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Preface

This report is a study of the development paths of four regions with strong clusters “in the new economy” – namely Turku and Jyväskylä in Finland, Aalborg in Denmark and Trondheim in Norway. The development and the role of development policies is analysed for each region and discussed in a comparative perspective.

This report is edited by Markku Sotarausta at the University of Tampere and Henrik Bruun at the University of Helsinki.

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Nordic co-operation
takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council
is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers
is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

Stockholm, Sweden
2002
Nordic Perspectives on Process-Based Regional Development Policy
Markku Sotarauta & Janne Hukkinen

The point of departure – the rise of regions and increasing competition
This book examines the answers to how regional development (RD) policy can respond to the challenges of a global, informational and networked economy and how development processes are carried out in time, or rather, how they proceed. Our point of departure here is recognition of the fact that the globalising economy and rapid technological progress has challenged us to find not only new policies, but also new ways of organising policy-making and managing policy processes. Therefore, we should have a more profound understanding of the ways in which various incidents, people, institutions and strategies, among other things, influence the course of development.

This book focuses on four Nordic cases and lessons to be learned from them. Its main aim is to draw some general policy recommendations that could stimulate learning processes in the regions of the Nordic countries. Before entering the world of Nordic regional development processes, we take a brief look at the issues raised in contemporary studies on regional development.

The basic puzzle is how to create locations for opportunities in the “borderless world”. Many observers argue that globalisation tendencies are one of the most important sources of overall change in the world, and thus one of the key contextual factors for evaluating and planning regional futures (e.g. Castells 1996, Asheim & Dunford 1997). Globalisation is inevitably one of the key elements that generate the need to reshape Nordic regional policy-making as well. In the early 2000s, cities are engaged, willingly or not, in a fiercer global rivalry than before in their efforts to create or attract activities that generate wealth for their citizens. This rivalry has lead to a situation in which only a few city regions prosper economically. In Finland, for example, mainly the big university cities and/or smaller towns specialised in the electronics industry have been able to meet the challenges of the globalising world
and have been able to prosper economically in the global economy. (See about development of the cities in Vartiainen & Antikainen 1998; Antikainen 2001; Huovari et al. 2001.) People and firms seek out those city regions where they believe that future options are to be found. (See Raunio 2001; Kostiainen 1999.) In an industrial society, borders between nations, institutions, organisations, regions, etc. largely determined the position of regions; in a global economy, however, borders are fuzzier than ever before. Now the positions of both organisations and regions are determined by their competencies and skills at learning and developing in a continuous process. Consequently, local initiatives and an enterprising disposition are becoming increasingly important in regional competitiveness. The institutional and innovative capacities of regions are highly stressed. Scarce resources need to be channelled and allocated more efficiently than before and new operational models need to be created to achieve a sustainable, competitive position in the global economy.

All in all, contemporary development is leading to a polarised development through increased differentiation in innovation and economic growth between the “successful” and the “unsuccessful” regions, thus giving strategic importance to the innovative capacity of firms and regions in determining regional futures (Asheim & Dunford 1997). In this book, we examine how some Nordic city-regions have endeavoured to raise their policy-making, management and innovative capacities.

The four cases analysed in this report focus on regional development, or rather on development efforts in the city-regions. Although the regional approach is greatly stressed nowadays, there is no generally accepted definition of “region”. As Cooke et al. point out, “region” is an intellectual concept. Drawing on Schulze’s definition, the authors define “region” in terms of four criteria: 1) a region must not have a determinate size, 2) it is homogeneous in terms of specific criteria, 3) it can be distinguished from bordering areas by a particular kind of association of related features, and 4) it possesses some kind of internal cohesion. The borders of regions are not fixed once and for all; they can change. (Cooke et al. 1996.) In the cases presented here, the focus is mainly on city-regions; in practice, however, the city-region is relegated to the background, the focus being on networks and development processes.

**Network society challenges the prevailing notions on region, space and time.** As early as the 1980s and especially in the 1990s, many prominent commentators stressed the role of regions. It became
commonplace to point out that the regional level is better suited for promotion of regional development than the state level and the rhetoric and practices of a “Europe of Regions” became current in many policy spheres. However, our notion of places and regions is not based on a “border-oriented”, administrative view but on the networks and processes that “flow through and in the city-regions”. Our rather Castellian (see Castells 1996) understanding of the place, and thus of city-regions, is based on thinking that is conditioned by the concept of the “network society”.

In the network society, activities and processes are increasingly organised in networks and participation in the networks and network dynamics are critical sources of power. A developed information technology enables an ever-accelerating interconnection of flows, diminishing the time-space ratio. Castells describes this change by saying that we have moved from a space of places to a space of flows, such as flows of capital, flows of information, flows of technology, flows of images, sounds and symbols and flows that express organisational interaction. (See Castells 1989 and 1996.) Castells uses the term “flows” to describe the purposeful, repetitive and programmable interaction and exchange between physically disjointed positions held by agents in different economic, political and symbolic structures. These flows are not just elements of the social organisation, but are expressions of the economic, political and symbolic processes that dominate our society.

A central determinant of the space of flows is dynamics. Flows pass through certain nodes and hubs, but if a city-region becomes less attractive or some other area becomes more attractive, the routes of flows may change quite rapidly. In the space of flows, companies are not the only global competitors; regions and cities also compete globally. This means that within certain segments, city-regions have to possess clear competitive advantages that they can offer to local operations, organisations and people. The dynamics of the flows force city-regions to develop their competitiveness continuously, because decreasing competitiveness means that important flows will find other, more attractive routes. The incessant need to improve competitiveness requires city-regions to specialise. In other words, city-regions need to choose which flows they want to attract and what type of development strategies they need to implement (Kostiainen 1999).

In the network society and its space of flows, capital, information and innovations move faster than ever from one place to another. As Thrift argues, the globalising economy and its flows not only erase the many borders but they also change the rhythms; a global economy
becomes hyperactive (Thrift 1995). This also means that the globalising and informational economy challenges our perceptions of time and space. By place, Castells (1996) means “a locale whose form, function and meaning are self-contained within the boundaries of physical contiguity”. “Place” constitutes a frame for social interaction. It is also the forum in which daily knowledge and experience are gained. (Knox 1996.) In the network society, networks and flows may constitute places in similar ways as cities and villages in the industrial society. Ever more frequently and for an ever-increasing number of actors, the networks set the scene for social interaction. They constitute the daily structures of social and economic activity. The interaction that governs our actions increasingly takes place in the networks made possible through the development of information technology. However, an overwhelming majority of people live in places and so they perceive their space as place-based. These places do not vanish; their logic and significance merge into the social networks (Castells 1996). Therefore, the space of flows is not placeless, although its structural logic is. Networks are linked up to specific places; some of them are exchangers, communication hubs that play a co-ordinative role for a smooth interaction of all the elements integrated into the network. Other places are the nodes of the network, locations of strategically important functions that build a series of locality-based activities and organisations around the key function in the network (Castells 1996, 413).

**In the flowing world, to be competitive is to be attractive.** In the network society and its space of flows, one of the forces changing the nature of games played is the “phantom state” of international money. Nomadic by nature, it has no permanent spaces to call its own, only a series of transient sites in a few global cities. Constant mobility has its advantages: the world of international money is difficult to tie down. It is always chasing opportunities in the nooks and crannies of the world economy that might produce profit. The threat the phantom state is faced with is the possibility that it will be trapped by the nation-states’ controlling territories (Thrift 1995). In practice, the chances of this are on the decline, because states and cities are increasingly dependent on the global economy and are therefore forced to adjust to global flows. As it is in their interest to attach the important flows to themselves, there is usually no motivation for keeping them out (Sotarauta 1999). Economic competition and competitiveness are therefore growing in importance as policy concerns among European cities. The question is, however, not only how to attract foreign capital, but also expertise, information, technology, etc..
Globalisation is based on comparative and competitive advantage, and hence specialisation, or place-specific advantages are being created on the basis of innovation, pools of skilled labour and different institutional cultural environments. All these factors can be expected to offer subtle distinctions in the operating environment for various actors (Maskell and Malmberg 1999). This ability to provide the wherewithal to be successful in these terms is commonly described by the concept of competitiveness. Sotarauta and Linnamaa (1997, 62) define regional competitiveness as an ability to:

- Connect the urban area and its actors to the best possible networks as tightly as possible.
- Maintain and develop the quality of life of local residents (services, education, environment, etc.).
- Attract new, competitive companies to the area.
- Create such operational prerequisites that the existing companies of the area are able to maintain and develop their competitiveness.

Sotarauta and Linnamaa’s definition takes into account the demands of both the residents and the companies and connects competitiveness to networks. Competitiveness of a city-region is here seen as an ability to attract flows of information, technology, capital, culture, people and organisations that are important to the region, and along with it, the ability to maintain and develop the quality of life and standards of living of local residents, as well as an ability to create an innovative operational environment in which companies can develop their competitiveness (Kostiainen 1999). In addition, in order to be competitive in the longer term as a whole, regions should be able to redistribute the attracted flows within the region to enhance wealth, social equity and the quality of life of the region as a whole. It is therefore crucially important also to tie various activities, among other things, to the region. Such issues as networks and learning are thus often seen as effective ways of disseminating and creating knowledge and tying different issues and activities together for urban competitiveness. Therefore, rather than emphasising the competitiveness of individual firms, it has become habitual, in the spirit of Porter, to focus on clusters.

Porter (1990) popularised the view that the development of internationally competitive firms depends on the clusters that are able to exploit the resources of their home city-region or country. Porter’s model suggested that the critical competitive factors are not only based on such factors as labour costs, resource availability and the general macro-
economic environment, but also on qualitative factors of the local environment that are intensified through clustering. The benefit of clusters is also that individual firms may come and go, but clusters as a whole continue to create employment and generate wealth, and the city-region has the chance to continue to prosper. Adequately developed clusters also give a highly skilled labour force more opportunities within a single city-region and a better creative problem-solving environment, that is, a pool of challenging job opportunities and possibilities for learning (see Raunio 2001).

**Flexibility and ways to link up to the flows stressed – the focus on networks, innovation and the innovation environment.** Cluster thinking also reflects the key features of recent developments characterised by the breakdown of vertically integrated corporations and the adoption of flexible specialisation among the resulting networks of smaller firms. The main critiques of traditional agglomeration theory focused on industrial districts (1990), innovative milieux (GREMI group), and the institutional approach (Coase; Williamson quoted in Simmie 2001b). These models presented arguments for the need for smaller innovative firms to concentrate in local production systems in order to accommodate continuous change and minimise networking and transaction costs (Scott 1990), or, as Storper (1995) put it, to maximise the benefits of untraded interdependencies (Simmie 2001b). Paradoxically, it appears that the sources of global competitiveness are increasingly dependent on local economic, political and social institutions, processes and networks. A strong case indeed has been made today for the idea that regional agglomeration is growing in importance as a mode of economic co-ordination (Cooke & Morgan 1998). The main supporting argument is that regional agglomeration provides the best context for an innovation-based economy (Asheim & Isaksen 1997). In many studies, innovation is argued to be one of the most crucial elements in the developing knowledge economy. It has led to an increasing interest in national systems of innovation and regional innovation systems. (See e.g. Lundvall 1992; Braczyk et al. 1998; Kautonen & Sotarauta 1999.)

**The global economy is driven by and dependent on the flows of information.** Achieving regional-innovation-focused competitive advantage is based on the ability to access and generate knowledge, and access to knowledge networks is of particular importance to securing competitive advantage. It is generally believed that the countries and cities that are successful in the knowledge-based, fast-evolving flows are those that are able to keep their feelers out constantly, those that are able to adapt, learn and innovate and that are able to create knowledge.
constantly in an interactive process. This means that mainly those that have participated in the creation of information will be capable of utilising it in time. Indeed, many commentators (e.g. Florida 1995; Lundvall 1992; Simmie 2001a; Kostiainen & Sotarauta 2000) have studied the role of viable cities as pools of knowledge, where organisations, and especially business, can benefit from knowledge created in the city-region and from knowledge that has been attracted to the city-regions from various knowledge networks. Cities are the places where knowledge as a “strategic resource” is created and achieved. Throughout history, cities have in one way or another been centres of knowledge activities (e.g. in the form of universities, entrepreneurial networks, or the knowledge centres of firms). Business performance will be enhanced by the knowledge base of the city, its knowledge infrastructure and the institutions and conventions that support interaction and collective learning. Cities can hence be seen as nodes and hubs of knowledge networks, and contemporary RD policies often focus on rebuilding the learning capacity in the cities. Much of this relates to research and development, institutional development and inter-firm networking.

The significance of knowledge creation leads to polarised regional development. Socialised processes of knowledge production suggest that regional development is not leading towards a process of convergence and that the free flow of information and knowledge does not stimulate economic convergence. Intense national and regional inequalities remain or even widen, with some regions being seen as centres of knowledge production and other having difficulties linking themselves up to the knowledge networks. This suggests that knowledge is not so easily transportable and it often tends to accumulate in specific places. Hence, the importance of knowledge and tacit knowledge in particular has become a central element of new theories of regional development, often summarised as “New Regionalism” (Lovering 1999).

Knowledge creation and innovation are social processes. Various actors are embedded in their environment. The concept of embeddedness, according to Simmie (2001b, 25), is a key feature that distinguishes the analyses of both new industrial districts and innovative milieux from neo-classical agglomeration theory. Granovetter, in his often-quoted article of 1985, argued that economic activity is not a separate, detached activity with its own independent forms of behaviour. On the contrary, economic activity is also a social phenomenon in which such social characteristics of economic activity as habits, conventions and norms of behaviour may be developed by the social interactions of actors
“embedded” within a regional context. The significance of the spatial context is based on the notion of the importance of trust that is built up through repeated personal contacts. These, on the other hand, are facilitated by geographic proximity and hence by easier possibilities for multiple face-to-face contacts (Simmel 2001b, 25). This also explains why companies join networks and form alliances with the aim of developing new technology, (Lundvall & Borras 1997, Kostiainen 1999) and why firms, as Aydalot (quoted in Bramanti & Ratti 1997) put it, are no heaven-sent agents free to “choose” an environment, but are rather secreted by their environment. Firms are not isolated innovative agents but parts of the milieu which makes them act.

**Regions may be important, but the state still plays a role.** While there is new literature seeking to emphasise the importance of agglomeration for learning, it has not proven, even in relation to disembodied knowledge, that the regional milieu is more important than the national environment (Asheim & Dunford 1997). Amin and Tomaney (1995) state that the role of the region in knowledge accumulation is relative, and those commentators who only stress the regional innovation networks and/or learning regions do not see the role of national policies and decisions clearly enough. These observations seem to be valid, especially from the viewpoint of small countries like the Nordic nations. As Kautonen and Schienstock (1998), for example, have stated, the Finnish innovation system is national-local in character. Therefore, the question is not whether regional development is national or local, but rather what kind of new interrelationships are emerging between different actors and what the roles of different organisations in different contexts may be. That is, the question is how development processes can be global, national and local at the same time. (See Kostiainen & Sotara, forthcoming.) Even though the national level still plays a role in economic development, the above discussion implies that cities and regions should be aware of the need to modify behaviour in order to retain their advantage.

**Institutions frame development activities.** Many studies focusing on regional development have raised the importance of institutions, especially private and public organisations, that shore up the networking of economic activities. Thus, more often than not, institutions are nowadays seen as central factors in economic development. (See e.g. Cooke & Morgan 1993; Maskell 1996; Morgan 1997.) In a narrow sense, institutions refer to non-profit organisations, conventions, etc., including public sector organisations and universities. In a wider sense, institutions refer to organisations, conventions and to repeated and established
practices (Dosi & Orsenigo 1988, 19). In practice, an institution can be defined in many ways. Drawing on Linnamaa’s article in this publication, we can generally see institutions as a framework for actions and choices. Therefore, institutions refer to the relatively permanent modes of operation, rules and resources and the organisational field which all give the development actions and various networks their basic form. In contemporary regional economy research, special importance is attached to informal institutions and regularly recurring behaviour generated by culture – habits, customs and routines. Formal institutions are also significant for development activities: formal institutions come into being when it is judged necessary to create a new mode of operation, presented in the form of a law, statute or written contract, or realised through some specific organisation. (See e.g. Maskell 1996; Morgan 1997; Huikinen 1999; Klijn & Teisman 1997; North 1992; Linnamaa 1999 and 2002.)

**Institutionally “thick” regions prosper.** One of the key questions in the network society is how local governance is able to play a role in reducing the vulnerability of local economies, societies and environments to damaging external pressures, while promoting local economic health and the quality of life at the same time. It can be argued that localities that are able to deliver this kind of beneficial nexus are often characterised by the following four factors: a plethora of civic associations, a high level of interaction between social groups, coalitions which cross individual interests and a strong sense of common purpose (Healey et al. 1999). These four factors, Amin and Thrift have argued, generate a quality of “institutional thickness” within which firms and other actors are embedded, and an institutional capability to mobilise in order to sustain supportive conditions for both (Amin & Thrift 1995, 101). However, as Healey et al. (1999) state, other researchers have pointed out that these four factors do not necessarily lead to beneficial trajectories, as they can be found associated mainly with dominoary local elites and with failures in economic innovation. Thus, some qualities of institutional thickness seem to promote economic growth and innovation, while others may be more effective in fostering particular forms of social cohesion.

In any case, institutional thickness is one of the key factors in the emergence of path dependency, which refers to the significance of the past in contemporary and future developments. (See e.g. Eskelinen &

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1 See e.g. Dosi & Orsenigo (1988) and Maskell (1996).
Path dependency is a characteristic of models that get locked into the particular dynamical path they initially “choose” (usually by chance). When these models describe socio-economic processes, the choosing is done by participants in the system rather than by natural forces. Path dependency is therefore another way of understanding economic change as a process of cumulative causation where the dominant feedback loops are self-reinforcing rather than self-correcting as they are in equilibrium models. Self-reinforcing feedback systems become evolutionary models because, if allowed to continue without some offsetting or opposing feedback, they will cause the underlying structure to change rather than re-establishing a new equilibrium within an unchanged structure as self-correcting systems do. Once the structure has changed, it is not possible to reverse the process and return to a previous equilibrium position because it has been eliminated as the structure changed. An existing path may have been determined by a chance event in the past or by the cumulative effects of past actions, and this means that the path we are on may or may not be desirable; more likely it will be desired by some and not by others.

Simmie (2001b, 35) states that in some ways, the concept of path development provides a more plausible explanation for the lack of change and innovation than it does for the branching and breakout that are associated with new innovations. In this study, we see path dependency from two viewpoints: 1) how regions can unlock themselves from the past path and promote economic transformation and 2) how the previous phases of the development affect regional development activities. Here we focus especially on how some regions have been able to change their paths, or at least how they have tried to do it.

**In search of new modes for policy-making**

The change that is taking place in regional development also means that regional development policies and economic policies in general have been replacing subvention and intervention policies with a policy that promotes economic competitiveness. Modern RD policies try to increase relative advantages for the benefit of firms and other actors in their endeavours to improve their own competitiveness. The central idea is to promote the capability of companies to create an individual competitive edge, and to establish a connection between this capability and the region in question (Kostiainen 1999).

The economics of urbanisation and localisation suggest possibilities for a renewed role for public-policy makers in regional economic development. In particular, policy makers in many regions...
have sought to counter the decline in traditional industries by developing new knowledge-based high-technology industries. Policy makers have sought to emulate and replicate successful city-regions and industrial districts by developing a “technopolis” (Hall & Castells 1994), by supporting clusters of industries (Porter 1990) and by facilitating the development of an innovation milieu (Aydalot 1986). While these policy responses have been based on attempts to draw general lessons from successful new industrial districts, few authors have explained how agglomerations of new knowledge-based high-technology industries develop and what policy interventions can best “seed” the development of these new industries in city-regions that have experienced urban decline (O’Gorman & Kautonen 2002). Therefore, the question of path dependency becomes topical. If, as Lambooy and Boschma (1998) have claimed, innovative behaviour and adaptation to change are largely based on the boundaries of spatial matrices laid down in the past, how is it that some regions break out of the constraints, are able to change the path they have been dependent on and are able to create new kinds of competitiveness? Based on the above considerations, it is possible to simplify by saying that being competitive means that the region

- Knows what it is competing for.
- Identifies the flows it wants to attract.
- Is able to develop the elements of competitiveness so that they support the attractiveness in relation to the selected flows.
- Identifies those issues that it seeks to root into the region.
- Is able to make choices, i.e., to create strategies in a development network.
- Is able to mobilise resources and create new ones.
- Is able to mobilise actors.
- Is able to create functional networks in which the competencies, strategies and objectives of various actors are made as parallel as possible.
- Is able to link itself to knowledge networks.
- Is able to create a strategy process that binds together the vision and strategies of different organisations.
- Is able to create institutions, on the one hand, and to transform them on the other.

As briefly examined above, much has been written recently about knowledge and learning and their role in regional and local development.
Indeed, studies abound that show the importance of the above factors, strategies, networks, etc., in regional development. Consequently, there are places that can be said to be economically successful and that are claimed to exhibit the characteristics of networked, knowledge-based, strategic, learning regions or cities. Many city and regional authorities have set their sights on strategies to develop knowledge-based activities, or to create networked learning communities. The policy response is to try to combine strategies to attract additional resources and expertise in knowledge-intensive activities, with learning strategies targeted at a variety of groups within the city. All in all, in spite of the series of studies that increase our understanding of new modes of regional development, we still face the question of how all this is carried out.

This publication is based on the basic point of departure that the development processes investigated in the four cases operate on the scale of the space of flows and especially on the level of the various networks, rather than merely within administrative territories and structures. Many borders have been crossed in different phases of development in “successful cases” to transform the economic base of a region. Success is, of course, always a relative concept in proportion to time and other regions. For example, there are some signs of success in the Jyväskylä case at the moment and yet it is evident that the past “path” of Jyväskylä traverses also less successful points in time. In our view, success is a fleeting moment and always depends on what those involved in the process view as “success”. As will become clear in the next section, this constructivist notion of success has important implications for interpreting our case study findings. The conclusions presented in this book should be read with the understanding that most of our data come from extensive interviews with those intimately involved in the processes of regional development. Their primary concern was typically to ensure the ‘success’ or the viability of the process. In this study, we are not interested in success as such, but in development processes and networks that presumably usually contain periods that are perceived to be successful and periods perceived to be failures.

**Research task and objectives**

This study is a sub-project of a research programme that focuses on the future challenges and preconditions of Nordic regional policy. It is funded by The Nordic Senior Officials’ Committee for Regional Policy and co-ordinated by Nordregio. The research programme’s main aim is to open a discussion on a more interactive and process-based regional development approach.
Adapting a more interactive and process-based but at the same time purpose-oriented way of generating regional development (RD) policies is not only a technical question. It is very much a matter of policy-making culture. RD policies are still based on a fairly well established belief in the capabilities of policy-makers to find the correct strategies for the future by rational planning. Once development strategies have been formulated, action is assumed to follow. Based on our previous studies, we argue that RD policies are often programmed descriptions of the current state, through which it is not always possible to generate innovative enough means to develop regions. However, RD policies may function as instruments that create the proper environment, or setting where innovative approaches have ‘good soil’ in which to emerge and grow. What we suggest here is that we should acknowledge the unpredictable, multiversal and complex nature of human activities and become more skilled in leading and managing transition and processes, not only in administrating resources and formulating development programmes. (See more on previous studies on new modes of policy-making, management and leadership in Sotarauta 1996a, 1996b, 1997; Linnamaa 1999; Kostiainen & Sotarauta 2000; Sotarauta & Mustikkamäki 2000; and on the institutional underpinnings of policy uncertainties and complexities, see Hukkinen 1993a, 1993b, 1995, 1998, 1999; Hukkinen et al. 1990.)

The basic argument behind this study is that, instead of finding solutions only in fairly straightforward policies, we may also find them in the communicative and more or less self-organising processes of decision-making, policy-making, co-operation, knowledge creation, etc. To summarise, our general points of departure for the task of balancing the current focus behind policy-oriented studies and practices are the following observations:

A) The various development processes are not understood deeply enough, and thus many of the shortcomings faced in regional development policy-making are largely due to the fact that policy-makers do not have the capacities to manage development processes efficiently.

B) There is a need to create systematic, process-based approaches for regional development policy-making and for the management of regional development activities.

Usually the concept of policy-making refers to the planning procedures and actions of the public sector; our study, however, focuses on concepts such as policy process, networks, network management and process management. Based on the considerations briefly described
above, the *research tasks* were set to provide an answer to the following question:

What are the key characteristics of process-based regional development policy that would be appropriate for enabling actors to manage policy processes, i.e., continuously to seek possible futures, generate innovations, learn and cope with various problems in issue-based arenas.

The objectives were set out as follows:

- To develop a theoretically sound but practically oriented methodology for regional development policy-making that is process-based and aims to achieve knowledge-creation and innovation.
- To inform policy-makers of best practice for formulating and implementing regional development policy based on better understanding of the related processes.
- To stimulate learning amongst policy-makers through the transfer of endogenous development potential and to raise awareness of the need for new or adapted regional governance systems and policy processes so that competition is geared to future rather than past needs.
- To assess empirically the success or failure attained through the different processes and how foresight, institutional learning, reflexivity capacities and adaptation interrelate to match the changing environment.
- To identify the features of a process-based RD policy approach and to integrate socially and culturally sensitive processual approaches into the current content and result-oriented approaches.
- To establish how regional economic competitiveness relates to the RD network’s capacity for creative foresight, knowledge creation and the quality of governance processes that derive from co-operative and communicative behaviour.

The difference between analysis focusing on processes as opposed to structures in policy making can be illustrated with a metaphor. Imagine regional development policy-making as rafting in a river. Rafting can be observed either from the riverbank or from aboard the raft. Observation from the riverbank focuses our attention on how the structural features of the riverbed influence the path of the raft in the current, whereas observation from aboard the raft highlights how the actions of the rafters and the currents of the river influence the success of the rafting exercise.
Just as the view from the riverbank enables the observer to analyse how the more permanent structures of the riverbed shape the course of the raft, so does analysis of policy structures concentrate on explaining how the more permanent political, economic and social structures at different levels influence the course of regional development policy. And, just as the rafter can best understand the dynamics of the river and rafting, so does analysis of policy processes reveal how the sequence of decisions made by individuals involved in the formulation and implementation of policies influences the outcomes in regional development.

But our focus on processes as opposed to structures has implications concerning the kinds of case studies we present and the policy recommendations we arrive at. Like the river rafter who is primarily concerned with surviving violent currents, the policy planners and makers that we interviewed in Finland, Denmark and Norway were primarily concerned with survival and success. Like our critical commentators from the other Nordic countries, we recognise that this perspective has resulted in analyses and conclusions that to some may appear uncritical. The analyses presented in the case studies are coloured by some of the enthusiasm of the regional policy makers we interviewed. On the positive side, this tendency reassures us that we have not drifted too far from our primary data, the interviews. At the same time, the reservation should be made that with more time and resources, we would have liked to put the cases into the context of more structurally oriented policy studies. For example, the processual case study of the Digital North Denmark Programme should be complemented with a study of more formal institutions, organisations and power structures of policy making, as Henrik Bruun points out. And in the case of the development of the ICT cluster in Jyväskylä, structural analyses would be needed to assess the extent to which the local media were drawn into the official optimism of the political and economic elites at the cost of critical journalism.

Despite these reservations, we believe that previous studies of regional development policy have neglected the processual approach. Combined with more traditional analyses of the structural boundary conditions of policy making, the processual analyses at hand afford a much richer base for crafting future policies for regional development in the context of global networks.

At all events, we hope that this study, with four cases and a series of theoretical and practical considerations, will raise new questions about and insights into the regions of the Nordic countries. We welcome questions such as whether we have similar issues or similar difficulties
and/or success factors as in the case-regions, whether we are capable of overcoming our difficulties and whether there are the case-regions raise issues that we too ought to focus on more in the future, etc. One of our main aims is to provide support to the learning processes of policy-makers in the proactive Nordic regions. In order to do so and to assess the Nordic significance of our research, four associated specialists – representing Sweden, Denmark, Norway and the Arctic regions of the Nordic countries – discuss our research results in the light of similar processes in their respective countries and regions. The following questions were posed to these four specialists.

- Have studies on regions and regional development in your own country raised the same issues as the case studies of this project have raised in Finland?
- Does development of the regions in your country follow the same patterns as in Turku, Jyväskylä and North Denmark? What are the similarities and differences?
- What other thoughts do our case studies raise? Views on the research task and methods, policy-recommendations of the case studies, conclusions, future research questions, etc., are welcomed.

The commentary by the four Nordic specialists is presented in Chapter 8 in its original form.

**The structure of the report, cases and the methodology**

The search for answers set out above in the form of objectives for this study begins with Reija Linnamaa’s article “Development Process of the ICT Cluster in the Jyväskylä Urban Region”. It scrutinises policy processes and their management in the development of the ICT cluster in Jyväskylä, Finland. Linnamaa is in search of messages for more dynamic and creative policy processes and regional development policy. She also examines the role of networks and network management in urban competitiveness. She focuses especially on the dynamics of development processes in the long term, the key question being how development work is done in different phases of development.

Henrik Bruun continues the search initiated by Linnamaa in his article “Regional Development and Biotechnology – A Network Analysis of the Local Bio-Grouping in Turku, Finland”. His main research questions are: What have the main events been for locking local development into the BioTurku trajectory? Who have the most significant actors been in this process? How have these actors collaborated and how
has the pattern of collaboration changed over time? What kind of network is BioTurku? In his article “Mobilising a regional lighthouse: A study of the digital North Denmark Programme”, Bruun analyses the process of planning and implementing the Digital North Denmark Programme. From Denmark, Bruun proceeds to Norway and considers reasons why Trondheim has not chosen a clearer high-technology focus in its economic development policy, although Norway’s only university of technology is located there.

In his chapter, Markku Sotarauta raises the issue of the changing nature of power and looks for the core of influence from the network society perspective. He also aims to identify, tentatively, different leadership types and to reflect on their significance and role in the promotion of regional development. The purpose of the chapter is to create a picture of the kinds of qualities leadership may require and to look into how different leadership skills and abilities can be seen as a single entity. In the last chapter, the research team, Sotarauta, Hukkinen, Bruun and Linnamaa, makes a series of observations and policy-recommendations based on the case studies.

The report is concluded by four evaluations of the empirical research presented here. The assessments were made by researchers working in Sweden, Denmark, and Norway, so as to compensate for the Finnish bias of the project team. It should be noted that the evaluations are based on earlier drafts of the chapters included in this report, and that the authors have responded to many of the comments. The evaluations also affected the final case study – the Trondheim case – which was done only after the feedback from the evaluators had been received.

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Nordic co-operation takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

Stockholm, Sweden
2002
Development Process of the ICT Cluster in the Jyväskylä Urban Region

Reija Linnamaa

Abstract
The present study is based on the assumption that the dynamics of development processes, the question of how things are achieved, may for its part explain differences in success among otherwise similar regions. Attention is thus focused on the analysis of development processes, on how new development ideas come into being and develop, how processes are led and how strategies are created. The question “how” cannot be satisfactorily answered by general observations, such as wide participation or innovative actions, for example. To gain insights into development processes, it is necessary to go deeper, beyond these generalities.

This article analyses policy processes and their management in the development of the ICT (information and communication technology) cluster in Jyväskylä, one of the fastest growing urban regions in Finland. This analysis has two aims: first, to find messages for more dynamic and creative policy processes and regional policy. Second, it aims to examine the role of networks and network management in urban competitiveness.

Introduction
Along with the debate on globalisation, recent decades have also witnessed intensified discussion on the rise of the importance of regions and on tightening competition between them. Increasing emphasis has been placed on the concept that the competitiveness of enterprises is influenced by the environment that a region can offer them (see e.g. Begg 1999; Saxenian 1996). Regions, particularly urban regions, have encountered completely new development challenges on moving from a space of places to a space of flows (Castells 1996). In their development work, urban regions have been compelled to take into account the economic logic based on global information and expertise. They have had to contemplate means of attracting various flows of information, technology and investment and to consider how appealing they are as operational environments for businesses and as living environments for individuals. In regional development activities, growing emphasis is
placed on the region’s ability to strengthen its own competitive position and create competitive advantage from local conditions.

An increasing number of recent studies analyse regional success factors and compare the competitiveness of various regions. Regional competitiveness is frequently defined through economic factors with direct bearing on the competitiveness of enterprises. Studies on regional success factors conducted in recent decades have also directed attention towards social capital (Putnam 1993), institutional “thickness” (Amin & Thrift 1995) or innovative milieus (e.g. Camagni 1991), for example.

In comparative regional studies, competitiveness is usually defined on the basis of the context and the variables used in the research. Thus, the rank order of urban regions may vary a great deal. Many comparisons are based on statistical examination, whereby the “soft” factors of competitiveness, such as operating culture and functionality of networks, are excluded from the investigation. Another weakness of statistical comparisons is that they are based on past development; therefore, it is difficult to elicit the future development potential of a region by examining statistics. Moreover, the measure of competitiveness frequently includes factors that can be considered to be the result of competitiveness rather than contributors to it (Huovari et al. 2001, 8).

If urban competitiveness is analysed from the perspectives of changes caused by comprehensive development work in urban regions and by the information society, the basic elements of urban competitiveness can be considered to be the region’s infrastructure, enterprises, human resources, quality of living environment, institutions

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2 Generally, regional competitiveness can be defined as a region’s ability to attract and maintain activity that increases economic well-being. The term is ambiguous; definitions vary from study to study. The critique focuses on whether the term is totally devoid of meaning or whether it is possible to speak of the competitiveness of a geographical area. According to Krugman, regional competitiveness refers only to the competitive ability of companies. The concept has also been perceived as pejorative because it connotes a competitive set-up, confrontation instead of co-operation (Huovari et al. 2001, 1). Despite such criticism, the term regional competitiveness may be considered useful if we interpret it as based on the development of the region’s own functions and on the enhancement of its own well-being, and thereby, secondarily, on its success in interregional competition. The present study argues that regional competitiveness is composed of many factors other than merely the competitiveness of companies; consequently, we use the term to describe the influence of various factors. Research on regional competitiveness also helps the actors involved in development processes to analyse their own work.

3 This is a rough division at a general level, not an exhaustive list.
and functioning development network, membership in the networks, the image of the region and the creative tension linked to development activity at the core of development (Linnamaa 1999; Sotarauta & Mustikkamäki 2001; on creative tension, see also Chapter 5.1 below). These basic elements can be further divided into structural and dynamic factors of competitiveness. Structural factors determine the conditions for development work. Dynamic elements relate to interaction among actors and their ability to learn new things and create innovations through cooperation and networks. Factors of dynamic competitiveness are quite difficult to maintain and imitate; it can therefore be assumed that they have an influence on whether or not one region has a competitive advantage⁴ over other regions (Linnamaa 1999).

The present study is based on the assumption that the dynamics of development processes, the question of how things are achieved, may for its part explain differences in success among otherwise similar regions. Attention is focused on the analysis of development processes, how new development ideas come into being and develop, how processes are led and strategies are created. The question “how” cannot be satisfactorily answered by general observations such as wide participation or innovative actions, for example. To gain insights into development processes, it is necessary to go deeper, beyond these generalities.

⁴ According to Barney & Hesterly (1996, 134), an actor has a competitive advantage when the resources are 1) valuable in enabling actors to exploit environmental opportunities and neutralise threats; 2) rare among the actor’s present or potential competitors; 3) costly to imitate; and 4) without close strategic substitutes.
This article analyses policy processes and their management in the development of the ICT (information and communication technology) cluster in Jyväskylä, one of the fastest growing urban regions in Finland. Through analysis, it aims first to find messages for more dynamic and creative policy processes and regional policy. Second, it aims to examine the role of networks and network management in urban competitiveness.

Vartiainen (1998) divides Finnish regional policy into the three following phases: industrialising regional development policy, planning of regional policy and programme-based regional development. However, the desire for the next phase is in the air already. This coming phase may be founded on process-based and network-like development: on starting up and managing processes and activating the foremost experts in each phenomenon for development work from their own particular points of departure. This process-based approach would also stress the development of local operational environments as magnets for various flows, and the dynamics of various processes (Linnamaa & Sotarauta 2000, 31).
The present study analyses the development of the Jyväskylä urban region from a process-based standpoint. This region was selected for case study because its development since the second half of the 1990s has been positive and because its development measures have been deemed successful. (See e.g. Alueellinen kehitys ja aluepolitiikka Suomessa 2000, 188 – 189; Eloa ja elinvoimaa Jyväskylässä 2001.) The competitiveness of the Jyväskylä urban region is not evaluated; our starting point is the assumption that positive outcomes have been achieved in the region. The focus of this study lies on the question of how this development has been brought about in the region.

In this study, the case is looked into from the perspectives of regional development work and the organisations participating in it. Thus, different factors will probably be emphasised in the region’s development than would have been in as study where the same phenomenon is contemplated from the perspectives of enterprises, innovation systems or technology research, for example.

Empirical data were gathered by using two methods. Firstly, various written documents such as strategic plans, memoranda, evaluations and overviews were analysed. Secondly, and more importantly, theme interviews were conducted. The interviewees (see Appendix) represent different viewpoints regarding the development of the Jyväskylä urban region. In all, 25 interviews were conducted in the spring and early summer of 2001, and the interviewees were selected using the “snowball” method⁵. However, the first interviewees were chosen on the basis of the document analysis. Direct quotations excerpted from the interviews are presented in indented quotations below. Any data that could identify respondents have been removed. The transcribed data do not include all commentaries verbatim. Omitted passages (e.g. departures from the main theme) are indicated by three full stops in the quotation.

This article is organised as follows. After the introductory chapter, Chapter 2 presents the theoretical framework of the study. Chapter 3 describes the Jyväskylä urban region and its ICT cluster and Chapter 4 the ICT-led development process and the most important turning points in that process. Principal phenomena on the process are reviewed in Chapter 5 and the future opportunities and threats in Chapter 6. Finally,

⁵ Interviewees suggest other people to be interviewed. In this case, these were mainly actors who play a central role in the development process of the ICT cluster in the Jyväskylä urban region. Some interviewees had not been involved in the process directly but had followed it closely. Among the selected interviewees were also some who had criticised the development work.
the concluding chapter considers what messages the development process of the Jyväskylä urban region can contribute to an outline of process-based regional development.

**Theoretical framework and key concepts**

This study focuses on analysis of the dynamics of development processes, especially how development work is done. Our assumption is that analysing processes helps demonstrate why one region’s competitiveness differs from another’s. *Process* refers to a series of interconnected measures and events. Thus, a process is sustained activity and/or a series of changes occurring over time. In regional development, a process is composed of the measures and reactions of interest groups exerting influence over strategic change and events external to the development network.

The research method is to track the development process and to identify the main turning points in the process and central phenomena at such turning points. The *turning point in a development process* refers to the point at which the past experiences and future expectations of several actors culminate. It is assumed that the turning point at least partially excludes certain future alternatives and opens up others.

What underlies the tracking of processes is the view that both the development of the region and the development activity are always at least to some extent *path-dependent*; that is, previous paths, network connections, learning processes and the subjective modelling of historically transmitted matters affect present and future events in many ways (see e.g. North 1993). Path dependence affects the forms of development and the institutional, structural, social as well as economic characteristics of the region.

In spite of path dependence, successful regions are still considered to be examples of development. However, direct copying is seldom successful, since using different action models as examples calls for analysis and interpretation of the models and learning based on this, i.e., learning in which action models are filtered and shaped according to the region’s own points of departure.

Particularly in the 1990s, strategic planning and network-like cooperation of several actors gained popularity in Finnish regional development policy. The present study therefore employs theories of policy networks and network management in support of the analysis of development processes because they provide tools for organising and understanding the phenomena occurring in a network-like manner.

*Policy network* is used to indicate patterns of relations between interdependent public, semi-public and private actors involved in
processes of public policy-making in a certain policy field (Kickert 1997 et al). As Kenis and Schneider state, policy networks are mechanisms of political resource mobilisation in situations in which the capacity for decision-making, programme formulation and implementation is widely distributed or dispersed among private and public actors. A policy network can be described by its actors and their linkages as well as by its boundary (Kenis & Schneider 1991, 41).

Operating in a world of shared power in which governance is the effect of actors on one another and themselves, the achievement of successful policy processes requires management suitable for the networks. In connection with policy networks, network management refers to an activity that seeks to promote the process of interaction, to serve as a mediator for interaction among various actors and to direct activities towards searching for a goal. In principle, every actor involved in a policy network can perform a management role (Kickert et al. 1997). According to Klijn and Teisman, network management may address perceptions, actors and institutions and the relations among them (Klijn & Teisman 1997).

Regarding actors’ perceptions, the similarities and differences in actors’ values, goals and perspectives are examined in relation to the matter at hand. Generally, institutions can be interpreted as a framework for actions and choices. In regional economy research, special importance is attached to informal institutions and regularly recurring behaviour generated by culture – habits, customs and routines. These are considered to reduce uncertainty and facilitate interaction (see e.g. Maskell 1996; Morgan 1997). On the other hand, formal institutions are also significant for development activities: Formal institutions come into being when it is judged necessary to create a new mode of operation, which is presented in the form of a law, statute or written contract, or is realised through some specific organisation (Linnamaa 1999). The present study scrutinizes the effects of both formal and informal institutions on the development process and its turning points.

Actors participating in development work constitute a third major focus group in tracking the development process. Attention is paid to which actors played a decisive role at which turning point (including who took the initiative, who led the process and whether the achievement of the turning point was backed by individual actors or by some group). At the same time, attention is also paid to those who were not involved.

The analysis also focuses on external and internal drivers of change that for their part contributed to the shaping of the development. The driver of change is not merely an organisation or institution; it may be,
for example, a value, a trend or a widely held opinion. What is essential is that it exercises great influence over the strategies of various actors. In some cases, the driver of change may be a single actor who is significant enough to direct the course of development. A new institution may also be seen as an internal or external driver of change.

Figure 2. The framework of the study

This study looks into the development process of an ICT cluster. According to Kautonen and Tiainen, cluster refers to a concentration of enterprises developing and using similar products and technologies, thereby enabling the potential of synergy for innovations. A cluster is a network composed of economic actors in which interaction is intense and sustained. It may be regional or it may take shape without a clear geographical accumulation. The cluster perspective focuses on production processes in which several different fields of operation may be combined (Kautonen & Tiainen 2000, 7). The present research applies the cluster definition quite loosely and does not analyse the extent to
which the ICT agglomeration in the Jyväskylä urban region fulfils cluster criteria. The term cluster is employed because it is used in the development work of the Jyväskylä urban region, because ICT companies (including companies that apply local ICT expertise and organisations that support the operational preconditions for such companies) operate in the region, and because the development of the conglomeration is based on co-operation among the organisations mentioned.

Case area

Jyväskylä urban region in general

Jyväskylä is located in the lake district of Central Finland, about 250 kilometres from Helsinki. It is often called the “Athens of Finland” because of its cultural and sports facilities and its long traditions in education. The Jyväskylä urban region has about 135,000 inhabitants and it covers the City of Jyväskylä, the Rural Municipality of Jyväskylä, Lauskaa and Muurame (Figure 3). Jyväskylä is the biggest city in Central Finland (a region with about 264,000 inhabitants). Its most important industrial branches are the metal industry, paper manufacture and paper machinery, wood processing and fast-growing information and communications technology. A total of 73 % of jobs are in the service sector in Jyväskylä.

In the 1980s, Jyväskylä was one of the most prosperous cities in Finland; it enjoyed a rich tradition in industry, administration and education. The severe economic recession that ravaged Finland in the 1990s hit Jyväskylä harder than many other urban regions. In the early 1990s, many enterprises in the Jyväskylä region went bankrupt or downsized their activities. Job losses totalled 9,000, more than one-fifth of the total number of jobs. The simultaneous balancing out of the public economy weakened the economies of the municipalities in the urban region, because Jyväskylä, as a city of educational institutions and the centre of provincial government, was heavily dependent on public services. During the recession, unemployment peaked at more than 20%, and has been very slow to improve.

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6 Hence, the educational level of the inhabitants of Jyväskylä is high; in 1999, about 68% of all inhabitants over 15 years of age had graduated from educational institutions (nationwide about 59 %). Of those, 30 % had university-level education (nationwide about 23 %). (Statistics Finland.)

7 The unemployment rate in Jyväskylä peaked at 25.4 % in 1994. The unemployment rate for the urban region as a whole at the same time was 24 %. Unemployment has fallen very slowly since the recession, despite the rapid...
In the mid 1990s, the mood in Jyväskylä was still one of “a great future behind us.” On the other hand, in the recovery period after the recession, the Jyväskylä urban region has risen relatively quickly to join the most rapidly expanding urban regions. Since the end of the 1990s, it has been considered as one of the few Finnish growth centres alongside the urban regions of Oulu, Tampere, Turku and Helsinki (Huovari et al. 2001).

The development of the Jyväskylä urban region has gained considerable positive publicity in recent years. The region received national recognition for the development of its image and for its business strategy and in various surveys, it has been at the top of the list for its pleasantness as a place of residence (Elä ja elinvöimaa Jyväskylässä 2001). Change in development has been particularly rapid, which has aroused general interest in the reasons for the change.

Figure 3. Jyväskylä urban region (population on 31 December 2000)

Economic development; in March 2001, the unemployment rate was 16% (Statistics of the Ministry of Labour).
Description of the ICT cluster in the Jyväskylä urban region

ICT has become a cornerstone of the local economy in the Jyväskylä urban region in the 1990s. ICT Businesses in the whole of Central Finland currently employ over 5,000 professionals (including ICT professionals in education and research in the field). The number of employees in the ICT industry of Central Finland is expected to more than double in the next ten years, reaching 10,000 by 2010 or perhaps by 2006 (Nukari & Neittaanmäki 2001, 1).

ICT is not a clear-cut concept. This study principally uses the term ICT because it describes development in the Jyväskylä urban region better than the term IT. In practice, the terms ICT and IT are commonly used also to refer to the application of ICT. In Jyväskylä, the rise in the influence of ICT has also been perceptible in other fields: the traditionally strong industries in Jyväskylä (metal industry, paper manufacturing and paper machinery) have been quick to apply ICT. In connection with an examination of the development process of the Jyväskylä urban region, it might make better sense to speak of the information industry or of the development of operational preconditions for expertise-intensive entrepreneurship. However, the term ICT will be used, since the aim of the study is not to analyse the cluster itself but rather the development process in which the core phenomenon is referred to by the terms ICT and IT.

“If you look at this as if you were an engineer, I wouldn’t be too keen on saying that the whole thing is about ICT or IT. You could just about say that everything and anything is ICT, even a grocery shop, if you think that all application is ICT… but what matters here is that new knowledge and new technology are being used.”

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8 The problem encountered when surveying the development of the field is that “official” classifications are not directly appropriate. The OECD considers that ICT subsumes many internationally classified ISIC sub-fields under the heading of electronic products and optical equipment and also the sales and hiring of technology. In addition to these fields, the definition includes telecommunications and data processing. In practice, not even the OECD can adhere systematically to its definition (Tietoyhteiskunta-asiain neuvottelukunnan… 2001, 11).

9 The information industry includes the electric and electronics industry, telecommunications, information technology, software production and contents production (Visiosta osaamistarpeisiin… 2000, 3).

10 The term IT is used in the article when referring to strategy and to other documents in which it appears and also when an interviewee uses it.
From the perspective of the development of the Jyväskylä urban region, what is emphasised is ICT in a broad sense and as a development factor that has an influence on several industrial branches. The ICT cluster can be considered as a leader in the development of this region in recent years. ICT has been concentrated in the Jyväskylä urban region, but the electronics industry in particular is also represented elsewhere in Central Finland.

The Jyväskylä urban region has become one of the four information technology growth centres in Finland. In training volume in the field, Jyväskylä comes fourth after Helsinki, Tampere and Oulu (Jyväskylän seudun osaamiskeskusohjelma 1999 – 2006, 22).

“Now we’ve got about five thousand jobs in that cluster, and the target is that at the end of this term, we should have 8,000. That may not say a great deal in absolute terms. Of course if you compare this to Oulu and Tampere and the metropolitan area, we’re not in among the biggest just yet. Another yardstick is in the area of Central Finland: at the moment our most important industry is paper or wood in which there are 8,000 jobs. Now ICT is catching up in the number of jobs, so that in 2006 or 2010, depending on how it goes, this will be the biggest or one of the two biggest industries. Out of the entire Finnish ICT cluster, we will not be the biggest branch. We might be around the fifth place or somewhere.”

ICT companies in Central Finland focus on software, data communications, digital media, utilisation of network technologies and industrial automation. The firms in the cluster can be divided into service providers, equipment producers and adapters. The foundation of the ICT cluster in Central Finland is partly created by the computer centres of state administration. The most important units of the public sector services in the cluster are the Computer Centre of Social Insurance Institution of Finland, the ADP Agency of the Finnish Defence Forces, and the Computer Centre of Finnish Tax Administration.

Among the biggest companies in the region are two units of Nokia, the Yomi Group, Sonera, Sanmina, Enermet and TietoEnator. The best-known company internationally in Jyväskylä is Nokia, which began operations in Jyväskylä in 1998 and now employs nearly 500 people. Nokia’s units in Jyväskylä include Nokia Mobile Phones and Nokia Networks. Most technology companies, like Nokia, are located by Lake Jyväsjärvi, in the centre of Jyväskylä.

The rapid increase in the number of jobs in the ICT cluster largely results from increased educational opportunities provided by both the University of Jyväskylä and the Jyväskylä Polytechnic. The number of
students admitted to educational institutions is now three to four times
greater than in the mid-1990s (Nukari & Neittaanmäki 2001, 1).

Figure 4. ICT cluster in Central Finland (Nukari & Neittaanmäki 2001)

University of Jyväskylä — One clear strength of the Jyväskylä urban region is its multi-faculty university with over 13,000 students. The Faculty of Information Technology was established in 1998 with about 1,400 students, and there are plans to increase this number to about 2000 students by the year 2006. Other faculties are Humanities, Education, Sport and Health Sciences, Mathematics and Science, Business and Economics and Social Sciences. The University of Jyväskylä also has the Computing and Mathematical Sciences Graduate School (COMAS) with nearly 100 post-graduate students. The Information Technology Research Institute (ITRI) with about 50 researchers focuses on business-driven research and development services in the field of IT.

Education in ICT has developed rapidly in Jyväskylä. The investments are not yet nationally acknowledged compared to those of
the universities of technology, for example. The University of Jyväskylä has traditionally been oriented towards the humanities and wants to develop expertise in ICT in this context by building a profile for the development of human-centred information technology through interdisciplinary projects, by combining information technology with expertise in psychology, social sciences, sport and health sciences, education and the humanities (Agora, Human-Centered…2001, 4).

**Agora, The Human-Centered Information Technology Research Center** of the University was started in 2000. The Agora Building, in which the Research Center is located, is the first privately financed public building project in Finland. In addition to the Faculty of Information Technology, there are also expertise-intensive enterprises in Agora. Moreover, the centre serves research laboratories, multi-disciplinary research projects including the Psykocenter\(^\text{11}\), which belongs to the Finnish Centre of Excellence Programme of the Academy of Finland\(^\text{12}\), and other research units concerned with human development. In its first phase, Agora provides jobs for 500 people, of whom 300 are employed by the University and 200 by companies.

Agora strives to seek new modes of operation so that its reputation as a research and development centre operating under a new concept will distinguish it from other universities offering education in the field of ICT and will attract gifted students. There is also a research programme being developed especially for Agora (Agora, Human-Centered… 2001, 4; 7).

**Jyväskylä Polytechnic, School of Information Technology** – The Polytechnic with approximately 6,300 students is one of the most

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\(^{11}\) Psykocenter is a multidisciplinary consortium of about 20 research groups, which share an interest in the research of human growth, learning and development through the life span, and in the development of human-centred IT.

\(^{12}\) The Academy of Finland is an expert organisation on research funding. The Academy’s aim is to promote scientific research through long-term, quality-based research funding, science and science-policy expertise and through efforts to strengthen the position of science and scientific research. According to the Academy of Finland, a centre of excellence is a research unit or researcher training unit that comprises one or several high-standard research teams with shared, clearly defined research goals, and that has attained, or has good potential for reaching, the international forefront in its field. The Academy funds the centres of excellence in research together with universities, the National Technology Agency Tekes, ministries, business enterprises and foundations. Twenty-six new centres of excellence started at the beginning of 2000 and they are receiving funding for a six-year term (Centres of Excellence in Research 2001).
multidisciplinary polytechnics in Finland. In 1999, it established its School of Information Technology, where core areas of expertise are automation, electronics, programming, software engineering and data network technology. The School of Information Technology is the first unit providing training for engineers to receive the ISO9001 Quality Certificate. The total number of students in ICT-related fields exceeds 1,000 in Jyväskylä Polytechnic.

Jyväskylä Science Park Ltd. – The business idea of Jyväskylä Science Park Ltd is to develop and support companies that deal with new knowledge and technologies. The Science Park in particular aims to promote the commercial exploitation of research results and the development of small and medium-sized enterprises. Incubation activities in the Science Park have a ten-year history, during which some 120 companies have been incubated. Three-fourths of the companies work in the ICT industry.

The Science Park co-ordinates development programmes that have as their objective to produce information as a basis for new business operations and to support the development of research environments. These development programmes are also a means of encouraging the initiation of a project combining several areas of expertise. The Centre of Expertise Programme\(^\text{13}\) is an example of these development programmes. The focus in the programme is on management of paper manufacturing, energy and environmental technology and information technology. In connection with ICT, the science park also co-ordinates a development programme in the field of electronics.

The Jyväskylä Science Park administers the regional capital fund Midinvest Ltd., which makes its own capital minority investments. Its premises and related services are the responsibility of the affiliate JSP

\(^\text{13}\) The Centre of Expertise Programme was launched in 1994 as part of a new programme-based regional development policy. The Decree on Regional Development (1315/93) stipulates that the “aim of such centres is to improve the preconditions for the establishment and development of entrepreneurship which requires high expertise and is internationally competitive. The programme supports regional specialisation and division of labour among centres”. The programme was implemented in Finland in eleven centres in the period 1994–1998. On the basis of positive experiences of the first period, the Council of State expanded the programme by nominating new areas of expertise and new centres to implement a second national programme. For the period 1999 – 2006, a total of fourteen centres of expertise and two net expertise centres have been named. The centres of expertise are funded by ministries, regional councils, city administrations and municipalities and also by the private sector. When Finland joined the EU, the centres of expertise were able to apply for EU funding.
Facilities Ltd., which supplies them for enterprises. In 2000, the Science Park housed about 110 enterprises.

Jyväskylä Regional Development Company – Known as Jykes Ltd., this company is owned by four municipalities and is responsible for the business policy of the municipalities in the Jyväskylä urban region. Jykes Ltd. is also an important developer\textsuperscript{14} of the ICT cluster. The municipalities’ financing for Jyväskylä Science Park (among others) is channelled through Jykes. All in all, the owner municipalities financed development activities through Jykes to a total of FIM 38 million in 2000 (Jykesin vuosi 2000).

\textbf{Development process}

The development process of the ICT cluster in the Jyväskylä urban region can be divided into three stages:

1. Seeds of the development, no conscious strategic planning; from the 1960s to the mid-1980s
2. Strengthening of the foundation of technological know-how; from the mid-1980s to the mid-1990s
3. Systematic development of the ICT cluster, emphasis on programmes; from the mid-1990s and onwards.

\textit{First stage: Seeds of the development, no conscious strategic planning}

Although the actual growth of the ICT cluster in the Jyväskylä urban region occurred in the 1990s, the origins of this development can be traced back much farther. The first development phase, in which the foundation of the cluster was taking shape, took place in the period 1960–1985. In the 1960s, the development of Jyväskylä was characterised by the consolidation of the city’s position as an administrative and educational centre. The Province of Central Finland was established in 1960, thereby increasing the number of administrative jobs in Jyväskylä. The founding and expansion of the University of Jyväskylä reinforced this development.

The roots of the University of Jyväskylä go back to the 1800s, with the first teacher training college in Finland established in Jyväskylä in 1863 and transformed into the Jyväskylä Institute of Pedagogics in 1934.

\textsuperscript{14} The focus in this chapter is on the firms and on the developers referred to as specialised developers of the ICT cluster. Developers referred to as general developers whose duty it is to develop the whole region but who have an important role in the cluster, such as the City of Jyväskylä, other municipalities of the urban region and the regional council, have not been presented here.
In 1958, the institute established a Faculty of Philosophy and professorial posts in the humanities, and in 1965, a Department for Mathematics and Natural Sciences. With funding from the Jyväskylä Commercial Association, teaching in economic sciences began in 1966, by which time the institute had become the University of Jyväskylä (Kangas 1992). At the end of the 1960s, the Jyväskylä Commercial Association endowed the University of Jyväskylä with a professorial post in computer science. The key figure in this donation was the industrialist Eero Fredrikson, a manufacturer of hats. Computer science has been offered as a subject for study since 1968.

“They caught on to computer science; that was in the 60s when the Association donated the professorship… but it’s hard to say whether it was good luck or good management that the Commercial Association had the sense to take hold of it… Since then, of course, capacity in the field got bigger.”

In the 1960s and 1970s, the management of the city’s economic development policy was very much in the hands of officials. The then left-wing-dominated City Councils and the leading officials on the one hand, and the predominantly right wing business people, on the other did not easily find a common line. In the 1970s, the negative atmosphere that entrepreneurs experienced caused firms to move away to neighbouring municipalities (Ojala 1997, 108 – 110).

In the 1960s and 1970s, business life in the City of Jyväskylä was essentially dominated by large-scale industry. In addition, there were many small family businesses but an almost total lack of SMEs. The increase in unemployment in the 1970s had the effect of activating economic policy, although at that time the role of traditional large-scale industry was still emphasised. At the end of the 1970s, a price had to be paid for the major role that large industrial enterprises had played when Jyväskylä drifted into a very deep structural change (Ojala 1997).

At the turn of the 1970s and 1980s, the most significant element in local economic development policy was the reaction to measures of regional policy by central government. Central government endeavoured

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15 The international energy crisis of the mid-1970s caused a worldwide economic recession that was also reflected in Finland. Compared with the rest of Finland, there were many large state-owned industries in Jyväskylä. The state-owned industries reorganised their activities a few years later than other firms. Hence, although the structural change began in Jyväskylä at the end of the 1970s, the largest cuts occurred at the beginning of the 1980s. During the period 1980–1984, the number of industrial jobs dropped from 10,000 to 8,000 (Jokinen 1997, 128 – 129).
to decentralise its functions and these endeavours employed economic development officials of the City of Jyväskylä. Eventually some computer units of the state administration were decentralised to Jyväskylä (Ojala 1997, 110). These relocations of high-technology units served to increase the number of actors involved in ICT, thereby laying a foundation for subsequent development. The state units for their part created an ICT-related culture in the area.

During the first stage of the development of the ICT cluster, it can be said that:

- There was no conscious strategic plan for the development of the cluster (or what later became known as a cluster), nor could anyone yet foresee the opportunities presented by ICT.
- The development measures were isolated, lacking co-ordination and they were reactions to (institutional) policy changes occurring at the level of central government.
- The institutional (educational) framework of the development of the ICT cluster began to take shape with the foundation and growth of the University, the establishment of a professorial post in computer science and the beginning of education in the field.
- The stage was characterised by different interpretations among those in business life and the city’s elected and professional officials as to how the development of economic policy was to be handled.
- There were no clear managers of the development process as a whole.

Second stage: Strengthening the foundation of technological know-how and expanding co-operation

The second stage of the development process began in the mid-1980s and was characterised by efforts to raise the technological level and increase co-operation in development issues.

An institutional change in the economic development policy of the City of Jyväskylä came about in 1983: its implementation was incorporated and Jyväskylän Teollisuuskiinteistöt Oy (Jyväskylä Industrial Real Estates Ltd.) was founded. This company was established in order to facilitate more flexible co-operation between entrepreneurs and the city authorities. In the 1980s, the views of entrepreneurs and political decision-makers did indeed approach each other in the economic development policy of the City of Jyväskylä. In 1987, the name of
Teollisuuskiinteistöt Oy was changed into Jyväseudun Kehitysyhtiö Oy (Jyväskylä Urban Region Development Company Ltd.), and in addition to the City of Jyväskylä, the Rural Municipality of Jyväskylä also became a shareholder. The Technology Centre Tietotaajama Oy was also founded in 1987, its name later being changed to Jyväskylä Science Park Ltd. (Ojala 1997, 112 – 113).

Until 1987, Tietotaajama Ltd. functioned as a Tietotaajama Project. The initiative for establishing the science park activity was taken by Professor Eero Peltola, an expert in computer science at the University of Jyväskylä. The time was right for the proposal, as Jyväskylä was undergoing a structural change in basic industry and the need to diversify its economic structure was obvious. On the basis of the proposal, Mayor Lovén convened representatives of the University, business life and the city authorities in an unofficial group to generate ideas for the start-up and content of the Tietotaajama Project. The idea behind this project was to create linkages between enterprises and research activity. The key focal area of the project was information technology; therefore, Jussi Nukari, who had studied computer science at the University of Jyväskylä, was appointed to lead the project.

“There was a professor of computer science at the University, Eero Peltola. In ’84 he wrote to Jaakko Lovén, who at the time was Mayor of Jyväskylä, saying that elsewhere in the world a lot of science parks had been set up, and that they seemed to be places of future growth. In a letter a couple of pages long Peltola proposed that it would be worthwhile for Jyväskylä to investigate the prospects of founding a place like that. In the 1980s there had been a slump in industry in Jyväskylä … and in that sense they had a positive attitude toward everything connected to the future and job creation.”

On 1 April 1985, Tietotaajama operations began under Jyväskylän Teollisuuskiinteistöt Oy, as one of the earliest technology centre initiatives in Finland. In the mid-1980s, there were very few subjects offered at the University of Jyväskylä to support technological development or enterprises in the field. This scarcity of activities affected the Tietotaajama Project; in the late 1980s, the project was still seeking its identity and funding was being sought from various sources. In the early stages of the project, city officials and political decision-makers occupied a pivotal role. To obtain funding, considerable networking was undertaken and many negotiations were held to investigate thoroughly the wisdom of investing in the project.

16 Mayor is not an elected office in Finland; he/she is a municipal official.
In the 1980s, co-operation of the unofficial small group around local technology policy intensified. In those days, the Technology Centre was searching for a focus and credibility for its activities. For that reason, the centre started a sauna club that used to meet to brainstorm about solution models for the lack of higher technical education in the region. In these discussions, it was deemed impossible to have a university of technology or a technical faculty for the University. To compensate for these deficiencies, an applied natural science programme was delineated. The lack of technical education was not only an issue for this small unofficial group, but was a subject of regular debate in official forums and in various development seminars.

“For the development of education, we came to the decision that there was no possibility of founding a technical faculty as there was formidable opposition to this among all those who already had one. That was the reality, as it were. So we decided on setting up a programme for applied natural sciences…. It was a sort of substitute.”

“Then at the end of the ‘80s, we were mapping out new paths to get to this point quite nicely in the mid-’90s. They did those fashionable SWOT analyses at all the development seminars as they also did elsewhere in Finland, and there was always the same result in that one square. Things were otherwise OK, but we lacked a technical faculty at the university level, and we started thinking that something should be done about it.”

The plans for a degree programme in applied natural sciences progressed through official channels as follows. First, in 1985, in a report on the development of co-operation between the University and its operational environment, the work group appointed by the Rector of the University of Jyväskylä proposed that education in technical and applied natural sciences should commence. The report was based on a needs analysis of business life. Sitra\textsuperscript{17} granted funding for the year 1988 for the planning of educational options. The Ministry of Education also held a positive attitude toward the proposal by the University of Jyväskylä for the commencement of education in applied natural sciences and the first tenured post was established in 1988 (Asplund et al. 1988, 8). Pekka Neittaanmäki, Professor of Information Technology, was one of the principal actors in the ideation and promotion of the degree programme.

Education in applied natural sciences began in 1989 in applied computer science, applied physics and applied chemistry. Moreover, the programme entailed the beginning of co-operation with the Helsinki University of Technology in the training of Masters of Science in paper

\textsuperscript{17} The Finnish National Fund for Research and Development.
manufacturing technology and environmental and energy technology. The overall costs of the programme up to the year 1994 amounted to more than FIM 25 million, including 21 tenured posts and other jobs. The costs were met by an internal transfer of University funds, endowments (including gifts from local municipalities and businesses) and allocations from the state budget (Asplund et al. 1988, 8; Tanskanen 1989).

A team spirit evolved among those engaged in ideation and fundraising for the development programme in applied natural sciences, and later the members of the sauna club in particular came to exert influence in other aspects of the Jyväskylä urban region development strategies. Furthermore, the programme provoked a discussion process in the University on the need to develop applied research.

“It was one of those practical assignments on how to modify a humanistic university to meet the needs of the present day or how to expand it. A good and large university, but still with certain shortcomings – the connection to business life was non-existent…. It was a very significant practice stage and then the areas of strength began to emerge.”

Towards the end of the 1980s, awareness of the importance of technological expertise for the competitiveness of enterprises was already on the increase in the province of Central Finland. Development plans with an emphasis on the development of R&D activities for the province were drawn up under the leadership of the provincial governor Kalevi Kivisto. There was also an industrial committee in the province with a technology division under it, which included a considerable number of representatives from various companies.

In 1989, the technology policy programme of the province of Central Finland came out with the aim of making research and development in Central Finland more intensive. The programme was drawn up at the request of the Ministry of the Interior. It stressed raising the level of technological expertise and intensifying co-operation between research institutes and institutions of education (Keski-Suomen läänin teknologiapoliittinen… 1989).

“It may well have also been the provincial government of Central Finland which rose to prominence, and at that stage pushed development issues along…. Here in the provincial government, Kalevi Kivistö was governor, and he had, how shall I put it, a very positive understanding of these things. Then they founded the technology division in the provincial government with the captains of industry taking part in it.”

18 The Ministry of the Interior in its communication of January 8, 1998, exhorted the provincial governments to prepare regional technology policy programmes.
Thus, co-operation on development issues increased on the whole at the end of the 1980s. Co-operation among the municipalities of the urban region was problematic, however. At the turn of the 1980s and 1990s, co-operation was inhibited by the issue of the consolidation of municipalities that concerned the City of Jyväskylä and the Rural Municipality of Jyväskylä. Several attempts were made to accomplish this consolidation (see Puustinen 1998). One decisive factor in improving the atmosphere for co-operation was the fact that the mayors of the City of Jyväskylä and the Rural Municipality of Jyväskylä changed in the mid-1990s.

The new mayors stressed that co-operation was to be built up between independent municipalities with no attempt at consolidation. Another significant reason for improvement in co-operation was the economic recession at the beginning of the 1990s. A state of crisis made it necessary to set up co-operation on a new footing so that all municipalities in the region could feel like equal partners in co-operation. Therefore, it was decided to build up co-operation on local economic development policy. Since 1996, municipal funding has been channelled into the strategy work in economic development policy and development projects through Jykes Oy (Jyväskylä Regional Development Company Ltd.), which was much better financed than the economic development policy companies preceding it (Ojala 1997, 113). Co-operation between municipalities has facilitated the development processes of the urban region more extensively, since time and energy have not been wasted on bickering between municipalities.

The second stage of the development of the ICT cluster was characterised by:

- Strengthening the foundation of technological know-how by increasing education based on applied expertise and by introducing a technology policy programme.
- Gaining a more strategic grip on the development work than was possible in the first stage of the process.
- Strengthening the institutional framework of the ICT cluster development (the foundations of the economic development policy company and the technology centre, the widening of education).
- Intensifying co-operation between the City of Jyväskylä, the University of Jyväskylä and business life and a more widespread consensus regarding the focal areas for urban development work than during the first stage.
• Emphasising the central role of the university in ideation of the development entities.
• Seizing new opportunities and picking up on weak signals (the idea of the science park, consciousness of the significance of technological know-how for the competitiveness of companies).

Third stage: Systematic development of the ICT cluster and emphasis on programmes

The third stage can be described as the systematic development of the ICT cluster and the emphasis on a programme-based approach in the development work. This stage started in the mid-1990s.

Centre of expertise programme work

The preparation of the centre of expertise programme\(^\text{19}\) in 1993 and its implementation in 1994–1998 played a decisive role in creating ICT-led development. First, the preparatory process of the programme increased co-operation among actors and enhanced credibility for the model of doing things together. An action model for the organisation of co-operation evolved in the Jyväskylä urban region; it was not handed down as a ministerial requirement. The concept of a centre of expertise cultivated by the Ministry of the Interior, however, gave co-operation an official role and clear objectives. Second, the work done in the centre of expertise programme served as the first accommodation phase for programme-based regional development; there was a chance to ‘practise’ before Finland became a member of the EU. Third, work done in the programme aroused interest in strategic development of the field of ICT. Fourth, the programme work supported the strengthening of Jyväskylä Science Park, playing a crucial role in the preparation of the programme, and later serving as its co-ordinator.

“At the time there was quite a wide planning network. This centre of expertise programme was indeed taken seriously in Jyväskylä. We thought that although initially it would not bring in a great deal of cash, it would bring credibility to co-operation, this network co-operation.”

“The centre of expertise programme fostered the development of a way of handling things, including managing people in such planning. As a result, when the Science Park was running it, we had a steering group for the whole thing and also groups of experts for the various sub-fields with representatives of companies, service-users, the University and the media, and it produced a forum of interaction. It certainly helped. Somehow

\(^{19}\) See Chapter 3.2.
we’ve succeeded in forming a group for equal discussion and planning that we didn’t have in the early ’90s, including people with a different cultural basis, business people, academic and scientific people… who come to sit around the same table, put on their thinking caps and decide what should be done.”

In 1994, ICT was not yet actually included in the Jyväskylä region’s centre of expertise programme, since there was still very little enterprise or education in the field. The areas of expertise were paper manufacturing, energy and environmental technology. In addition to the above and as a fourth area, however, an attempt was made in the programme to increase research in the University’s areas of strength that support the other three areas of expertise, especially the utilisation and development of IT. Finally, IT was included in the programme in 1996.

In the new programme period 1999–2006, the Jyväskylä region is a centre of expertise for management of paper manufacturing, information technology and energy and environmental technology. Application of the action model used in the first period is continuing in the current period. The co-operation among Finnish centres of expertise focused on ICT has been significant for programme work in Jyväskylä region. The internationalisation of software firms has been a special area of co-operation.

EU Objective 2 Programme work
When Finland joined the EU, the areas in Central Finland coming under Objective 2 included the Jyväskylä sub-region as well as the towns ofÄänekoski and Suolahti in the Äänekoski sub-region. The main objective of the programme was to strengthen expertise. One of its most significant projects was the creation of a Master’s programme in re-orientation training in IT at the University of Jyväskylä. The costs of the project for the period 1996–1999 amounted to approximately FIM 100 million. This re-orientation training programme has been continued in the new Objective 2 Programme period 2000–2006\(^\text{20}\). Applicants for re-orientation training must have sufficient higher education appropriate to the training and also basic studies in IT disciplines. In 2001, 195 students were accepted, 70 of whom were financed by the Ministry of Education. The remaining 125 were financed by EU structural funds.

In the debate as to how the money should be used, training in ICT became the focal point because ICT was perceived to be a growing field

\(^{20}\) In the Objective 2 Programme of Central Finland 2000–2006, the emphasis is on strengthening existing expertise; the programme seeks to implement regional specialisation by means of investment and education.
and educational investments in ICT would be reflected rapidly in the operations of enterprises. The University of Jyväskylä and in particular Professors Kalle Lyytinen and Pekka Neitpanäki played a decisive role in the ideation of re-orientation training.

The first Objective 2 Programme was drawn up by a fairly small group of actors who wanted to reach the implementation stage fast. Re-orientation training was a novel and extensive project and, in order to ensure that its implementation was indeed feasible, the actors in the Jyväskylä region were compelled to seek a commitment from the state government. Consequently, the Minister of Education Olli-Pekka Heinonen and the Director General of the Ministry of Education Vilho Hirvi gave the project the go-ahead.

“That’s where the initiatives came from and when they were made, the programmes of that time were carried out by quite a small group. Now it seems like there are legions of people. So then they got the Minister of Education, Olli-Pekka Heinonen, enthusiastic about it and it went on its way. It was a good window of opportunity for the programme. And it somehow suited Heinonen. Then Ville Hirvi, who died recently, he was director general at the time, and we had really good channels to bulldoze it through… because there is always a need for some national funding. And then Pekka Kettunen, the Mayor of Jyväskylä, got the city officials in on it and a few other municipalities and some companies.”

The re-orientation training programme at the University of Jyväskylä started up some two years earlier than the National Information Industry Programme of the Ministry of Education. The objective of this programme was to expand the education and research being carried out in the polytechnics and universities that was needed by the information industry. Thus, in investments in education, Jyväskylä was ahead of other Finnish urban regions.

“Then they decided on the Master’s degree programme. They decided that they should have re-orientation training, specially geared toward people who’ve already studied something lower down. And now this Master’s level education model has spread to many fields. We should be seeing some results in a short time. The idea is not to go in for basic education with EU money… The starting point is the question of how we can get Finnish marks to flow in from abroad, and what we can realistically do. So that’s the analysis in the background.”

**Strengthening institutions of education: Faculty of Information Technology; the School of Information Technology**

On 1 September 1998, the Faculty of Information Technology was established at the University of Jyväskylä. This faculty brings together
teaching in ICT from economics and business administration and the Faculty of Mathematics and Natural Sciences. Under the new Decree and Act\(^1\) on Universities, it became possible for the university itself to make the decision to establish new faculties and the University of Jyväskylä was quick to take advantage of this change in the act. Opposition to the move within the University came from, among others, the student union, which opposed it because of fears that other disciplines would lose funding and that the faculty would be too small an entity. However, it also enjoyed support. Enquiries led to a relatively widespread recognition of the view that other fields would lose nothing through investment in ICT and that ICT might afford openings for co-operation with other fields. The City of Jyväskylä and Jyväskylä Science Park were active in promoting the establishment of the faculty.

The Faculty of Information Technology tries to pursue a new phenomenon-based, flexible action model in order to be able to anticipate rapid changes in the field. Moreover, the existence of a faculty in the field emphasises versatility and breadth of teaching and contributes to an enhanced image.

Education has been further strengthened by the establishment of the School of Information Technology at the Jyväskylä Polytechnic in 1999, which was also planned in co-operation with various actors.

**Transfer of Nokia to Jyväskylä 1998**

The transfer of Nokia in 1998 to Jyväsranta, in the vicinity of the University and Jyväskylä Science Park, had a significant effect on the Jyväskylä urban region, as did the Faculty of Information Technology. In Finland, the presence of a “Nokia location” is considered to be a sign of a dynamic and growing centre. The transfer of the Nokia research and development unit from Åänekoski to Jyväskylä was interpreted by the public as a clear indication that the Jyväskylä urban region could offer a competitive environment of expertise-intensive entrepreneurship.

“It was seen as a clear signal when Nokia came to Jyväskylä. This seems to have been the turning point, after which we started seeing papers being written about how well things are going there.”

Many factors have been evinced as reasons for the locating of Nokia to Jyväskylä right from personal networks. However, the most significant reasons may be considered to be that the Jyväskylä urban region could offer a competitive operational environment: ICT experts are trained in the region and the region offers employees a pleasant living

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\(^1\) This legislation (645/1997) on the universities came into force 1 August 1998.
environment. The issue of premises was resolved in a manner that was satisfactory to Nokia and an increasing number of Nokia’s co-operation partners reside in the urban region.

“Stories about personal connections, about people being on the same course, or who knew somebody, they’re like legends… But it was education and there are operational prerequisites and here in the city, there is the infrastructure. Nokia started to have subcontractor companies in the region… They operate very pragmatically and where it’s worthwhile to operate. This personal lobbying was actually of very little significance. If it hadn’t been for those big investments in education and the systematic approach, we wouldn’t have attracted them here. Other places have tried it as well.”

**Strategy work of the City of Jyväskylä**

The development of ICT was also affected by a change in direction in the City of Jyväskylä’s own strategic work. The reforms in strategy begun by the City of Jyväskylä in 1995 could be encapsulated in the phrase “Jyväskylä the Capable, a city of the new wave”. Its strategic objectives are connected to the development of vitality and improving the unity of the urban region. Investment in the development of business life has been accompanied by the development of services, education, culture and the quality of the living environment in general.

“So back in ’95 we had the image of a dying place, with everybody going out of here on a one-way ticket and nothing coming in. The intellectual atmosphere was pretty grim at the time. In our own work in the city, we thought that now something must be done. We wanted to think of an inspiring motto, and after a time, we came up with “New Wave Jyväskylä”, meaning a new way of doing things, doors open outwards… calling to mind the image of an innovative city of the future.”

The strategic thinking of the city has sought to break free from conventional, rigid planning and to implement strategies in a flexible manner. There has been a conscious quest for creativity and innovation through the interfaces of different areas of expertise and by making co-operation among different people possible. On the one hand, the city’s strategy work is based on the close co-operation of a core group of senior officials in land use, economy and strategic planning that the mayor has gathered around him. The elected officials have participated in strategy work much less than the core group.

On the other hand, extensive co-operation in the strategy work of the City of Jyväskylä has been sought via the Jyväskylä Forum started in 1995. People from different fields have been invited to this Forum, which addresses issues with long-term effects on the Jyväskylä urban region,
issues that would otherwise be trampled underfoot by everyday development routines.

“Since ’96 there have been about 4 to 6 sessions. And there the discussion goes above the ordinary day-to-day issues to a very conceptual and visionary level, and you can hone in on very tricky themes. Nobody represents any particular interest group, just themselves as individuals. The idea is to question matters and unravel tangled questions. They’ve got very broad participation. There’s been a former provincial governor running it, at one point it was the Rector of the University and then workers from the street mission or representatives of the association of the unemployed, the Lutheran church and from one extreme to the other.”

In February 1999, the city programme originating in the ideas of the Jyväskylä Forum and entitled “From Felt to Particle Accelerator – the shore of Lake Jyväsjärvi from the back yard to a facade” was completed. Jyväsjärvi is a lake in the centre of the city that from the 1970s was used for dumping waste from the plywood factory and from households located on its shore. Since then, the lake has been improved to the extent that its water had become fit for swimming by the late 1990s. The plywood factory stopped production and on the site of the former dump there is a park, a bathing beach and University buildings. Under the city programme, construction investments have been realised on the shores of the lake and physical settings have been created for the projects mentioned in the centre of expertise and Objective 2 Programmes. The shoreline zone includes the University of Jyväskylä, Jyväskylä Science Park, the premises of ICT companies, exhibitions and congresses, etc. In addition, high-quality housing has also been constructed near the shore.

“The next step was really taken in ’99 when they made this city programme to turn the lake shore into a façade. In the beginning they were saying that we could provide jobs for 6,000 experts on the shore of the lake in the centre of town. But the development has accelerated more than was believed in the plan and now they’re talking about 10,000 jobs. It’s gone a lot faster than we ourselves expected, thanks to both skill and beginner’s luck. And it’s specifically IT-oriented to a great extent.”

“The city programme went very well indeed. In a way it was the formulating of those viable economic policy strategies into city planning. In a way it was a sub-programme to the centre of expertise programme and the rest.”

**The completing of the Agora Building**

The development of the ICT cluster has aimed at activities that transcend borders. The clearest evidence of this is Agora, the Human-Centered Technology Research Centre, which was completed on the shore of Lake
Jyväsjärvi in August 2000. The Agora concept was also conceived as a co-operation between several actors.  

“And then in our home base here on the lake shore came the Agora, the human technology research centre. The psychological expertise that is strong in Jyväskylä, with a centre of excellence of the Academy in psychology, as well as IT technology were put into the same building along with companies, too: probably 500 people in all work in the building.”

The third stage of the development of the ICT cluster in the Jyväskylä urban region can be characterised by:

- Systematic development of the ICT cluster; ICT has become a spearhead of the development of urban competitiveness.
- Emphasis on a programmatic approach in the development work.
- Fast and unconventional utilisation of new funding sources, seizing new opportunities.
- Increased strategic thinking and planning of the development work in general, compared to the earlier stages.
- Increasing investments in development work (investments far exceeding what they had earlier been).
- Close co-operation among actors, especially among the university, the city and the science park; new modes of cooperation.
- Strengthening of the education related to ICT (the programme of re-orientation training) and strengthening institutions of education (Faculty of Information Technology, School of Information Technology).

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22 For more on Agora, see Chapter 3.2.
Figure 5. Development process of the ICT cluster in the Jyväskylä urban region and its central turning points.

**Principal phenomena**

*Crisis generates creative tension*

According to Sotarauta, creative tension can be found in the core of development. It can make people genuinely inspired to do development work and thereby create a competitive advantage for the region. Sotarauta defines the state of creative tension as an essential state for the development of regional competitiveness. It can be characterised by excitement and uncertainty about the consequences of future events and measures. The dominating thought and/or action patterns are questioned simultaneously by forces that are in mutual opposition or sufficiently different from one another. Creative tension may result in unprecedented, original products or in processes, thoughts and action models, etc. Creative tension may come into being spontaneously or as a result of leadership\(^\text{23}\) (Sotarauta 2001).

\(^{23}\) Creative tension refers neither to a state of harmony nor to a state of conflict; it is a state somewhere between these dimensions. Creative tension may result in something new; if the tension is disruptive, there can be the seeds of conflicts.
In the development of the ICT cluster in the Jyväskylä region, phases can be distinguished in which the urban region went into a state of crisis. This state of crisis can be considered as a significant catalyst in the mobilisation of the development process and as a generator of creative tension. The situation that resulted in the finding of resources for establishing the degree programme in applied natural sciences can be considered to have been a slight, gradual crisis. The actors of the urban region started to become aware of an ongoing structural change in economic life. General recognition of the increased importance of knowledge and expertise increased. As a result, people began to consider how the lack of higher education in technology, known to be a major bottleneck in the development of the urban region, could be alleviated.

An even more obvious realisation resulting from the crisis can be located towards the end of the severe economic recession that ravaged all of Finland in the early 1990s. The effects of the recession gave rise to the feeling that something had to be done in a different way from before if the negative developmental direction of the region was to be reversed. The gravity of the situation and the need for speedy measures were widely acknowledged. At the same time, it was noted that change could be accomplished through close co-operation among the various groups of actors and in various themes; resources were known to be limited and it was seen as pointless to waste these on rivalry and overlap.

Moreover, the recession created a need to intensify municipal co-operation. Another reason for such intensification was the crisis developing in relations relating to co-operation in the context of the debate on consolidating the two municipalities. Going into crisis made it necessary to rebuild co-operation completely, thereby making all municipalities in the region feel that they were being treated equally in co-operation.

“One background factor was surely the fact that the recession dealt us such a blow. It was like a state of terror, what’s going to happen to us… The drop in activity around Jyväskylä was notable. The centre of expertise programme really came at the right moment. It made it possible to rally the troops. Added to that was the fact that the municipalities in the Jyväskylä urban region got their co-operation up and running and got Jykes back on its feet. This meant that the development funding of the municipalities was in one lump. When EU funding came along, we could combine the funds and mobilise them on a greater scale. There was no need to have a whip-round for it.”

“Here the recession taught a lesson the hard way. It showed us once and for all that you can’t get by alone. We’re not sufficiently clever, big or rich for that and we don’t have the resources to manage alone. But the
recession was so hard on us that we just had to do something to survive. And why not think about it and do it together?"

The crisis alone was not enough to precipitate development. It was necessary to bring the development need to the fore and to manage change. The management of change of the 1980s was connected to the activities of the group that arrived at the development programme in applied natural sciences. In the process of bringing the development need for co-operation among municipalities to the fore, a decisive role was played by the new leaders of the city and the rural region, Pekka Kettunen and Tarmo Pipatti. Several actors played a part in refining the approach to development towards the end of the recession, namely people from city organisations, the University, the Regional Council and the Science Park, for example.

Investing in expertise as a central and consistent strategy

One explanatory factor for the development of the Jyväskylä urban region in the latter half of the 1990s is the series of successful strategic choices that were made. Investing in the development of expertise was one of the main pillars of the development work. Investments in development focused on diversifying the humanities-oriented University and on developing and expanding the disciplines taught at Jyväskylä Polytechnic. An emphasis on the importance of knowledge and expertise as a production factor through expertise alone was felt to be attracting money and investors in the region. In developing expertise, emphasis was also placed on developing competitiveness by transcending one’s own borders in the creation of something new.

“There was a view that it was more worthwhile to invest in knowledge and expertise than in bridges and roads. When money was used in development programmes, especially EU regional development funds and ESF money, it has been deliberately put into projects between people’s ears rather than under their feet.”

The level of expertise has been reinforced in extensive co-operation and the municipalities and business life in the region have invested a great deal in the development of the University of Jyväskylä in particular. Furthermore, interest emerged within the University and in the University management for increased co-operation with other actors in the region, in contrast to the more community-oriented attitude that had prevailed since the 1980s. In the early 1980s, the view still persisted that co-operation between the University and business life was detrimental to the objectivity of science. The willingness of the universities to engage in co-operation with the surrounding region was enhanced not only by
changes in attitudes but also by the fact that in order to finance the new teaching and research activity, the universities were compelled to rely on external funding.

“Through this the University got more money, and if the University wanted to pursue this development, it had to accept money from sources other than the Ministry of Education. If it had clung to the old ways, it would have shriveled up due to economic reality.”

“All in all, attitudes changed in the University. Whereas earlier they thought that it was practically a sin for a doctor or professor to have contacts in the world of business, now it’s virtually the other way around, they are supposed to have them.”

It has also been crucial that in investing in expertise, the right “choice” was made; that is, to invest in the burgeoning ICT sector. Availability of skilled labour has been essential for this development. Thus, channelling investments into education supporting ICT development had rapid growth effects. Visible results after a very short time had the effect of increasing enthusiasm for development work.

“Of course the economic climate was favourable. At the same time as we so boldly invested, the general preconditions improved nationwide. And ICT grew exponentially worldwide, so luckily we had put a lot into this. That was a decisive help.”

Investing in expertise proved to be a strategic choice that fostered progress. Development of expertise in the long term was also crucial. In several development strategies concerning the Jyväskylä urban region, the development of expertise was a main strategic objective. The chain connecting the various development programmes was obvious; earlier programmes and the work accomplished on them served as a basis for subsequent programme work. (See also Haveri & Majoinen 1995, 73.) Furthermore, the ability to make bold strategic choices has been characteristic in the Jyväskylä urban region, as has the ability to invest properly in selected spearheads. Strategic choices gave rise to debate in the urban region and more widely in Central Finland as to whether the selected emphases were right for the development of the region and whether investment should have been made in several areas. However, the choices made had powerful supporters and these choices have been rigidly adhered to.

“But among those decision-makers, each one represents some sector, so each one thinks that the sector should be involved. Then the strategy becomes pretty boring and conventional, and any municipality could do the same; that is, they don’t dare to make choices. And it was making
these choices that caused the criticism. That such and such a sector is out is important for us. When you put these additional investments in the strategy, EU money and the rest, it doesn’t stop you from putting in business-sourced money or something else into something else, too. But these spearheads, some say there should have been more of them, but that would have been a strategic mistake.”

Innovativeness, rapid reaction, border-crossing and change management

The development measures in the Jyväskylä urban region have been innovative and characterised by a reform in modes of operation. The degree programme in applied natural sciences can be considered an innovative development entity, as can the re-orientation training programme implemented on EU Objective 2 funding, the city programme centred on the Jyväsranta development as well as the concept for the construction and implementation of Agora, etc. Since the 1990s in particular, there have been such innovative people in the Jyväskylä urban region, with the courage to create new openings and the enthusiasm to make something out of them, leaders of change making creative tension a reality in the region.

“I believe these were the people who achieved the success. And there were some strong visionaries who were also strong personalities, able to keep the wheel turned in the right direction. In fact, you couldn’t say it was all easy going. There were distinct conflicts at various stages of the development.”

Those mentioned in the interviews as leaders of change and innovation were Pekka Kettunen, Mayor of Jyväskylä and Professor Pekka Neittaanmäki, then Vice-Rector of the University. The latter is considered to be interested in regional development and its promotion, an individual who brought ICT-led development to the fore and who was a creator of new action models and development entities.

Pekka Kettunen, who became Mayor of Jyväskylä in the mid-1990s, was then seen to have served as an originator of creative tension in the development of the urban region and as a leader of change. Today he is still involved in the work of a great many development organisations and therefore has an overall view of development work and a great deal of influence. Kettunen’s blunt manner, raising economic policy development above the other sub-fields of the city organisation, testing and breaking the limits of conventional action models and rapid promotion of large projects have aroused both favourable and resentful reactions.
“Even when talking about openness and transcending borders in politics, such as in process management, this concentration is a good thing. As I said before, Pekka Kettunen as mayor became the symbol of the rise of Jyväskylä... a lot of matters went through him. He is chairman of the polytechnic board, chair of the Science Park, member of the Jykes work group and has very close co-operation with certain organisations and key people in the University. So great amounts of information go through him. He is also one of the few people capable of envisaging larger entities splendidly. He has a view over the entire playing field.”

In addition to placing emphasis on innovation and creativity, the City of Jyväskylä has begun to highlight a thread running through its strategy work, namely that it is crucial to competitive advantage that the community has the ability to sense changes in society, even the faintest ones, and to get things right, make decisions faster than others when some new entity means a competitive advantage. The clearest example of rapid action and questioning and breaking the dominating action models in the Jyväskylä urban region is probably the idea for the re-orientation training programme and its implementation on EU Objective 2 funds. No prior experience existed in Finland for comparable projects. In the Jyväskylä urban region, action was swift and the education had already been started up when others were just thinking about what use the money could be put to.

“It didn’t exactly provoke opposition, as nobody really knew what to do; nor was there any competing project.... There were those with doubts and many said you can’t do that, but they thought it was a sensible thing to do and would promote change in the industrial structure. And why would anybody object to it? Generally the doubts were about what they would say in Brussels, but they don’t say anything there. It was regional will if you do no wrong.”

“What happened was that the fast ones ate up the slow ones... At the Ministry of Education, they have not learned how to do this, so it had to be taken care of right up at the ministerial level.... In just three weeks, the ad was in the paper and the money only came at the end of the year, six months later. They only fixed the preliminary strategy in May and student recruitment started within three weeks. That was fast. Only in August did the official EU papers go to Brussels. We took a little... risk.”

**Networking: core group and wide participation**

It was the slump of the 1970s and the gradually emerging structural change that woke people up to the need for co-operation in Jyväskylä. However, co-operation increased clearly only at the planning stage of the
degree programme in applied natural sciences. Another significant impetus for intensified co-operation was the slump of the 1990s.

The main features of regional co-operation were the close and unofficial co-operation of key persons, on the one hand and the broad participation of actors in various strategy processes on the other. The roots of co-operation in the core group, which included heads of organisations especially from the City of Jyväskylä, Jykes, Jyväskylä Science Park, the Regional Council, the University of Jyväskylä and also from the business sector, go back to the 1970s when many of today’s main actors in Jyväskylä got to know each other at University. On the other hand, a suitable number of new actors came onto the scene at the right time, free from old concepts and able to see the weaknesses of the models in use.

“In the early ‘70s we were all studying at the University of Jyväskylä, coming from different parts of Finland…. In this core group, we’ve known each other for 30 years... in a small town there were enough of these fellows, and even if we weren’t exactly pals, we knew each other from various connections. And since you know them you’ve done a lot of brainstorming together, voicing wild ideas, and the others understood what angle somebody introduced the ideas from.”

“Then new blood came along with the enthusiasm and courage to set out…. They didn’t have old baggage, and they came a bit from the outside, looked at things with new eyes and saw the opportunities. Not in the old rut.”

The co-operation of the core group has been both official and unofficial. The co-operation forums were those sauna evenings, unofficial brainstorming sessions and the boardroom discussions of various development organisations. One explanatory factor for the functionality of co-operation is the suitable size of the urban region: in a relatively small place it was easy to start and develop co-operation. On the other hand, the urban region was big enough to have expertise accumulating around different development themes.

“The mayor can invite people around some theme and it is discussed. But indeed they meet fairly regularly just because we have these key organisations and their boards meet once a month. And generally everybody tries to participate in them.”

Although the co-operation of the core group has had a positive effect on the development of the Jyväskylä urban region, such a limited

24 See also Haveri & Majoinen (1995, 76)
group had its dangers: the real power over development work was in the hands of a few and the co-operation of a small group easily becomes locked in the prevailing thought and action models.

“Of course you can say that at some point it can become a burden that we are such a small group involved in everything…. Although there are a couple of hundred involved in the various decision-making organs and work groups and others, really the group that makes the strategic choices and decisions is much smaller, maybe twenty people. And then the real core, maybe about ten. It’s been a pretty good thing that these people are aware of the situation of the various organisations, and then in a way it’s easy to reconcile them and to avoid overlap but still direct operations so that they strengthen each other.”

“In strategy work, you don’t need large numbers of people, just the core group of the official body to streamline the strategy. Then you need a road show to sell it to the decision-makers. And that’s really how we did the city strategy; there was the core group and then we sold it through certain participation. The real process took place in a very small group.”

The development of the Jyväskylä urban region has been characterised not only by its strategic core development group but also by the fact that the participation of a wide range of actors in it in was well organised. However, new ideas came into being and were taken farther through the core group. Characteristic of the co-operation in the extended group as well as in the core group is the fact that several kinds of actors were involved. Extensive co-operation has been considered to be important; it has served to increase strategic awareness, to unify interpretations and to secure the commitment of participants to development work.

The Jyväskylä actors also emphasise the importance of functioning co-operation as a factor that enables the urban region to stand out from otherwise similar urban regions.

“In my opinion it is a very important matter that cannot be overemphasised. I have indeed seen that such expertise is in many places. And I would go as far as to say that there is high-level expertise in all our universities (in Finland), and undoubtedly IT expertise. But the ability to manage co-operation, to network, promote the same cause and so on, that’s one of the important success factors of the Jyväskylä urban region.”

*Utilising image in development*

The key actors in the development of the Jyväskylä urban region have sought further impetus for the development work in publicity, which has resulted in a great deal of positive reporting on the development of the region. Media interest has been increased by the speed of the post-
recession development of the Jyväskylä urban region, the variety and clarity of the focal points for development and of the projects in relation to other urban regions as well as the role played by development actors in bringing positive news to the fore. Positive news has made the region increasingly attractive in the eyes of companies, residents and investors alike. Mayor Pekka Kettunen’s regular column on development work in the main newspaper of Central Finland, *Keskisuomalainen*, has been significant, as has his active contribution to other journals. These columns have not only opened discussion but also directed its course.

The image of the Jyväskylä urban region has also been strengthened in that its key actors have brought out positive aspects of its development activities in various forums. In the late 1990s, development activity of the urban region had assumed the position of a “prime example”. Moreover, the good personal networks of the main actors have made the development measures achieved in the Jyväskylä urban region better known.

“Of course these people, since they have enormous networks all over Finland and also abroad, are PR for this region. When they say something has happened, they know and they were themselves involved in doing it, so they can tell people about it convincingly so that it’s credible…. That’s good for our image.”

Thus, a good image has supported the development work. On the other hand, there is some fear in the region that the image is too good in relation to the reality; there are grounds for a good image but not perhaps quite to the extent that the media require. ICT is not the most significant employer in the region nor can the size of the concentration be compared with the major concentrations in Finland. The urban region continues to have a major employment problem and not all actors in development activity have committed themselves to the ICT-led development strategy.

“Sometimes it seems, at least recently, that there has been a great deal of talk about Jyväskylä, as if something really remarkable had been achieved here. So I think our situation has maybe been exaggerated a bit. We still have plenty to do and maybe we’re just not that great.”

**New institutions from outside as enablers**

The Jyväskylä urban region has been able to take quick advantage of both national and international changes. Reactions to new opportunities opening up in the region have been fast and unprejudiced. The choice of ICT as a focal point for development has been based on both the actors’ own conception of ICT as a potential growth area and on the reaction to the focuses of national expertise in development finance. Action models
of programme-based regional policy have also affected the development of the Jyväskylä urban region. Programme work has made the development work even more networked and more strategic than before.

“At the beginning of the ‘90s, when Finland was heading towards a great recession, the strategy of the whole country was to invest in those fields…. Now it has turned out to be a success story. And Jyväskylä seized on this too…. IT was indeed a bold choice at the national level back at the beginning of the ‘90s…. And then political influence was exerted so that the Academy and Tekes25 would opt that way and that in turn made Jyväskylä invest in it.”

“In the same connection, the EU programmes entered the game. And there was a new instrument to provide the impetus for development; it was possible to start up development projects.”

Institutional changes coming from outside the urban region have thus served as forces of renewal and opportunity for development work. Making the most of change, however, has required the actors in the urban region to seize opportunities as they open up.

**Future opportunities and threats**

In the development of ICT in the Jyväskylä urban region there are both future opportunities and threats. One opportunity in development is the potentially strong area comprising multidisciplinarity and content production. A slowdown in the traditional electronics industry has been predicted, along with growing importance of the software and content industries, especially regarding the creation of new jobs. An increase is also predicted in human-centred ICT development. Areas of strength at the University of Jyväskylä include subjects related to ageing, disability and sport sciences, that, related to ICT, are believed to become future areas of expertise.

“Our ICT strategy is different from that of Tampere or Oulu, which are very engineer-biased. That’s where they make the gadgets. But our strength… is in something like third generation ICT…. And it reacts differently to economic conditions. If there is only research and development done here… that works pretty well, we are not tied to the mobile phone. Then this content production;… it doesn’t seem possible that content production could ever end, even if they can make mobile phones in Malaysia and China. It doesn’t worry us. That is to say, the job

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25 Tekes, the National Technology Agency is the main financing organisation for applied and industrial R&D in Finland. The funds for financing are awarded from the state budget via the Ministry of Trade and Industry.
structure of Jyväskylä is very R&D-intensive. And that is much more faithful to the home region than production is.”

The suitable size of the Jyväskylä urban region can also be seen as a strength along with its reputation as a dynamic urban region. In attracting capable people, it helps that in various comparisons the city has been found to be a pleasant place to live and an alternative to the hectic Helsinki urban region (see e.g. Raunio 2001).

“We don’t have such great burdens. On the other hand there are surely several positive images. There is the natural environment, the city is not so big but still big enough to have certain services… so these together with the model of doing the newest things make it easy for people to come here and stay.”

A potential bottleneck in the ICT field is the slowing down of the rate of development, general downturn in the economy or even a new recession. A downturn in ICT development could have a very bad effect on the atmosphere of Jyväskylä as the development has just started. A recession could destroy faith in the future and make development actors excessively cautious in their investments.

Another bottleneck connected to ICT is the availability of capable people (if the downturn does not turn into a recession). The University should have some top international expertise in order to respond to the demands of global enterprises and to attract gifted students. One problem in attracting top researchers is the modest salary level compared to what the private sector can offer. In attracting foreign experts, another bottleneck is the high taxation in Finland. Further problems are caused by the fact that a considerable part of ICT education is financed by regional development funds26, which are tied to the duration of the programme. In the future, it is not likely that the current levels of funding from the EU would be financed by the Ministry of Education. Thus, the temporary nature of certain teaching posts may dissuade experts from coming to the region.

“If we want ICT to stay here, to grow here, it means that not only must education be plentiful but also that the top should be really good. In that field you can clearly see that students go where the top is really special. Then the

26 Itkonen et al. (2000, 63) also point out that it is not necessarily to the point that a university engaged in a national teaching task should implement a regional education project. Students come to the university from different parts of the country, and after graduating there is no guarantee that they will remain in the region. Thus there is no certainty about the efficacy of the re-orientation training programme.
companies go where… the competition for top talent is fierce. And the arrangements we have are such that they give no leeway. There is no leeway in the state salary system; they don’t compete with companies. And they haven’t got used to the idea that tailor-made solutions have to be created for these people.”

Yet another potential bottleneck for the entire system is that relatively straightforward activities have their opponents. Some actors consider the selected strategies to be concentrated on too narrow an area and the investments committed to development by the City of Jyväskylä to be too large vis-à-vis the resources of the city. The Left Wing in particular has been critical of the selected line and the big investments. It has been claimed that excessively large investments made too fast will soon have to be paid for by the residents. Moreover, they argue that the City of Jyväskylä is after all a municipal organisation for which fast decision-making on the lines of a company is not appropriate. Further criticism has been aroused by the fact that the expertise-oriented economic development policy has not been able to improve long-term unemployment in particular. Moreover, the city has a considerable debt, and as a result of population growth, housing production is inadequate and more resources than at present should go into developing services.

The Jyväskylä urban region has in its development work emphasised co-operation between those with concrete expertise and holders of official posts in the creation of new openings and their rapid implementation; elected officials have been neglected. The quest for speed in development activity had further led to the preference for a small inside group. Thus democracy and overall weighing up of matters may suffer. Some elected officials have criticised prevailing practices, and potentially, increasing criticism may weaken the co-operative atmosphere in the near future. Elected officials have raised the issue of their minor role in development work with increasing frequency. On the other hand, the members of the core development group think that the flexibility, speed and good outcomes of development work can be explained by the fact that development work in the region is no longer as political as it used to be.

“One thing is that the politics disappear from it all. There are different political views, but when you’re doing this development work there’s no politics in it at all. But it used to be political: who was allowed to do what,

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27 For a long time there has been a Left Wing majority in the city of Jyväskylä. The last two terms of the City Council, however, have had a Right Wing majority.
which of the politicians was allowed to be involved. When that ended, the development went forward.”

“There was always a certain tension with the political leadership. It somehow belongs to this time that these tasks become so complex and fast and difficult, that the role of professional management clearly rises. And then how to preserve confidence in the decision-makers is one of the more difficult problems in today’s management. And there they measure the powers of each party. So it didn’t happen without bruises.”

Perhaps elected officials should be more clearly included in the preparation stages and made more committed to them than they are at present, in order to make decision-making easier. The culture of debate should also be more open than at present, so that voices that are critical of the present line in development activities are heard and taken seriously. At the present moment, the existence of criticism is acknowledged but redirecting activities on the basis of it is not considered. Failure to listen is unlikely to cause problems as long as the development of the Jyväskylä urban region is positive, but if the direction changes, criticism will easily mount and it will be difficult to get approval for various development matters.

**Messages for process-based regional development**

As a future mode of action in regional development, Chapter 2 presented a process-based development that emphasises the initiation and management of processes in a network environment and the involvement of the best experts in the respective areas according to their own points of departure. In recent years, the Jyväskylä urban region has been considered one of the best examples of regional development in Finland. Thus, the assumption behind the present study is that indications of the future directions regional development will take would be more likely found in regions like the Jyväskylä urban region than elsewhere.

The development of the Jyväskylä urban region emphasises the development of regional competitiveness and network-like operation. “Soft” factors of competitiveness have played an important role in the development of the ICT cluster. ICT-led networking has been connected to the overall development of the region and the development has been path-dependent: although the deliberate development of the ICT cluster was begun only in the mid-1990s, the laying of the foundations for the development had already begun at the beginning of the 1960s. In the first phase of the development, conscious strategic planning for the development of the cluster had not yet occurred. From the 1980s to the mid-1990s, the development concentrated on strengthening the
technological knowledge base. Since the mid-1990s, the ICT cluster has been developed systematically. Increasing emphasis has been placed on drawing up and implementing various programmes as well as large development projects.

The main clear turning points in ICT-led development were first the professorial post in computer science donated in the late 1960s and the initiation of education in the field. The turning points of the 1980s were the inception of the science park activities through the Tietotajama project, emphasising ICT, and the ideation and start-up of the degree programme in applied natural sciences. The 1990s saw several turning points, the more significant among them being the inception of the centre of expertise programme work, the ideation and implementation of re-orientation training under the EU Objective 2 and the transfer of Nokia to Jyväskylä. In the new millennium, the emphasis on multidisciplinarity in ICT development is symbolised by the opening of the Agora Building.

Gradually occurring turning points include especially the changes in attitudes within the University of Jyväskylä in the 1980s that led to increased co-operation between the University and the surrounding area. Another important turning point was the transformation of the relations between the municipalities in the Jyväskylä urban region from friction to co-operation, while the changes in the strategy work of the City of Jyväskylä itself after the mid-1990s constitute a third gradually occurring turning point.

Examination of the process of ICT-led development shows that the main explanatory phenomena for the positive development of the Jyväskylä urban region after the middle of the 1990s were, first, a right strategic choice, namely investing in the strengthening of expertise and ICT-led development, Second comes the ability to capitalise on creative tension; that is to bring to the fore themes that are rife with this tension and that make people take interest in and become motivated for development work. Utilising creative tension in development work has required the presence of active people with an interest in the development of the urban region, leaders of change with the courage to propose large development projects calling into question innovative and established action models.

The third main explanatory phenomenon is networking: The main characteristic of development work has been the intense and functional co-operation among actors. The business community and research and educational institutions have also been involved in the development. The fourth explanatory factor has been the exploitation of publicity for the development, the improvement of the City of Jyväskylä’s image. The
fifth main phenomenon has been the ability of the actors to seize opportunities as they opened up and make prompt use of the new practices of development work, especially action models for programme-based development and sources of funding.

Numerous strengths are present in the development work of the Jyväskylä urban region that leads us to predict that positive development will continue. On the other hand, potential bottlenecks to development include especially the slowdown of development in the ICT field and a possible recession as well as the fact that not all actors are committed to ICT-led development and the modes of operation employed. Failure to listen to criticism may lead to a crisis in the atmosphere of co-operation, the more so if strategic choices do not produce the anticipated results.

Although the development of the Jyväskylä urban region has been path-dependent, it also includes features with suitable implications for more extensive regional development. To be able to respond to the dynamic nature of the environment with dynamic development work as in the development process of the Jyväskylä urban region, attention should be paid to:

- Dynamics of processes, the start-up of processes and their management.
- Correct timing of development work, making the “right” strategic choices, seizing the competitive advantage by being a pioneer.
- Ability to create and utilise creative tension in development work and the sense of drama: presenting issues so that people become enthusiastic and join in the development work.
- Ability to attain short-term success in order to sustain motivation.
- Management of change and the importance of bold, innovative people.
- Functioning of networks and the importance of broad participation; on the other hand, sufficiently strong coalition behind the change that still does not preclude listening to different opinions and questioning objectives.
References


**Other references (memoranda, strategic plans, programmes, laws etc.)**


*Centres of Excellence in Research 2001.* The Academy of Finland. 
Eloa ja elinvoimaa Jyväskylässä 2001. [Life and Vitality in Jyväskylä]


Appendix: Interviewees

Jouni Juutilainen, Development Manager, City of Jyväskylä 26.3.2001

Jari Kovanen, Senior Technical Advisor, Employment and Economic Development Centre, Technology Unit 26.3.2001

Hannu Korhonen, Development Manager, Regional Council of Central Finland 26.3.2001

Erkki Laatikainen, Editor-in-Chief, Keskisuomalainen Plc 5.4.2001

Jussi Nukari, Director (IT Sector), Jyväskylä Science Park Ltd, Centre of Expertise Programme in Information technology 5.4.2001

Ritva Nirkkonen, Director (Business Development), Jykes Ltd (Jyväskylä Regional Development Company) 5.4.2001

Dan Asplund, Technology Manager (Development Programmes), Jyväskylä Science Park Ltd 6.4.2001

Petri Maaranen, Director, Jyväskylä Polytechnic, School of Information Technology 6.4.2001

Erkki Järvelä, Executive Director, Regional Council of Central Finland 20.4.2001

Mikko Koskela, Development Manager (Electronics Industry), Jyväskylä Science Park Ltd 20.4.2001

Pekka Kettunen, Mayor, City of Jyväskylä 23.4.2001

Uljas Valkeinen, Managing Director, Central Finland Chamber of Commerce 23.4.2001

Esko Peltonen, Managing Director, Jyväskylä Science Park Ltd 23.4.2001

Jukka Akselin, Managing Director, JSP Facilities Ltd 11.5.2001

Olli Väätäinen, CEO, Yomi Group 22.5.2001

Esko Miikkulainen, Vice-President, (Business Development), KSP Group Plc 22.5.2001

Pekka Neittaanmäki, Professor, University of Jyväskylä 23.5.2001
Erkki Ikonen, Chair of the City Board 23.5.2001
Asko Malinen, Area Director, Sonera Entrum Ltd 25.5.2001
Mauri Pekkarinen, Member of Parliament 4.6.2001
Pasi Mäkinen, Director, Employment and Economic Development Centre 6.6.2001
Matti Ojala, Vice-Chairman of the City Board 6.6.2001
Pentti Sahi, Ex-Chair of the City Board 6.6.2001
Antti Tanskanen, CEO, OKOBANK 8.6.2001
Kauko Keränen, Site Manager, Nokia (NMP Jyväskylä) 12.6.2001
Nordic co-operation

takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council

is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers

is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

Stockholm, Sweden
2002
The Emergence of a Regional Innovation Network

A Process Analysis of the Local Bio Grouping in Turku, Finland

Henrik Bruun

Abstract

In the first half of the 1990s, many regions experienced economic stagnation and unemployment as a result of the worldwide economic recession. These problems were particularly severe in Finland, where the recession was deepened by the collapse of trade with Russia. Consequently, Finnish regions had to rethink both the contents and the means of their industrial policies. In practice, this meant that municipal authorities started working toward a restructuring of the local economy, trying to create good business environments for high technology industries. The City of Oulu is perhaps the internationally best-known example. However, similar developments have been going on in most larger cities in Finland. This is a study of biotechnology development in Turku, a city on the southwestern coast of Finland. During the 1990s, Turku grew into a European centre of biotechnology, competing with the Helsinki area. A condition for this development has been close cooperation between industry, universities and public authorities. The study is based on a regional innovation network perspective and analyses the network process in the light of nine process parameters. It concludes that the rapidly developing BioTurku network is characterised by a high degree of density, goal consistency, symmetry and openness, a medium degree of integration, connectivity and formality and a low degree of transparency. These qualities are positive from the perspective of performance dimensions like education, research and entrepreneurship. However, they might turn out to be problematic according to other performance criteria, such as broad participation in decision-making, political legitimacy and critical discourse. In addition, there is a conflict between the need for closure and concentration in order to build lobbying power for the network, and the need for openness and distributed decision making to maintain the ability of the network to adjust to changes in the environment.
Introduction

Recent changes in the technological, institutional and cultural foundations of the international economic system have exposed regions to new challenges. The overall development is summed up, for instance, in Manuel Castells’ (2000) notion of “the informational economy.” Some of the features of this “new” economy are (selective) globalisation of markets for finance, goods, services, science and technology; internationalisation of production; increasing significance of information and knowledge-intensive production; transition from vertical models of production and management to various forms of networks; displacement of economic activities from individual corporations to projects and networks; emergence of the network company and so on. These developments have led to substantial changes in the conditions for economic growth in states and regions (Cooke and Morgan 2000/1998). Factor inputs are less and less restricted to traditional political or administrative boundaries, but move in what Castells (2000) calls a space of flows. States and regions need to attract those flows in order to sustain economic development. Since growth has been unevenly distributed over economic sectors, many regions have had to restructure their economies during the past ten or twenty years. The goal has been to exploit new growth areas, many of which involve the production and utilisation of knowledge-intensive technologies.

This is a study of a particular city involved in the kind of transformation described above: Turku in southwestern Finland. As will be described in more detail below, Turku is experiencing a restructuration of its economy. One of the main challenges has been to establish Turku as a centre for the growing Finnish biotechnology sector. Thus, during the past decade, biotechnology has acquired the status of a local development project and various actors in Turku have successively increased their stake in the project.

Turku, just like any other city that wants to increase its competitiveness in the globalising economy, has faced the challenge of increasing the innovative capacity of local industry. A basic insight of modern innovation research has been that such capacity cannot be built by focusing on individual companies only. In this view, the source of competitiveness is to be found in the environment of the company as much as in the company itself. The notion “milieu of innovation” has been used for designating local or regional environments that are successful in stimulating innovative activities (Kostiainen and Sotarauta 2000; Castells and Hall 2000/1994). Such milieux are characterised by their capacity to create synergy between various elements and to channel
this synergy into the generation of new knowledge, new processes and new products (see also Kostiainen 2000). According to Castells (2000, 421), “[m]ilieux of innovation are the fundamental sources of innovation and of generation of value added in the process of industrial production in the Information Age.”

Turku faced this challenge under rapidly changing conditions for local policy-making. In the beginning of the 1990’s, Finland experienced a severe recession, which was particularly hard on Turku as a result of its industrial structure. Local decision-makers were therefore forced to pursue more active industrial policies, targeting investments to prioritised branches. Biotechnology was one of these. At first, the plan was to build production facilities for firms that needed them. However, it was soon realised that no one was managing the bio-grouping (nowadays called BioTurku) as a whole and that such management was necessary for strengthening its competitiveness. The city took upon itself to be such a manager and established a new structure for this, Turku Science Park. The present study explores this process, tracking some of its critical events and analysing the resulting innovation network. One of the striking features of the BioTurku-trajectory is that it did not follow established decision-making channels, but was rather created through a mixture of old and novel forms for decision-making. Thus, horizontal collaboration between people and organisations (sometimes formalised, sometimes informal) was at least equally important as the vertical decision-making hierarchies of, for instance, the city and the universities. Seen from a BioTurku-perspective, the locus of initiative has been on the move constantly and the bio-grouping has been a dynamic and self-transforming rather than a static structure. I have therefore chosen to use a network approach in this study, implying that the analysis will focus on the characteristics of BioTurku considered as a regional innovation network.

The research questions are: What were the main events in the history of BioTurku? Who were the most significant actors in this process? How have these actors collaborated and how has the pattern of collaboration changed over time? How do the actors themselves experience the quality and significance of local collaboration? What kind of network is BioTurku? And, finally, what are the challenges that Turku faces in attempting to sustain and strengthen the BioTurku-network? These questions will be addressed in section 2, using the conceptual framework for process analysis presented in that section.

The empirical material was gathered through interviews with twenty-two people from Turku, working in organisations that are parts of
BioTurku (see appendix I). The interviews were conducted in the spring and early summer of 2001, and the interviewees were selected partly by the snowball method, and partly on my own judgement. The snowball method, which implies that the interviewees themselves suggest people who should be interviewed, is good for identifying those who are visibly participating in collaboration or controversy. However, it is of less value for identifying actors whose visibility is low. I also wanted to interview people from several organisations in each actor-category in order to get a better sense of how well the interviewees selected by the snowball method represent their categories. A limitation of the empirical material is that it does not include interviews with members of the City Council or the City Board of Turku, or with representatives of the “old” pharmaceutical and diagnostic industry in Turku (except for two shorter telephone interviews, see appendix).

In addition to the interviews, various documents were used as primary material, for example, strategic plans, memoranda, assessments, risk analyses, overviews, etc. I have also benefited largely from Maria Höyssä’s (2001) study of the building of a biotechnology centre in Turku and from my previous collaboration with her on the topic (Bruun et al. 2001), as well as from Nina Janasik’s (Janasik 2001) comparative work on technology policy in the Nordic countries. Janne Hukkinen, Maria Höyssä, Andrew Jamison, Richard Langlais, Reija Linnamaa, Mikko Rask, Johanna Reiman, Markku Sotarahta, Göran Sundqvist and Knut Sørensen gave me valuable feedback on earlier versions of the manuscript.

The article is structured as follows. The ensuing section presents the notion of the regional innovation network and specifies its meaning in this work. The outcome is a process-oriented conceptual framework. The third and fourth sections contain background information about the economy of Turku, the industrial policies of the City of Turku and the present concentration of life science research and bio-business in the city. Section five describes some of the critical events in BioTurku’s short history. Section six analyses BioTurku as a regional innovation network, using the concepts that were presented in section two. Finally, section seven sums up the results and identifies some of the challenges for the future of the BioTurku network.

**Conceptual Framework**

During the 1990s, the term “network” acquired the status of a key concept in discourse on contemporary society. Manuel Castell’s (2000) notion of “the network society” was particularly influential. He argued that the shift from an industrial economy to an informational economy
(see previous section) from the mid-1970s onwards has effected a transition in the organisational logic of operations. The past two decades have seen the emergence of a multitude of network-models of organisation – from supplier networks based on concepts like “just in time” to strategic alliances between competitors. Even corporations themselves – or at least large ones – have adopted a network form of organisation, according to Castells. A recent study shows that Finland is no exception to many of these trends (Tsupari et al. 2001).

The network form of organisation seems to be particularly typical for high technology firms (Powell et al. 1996; Acharya et al. 1998; Castells 2000; Tsupari, Nissinen et al. 2001). The reason for this is, according to Powell et al. (1996, 117), that in fields of rapid technological development, “research breakthroughs are so broadly distributed that no single firm has all the internal capabilities necessary for success.” For example, the research done by Powell and his colleagues suggests that networking has become a paradigmatic form of organisation within biotechnology and that “the field is becoming more tightly connected” (Powell, Koput et al. 1996, 143). Collaboration occurs within a multitude of fields, ranging from R&D to marketing and licensing. The authors argue that networking is significant not only for sharing risks or acquiring access to knowledge and information, but more importantly for building-up strategic organisational competences – capabilities such as interacting with other firms, locating oneself in a network position, seeing the opportunities provided by collaboration and benefiting from it. In other words, the experience of networking makes organisations more competent networkers, and thus – according to Powell and his colleagues – more competitive in the network economy.

Collaboration through networks is, however, not only a feature of innovation, production and business. A similar trend has been observed within the public sector of contemporary societies. Both policy-articulation and policy-making is increasingly taking place through collaboration between public authorities and various non-public local, regional, national and/or international actors (Marsh 1998; Kickert et al. 1999/1997). The resulting “policy networks” have been described as “patterns of relations between interdependent public, semi-public and private actors involved in processes of public policy-making in a certain

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28 The network corporation is characterised by “organization around process, not task; a flat hierarchy, team management; measuring performance by customer satisfaction; rewards based on team performance; maximization of contacts with suppliers and customers; information, training, and retraining of employees at all levels” (Castells 2000).
policy field” (Sotarauta 2001, 39). This transition is potentially dramatic, because it contains a shift in policy-thinking from “government” to “governance” – that is, from the idea of centrally co-ordinated and sectorial policy-making with narrowly defined problems, clearly articulated goals and resources that meet the needs, to the notion of decentralised and collaborative policy-making in which problems are often hard to define, objectives multiple and sometimes contradictory, at the same time as needs constantly exceed resources (Heffen et al. 2000; Sotarauta 2001).

Both economists and political scientists have thus become increasingly interested in using a network approach in their research, and this study draws on both traditions. Originally, biotechnological R&D in Turku was organised mainly by the universities and a few larger companies. During the last fifteen years, however, the City of Turku has become more and more involved in the network, utilising the idea of network governance rather than hierarchical government. Turku thus follows a trend in regional industrial policies that has been recorded in numerous studies of high performance regions like Silicon Valley, Emilia-Romagna and Baden-Württemberg (Saxenian 1994; Castells and Hall 2000/1994; Cooke and Morgan 2000/1998), reconversion regions like Styria in Austria, Wales and the Basque country (Cooke et al. 2000; Cooke and Morgan 2000/1998); regions with industrial districts like Friuli in Italy (Cooke, Boekholt et al. 2000); and regions in transitional economies like Lower Silesia in Poland (Cooke, Boekholt et al. 2000).

The regional emphasis of innovation activities and policies has been conceptualised through several notions, the most widely used being “regional innovation systems,” “innovative milieux,” “regional clusters” and “industrial districts” (see, for instance, Isaksen 1997; Braczyk et al. 1998; Kostiainen and Sotarauta 2000; Castells and Hall 2000/1994; Cooke and Morgan 2000/1998). As mentioned before, this study uses the concept of the regional innovation network. Thus, it focuses on collaboration and complementarities, just like the notions of the innovation system and innovative milieu. However, it is restricted to a particular field of collaboration – biotechnology – and the emphasis is on analysing processes and the structure of processes rather than mechanisms. The regional innovation network can be defined as a geographically embedded pattern of inter-organisational relations that converge around some particular field of innovative activity.

What is at issue in the regional innovation network approach is the hypothesis that such networks make a difference for innovation and economic performance, as well as for the contents and success of policy
making. An important step in demonstrating the significance of inter-organisational collaboration is that of distinguishing between different kinds of networks. In economic analysis such distinctions are often made on the basis of what the network performs or whom it involves: production network, supplier network, customer network, etc. Political scientists have instead focused on the structural features of the network. For instance, Marsh and Rhodes made a distinction between tight and weak networks. Tight networks involve few participants, shared values, resources exchange and continuity. Weak networks are the opposite. Marsh and Rhodes argued that these structural features have effects on policy outcome: “… the existence of a tight policy network constrains the policy agenda and tends to result in policy continuity” (Marsh 1998).

The emphasis on network structure has, however, also been criticised for neglecting the processes of network formation and network transition (Hay 1998). If structure is emphasised too much, all change must be explained with factors exogenous to the network (Marsh 1998). Yet the fact that so many networks undergo change over time suggests that also endogenous forces, that is interaction between the members, are at work (Dowding 1995). This has also been emphasised in some of the economic literature on networks. Mark Ebers (Ebers 1999/1997), for instance, has complained that we know too little about “how inter-organisational networking relationships are built, develop and dissolve.”

Another issue that has been debated among scholars of regional networks is the extent to which processes that take place at a national or international level should be taken into account when explaining network formation and network characteristics in regions. Such trends in economy, technology and policy-making are bound to affect networking in the regions. Marsh (1998), for instance, has argued that policy networks are a meso-level and that any study of them must take both the micro-level (processes, interaction within the network) and the macro-level (larger trends) into account.

This study combines the processual and the structural approaches to networks, at the same time as it shows how the innovation network in question, BioTurku, has been embedded in macro-level changes. The processual analysis is organised through the identification of critical events in the network formation process. The structural analysis takes its point of departure in the structure of the process. Thus, instead of treating BioTurku as just a network of relations between actors, I will acknowledge its processual character. Traditional network characteristics, such as the number of nodes and their relations, are a part of such an analysis. These form the basis for notions like concentration, density,
openness and connectivity (see below), because they can be seen as highly relevant for the process of interaction. However, of interest is not only what the network looks like at some specific point of time, but also how it changes over time. Thus, the analysis will focus on the direction of change in network parameters (dynamics in the list below). Finally, the conceptual toolbox of network analysis has been extended with a corresponding set of tools for process analysis. These concepts refer to the characteristics of interaction between network members and the perceptions the actors have of the network. Formality and integration are examples of the former, and transparency and consistency of the latter.

The parameters used in the analysis are the following:

- **Concentration:** Is the network process centred or decentred? Decentred processes are based on symmetrical relations, such as “being a sibling” or “entering a shared project on equal terms.” Centred processes involve asymmetrical relations, such as hierarchies of command or a supplier network that is dominated by one big user. (Mattila and Uusikylä 1999).

- **Density:** Do actors have just one kind of relation to each other, or several kinds? Dense processes consist of actors with multiple relations to each other, as a result of, for instance, actors having several roles or actors having changed roles over time (relations to people do not change as fast as roles). In thin processes, members have just one kind of relation to other members (that is, relations associated to just one role).

- **Formality:** Is the network formal or informal? Formal processes are based on agreements, often in the form of written contracts that bind the parties to a particular course of action. Informal processes are based on relations that involve no articulated agreement. Mutual trust is often the glue of these relations (Powell, Koput et al. 1996; Mattila and Uusikylä 1999).

- **Transparency:** How transparent are the components and the processes of the network to its members? This is partly an issue of monitoring the network and partly a question of information sharing and communication. Transparent processes are based on continuous monitoring, a high degree of information sharing and “noise-free communication.” The opposite is called a non-transparent process.

- **Integration:** Do members change their way of thinking and acting as a result of interaction within the network?
Encyclopaedic processes are made of autonomous actors whose identity does not change as a result of network membership. Synthetic processes, on the other hand, consist of actors who adapt their activities to the network, or who manage to get the network to adapt itself to their activities.

- **Connectivity**: How many intra-network connections are there in relation to the number of members? High connectivity suggests that network members are more dependent on the network as a whole than on particular partners within the network. Low connectivity, on the other hand, suggests that the network is organised around one or a few central members and that it is characterised by asymmetric dependency relations: most members will be dependent on these “main connected components” (Powell, Koput et al. 1996).

- **Consistency**: A high degree of consistency implies that it is possible to identify a network goal that is shared by most members of the network (Castells 2000). Thus in consistent processes, members have good reasons to define themselves as part of the network. Inconsistent processes show a divergence in interests between their members and must therefore be held together by some form of domination.

- **Openness**: Is the process open or closed? Does the network have a clear boundary regarding membership? In closed processes there is little new entry over time, while in open processes new actors face few obstacles to becoming members.

- **Dynamics**: Is the network static or dynamic? Change can be measured in several ways. The most basic measure is that of growth or decline. A growing network demonstrates more entries than exits, while a declining network has a surplus of exits. However, networks can change along any of the axes presented here and the issue of size should not be emphasized too much. Changes in the structure of relations may be much more important than changes in the number of network members. Dynamic processes are characterised by change in several of the parameters mentioned here, while static processes show little change. Note that there is no positive value in the word dynamic in this context. Change is not always to the better.
The relevance of these features and their particular combination in BioTurku is discussed in the concluding section. The analysis is qualitative, based on interviews and documents rather than on quantitative data. Ideally, quantitative analysis should supplement the qualitative approach. In this study, however, this was not possible because of time restrictions.

Turku: from Reactive to Proactive Industrial Policies

Turku is situated in the southwestern part of Finland, on the shore of the Baltic Sea. With approximately 172,000 inhabitants, it is Finland’s fifth largest city. Administratively, Turku belongs to the greater Turku region (officially Turku sub-region), which also includes the towns of Kaarina, Raisio, Lieto and Naantali, and totals a population of 230,000. Turku is the oldest Finnish city and has played a significant political, economic and cultural role in the country’s history. In modern times, however, Turku has been bypassed in national significance by the Helsinki area (including the cities of Espoo and Vantaa) and, more recently, has run into considerable competition with other regional centres, such as Tampere, Oulu, and Kuopio. The economy of Turku and its region is diversified, with services, trade, and industry being the dominant sectors. Other important sectors are transport and construction. From a cluster-perspective, the Turku region has five strong “groupings”: the metal group, structured around shipbuilding; the real estate group, which includes construction, property maintenance and real estate business; the logistics group, focusing on land and sea transport, cargo handling and storage; the graphic industry with publishing and printing as main activities; and finally, the biotechnology and food group, structured around the research-intensive pharmaceutical and diagnostics industry, as well as more conventional food processing (Stenholm 2000). What is striking is that the Turku region has a weak position in two of Finland’s most important clusters, the forest cluster and the telecommunications cluster. This background information is important for understanding the strong position of the life science-sector in the region.

The Turku region suffered a considerable decline in employment during the recession of the Finnish economy in 1990-1994. In the city of Turku, the unemployment rate rose from 4.2% in 1990 to 22.1% in 1994 (City of Turku 2000). There were many reasons for this development. Beside the general recession in Finland during these years, Turku was particularly struck by the sudden end to trade with Russia, which led to the closing down of most of the textile, clothing and shoe industries and

The four bigger cities are Helsinki, Espoo, Tampere, and Vantaa.
approximately 40% of the food industry. The latter was also affected by Finnish membership in the European Union (Interview with Ilpo Siro). Turku has had significant problems reviving its economy after the recession. In 1999, the unemployment rate was still 17.4% (Statistics Finland; compared with 10.2% for the whole of Finland). Even though some of this high unemployment can be explained by migration of unemployed people from the countryside to the city, it is also clear that local economic life had stagnated or even declined. Measured in regional BNP per capita, the 1992-1999 trajectory of the Turku sub-region was clearly worse than that of Oulu, Helsinki and Tampere and slightly worse than Jyväskylä (see figure 1). Salo was included in figure 1, despite its being smaller than the other regional centres, because the sub-region is situated within the same larger regional administrative unit, Southwest Finland, as Turku. In contrast to Turku, Salo was successful in attracting parts of the rapidly growing ICT-cluster (Steinbock 2001).

![Figure 1. BNP per capita 1992-1999 in the sub-regions of Oulu, Helsinki, Tampere, Turku, Jyväskylä, and Salo. Index 100 = Finland (Source: Statistics Finland)](image)

The recession affected the political climate in the whole country. The need for targeting industrial policies was generally acknowledged, and cities and regions started making strategic plans for the future. According to deputy mayor Juhani Määttä, 1992-1996 was a period of

30 In Finland “mayor” refers to an administrative position, “city manager”.
conflicts. There was an awareness of “Turku being bypassed by Oulu, Tampere and Jyväskylä” (Interview with Juhani Määttä). However, in these difficult times policies tended to be reactive rather than proactive. The discussions did not lead to any significant measures until 1997, when the first Turku strategy was formulated and accepted by the City Council. The strategy identified biotechnology, information technology and culture as strategically significant areas and emphasized the need to encourage knowledge production, innovation, and the emergence of new technology firms (Turku City Council 1997). This represented a major shift in attitude, because previously these activities had primarily been seen as a concern of the universities and industry, not of the city administration. It is true that the city participated in the establishment of a technology centre in Turku already at the end of the 1980s and the beginning of the 1990’s by investing millions of Finnish marks (€ 1 = FIM 5.94) in facilities and equipment. However, it had not been an initiator or an engine for the developments.

Since 1997, the City of Turku has taken upon itself a more active role in the local economy. In 1999, it decided to invest FIM 75 m (€ 12.6 m) in Turku Bio Valley Ltd, a company that would own, manage and arrange production facilities for bio-companies. Most recently, in 2001, the City Board has planned to restructure the technology centre, which is presently limited to five buildings, into a structure that would make most of Turku (and also some areas outside the city) part of it. This implied a conceptual shift from technology centre to science park. According to the plans, the science park would be managed by three companies, Turku Science Park Ltd, which would be responsible for concept development, coordination and marketing related to the science park as a whole, and two “cluster corporations.” The publicly owned (at least initially) cluster corporations would have responsibility for concept development, coordination, marketing, centre of expertise programmes and other operative activities for the two major “clusters”: the bio-cluster and the ICT-cluster (see figure 2). There are no formal decisions about investments, but figures like FIM 35-45 m (€ 5.9-7.5 m) for Turku

31 For instance, in 1986-1989 the city bought almost 25% of the facilities in DataCity (FIM 50.4 m), the first technology centre building to be erected in Turku. In 1992 it supported the next technology centre-project, the BioCity-building, by investing FIM 15 m in equipment for a Centre for Biotechnology, and approximately FIM 10 m in the purchase of congress centre-facilities in BioCity (Höyssä 2001). It was also a shareholder of DataCity Centre (DCC, the body responsible for coordination and development of the growing technology centre), and supported some of its projects financially.
Science Park Ltd and the ICT-cluster company have been mentioned. The bio-cluster corporation will, as it seems now, be Turku Bio Valley, that is, the production facility developer that has already acquired FIM 85 m (€ 14.3 m) from the city.

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To sum up, in recent years the City of Turku has taken a series of proactive steps to counter the problem of economic decline. One of the strategies, perhaps the most important, has been to develop Turku as a milieu of innovation in the sense explained in the introduction. This has involved not only a redefinition of the responsibilities of the city for encouraging local economic development, but also the selection of strategic high technology areas in which investments will be made. The 1997 Turku strategy proclaimed bio- and information technology to be particularly important fields (Turku City Council 1997). Four years later, in the Turku strategy for 2001-2004, “bio” and ICT are already written about as the “leading branches” of the city (together with low technology areas like logistics and tourism) (Turku City Council 2001). The City’s
new approach is based on collaboration and networking. All this was very new for the city (although it was more or less typical for Finnish cities in the 1990s; in fact, Turku was a latecomer in comparison with some of the other major cities), and contrasted with a previous lack of a collaboration culture in Turku.  

**Why “Bio” and ICT?**

Like many other cities and regions, the City of Turku identified the generic high technology branches of ICT and biotechnology (in a wide sense, often just labelled “bio”) as representing the best opportunity for future economic development and employment. Reference is often made to the economic trajectories of Salo and Oulu (see figure 1). It is now hoped that Turku could experience something similar in the next wave of ICT-development, in which software and content production is expected to play a central role – a trend that would suit Turku’s profile in ICT-competence better (Carlsson 2000). The City Board has also discussed the possibility of shared ownership of the ICT-cluster corporation with the City of Salo (Turku City Board 2001). This would imply a significant geographical extension of the Turku Science Park, and in practice would constitute an alliance with Finland’s economically most successful ICT-centre (measured in regional BNP per capita).

The bio-focus of Turku Science Park has quite a different background, and since this is the area for my empirical study, I will discuss it more extensively. The organisational chart in Appendix II and the event calendar in Appendix III will provide the reader with some orientation.

As mentioned above, a significant biotechnology and food grouping already exists in the city. At the moment (September 2001) there are 41 “bio-companies” in the city, 12 operating in the field of pharmaceutical product development, 14 in diagnostics and products needed in biotechnological research, 3 in functional foods, 3 in

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32 A strikingly high percentage of the interviewees used the word envy when describing the local community (Turku). There was seldom any concrete demonstration of how this envy expresses itself, other than general statements such as that people in Turku masochistically enjoy misfortune. Also, many interviewees claimed that Turku (in general, not BioTurku) has a poor tradition of co-operation. The Turku interviews can be compared with those of another case study on regions and high technology that I was performing at the time in Aalborg, Denmark. There no one used the word envy, and all interviewees praised the local culture of co-operation. I do not want to exaggerate the significance of this observation, but the signs of local culture hampering the general climate of collaboration in the city were too obvious to be ignored.
biomaterials and 9 in providing research-services, marketing services, consultation, etc.\textsuperscript{33} One reason for this concentration is to be found in the development of the Finnish pharmaceutical industry in the 1970s and ’80s. Before the end of the 1970s, the industry was primarily based on acquiring licenses for foreign products to be sold in the domestic market. In a world of national trade barriers, this was a successful strategy. It was also compatible with the general Finnish policy of self-sufficiency in sectors of national importance (Interview with Kyösti Jääskeläinen). Among the companies were Farmos Ltd and Leiras Ltd, both established in Turku in the latter half of the 1940’s (Farmos as Lääke Ltd in 1947, Leiras as a part of Huhtamäki Ltd in 1946) (Peldán 1967). However, as pressure towards freer trade increased during the 1970s, several Finnish firms decided to embark on R&D-projects of their own (Pirhonen et al. 1982). Farmos, for example, was successful in developing the first Finnish medicine for breast cancer in the early 1980s. Farmos also developed tranquillizers and analgesics for animals during that decade. The pharmaceutical industry saw the new strategy as a way to prepare for the west-export that seemed necessary for compensating future market share loss in the domestic market. Product development, which is very expensive in the pharmaceutical sector, could be financed by the still profitable domestic market and by export to Russia that had increased rapidly in the 1970s (Interview with Kyösti Jääskeläinen).

The 1980s was a decade of consolidation: two companies, Orion Corporation (with headquarters in Espoo) and Huhtamäki Ltd, bought most of their competitors. Both companies were involved in several product development projects, and much of this activity was situated in Turku. (Farmos merged with Orion in 1990; Leiras merged with Medica Group to form Huhtamäki Pharmaceuticals in 1986; in 1992, Leiras once again became a separate legal entity.) The 1990s brought radical changes in operational conditions for the pharmaceutical industry. The Russian export market closed and prices in the domestic markets started sinking. Partly in response to this, Orion and Leiras made the strategic decision to target their product development more narrowly by reducing the number of R&D-projects (Interview with Kyösti Jääskeläinen). As a result, highly skilful researchers with considerable experience working in the industry

\textsuperscript{33} These numbers are based on cross-checking two compilations of bio-companies in Turku: a) Johanna Reiman’s (BioCity Turku) list 23.10.2000, and b) Turku Technology Centre’s list at its web-site (http://www.turunteknologiakeskus.com/TTK/ttk.nsf/enetusivu) 4.9.2001. The continued existence of companies that appeared in Reiman’s list, but not in the Technology Centre-list was confirmed.
decided to start their own companies to pursue the projects that had been shut down. Many of them operated in Turku. Examples of such companies are Galileus Ltd (from Leiras), Focus Inhalation Ltd (from Leiras), Juvantia Pharma Ltd (from Orion), and Hormos Medical Ltd. (from Orion). In the end, Huhtamäki Group solved its problems by selling Leiras to Schering AG, an international pharmaceutical company with which Leiras had been involved in co-operation since 1953. (Peldán 1967). At the same time, turbulence was rife within another area of local strength, the diagnostics industry. Wallac Ltd, with a long tradition of R&D in Turku, was sold to PerkinElmer Inc. (formerly EG&G Inc.), a global technology company based in the U.S. Thus, shortly after the recession, Turku suddenly found itself to have not only Finland’s greatest concentration of small biotechnology companies, but also two new multinational companies that had to be convinced that Turku was the right place for them. This was paralleled by a crisis within the Turku sub-region’s food processing industry, in which the number of employees sank by 21% (from 3216 to 2541) between 1995 and 1999 (Statistics Finland). The food processing industry is often mentioned as a background factor for the bio-group in Turku. However, it seems that its R&D-activities have been relatively restricted, and that it has yet to prove itself as a part of the high-technology grouping.

Turku’s investments in the bio-grouping were not motivated by the existing industry only. Equally important was the presence of a local education and research structure that supported the industry. According to the theory of innovative milieux, universities and other similar institutions are of utmost importance for regional or local competitiveness (Castells and Hall 2000/1994). The shift in industrial policies from direct subsidies to the creation of innovative milieux has resulted in the educational and scientific system becoming part of these policies. The city of Turku hosts numerous institutions of higher education: two universities, the University of Turku (16,200 students), and Åbo Akademi University (almost 7,000); a business school, the Turku School of Economics (1,900), a vocational high school, the Turku Polytechnic (over 6,000), and the Turku Vocational Institute (4,500). The University of Turku and Åbo Akademi University are both traditional universities with a broad range of domains of study. However, neither of them has a general faculty of engineering (although Åbo Akademi has a faculty of chemical engineering) – a fact often cited as an explanation for Turku’s inability to exploit the Finnish ICT-boom. Instead, both universities are strong in life sciences, with a total of four faculties doing research in the area. This cluster of research and education has been organised in a cross-
Faculty and cross-University organisation called BioCity Turku. Administratively, BioCity Turku belongs to neither of the universities, but has its own board with representatives from both of them. Industry and “research expertise” are also represented on the board. BioCity Turku’s mission is to effect collaboration, resource sharing, infrastructure development and synergies in research and education in the area of life sciences. The model of structured interdisciplinary collaboration has been perceived as successful, and it has been suggested that it should be diffused to other faculties and departments within the university (Tomlin 1999). There are, however, also critical voices (Kivinen and Varelius 2000, see the concluding section of this article).

BioCity Turku is structured in four research programmes, the Receptor Structure and Function programme, the Centre for Reproductive and Developmental Medicine, the Turku Immunology Centre, and the Systems Biology Research Programme. In addition, the two universities host or participate in seven Graduate Schools in the life science area, employing 182 graduate students (in 2000) from Turku in four-year positions (Johanna Reiman, BioCity Turku). In 1999, the BioCity Turku community produced 94 doctoral degrees (Working Group for Research and Education 2000), which amounts to 54% of the 1999 doctoral degrees at the two universities, and 15% of the corresponding degrees in Finland (The KOTA database, Ministry of Education). Turku Polytechnic and Turku Vocational Institute supplement the universities by educating bio- and food technology engineers, medical laboratory technologists, laboratory assistants, etc. Another important institution is the University Hospital of Turku (TYKS), which is one of five university hospitals in Finland, and which actively collaborates with the Faculty of Medicine at the University of Turku.

Expectations on the two strategic areas of Turku’s industrial policies, ICT and “bio,” are high. For instance, the number of people employed by the bio-grouping has been estimated to be almost 3,000 (university researchers included). According to targets set at strategy work led by city-owned Turku Bio Valley, the grouping should employ up to 10,000 people in 2010 (Nordic Adviser Group 2000). Most of the interviewees of the present study considered this to be a realistic prediction. (It should, however, be noted that the interviews were carried out before the economic downturn in the summer and autumn 2001.) In 1997, the software and electronics grouping in the Turku sub-region

34 The Graduate Schools are a part of the national system of higher education. They are administered by the Ministry of Education.
employed approximately 1,700 people. Here, visionaries have talked about 5-8,000 new workplaces in the region of Southwest Finland between 2000-2005, a substantial part of which could come to Turku (Carlsson 2000). Thus, all in all the two groupings are expected to produce 10-13,000 new workplaces in Turku within the next eight or nine years. This can be compared with the numbers of 23,200 jobs lost in the Turku sub-region in 1990-93, and 20,100 new jobs created in 1993-99 (Statistics Finland).

**The BioTurku Trajectory**

Regional innovation networks are cumulative and develop in a path dependent manner. This means that network dynamics cannot be reversed as if history did not matter. As mentioned above, BioTurku has, its origins in the local university structure and the strong presence of the pharmaceutical and diagnostic industry. It has no definitive date of birth, and there was collaboration between the university and industry already in the 1970s (Höyssä 2001). However, in the contemporary sense of broad collaboration between different activity domains, BioTurku is a relatively recent creation. The building of BioCity and its facilities for the Centre for Biotechnology in 1989-1992 can perhaps be seen as a kind of birth.  

35 This was paralleled and followed by a series of other critical events or activities: the formation of a BioCity scientific advisory board in 1990 and its integration with BioCity Turku in 1999, the Centre of Expertise Programmes of 1994-1998 and 1999-2006, the City of Turku’s decision in 1999 to found Turku Bio Valley Ltd, the working out of a common strategy for BioTurku in 2000, the redefinition of Turku Bio Valley’s mission in 2001, the building of PharmaCity and the first development project in the Bio Valley area the same year. A few words about each of these events are necessary for fleshing out the history of BioTurku. As before, appendices II and III can be used to facilitate reading.

BioCity is a seven-storey building with the architectural design of a modern high tech centre. Its significance lies in the fact that it was a first attempt to develop a permanent structure for synergies between the universities and local industry in the bio-area. The process has been described and analysed in Höyssä (2001), and Bruun, Höyssä, and Hukkinen (2001). BioCity was a real estate project, initiated by a construction firm in collaboration with scientists and people working in the industry. Eventually it became more and more of a university project:

35 The Centre for Biotechnology was already founded in 1988 and operated on a small scale in the DataCity-building until BioCity was finished.
both universities moved departments or parts of departments into the new building. The most path-breaking achievement was perhaps the Centre for Biotechnology, an institute shared by the two universities. As mentioned before (see note 31), the City of Turku participated in its funding. The Centre soon developed into a kernel for research activities across the boundaries between academia and business. Some of its more important research orientations have been structural protein research (protein crystallography), cell biology, molecular biology, and, most recently, functional genomics.

BioCity Turku (which was described in the previous section, and which should not be confused with the BioCity building) was founded in 1992 as an informal community of education and research. In 1995, the community was structured in six research programmes. These were later (2001) reduced to four. Despite being primarily an academic structure, BioCity Turku has played an important networking role through its emphasis on collaboration across disciplinary, faculty, and university boundaries.

BioCity as such was just a building. It did not have any strong organisation for coordination of its own, but only a scientific advisory board that decided upon the distribution of money from the Ministry of Education (special funds allocated to biotechnological research since the 1980s). The BioCity building was constructed as part of an already existing technology centre, which at that time consisted of another neighbouring building, Data City, and its operative technology centre-organisation, Data City Centre Ltd. (DCC, which, again, should not be confused with the building with a similar name). DCC’s sphere of responsibilities was successively extended to include also the bio-field. Two facts about DCC (later (1999) renamed Turku Technology Centre Ltd.), affected its activities in the bio-field. First, it did not own the technology centre buildings. This meant that it had little capital and no permanent sources of income. Second, for DCC the bio-field was just one of its responsibilities and it did not define the promotion of that field as a top priority. As the names suggest, both the DataCity building and the DataCity Centre organisation had their origins in IT-oriented visions. This means that DCC never acquired any strong position in BioTurku. The most important source of funding for the technology-centre organisation was the National Centre of Expertise Programme.\footnote{36 A national programme for regional development administered by the Ministry of the Interior. Regions can apply for funding for projects carried out within a regional Centre of Expertise framework. The idea is to target funding to focused...}
this programme, the technology centre provided BioTurku with an important, if restricted, input. Its two Centre of Expertise Programmes have consisted of a set of projects funded by the Ministry of the Interior, Southwest Finland, and the City of Turku. The projects were designed by various people from the industry and the universities and were operated by DCC. The first programme (1994-1998) contributed to the establishment of a series of units for clinical research services at University of Turku; Clinical Research Services CRST, Preclinical Pharmacology Research Unit PreFa (an externally funded university project from 1997 that will be integrated with Safety City in 2002), and Safety City (an externally funded university project from 1997, turned into an independent company in 2001). The programme’s ambition was to improve the local infrastructure for research and entrepreneurship in biotechnology. The second programme (1999-2006) puts more emphasis on creating new workplaces, new companies, and on the international impact of the region. The flagship project is perhaps the establishment of a national cluster organisation, Finnish Pharma Cluster, for companies and universities involved in drug development (Southwest Finland Centre of Expertise 1998). In 2001, the organisation published a target programme for the Finnish pharmaceutical industry (Brännback et al. 2001).

As a result of the turbulence within the local pharmaceutical and diagnostic industry, the commercial segment of BioTurku was strongly vitalised in the middle of the 1990’s. BioCity turned out to be an ideal environment for the new spin-off and start-up companies. It provided them with representative facilities and a stimulating environment in which collaboration with university researchers and providers of research-services could be pursued on a day-to-day basis. However, the strong growth of some of these companies and their expected advances from product development to production suggested that the BioCity-facilities would soon become too small. The City of Turku, which was now pursuing more proactive industrial policies and had defined biotechnology as one of its priorities, decided to found a new company for “owning, managing and fixing facilities for the growing high-tech companies in the Turku region.” This is the Turku Bio Valley Ltd. that has already been mentioned a few times. Its name derives from that it was given a particular area, the “Bio Valley,” to develop (Turku City Council 1999). As mentioned before, the city committed itself to invest FIM 75 m (€ 12.6 m) in the company. The financial arrangements resulted in the local efforts. At the regional level, the projects are generally administered by a technology centre.
transfer of the city’s shares in DataCity (the joint stock property company of the building with the same name) to Turku Bio Valley, thus giving it the capital and rental income rent) that the technology centre had never enjoyed. Juhani Leppä, a former city mayor, was appointed as managing director.

Perhaps as a result of being new in the field, Leppä felt that there was a need for gathering local actors in the bio-field in order to help Turku Bio Valley define its own strategy. Such coordination was important to guarantee customers to the risky real estate business of the company. Leppä was afraid that the decision to invest heavily in production facilities had been premature, based on a belief that the cluster was more mature than it really was. He initiated a strategy-process in the spring of 2000, and managed to enrol all significant members of BioTurku. Leppä’s initiative was timely because, as a result of the rapid developments in the end of the 1990s, many actors felt a need for getting an overview of the network. Businesses were, of course, primarily interested in benefitting from the resources that the City of Turku was investing in the field. They also had an interest in guaranteeing a future supply of people with a suitable education. At the same time, the vocational schools and the universities needed to know how their educational programmes fitted existing and future labour markets. The City, on the other hand, had a chance to make an inventory of its recently selected priority of industrial policies. The City’s mayor Armas Lahoniitty, deputy mayor Juhani Määttä and trade promoter Ilpo Siro all participated in the strategy work. The process had unexpected consequences. First, it resulted not only in a strategy for Turku Bio Valley, but more significantly in a strategy for the whole of BioTurku (Working Group for Research and Education 2000). Strategy-processes have, of course, no value in themselves and are part of the ordinary life of many organisations. In this case, however, we are not talking about a strategy for some specific organisation, but for the bio-grouping as a whole. These kinds of regional cluster-strategies are not particularly common either in Finland or in the rest of Europe. The strategy framed BioTurku as an innovation chain and various kinds of weak or missing links were identified. A set of shared targets and recommendations were formulated. 37 Most of these concerned projects that had already been

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37 Collaboration between educational organisations on the realisation of new training programmes, a strengthening of the Centre for Biotechnology in the area of functional genomics, the establishment of a drug development centre within the framework of BioCity Turku, strengthening of the position of the Centre for Biomaterials in the university structure, establishment of a national food
started and cannot as such be seen as a result of the strategy work. What was significant, however, was that individual projects could now claim to have backup from the cluster as a whole. This has, according to several interviewees, been crucial for speeding up many of the endeavours.

The other result or effect of the strategy work was even more unpredictable. The process revealed that there was no organisation taking responsibility for the management of the bio-network as a whole. The existing cross-boundary organisations were all restricted in this sense: BioCity Turku focused only on academic collaboration, the Centre for Biotechnology was exclusively research-oriented and Turku Technology Centre (a new name for DCC) lacked resources for such work. Leppä wrote a brief to the city administration in which he argued that the city should take action to guarantee proper management of the bio-cluster (Leppä 2000). Such measures would, he argued, have consequences for the whole technology centre structure. At the same time, the Turku Area Development Centre (TAD) was in the process of creating a common marketing project for the real estate developers in the city. As a consequence of the high technology boom at the time, exceptionally many real estate projects were being planned or realised independently of each other. A foundation called Uuden teknologian säätiö (Foundation for New Technology), with Kyösti Jääskeläinen as chairman, arranged a meeting in which the common denominator of contemporary and planned real estate projects was discussed. The meeting resulted in the vision of a Turku Science Park – a structure in which the production of science and technology would be seen as an organic part of the city and the larger region, rather than as an activity that is proper only to the universities or the technology centre (Working Group for Reorganisation of the Technology Centre Activities 2001). The science park was already mentioned above (section 3) as an example of the city’s more proactive industrial policies. Here I will go into more depth on the process of its foundation.

The two lines of thinking – Leppä’s and Jääskeläinen’s – attracted the city administration, which established a working group to plan the new structure. The outcome was a proposition that the technology centre should be rearranged in a three-company structure in which a new development centre with an interdisciplinary orientation, attracting the VTT Technical Research Centre of Finland to Turku, quick establishment of an incubator exclusively for bio-businesses, development of clean room activities and investigations of how international bio-industry could be attracted to Turku more efficiently.
Science Park Ltd. would have responsibility for development and marketing of the science park as a whole, while two cluster corporations would manage and market “the strategic branches” (bio and ICT). More specifically, the cluster corporations would be responsible for performance in the following areas: business administration, R&D-management, administration of projects and programmes, incubators, pre-seed money, technology transfer, venture capital, facilities, equipment, and other services (see figure 2). It was emphasized that the cluster corporations should not be general-purpose developers, but operate on a strict customer basis – the customers being branch-specific business groups and their service providers (including the state, region, sub-region, and the city). The working group also suggested that Turku Bio Valley’s articles of association should be changed so that it could function as the cluster corporation of BioTurku (Working Group for Reorganisation of the Technology Centre Activities 2001). Things happened quite fast. In July 2000, Leppä complained to the city administration that “unless BioTurku is resolutely managed, Turku Bio Valley Ltd. will not have customers.” Eight months later, the City Board was already discussing whether Turku Bio Valley itself should be turned into that resolute manager. Formally, this happened in January 2002.

At the same time, BioTurku has been expanded through a series of construction projects. A building called PharmaCity is presently being erected next to BioCity. PharmaCity, just like its neighbour, contains a mix of academia and business. Some of the new bio-companies (Hormos Medical, Juvantia) needed bigger facilities and moved to PharmaCity. VTT Technical Research Centre of Finland located a new research unit, its first in Turku, in the building. PharmaCity’s basement hosts a test animal service centre. The building is owned by VarmaSampo, an insurance company that agreed to buy it after Turku Bio Valley made a commitment to rent three floors (which are leased to the companies mentioned above). Expansion is also occurring in the so-called Bio Valley area (a place in Turku), where Turku Bio Valley (the company) is presently building office and quality control facilities for Novatreat (2,500 m²), and a pharmaceutical plant for Focus Inhalation (12,000 m²) – both of which are recently created companies (Novatreat 1997, Focus Inhalation 2000).

**Process Analysis**

The two previous sections have shown that BioTurku has developed through a series of critical events in which the locus of initiative was in constant shift, from real estate companies and the universities in the phase of planning and building BioCity, to DCC as the programmes of
expertise were designed and implemented, to BioCity Turku during the phase of establishing cross-faculty and cross-university research programmes, and to Turku Bio Valley and the City of Turku during the most recent strategy-making and science park building phase. At the same time, all phases involved collaboration between organisations and people operating within different activity domains. The building of BioCity was initiated by real estate companies in collaboration with scientists from university and industry, while most of the concrete planning was done by the two universities together. DCC used scientists from industry and the university to plan the programmes of expertise, and the City of Turku was represented at a high level on its board. BioCity Turku formalised collaboration between the universities and encouraged interaction over disciplinary boundaries. It also collaborated with the Centre for Biotechnology, in which co-operation between academia and business was a principle of operation. Finally, Turku Bio Valley has made even more extensive and systematic use of the BioTurku people and organisations. Its strategy work involved 70-100 people, and in 2002 acquired a formal position as a cluster organisation. In sum, an analysis of the critical events demonstrates that BioTurku really can be seen as a network.

This impression is further confirmed if one looks at the day-to-day reality of BioTurku. People circulate between organisations, transferring knowledge. Knowledge is also shared through various forms of collaboration. There are many examples of flows or interactions over organisational boundaries: the universities and vocational schools providing industry with educated people; cross-faculty/cross-university research schools and research programmes; equipment sharing between departments, universities and university and business; shared research projects between university and industry; university researchers doing contract research for industry; service units providing industry and the university with different kinds of research-related services; the business school educating executives of bio-businesses; the business school doing market research for companies; common strategy-making processes; common marketing of the network as a whole, and so on.

How should the development of this network be characterised utilising the structural process terminology presented in section 2?

Concentration: At the outset, BioTurku was a relatively centred process, with the universities being the powerful actors, while the pharmaceutical industry operated more or less independently. However, in the latter part of the 1990s, many new bio-companies were established at the same time as the City of Turku redefined its interests in the bio-
field. This has pushed the network process in a more decentred direction, with the universities, the new bio-industry and the city as the powerful nodes. One of the questions that this study cannot answer in a satisfactory way concerns the role of the “traditional” pharmaceutical and diagnostic industry in this constellation. As will be shown below, Leiras (now Schering), Orion, and Wallac (now Perkin-Elmer Life Sciences) have been important as providers of brokers or intermediators to the network. They also provide job opportunities for people who have studied at the university and the vocational schools and to some extent they collaborate with these organisations on research. Yet it seems that their direct input in the formation of BioTurku has been limited – generally mediated by people who have acted as private persons rather than as formal representatives of their companies.

**Density:** BioTurku constitutes a dense process because many people have occupied different kinds of positions over the years and have thus formed not only relations to a large set of people, but also many kinds of relations to the same people. For instance, many of the key people share a history in the “traditional” pharmaceutical industry, that is in Leiras or Farmos (later Orion). This is where they got to know each other and where they seem to have formed their ways of thinking about the relation between research and business. Today, they collaborate in new and quite different institutional settings. Examples are the executives of the Turku Technology Centre, the Finnish Science Park Association (Tekel), Hormos Medical and Juvantia Pharma. Others have a background in both academia and business. For instance, the president of BioTie Therapies – the first start-up bio-company to be listed at the Helsinki Stock Exchange – was previously the head of Centre for Biotechnology at the university. He is also married to one of the most successful university professors doing biotechnology-related research. Another example is the scientific director of BioCity Turku (university), who was active in the establishment of Hormos Medical, a spin-off company from Orion. These people often play the role of mediators – or brokers, in the terminology of network analysts (Jamison 2001) – between different activity domains. Besides having a rich experience and being familiar with the activity domains to be bridged, brokers also have personal contacts in many directions. Thus, they introduce a strong, and presumably important, informal dimension in the network.

**Formality:** BioTurku is a mixture of formal and informal networking. BioCity Turku is perhaps the best example of more permanent formal collaboration, while Turku Bio Valley’s strategy work was done on a strictly informal basis. In fact, the company did not invite
people to participate as representatives of their organisations, but rather as private persons who are familiar with the situation and the needs of BioTurku. This caused some problems in organisations with a more formal and hierarchical culture. However, as a result of the Turku Science Park structure and its two cluster corporations, the BioTurku network seems to be in a process of becoming more formalised. It remains to be seen what this means for the network dynamics. Up to this moment, many of the initiatives that have been critical for the network trajectory have had their source in informal rather than formal collaboration. The building of BioCity, the gathering of BioTurku into a common strategy framework and the transformation of Turku Bio Valley into a cluster organisation are all processes that started outside the formal hierarchies for making such decisions. With the new role of Turku Bio Valley, there will, for the first time in BioTurku’s short history, be an organisation with the explicit task of maintaining its dynamics. One of its challenges will be to combine efficient management with a continued openness for informal initiatives.

Transparency: Lack of transparency has been a problem for BioTurku, both internally and in relation to external actors. Many of the initiatives, such as the building of BioCity and the establishment of BioCity Turku, were partly taken as a result of the apparent lack of visibility of Turku as an important site of life science research (Bruun, Höyssä et al. 2001; Höyssä 2001). Also, Leppä’s initiative to rearrange the technology centre structure had its background in dissatisfaction with the Turku Technology Centre and its inability to boost and market BioTurku in an efficient way. Success in visibility and marketing presupposes that a network is transparent for outsiders in the sense that they can get a good picture of what is going on and of who is doing what. For instance, only since Turku Bio Valley entered the scene have the actors of BioTurku gathered in common sections at local, national and international biotech-fairs. As for internal transparency, many of the interviewees felt that the most important aspect of the strategy work initiated by Turku Bio Valley was that it provided the participants with an overview of the field and an understanding how their own activities fit into the greater picture. Obviously these needs had not been satisfied before. Several interviewees mentioned as a problem the existence of a large set of different co-ordinating organisations; for instance the Turku Technology Centre (previously DCC) was criticised for not informing the others clearly enough about its own activities. In conclusion, BioTurku has a history of being a relatively non-transparent process, but important steps toward greater transparency have been taken.
Integration: The depth of integration varies. Examples of actors adapting their activities to the needs of the network are: the two Centre of Expertise Programmes administered by DCC (Turku Technology Centre from 1999); the services and equipment of Centre for Biotechnology; University of Turku’s training programme for health and bio sciences, which combines medical science, natural science and business administration; the Turku School of Economics’ Innomarket Unit, which offers market research services for bio-companies and provides the business school’s MBA-programme with a biotech & life-science module; Turku Polytechnic’s training programme for bio- and food technology; the City of Turku’s decision to establish Turku Bio Valley to arrange production facilities for bio-businesses; and Turku Bio Valley’s activities to promote BioTurku. At the same time, however, there are also many actors who are more autonomous members of the network. Companies pursue their own agendas, and have primarily an instrumental interest in the network. During most of the 1990s, the City of Turku was relatively passive in relation to the bio-field. Many interviewees also thought that the universities react too slowly to the needs of BioTurku. Consequently, BioTurku seems to be somewhere between the extremes of an encyclopaedic and a synthetic process, moving from the former towards the latter.

Connectivity: The issue of connectivity can only be solved by quantitative analysis. However, my study suggests that the BioTurku process shows a medium-level of connectivity, which means that some actors (such as small bio-companies or organisations at the interface of activity domains, such as the Turku Technology Centre, the Centre for Biotechnology, and Turku Bio Valley) are in intense interaction with many other members of the network and therefore highly dependent on it. Other actors, such as the universities and many of their departments, and most of the bigger firms (even some of the new ones) are less connected and therefore pursue their activities more independently.

Consistency: In general, there seems to be a relatively high level of consistency in BioTurku. The three nodes of the network – the universities, the bio-businesses and the city – all share the interest of attracting students, educated people, international high-level researchers, research organisations like the VTT Technical Research Centre of Finland, new companies and venture capital to the city. They also seem to agree on the goals and the needs of the network, as articulated in the BioTurku-strategy and in Turku Bio Valley’s strategy-report (Nordic Adviser Group 2000; Working Group for Research and Education 2000). None of my interviewees contested the contents of these documents, and
none of them questioned the initiatives taken by the City to establish the science park and the cluster organisation for the bio-field. All seemed to accept the role that Turku Bio Valley had taken upon itself as a manager of BioTurku.

**Openness:** BioTurku has been a relatively open process. Two examples are BioCity Turku and the strategy work initiated by Turku Bio Valley. BioCity Turku, the separate organisation for bio-research within the two universities, is open to any department that wants to join. Similarly, Turku Bio Valley’s strategy work was highly inclusive. It is difficult to find examples of marginalized actors within the biotechnology-field. However, it is quite possible that such marginalisation has occurred in relation to other fields, such as biomaterials and more traditional fields of biological research. The empirical material gathered for this study neither confirms nor refutes such a hypothesis. Also, several interviewees expressed the fear that the establishment of the Turku Science Park, with its two cluster corporations (Turku Bio Valley for “bio”, and a new company for ICT), might lead to competition for public resources between the two clusters. It is possible that this could lead to the creation of boundaries that become obstacles for collaboration at the interface. Considering that many see bioinformatics as one of the main fields, or perhaps even the main field of biotechnology in the near future, this would clearly be a problematic development.

**Dynamics:** BioTurku has been a dynamic process in many ways. It has been in constant growth, particularly through the establishment of new bio-companies. New actors have entered the scene, even at the very heart of the network (e.g. DCC, Turku Bio Valley). A few external organisations have also been attracted to Turku, most notably Schering, Perkin-Elmer and VTT interviewees felt that there have been many conflicts along the way, particularly within University of Turku and within the City Council at the time of building BioCity, and between Turku Bio Valley and Turku Technology Centre when constructing the Turku Science Park model. However, considering that conflict is hardly avoidable in rapidly changing societies and that it is not realistic to expect attitudes and ways of thinking to change overnight, the overall picture is to me one of relatively smooth change. It remains to be seen how the formalisation of the network into a cluster managed by a public cluster organisation will affect the dynamics.

Summarising the analysis, BioTurku of today can be said to be a network process that is characterised by the following traits:

- Movement from high concentration towards greater symmetry.
Dense.
In the process of becoming more formalised.
Moving from non-transparency toward greater internal and external transparency.
Medium degree of integration.
Medium degree of connectivity.
High degree of consistency.
Open.
Highly dynamic.

Conclusions
In conclusion I will discuss the empirical results in the light of the theoretical issues mentioned in section 2. More particularly, what are the effects of BioTurku’s structural features on its performance, today and in the future? This case study clearly demonstrates the risks of too much emphasis on static structures in explanations. The analysis showed that BioTurku is a changing structure and the historical record suggests that at least part of the explanation for the change is to be found in the actions of its members and their interaction. It is therefore difficult to label BioTurku on structural grounds (as a “tight” or “weak” network). What is interesting in the case of BioTurku is not only the way in which its structural characteristics will affect its future performance, but also what the effect of the change in these characteristics will be.

Network analysts are often tempted to draw aggregate conclusions on the basis of structural features. This has been the case in, for instance, the discussion about policy networks. Policy scientists have presented numerous structurally based classifications of policy networks. Examples of resulting network labels are “state corporatism,” “group subgovernment,” “iron triangle,” “policy community” and “issue network” (Jordan and Schubert 1992; Waarden 1992). The problem with such aggregations is that they assume too simple a relation between structure and outcome, and the reason for making this mistake, it seems, is that structural analysis of networks has not been paralleled with a corresponding systematisation of outcomes. Such an endeavour, I suggest, would show that there are many different kinds of outcomes, and that there is no unambiguous causal relationship between a network considered at the aggregate level and its portfolio of performances. Instead, I predict that a performance oriented study of, for instance,
policy networks would show that two networks of ‘the same kind’ – let us say, policy communities – often result in quite different sets of outcomes. The reason for this is not necessarily that structure lacks causal relevance, but rather that there are many dimensions of outcome, and that different dimensions can be related to different combinations of structural features. This complexity is lost if networks are classified at an aggregate level and related to just one type of outcome (such as the temporal scope in action; long term – short term).

Thus instead of trying to classify BioTurku as a specific type of regional innovation network, I will discuss the way in which its process features are related to performance in different dimensions. In some cases, such relations will be more obvious and significant than in others.

To what extent do network members benefit from BioTurku? To evaluate this we must distinguish between direct and indirect benefits. Benefit is direct if collaboration with other parties is instrumental for the achievement of the actor’s immediate goals. Benefit is indirect if an organisation benefits from the effects that the network as a whole produces, without necessarily being involved in much concrete interaction with other members. BioTurku gives several examples of both direct and indirect benefit. Local sources of direct benefit are, for instance, shared research projects, instruments and marketing campaigns; building of facilities for bio-companies; the new incubator for bio-companies and its structure for pre-seed funding; research and marketing services; and the Centre of Expertise Programmes that channel national money to the local community. Primary beneficiaries from such collaboration are university departments and companies that are able to attract funding from national financiers such as Tekes National Technology Agency, entrepreneurs that will acquire valuable help to set up new companies, and small bio-companies that need to externalise a substantial part of their R&D and cannot afford extensive international marketing. Other actors are more indirectly supported by the BioTurku-network. Thus the universities, the City, and the larger corporations will be indirect beneficiaries if BioTurku succeeds in attracting regional, national and international flows of people, knowledge and capital. One of Turku Bio Valley’s main challenges, in its role as network-manager, will be to maintain and deepen the sense of mutual benefit that exists within BioTurku. This study suggests that connectivity, integration (mutual adaptation) and transparency are important process characteristics for nurturing such perceptions.

Research performance seems to be relatively good. In 1997, an evaluation panel found eleven (out of forty) research groups at BioCity
Turku to be on a high international level. The panel also praised the BioCity Turku-structure for being “a very effective instrument for bringing both fundamental and applied research together under the same roof” and urged the community to maintain its “excellent tradition of collaboration between groups” (Saraste et al. 1997). Another set of facts supports the positive assessments of the quality of research. For instance, in 2000, the University of Turku was second nationally in numbers of international publications per professor (KOTA database). Considering that, at the University of Turku, medicine and natural sciences answer for a great majority of these publications (over 70% in 1998, Puukka 2000), it seems reasonable to assume that the BioCity Turku-community can be given much of the credit. Also, in 1997-1999, BioCity Turku had the status of a national centre of excellence (awarded by Ministry of Education). The same status was given to one of the BioCity Turku research groups for 2000-2005. However, the BioCity Turku-structure has also been criticised for being too heterogeneous and diffuse. Further, according to some critics, there should be better mechanisms for knowledge and technology transfer from academic research to commercialisation. It has also been argued that academic researchers lack the capability to collaborate with industry (Kivinen and Varelius 2000). In sum, it seems that connectivity and integration are particularly important process features for enhancing research performance.

Turku hosts a large share of new Finnish technology companies (i.e., knowledge-intensive small companies that are less than five years old) in the life science field. According to Finnish Bio Industries, more than 40% of Finnish start-up companies in the fields of medicine and diagnostics are situated in Turku (Kuusi 2001). These companies have also been successful in attracting venture capital. Finland’s two major venture capital companies in the life science field are Sitra (public) and BioFund (private). 25% of Sitra’s present investments in the bio-field and 18% of the companies in BioFund’s portfolios I and II are situated in Turku. The corresponding numbers for the cities in the much larger capital region (Helsinki and Espoo) are 20% and 18%. However, many expect entrepreneurial leadership to move from Turku to Helsinki in the next few years as a result of recent investments in innovation infrastructure there. Past experience suggests that density and connectivity are important process characteristics from the perspective of entrepreneurial performance.

BioTurku has not been successful in attracting foreign companies to start new activities in the area. Both Schering and Perkin-Elmer took over existing companies. On the domestic side, some companies have
chosen to relocate to Turku from other Finnish cities. Orion Pharma is presently expanding its research activities in Turku, and in 2001 the VTT Technical Research Centre of Finland decided to start a new life science unit in Turku. It can be hypothesised that transparency and consistency are important process features for attracting external actors.

BioTurku employs an estimated 3,000 people. The employment trend has been positive, but will have to change into exponential growth if the expected number of jobs is to be reached. Such a development is not beyond the realm of possibility, considering that many of the existing start-up or spin-off companies are working on products that will be commercialised within the next few years. Yet commercialisation does not automatically mean a dramatic increase in employment, since most companies plan to license their products to producers outside Turku. Some of the interviewees considered the “old” pharmaceutical and diagnostic industry to be more significant for future employment than the new, smaller enterprises. The positive development in the area also makes the arrival of one or two large foreign employers an increasingly likely scenario. In sum, BioTurku’s present performance in employment is not very informative about its employment capacity in the future. It was suggested above that network density and connectivity are particularly important for the emergence of new companies. On the other hand, transparency and consistency make the network attractive for external actors. Thus, to the extent that network process characteristics (in contrast to the efforts of individual companies) can affect future employment, it seems that a balance between density and transparency needs to be struck, at the same time as connectivity is encouraged in a way that maintains consistency.

While scoring high according to several performance criteria, BioTurku also faces significant challenges for the future:

- The management of a rapidly growing network is both difficult and risky. Investments must be made without having guarantees for success. This is true not only of bio-companies entering the laborious path of drug-development, but also of organisations like Turku Bio Valley which runs the risk of investing in real estate development that will not find users. Integration, or mutual adaptation, seems to be of particular importance for successful network management. City of Turku has tried to encourage integration by formalising the network through the Turku Science Park structure.
- BioTurku’s educational capacity has been growing and there is a strong bio-educational chain from vocational schools to
universities. Also, training programmes that are specifically designed for the needs of the bio-industry have been started, notably at the vocational schools. However, in relation to future challenges, it seems that further changes are needed, both in the quantity and the contents of education. Several interviewees expressed concern over the universities’ ability to provide industry with the required number of people with the right kind of education. Reaching the target of 10,000 workplaces in 2010 will mean that employees are needed for at least 7,000 new jobs. Many of these will require competences that are in short supply. Overall development threatens to exceed the capacity of the local educational system, which means that the workforce must be brought in from other parts of Finland or from abroad. Considering that there is already strong national and international competition for educated people in the bio-fields, the problem could be serious. Since both universities consider their strength to be in their breadth, and since breadth is also a quality that supports the attraction of high-level bio-researchers and their families to Turku, it is quite unlikely that the problem of an insufficient workforce will be solved by rapid changes in the priorities of the universities. Attracting people from outside areas, on the other hand, requires efforts to make Turku an attractive city for potential employees. BioTurku is thus dependent on City policies in fields like housing, environment, day care, education and culture. It can be expected that the ability of the network to influence policies across such a broad range of sectors is dependent on the degree to which Turku Bio Valley and Turku Science Park can claim to be spokesmen for the network. Thus, a certain degree of concentration of representative authority will be needed. On the other hand, continued internal development of the educational chain will require openness (allowing all educational levels to participate), efforts to increase transparency and active sustenance of goal consistency within the network.

- BioTurku’s small size might turn out to be a significant restriction in the future. The local perspective on development therefore risks coming into conflict with the needs of the industry. A sign of this is the national Pharma Cluster initiative that was undertaken by the new pharmaceutical industry in Turku. This “cluster-network” organises
collaboration nationally, not locally. BioTurku is quite small when compared to other European and American concentrations of bio-industry and openness to extra-regional collaboration will become increasingly significant.

- Public involvement in BioTurku has increased significantly during recent years. This means that societal approval is becoming more significant for the cluster. Until now, BioTurku has been successful in achieving such approval. There seems to be little criticism of public involvement or of the prevailing research orientations and industrial activities. Public approval is mediated by the city’s elected representatives. However, most interviewees felt that local politicians have little interest in, or knowledge of, BioTurku, and that their involvement generally means trouble rather than constructive input. It is striking that none of my twenty-two interviewees mentioned any City Board or City Council members as important persons to be interviewed about BioTurku, and when asked about it, most interviewees had serious difficulties coming up with even one name. If this reflects the state of knowledge and interest in these matters among local politicians, public involvement in BioTurku might turn out to be provisional only. The commitment to public long-term investments in the science park and its clusters would be threatened whenever economic downturn makes more immediate problems pressing. Yet, as a result of restrictions in its design, this study cannot verify the interviewees’ statements about the involvement of politicians. Whatever the case, it seems that openness in relation to local political forces would be a sound long-term policy, even if exclusiveness in this direction proved more efficient in the short term.

- Important problems remain to be solved concerning relations between the public and private domains. Through Turku Bio Valley, the City of Turku promotes private business with huge profit opportunities and high risks. The continued legitimacy of this kind of policy will depend on maintaining taxpayers’ trust in the sincerity of the BioTurku-actors and in the control mechanisms related to the use of public money. The planned arrangement with policy implementation through public corporations risks failing to address the issue of political involvement and control, and some of the process
characteristics even undermine such control – most notably, the low degree of transparency and the relatively high degrees of density and informality. How can the public sector combine the need for political support and control with its desire to promote a dynamic, competitive and economically successful bio-industry? This is a problem that needs to be addressed not only to safeguard the interests of taxpayers, but also to ensure the long-term involvement of the city and consistent public policies.

- Related to the issue of political legitimacy is also openness to criticism. In the hands of Turku Bio Valley, BioTurku is being branded. One of the company’s main tasks is (formally from 1.1.2002) to market the cluster. All interviewees, and particularly city administrators and business people, emphasised the importance of image creation. Image, they argued, is important for attracting students, researchers, funding of research, other investments and companies to Turku. It is also significant for mobilising local support for the city’s involvement. Image should, according to all interviewees, be based on “substance,” because most actors in the field have the capacity to reveal fraud. However, since BioTurku “really is a dynamic cluster,” the interviewees felt that this should be highlighted in the communication to internal and external parties. A continuous flow of new steps forward in the building of the cluster is therefore of great importance, “something has to be happening all the time” (Interview with Juhani Leppä). Now, as a social scientist one is inclined to ask to what extent this aspired image of smooth development and continuous enthusiasm risks suffocating possible criticism, both related to the city’s involvement in BioTurku and to the ways in which biotechnology is put to use. As BioTurku becomes a part of the City’s identity and economic strategy, it becomes increasingly difficult to neglect the effects of criticism on local success. Thus, integration and consistency, which are important from the perspective of short-term economic performance, might turn out to be highly problematic if BioTurku is evaluated with criteria that emphasise the moral and possibly also the long-term economic value of critical discourse.

In conclusion, this case study has pointed out a highly complex relation between the structural characteristics of network processes and
performance in different dimensions. The study suggests that process features such as informality, connectivity, integration and goal consistency enhance performance in certain areas, such as education, research, entrepreneurship, while at the same time being problematic for other kinds of performance, most notably broad participation in decision-making, political legitimacy and critical discourse. The latter require openness and transparency and perhaps also a formality that guarantees participation to actors who do not have access to the informal networks. There is also a strain between the need for closure and concentration in order to build lobbying power for the network, and the need for openness and distributed decision-making to maintain the ability of the network to adjust to changes in the environment. These are the contradictions that network management faces, and the future of BioTurku is at least partly dependent on how well its actors can balance the conflicting needs.

References


Networks of Learning in Biotechnology” in Administrative Science Quarterly 41, pp. 116-145.


**Appendix I: List of interviewees**

1. Ilpo Siro, Turku Area Development Centre TAD
2. Juhani Leppä, CEO, Turku Bio Valley Ltd
3. N. Tapani Saarinen, Turku Technology Centre
4. Juhani Määttä, Deputy Mayor, City of Turku
5. Juho Savo, Executive Director, The Regional Council of Southwest Finland
7. Harri Lönnberg, Deputy Rector, University of Turku; Chair of the BioCity Turku board
8. Kalervo Väänäinen, Professor, University of Turku, Department of Anatomy; Scientific Director, BioCity Turku.
9. Pekka Mäntsälä, Professor, University of Turku, Department of Biochemistry and Food Chemistry
10. Erkki Soini, Professor and Head of Department, University of Turku, Institute of Biomedicine, Medical Physics and Chemistry
11. Eva-Mari Aro, Academy Professor, University of Turku, Department of Biology, Plant Physiology and Molecular Biology
12. Olli Lassila, Docent, Institute of Microbiology and Pathology, University of Turku
13. Riitta Lahesmaa, Professor and Director, Turku Centre for Biotechnology

118
14. Sirpa Jalkanen, Head of Laboratory (?), MediCity Research Laboratory
15. Olle Anckar, Deputy Rector, Åbo Akademi University
16. Bengt Stenlund, Professor and Head of Laboratory, Laboratory of Polymer Technology, Åbo Akademi University
17. Malin Brännback, Professor and Research Director, Turku School of Economics and Business Administration, Innomarket
18. Raimo Pärsinnen, Unit Director, Turku Polytechnic Technology and Communication
19. Risto Lammintausta, Managing Director, Hormos-Medical Ltd.
20. Markku Jalkanen, President and CEO, BioTie Therapies Ltd.
21. Jouni Aalto, Managing Director, Novatreat Ltd.
22. Juha-Matti Savola, CEO and President, Juvantia Pharma

Shorter telephone interviews:

1. Isto Peltonen, Head of archive, Orion Pharma Ltd
2. Tuija Oksa, Archive Administrator, Leiras Ltd
Explanations of arrows and colours:

Becomes part of, is merged with…
Spin-off activity or company
Founds, initiates…

Limited company
Public research and/or education
Other public organisations
APPENDIX III: Calendar for some BioTurku-events in 1990-2001

Information about many of the organisations and research programmes can be accessed through http://www.turunteknologiakeskus.com/TTK/ttk.nsf/enetusivu and http://www.biocity.turku.fi/

1990
- Farmos is merged with Orion.
- The BioCity scientific advisory board is established.
- Recession starts.

1992
- BioCity (the building) is completed, Centre for Biotechnology acquires its new facilities.
- BioCity Turku becomes the umbrella term for life science research and education in Turku. Formally, BioCity Turku is embodied in the BioCity scientific advisory board and the Centre for Biotechnology board.

1993
- Three multidisciplinary and cross-university research programmes are started on the initiative of Medical Faculty at University of Turku:
  - Turku Immunology Centre, Reproductive Medicine and Developmental Biology, and Receptor Structure and Functions.

1994
- Unemployment rate reaches its peak, 22.1%, in Turku.
- First Centre of Expertise Programme (1994-1998)
- HyTest Ltd. and Galilaeus Ltd. are incorporated.

1995
- Turku Centre for Biomaterials is founded.
- Innotrac Diagnostics Ltd is incorporated.
- CRST Clinical Research Services Turku is established as a shared project by University of Turku and University Hospital of Turku.
- BioCity Turku launches six research programmes:
  - Receptor Structure and Function, Centre for Reproductive and Developmental Medicine, Turku Immunology Centre, Molecular...
Biotechnology and Diagnostics, Biological Structure-Function Analysis, and Microbial and Plant Molecular Biology and Biotechnology.

1996
- Schering buys Leiras.
- BioTie Therapies Ltd starts its operations (the company was founded in 1992).

1997
- Hormos Medical Ltd, Juvantia Pharma Ltd, and Novatreat Ltd. are incorporated.
- First Turku strategy
- PreFa and Safety City are started as university projects funded by Tekes (National Technology Agency).
- The BioCity Turku-community is appointed a Centre of Excellence (1997-1999) by the Ministry of Education.

1998
- ContraPharma Ltd. is incorporated by six individuals and ContraClinics Ltd. The company has offices in Espoo and Turku.

1999
- Second Centre of Expertise Programme (1999-2006)
- Turku Bio Valley Ltd. is founded.
- DCC Data City Centre becomes Turku Technology Centre.
- The Turku unemployment rate is still high, 17.4%.
- The BioCity Turku community is formalised into an umbrella organisation. The scientific advisory board for BioCity and the Centre for Biotechnology board are integrated with BioCity Turku. BioCity Turku administers six research programmes (see 1995).

2000
- Turku Bio Valley initiates a series of workshops that amount to the articulation of a BioTurku strategy.
- BioTie Therapies Ltd is listed on the Helsinki Exchange NM-List as the first biopharmaceutical bio-tech company.
- Focus Inhalation Ltd is incorporated (spin-off from Leiras).
- Professor Sirpa Jalkanen’s Cell Trafficking research group is appointed as a Centre of Excellence (2000-2005)
2001

- BioCity Turku restructures its research programme-structure: a new programme on systems biology is started, three old programmes are closed.
- Turku Science Park is founded: two new companies, Science Park Ltd, and ICT Turku Ltd.
- Second Turku strategy.
- The PharmaCity building is completed.
- First construction in BioValley (the area) is completed.
- Safety City is incorporated.
Nordic Perspectives on Process-Based Regional Development Policy.
Editors Markku Sotarauta and Henrik Bruun.
Stockholm: Nordregio 2002
(Nordregio Report 2002:3)

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Nordic co-operation
takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council
is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers
is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

Stockholm, Sweden
2002
Mobilising a Regional Lighthouse
A Study of the Digital North Denmark Programme
Henrik Bruun

Abstract
This is a study of the process of planning and implementing the Digital North Denmark programme (DDN) in the Danish region of North Denmark. The purpose of DDN (2000-2003) is to diffuse information technology in the region in a way that promotes innovation as well as a core set of societal values. The programme is funded by the Danish state (DKK 170m) and by the participating organisations (DKK 340m). The study focuses on the way in which actors were enrolled into the planning and management of the programme, the conflict between different interpretations of DDN, the organisation of programme design and the reasons for success in mobilising project applications. It is shown that the enrolment process was initiated through active, informal collaboration between three key actors in the region. This led to the establishment of a prestigious board of executives. There were three competing interpretations of what DDN policies should focus on: IT use, industrial innovation and research. As a result of the composition of the DDN organisation and the rules set by the ministry in charge, IT use became the dominant perspective. Thus, the programme was not designed to promote research at the university or the local cluster of ICT industry. Still, DDN has managed to mobilise a significant number of applications in seven application rounds. This can be explained by the intense marketing campaign, the activity and authority of key persons and the strong regional contextualisation of the programme.

Introduction
The challenges faced by many regions today have renewed interest in the conditions for successful regional development (Karppi 2000). There is, of course, an almost endless amount of literature on the topic. Much of this work focuses on the structural conditions for regional success. This is the case, for instance, in the emerging literature on regional innovation systems (Isaksen 1997; Braczyk et al. 1998; Cooke et al. 2000). Structural approaches are important because change always occurs in a specific context. However, in themselves they are not enough to give us a comprehensive picture of local and regional development. As a result of
downplaying, or completely neglecting, the significance of *processes*, they fail to account for the possibility that regions with similar structural points of departure can end up in different developmental trajectories both concerning contents and timing (Sotarauta 1997; Sotarauta and Linnamaa 1997; Sotarauta and Linnamaa 1998). This work proceeds from the view that regional development is a cumulative phenomenon in which the outcome is a result of the interaction between the structural features of the region (natural resources, social structure, industrial structure, institutional structure, cultural traits, etc.) and the choices made by actors involved in the development process. In this perspective, decision-making is not just an expression or outcome of existing structures. There are several reasons for this. First, different structural domains can have different implications for particular actions. Thus, companies in two regions that occupy a similar position in the *economic* structure can develop along divergent paths as a result of the differences between the *institutional* structures of the regions. Second, regions are not closed systems. They are continuously influenced by events in the outside world, events that appear contingent from the regional perspective. Such events are dealt with at the level of action, and their effect on regional structures is dependent on the choices made by actors.

Regional decision-making can be analysed from various perspectives. In this article, the focus will be on regional policy making. Policy-making is here understood in a broad sense, as authoritative decision making that provides directions for the choices of a larger set of organisations or people. Thus, the point above can be rephrased; structural research on regional development should be complemented with studies of regional policy processes. The latter should focus not only on the contents of policies, but also on the process of policy formulation and implementation. The present study will apply the policy process approach to the analysis of a regional IT programme called “Digital North Denmark” (DDN, Det Digitale Nordjylland). DDN is a nationally funded programme to be implemented in the region of North Denmark in 2000-2003. The Danish Ministry of Research and Information Technology is investing DKK 170m in it, while local actors are expected to contribute another DKK 340m. The aim of the programme is to make North Denmark into a regional IT lighthouse, guiding the rest of the country into the future.

By using the policy process approach, I will present a systematic account for how DDN was set up and implementation started. We will see that DDN has had a set of key stages in which the contents of the programme and the strategies for involving local actors in it were fixed.
The argument is that decisions about contents could have been different and that, at the outset, there were no guarantees for success in mobilising the region. Contents and mobilisation were dependent on decisions and strategies that were made during the planning and implementation of DDN. It would therefore have been difficult, beforehand, to predict the contribution of the programme to regional IT and the regional economy on the basis of structural facts. In fact, the structural characteristics of the regional economy could have suggested quite a different kind of programme. At the same time, there is at least a theoretical possibility that DDN will have a significant effect on the developmental trajectory of the region.

The study is based on interviews carried out in the early summer of 2001 with twelve people representing different perspectives on IT development in northern Denmark. Eight of the interviewees have been directly involved with the planning and implementation of DDN. All key players – the County of North Jutland, Aalborg University and the Municipality of Aalborg, the science park NOVI, the local ICT cluster, local ICT industry, and the DDN secretariat – were represented in the sample. In addition to interviews, the empirical material consisted of various documents that were produced as a part of the DDN process.

The article is structured as follows. Section two presents the context within which this research was carried out and some results of previous case studies. Section three then develops some conceptual tools for the analysis of policy processes. These tools have been borrowed from actor-network theory – an analytical approach that was originally developed within science and technology studies. It is hoped that their application in regional studies can contribute to a better grasp of the processes underpinning regional development. Section four presents the DDN-programme, its background and the region in which it is being implemented. This section provides the reader with some of the structural information that is relevant for the case. Section five performs the actual analysis of DDN as a policy process. Finally, section six summarises the results of the study and discusses some of its policy implications.

Some Previous Case Studies on Regional Policy Processes
This research was done within the frame of a larger research project on regional development and high technology in the Nordic countries. The other studies of the project focused on high technology development in two Finnish cities, biotechnology in Turku (Bruun 2001; Bruun et al. 2001) and ICT in Jyväskylä (Linnamaa 2001), and one Norwegian city, Trondheim (not yet finished). These studies have provided some empirical evidence for the need to include policy processes in
explanations of regional development. For instance, who could have predicted ten years ago that the Finnish city of Jyväskylä would now be the locus of a growing and dynamic ICT-industry? Ten years ago, there was very little ICT-education and research at the university and there were no significant ICT companies in the city. On the contrary, at that time the city experienced one of the most serious crises in its history, losing 1/5 of all jobs. Today, Jyväskylä is one of the information technology growth centres in Finland. The regional ICT-grouping (region of Central Finland) employs 5,000 people and the University of Jyväskylä has established the first Faculty of IT in Finland. (Linnamaa 2001) How was all this possible?

There are no simple explanations. Many would perhaps refer to the Finnish regional policies in the 1990s that encouraged regions to take initiatives and to target efforts in areas of expertise. Jyväskylä has also received Objective 2-money from the EU, which was used to fund new initiatives in IT education. Others would, perhaps, emphasise the importance of Nokia’s transfer of its research and development unit from Äänekoski to Jyväskylä in 1998. The city also hosted a relatively large forest industry, which has become an important user of IT. Finally, Jyväskylä was in possession of one of the basic components of high technology concentrations: a university. However, facts like these cannot explain the developmental trajectory of the city. The university did not have a technological orientation, its areas of strength were in the humanities. There was little to indicate that national funding (or later EU-funding) would be used for building up competence in a new high technology area, and the arrival of Nokia should be seen as a result, and not a cause, of cluster building in Jyväskylä. (Linnamaa 2001)

Another Finnish example of unpredictable development is the city of Turku. Turku is Finland’s second centre of biotechnological education, research and business, employing approximately 3,000 people in the field. In some areas, such as the pharmaceutical industry and diagnostics, Turku hosts more companies than any other city in Finland. Considering that approximately every tenth biotech company in Europe is Finnish, and that the main commercial focus in Finnish biotechnology is in pharmaceutics, this is not without significance. Ten years ago, however, few would have believed such a scenario. It is true that the city hosted two universities doing life science education and research in four faculties and that it had Finland’s most significant concentration of the pharmaceutical and diagnostic industry (particularly, three larger companies). Yet biotechnology had no strong position in the City of Turku’s industrial policies and researchers had to fight to catch the
attention of national research funders. Further, local bio-industry did not show much interest in thinking in terms of regional co-operation and cluster building. The idea of Turku as a national and European centre for biotechnology has matured during the 1990s, and today the universities, the city administration and industry collaborate in making long-term strategies for the local “bio-cluster”. (Bruun 2001; Bruun, Höyssä et al. 2001) How should this change be explained? Structural factors are surely significant, but comprehensive explanation requires that we also give the policy processes involved in the cluster building their proper attention.

A common finding in the studies referred to above was that regional development is about building structures as much as it is about acting on them. This is particularly true today, when regional policies in the EU and in many countries are aimed at helping the regions help themselves, rather than at spreading one model of regional development to all regions (Sotarauta 1997). Regions that attempt to base their future economy on high technology need to build comprehensive local infrastructures for innovative activities.38 This is a minimum requirement. In addition to this, they need to work on their urban, cultural and general educational structures in order to attract skilled people and their families. Success in such work depends partly on existing resources, but equally on how things are done. In the Jyväskylä and Turku cases, success in building infrastructure for innovation was dependent on the following policy process-related factors:

- Ability to transform crisis-situations into something constructive.
- Ability to bring to fore visions of a different future.
- Ability to transform these visions into focused strategies.
- Skilful lobbying to external financiers and decision-makers.
- Creative utilisation of external funding (national, EU).
- Openness to initiatives via informal decision-making channels.
- Ability to channel these initiatives into formal structures of decision-making.
- Creation of a sense of mutual empowerment among actors.

38 Such as new educational programmes in vocational schools or at universities, updating education, office and laboratory facilities, equipment centres, structures for transdisciplinary collaboration, technology transfer units, incubators, local venture capital, research service units, production facilities, cluster management and cluster marketing organisations.
• Competent networking and efficient utilisation of informal relations.
• Flexible actors: actors that, at least to a certain extent, adapt to the cluster.
• Understanding of the mobilising function of image and atmosphere.

In both cases, pragmatism dominated collaboration. This means that many policy processes took place outside formal structures and across activity domains (local authorities, business and state universities). In Jyväskylä and Turku, change was fast and there was little time for discussion on principles. This led to what could be called the politician’s dilemma of involvement. Attracting external investors and people to the region is pretty much a question of confidence and confidence is to a large extent created by impressions. The cities tried to create such confidence through active industrial policies and clear strategic choices. However, as politicians embark on more dynamic industrial policies, they in fact risk undermining their own influence and freedom of action.

There are at least two reasons for this. First, in high technology sectors the pace of change is fast. This concerns not only technological change, but also the behaviour of the public sector. Cities must constantly prove that they have the ability to react to new needs, for instance supplementing missing links in innovation chains. In such an atmosphere, pragmatism reigns. Discussions on principles and wide political participation carry the risk of political conflict, and such conflicts might in the short term be problematic from the perspective of dynamic agency. Second, continuity in public policies is important for creating confidence. There is consequently pressure to show political consensus on strategic choices. Political conflicts undermine confidence. They are an image-problem. As a consequence, many of the other actors try to dissociate the political machinery from decision-making. At the same time, however, they are dependent on the active involvement of the public sector, which itself is ultimately dependent on its legitimacy in the eyes of the politicians and their voters. Thus, what is desired is the support and understanding of politicians, but not their involvement.

39 The term activity domains refer to a range of activities in which action is framed in a similar way (according to a similar logic).
**Conceptual Framework**

Before entering the empirical account of DDN, a few words are needed about the conceptual foundation of policy process analysis. How can policy processes be described in a way that acknowledges their contextual character without getting completely lost in the particularities of each process? Are there any general terms that could be used for the description of policy processes? It seems that scholars of regional development have given this kind of conceptual development little attention (with, of course, some exceptions. – See, for instance, Sotarauta 1997; Sotarauta and Linnamaa 1997; Sotarauta and Linnamaa 1998.) Instead, process-oriented studies tend to use atheoretical descriptions (a history of events). I will therefore permit myself to make a somewhat extensive theoretical detour here. Then, in the rest of the article, I will demonstrate how the conceptual tools can be used in the analysis of DDN.

Above, policy making was defined as authoritative decision making that provides directions for the choices of a larger set of organisations or people. “Policy process” refers to the process of making and implementing such decisions. The notion of process implies that there is some pattern of action and interaction clustering around policy formulation and implementation. This patterning can be analysed in terms of path formation, that is the increasing convergence of perceptions and actions around some policy content. Path formation occurs as a result of the commitment of actors to some particular course of development. It is a phenomenon that occurs in all kinds of human contexts and is not specific to regional policy processes. Also, the reasons for path formation vary. A common explanation of paths is that of *increasing returns* (Arthur 1994). The argument is that investments in particular patterns of development increase the capacity of agents to benefit from that development and therefore reinforce them to make new investments. The nature of investments varies with the nature of the process. Thus in processes of learning, investments can be made in the form of time, energy, and attention to studies at some school, while in processes of bonding (for instance, making friends with someone) they are more of an emotional type. In analyses of economic activities, increasing returns are, of course, partly a question of money and profits. However, there are other forms of returns in these activities too. For instance, it has been argued that active networking on the part of businesses increases their capacity to benefit from collaboration with other businesses and therefore reinforces their inclination to make new investments in such activities (Powell et al. 1996).
Another reason for the occurrence of paths is that the policy process pattern reinforces itself by reducing the margins of choice for actors. Thus, the stronger the path, the greater the cost of choosing alternative paths of behaviour. In other words, what starts as a voluntary movement based on increasing returns can, as time goes by, start presenting itself to actors as an irreversible situation in which their choices “are inexorably predetermined by decisions taken earlier” (Callon 1995, 307). The project acquires a deterministic air and agents who would prefer alternative courses of action have good reasons for feeling disempowered.

It should be noted that, in themselves, paths have no given moral significance (“good” or “bad”). They generally bring benefits for some people and problems for others. Paths are particularly beneficial for those who participate in the game of increasing returns. They also bring stability to development and facilitate planning and rational decision-making (within the boundaries of the path). The problematic side of path formation is that it tends to exclude alternative choices and that it marginalizes those who do not want to, or who cannot make the appropriate investments in the process. A path can also affect its initial beneficiaries detrimentally. First, there is no guarantee that the chosen path leads to the best solutions. The more closed path, the greater the risk that sub-optimal solutions are pursued. This is because it is difficult to identify inefficiencies if awareness of alternative ways of development is decreased. Second, a path that is insensitive to changes in the environment might turn out to disempower its initial beneficiaries in the long run. For instance, measures for short-term competitiveness of firms might decrease their competitiveness in a longer time perspective.

Increasing returns and reduction of the margins of choice are important explanatory models of path formation. Yet they are not enough. These explanations work particularly well in cases where decisions are made in isolation, like in the ideal market of neoclassical economic theory. Most paths involve phases that are dominated by such decision-making. For example, as a new household product is marketed, ordinary consumers make relatively independent decisions about whether or not to purchase a particular kind of product. However, most processes of decision making also involve a phase in which decisions are made collectively and in which there is neither any guarantee of increasing returns nor particularly strong pressure to behave in a predetermined way. For the investigation of these phases we need other models – models that explain how the frame of the path is created in the first place.
How can people and organisations be engaged to co-ordinate their behaviour so as to produce a logic of development that makes increasing returns or margins of choice possible? In other words, how is this kind of direction created in policy processes for instance? Here, I will focus on the role of problem-definition and various forms of coupling and decoupling for activating people and organisations in uncertain circumstances. I will also make a conceptual distinction between creating the conditions for path and acting within it. My terminology is borrowed from science and technology studies, a field that has produced a lot of literature on processes during the past few decades. (The most significant reference for the notions used here is Callon, 1986 #877; however, see also Latour 1987; Latour 1993; Callon 1997; Law 1997; Law and Callon 1997; Callon 1999). To simplify the presentation, I will call the path that is studied $X$.

The first mechanism of path generation is called *problematisation*. This refers to the framing of a particular action as the solution to some problem $P$ that an actor $A$ (individual agent or organisation) experiences. A first condition for the framing of a path is then that actors perceive investments in $X$ as a way of solving their own problems. For example, in the Turku-case, referred to above, the economic crisis in the beginning of the 1990’s led the City of Turku to reinterpret biotechnology (Bruun 2001). Previously, it had been just one of the many activities that were going on in the city. Now it was perceived as one of a few strategic sectors for creating future employment and it had become a key for local and regional development. Problematisation does not, however, always imply that new solutions are suggested for old problems. Since the experience of problems is not a constant, problematisation can also involve a reinterpretation of needs. Both Turku and Jyväskylä had been quite well off in the 1980’s, so the first step in the process of selecting biotechnology and ICT, respectively, as strategic foci, was to identify economic stagnation as the problem. High technology could then be framed as a solution to the new problem.

Problematisation in itself is not enough to mould action. Even if $A$ sees investments in $X$ as a solution to $P$, he might choose not to make them. There can be numerous reasons for this. $A$ might, for instance, be committed to another process $Y$ which exhausts his resources (time, attention, money, etc.). Consequently, problematisation must be supplemented with *coupling* of $A$ with $X$, which means that $A$’s commitment to $X$ is strengthened and that his commitment to other
competing processes, such as $Y$, is weakened. There are many forms of coupling: brute force or threat of force, persuasion, seduction, indoctrination and so on. In Turku, for instance, coupling the City with biotechnology involved statistical analyses demonstrating that the existing industrial structure had ceased to produce new jobs and that it had stagnated in terms of productivity. It also involved historical accounts according to which Turku had already for a long time hosted a most significant concentration of bioindustry and research. Finally, reference was made to a body of economic research according to which cities that want to succeed in the new, global and informational economy must invest in knowledge-intensive industries and interpret themselves in terms of competitiveness. Thus, the problem of economic stagnation could not be solved by investments in “traditional low tech industries”, but instead by exploiting the already existing potential of local biotechnology.

After commitment has been achieved, actual action is needed. Thus, for behavioural path formation to occur, coupling must be supported by transformation of commitment into real investments in $X$. This is called enrolment. To exemplify, in Turku the CEO of a recently established public company (owned by the City of Turku) for building bio-production facilities, invited all other relevant actors of the local “bio-cluster”, including the city administration, industry and the universities, to participate in a common strategy process. He wanted to enrol, at a minimum, all those who had “real influence”. Since these are very busy people and since the strategy process required that the participants be prepared to invest both time and attention in it, the CEO took a set of measures to transform the commitment of the actors to the local bio-cluster into active participation in the strategy process. He had no formal authority in relation to the others, so he could not force anyone to participate. Instead he chose the strategy of confidence building. He used his informal contacts (as a former deputy mayor of Turku) to involve as many top decision-makers as possible, and a consultant to make the strategy process “professional”. Also, and most significantly, being new in the bio-field, he kept himself in the background as one of the participants rather than appearing as the leader of the strategy work. “You will do the work,” was his message. The CEO succeeded in enrolling

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40 This has been called *interessement* in actor-network theory. I prefer to use “coupling” because the term “interest” suggests that what is coupled with (or made interested in) something is a being capable of being interested. Yet the point of the term (*interessement/coupling*) is that it can be used also in cases when non-intentional objects are linked to the process.
surprisingly many actors, and the process ended in the formulation of a common strategy for the cluster as a whole (Bruun 2001).

A fourth mechanism of path formation is mobilisation. While enrolment refers to the “active” commitment of a limited number of actors in X, mobilisation signifies that those, on whose behalf the enrolled speak, also invest in X. In the previously mentioned strategy process, for instance, mobilisation is being tested at the moment. The strategy articulates a set of targets or recommendations. Will these be achieved? More particularly: Will the local universities collaborate more intensely in education and research? Will the Centre for biotechnology strengthen its capacity in functional genomics? Will BioCity Turku succeed in establishing a drug development centre? Will the University of Turku achieve the establishment of a national centre for food development? And so on. All these actions represent investments in X (which in this case is the development of the local bio-cluster).

The distinction between enrolment and mobilisation acknowledges that processes have “centred” and “distributed” stages and that the centred stages involve people who are seen as spokesmen for those who are supposed to be involved in the distributed stage. In the centred phase, decisions are made by a limited number of people, while in the distributed phase a mobilisation of “the masses” is necessary. Only at this stage does the mechanism of increasing returns seem to operate with full force. As the process is distributed, collective problematisation and effective coupling become increasingly difficult. The various forms of marketing or information that are used tend to have limited effects, which means that “the masses” must perform problematisation and coupling themselves to a larger extent. In this, the experience of increasing returns or of limited margins of choice is probably of great importance.

**Why North Denmark?**

In February 2000, the Danish Ministry of Research and Information Technology decided that the region of North Denmark (also called North Jutland) would become one of the country’s two IT lighthouses. The background was a governmental initiative called Digital Denmark (DDD, Det Digitale Danmark), which articulated a strategy for making Denmark a “network society” based on extensive use of information technology (Dybkjær and Lindegaard 1999). One of the measures was to initiate two regional large-scale experiments in which the regions would be offered resources that they themselves could allocate according to guidelines to be agreed upon (Rambøll Informatik 1999). Subsequently two regions were selected, Ørestaden (Copenhagen) and North Denmark. In the case of North Denmark, where the experiment is called Digital North
Denmark (DDN, Det Digitale Nordjylland), the Ministry offered DKK 170 m on the condition that another two-thirds would be invested by regional and local public authorities and businesses. Thus the total size of DDN is DKK 510 m. The lighthouse experiment is structured as a technology programme that offers resources to individual projects on an application basis. It is administered by a DDN-funded secretariat, the Lighthouse centre that has been set up at the county administration. The project funding is channelled through four thematic groups: 1. IT infrastructure, 2. IT industrial development, E-business and IT Framework conditions for the Industrial Sector, 3. Qualification and Education, and 4. Digital Administration. At the moment of writing (November 2001), DDN has granted DKK 132 m to 70 projects (out of 166 applicants) in the region. The total value of the projects (if implemented according to applications) is approximately DKK 475 m. This is quite remarkable considering that the granting criteria have been strict, requiring among other things that the projects are in agreement with the targets of the thematic areas, that they have a visible and sustainable impact on the region and that they are innovative in the sense of providing solutions that “have not been seen before” (Digital North Denmark 2001).

Since DDN is an ongoing programme, there is no point in trying to evaluate it here. Thus it is not known to what extent the projects really achieve the ambitious goals of DDN. What can already be said at this point, however, is that the programme has effected an impressive regional mobilisation and targeting of resources and efforts. And that is precisely what interests me. How do you, in a marginal region like North Denmark, mobilise authorities, university and businesses to come with so many serious project proposals in just one and a half years? As was suggested above, I believe that part of the secret is in the way regional actors interacted and the way in which they organised and marketed the programme. Yet before going into those questions, a short description of the region is needed. This allows us to appreciate also the importance of the structural context within which the processes to be analysed took place.
**North Denmark**

North Denmark is the northernmost region of Denmark, surrounded by the North Sea in three directions – west, north, and east. There are 27 municipalities in the region, the demographically most significant being Aalborg (160,000), Hjørring (35,000), and Frederikshavn (34,000). Aalborg is the regional centre. Since 1970, the North Denmark population has grown by 8.4 % to approximately 494,000 today (County of North Jutland 2001). Demographic growth has been uneven however, and some of the municipalities have experienced significant depopulation during the last three decades. The relative “winners” are small municipalities, such as Støvring and Hals. The economy of North Denmark has traditionally been based on the primary sector, with agriculture and fishery as significant sources of employment and income. Early industries were shipbuilding and concrete production. Otherwise, industrialisation came comparatively late to the region. From the middle of the 1970s to the middle of the 1990s, North Denmark had the highest unemployment numbers of all Danish regions. At the end of the period, unemployment had settled at a level 3-4% above the national average. At the same time, GNP per capita was lower in the region than in Denmark as a whole. A report from 1994 drew a gloomy picture of the economy: crisis in the shipbuilding industry as well as in agriculture and fishery, and decline in the food industry and the iron and metal industry (Ministry of the Interior 1994).

During the latter part of the 1990s, development was more favourable for North Denmark. After the peak in unemployment in 1993 (almost 16%), new employment was created faster in North Denmark than in the rest of the country. 5,000 new jobs were created in just a few years (Interview 003-08-060601-1-2). In 1999, the unemployment gap between the region and the national average had been reduced to almost zero (County of North Jutland 2001). This development was based on a restructuring of the regional economy. Employment in agriculture, fisheries and extraction declined by over 35% in 1988-1998, while the corresponding change in, for example, financial and business services was an increase of over 30%. Other areas of growth during this period were trade, hotel and restaurant services (9%) and telecommunications (more than 8%) (statistics presented by the county). In 1997, total employment was 244,928 in North Denmark. The most significant sectors were public services (34.5%), manufacturing (20.6%), trade, hotel, and restaurant services (17.6%), and other services (10.5%). Agriculture provided only 5.8% of employment and fisheries 0.5%, even though their local significance is much greater in some parts of the region.
In sum, a considerable shift from the primary sector towards the service sector has occurred.

What public measures were involved in this change? The most important measures were, and still are, the EU structural programmes. North Denmark has participated in such programmes since 1986, and according to statistics presented by the county, the projects funded by the EU have produced 15,000 new jobs in manufacturing and the service sector. However, this source of external funding will not last forever. The expansion of the EU and the subsequent reorganisation of the structural funds will most probably leave North Denmark outside future EU-funding. Public authorities are well aware of this and have tried to increase the competitiveness of the region by allocating EU-money to building “infrastructure”. Examples of such projects in Aalborg are the extension of the local airport, building a music house (cultural infrastructure) in the heart of the city and investments in the local science park NOVI (see below). In the county, the Digital North Denmark programme was seen as a substitute for decreasing EU-funding, and thus as yet another opportunity to increase the competitiveness of the region with the help of external resources. However, the DDN differs from Objective 2 and 3 funding in two ways. First, decision-making is more decentralised in the sense that the contents of the programme have been determined by local actors, and, second, the programme is much more targeted than the EU-funding, focusing on certain ways of using information technology.

The ICT-cluster

From the perspective of the Digital North Denmark programme, a most important aspect of the regional economy is that it contains a concentration of businesses in communication technologies. Together, these companies form an ICT-cluster that has been called NorCOM after a branch association with the same name. In 2000 the NorCOM-cluster consisted of 28 companies operating in the fields of mobile and wireless communication, maritime communication and navigation and equipment for land-based satellite communication. Most of the companies work with R&D rather than manufacturing. The cluster employed almost 4,200 people in 2000, most of them (more than 3,500) in mobile and wireless communication. A majority of the companies is situated in or near the city of Aalborg, which is the regional centre of North Denmark. (Pedersen 2001)

The history of the cluster goes back to 1948, when S.P. Radio was founded. The company had international success with its equipment for maritime communication in the 1970s and 80s. The first major turning
point for the emerging industry was, however, the foundation of Aalborg University in 1974. The university has a faculty of engineering and science, and is one of Denmark’s two schools for educating engineers. In the 1990s, approximately half of the Danish electrical engineers were trained in Aalborg. The next turning point – from the NorCOM-perspective – was the work in the 1980s of two new companies, Dancall and Cetelco, in the area of mobile communication. After having focused on the Nordic NMT-standard for some years, they shifted to R&D in GSM technology at the end of the decade. By founding a common company, DC Development, they successfully pooled their resources and became, in 1992, one of the first in the world to launch GSM-technology. (Dalum 1995; Dalum et al. 1999; Pedersen 2001) Even if both Dancall and Cetelco later ran into economic problems and were purchased by foreign companies, their collaboration and performance through DC Development is often mentioned as the primary success story of the cluster. Otherwise, however, it seems that collaboration and knowledge diffusion between university and business has been more important than that between businesses. This is natural, considering that some of the companies are competitors and that the degree of vertical integration is low (since there are few manufacturers).

In the 1990s, the cluster entered a new phase of development. Many of the local activities were bought by foreign companies. Maxon established itself in 1991, EuroCom Industries (ECI) in 1992, LM Ericsson in 1995, Analog Devices in 1997, Telital in 1998, Texas Instruments and Nokia in 1999 and Flextronics and Siemens in 2000 (www.norcom.dk). At the same time, Aalborg University has attempted to answer the increasing need for education and research in mobile and wireless communication. Its Department of Telecommunication works with digital signal processing, acoustics, telecommunication and personal communication. In 1993, an independent unit, the Center for PersonKommunikation (CPK), was formed on the basis of a grant from the Danish Technical Research Council (STVF). Today CPK employs almost 100 researchers and produces approximately 70 graduates a year. Its research focuses on wireless communication, including speech technology. Some of this work has been carried out in collaboration with companies like Nokia and Sonofon (a local mobile telephone operator). (Dalum, Holmén et al. 1999; Pedersen 2001)

A final component of the NorCOM-cluster that should be mentioned is the NOVI science park. Founded in 1989 and reactivated in 1996, it forms a rapidly expanding innovation environment for its tenants. Today, NOVI consists of five building complexes with a total floor space
of 19,500 m², and hosts 44 companies as well as the previously mentioned CPK. NOVI provides facilities and various services to its tenants. A special feature of Danish science parks is that they have their own venture capital companies, here called NOVI A/S. Many of the NorCOM-companies, including DC Development, have at some point been situated in NOVI. The NOVI vision is “to create a Nordic platform for... exploitation of the new information and communication technologies (ICT)” (www.novi.dk).

The ICT-cluster seems to have been an important factor in the decision of the Ministry of Research and IT to select North Denmark as one of the two national IT lighthouse regions. In its Digital Denmark report, the ministry argues that the IT lighthouse status should go to regions which “already have the strongest and best IT potential” in the country and which thus are “better equipped to be IT lighthouses of international standard” (Dybkjær and Lindegaard 1999, 98). The particularly strong IT potential of North Denmark is ascribed to its high tech enterprises, the IT and telecommunications research of Aalborg University, and NOVI as an internationally recognised research centre. Reference was further made to the ways in which things are done in the region: the visionary thinking of regional and local decision-makers who “directed their activities at attracting enterprises characterised by new technology,” and the strong tradition of collaboration between the university and regional trade and industry, as well as between the public authorities (municipalities and county) in the region (Ibid., 98-99).

This raises the question of how significant the NorCOM-cluster actually is from a national perspective. The Ministry report provides no numbers, but there is no doubt about the fact that its significance is high (“the strongest and best IT potential”). However, there might have been other, unofficial reasons for the selection of North Denmark. One (presumably well informed) interviewee suggested that North Denmark was chosen because the legitimacy of the whole lighthouse programme required that it did not benefit only the biggest cities. Another reason for the choice might, according to another interviewee, have been that North Denmark had recently lost another competition for a larger nationally funded project (a centre for food quality). Thus it is possible that the choice of North Denmark was based more on regional policy considerations than it was on the promotion of regions with “the strongest and best IT potential”.

The two lines of argument could be combined without contradiction only if the NorCOM-cluster really represents a nationally significant concentration of ICT. Unfortunately, the existing information
about this is contradictory. The County of North Jutland claims, with reference to unpublished material provided by a well known researcher at the Copenhagen Business School, that the regional degree of specialisation in employment was 3.79 for the telecommunication sector (the Danish average = 1) (County of North Jutland 2000). This would suggest a strong concentration of high national significance in this sector, and thus be in accordance with the claims in the Ministry report on Digital Denmark. However, a cluster analysis performed at Aalborg University, gave only 1.02 for the same measure (Pedersen 2001) – a number which suggests that the national significance is much more modest and that regional policy considerations guided (or should have guided) decision-making. The difference between the numbers is strange, since both analyses seem to have used NACE branch codes, and since there is an unambiguous code for telecommunication (6420). In any case, the ministry drew heavily on the cluster in its report, and irrespectively of the real motivations behind its decision, “the combination of a high-tech growth area, which is already germinating, and a general will to change” is what publicly made “Northern Jutland a platform on which an IT lighthouse can be established” (Dybkjær and Lindegaard 1999, 99).

Building the Lighthouse
After these preliminary considerations, it is now time to move on to the actual shaping of the Digital North Denmark-programme. For this discussion, I will use the conceptual framework presented in section two. It will be shown that the national release of the programme was followed by a regional process of enrolment in which the contents of DDN were defined (problematisation) and regional actors were tied to it (coupling). Despite controversies, enrolment was successful. This meant that a relatively straightforward framework for the mobilisation of projects could be established, consisting partly of selection rules and partly of an organisation for administration and for the determination of new rules whenever needed. Also, significant efforts were made to market DDN to municipalities, businesses, schools and so on. At the same time as the programme leaders informed the actors about the opportunity at hand, they also tried to affect the decision making criteria of local organisations: “Don’t ask what the region can do for you, but what you can do for the region.” There was, in other words, no clear demarcation line between the enrolment phase and the mobilisation phase.

Problematisation
The region of North Denmark was first informed about the IT lighthouse programme at Aalborg University’s 25-year anniversary in September
1999. The rector of the university and the county mayor acted upon this information and brought together some of the key actors in the region. An interim board of executives was formed with representation at the highest level from the county, the university, the Municipality of Aalborg, the regional association of municipalities, the local branches of the national employer’s organisation, the corresponding trade union and NOVI. The task was to convince the ministry that North Denmark was ready for the IT lighthouse status. A report, “Det Digitale Nordjylland,” was prepared by an interim board of directors (which functioned as the right hand of the board of executives) chaired by the chief executive of the county. The report was not an application, because the ministry did not arrange any formal competition between regions, but rather a paper that tried to demonstrate that North Denmark would be able to mobilise the required money, initiatives and ideas.

The work of the interim boards of executives and directors contained elements of both problematisation and coupling. For the sake of clarity, however, I will discuss them separately, starting with the issue of problematisation.

As the “Det Digitale Nordjylland” report was prepared, there was an intense discussion about the contents of the programme. What were the problems to which DDN would be the solution? These discussions continued also in the four thematic groups that were established after the ministry’s (and the Danish parliament’s) decision to give North Denmark the IT lighthouse status. All in all, there seem to have been three major ways of framing the programme, all drawing on different aspects of the arguments that the Ministry of Research and IT had used to explain the programme and the selection of North Denmark.

DDN had its background in the Digital Denmark (DDD) strategy. Thus it could be argued that DDN should reflect the values and targets of DDD. DDD had defined the problem as that of making Denmark into a network society, arguing that “it is the networks that are really changing the world” and that the challenge is “to ensure that Denmark takes the new technologies into use quickly so that we get a share in the great growth potential of the digital economy and so that the conversion is based on the values which form the foundation of Danish society.” (Dybkjær and Lindegaard 1999, 34). The underlying values were articulated in the following way: “Digital Denmark is based on an active, representative democracy in which there are equal opportunities for all and in which a feeling of solidarity binds society together and ensures help for those who need it.” (Ibid.)
The DDD was not a strategy for industrial development, but rather for diffusing IT in the Danish society. The four major objectives of the strategy reflect this: 1) life-long learning for all; 2) Denmark as an e-commerce nation; 3) more effective and cheaper service with digital administration, and 4) Danish Internet initiatives. Special emphasis was put on the inclusiveness of the network society: “A network society for all.” In other words, DDD adopted a user-driven approach to IT policies. This approach was also adopted by the public authorities (the county and the municipalities) involved in planning DDN. They emphasised the primacy of the user perspective and the importance of inclusiveness. However, just like the Ministry of Research and IT, they also claimed that this approach was compatible with the target of economic growth, and this is the point at which opinions were (and still are) divided.

Many people wanted to see DDN as a partial solution to the challenges of the regional economy. According to this interpretation, the DDN-funding should be seen as a continuation of the EU’s Objective 2 and 3 funding: a programme that should aim at strengthening the region’s competitiveness. For representatives of this view, the IT-orientation of DDN meant that it could be used for improving the operational preconditions of the ICT industry in the region. This innovation-driven approach to the programme was adopted, as it seems on the basis of my interviews, by at least some parts of the local ICT-industry, NOVI and some of the university researchers who were involved in the planning process. They thought that the interests of the existing ICT-cluster should be taken into consideration when formulating programme targets. At first sight, this seems to deviate strongly from the ambitions of the DDD-strategy. Yet a careful reading of the strategy shows that there is also some support for it. First, in its section on the IT lighthouses, the strategy explicitly compares them with regions that have been successful as innovative milieus (for a discussion on this term, see Castells 2000; Castells and Hall 2000). Thus, Silicon Valley in California and Oulu technolopolis in the north of Finland are mentioned as models. Second, the DDD-strategy clearly adduces the ICT-cluster as a strong reason for selecting North Denmark as an IT lighthouse. Finally, economic growth is mentioned as an important target and as the major motivation for the initiative.

However, as a result of the strong presence of public authorities supporting the user-driven interpretation of the programme, the regional competitiveness approach never gained any broad support. The criticism was kept in the background. In fact, even the director of the DDN-secretariat seemed to be unaware of the broad existence of such criticism.
This is unfortunate, since the opposition between the two views raises important questions about the compatibility between the targets of the programme. Will user-driven policies also increase regional competitiveness and effect economic growth in the region? Those who argued that it would (the DDD-strategy and some of my interviewees) made few efforts to prove the claim. A common conception among many economists as well as policy makers is that high technology industries provide the best opportunities for economic growth and new employment (Castells 2000). According to this logic, it would have been wise to make investments in a way that clearly supported the development of the existing ICT-cluster. On the other hand, there is also the counterclaim that it is not innovation and production, but rather the efficient use of new technologies that contains the most significant economic potential (Lucas 1999; Pohjola 2001). The argument is that such use increases productivity, which is the real basis of social welfare. In this view, the potential effect on the economy of IT production is restricted because it forms just one sector alongside many others: “Production benefits only one industry sector – the IT sector, while IT use can benefit all industry sectors”. (Kraemer and Dedrick 2001, 271)

A third interpretation of DDN was more successful in imposing itself upon the discussions, namely that of Aalborg University. The university saw the programme as a way to strengthen IT research in the region. As support for this interpretation, the university representatives reminded the negotiators of the fact that the Ministry of Research and IT had released the initiative at the anniversary of the university. Also, the ministry’s arguments for selecting North Denmark emphasised the quality of research in the region. The research-driven approach to DDN ran into serious problems when it turned out that the ministry would not accept that university departments used their regular funds as original costs in project applications. Projects would be considered only if they brought “new money” with them. Departments had, in other words, to acquire external funding in order to be able to apply for the DDN-money. This backlash took some of the air of the university’s argumentation, and attention had to be redirected towards rescuing university participation altogether by special arrangements that could be accepted by the ministry.

In sum, as regional actors started to plan DDN, they entered a process of problematisation in which three perspectives were set against each other: user-driven, innovation-driven and research-driven programme policies. The “Det Digitale Nordjylland” report contains a section on the vision of the programme. Here, traces of all three approaches can be found. However, as the project became more concrete,
the user-driven approach became dominant and clearly outscored the others.

**Coupling**

Despite the conflicting views of the programme presented above, the board of executives managed to achieve consensus on the programme contents. How was this possible? A first answer can be derived from the composition of the DDN boards of executives and directors. Neither of them includes any high level members from the industry to balance the strong presence of the county, municipalities and Aalborg University. Similarly, the four theme groups consisting of thirty-four members had only three representatives from the local ICT-industry. None of the multinationals were represented. Thus, the DDN was organised in a way that from the beginning excluded strong influence from the industry. In the enrolment phase, the programme was primarily a public endeavour and did not aim at the kind of public-private collaboration on equal terms that we have seen in Turku and in Jyväskylä.

According to one of the interviewees.

“**It is very typical for Denmark to create programmes without communicating with the leaders of industry. Therefore programmes are created that do not work for the industry. In the case of the Digital North Denmark, for example, industry has hesitated. Dorte Stigaard [the director of the DDN secretariat] will of course not confirm this. It is her duty to believe in the programme. … The problem is that the board of Digital North Denmark is political. Almost everyone is from the county, the municipality [Aalborg] or the university. But only a few are from industry. It should be the other way around.”** (Interview 003-06-080601-1-1)

In the enrolment phase, the programme leaders chose, instead, to focus on enrolling other public authorities. They made significant efforts to interest the region’s municipalities with the programme. The IT lighthouse framework required that regional and local authorities contribute with one-third each of the funding of the DDN secretariat (the Lighthouse centre). This meant that support from the regional municipalities was necessary for the implementation of DDN. The marketed model was that each municipality would pay DKK 5 per citizen, without receiving any guarantees of refunding through DDN money to local projects. According to programme leaders, it was crucial that projects would be selected on the basis of quality rather than as a result of political deals. The leading people of the county, the municipality of Aalborg and the DDN secretariat spent a lot of time travelling around the region to discuss with local politicians and
administrations. Their argument was that this was an opportunity for the whole region to bring itself up to grade as an IT region, and thereby improve its general image in Denmark. In the long run, the argument went, the whole region would benefit.

**Enrolment**

The actual enrolment of members in the two boards of DDN and the four theme groups used formal channels. For instance, industry was represented through appointees of an employer’s association and a labour union and the region’s municipalities were represented through their common association, Kommuneforeningen. One of the key people in setting up the organisation complained that the formal way of doing things led to sub-optimal results: several competent people with interest in the programme were left aside, particularly within industry, because they could not be enrolled directly (Interview 003-01-110601-1-2). In some cases enrolment required special arrangements as a result of demands made by influential actors. The university demanded a strong presence on all boards and theme groups, and succeeded in getting more positions in the theme groups than any other organisation. The county and the municipality of Aalborg were also granted positions on all boards and theme groups. This is perhaps natural since the county is involved in the administration of the programme and since Aalborg is the regional centre. However, the arrangements also seem to reflect the genealogy of DDN. As was described above, the process was initiated by the leadership of the county and the university. The municipality of Aalborg was one of the first actors to be enrolled. These three key actors formed separate DDN planning groups in their own organisations, which shows that they took the programme seriously and that they were committed to it at an early stage.

The appointment of Dorte Stigaard as director of the Lighthouse centre, responsible for the administration of DDN, reflected the programme structure and targets. Stigaard was not an engineer, but had a background in humanistic informatics at the University of Aalborg. One of the core themes of humanistic informatics is that of building competence among IT users and the construction of user-friendly systems. Before DDN, Stigaard worked as an IT manager at the Municipality of Aalborg, where she had responsibility for all strategic use and development of IT in the municipality. At the early stages of planning DDN, she worked together with people from the county to write the “Det Digitale Nordjylland” report. Thus, she had strong legitimacy in the eyes of the three major actors and her competences reflected the spirit of the programme (humanistic informatics and experience in public
administration). Even the critics of DDN appreciated this: “She is the right carrier of the vision of DDN. I would probably have chosen another vision, and therefore hired another person. But given the vision, I think she is very, very good.” (Interview 003-05-070601-2-2)

The theme groups have been mentioned several times above. What was their role in the process? The answer is somewhat complex because of a transition within DDN. In the beginning they were set up to specify the contents of the programme. The “Det Digitale Nordjylland” report had formulated the vision of DDN, but in order to target the money, stricter specifications were needed. The programme leadership had at an early stage made the decision that the funds should not be spread evenly, either in terms of activities or geography. Instead, four focus areas were chosen (1. IT infrastructure, 2. Industry and E-business 3. Education, and 4. Digital Administration) and the decision was made that funding should be based on project quality only. The theme groups were formed to provide the expertise needed for content specification in each focus area. However, as was already mentioned, industrial expertise was to a large extent excluded.

The work of the theme groups resulted in criteria for project evaluation in the first round of applications. All groups made consensus decisions about the criteria to be used. However, during the group work differing opinions appeared, particularly in the group working on IT industrial development and e-business. Should DDN promote IT innovation or IT use? To what extent should DDN support the already existing ICT-cluster? The user-perspective gained the upper hand and e-commerce rather than IT industrial development became the focus. Interestingly enough, these kinds of conflicts were kept internal within the working groups and never threatened the programme as a whole. One of the interviewees representing the minority view explained this with the fact that the region cannot afford a lot of controversy: “… One of the main secrets of this region is that people collaborate to some extent and don’t make civil wars …. That is why you create some self-discipline.” (Interview 003-05-070601-1-2)

After the first round of application in which DKK 79 m was given to 55 projects, the DDN board of executives decided that the rest of the money should be distributed in four smaller rounds of application spread evenly over 2001. The initiative for this came from the Lighthouse centre, which thought that the remaining funds should be used in an even more targeted way than in the first round. In the first round, money had been given to projects in areas like digital administration and e-business. Now, the Lighthouse centre argued, more difficult areas should be attended to,
such as IT use in the health care sector, in youth education, in culture, and so on. The new policy implied a shift in the locus of initiative from the theme groups to the Lighthouse centre. One of the interviewees from the Lighthouse centre staff described the change: “We have a different attitude to the project theme groups now. They have been used as sparring partners – giving feedback to our proposals – rather than being takers of initiative.” (Interview 003-01-110601-1-2) At first this caused some opposition within the theme groups, where it was argued that the Lighthouse centre should be responsible for administration only, not for content planning. However, it seems that the centre has been successful in gaining authority within the programme and that the criticism has died away.

Mobilisation

Mobilisation refers to the phase of a project in which decision-making becomes distributed, which means that decisions are made in isolation rather than in the core group of enrolled actors. DDN has shifted to a mobilisation phase in each round of application. In principle, authorities, industries, university departments, schools, etc., make independent decisions on whether or not to submit an application. In this context, “independent decision-making” means that decisions are made outside the DDN-organisation and that the primary motivation for decisions is not the implementation of DDN as a programme. Instead, actors can be assumed to base decisions on criteria like expected returns and margins of choice. Quite plausibly, many applications may have been motivated by the profits that investments in IT are expected to lead to, and perhaps from an experience of increasing returns from previous use of IT. In other cases, the motivation may have been more of a push-type. Some applicants may have seen IT investments as a necessity to remain competitive. Analogically, some departments in the county administration or in some of the municipalities may have felt a pressure to submit an application as a result of the visible commitment to DDN of their leaders. In both of the latter cases, decisions would have been motivated by limited margins of choice rather than returns. However, this study was not designed to determine why some organisations applied while others did not. Instead I will attend to how the DDN leadership tried to affect the process of mobilisation by reducing the degree of independence in the distributed decision-making.

From the perspective of mobilisation, the first challenge for the DDN leaders was to make the programme known in the region. A preliminary campaign of contacts “in the field” had occurred already at the stage of writing the “Det Digitale Nordjylland” report – that is, before
any formal decisions about the implementation of DDN had been made. As mentioned above, the programme planners wanted to show national decision makers that the region would have the capacity to come up with a large number of creative IT projects. This was not self-evident, and during much of the programme there has been a worry that the next application round would fail. Thus, in an attempt to demonstrate the region’s potential, the programme planners asked municipalities, businesses, educational organisations, etc., in the region to submit preliminary (one page) proposals for new projects. “We got 250 ideas of new projects within a few weeks. … So we could document that there were a lot of ideas in the region.” (Interview 003-07-120601-1-2)

Then, as DDN had acquired formal status, an intense campaign of communication with the region started. “Hundreds of meetings” were arranged with organisations in the region, and a set of supporting materials was produced: slides, PowerPoint presentations, pins, t-shirts, and later even a video. These could be used by anyone who wanted to participate in marketing the programme. According to the interviewees, the interest in doing this was great, and one reason for the success in mobilisation might have been that “there were so many people who wanted to go out and tell others about the programme”. (Interview 003-01-110601-1-2) Most importantly, the most influential people at the county, the municipality of Aalborg and the university acted forcefully in this. “They told others about the programme in a very lively way and said that they wanted to show what the region can do. They had a good ability to talk in concrete terms so that people could understand how the programme was important for them.” (Interview 003-01-110601-1-2) All interviewees who talked about this referred to the enthusiasm and personal commitment of people like Per Okkels, chief executive of the county, and Jørgen Litske Petersen, deputy chief executive of the municipality of Aalborg – both members of the DDN board of directors. These key people also complemented each other in terms of their contact networks.

“Okkels inspires people. … He is a well-known face all over. He is known as a person who has done a lot for the region, also for the industry. If he goes out and says that this is a unique opportunity for North Jutland, people listen. But he has also believed in the project at a personal level. People could see his enthusiasm.

…

Petersen is very different from Okkels. He is more jovial. He is funny. People like him. Okkels and Petersen are respected in different circles, so they shared the job of informing people about DDN. Petersen is known
among IT suppliers who want to sell their products to the municipality of Aalborg. Aalborg is the biggest municipality in the region, and it is in charge of many projects together with other municipalities. So he has quite a large network there.

... One of Okkel’s strengths is that he understands NOVI, the university, the employer’s organisations, etc. He is used to reflecting on regional development together with them. He knows what fires them and what doesn’t, which people like each other and which don’t. “ (Interview 003-01-110601-2-2).

Another key person in the mobilisation phase was Dorte Stigaard, the director of the Lighthouse centre. In contrast to Okkels and Petersen, she was not well known in the region when the programme started. Yet in just a year she had gained considerable respect both within and outside the DDN administration.

“She is very good at performing and at describing what everything is about in concrete ways: how can I use IT. … Dorte’s authority derives from her position in DDN and in the county. So when she is out there everyone knows that we all stand behind her. … But she also has a natural gift to bear this authority.” (Interview 003-02-080601-1-1)

“She is very energetic. … She knows a lot about IT management. I think she had a pretty high position in the IT infrastructure in the municipality of Aalborg. So she knows quite a lot about that. And she knows a lot of the people. She has gained authority and is respected as a strong girl. So full respect for that.” (Interview 003-05-070601-2-2)

“She is very, very talented, a very skillful speaker. … Dorte has a strong personal authority.” (Interview 003-04-070601-1-1)

What was the message of the promoters of DDN? On the surface, the message was about the opportunities provided by information technology and how DDN could help people implement visionary IT projects. However, at a deeper level the message was as much about regional identity and pride. DDN was marketed as an opportunity for regional mobilisation. One of the active promoters describes the strategy:

“We created a board in which all the important actors in the region were represented. … When we described the programme for these people, we said: ‘Go back to your organisations and say that this is not a question of what we can do for you, but what you can do for the region.’ And they did it.” (Interview 003-02-080601-1-1)
Another interviewee, also one of the key marketers of the programme, went so far as to claim that “the regional element is what is important in DDN; it is what motivates the region to participate.”

“In fact, the IT development itself, the technical development, that aspect is not of such great interest to the region. … The regional rhetoric is of key importance for the project. The fact that you create consciousness around the project … that the project is widely known among the people … this is instrumental for mediating the project and creating images of the project, the meanings of the project, to motivate enterprises and private people to get involved.” (Interview 003-04-070601-1-1)

A third interviewee, who was critical of the DDN policy, argued that the regional contextualisation was important even for the decisions of private businesses to participate in DDN.

“Ericsson and Sonofon were active in some applications. They saw the opportunity, and some people have thought that we simply need to embark on this process, because if it’s a failure, Aalborg and North Jutland will not get this chance again. So we have to embark on it, because otherwise it will be a scandal. And this region cannot afford a scandal. … I really think that the companies have had these kinds of motivations.” (Interview 003-05-070601-1-2)

The media formed an important channel for marketing DDN. One of the interviewees complained that the local newspapers had been quite sceptical in the beginning, claiming that the programme was for public administrations only and that ordinary citizens would not benefit. However, as concrete projects were selected in the first round of applications, the tone changed and since then “the media have been fantastic”. (Interview 003-01-110601-2-2) Another interviewee suggested that the secret behind the positive media treatment was that the programme was designed in a way that ordinary people could understand. “It was easy to explain to people what it was all about and to give concrete examples. And the media said, “Wow, finally someone who tells us what global development and the network society are about.”” (Interview 003-02-080601-1-1)

Thus, in sum, DDN was marketed in a way that aimed at reducing the distinction between enrolment and mobilisation. Organisations and people were urged to participate in making DDN a success, and through this, to enhance the region’s reputation. It is impossible to determine to what extent those who applied for DDN money really were motivated by such considerations on the basis of the empirical material gathered in this study. What seems clear, however, is that the strategy succeeded in raising great interest in the region, and it can be hypothesised that the
programme is much better known among North Jutes than it would have been if it had been marketed as a simple IT programme, without the regional contextualisation. It can also be speculated, on the basis of the interviews in this study, that the success of the regional rhetoric was linked to the user-driven policy opted for by the planners of DDN. It would have been much more difficult to frame the programme as a regional effort if policies had been research- or innovation-driven, because such policies would have been much more restricted in terms of the sectors and geographic areas that stood to benefit.

**Conclusion**

In the introduction above, I argued that the actual ways in which things are done affect regional development, and that structural studies of regions should be complemented with studies of policy processes. Further, in section three I suggested that a more theoretical understanding of processes than is common should be encouraged, and that one way of doing this could be to work on the conceptual instruments that are used for this. This study was an attempt to demonstrate how policy processes could be analysed by using a set of concepts imported from science and technology studies.

The Digital North Denmark Programme and its implementation can be thought of as one of the processes initiating change in North Denmark. At the moment it is impossible to predict the impact that DDN will have. One interviewee was quite pessimistic. “Come back in 2005 and assess the results of Digital North Denmark. … They will not be significant.” (Interview 003-06-080601-1-1) Others were more optimistic, envisioning positive effects on peoples’ lives as well as new jobs and an improved regional image. It is even possible that DDN could affect the ICT-cluster by widening it if new ICT companies are created or if already existing companies take up new activities. Whatever the case, DDN is clearly a programme with a potential developmental significance, and thereby qualifies as a policy process of interest from the perspective of regional studies.

DDN was initiated through collaboration between regionally influential actors, the county, the university and the municipality of Aalborg. Just like in our previous case studies in Turku and Jyväskylä, the ability of key actors to perform fast and proactive collective action was of great significance to guarantee external (national) funding and to raise interest in the region. In this case, success required that the actors be able to agree on a vision of what building an IT lighthouse should be about. The phase of problematisation brought forth three different interpretations of the programme, each emphasising different aspects of
information technology: IT use, IT innovation and IT research. The resolution of this constellation of potential conflict is intimately tied to the processes of coupling and enrolment.

Coupling activities were primarily directed towards public authorities in the region, and the actual boards and theme groups that were formed (enrolment) contained little representation from industry. At the same time, the ministry’s rules for funding undermined the research-oriented interpretation of DDN. Thus, despite the strong presence of the University of Aalborg in the organisation of DDN, it was the user-oriented interpretation that became dominant. This reality was reflected both by the selection of Dorte Stigaard as director of the DDN administration and by the Lighthouse centre’s growing influence in the programme in 2001. Finally, the DDN leadership succeeded in mobilising regional actors to submit applications despite the strict criteria for funding and the high share of self-financing that was required. This can partly be explained by the active campaigning in which regionally well-known and respected people put their authority behind the programme, and by the ability of these people to transmit a positive and regionally anchored picture of it.

All in all, the analysis of the policy process reveals that there were several stages in which the programme could have taken another turn, either in terms of contents or in terms of success. It also confirmed some of our findings from previous studies of regional development (section two above): that the ability to bring to the fore a vision of a different future is important, as well as the ability to embody this vision in a functioning organisation. Active lobbying to the Ministry of Research and IT and active networking in which informal relations were utilised were also crucial elements in the process. The success of the key actors in enrolling other actors suggests that the DDN leadership was able to create a common sense of mutual empowerment, and that they had a good understanding of how to use image and atmosphere. Finally, there were several examples of how actors adapted (or may have adapted) to the programme trajectory despite of having deviating conceptions of the optimal contents of DDN. The greatest difference to the Finnish cases was probably in the formality of the process and in the partial exclusion of industry from defining the agenda of development.

It seems to me that the case has been made for the significance, in regional studies, of complementing structural research with research on processes, and that some useful concepts for such research have been presented. I hope that this will encourage further efforts to do similar studies and to work on concepts and explanatory models, because we are
just beginning to fully understand the policy process dimension of regional development.

**References**


Nordic co-operation takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

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Building Policy Networks

A Comparative Study of Public Attempts to Create, Coordinate, and Stimulate High Technology in Turku, Finland and in Trondheim, Norway

Henrik Bruun

Abstract

This study compares two recent Nordic attempts, at the municipal level, to make industrial policy by using a network approach. The first case focuses on biotechnology development in Turku, a city in southwestern Finland, while the second case highlights the making of a strategic industrial plan for Trondheim, a city in the middle of Norway. The commonality of the two cases is that policy was formulated in collaboration with academia and industry, and that a multi-actor implementation apparatus was established. Yet a closer look shows that there were significant differences in the ways the policy processes were organised and the role that the municipality took upon itself. The Turku effort was more focused and better resourced, and will therefore probably have more significant effects on its focus area (biotechnology). The Trondheim effort was less focused, and hardly at all resourced by the municipality, which means that implementation will be dependent on the other actors involved. These differences seem to have had, and can be predicted to continue having, significant effects on the ability of the public actors to make policy by using networks. A positive aspect in the Trondheim process was that the action plan included a broad range of actors, and distributed tasks to interest organisations, political parties and even media. However, as a result of the other weaknesses, the Trondheim case does not yet provide a good example of how a higher degree of participation could be combined with successful industrial policies.

Introduction

Network thinking has grown strong in policy science. At the same time, however, opinions about the nature of policy networks and about their roles in society diverge. There is thus a need for empirical studies of different kinds of networks and of new trends in policy network formation. This study compares two recent Nordic attempts, at the municipal level, to make industrial policy by using a network approach.
The first case concerns biotechnology development in Turku, a city in southwestern Finland. Here a publicly owned company, Turku Bio Valley, initiated a strategy-making process that led to the writing of a strategy for the whole biocluster in the city. The second case is in Trondheim, in the middle of Norway, where the Municipality of Trondheim initiated a process of strategic industrial planning for local economic life.

The commonality of the two cases is that policy was formulated in collaboration with academia and industry, and that a multi-actor implementation apparatus was established. Yet a closer look shows that there were significant differences in the ways in which the policy processes were organised, and the role that the municipality took upon itself. There was much more focus in the strategy process in Turku, and, in contrast to the Municipality of Trondheim, the City of Turku invested significant sums in its local high technology clusters. These differences seem to have significant effects on the ability of the public actors to really make policy – in the sense of influencing development – by using networks.

The present study is part of a larger project called PROB (In Search of Process-based regional development policy), which investigates regional responses to the challenges of the global, informational and networked economy. PROB is based on a series of studies of various high technology-related development processes in Nordic cities and regions, including biotechnology in Turku, Finland (Bruun 2001), ICT in Jyväskylä, Finland (Linnamaa 2001), information technology in North Jutland, Denmark (Bruun 2002), and ‘high technology’ (in general) in Trondheim, Norway. This work compares policy processes in two of the PROB cases, Turku and Trondheim. A more general analysis of the Turku case has already been published (Bruun 2001). There will therefore be a stronger focus on the Trondheim case in this article, and the Turku case will be used more as a reference for making comparisons. Yet at the same time, the paper includes information about the Turku case that has not been published before.

The study is based on interviews and documents like strategic plans, memoranda, assessments, risk analyses, overviews, etc. In Turku, twenty-three interviews were carried out in the early summer of 2001. In Trondheim, ten interviews with thirteen people were carried out in the autumn that same year. The coverage was much broader in Turku, partly as a result of geographical proximity and partly because there being a better picture of what to study from the beginning. The choice of interviewees in Turku was based on the snowball technique in which
interviewees are asked to suggest other people who should be interviewed
until circularity is reached. All major actors were interviewed, along with
a set of people who represented perspectives that I found interesting even
if they have restricted influence in the biocluster development or the
policy process to be analysed here.

The Trondheim case presented some problems. First, travelling
costs combined with restricted resources made the time span for
interviews much shorter. Also, there was very little information about the
processes going on in Trondheim as the study started. The topic of
interest was successively discovered as the interviews advanced, the
effect being that the composition of the interviewees failed to be optimal
from the perspective of the final analysis. In other words, some of the
interviewees had little to do with the policy process to be analysed here,
while other people who could have been interviewed had to be left out.
Limited resources precluded another trip to the city. However, most
significant actors were covered.

The article will be structured as follows. Section 2 will discuss the
notion of policy network and the particular approach to policy networks
to be used in this context. As suggested by the title of this study, the
focus will be on policy network building, and the conditions for success
in that activity. Section 3 presents the policy process in Turku and the
context in which it took place, and Section 4 does the same for the
Trondheim case. Then, in Section 5, the two examples of policy network
building are compared and similarities and distinctions are identified.
Finally, in Section 6, a few speculations are presented about how the way
in which the policy networks were built might (or might not) affect
continued development in the high technology sectors that were
addressed in the policy processes.

The Notion of Policy Network

Policy Networks

The role of inter-organisational collaboration and networks has interested
political scientists since the late 1950s. Early attention to these issues was
linked to the debate between pluralists and elitists about the nature of
political decision-making. The former emphasised the openness of
politics for participation by any organised group, while the latter argued
that such openness, to the extent that it seems to exist, is a chimera. One
outcome of the discussion was a new research orientation that focused on
interest group representation in governmental decision making. (Marsh
1998; Klijn 1999)
The debate on the openness of political processes recurred in Europe in a new form in the 1970s. Again, the positions were divided between pluralists, emphasising the openness of political decision making, and elitists, now called corporatists, who argued that politics was primarily made by the state in collaboration with well-organised pressure groups (Klijn 1999). From the policy network perspective, the most influential literature has been elitist or corporatist in orientation, designating the closed networks of decision makers with notions like meso corporatism, subgovernment, iron triangle and policy community (Jordan and Schubert 1992; Waarden 1992).

These developments were paralleled by a change in policy science, from understanding policy as an outcome of rational decision making proceeding in distinct stages (policy formulation, decision, and implementation) to seeing it as a multi-actor process in which the policy content is affected by all stages of policy making, and in which heuristic rules and routines have a strong influence on the behaviour of actors (Klijn 1999). According to Klijn (1999, 14), the policy network approach was a subsequent attempt to understand the “context in which policy processes take place.” Policy scientists started using the policy network term in the middle of the 1970s. Scharpf (1978), for instance, argued that previous policy science had focused too much on interactions between particular organisations, while neglecting the longer-term structural relations between policy making organisations.

What, then, is a policy network? There are no generally accepted definitions. A first demarcation line concerns the scope of the concept. The British research tradition understands policy networks as “a model of interest group representation which is superior to, and indeed can subsume, pluralism and corporatism” (Marsh 1998, 8). Thus the notion is used to reframe the dispute, mentioned above, between pluralists and corporatists; there is a continuum of policy networks from a more open type (for instance, issue networks) to closed ones (Jordan and Schubert 1992; Waarden 1992). The German and Dutch tradition, on the other hand, makes a historical claim about policy networks (Kickert et al. 1999; see also Heffen et al. 2000). Policy networks are here understood as a new form of governance, successively replacing top-down policy making in the form of state intervention, as well as market oriented attempts to make government more businesslike (“new public management”) (Kickert and Koppenjan 1999; Sotarauta and Linnamaa 2001). In this view, policy networks constitute a third, alternative model of governance – a model that is winning terrain, partly as result of the failures of the two
other models, and partly as a result of the increasing complexity of modern policy problems (Kickert and Koppenjan 1999).

Kickert, Klijn, and Koppenjan’s (1999, 6) definition of policy networks as “(more or less) stable patterns of social relations between interdependent actors, which take shape around policy problems and/or policy programmes” will be used as a starting point for the present work. The notion of interdependence is important here. Much of the policy network literature has its theoretical underpinning in resource dependency theory, which was developed by organisation theorists in the 1960s and 70s (Klijn 1999). Resource dependency theory explains collaboration between organisations with their need to get access to critical resources that they themselves do not control. In the case of public actors, such complementary assets can be, for instance, experiential knowledge of the field that is the object of policies, economic resources to implement policies, or societal influence that is crucial for the legitimacy/implementation of policies.

The Role of Policy Networks in Regional Industrial Policy

This study will focus on policy networks in regional industrial policies. The two cases that will be compared represent attempts to renew policy making by including new actors in the policy formulation process. There exists a vast literature on the general forces behind regional attempts to revitalise industrial policies (Saxenian 1994; Isaksen 1997; Braczyk et al. 1998; Dalum et al. 1999; Sotarauta 1999; Cooke et al. 2000; Kostiainen and Sotarauta 2000; Cooke and Morgan 2000). According to this body of research, regions are becoming increasingly dependent on having internationally competitive industries. The background is that many states have moved from redistributive regional policies to promoting successful regions, and that the opening of international markets has exposed local economies to international competition (Vet 1993; Cooke and Morgan 2000). Thus, regions are more dependent than before on the economic performance of their own industry, at the same time as the demands on that industry have increased drastically. A minimisation of production costs is no longer sufficient for the required competitiveness, but must be supplemented, or even substituted, by “continuously increasing product quality, timeliness of service, flexibility, rapid and continuous innovation, and command of strategic technologies” (Vet 1993, 98).

Contemporary industrial policies, in both regions and nations, can be seen as attempts to adapt to the process of economic globalisation. Several studies (see references above) have suggested that, contrary to what some might have expected, globalisation is not leading to a levelling of economic space, but that, on the contrary, regional specialisation and
strategic localisation are important ingredients of the new economy. De Vet (1993), for instance, has argued that the internationalisation of markets is causing a reconfiguration of the international division of labour, encouraging regional specialisation. The reason for this is, according to him and many others, that the competitiveness of companies is not dependent on what happens within them only, but also on the environment in which they operate (Nelson 1993; Lundvall 1995; Edquist 1997; Schienstock 1999). Good transportation and communication infrastructures, a competent labour force and the reliability of supporting companies are examples of performance enhancing features of the operational environment. This list can be extended, and some authors even talk about regional innovation systems or regional innovation milieux, consisting of large sets of regional elements that positively affect the competitiveness of firms (for a review of the concepts, see Kostiainen 2000). A most important point, however, is that distinct economic activities require different kinds of supporting environments (Tidd et al. 2001), which means that regions, which have limited resources, must make choices. In practice, this implies that regions should focus on “specific rather than on general industry needs” (Vet 1993, 17).

What are the implications of these considerations for regional policy makers? First, the overall message is that industrial policy must be sensitive to the needs of local industry. At the same time, however, it must influence development so that the right kind of industry, the industries of the future rather than those of the past, prospers. Many regions have tried to solve this equation by applying the policy network approach described above. By collaborating with industry, the university and other significant categories of organisation, public authorities can benefit from the expertise of their partners, and gain first hand information about their needs. Even more significantly, perhaps, by using the policy network form, authorities can expand their implementation machinery significantly. Implementation is no longer restricted to public agencies, but extended to the whole policy network. This is in fact yet another reason for letting the non-public actors participate in the policy formulation process. It should, however, be noted that the strategic use of policy networks implies a drastic change in the conditions for policy making. Most significantly, policy formulation is no longer a privilege for the actors representing the public sector in the region, but must be achieved through a negotiation process with a large set of actors. This requires a new view of governance, defining it more as “directed influencing” than as command and control (Sotarauta and Linnamaa 2001). Kickert and Koppenjan (1999, 39) designate this with the term
‘public governance’ which they define as “the directed influencing of societal processes in a network of many other co-governing actors.”

Policy Network Building

While most policy network literature is structurally oriented, with a focus on network structure and its relation to policy outcomes, this study attends to the process of network building. The choice had empirical reasons – industrial policies in the two cities happened to be at such a stage when this study was done. Yet the decision to focus on the process was also supported by complaints by policy network analysts that network formation is “one of the most sadly overlooked, least discussed, and yet obviously crucial aspects of networking” (Hay 1998, 45; see also Ebers 1999). Hay (1998) has argued that network formation is particularly important because it establishes network traits that might turn out to be persistent as the network evolves, the reason being that networks develop in a path-dependent manner.

Even if it is true that network formation is a neglected field in policy network research, and in network studies more generally, a few authors have addressed the issue. A common approach has been to distinguish between different phases of network building. Gray (1985), for instance, distinguished between the problem setting, direction setting, and structuring phases of collaboration in ‘interorganisational domains’. According to her, the problem-setting phase involves the “identification of stakeholders within a domain and mutual acknowledgment of the issue which joins them” (Gray 1985, 916). The process continues with direction setting, that is, the articulation by stakeholders of “the values that guide their individual pursuits” and early steps to “identify and appreciate a sense of common purpose” (Gray 1985, 917). In the third phase, structuring, interactions are institutionalised and formal structures for collaboration established. Larson (1992) uses a similar typology of phases, but gives more emphasis to the pre-networking stage of relations between actors. Policy network literature has sometimes distinguished between the background networks that actors have, and the networks that develop around some specific policy issue. As a policy initiative is taken, the initiator must decide upon whom to include or not include in the process. In most cases, the policy network building process will start by a selective activation of the background network of the initiator (Klijn 1999).

Bruun (2002) has pointed out that there are two distinct kinds of activation in policy network building. Using the terminology of science and technology studies, he distinguished between enrolment and mobilisation. In Bruun’s interpretation, the first refers to the inclusion of
actors through a process of negotiation, in which the initiator tries to convince the others that they should invest in the proposed collaboration. The outcome of successful enrolment is a core group that collaboratively manages the policy process. Enrolment involves all the phases identified by Gray (1985), problem setting, direction setting, and structuring. In successful cases, the outcome is an agenda and a body of rules for participation by actors who do not belong to the core group. These rules determine the conditions for the second kind of activation, mobilisation. In distinction from enrolment, mobilisation is not based on negotiation, but rather on a one-way communication of the type “you can participate if you accept the existing agenda and fulfil these and these requirements”.

The characters of enrolment and mobilisation are very different. While enrolment gives opportunity for mutual adaptation and qualitative development of the policy initiative, mobilisation works in a “take it or leave it” fashion, proceeding from an agenda and rules for participation that are controlled by the core group. This means that the logic of decisions about participation is different in the two kinds of activation. In enrolment, there will be emphasis on the value of the proposed policy process, the opportunity to influence its general direction and the benefits of collaboration with the other key actors. In mobilisation, on the other hand, the actors have a more instrumental relation to the policy process, making decisions about participation on the basis of whether it furthers their own targets and projects or not. As a result, the mechanisms for activation will differ in the two cases. The key to successful enrolment seems to lie in the ability of the initiator to create a sense of urgency among the actors to be enrolled, on the one hand, and a willingness to share process management, on the other hand. Urgency motivates investments, and a willingness to share responsibility and control makes collaboration possible. The literature on networks has identified several conditions that facilitate enrolment, among them communicative and strategic skills, good personal and organisational reputations and prior relations with the actors to be enrolled (Larson 1992; Bruun 2002). The mechanisms for mobilisation are different. Here the major incentive is formed by the direct benefits that can be expected from participation, rather than by the long-term outcome of the policy process as a whole.

It is important to distinguish between enrolment and mobilisation, because the mechanisms of efficient enrolment will not work in mobilisation and vice versa. It is, in other words, unwise to invite actors to participate in the management of a shared policy process by exclusively pointing out the benefits that they themselves might get from such participation. This would create a high risk of withdrawal into the
core group. Defection could occur whenever there is any reason to doubt the realisation of benefits that were promised. Enrolment is more efficient if the actors see values that are larger than their own benefit in the process to be managed. Similarly, it seems unwise to base mobilisation on arguments about the general value of the process in question, rather than on individual benefits. Again, there will be little commitment to participate in a relatively predefined policy process without clearly seeing how one can benefit from it.

The Turku Case

With its 172,000 inhabitants, Turku is Finland’s fifth largest city. It is situated in the southwestern part of the country, on the shore of the Baltic Sea. The economy of Turku is diverse, based on five “clusters” structured around locally significant activities – shipbuilding; real estate construction, maintenance, and business; land and sea transport; publishing and printing; and the pharmaceutical and diagnostics industry. Turku was for long a relatively prosperous city and there was little pressure to develop local industrial policies. Things changed, however, in the 1990’s when the Finnish economy was thrown into deep recession. Unemployment in Turku rose dramatically within a few years, from 4.2% in 1990 to 22.1% in 1994, and stayed at a high level for the rest of the decade. In 2000, the unemployment rate was still above 15%. An additional problem was that Turku experienced a decline in productivity during most of the 1990s, in contrast to competing cities like Helsinki, Tampere and Oulu. The City of Turku reacted somewhat slowly and only in 1997 was it ready for proactive measures. A Turku strategy was formulated and accepted by the City Council that year. It identified biotechnology, information technology and culture as strategic focus areas. Four years later, the key position of biotechnology for local industrial policy was confirmed in the second Turku strategy. (Bruun 2001)

Turku’s biotechnology cluster has its background in the establishment of the pharmaceutical industry in the city in the late 1940’s. Today, two of these firms remain, Orion and Leiras (owned by the German company Schering AG). Orion Pharma is Finland’s most significant developer of new pharmaceutical drugs and its main research unit was recently moved to Turku. The city also hosts two universities with a total of four faculties doing research in the life science area, as well as a university hospital that collaborates closely with the University of Turku’s Faculty of Medicine. Collaboration between academic research and business was boosted by the building of BioCity, a technology centre building, in 1989-1992 (Bruun et al. 2001; Höyssä
Most significantly, the two universities created a Centre for Biotechnology for sharing research and equipment. The Centre, which was given facilities in BioCity, actively sought collaboration with industry. The universities also created a broader joint structure, called BioCity Turku, for the co-ordination of education and research in the life science area. Today BioCity Turku is organised in four research programmes. In addition to this, biotechnology related educations are provided by the Turku School of Economics and Business Administration, the Turku Polytechnic, and the Turku Vocational Institute. (Bruun 2001)

In 1994-1998, participation in a national programme for regional development, the Centre of Expertise Programme, led to the establishment of a series of units for clinical research services. The period also saw a dramatic increase in small biotechnology companies, partly as a result of the termination of research lines in the “old” industry. Some of these companies moved to the BioCity building and one of them became the first biotechnological start-up company to be listed at the Helsinki stock exchange. Today Turku hosts more than forty “bio-companies,” operating in the fields of pharmaceutical drug development, diagnostics, biotechnological products (to be used in research), functional foods, biomaterials, research services, marketing services and consultation. All in all, the local biocluster is estimated to employ more than 3,000 people. The key actors expect that 6-7,000 new jobs will be created within this decade. (Bruun 2001)

The expansion seems to be well on its way. Several of the new biotechnology companies grew rapidly at the end of the 1990s and some even approached the point of initiating production. It was obvious that the existing facilities and infrastructure would soon fail to satisfy the needs of the growing bioindustry. This meant that the seriousness of the City of Turku’s strategic emphasis on biotechnology was put to the real test for the first time. The City acted with determination. It established a public firm, Turku Bio Valley, with the task of arranging new facilities for the local bioindustry. The City of Turku has invested € 14.3 m in the company. Turku Bio Valley was given a particular area in Turku, the “Bio Valley”, to develop. By concentrating the industry geographically, the City wanted to create the economy of scale needed for building advanced infrastructure for pharmaceutical R&D and production. The first buildings have already been finished. Turku Bio Valley also played a key role in the building of a new technology centre building, PharmaCity, for medical research and business. The building, which was erected next to BioCity in 2001, hosts university departments, biotechnology
companies, a centre for test animals and a biotechnology incubator. (Bruun 2001.)

From the perspective of this study, the major significance of Turku Bio Valley is that it represented a new way of making industrial policy in Turku. This happened almost accidentally. The company’s CEO Juhani Leppä, a former deputy mayor in the city, was worried about whether there was a sufficient foundation in the local industry for the Bio Valley development project. He also felt that his company should build its activities on the basis of the real needs of the industry. At the same time, he wanted to get a better picture of the cluster as a whole, providing a first hand touch to his operating environment. Thus he invited all the significant actors within the local biocluster – among them the universities, the city administration and many firms – to participate in the making of a strategy for the cluster as a whole. The strategy process included a series of interviews and workshops in the spring of 2000, involving 70-100 people. A consultancy, Nordic Adviser Group, was hired as process manager. The outcome was a mapping of the cluster, targets for the future and a set of means for reaching the targets. Some of the means were very concrete, to be implemented in the near future. 41 Most of them were based on projects that were going on anyway and cannot be said to be results of the strategy process. What was important, according to several interviewees, was that the strategy work provided everyone with an overall picture of what was going on, and a sense of progress without too much overlap. Some projects might have been boosted by becoming formalised in the strategy.

There were also more abstract targets and means. These included a set of targets for 2010. By then, Turku should have become the site for business units from several international biotechnology firms, given birth to several high growth firms, attracted international top know-how to the region and be internationally well known and recognised. New biobusinesses should be created at an annual rate of 1-5 in 2000-2005 and

41 Collaboration between educational organisations on the realisation of new training programmes, a strengthening of Centre for Biotechnology in the area of functional genomics, the establishment of a drug development centre within the framework of BioCity Turku, strengthening the position of the Centre for Biomaterials in the university structure, the establishment of a national food development centre with an interdisciplinary orientation, attracting the VTT Technical Research Centre of Finland to Turku, quick establishment of an incubator exclusively for bio-businesses, development of clean room activities, and investigations of how the international bio-industry could be attracted to Turku more efficiently.
5-10 in 2005-2010. By 2010, at least one of the new companies should have become an internationally significant player, and the cluster as a whole should employ approximately 10,000 people. The strategy process also led to a redefinition of the role of the public company Turku Bio Valley. The company took upon itself a set of new tasks: to develop R&D facilities, to create a biotechnology incubator, to establish a structure for seed funding, and to function as a well resourced discussion partner for the universities and businesses.

From the policy making perspective, the action of Turku Bio Valley, a public company, was based on policy network governance rather than top down public intervention. Policy targets were formulated in collaboration with other public and non-public actors, and implementation was framed in terms of the network as a whole, rather than as a sole responsibility of the City of Turku or Turku Bio Valley. The city administration participated in the strategy work as one of the invited parties, not as the policy maker, and Turku Bio Valley consciously kept a low profile in the process. Most of the participating actors knew each other from before, as is normal in a small city, but this was the first time that they gathered in such a large group to plan their common future. Previously, the City of Turku had been more traditional in its bioindustrial policies, funding projects, investing in facilities, building infrastructure, etc. These subventions were based on targets that the City had formulated for itself, and the needs that were communicated to it from actors in the emerging biocluster. There was no policy network in the strict sense of the word (“more or less stable patterns of social relations between interdependent actors, which take shape around policy problems and/or policy programmes”). Turku Bio Valley’s strategy work was an act of policy network building, and this is the perspective from which it will be analysed in the Section 5.

The Trondheim Case

Trondheim is Norway’s third largest city, inhabited by 150,000 people. It is situated at the Norwegian west coast, approximately in the middle of the country along the north-south axis. The city is the seat of government for the County of Sør-Trøndelag. Trondheim is an old commercial city with little industry and a large public sector. The latter employed 31% of the workforce in 1999 (Statistics Norway 2002). Among the public employers are the Municipality of Trondheim, the regional hospital, the County of Sør-Trøndelag and NTNU Norwegian University of Science and Technology.

Trondheim is a major locus for Norwegian research in natural sciences and engineering. In addition to having NTNU, Norway’s single
university of technology, it also hosts Sintef (The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology), a private research foundation employing more than 1,600 people (Sintef 2002). Despite all this, Trondheim’s industry sector is quite weak. Industry and mining employed only 10.2% of the workforce in 1999, down from 13.6% in 1986 (Municipality of Trondheim 2002). The corresponding number (mining excluded) for Turku was 19.3% in 1999 (City of Turku 2002). Yet Turku has no university of technology and only a little engineering in the three universities that exist. As we will see further below, the relation between NTNU, Sintef, and Trondheim is somewhat complex.

It is difficult to identify any obvious clusters in the Trondheim economy. The public website of the Municipality of Trondheim lists fishery, commerce, media, the food industry, oil and gas, advertisement and graphical production and “technology” as strong branches in the city (Municipality of Trondheim 2002). Yet none of these has given rise to the same cluster consciousness as, for instance, the biotechnology cluster in Turku. As mentioned above (see introduction), the PROB-focus was on high technology clusters in Nordic cities or regions. Are there any such in Trondheim? Unfortunately, my attempt to answer the question must be based on a weak research base. Unlike the universities in the other cities that were studied within PROB, NTNU does little research on the local and regional economy. Symptomatically, the most recent study of local high technology clustering was done, not by NTNU, but by the Mid-Norway Chamber of Commerce and Industry (Strand 2001). It focused on the information technology sector in the Trondheim region. The study, which is available in overhead copies only, estimates that IT companies employed 2,400 people in the Trondheim region in 1999, and that they had a total turnover of NOK 3,000 million in 1998. That year there were more than 330 IT businesses in the area. Most of them, however, have only one employee. All in all, it seems that one could speak about a cluster in a very loose sense – a small, local cluster. The Chamber of Commerce study suggests that software development, consulting and counselling and systems development and marketing are important fields.

Trondheim’s IT cluster has its background in a wave of new companies that were established in 1981-1986. Many of them were spin-offs from research going on at the Norwegian Institute of Technology (today NTNU) and Sintef. A small electronics cluster emerged, linked to local industry in shipping, environment, oil exploitation, and fisheries. Fifty of these companies are still in business, employing approximately
1,000 people. Sinking oil prices (1986) and the Norwegian bank crisis in the beginning of the 1990s destroyed the breeding ground for further growth. When conditions improved in the middle of the decade, there was a new wave of start-up companies, now labelled as IT companies. Just like in the first wave, many start-ups had their background in NTNU and/or Sintef. In contrast to the first wave, however, several of the second wave companies had a strong international orientation from the beginning. These companies were financed by international capital and had operations in several countries from the start. (Interview 004-07-221001-1-1) Fast Search & Transfer ASA (FAST) can be mentioned as an example. FAST, founded in 1997 by scientists from NTNU, develops search engine technologies and has been growing rapidly with revenues up from $4.9 m in 2000 to $36.1 m in 2001. The company has its corporate headquarters and research facilities in Norway, product development operations in the United States and business operations in the United Kingdom. Its customers include worldwide companies like Dell, KPNQwest, LookSmart, Lycos, Reed Elsevier and TIBCO Software.

Many of the second wave companies have been supported by new national innovation policy measures. The national Science and Technology based Innovation Programme FORNY was launched in 1994. The programme provides funding to research units collaborating with commercialisation units. In Trondheim, the FORNY funding is channelled through Leiv Eiriksson Nyfotek (LEN), a business development company that operates three incubators in the city. LEN is owned by 12 shareholders, the biggest being Sintef and NTNU. The company manages a publicly subsidized seed fund called Såkorninvest Midt-Norge, with a capital of NOK 100 m. Its portfolio includes 34 companies, half of which have IT development or IT use as a central element in their business concept (Leiv Eiriksson Nyfotek 2002).

Traditionally, the Municipality of Trondheim has been quite inactive in relation to the local industry, restricting its inputs to infrastructure building. Many of the interviewees explained this by the fact that there are few reasons for such activity. Unemployment, for instance, has been significantly lower than in corresponding cities in its neighbouring countries (3.4% in 1999, Statistics Norway 2002). Still, at the end of the 1990s, there were signs of a shift in attitudes and a reinterpretation of the role of the municipality in local economic development. This was part of a more general reassessment of the foundations of the Norwegian economy, based as it is on exploitation of natural resources like oil, gas, fish, hydropower and forests.
Some of the Norwegian industries have been very successful, most notably the oil and gas industry. Thus there have been few incentives to invest in new sectors and to focus on the general vitality of the economy (its ability to adapt to new circumstances). Norwegian industrial and technological policies can be contrasted with the Finnish ones in the 1990s. The latter sought actively to boost research and commercial activities in new fields like ICT and biotechnology. Unlike Finland, Norway did not experience a deep recession in the 1990s, and unemployment rates have been very low. However, today there are signs of policy change also in Norway. There is increasing criticism of the implicit assumption (in the policies) that natural resources will guarantee national wealth in the long run. The problem is not that the oil and gas reserves could drain in the near future, but rather the prospect of successive replacement of oil and gas by other energy sources, which could lead to problematic drops in prices. If this really happened, the critics argue, Norway would be in serious trouble. (Interview 004-07-221001-1-1)

Norwegian surplus value creation in “industries of the future” has for a long time been lower than in other comparable countries. According to ECON, Centre of Economic Analysis, an annual economic growth of 2% during the next twenty years would require that 800,000 jobs are created in enterprises that do not exist today and that the national value creation is raised by NOK 600 billion (Nafstad and Roland 1999). The policy implication is, according to the report, that entrepreneurship in branches that are promising from the perspective of value creation should be stimulated.

The ECON analysis, and others similar to it, formed a background for the change of municipal industrial policies in Trondheim in the late 1990s. The challenge of economic restructuration was particularly urgent for this city, because it lagged behind its main domestic competitors, Oslo and Stavanger, in terms of value creation. Despite growth within the IT cluster, the long-term trend of the local economy was one of sinking value creation per capita. The new municipal policy implied not only new policy contents, but also new ways of making policy. The Municipality of Trondheim initiated, in collaboration with Trondheim Næringsforum (a previously established network organisation for development of the local economy) a strategy process for designing an industrial plan for Trondheim. The plan (Municipality of Trondheim 1999) was written by a group of high-level representatives from the municipality, Sintef, local industry, banking and business development activities. In other words, it was not a product of some municipal department. Still, in March 2000 the
Municipality Council accepted the work as the official strategic industrial plan for Trondheim for 2000-2010.

The plan was based on a vision of guaranteeing and improving future social welfare by stimulating value creation in Trondheim – the target being an increase in value creation that is faster than that of any of the competing cities in Norway (Municipality of Trondheim 1999). Growth should be based on three pillars, a) fisheries and aquaculture and related activities, b) production of energy and spin offs from this, and c) commercialisation of new technologies and spin offs from knowledge environments (such as NTNU and Sintef). A fourth pillar, crossing the three first ones, is to attract “competent people” to Trondheim. In practice this means that the city should try to stop the drain of NTNU graduates to other parts of the country.

This work was followed up in 2001 by an action plan for 2001-2003 (Municipality of Trondheim 2001), which was designed by 50 people from local economic life, organised in four groups according to the “pillar structure” of the industrial plan. The action plan identifies 31 projects to be implemented in the near future and distributes the responsibility of implementation for each project among finance, industry, a new network organisation (TÆL), interest organisations, media, research organisations, the municipality, the county and the state. Each project is described on one page, including its needs for, and sources of, funding. However, there are no binding commitments. It is not a municipal plan made by an authority that has the power to give commands to the implementers. To describe its status we need the policy network terminology described in Section 2 above. Both the strategic industrial plan and the ensuing action plan are examples of policy making by building policy networks. In both cases, municipal policy was formulated in collaboration with actors, both private and public, that are external to the municipal organisation. In addition to this, a common plan was made for implementation, distributing responsibilities to all parties. Finally, a new company, called TÆL (“guts” in English, “sisu” in Finnish), was created for the mobilisation of funds, counselling, and project development.

TÆL is a continuation of a previous network organisation, Forum Trøndelag, which had been established in 1993 to coordinate initiatives to develop local economic life. As a result of the lack of committing mechanisms, the organisation became more of a discussion club for academia, business and the public sector (Interview 004-09-231001-1-2). Forum Trøndelag was dismantled in 1998. TÆL is a limited company and should therefore be more binding to its shareholders, which are the
municipalities of Trondheim and Steinkjer, the counties of Sør-Trøndelag and Nord-Trøndelag, local banks, and a few companies from local industry. However, the establishment of TÆL was a difficult process, partly as a result of the competition for the role of policy initiator between Trondheim and the counties and partly as a result of the risk of overlap with some of the private initiatives that were already going on (Interviews 004-03-191001-1-1 and 004-09-231001-1-2). The basic capital of TÆL is NOK 50-60 m. The biggest investors are two banks, which have invested NOK 10 m each, while the Municipality of Trondheim invested only NOK 1 m (Interview 004-03-191001-1-1).

Finally, a few words should be said about the targets and measures that the two plans identify for the area of interest in this study, the “commercialisation of new technology” pillar. The industrial plan (Municipality of Trondheim 1999) estimates that the value creation potential of this field of local high technology business could reach NOK 10-20 billion within the next 10-20 years. This estimate is based on the assumption that new high technology activities and companies will employ 4,000 people in 2005, 10,000 in 2010, and 20,000 in 2020. Each high technology workplace is assumed to create 1-2 secondary workplaces, and thus approximately NOK 1 billion in new value. The value creation target for high technology of NOK 10 billions in 2010 can be compared with the target for Trondheim as a whole, which is NOK 30 billion. There is, in other words, much at stake and it is important that the city plays its cards well. The action plan identified six projects to stimulate the commercialisation of new technology. TÆL has primary responsibility for three of them, finance and real estate businesses for two and interest organisations for one. TÆL’s responsibility is to facilitate the founding of high technology start-up companies (project 3.1), establish meeting places for new entrepreneurs and existing businesses (project 3.4), and diffuse information about local economic life to media and the education sector (project 3.5). Leiv Eiriksson Nyfotek committed itself to expanding its incubator activity in the city (project 3.2), and interest organisations, including the political parties, are given the task to convert national and international studies to a local agenda for value creation (project 3.6).
Comparative Analysis

Similarities

There are both similarities and differences between the two cases of policy network building that were described above. This section will analyse these by using the conceptual framework developed in section 2. In both cases, the focus will be on the enrolment phase of policy network building, the reason being that the mobilisation phase is still under way. I am particularly interested in the elements that affect the success of enrolment. I will also speculate about how the enrolment processes in each case might affect future mobilisation.

The major similarity of the two cases is that they both involve municipal authorities trying to stimulate local economic life. In both cases this happened through the initiation of a strategy process that involved industry and academia. The strategy work was, in other words, based on a policy network approach. Since this approach was new in both Turku and Trondheim, new policy networks had to be built. The outcome was, in both cases, policy documents describing the challenges (problem setting), targets (direction setting) and measures (structuring) as described above. In Turku, the BioTurku strategy was signed by the actors participating in the strategy work, while in Trondheim, the Municipal Council ratified the Strategic industrial plan. Thus, both processes involved some kind of formalisation to make the agreements more binding. Yet in both cases, implementation of measures is highly voluntary and is based on the activity of a set of actors that are not controlled by the policy initiators (the municipalities). Therefore, most of the measures mentioned in the strategy documents are either projects that would have been undertaken anyway (this dominates in the Turku case), or projects that are so general that they border on the meaningless. (This dominates in the Trondheim case of high technology). The significance of the strategy work did not seem to be to create new, concrete projects to be implemented in the near future, but rather to give formal support to ongoing projects, to coordinate the activities of the participating actors, and to create a “cluster consciousness” that could encourage more concrete collaboration in the longer term.

From the perspective of enrolment, the policy network building processes in Turku and Trondheim show several similarities. In both cases, a high status core group was established to manage the process. The constitution of these groups was based on the personal relations of the policy initiator. Both core groups hired a consultancy to gather information, to manage seminars and workshops with representatives
from local economic life and to write reports. Many of the interviewees, particularly in Turku, argued that the professional management of seminars, workshops, etc., was important for their continued interest in the process.

Both strategy processes were organised in working groups that dealt with different fields. The idea was to let the stakeholders formulate targets and measures. The municipal authorities did not take any privileged position in this, but participated as one of the stakeholders. Still, the strategy process as a whole was firmly managed by the policy initiator, which was the city-owned Turku Bio Valley company in the Finnish case, and the Municipality of Trondheim in the Norwegian case. Consequently, I have felt justified in understanding the processes as public policy making rather than as strategy making in general. The two strategy processes can be contrasted with another case that was studied within the PROB project, the ICT cluster in Aalborg, Denmark (Bruun 2002). Here the recent ICT cluster strategy (NOVI and NorCOM 2002) was made without any direct involvement from the City of Aalborg or the County of North Jutland. The strategy initiator was instead the science park NOVI and the cluster organisation NorCOM. At the same time the county, which is a major actor, is doing its own strategic work, which focuses more on visualising new, emerging clusters than on supporting the existing one.

**Focus?**

A major difference between the policy network building processes in Turku and Trondheim is that the first focussed on a relatively well-defined field, biotechnology, while the second addressed several sectors. This difference remains even if we restrict ourselves to the high technology part of the strategy work in Trondheim. The plan talks about high technology in general and there is no attempt to identify groupings or clusters and to treat them in a differentiated way. This contrasts strongly with Turku, where the need for different strategies for biotechnology, biomaterials and ICT has been emphasised. There are several possible explanations for why there was so little cluster thinking in the Trondheim strategy. One could be that high technology activities in Trondheim are too heterogeneous. Some of the interviewees argued that the national, in contrast to regional, orientation of NTNU and Sintef, compels them to pursue “360 degree technology,” the effect being that there is little breeding ground for regional specialisation. On the other hand, Section 4 above suggested that there is in fact a certain agglomeration of IT industry that could be seen as an emerging cluster.
Thus it is quite possible that the explanation of lack of focus is more in attitudes and the culture of collaboration than in the industrial reality.

The latter hypothesis was supported by the interviews that were done for this study. In contrast to BioTurku, where everybody seemed to pull in the same direction, the Trondheim actors complained about the lack of collaboration and co-ordination. The emphasis was never on collective performance, but always on one’s own projects. In fact, there was a clear distrust of the idea of working collectively. One interviewee talked about this in terms of national differences.

“In Oulu, investments were targeted, heavy. … Here [in Trondheim] development happens through individual initiatives. … This is the difference between Finland and Norway. In Finland you make heroic choices, ‘We invest in this’ and then you go for it for ten or fifteen years. … This is not a Norwegian way of doing things. … In Norway you get hanged if you try to take such initiatives.” (004-01-241001-1-1)

The problem of co-ordination was a main theme in many interviews. Municipality representatives complained about the county’s attitude to its initiatives. In the same vein, the major actor running incubators and business development in the city criticized TÆL for overlap with already existing activities.

“Trondheim is a city with 150,000 people. There is no room for several science parks that are big enough to maintain quality and productivity over time. We should gather around one. … (004-09-231001-1-2)

Many of the interviewees also complained about NTNU’s attitude to the region. According to the critics, NTNU has profiled itself nationally and internationally and has thus actively avoided regional collaboration. This can be compared with Turku, where one of the University of Turku’s two prorectors is considered to be a key person in the BioTurku network. Also, the three universities in the city have been active participants in the building of the Turku Technology Centre (now Turku Science Park), and have located several departments in the technology centre buildings. Thus, in Turku the physical proximity between academia and local business has been emphasised much more than in Trondheim. (This is true in all high technology fields, not only biotechnology). Does this mean that the university is pursuing a regional identity at the cost of its national or international profile? Not if we are to believe the prorector mentioned above.

“Some people have argued that regional collaboration is in conflict with the target of international top level research. … I don’t subscribe to this claim. First, the world is so global that things can be regionally significant
only if they are of sufficiently high international quality. Being at the international top level is a presupposition for regional work. Second, regional collaboration provides resources for the achievement of the international top level. We get two kinds of resources: 1) financial resources (partly through direct investments from the city, but more important perhaps, political support from the region that is significant when national resources are distributed), and 2) ‘spiritual’ resources. The idea that all wisdom and all knowledge are in the universities has had its time. Universities no longer have the monopoly on knowledge. High technology companies have both knowledge and visions that we need to be familiar with, even if we do not follow their model directly. In this way, one can develop one’s own thinking and learn to put things in perspective.” (001-04-170501-2-2)

Cultural differences are of course important and they need to be respected. The Finnish model of identifying core competencies and making “heroic choices” might not suit a Norwegian context. At the same time, however, it should be noted that none of the interviewees in Trondheim was satisfied with the present model of pluralism and distributed solutions. Implicit in the complaints about fragmentation was a wish for more focus and co-ordination. The drawbacks of the distributed model were obvious in the action plan for the high technology sector. The projects that are identified in the plan are so general that there is a high risk that they will fail to have any significant effect at all, even if they were undertaken in the way described. This is also the verdict of several of the interviewees.

“I don’t think that the future of Trondheim should be assessed on the basis of the Industrial plan and that kind of report. The function of those activities is to keep the municipality updated with what is happening. Regional development has not been planned.” (004-07-221001-1-1)

Yet the ambition of the municipality is obviously more than just being updated. It claims to be making and implementing policy with defined targets and measures. One of the challenges for the future will be to find some kind of focus for the activities in the high technology sector. A presupposition for this is that the attitudes towards collaboration, co-ordination and making collective choices are changed. The issue of focus is not only a matter of culture, but also, more significantly, a question of the way in which innovation in different fields is conditioned by the logic of technological development. Tidd et al. (2001) have argued that industrial sectors show significant differences in the size of innovating firms, the types of products made, the objectives of innovation, the sources of innovation and the locus of innovation, which all differ between technological domains. Thus the needs of companies working
with distinct technologies can be very different – a fact that local strategies for supporting high technology should take into account. As already mentioned in Section 2, the necessity of making choices comes from the fact that regional resources are limited and will not be sufficient to support globally competitive activities over a broad range of sectors (Vet 1993).

Public Investment?

The second big difference between the Turku and the Trondheim examples concerns municipal strategies in relation to local economic life. Both municipalities pursued networking strategies, using policy networks for policy formulation as well as implementation. However, in Turku, networking is supplemented by major investments in the high technology sector. € 14.3 m has been invested in Turku Bio Valley and the two other science park corporations (Turku Science Park and ICT Turku) will share a similar sum. In contrast, the Municipality of Trondheim pursues networking without supplementary investments (or only very small ones, € 126,000 in TÆL). This difference has two effects. First, Turku has created a strong implementation apparatus of its own. Turku Bio Valley develops the Bio Valley area for the local bioindustry. It facilitated the building of a major technology centre building, the PharmaCity, by buying several floors that it now rents to biotechnology companies. It operates a bioincubator, channels national funding to the development of biotechnology projects in the region, coordinates participation in fairs and pools resources for international marketing, etc. In Trondheim there is no public agent for doing these kinds of things. In fact, there is no coordinating actor at all in the high technology area. TÆL was created for all three pillars of the Industrial plan and it is planned to be more of a business development organisation than a cluster organisation.

The other effect of the resourcing strategy of Turku is that the City of Turku and Turku Bio Valley have much more weight in collaboration with the universities and local industry. None of the Turku interviewees doubted the seriousness of the City, and actors are attracted to the collaboration initiatives of Turku Bio Valley by the existence of potential benefits. In contrast, in Trondheim, interviewees said that the main reason for participating in the strategy work was that they wanted to support the municipality in its new orientation, hoping for a stronger shift in attitudes to local business life in the longer term. None of the interviewees outside the municipality thought that the Industrial plan would make much difference, even if everybody thought that it was “better than nothing.” These doubts were also projected onto TÆL, which could turn out to have the same problems as its predecessor, Forum Trøndelag.
Again, there are several possible explanations for the differences between Turku and Trondheim. One interviewee suggested that Trondheim is much poorer than Turku and thus cannot afford such extravagance. This was, however, contested by other interviewees. The most common explanation was perhaps that the problems Trondheim is facing are much more abstract and hard to grasp than the problems that Turku experienced in the 1990s. As in the issue of global climate change, the adverse effects of the present trajectory of the Trondheim economy will be felt only in the future. Thus, it has been much more difficult to mobilise a sense of urgency in Trondheim than it was in Turku, which experienced strong economic decline and very high unemployment in the 1990s. Turku’s proactive industrial policies started as a reaction to the immediate crisis, and there are good reasons to believe that this would have been significantly delayed if conditions had been more similar to those in Trondheim.

Degree of Participation?

A positive aspect in the Trondheim process was that the action plan includes a broad range of actors and distributes tasks to interest organisations, political parties and even media. This contrasts with Turku, where such actors were not considered as parts of the cluster. In fact, several of the BioTurku interviewees saw politicians as a problem and thought that the whole project of building a competitive biotechnology cluster could be risked if ‘things get politicised.’ Interest organisations, such as labour unions or civic organisations, were never even mentioned and media was clearly defined as an external actor that the cluster cannot control. According to Bruun (2001), these attitudes might turn out to be a problem in the long run, since the legitimacy of the idea of biotechnology as a foundation for the city’s future depends on support from the political parties and the powers influencing them – voters, media, etc.

Unfortunately, the Industrial plan for Trondheim and the strategy work behind it do not as yet give us any model for how to increase the degree of participation. First, there was little representation of these kinds of organisations in the strategy work (with the exception of the LO, the labour union), and second, the measures are quite abstract and the distribution of tasks even questionable. What does the assignment to translate knowledge about national and international development into local agendas (project 3.6) mean? The role of these actors does not seem to be to participate in the development of economic life itself, but rather to prepare the ground for such development by diffusing more positive attitudes to industrial policy in the region. This instrumental attitude to opinion-forming organisations excludes participation from those that are
more sceptical about the policies in force. A curiosity in the Trondheim action plan is that the media are given a role in changing opinions. The plan is somewhat unclear on this point, however. In the project descriptions, it is said that opinion-formers should influence media, but in the chart distributing tasks, the media are mentioned as one of the participating actors.

**Summary and Speculations**

The analysis above has shown that the municipalities of Turku and Trondheim both applied a policy network approach in their attempts to stimulate local economic life. The Turku effort was more focused and better resourced and thus will probably have more significant effects on the focus area. The Trondheim effort was less focused and hardly at all resourced by the municipality, which means that the implementation will be dependent on the good will of the other actors involved. The interviews suggest that there was scepticism among actors who participated in the making of the industrial plan about whether it would have any significant effect, and their participation seems to have been motivated more by a sense of obligation than by excitement. If this was the case (more of the participants should be interviewed for certainty), it can be predicted that the Municipality of Trondheim will face difficulties in enrolling actors into the core groups of future projects. Similar problems could occur also in the mobilisation of actors to participate in predefined projects. At the moment, it simply seems unclear how actors in the local high technology sector can benefit concretely from the measures that are planned.

The strength of the Trondheim plan is that it involves a broad range of actors, including interest organisations and media. These were left outside the strategy work in Turku. However, as a result of the other weaknesses of the industrial plan for Trondheim and its action plan, the Trondheim case does not as yet provide a good example of how a higher degree of participation could be combined with successful industrial policies.
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http://www.sintef.no


http://www.ssb.no/kommuner/region.cgi?nr=16


Nordic co-operation

takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council

is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers

is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.
Leadership, Power and Influence in Regional Development
A Tentative Typology of Leaders and their Ways of Influencing
Markku Sotarauta

Abstract
This chapter aims to raise the issue of the changing nature of power and to look for the core of influence from the network society perspective. It also aims to recognise different leadership types and reflect on their meaning and position in local government. Its purpose is to create an image of what kind of qualities leadership will require in the future, and how different skills and abilities can be seen as a single entity. This article will perhaps also help to understand the activities of different local government leaders.

Introduction
According to the Webster’s dictionary to lead is…
• To go before or to show the way.
• To influence or to induce.
• To go head of or in advance of.
• To have the advantage over.
• To act as leader.
• To go through or pass.
• To act as guide.

But what is it to lead a complex, ambiguous and muddled process of regional development? How can one go before or induce or act as guide if one does not have formal power to do so? How can one go ahead of others if one has a formal position but is not respected? Consequently, the basic question in this article is, what is leadership like in regional development?

If asked what is important in the role of a leader engaged in regional development, leaders themselves may provide a wide range of different answers. Some might stress the implementation of statutory
services, some draw attention to the significance of the creation of shared visions and strategies that steer the network or development organisations, some stress the creation and use of networks, or emphasise success indicators and their follow-up. And most likely, all of them would be right. Leadership tasks are manifold and intricate: along with the changing world, the challenges leaders face are continuously changing. It should also be noted that in regional development, leadership is not a straightforward question of leaders and followers, leaders lead some issues but often they are followers in some other, and some of the followers may on another occasion be leaders. In this kind of context, leadership may be seen as the effect of actors on one another and it may be that in the promotion of regional development, there are several leaders with different qualities. At all events, leadership in regional development is a more or less collaborative process. No one can lead the entire region alone since it is not possible to control the activities of the other actors. In this article I argue that leadership in regional development may be based on many things and that the fundamental question is about seizing leadership, and how it can be seized.

In the era of building the welfare state, especially in the public sector, leadership required good administrative skills, knowledge of various statutes and the ability to follow instructions correctly and efficiently. Globalisation, the development of information technology, the growing significance of knowledge as an economic strength, the new logic of economic activity, tightening international competition and European integration have changed the demands for leadership. The options of waiting for instructions from the outside and acting under the conditions of the welfare state system no longer exist. Therefore, regions have to be capable of capitalising on their own resources as efficiently as possible, and also of continuously looking for new resources and action models based on their own points of departure.

A starting point of this article is the premise that leadership has become more significant than before. At the same time, a region’s capability of combining the qualities of various leader types has become central in a situation in which the region is attempting to use its own resources as efficiently as possible and is looking for new resources and networks that complement its own expertise. A second starting point of our discussion is the premise that the nature of influence is changing. Therefore, what kind of leader types there are in regions and how they complement each other will become increasingly central to regional development activity.
What makes searching for the nature of influence and attracting the right leader types to regional development challenging is that in the societal development phase called the network society (Castells 1996), speed, flexibility, information and co-operation have also challenged leaders engaged in regional development to learn new things. In the knowledge-based and continuously changing world, leadership requires continuous use of one’s “feelers”, in other words, probing of the reactions and intentions of other people, continuous learning, innovating and adapting to changing situations. At the same time, leadership still has to ensure that change does not get control over organisations and that networks do not start to have lives of their own; leaders have to be both dynamic and persistent simultaneously.

Numerous different models to support leadership have been developed. Sometimes there is great enthusiasm about management by results, sometimes management by quality or management by resources is emphasised. Every now and then, the significance of visionary management, strategic management, or knowledge management is brought up. There is definitely no lack of models developed for the corporate world. In studies focusing on regional development and in the world of regional policy-making, the significance of leadership is not fully understood, or at least appreciated, although the significance of leadership is found in a central position in the creation of new strategies and in implementation of new models. Regional development needs new kinds of leaders who possess the skills required by the network society and who have an understanding of a new kind of power.

This paper aims to raise the issue of the changing nature of power and to look for the core of influence from the network society perspective. It also aims to recognise different leadership types and reflect on their meaning and position in local government. Its purpose is to create an image of what kind of qualities leadership will require in the future, and how different skills and abilities can be seen as a single entity. This article perhaps also helps to understand the activities of different local government leaders.

**Power and Influence**

In regions and in communities formed by people in general, a struggle for power, for who has influence on the matters at hand and who does not, is usually ongoing in one form or another. Also, in the network society, power is still one of the great elements affecting human activity. Its nature, however, has changed and is changing. The network society is so clearly more complex, more blurred, more dynamic and more penetrating than the earlier development phases of society that it is difficult to know
what it is each time that makes one influential and how. In comparing leadership to games, we can state that today’s leadership puts emphasis not on forcing moves but on seductive moves:

A forcing move is based on the fact that other players have to respond to the move made by one player, and that there is only one possible response to the move. A seductive move again is based on the fact that other players do not have to respond to it, but they want to, because it takes into account other players’ strategies and goals. While the forcing move attempts to make other players yield to what it wants, the seductive move attempts to make other players co-operate.

As seductive moves are gaining emphasis, influencing other actors’ independent decisions, or in other words, understanding the nature of influence, will present a demanding challenge for leaders. In this context, the traditional conception of power proves insufficient. As we know, power in general is usually seen as an actor’s ability to make other actors do something that they would otherwise not do. More specifically, power can be defined and divided as follows:

- **Power to act and decide – direct power exercised by official actors**
  - Provided by position, status and/or knowledge, etc.

- **Power to create institutions and lay official strategies**
  - Institutions are used to create a framework for action. Laws, decrees, written agreements, organisational settings, and communication arenas, among others, are emphasised.
  - The power to create institutional settings is quite direct; it is, however, a slightly more subtle and invisible form of power than the power to act and decide.

- **The deep structure of social and economic activity**
  - Manifested deep in action culture, it is therefore indirect, invisible and penetrating but often very influential.
  - The deep structure of power often defines which phenomena are touched upon and which are not, what ”may” be talked about and what not.

(More specifically on the nature of power, see e.g. Wrong 1997; Castells 1997; Flyvbjerg 1998)

Leaders can make people act differently by using the formal power that their position brings with it, by directing resources, or by creating new rules. Acting like this, however, they are more or less exercising...
coercion, using forcing moves, which may lead to superficial changes only. If the effect remains superficial, it will last only as long as leaders are able to or have the opportunity to use their power. Leaders may be able to make other actors yield to their will momentarily; sustainable results, however, cannot always be produced as assumed, because different social actors have more freedom and the personnel in one’s own organisation has more possibilities than before to make decisions about many things. The direct exercise of power might even lead to results contrary to the intended ones.

In regional development, the power to act and decide as well as the creation of institutions and strategies have been emphasised as sources of power. To put it more simply, we can state that public policy-making as an entity does not perceive the significance of the social and economic deep structure in the course of events very well (see Sotarauta & Lakso 2000). Public administration also often approaches different matters from the viewpoints of administration, statutes and programmes, for example, and therefore, regional development networks have not been able to react very easily to the new opportunities and threats brought about by the network society. Neither have they recognised how one can influence or become influential in the network society.

Influence is inducing by nature, not forcing. It is a subtle process, essential to which is the renewal of behaviour models, attitudes, and beliefs as well as the change in activity brought about by this renewal. In practice, influence builds on different forms of power, but first and foremost, on interaction and social skills. (Bragg 1996, 43.) Power can be seen as a potential to influence; in other words, from the viewpoint of influence, power is a latent resource of influence. It needs to be freed and used through other processes. Thus influence is defined as a process in which the actor, by using interaction skills and other social skills, makes other actors see things, people, functions, etc., differently from before and thereby voluntarily do something that they would not otherwise do.

Municipalities need new kinds of leaders who have a sense of new, dynamic and ever-changing power. The starting point is to realise that, in the network society and in regional development in particular, power is shared. Thus, power consists of capabilities exercised in interaction to achieve joint and/or separate aims. (Bryson & Crosby 1992, 13.) No one actor alone can develop any region or solve any social problems. Power is shared across the global and local networks. In order to be able to influence the development of their own region, leaders need to combine the functions of many different interest groups and organisations, their expertise and resources. Then, emphasis is put on interlinking the various
forms of power so that the course of development can be influenced as efficiently as possible.

Network power is becoming crucial in the course of events; it is one of the most essential latent resources of influence. According to Innes and Booher (1998), network power is not a weapon that an actor can point at another player to make him do what he wants. It is clearly a more indirect way to influence. Network power is based on a set of loose and/or fixed linkages between networks formed by individuals and organisations. Thus the stress is on communication, on interaction, and on interpretations. For example, Thrift (1996) argues that the international financial world produces continuously such a massive amount of information that the actor that is able to create the *most credible interpretation* of the moment gains influence. It is easy to agree with Thrift’s view of the significance of the most credible interpretation. Based on it, we can pose the question as to whether the actor that formally has a strong position or the actor that creates the most credible interpretation of the state of the region and its potential strategies and means has the most power in regional development. Credibility can be based on position, on expertise, on good contacts, or on the skill of being able to present matters convincingly in both written and spoken form. Leading interaction processes, bringing actors together, removing obstacles hindering communication, enabling information flow, creating new information and looking for meanings, building trust, linking different issues to each other, among other things, are stressed. Issues are not served to other actors as ready-made packages; instead, people need to have an opportunity to find themselves in different situations (development programmes for example) from their own starting points.

Network power is based largely on information and images. A skilful use of network power gives those who have felt imprisoned by the system in industrial society completely novel opportunities to carry out their own ambitions. At the same time, in the network society, there is a built-in concern about people losing their grip on their own lives and on what happens in their own locality. The greatest concern is based on the fact that the visible forms of power get blurred in the dynamic world of flows and networks and that only the “surfer generation” that has understood the nature of the new power is capable of linking to global networks and flows. Many people and issues are at risk of being totally excluded from the games that shape the development of regions. (Castells 1999.) Following Hudson, we should more often ask…

“what will prevent new approaches creating space for powerful economic interests from dominating the agenda about the developmental trajectory
within regions? What will serve to prevent the emergence of forms of competition between regions in which the winners in a zero-sum game will be those that are already strong, that already have a sophisticated system of institutional support underpinning economic success?” (Hudson 1997, 475.)

Hudson’s questions are more difficult than they look at first glance. The strong get stronger and improve themselves in order to be competitive in the network society. Thus they do not act against the weak but work to strengthen their own position. From the viewpoint of the big picture, it is out of the question to decelerate the reinforcing of strengths on the basis of the assumption that decelerating the growth of the strong would benefit the weak. It is much more likely that the strengthening process would transfer to other nodes of the network society; that is, decelerating the expansion of growth centres would probably make many flows turn abroad.

A great deal depends on how different social institutions are able to adapt to the flowing world in a way that makes it possible for the strong to get stronger but also for the weaker to get involved in the processes of the network society. As Logan (1999) states, with the nature of society changing, the issues of which matters have been dropped from the development strategies and left totally out of the discussion, and of under whose conditions this has happened become more and more central. In the network society, skilled actors can bring into discussion issues that are important to them and/or leave out issues that in their opinion are less important, without other actors even noticing it. For many actors, it is increasingly difficult to piece together on what grounds and how people and issues are selected in the official decision-making. A leader skilled in the use of network power can take advantage of the formal decision-making power, and at the same time, influence the deep structure of the activity and the interpretations people have of different phenomena.

In comparing networks to representative democracy, one of the most essential differences is that, in networks, modes of action, power relations and the rules of actions change continuously. In networks, power can be used flexibly to mobilise actors and resources to leap at an opportunity or to ward off a threat. The flexibility of power is one of the most central factors in creating and maintaining competitiveness. Simultaneously, it presents a great challenge to democratic decision-making. In a way, the issue here is the relation between power and rationality, and, on the other hand, the relation between power and democracy. In the network society, the relations in question change continuously, and the actors who have internalised the nature of network
power have more space to act in than the "powerless" actors do. And at the same time, they have an opportunity to define how the relations in question are defined, since in the end, it is power that defines what is rational (see Flyvbjerg 1998).

We are stepping into the era of surfers; because for the one surfing smoothly in global flows, the world is an open book and filled with opportunities. The network society, however, is not only a world of opportunities. If the power that representative democracy brings with it is transferred in too large quantities to the actors that smoothly surf in the flows, they might shape the global networks and flows to their liking without concerning themselves with others. And since the nature of power and the rules of the game are dynamic…

- What is it that prevents economic interests from dominating the development activities and development of regions too much? How can local democracy respond to the logic of the world of flows if control over local events fades? The danger here is that municipalities and their councils, for example, become makers of “minor decisions”, while major decisions are made in faceless networks. It is probably not possible for municipalities to break loose from the circle of minor decision-making by holding onto old action and thought models. In the network society, the best way to influence is to act on its terms, by searching for natural modes of action.

- How can the dynamic grip of the network society be benefited from without society dividing into those who know how to act in the new situation and those who do not. The danger here is that only the “new race” that can understand the nature of power will be able to link themselves to global flows and networks but the old one will not. Then regional development will become the playing field for global players and various localities will be made to play against each other without being able to affect their own development in any other way than by adapting to the situation.

The Basis of Leadership

The relationship between power and influence as well as between forcing and seductive moves inevitably brings up a question of whether it is possible for a leader to influence without having power. The answer is probably as inevitable as the question. A leader needs some kind of power to be able to influence. If we turn the notion the other way around, it is still possible for a leader to have power without any real influence. In
Finnish regions, there are leaders that hold good and formal positions but that nobody listens to. A leader can also make his subordinates act against their own will; the exercise of power has then often turned into rude manipulation that might lead to results in the short run, but that in the network society can be assumed to be relatively short-lived. Many leaders engaged in regional development have already been confronted with the fact that the old ways of influencing the activity of a still quite hierarchical organisation and the development of their own region do not work as before.

In order to be able to influence events, leaders have to act in the riptide of several different interests and aims, and find a totally new range of different means that can be applied to different events. On the other hand, a good leader has always known how to act in a complicated field of activity, mastering several different operational environments, interests, people and issues simultaneously. Leaders have also earlier been able to sense what different people need in different situations, and therefore, they have been able to act as required by the situation. They have also known how to build networks, to involve new actors in networks, to negotiate funding and to capitalise on state funding, for example, through skilful tacking. The network society as an environment is, however, different in that various situations have become even more challenging than earlier. The ability to shape big pictures and organise issues as well as skills in interaction are stressed; in other words, more and more actors should have a more developed strategic built-in sense of the game than before.

The changed situation has already brought softer forms of influencing, such as visions and strategies, communication, value discussions, the development of organisation culture, for example, to co-exist with or even to replace organisation models, rules, and norms. Many novel approaches and gimmicks have been experimented with in regions, only sometimes with success. New methods have often been tested on and between old structures without giving a thought to the underlying philosophy and basic assumptions or their applicability to one’s own organisation or region. New approaches have often been applied badly, experimenting carelessly here and there.

Despite numerous different models and leadership styles, the most efficient leaders trust themselves and their own sense of assessment of the situation, and use a combination of several different models and styles. They understand that there is no one best way to exercise leadership, although consultants are willing to imply just that. Whatever the leadership model or range of combinations, the basic tasks of a leader can
in simple terms be summarised around the following abilities (Karlöf 1995, 117):

- Ability to define guidelines for activity.
- Ability to involve people.
- Ability to make people work to reach and agree on goals.
- Ability to speed up, boost, and change the course of action when the environment changes.
- Ability to look at activity persistently and comprehensively.

As stated earlier, in the network society, the best way to make people enthusiastic is to give them a chance to find themselves in the midst of different issues and situations. A special challenge lies in that leaders should be able to be both issue- and process-oriented at the same time. A leader who concentrates only on issues may not have social skills, and therefore, may not be able to create an atmosphere that inspires people. Another leader with social skills and the ability to further a process runs a risk of remaining an empty shell paying lip service without any content-based knowledge and of losing the respect of personnel.

There is no doubt that, in the larger picture of the promotion of regional development, not all activities can be conducted through managing details or by going directly through people. Instead, creating the right kind of atmosphere is becoming essential. If the atmosphere encourages people to be active, to develop their own work continuously, and to take initiatives, the network and various organisations have a good basis for finding their place in the ever-changing environment.

- **Flexibility** – in organisations and especially in the degree of freedom people enjoy to express themselves, to look for new solutions and to innovate.
- **Sense of responsibility** – how the regional development network bears responsibility for its own work and for the success of the entire municipal organisation.
- **Quality and goal standard** – the commonly accepted conception in the region of what constitutes good work performance, good customer service, etc., in the promotion of the respective region.
- **Feedback** – how good performance is rewarded and bad work is given feedback so that performance can be improved.
• **Clarity of values and mission** – how clearly the regional development network is conscious of the foundation of its existence and its basic tasks.

• **Commitment** – how the setting and atmosphere are created to ensure that organisations and people are voluntarily and from their own starting points as committed to regional development as possible. Internal motivation is emphasised.

• **Persistent dynamism** – ability to act quickly and flexibly, creating new opportunities continuously and reacting to emerging situations but still ensuring that activity is persistent and coherent.

• **Networking** – complementing the expertise and resources of one’s own organisation through various co-operation relationships.

• **Creation of new knowledge** – Emphasis on the significance of knowledge and information raises new issues of developing a municipality and the provision of its services. How can we respond to the increase in information, the challenges presented by information management and the requirements for quick learning? How can we manage the vast information and knowledge flood and distinguish its essential features? How can we organise the creation and management of knowledge in municipal activity?

Based on the above issues, it is possible to distinguish the following skills and abilities enabling leaders to gain influence and be leaders in regional development.

*Ability to co-operate* – one can gain influence by…

• Playing together with other actors without flying solo too much.

• Creating genuine and working networks based on the needs of actors, not of administration.

• Trusting other actors and building trust without excessive controlling.

• Creating teams without overly crediting individual achievements but at the same time, by inspiring individuals to improve continuously.

• Listening to what other actors have to say without being too partial to one’s own ideas and voicing them too much.
Understanding that, from the perspective of the future, it is important that the actors with fewer resources also have a chance to be heard.

Ability to encourage other people – one can gain influence by…

- Inspiring, not administering bureaucratically.
- Understanding that change is usually generated through experimentation and risk-taking, and not through administrative processes.
- Gaining respect more for one’s ideas and activities than for one’s position.
- Looking for latent potential in development without concentrating too much on the existing resources and/or various limitations.

Ability to create an innovative environment – one can gain influence by…

- Creating the kind of local innovative environment in which actors can develop their own creativity, innovativeness and competitiveness. A good player does not play for others.

Ability to create the future – one can gain influence by…

- Envisioning and creating the future without putting too much faith in plans.
- Shaping the big pictures from the perspective of the future and seizing the impossible without getting caught in details.

Ability to create new knowledge – one can gain influence by…

- Taking advantage of the unclear without overly striving for order.
- Looking for the new and creating an enthusiastic atmosphere without getting too stuck in old beliefs or old knowledge.
- Knowing how to use narratives, metaphors and images without getting too weighted down with facts.

Leader Types and Influence

The most efficient leaders are capable of combining several different leading styles. They do not get bogged down with the thought and action models and related methods they once learned but continuously observe the change in their environment and the state of their own regions, and look for the most suitable instruments of influence for each situation. This kind of leadership style requires an open mind and readiness to
renew oneself on a continuous basis. In any region within the network society, leaders who continuously develop themselves and find the right channels to influence are worth their weight in gold: they constitute one of the elements of competitiveness. It is, however, much easier to emphasise continuous learning and the best possible application of novel approaches to each situation than to actually put this into practice. Leaders’ experiences, education and character are qualities that shape their modes of action and establish them on a certain track. In the following, the nature of leadership and influence are looked at through a “leadership typology”. This typology is not primarily based on empirical research as such but has emerged from about 300 interviews in four studies focusing on the promotion of urban and regional development (see Sotarauta & Linnamaa 1999, Linnama & Sotarauta 2000, Sotarauta & Lakso 2000, Sotarauta & Linnamaa forth.), several experiences and observations in the course of several studies and practical strategy processes. In this connection, the following types are examined: the technocrat, the network shuttle, the visionary, the handicraftsman, the political animal and the battering ram. They are looked at using the themes presented in the previous chapters (see Figure 1).

Figure 1. Frame of reference for the examination of the leadership typology

Technocrats pay attention first and foremost to rules and details. They are systematic and precise but also determined and logical within their own reasoning. Technocrats like to keep to established modes of action and appreciate continuity and stability. Therefore, they concentrate on creating rules, structures and various institutions within these

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42 An earlier version of the typology has been presented in an articles by Sotarauta (2001a and 2001b)
43 Linnamaa and Sotarauta (2000) have also used the concept of guards of the system.
established modes of action. Technocrats see themselves as part of a predestined entity that is relatively stable and in which roles and positions are agreed upon in advance. Borders between units, organisations and municipalities make the technocrat feel safe and in control of situations and issues.

Many technocrats started to work in the field of regional development when the welfare state was being built and their “aim in life” has been to found and establish their own units as parts of the ever-growing public administration system. They are used to looking for and defending their own position as part of the comprehensive system, and for them, the network society action model may even pose a threat. Technocrats might fear having to give up something for somebody else’s benefit. They may see co-operation as a sign of weakness: “Only if we cannot cope by ourselves, will we consider co-operation”. Technocrats believe that the future can best be created by building machinery that is as clear and functional as possible and by seeing to it that actors act as well as possible under these conditions. They do not reflect much on alternative futures. They appreciate especially knowledge that is system-internal, systematically collected and fact-based. Technocrats pay attention first and foremost to issues and settings of actions; they do not pay much attention to people. They do not consciously think about how people could be inspired and involved in the development of activities.

Technocrats respect the direct power that official actors have and the power that comes with the creation of institutions and official strategies. They do not recognise too well the deep structures of social and economic activity nor can they exploit the strength embedded in network power or in seductive moves. It is very difficult for them to understand the significance of taking into account multidimensional knowledge and different viewpoints, which the inducing moves require.

Technocrats are significant to regional development because they maintain stability and make sure that rules are followed and various excessive actions are avoided. Yet they may lock the region or promotion of regional development into already existing structures and action models and thereby bury the emerging new initiatives.

*Network shuttles* are actors who understand and internalise the logic of network-like activity, who are co-operation-oriented, who devote themselves to network, and who understand other actors’ aims and reasons for commitment. Network shuttles are prepared to discuss and look for common interests. They proportion their activities with other actors’ activities all the time and see relationship networks as dynamic and continuously changing. In their thinking, networks live together with
actors. Network shuttles are prepared to compromise their aims in order to make the network function better and to be able to further their own organisation’s interests in the long run. They have faith in their own expertise and create their competitiveness by looking for network relationships with other competitive actors.

Network shuttles can also be opportunists who do not commit themselves to the development processes of their own region; instead, they are ready to leave local networks as soon as opportunities open up elsewhere. Network shuttles might also belittle the significance of rules and structures, because they think that success depends upon individual expertise and that action models involving weaker players do not have to be created: the belief being that everybody has the same possibilities to act as they do. Network shuttles understand better than technocrats that people should have to be inspired and involved in the development of activities. They might, however, direct too much attention to networks and the people involved in them, forgetting their own organisations’ personnel and their needs. For example, network shuttles may forget to keep their own organisations’ personnel up-to-date concerning what is happening in the networks and why. Then the personnel’s ability, motivation and possibilities to welcome new things and assimilate the knowledge, expertise and resources coming through networks into part of normal network activity remain weak.

Network shuttles appreciate innovative environments with a good atmosphere. They appreciate an opportunity to express themselves and to take on new challenges. Thus they might belittle the direct power exercised by official actors as well as various institutions and programmes. Network shuttles think that the traditional forms of exercising power make network activity slow and inflexible. They do not necessarily recognise the deep structures of social and economic activity very well. Network shuttles do not have time to go deeply enough into processes taking place in their own municipalities, since their primary environment consists of different networks. They do know the deep structures of and deep processes taking place in networks well. They understand that networks and their activities are renewed on a continuous basis. Network shuttles see knowledge as an ever-renewing process, in which “ultimate truths” are in practice only interpretations of issues at certain moments. New knowledge and new interpretations are continuously emerging, and network shuttles see themselves as a part of the process that continuously generates new knowledge.

From the standpoint of regional development, network shuttles are important because they bring new knowledge, resources and expertise
into the region through various networks. Since they are good at using network power and seductive moves, they also transfer knowledge from their own regions to large networks, create for regions a totally new image and open up novel opportunities through networks. However, network shuttles may get too enthusiastic and break away from their own regions’ activity.

Visionaries know how to break away from the flood of everyday routine, they have imagination and the ability to see the big picture. Visionaries get easily bored with details. They see structures, rules and the settings of the moment as changing, and, sooner or later, as renewing. Visionaries have an open mind for everything that is new. They do not shape only what activities will be important in the future and how they will be carried out, but they also ponder on completely new kinds of activity combinations, or on what kinds of completely new games might emerge. Yet they may be superficial and impatient; they raise new issues even before older ideas have been thoroughly examined, let alone carried out. Visionaries themselves are often not prepared or able to carry these out.

Visionaries consider the direct power and institutions belonging to official actors as forces that lock us into the past and prevent us from heading creatively towards the future. Often they feel that their duty is to educate the “holders of official power” so that these would be able to act in a more sophisticated way and focus on the future. At the same time, visionaries might appear to other actors as people who think they know better than everyone else, but who hardly understand what power, official institutions or the deep structures of social and economic activities are all about. In fact, they do not often care to understand them. Instead, they act with their focus on the future and want to surpass the existing structures and processes, see the big picture and create new knowledge. Thus, their way of thinking may break away from today’s realities too much and may appear as unrealistic daydreaming to other actors. Visionaries are not that interested in people. Their way of trying to involve people in activities and to work to achieve their goals is based on the “power of visions”. They believe that as long as an attractive and innovative enough image of the desired future can be created, it will guide people’s actions. Some visionaries see the activation of other actors to focus on the future as an important part of directing activities and therefore, they try to activate people and involve them in visioning processes.

Visionaries are important to a region because they think about issues that others do not think about. At its best, their influence on how things are handled can be very positive. The core of their influence is to
indirectly affect the thinking and activities of other actors and thereby to steer their activities. At the same time, visionaries inform their region about changes in the environment as well as about future opportunities and threats. Future-oriented knowledge lies in the core of their influence. Like network shuttles, they are not interested in the factual knowledge that flows in public administration. Visionaries are often not interested in power as such and they pay as little attention to the direct power that official actors have, to the power of creating institutions as they do to the deep structures of economic and social activity. For visionaries, power issues may appear as forces locking us into the present and in undesired future developments and that makes them feel frustrated. However, visionaries may end up as pawns in various power games. Their thoughts and visions may be used to further the different interest groups without them even noticing that they have ended up as pawns in power games. Political animals and battering rams in particular are good at using visionaries and their ideas to further their own goals.

Handicraftsmen pay attention first and foremost to the needs of the moment and try to make different processes go as smoothly as possible. They are responsible, balanced and helpful. Instead of trying to reach the best solutions, they repeatedly look for working solutions by means of which processes make progress and activity is smooth. In their own activities, they are predictable background actors and only rarely manage to surprise other actors with their actions and ideas. To other players, handicraftsmen might appear as “tinkers” who get stuck on details without understanding the big picture or how the events of the moment will appear from the perspective of the future.

Handicraftsmen are hardly interested in networks because these appear as entities that are complex and difficult to control and that live their own lives beyond the handicraftsmen’s control. Still, if handicraftsmen are given a task of co-ordinating a network, they are most likely to put their minds to it with all their expertise and to maintain the network as well as possible. They might, however, have difficulty in ever-changing and open-ended situations because, for handicraftsmen, ever-renewing knowledge and open-ended processes cause distress. They hardly waste their time reflecting on the future, since the most important thing to them is the smoothness of the ongoing activity. From their viewpoint, visionaries may appear as “big mouths” and network shuttles as superficial people who “hustle and bustle”, running from one place to another and never having time to do anything properly, and whose mess handicraftsmen eventually have to clean up.
Handicraftsmen’s influence is based on the fact that they know the “logic of small things”; in other words, they know how and in which order things need to be taken care of in order that processes progress as well as possible. Handicraftsmen differ from technocrats in that while technocrats first and foremost pay attention to rules and other institutional settings, handicraftsmen feel that the most important thing is a smooth process and not rules and structures as such. Thus, they know better than technocrats do the nature of processes; in other words, how by using knowledge, information and various forums, for example, it is possible to make things progress. Whereas technocrats see the settings of processes, handicraftsmen pay attention to the nature of processes and to their many small details. Thus they also know the details of the deep structure of social and economic activity. However, handicraftsmen are not interested in people; like technocrats, they are fact-oriented. But if furthering an issue demands it, they can also take people and their needs into account.

Handicraftsmen do not direct a region’s activity much but they can be invaluable for keeping various projects going and attending to the many details that others cannot complete. Handicraftsmen are at their best in assistive tasks. In a leading position, a handicraftsman is too cautious and relies too much on old models.

Political animals are interested first and foremost in their own positions and in the future. They are chameleons by nature; they are visionaries, network shuttles, or even technocrats if need be, as long as the role they selected serves their own ends. Political animals scent easily the right playing fields and find their way there before technocrats have noticed that a game has even begun. Political animals may be opportunists that break up development processes or they can be real network nodes important to the development of the municipality. It is difficult to anticipate their actions. How the municipality benefits from their activities depends upon how well political animals’ own goals meet municipal development goals.

Political animals continuously seek new co-operation partners and are prepared to join forces with all those actors whom they think can benefit them. They exploit various networks and look for value-added for themselves. They hardly think about what value-added they could give to networks or other actors, or how activities of networks should be developed. Political animals are ready to leave various networks and look for new ones as soon as they perceive that the networks are no longer of use to them.

Political animals are interested in people in their own superficial way. They ask how you are, they are interested in your everyday life,
hobbies and work, but only to give others an impression of being interested in other people’s affairs. Political animals continuously search for new contacts that benefit them and by pretending to be interested in other people, they want to keep as many doors as possible open with an eye to the future.

In their own way, political animals are masters in exercising power. They know how the official power that official actors have works in practice. They either find their way close to it or directly into its core. They also understand well the significance of creating institutions and know how to affect the rules of the games so that they can play their own games as well as possible in the future. They do not always necessarily recognise the deep structures of social and economic activity but they can surf smoothly on the foamy crests of their waves.

For battering rams, the most important thing is to reach the goals. They are very goal-oriented and use all possible means from seducing to negotiations to forcing in order to get what they want: they talk, convince, envision, network, change the rules of the game, among other things, without even getting tired. They hate plans that remain unimplemented, seminars in which lip service is paid to ideas, and bureaucracy that slows down action. Other players may feel that battering rams are oppressive bullies who never leave them in peace. Yet battering rams are appreciated because they play a big role in the implementation of visions and strategies.

In absolute value, battering rams are not interested in networking and co-operating, but if they feel it helps them achieve the goals, they are ready to do just that. Battering rams think carefully over the choice of actors with whom they network in respective issues. They do not want to waste time on stagnant networks, which they see as being only “nice social interaction and coffee-drinking” which, according to them, is not important and valuable in regional development. Battering rams’ relationship to the future is ambiguous. On the one hand, they act energetically and dynamically in order to create the future; on the other hand, they feel that visionaries’ fuss is worthless and does not lead to action. Battering rams are extremely action-oriented.

Battering rams are exploiters of information and knowledge. They are not interested in creating new knowledge or acquiring knowledge as such but if they feel that certain information is useful for achieving goals, they are prepared to get and exploit it. Battering rams’ attitudes towards people are the same as towards knowledge. They expect from other actors the same determination as from themselves.
Among leaders engaged in regional development there are probably all the types of leaders presented in the above typology. The basic types of “profile leaders” brought up are simplifications, of course, and it is probably clear that a single leader generally has qualities of several of these types and that there is no completely pure, single-profile leader. The ideal situation would be to ferret out in the heat of the development processes each leader’s best qualities and be able to create a successful development network from a range of different skills and abilities. Regions need all the above leader types, but along with network society development, it is probably clear that alongside the technocrats and handicraftsmen who have earlier governed regional development fields, we should have more visionaries, battering rams and network shuttles.

There are many kinds of leaders in the field of regional development. At the time when the welfare state was being built, the roles of technocrats and handicraftsmen were significant, since regions were largely developed under the flagship of a “national vision” and a national planning system. In the network society, localities need network shuttles and visionaries more than before. Also, the need for battering rams is evident. In the whole of Finland, for example, development strategies are quite similar, differing, however, in regions’ ability to implement them. In the background of the typology lies the assumption that in order to succeed in the network society, regions should be able to create teams consisting of leaders in which different leader types complement each other.

**Conclusions**

It is my belief that the most successful regions in the knowledge-based, quickly changing world will be the ones in which there are leaders and other people who are continuously able to put out their “feelers”, that is, to probe the reactions and intentions of other people, and who are good at learning, innovating and adapting to ever-changing situations. This in turn requires that leaders can inspire people and create an atmosphere and innovative environment in which expectations for the future – not the impact of rules and systems that lock us into the past – would guide actions. Leaders should be able to generate creative tension. (On creative tension, see Sotarauta & Lakso 2000.)

In regional development, leadership often seems to remain at the level of the mechanics of administration with the emphasis on control, plans and supervision, among other things. Rather than generating creative tension and people’s enthusiasm, leadership has diminished them. Among regions, however, there are indeed great differences in
development cultures. In any case, the capability to improvise is essential in relation to a region’s established modes of action and rules and within the setting they have created. On the one hand, these established patterns are followed without questioning; on the other hand, modes of action and rules are bent and tested in order to find their limits. Sometimes the limits are broken deliberately in order to free processes of change. The continuous stretching, testing and breaking of institutional settings renew leadership settings and prevent excessive lock-ins into the prevailing structure and thought patterns.

Finally, the basic message of this article can be summed up in the following six theses:

- First and foremost, leaders should have to realise that in the network society, power is shared. Without sharing power and information, it is difficult to lead and develop a region as well as to solve its problems. The concept of power should be renewed.

- Traditional power that a formal position brings with it does not take one very far in the network society. Influencing other actors’ independent decisions by using indirect means becomes essential. This is based on searching for third solutions, which means respecting other actors’ goals and strategies. In regions, new, interactive influencing skills should be learned.

- Leaders can gain influence by collective sense-making, i.e., by looking together with other actors for the meanings of events, by creating new knowledge as well as by recognising, renewing and creating interpretations. Essential to this is that various problems and challenges are looked at from many different angles. Living with uncertainty and the management of ambiguity are emphasised, not government of certainty. (See Sotarauta 1996).

- In leadership, the ability to visualise thinking, to use metaphors and narratives to get the message across, to create completely new combinations, to utilise polarities in generating creative tension and to read signs, messages and meanings become essential. Local government leaders should develop into “everyday geniuses”; they should develop their story-telling skills (see Sotarauta 2002).

- Municipalities should be capable of renewing their modes of action into a more dynamic direction to inspire their
inhabitants to participate in their activities, not only to use their services. It is very likely that the network shuttle generation does not feel that the traditional modes of action are meaningful in the network society. Municipalities should be able to question the basic premises that guide their activities.

- Leadership in regional development should be seen as teamwork and the skills and abilities of different leader types ought to be better exploited. As well, opportunities for leaders to develop and invest in their own expertise are essential.

References


Nordic co-operation

takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council

is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers

is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

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Observations and Policy Recommendations

Nordic Regional Development Policy in Search of New Modes of Action

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Introduction

This article raises a series of observations and policy recommendations for Nordic regional development policies. We do not cover all possible aspects of regional development and our recommendations focus especially on the question of how policies can be better managed, how they can be truly functional and how they might be better rooted in the wider social networks of regions. We also refer to other studies in order to provide background for the observations and policy recommendations as well as to reflect the observations made in the case regions onto other regions and onto more general considerations.

In general, there has been a simultaneous broadening and deepening of what constitutes industrial and development policy in many European regions. A major shift has emerged away from sector and industry-specific subsidies and arrangements towards cluster policies. The general aim has been to find synergies between industries, firms and other actors within wide resource areas. Cluster policies have also often increasingly included relevant services in their sphere of influence, as the boundaries between manufacturing and services have become increasingly blurred. Also the distinction between different policy approaches has become less salient and the role of innovation policy has been stressed in many other policy spheres too. Policy-makers’ attention has been directed towards linkages and interactions within and between different subsystems and towards actions that will improve the innovation capacity of the whole economy. The role of government has become one of facilitating the development of resources from “basic” to “advanced” factors; to invest in developing technologies and capabilities that are common to all the industries in a cluster; and to develop the labor force through an open and competitive labor market. Investment in resources and infrastructure will usually involve investments in the educational system, in industrial training and in research activities within firms and
within research institutions such as universities. (O’Gorman & Kautonen 2002.)

In all its manifestations, regional development is an extremely diverse entity, its practices are varied and its institutional set-up is usually quite complex. We therefore simplify our observations and recommendations so that they could raise debates on the "philosophy", contents and operational models of regional development policies in the Nordic countries. We organize our recommendations by using the conceptual framework presented in Figure 1.

![Figure 1. Key factors in the promotion of regional development and the general frame of policy recommendations](image)

**The spirit of the time and development view**

The spirit of the time refers to contemporary values, attitudes etc., that is, the way various issues are generally seen and discussed in a society. It is not an exact set of details but rather a general atmosphere that emerges from the general societal communication that is continuously ongoing in various forums and media.

The spirit of the time gives meaning to various policies as well; often it has a decisive influence both on what policies are seen as important in the society and on how they are expected to be carried out.
However, the relationship between the spirit of the time and the contemporary way of playing the policy game is not a static relationship; there may always be a saturation point hidden in the midst of the processes and thus the spirit of the time will change, sooner or later.

The spirit of the time shapes the development view of many actors. At the same time, it influences the way institutions are seen and how they are consciously created and/or reorganized and thus it also indirectly affects what resources are available for development efforts and how they are utilized. The contents of strategies, the nature and forms of networks, the people emerging as leaders and their skills usually reflect the spirit of the time.

If interpreted positively, the strong reflection of current “fashion” in the development strategies of regions appears as a sign of a proactive and dynamic region striving to be ahead of its time. If interpreted negatively, the strong influence of the spirit of the time may appear in many regions as trendy but hollow rhetoric. In any case, it clearly has a significant effect on the promotion of regional development, the basic question being: are there any real resources and capabilities in the regions to grasp the spirit of the time?

Observations

[1] In Jyväskylä, Turku, Trondheim and North Denmark it has been easier to mobilize actors to participate in collective regional development efforts when the topic has reflected the spirit of the time; namely, it has been discussed in the media, conferences, literature, etc. Local “inspirers”, the champions of development efforts, have been able to utilize general societal discourse in their own argumentation. The spirit of the time is one of the key resources in launching development projects.

[2] However, if there is an uncritical outlook on the spirit of the time, the promotion of regional development may end up being hollow development rhetoric with some fashionable catchwords. Consequently, many actors may lose their faith in the development process and momentum may be lost. This seems to be a risk in Trondheim, where several actors doubted the policies of the Municipality.

[3] In both the Turku and Jyväskylä cases, integration and the consistency of the regional development network are important from the perspective of the short-term economic performance of the BioTurku project and of the ICT strategies of Jyväskylä. There is a risk that coherence and homogeneity are prioritised at the cost of sound criticism. This might turn out to be highly problematic if the project is evaluated with criteria that emphasize the moral as well as the long-term economic value of
critical discourse. Such discourse, on the one hand, relates selected strategies to the respective region and its many other activities as a whole; on the other hand, it uncovers possible weaknesses of selected strategies and thus critical discourse is also a source of continuous renewal.

If the spirit of the time refers to the general atmosphere, the development view refers to the thinking patterns of individuals and groups. It may be seen as a more or less detailed system of beliefs and values. Its parts are worldview (what the world is like), knowledge (how knowledge of the world is acquired and justified) and values (what the world ought to be like). The development view does not therefore refer directly to the nature of the development as an absolute phenomenon, but it emerges from experiences, education, expectations and communication with other actors engaged in the promotion of regional development. The development view directs an actor’s way of comprehending the course of development and the general forces and actors influencing this. It leads an individual to see some things and not to see others. (Niiniluoto 1989; Sotarauta 1996) Here the spirit of the time is a general level collective phenomenon and the development view is more a cognitive phenomenon at the level of small groups and individuals.

The development view strongly influences what institutions are created and/or reorganized. Even though the spirit of the time is here seen as a more general and thus stronger force than the development view, the development view of influential actors affects the spirit of the time as well. The dominant development view of key policy-makers together with the spirit of the time greatly influences how resources are directed and thus also the tools made available. It also affects such issues as who are relevant partners for each other, that is, how networks take shape and what kind of power and influence leaders have.

In the promotion of regional development, the development view may have a major influence on practical work, as it guides, among other things, the direction of resources. The development view may also cause tensions and even conflicts, as it is not necessarily the same for all actors. This may cause people’s perceptions of the regional development network itself and the roles of its members as well as objectives and strategies to be very different from each other. In such a case, how knowledge is acquired and generated (or what is even paid attention to) may have a major influence not only from the viewpoint of the contents of regional development policies but also from the viewpoint of the functionality and dynamics of the development processes. In the same way, policy processes and the coordination of the actions and thinking of
different organizations cannot generally be planned in a very simple manner; the *leitmotiv* of development emerges from the processes as the actors discuss strategy, perceptions, points of view and their own observations, and so strategic consciousness emerges. Strategic consciousness is one of the most crucial factors in ensuring consistent and persistent regional development efforts (Sotarauta 1999).

For the development of consciousness, it is necessary for the actor to have the ability to monitor and interpret events and to make sense of them, that is, to consciously create his/her development view and “reshape” strategic consciousness. Consciousness expands to become strategic when the actor has the ability to find the important issues essential to development from a long-term perspective. The assumption then is that as strategic consciousness grows, so does also the probability that decision-makers and officials will act in keeping with the strategies formulated and in practice strategic programmes may turn out to be pragmatic, because long-term strategies exist not so much on paper but in the nerve centers of the key actors.

Based on our cases and previous studies, collective strategic consciousness comes into being in communication addressing the following themes:

- Strategic intentions – Strategic intent[^44] is a manifestation of the strategy designers.
- The resource base of a respective region – possible opportunities and threats to it.
- The desired future.
- The direction of present development, where we are going if the present development continues.
- Possible futures – both undesired and desired future alternatives (scenarios).

[^44]: In the promotion of regional development, strategic intent should express collective purpose, and as such it might be used to ensure consistency and coherence between various objectives, strategies and projects within a development network, and within a set of interrelated strategies of various organisations in the region and external to it. In this view, strategic intent may resemble vision, but grounded more on action and benchmarking, its potential may be higher. The question behind strategic intent is not “what will the future be like”, but “what must we do differently”. Through strategic intent decision-makers and the whole network are provided with an essential part of what is called strategic consciousness (see Sotarauta 1995).
Necessary changes and strategic issues – opportunities and threats.

Internal situation of the organizations engaged in regional development and their effects on the timing of strategy.

(Sotarauta 1999).

Observations

[4] In the 1990s, in Jyväskylä, Turku and North Denmark, the development view of many of the key actors has become increasingly parallel and it has had a significant effect in the promotion of regional development; it has become more effective and development networks have become more integrated, connected and dense.

[5] Strategic consciousness of the significance of networks and especially the role of cooperation between research and educational institutions, business and public development organizations has increased significantly. This has caused actors to take networking more seriously than before and to put more effort into finding new modes of cooperation.

[6] If the strategic consciousness and capabilities and skills to strategically adapt to a changing environment are not well developed, the commitment to public long-term investments in technology centers and/or science parks and clusters that they inhabit may be threatened whenever an economic downturn makes more immediate problems pressing.

[7] In the case regions, the development views and strategic consciousness of the key actors is becoming more parallel than before, which has led to a situation where it has been difficult for people to see and think differently when entering the development discourse. Strategic consciousness may make development work more effective, but it may also lead to a phenomenon called “group think” (Janitch 1982). “Group think” may hinder learning and thus prevent key actors from being able to reshape their development view. In this case, the dominant coalition does not listen to any critical arguments and does not see how changes in the environment are changing the base of the strategies. Consequently, the dominant coalition focuses on defending selected strategies and it may cognitively lock into the past path.
RECOMMENDATIONS A

A.1. In communicative and network-based regional development the conscious construction of collective strategic consciousness is one of the key elements both in ensuring strategic focus, and the density and integration of development networks.

A.2. Dynamic, network-based and process-oriented regional development policy should be grounded in the explicit maintenance of the moral and long-term economic value of social discourse critically utilizing, reflecting and weighing the spirit of the time, which has ensured the emergence of such a policy in the first place.

Resources

Key questions in regional development are: a) what kinds of resources are in the regions; b) are the regions capable of identifying regional resources and are they capable of creating new resources; and c) what is the capability of regional development networks to utilize resources?

In this context, resources are seen as inputs directed at the regional development work. The spirit of the time usually shapes the development view that concomitantly influences actors to see some things as resources and not see some others. Among the most important resources in an industrialized society were raw materials, sources of energy, and logistical location. In an information society, a highly skilled labor force, universities and expertise are usually seen as most important resources. On a general level, resources can be grouped as follows:

- Physical resources – infrastructure, location, logistical connections, etc.
- Firms – their expertise, resources, contacts, etc.
- Human resources – highly skilled people in the firms and other organizations, research and educational institutes, etc.
- Living environment based resources – natural environment, built environment, private and public services, etc.
- Material resources – funds for regional development work
- Connections – good networks, high-level social capital, etc.

(Sotarauta & Lähteenmäki 2001)
Observations

[8] In regional development, it is important to have actual resources on which to build development strategies. At the same time, it is crucial that key actors are able to see various things as resources and are able to utilize them. In Jyväskylä and Turku, the key actors have been able to see and effectively utilize university education and research, among other things, as inputs in wider development processes. This has been more difficult in Trondheim, where there is a higher degree of fragmentation and less interest in large, collective projects.

[9] A common strategy for all public authorities that were studied in the cases was to build networks for policy making. The idea is that communication and collaboration result in better policies as well as more efficient implementation. However, the cases also show that the authorities that themselves invested financial resources in the development processes had more success as network builders. They were perceived as serious players by the other actors. In contrast, authorities that entered network building without such investments faced considerable scepticism and will probably have little chance of making the most of the network strategy.

[10] In addition to utilizing local resources, the ability to locate and utilize external resources is of utmost importance. Hence, through skillful lobbying of external financiers and decision-makers and creative utilization of external funding (national, EU) it is possible to increase the resources to build on.

[11] In Jyväskylä, Turku and North Denmark the development network has been able to join internal and external resources together in the implementation of their own development strategy.

[12] The various resources of both BioTurku, the ICT cluster in Jyväskylä, the ICT cluster in North Denmark and the high technology companies in Trondheim are quite small when compared to those of other European and American concentrations of similar industries.
RECOMMENDATIONS B

B.1. The capabilities and skills of the key actors should be continuously developed to be able to see different things as “stakes” in the promotion of regional development and to utilize them in cooperation with other actors.

B.2. Authorities should not expect to gain free lunches through networks. Successful network policies require considerable investments in the process, both in terms of financial and spiritual resources. The credibility of the policy initiator is extremely important and attention should be paid to gaining such credibility.

B.3. Openness in relation to local political forces should be the long-term policy in ensuring the resource base for regional development, even if exclusiveness in this direction is more efficient in the short-term.

B.4. Openness to extra-regional collaboration should be fostered as a way of solidifying the long-term resource base of regional development.

Institutions

Case studies on the regional development networks and processes of Jyväskylä, Turku, Trondheim and North Denmark raise, in various ways, the significance of institutions in framing and directing development processes. This general level observation supports the conclusions of many studies focusing on the regional economy that stress the importance of institutions in economic success (see North 1992; Maskell 1996; Morgan 1997; Rutherford 1996; Hukkinen 1993; 1995a; 1995b; 1999a; 1999b; 2000). Drawing on Linnamaa’s article in this report, institutions can generally be seen as a framework for actions and choices. Therefore, institutions refer to the relatively permanent modes of operation, rules and resources and the organizational field that constitute the basic form of development actions and various networks. In contemporary regional economy research, special importance is attached to informal institutions and regularly recurring behavior generated by culture – habits, customs and routines. Formal institutions are also significant for development activities. They are presented in the form of a law, statute or written contract, or are realized through some specific organization. (See e.g. Maskell 1996; Morgan 1997; Klijn & Teisman 1997.) Consequently, institutions frame development policies and processes and give various networks their context.
Put simplistically, the promotion of regional development in institutions may have either a positive or a negative influence. On the one hand, they may represent continuity in a rapidly changing world and also provide actors with a clear and supportive playground. As mentioned in the introductory chapter, institutional thickness exerts a positive influence on the economic development of regions. On the other hand, institutions may lock regions into past development paths politically, functionally and/or cognitively (see Schienstock 1999; North 1992; Hukkinen 1999b).

Observations

[13] Institutions provide development processes with a general framework and they have a major effect on the direction of processes. Therefore, consistency and clarity of the institutional set-up is important in regional development. In a blurred and rapidly changing network society, uncertainty is not to be increased by unconsidered institutional transformations; institutions should reduce uncertainty, not increase it.

[14] Turku and Jyväskylä are institutionally thick city regions and both city regions have also been able to increase thickness in strategically important sectors through the creation of new institutions and increasing interaction between institutions.

[15] The importance of institutions is also reflected in the fact that the management of a rapidly growing regional development network is both difficult and risky, as observed in the Turku and Jyväskylä cases. Tension exists in the public sector’s efforts to combine the need for political support and control with its desire to promote dynamic, competitive, and economically successful new industries. This tension needs to be addressed not only to safeguard the interests of taxpayers, but also to ensure the long-term involvement of the city and the consistency of public policies.

[16] Even though it is institutionally thick, the BioCity Turku structure has been criticized for being too heterogeneous and diffuse. These critiques were combined with calls for better mechanisms for knowledge and technology transfer from academic research to commercialization.

Institutional thickness is one of the key factors in the emergence of path dependency. Development being path dependent, the transfer of “success factors” from one place to another is rather difficult, if it is possible at all without proper adaptation to local circumstances. On the other hand, not only is the development of regions path dependent but also the promotion of regional development and its processes are path dependent in the sense that past events and experiences of the development network have an effect on decisions and actions of today, as Linnamaa demonstrated in the Jyväskylä case.
Observations

[17] Turku, Jyväskylä, Trondheim and North Denmark have consciously made efforts to free themselves, at least in part, from the past path and to forge a new one by creating new institutions, by seeking out new resources to build on and by creating a new perception of the respective city-region, its current state and future prospects.

[18] One of the reasons that the development work of the case regions has proceeded well is the fact that in the earlier phases of development, new institutions and resources have either emerged or been designed that could be utilized later by a more systematic strategic development approach. However, there are also examples, in Turku as well as Trondheim, of failed attempts and a closing-down of organisations that did not work. The challenge lies in turning these failures into a strength by admitting them and learning from them. A learning region is a region that makes of its failures a resource for the future.

RECOMMENDATION C

C.1. As a way of reducing the risks and increasing the integration of regional development, process-oriented dynamic networks should be institutionalized with innovative organizational structures, such as programming processes and science parks and/or technology centers.

C.2. Network connectivity and integration are particularly important process features for enhancing performance in regional development. Drawing on the case studies, but also on Amin and Thrift's (1995) discussion of institutional thickness, the resilience, persistence and consistency of local institutions should be secured simultaneously. Thus the aim ought to be a) to deepen the pool of commonly held knowledge (explicit and tacit) by explicit knowledge management; b) to secure institutional flexibility (the ability of organizations to change); c) to develop innovation capacity in all walks of life; d) to increase the capacity to develop relations of trust and reciprocity and to create a sense of a widely-held common project.

C.3. Institutional obstacles blocking processes and networks should be removed in order to make the changeover to a new development path possible. Such obstacles may be prevailing thought and action patterns, organizational structures, administration, fear of losing acquired advantages, conflicts between organizations, etc.
Development networks and coalition

In the previous chapters of this publication, the significance of networks has been stressed and development processes are indeed nowadays more often than not organized in networks. As the experiences of the case regions show, there are many kinds of networks and modes of operation in them.

Observations

[19] The main characteristic of regional development work in Jyväskylä and Turku has been intensive functional cooperation among actors, including the public sector, business, research and educational organizations. On the one hand, network density and connectivity have proven to be particularly important for the emergence of new companies and, as a result, for future employment capacity of the network. On the other hand, transparency and consistency make the network attractive for external actors.

[20] Process features such as informality, connectivity, integration and goal consistency enhance performance in certain areas, like education, research, entrepreneurship, while they are at the same time problematic for other kinds of performances, most notably broad participation in decision-making, political legitimacy and critical discourse. Transparency and consistency are important process features for attracting external actors into the regional development network.

[21] In development networks, a sense of mutual empowerment is important and conscious efforts have been made in the case regions to create and actualize this. In this endeavor, it has been essential to understand that mutual dependency should be realized. It could simply be said that no single organization is capable of achieving such effective development work alone as it can achieve in cooperation with other development organizations. Also, the nature of network-like cooperation should be understood; namely, the importance of reciprocity, trust, solidarity and confidence ought to be accepted and internalized in order to have a truly functional network.

[22] In networks, shared power and leadership should be accepted. No single development organization may easily take precedence over others in issues of regional development (although it may be possible in individual issues). Thus, power is the ability to promote shared and/or separate objectives in interaction. The management of networks is stressed.

Even though the promotion of regional development is organized in a development network, often a dominant coalition assumes a central role in development activities. Logan & Molotch (1987) have labeled these kinds of groups as growth coalitions or growth machines. We use...
the term coalition when referring to these kinds of dense core groupings. Usually the interests that bring people together to form a coalition are based on the pursuit of economic benefit. (Harding 1997, 42.) Coalitions are not composed of all possible interest groups relevant to regional development; sometimes actors outside of a coalition may question the objectives the coalition sees as self-evident. (For related processes in regional environmental management, see Hukkinen 1995a; 1995b).

A coalition may be a strategic node of wider development networks, an engine for mobilizing resources and directing development efforts. However, it may become a separate and introspective entity, distinct from the development network, which strives purely for its own benefit without paying any attention to the interests of the region. Coalitions may therefore be either the main source of leadership in regional development or inward looking “old boy” networks. If this happens, discussions on regional development strategies may end up being the sole property of a local elite. However, if there is not a dominant coalition in some region, the danger exists that the region becomes locked into the past path.

**Observations**

[23] In the network-like mode of cooperation, one of the strongest mobilizing forces has been the coalition of key actors in the respective regions. The role and activities of coalitions have been important in the mobilization of resources, of people and in the creation of mutual empowerment. Often coalitions create many of the new initiatives in informal forums and legitimize them in the formal forums.

[24] In Finland, pragmatism dominates in collaborations on the promotion of regional development. This means that many processes of decision-making take place outside formal structures and across activity domains (local authorities, business, and state universities). Informality is one of the key sources of dynamism and it also has provided actors with opportunities to discuss difficult matters without the fear of losing face.

[25] In regional development there often is the aspiration for efficiency and dynamism. This kind of pragmatic development mode does not leave much opportunity for democracy and open social discourse. In Finland, however, there was a clear need for a pragmatic development mode when the recession was at its deepest in the 1990s. It also seems that politicians were ready to delegate more power to professional development actors.
RECOMMENDATIONS D

D.1. Successful development processes are often dependent on the existence of dominant development coalitions. The true value of a coalition is based on the moral values of the coalition, that is, is it open or closed and whose interests it is striving for and how.

D.2. Ensuring the longevity of process-oriented regional development and maintaining its entrepreneurial performance requires an adequate degree of density and connectedness of the regional development network, and often a coalition consciously develops density and connectedness.

D.3. Therefore, the key role for the network manager, whatever organizational form the network may have in regional development, is to maintain and deepen the sense of mutual benefit that exists within the network by enhancing network connectivity, integration (mutual adaptation) and transparency.

D.4. The network manager of regional development should also be able to maintain sufficient network informality, connectivity, and integration to promote education, research and entrepreneurship within the network, while at the same time guaranteeing network transparency and goal consistency to attract external actors, broaden participation and stimulate critical discourse.

D.5. To the extent that network process characteristics (as opposed to the efforts of individual companies) can affect future employment, a balance between network density and transparency needs to be struck, at the same time as network connectivity is encouraged in a way that maintains goal consistency.

Strategic planning and programming as a tool of regional development

In order to gain complete control over development or change in a given region, it would be necessary for all actors to be of one mind with regard to issues and strategies and their solutions. Furthermore, they would need to implement regional strategies through their own actions. Efforts have been made to unify the actions of members of development networks with the help of regional strategies. In other words, it is hoped that regional strategies will guide a maximum number of regional actors either directly or indirectly. Thus, some of the questions people engaged in regional development are interested in are: how is it possible to be
flexible and to react quickly (as is nowadays often stressed) and at the
same time enable the widest possible participation in strategic planning?
How is it possible to create strategies focusing on the future needs of the
region as a whole in a negotiation process of compromise and conflict
comprising numerous actors? Until now the dilemma has been solved by
an approach based mainly on classical strategic planning. Partnership is
therefore often assumed to occur within the regional strategy.

The basic idea of regional strategies, that the many organizations
operating in the region should realize shared strategies based on a shared
vision, is very tempting because it would make things more manageable.
However, it is more likely that different organizations would nevertheless
seek first to realize their own strategies. In the best case, the creation of
regional strategies can provide a good forum for making the goals and
measures of different organizations more parallel, but in the worst case,
there is the danger that strategies will not amount to more than papers
among a host of other papers. Every organization has its own ambitions
and strategies that, in that organization, are stronger than regional
strategies. This may mean that the intended regional developmental
strategies appear to be everybody’s but belong to nobody. Thus they
never become part of what the organizations are doing. At their most
efficient, regional strategies are backed by the organizations’ own
objectives and strategies and vice versa.

Regional strategies are supposed to guide the activities of the
organizations, but in practice it seems that different organizations
participate in strategy-making in order to ensure that their own needs and
the ideas of their backers are included in the strategies, thereby
safeguarding their own territory, and also in order to see what notions are
uppermost in the minds of the organizations responsible for strategy
making. With reference to the thoughts so far expressed and raised in the
case studies, it may be stated that partnership and classical strategy do not
go particularly well together. The ideal of classical strategy does not
work in regional applications, as it does not enable us to make a long-
term, enduring combination of different action logic and the differing
strategies and objectives emerging from these. Therefore, strategies are to
be seen more as long-term interactive processes than merely strategic
plans.

Thus, the assumption here is that partnership is not achieved within
regional strategies; partnership is achieved between strategies. If a
definition of regional strategy is sought on this basis, it may be defined as
a communicative process, in which different aims and strategies of many
actors are reconciled and various interests balanced, and touching-points
and concrete means between the many objectives are constantly sought out and coordinated. During this continuous process, the various goals and strategies of individual organizations are made as parallel as possible by communication, negotiation, strategic plans, programmes, etc. (Sotarauta & Linnamaa 1998; for ongoing regional experiments along these lines, see Müller-Wille and Hukkinen 1999; Hukkinen et al. 2002).

The earlier view stressed that discussion took place in the planning process, after which the various actors made a commitment to the result of planning and set about implementing it. In the process-based and network-centered approach, commitment has a new content. No commitment is sought for the idea created ready-made in the planning process; rather there is a constant search for commitment from different points of view for shared projects requiring and enabling commitment. Moreover, the strategy continues to live and change along with circumstances. In a way, it is constantly being recreated.

**Observations**

[26] Examination of the development process of ICT-led development shows that the main explanatory phenomena for the positive development of the Jyväskylä urban region after the middle of the 1990s were twofold: first, strategic investing in the strengthening of expertise and ICT-led development; and second, the ability to capitalize on the creative tension that makes people interested and motivated in development work.

[27] The development of the Jyväskylä urban region emphasized the development of regional competitiveness and network-like operation, in which ICT-led networking has been connected to the overall development of the region and the development has been path-dependent. In Jyväskylä, actors in the regional development network had the ability to seize opportunities as they opened up and made prompt use of the new practices of development work, especially doing programme-based work and attracting project funding. They have been able to create partnerships between various strategies by regional strategic planning.

[28] In the Jyväskylä case, the regional development process benefited from the improved image that the City gained by actively exploiting publicity.

[29] Development programmes should be seen as many-sided tools that have at least the following functions:

- The programme is a plan in which a vision, strategies and adequate measures are presented in order to channel and direct the use of resources.
- The programme is a legitimate forum for cooperation.
• The programme is a way of making sense together, to learn common language and new concepts, to create shared lines of action and thought patterns and a way of seeing the development and the role of various actors in it.
• The programme is a means of communication for messages from one group of actors to another group.
• The programme is a trigger for new processes.
• The programme is a tool in making better sense of the ongoing open social discourse in a region from the point of view of regional development.
• The programme is a tool in concretizing “noble sentiments” or in turning a crisis into something constructive.

[30] Our case studies of regional development from North Jutland in Denmark and Turku and Jyväskylä in Finland show that the ability to bring to the fore a vision of a different future is important, as well as the ability to embody this vision in a functioning organization. By means of visions, sufficient creative tension between the present and the future has been created and thus it has raised new discussions, made key actors interested in development efforts and also guided them. Quite often, visions created in strategic planning are so uninteresting that they remain self-evident lists of “everything nice and beautiful”. To be truly functional in the development networks, a vision should be communicable, challenging and appealing.
**RECOMMENDATIONS E**

**E.1.** The regional development network should solidify in a functioning organization the capacity to bring forth a vision of a different future for the region. The mechanical formulation of vision and strategies is not sufficient but development actors should develop their skills and abilities to make better use of use visions and strategies as tools in regional development.

**E.2.** Process-oriented regional development networks should strive to create path-dependent positive synergies between overall regional development on the one hand and business competitiveness on the other.

**E.3.** Process-oriented regional development should pay particular attention to investing in strengthening the region’s core competencies and capitalizing on the creative tension between the inspirations of key individuals and the dominant thought patterns.

**E.4.** In process-oriented regional development, it is important to create sense or urgency. This is important because often the formulation of a vision or development programme and, for example, receiving EU-funding provide a development network with a false sense of security. Development efforts need the sense of drama that can be found in a crisis, possible crisis, great opportunity, etc. It is essential to be able to arouse the interest and motivation of individuals.

**E.5.** Regional development processes should actively involve the media to make the public aware of regional development objectives, strategies and projects.

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**Leadership and individuals**

The ability to lead and manage the development processes has emerged as crucial in the cases. It could, of course, be stated that the importance of leadership has always been central in regional development, but the point here is that it has become even more important in the network society. At the same time, the nature of power and influence is changing and therefore the nature of leadership is changing too (see Sotarauta in this publication). Hence, the need to understand the dynamic nature of development processes, management and leadership may turn out to be crucial. Policy-makers are required to become more skilled in managing transition and processes, not only in administrating resources, programmes and formulating development programmes. In leadership,
the ability to accelerate, boost and change the course of action when the environment changes is often crucial.

Leadership and management in the promotion of regional development differ in nature from conventional modes of leadership because the means of exerting influence are mainly indirect. As mentioned in Sotarauta’s article, to be able to influence events, leaders have to act in the riptide of several different interests and aims, and find a totally new range of means that can be applied in different events. Despite numerous different models and leadership styles, the most efficient leaders trust themselves and their own assessment of the situation, and use a combination of several different models and styles. Whatever the leadership model or range of combinations, the basic tasks of managers can in simple terms be summarized around the following management and leadership approaches and abilities:

- **Strategic and visionary management/leadership**
  - The ability to define strategies and visions for regional development together with other actors; the ability to promote development activities persistently, consistently and comprehensively; the ability to create the future; the ability to bring to the fore visions of a different future and the ability to transform these visions into focused strategies and action; the ability to transform crisis-situations into something constructive; the ability to launch processes successfully and manage and lead them differently in different phases; the ability to find the right timing for development work and seize competitive advantage by being a pioneer; the ability to bring forth big objectives so that they seem credible and attractive to other actors, etc.

- **Network management/leadership**
  - The ability to involve people and empower them to act as a network; the ability to make people work to reach joint and separate goals and renew them in an ongoing process, namely, the ability to promote interactive processes serving as an intermediary in interaction between actors and steering activities towards seeking goals and enabling cooperation; the ability to connect various actors to the cluster from their own starting points; the ability to create and utilize creative tension in development work and to create the sense of drama (presenting issues so that people become enthusiastic and excited); the ability to achieve short-term success in order to sustain motivation; the
ability to network competently and to utilize informal relations efficiently, etc.

- **Resource management**
  - The ability to utilize existing resources and to find new ones in the promotion of regional development; the ability to direct resources according to regional strategies and in that way influence the strategies and operations of various organizations; the ability to lobby skillfully toward external financiers and decision-makers and to utilize external funding creatively; the ability to see different things as resources in regional development and to utilize them, etc.

- **Knowledge management**
  - The ability to create and apply new knowledge in the development network; the ability to create an environment that supports the knowledge management of different organizations; the ability to openly grasp initiatives via informal decision-making channels and the ability to channel these initiatives into formal structures of decision-making; the ability to understand and mobilize image and atmosphere, etc.

- **Institutional management**
  - The ability to create and maintain flexible but at the same time persistent institutional set-up that supports networking and the fluidity of development processes; that is, the ability to create institutions that provide organizations with a national, regional and local development and innovation environment that is as good as possible.

**Observations**

[31] In the cases of both Denmark and Finland, the ability of key actors to perform fast and proactive collective action was of great importance in guaranteeing external (national and EU) funding and raising interest in the region and mobilizing both people and resources.

[32] In the Danish case in particular, success required that the actors were able to agree on a vision of what building an IT lighthouse should be about. That the user-oriented vision became dominant in the North Denmark project can partly be explained by an active campaign, in which regionally well-known and respected people put their authority behind the programme and by the ability of these people to transmit a positive and regionally anchored picture of the project.
[33] In both in the Turku and Jyväskylä cases, the ability of the network to influence policies across a broad range of sectors was dependent on the degree to which the network managers can claim to be spokesmen for the network. Thus, a certain degree of concentration of representative authority was needed. However, continued internal education will require openness, efforts to increase transparency and active sustenance of goal consistency within the network.

**RECOMMENDATIONS F**

F.1. Institutions and thought patterns of development officers should evolve so that a mechanical planning and development culture could be left behind and regional development policies could enable and empower the activities of small groups and individuals. In regional development, there should be more efforts to create innovative milieux for organizations and opportunities and challenging environments for people.

F.2. The key actors in the regional development network should include visionary individuals capable of fostering consensus around a common vision for the development process.

F.3. Managers in the regional development network should have the skills to observe, understand and act on opportunities promptly as they open up in the development process, such as adopting new modes of development work and funding.

F.4. Key actors in the regional development project should be regionally well-known and respected individuals, because the combination of enthusiasm and authority that they embody is likely to transmit a positive and regionally anchored view of the project to the general public.

F.5. In the promotion of regional development, institutions responsible for development work should also pay more attention to the creation of challenging working environments and to the recruitment of active, highly skilled and respected individuals.

F.6. Visionary leadership and concentration of representative authority in the regional development network should be balanced with openness, transparency and goal consistency to guarantee the credibility and educational self-renewal of the network.
References


Nordic co-operation
takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council
is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers
is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

Stockholm, Sweden
2002
Commentary – from the Arctic Region perspective – on the Introduction and three Case Studies in PROB

(A project entitled “In Search of Process-Based Regional Development Policy”)

Richard Langlais

Introductory comments

This commentary on certain texts from PROB, a project with the full title, “In Search of Process-Based Regional Development Policy,” is written from the perspective of the Arctic Region. It has been produced on the basis of several premises. In my understanding, this commentary is intended for a number of readers, those who: carried out the project; were the subjects of the project; financed the project; or are other actors, of which there are many categories, working with various aspects of regional development. It is possible that some readers will fit more than one description from the previous list.

So as to avoid any suspense, it must be said at the outset that the preliminary results of the PROB project appear, at this stage, to be relevant and useful, both generally and for the Arctic Region. The objective of the study, the experience of the cases, and the results should prove interesting for both researchers and users of the study. Although a more detailed critique follows, the primary result from the project is that the grounds for believing that a process-based approach to the study of regional development have been reinforced. A number of valuable tools for working with regional development have been refined and, to some

45 The directions for producing the commentary were that it was to be written in the period between my receipt of the drafts and the production of the project’s final texts. The texts I received are drafts of PROB’s “Introduction” text and the reports from three of its case studies, two from Finland and one from Denmark. The understanding is that the final texts are to benefit from the input of a number of commentators, who must also labour without the benefit of the final texts themselves.
extent, introduced in the case study reports. That the study is not entirely free of problems should not detract from this overall estimation.

The case study reports are so rich in material and theory development that the few pages available for these comments seem inadequate. An attempt is made here to be as selective as possible, but is almost certainly doomed to miss many essentials.

After a brief description of the Arctic Region – which is necessary since it is so extraordinary, and without which the full implications of the comments might go missed – this commentary proceeds with sections containing:

- More detailed general and specific comments about the usefulness of the project’s results and the way in which it has been presented in the texts.
- More Arctic Region-specific comments about the character of research on the region’s high technology development.
- Concluding reflections on the Arctic Region in light of the regions in the case studies.
- A selected bibliography.

The Arctic Region

For present purposes, the Arctic Region is defined as the area of the land and sea north of the Arctic Circle, or about latitude 66.33 °N. Although there are many other ways of demarcating the region, this is one of the most frequently used. It does leave out several more southerly areas that are usually included in physical geography and in the politics of the Arctic Region (southern Hudson Bay, in Canada, for example), but from the northern European perspective it is more than generous. Consider that when speaking of even the most northern areas of the Nordic countries, one meets resistance to the notion that they are “Arctic.” Still, when using the Arctic Circle demarcation, large parts of each of the Nordic countries (with the exception of Iceland) do fall within the Arctic. Ironically, all of Iceland, at least topographically and climatically, easily fits most people’s idea of the Arctic, but is almost entirely south of the Arctic Circle; whereas Denmark, usually considered the opposite of an Arctic country, with its territory in Greenland has one of the world’s largest contiguous segments of Arctic landmass. Much more could be said about various national perceptions, space permitting.

The eight countries that have territory within the Arctic Region are Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden and the USA/Alaska. The highest-level political unit in the region is the
Arctic Council, an international, inter-governmental body that serves primarily as a forum for discussion, collaboration and co-ordination of affairs of mutual interest to its participants. In addition to the member countries (represented by the equivalents of Ministers of Environment and Ministers of Foreign Affairs), the Council’s membership includes a number of indigenous peoples’ organisations, or, as they are called, Permanent Participants. At the Council’s founding in 1996, those organisations were the Association of Indigenous Peoples of the North of Russia (RAIPON), the Inuit Circumpolar Conference (ICC) and the Sami Council. Recently, several other smaller indigenous organisations have been admitted as members. Both within and outside the Arctic Council there are literally dozens of other organisations with more limited interests.

About the study itself: General comments

Regional planning and regional development lie in the difficult area between bottom-up and top-down steering of social change. From the perspective of national planning, the level of the region is close to the ground, even local, while seen from the level of the citizen and the town, on the other hand, decisions and plans made at the regional level can seem remote and out of touch. In an open society, maintaining the balance between the aspirations of democracy and the economies of scale provided by progressively macro-level governance at all levels is not only difficult, but vital. Managing that balance through time, as the impacts of both subtle and drastic change occur, must be one of the essential challenges at the regional level; there, the distances to “the bottom” and “the top” are not so far, but being “in the middle” can be frustrating, uncomfortable and conflict-prone. The PROB project’s (draft) Introduction text formulates this dilemma as follows: “Globalising economy and rapid technological progress…and…the increasing interdependence between various actors and issues at (the) local, regional and global level”… are creating a situation where regional development “policies are often programmed descriptions of the current state, through which it is not always possible to generate innovative enough means to develop regions.” The project argues that a key ingredient in responding to these dilemmas is a process-based approach. Although this commentator felt that the reasoning around this approach was not so clearly expressed in its Introduction text - thereby not doing justice to the real merit and insight of the ideas that the PROB project actually is based
- the work done in the case studies provides sufficient grounds for wanting to make its results known to policy-makers and planners in any region, anywhere.

**Particular comments**

The use of case studies in the PROB project is to be applauded: this approach gives actors in regional development much actual material for assessing how much from the experience of others is useful in their own regions, as well as how much is case-specific and therefore not easily applicable. The way in which PROB organised its case studies does, however, raise several concerns:

- Although the project targets *regional* development, only the one dealing with North Denmark, clearly deals with a *region*. The others, Turku and Jyväskylä, are ostensibly cities (as Bruun, the author of the Turku and North Denmark case studies forthrightly states), even if there are indeed regional implications in the fact that both cities are the centres of their regions. Linnamaa, the author of the Jyväskylä case study, refers to Jyväskylä as an “urban region.” While the consortia examined in the two Finnish cases are interesting in their own right, one wonders if the processes that are the focus of the study might be seen in a radically different light if the actual regional level had been taken into account in those two non-Danish cases. At the risk of over-stating the obvious, a city is not the same as a region. Additionally, is there any relevance, or loss, in the fact that the only truly regional case is not in Finland? It would be interesting to know how actual regional cases in Finland differ from the Danish example; in other words, whether any national differences in regional development processes are discernible. This shortcoming could be remedied if final versions of the reports include more material that discusses the relevant interactions, or, equally important, the absence of interactions, between the cities and the rest of the regions in which they are located.

- The cases I was given to comment on all appear to be ones that demonstrate success in meeting their objectives. It would be helpful to know more about the criteria for choosing these cases. Was it that they were already seen as successful, and

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46 My specific comments regarding the Introduction text have already been forwarded to the project.
thus were selected in order to find out what had happened? Was there a prior impression that they were situations where process had been important, so they would be useful as “evidence” that the study of processes is necessary and useful? The text on Jyväskylä says that it was chosen because it was successful, but doesn’t explain why it was considered successful enough to be chosen; it states that the study assumes a positive start and that it focuses on “…how this development has been brought about….” In the North Denmark case, there is a section entitled, “Why North Denmark,” which discusses what the Danish Ministry of Research and Information Technology did in setting up the Digital North Denmark “experiment.” There is also a statement that the North Denmark case shows “an impressive regional mobilisation and targeting of resources and efforts”; it is reasonable to assume that, to arrive at the conclusion (at the beginning of the study) that the region has been impressive, much effort must have been expended. Being able to benefit from the content of that effort would be highly useful. The Introduction mentions that a fourth case, Trondheim, is one that demonstrates lack of success, but I have not been provided access to that one. It would be interesting to be able to compare it with the apparently successful cases. In each successful case, many reasons are given for that particular success. Is the success a result of the attributes that are defined in each case? If so, then those attributes, applied elsewhere, should also lead to success. Do we know that this is correct? Or are those attributes case specific and only relevant to that place, at that time, with those people? And, in the unsuccessful case of Trondheim (which is not available for comment), were those same attributes present? That Trondheim has apparently not been successful makes these questions even more important. To phrase it another way, to what extent are the case studies descriptions or prescriptions? To what extent are they useful descriptions of processes that have occurred, and that are probably continuing, or, rather to what extent are they useful prescriptions for other regions that might like to learn from the experiences described in the case studies? As was said about the North Denmark case, the actors did not know in advance that their way of going about things would prove
successful. Much more could be added to these reflections, but space does not permit.

- Whether the reasons for success in the cases that PROB chose (and that were available for comment) are generally applicable elsewhere, or are instead merely the story or the history of what happened in some successful cities in Finland and a region in Denmark, is a question that becomes even more pertinent because of the different conceptual frameworks that are used from case to case. The Introduction states that these different frameworks exist but does not explain the reason for this conceptual diversity. Did it “just happen” this way, or does the project team have solid explanations for this? Not having the answers makes the attempt to make useful generalisations on the experience from the cases all the more difficult. It is my hope that the final report may go a long way toward integrating the various conceptual approaches, and do so in a manner that will make comparisons and analyses across the spectrum of the cases, and elsewhere in further case studies, more likely. The North Denmark report goes a long way toward achieving the kind of overview that summarises the implications of the various case studies that I am calling for here and bears promise that the final PROB report will indeed achieve a helpful synthesis.

- Notwithstanding the foregoing, the cases taken by themselves demonstrate the use and, especially, the refinement and improvement of a good toolbox of separate conceptual and theoretical frameworks (“conceptual tools,” in Bruun’s words). Having the case study reports in hand provides the assurance that the processes they depict have been analysed and understood from a number of enriching, perceptive standpoints. As such, each of them on its own constitutes a valuable model for use in the analysis of other cases elsewhere. (It is when trying to understand the composite picture, the lessons that can be learned across the cases taken together collectively as a larger project, that their usefulness weakens.)

**From the Arctic Region perspective**

Discussions of regional development in the Arctic Region are, for the most part, characterised by wholly other issues than those highlighted in the PROB studies. That is not to say that the effort to study and achieve
high technology development doesn’t exist, for there are some specific places, or sub-regions, in the Arctic that do pursue the kind of social discourse in a similar context to the one described in PROB (places such as, for example, Iqaluit, the capital of the Nunavut Territory, Canada; Oulu and Rovaniemi, Finland; Nuuk, the capital of Greenland, Denmark; Reykjavik and Akureyri, Iceland; Bodo, Svalbard and Tromso, Norway; Murmansk and Yakutsk, Russia; Kiruna and Luleå, Sweden; and Anchorage and Fairbanks, Alaska, USA).

The character of research on development in the Arctic
To varying degrees, each of those places and the regions around them are visibly grappling with ways to achieve a greater role for high-technology in regional development, as well as being aware of the need to attempt trans-sectoral collaboration in such projects. They all have to do so in a context that is affected by their northern location, both within their countries (with the exception of Iceland’s capital, Reykjavik) and globally. It is striking that the northern reaches of the eight countries form smaller-scale models within the countries themselves of the other kind of North/South problematic, familiar from the study of “under- and lesser-developed” countries. One part of the Arctic – the border area between Norway and Russia and Finland and Russia, has been described by some researchers as representing the greatest contrast in the standard of living of any border area in the world.

Being in the north means, generally, that population figures are low and often declining, distance to markets is far, infrastructure is minimally developed and services are basic. Such descriptions can be quoted from actors themselves from all around the Arctic Region. It is the places that are exceptions to these issues that need considerable explanation, rather than the opposite. (For instance, both Oulu and Tromso are expanding cities and centres for research in a number of fields, including high technology. Although continuing population decline is predicted in the regions overall, population in the cities themselves is expected to increase.) On the other hand, many parts of the Arctic are blessed with an abundance of one or more natural resources – oil and gas, minerals and gems, living resources in the sea and on land – which represent a great source of local wealth, or, in contrast, heavy dependence on outside ownership, investment and control. Further, the notion of being on the periphery, marginalised and in a post-colonial situation is frequently cited by researchers to explain the state of affairs in the Arctic.

Are there things in the PROB project that can contribute to the study of Arctic matters? PROB, as I see it, has two main points:
That in regional development, it is important to be aware of process; this is meant by PROB to be an important point for both researchers and the actors responsible for planning and effecting regional development. It builds on the opinion that process is often ignored, and reasons that if planners and decision-makers can understand that successful development is often the result of processes, then this understanding should also affect the way in which planning is done, and also, it would be wise to encourage the evolution of the processes themselves.

That in studying process and in implementing the results of those studies, a number of conceptual tools that can be of assistance. These can be further refined with regard to high technology development. Using the PROB case studies for purposes of comparison with other regions provides an appropriate basis (even if in need of further refinement) for useful analysis of processes of development.

In my estimate, the awareness of point 1 above is well established among both actors and researchers of Arctic society. In fact, the Arctic is all about process. Ironically, achieving concrete plans for defined actions is often the part that goes missing, which is the opposite of the situation that PROB complains of in justifying its study. In the Arctic, it would be good, in my opinion, if process actually led to action more often, but when the desire to achieve complete consensus is so often the object of discussion about development, it can take decades to get things decided on and enacted. That is not to say that when consensus is finally achieved the results are not good; actually, there are several examples of excellent results after years of negotiation. To name just one, the agreement to create the new territory of Nunavut, in northern Canada, is a precedent-setting case of an aboriginal people taking on “big government” and, after more than twenty years of sitting at the table with representatives of six different governments, finally achieving the largest single peaceful transfer of territory, anywhere, in history.

Concluding reflections on the Arctic Region in the light of the PROB cases

The case of Nunavut illustrates one of the main themes in understanding Arctic society; namely, the continuing effort by indigenous peoples in many of the Arctic countries to reach greater autonomy. Because there is often resistance by governments to their claims and a lack of clarity on the rights to the resources and land being claimed, development is often stalled. This in turn may provide an incentive to governments to enter into processes of negotiation, which, as said above, can take many years, in the hope that solving questions about ownership and control will
eventually enable development to proceed. These processes have been studied intensively in the Arctic and, indeed, the awareness of the importance of process has been instrumental in the solution of major claim conflicts.

An interesting aspect of processes of development in the north is the important role played by researchers, both in making the results of their work available in a form that is accessible to the other actors, as well as working as advisors, and at times even as activists, in the processes.

Again, the preoccupation with more fundamental concerns in the Arctic – ensuring access even to secondary education, let alone higher education, improving basic health care, trying to move the economy away from dependence on distant sources (either corporations or transfer payments), brain drain and so on – has meant that the ability to establish the conditions for high technology development have been possible so far in only a very few Arctic communities. Such high technology development as has occurred has usually been of the kind that remains out of reach for the local economy: Large government research facilities, military installations, university projects and the development of polar air routes. Alaska will witness high technology investment in the form of multi-billion dollar missile defence installations now that President Bush has announced the American withdrawal from the thirty-year-old Anti-Ballistic Treaty with Russia, but this will be technology that is brought in from outside and literally bolted in place without much development input from local enterprise and research. In the unusual case of Svalbard, Norway is committing large resources to converting the archipelago from a mainly coal-producing settlement into a kind of science park, or science village, where the business of the place is science itself, but where businesses, in the usual sense, are not part of the equation, except as contractors.

Ironically, such a pattern of investment by large-scale outside organisations (that rarely employs more than a few local people for relatively menial labour and for which the sophisticated products are almost entirely for purposes that lie far outside the region itself), rather than creating co-operation in the region, often creates conflict and competition instead, as the different actors seek to gain as much as they can of what is on offer. This competition pushes large-scale integration in trans-sectoral development even further away. Unlike the experience documented in the PROB cases, collaboration between local governments and business is still weak in most parts of the Arctic, and far from what has been seen in North Denmark, Turku and Jyväskylä. Examples from Norway include the huge new telemedicine centre and the enormous
polar research facilities that have been established in Tromsø. While these will each have significant multiplier and development effects on the regional economy, these government facilities, although they include minor private sector involvement, are primarily agents of the Norwegian national agenda. It must be added, however, that the efforts to have the institutions established in Tromsø in the first place did represent a collaborative lobbying process by wide consortia of local interests.

One way in which the Arctic Region may soon benefit in a way that more closely resembles what is going on in the case studies regards the presence of the European Union. The EU is slowly, but gradually, waking up to the fact that three of its member states are also considered Arctic countries and vice versa. As this realisation grows, one can expect more of the kinds of development projects that emphasise the start-up of new enterprises, attempts to foster collaborative regionalisation and the involvement of the southern European countries in joint efforts that will also result in bringing to the Arctic the kinds of activities that are of commercial, scientific and development value to them.

Finally, having asserted that process comes first in the Arctic Region, and that regionally-generated, yet centralised, linear steering of development is still rather embryonic there (although there is excessive nationally-generated and central steering of development in the region), this is not to conclude that the important role that research such as that being done by the PROB project is irrelevant. On the contrary, the PROB cases are right on the mark, in that they provide an illustration of how the conceptual tools that have been developed and refined in the studies can be used. It would be fascinating to use the same tools in the Arctic Region, both descriptively and prescriptively.
Selected bibliography


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2002
1. Most research on regional initiatives in relation to the so-called advanced technologies is commercial in orientation. The general aim of such research is to improve the “competitiveness” of the initiatives being investigated. Usually, the research seeks to identify the various kinds of problems that have been encountered, in terms of resource limitations, institutional barriers, structural and infrastructural constraints, etc. The results of this research are then intended to lead to the development of suitable measures that can be taken to improve the situation, ranging from policy instruments and institutional innovations (new funding schemes, organizational reforms, changes in taxation, external support arrangements, etc.) to administrative adjustments of a highly practical nature, both within individual companies, and between companies and other relevant participants. This type of research, or, perhaps more accurately, evaluation activity is primarily supported by those involved, most often as one or another type of joint venture between the private sector and public funding agencies, usually within the ministries of industry or finance.

Most of this research has been carried out at business schools, or at departments of management within engineering faculties, although even more, I would think, is carried out on an openly commercial basis by consulting firms. In the course of the 1990s, as the development of technology has itself become ever more commercialised, so has the research that has been carried out to “understand” technological development. We have seen the emergence of a new branch of economics, so-called evolutionary economics, in which innovation processes are of central importance. There has also been a range of new network approaches within geography and sociology that have been developed to try to explore some of the social dynamics that are at work in high-tech business ventures. As I have previously noted, the broader interest in the relations between science, technology and society that was widespread in the 1970s, when those relations were being questioned by the “new social movements”, has tended to bifurcate into economic approaches and socio-cultural approaches, and it is most definitely the economic approaches that have dominated research on regional advanced technology initiatives (see Andrew Jamison, “Science, Technology and
the Quest for Sustainable Development,” in Technology Analysis and Strategic Management, nr 1, 2001).

In Denmark, there have been several programmes of research and consultation of this kind, supported by the Ministry of Industry and carried out primarily by business economists and specialists in industrial organization. The conceptual and analytical frameworks that are utilized tend to be managerial and the research is usually framed within what might be termed an instrumental rationality, taking its point of departure in one or another concept of competitiveness, such as that developed by Michael Porter. As such, the meaning of technology is generally reduced to that of a production factor; and technical change, or technological development, is largely reduced to a matter of business firms making marketable innovations, that is, to the commercialisation of artifactual products. Knowledge is of interest to the extent that it can be “commodified”, i.e., made relevant to such commercial activity. More generally, economics is redefined in evolutionary terms, as a process of natural (sic) selection, by which firms compete for their survival by following certain selection mechanisms, among which the choice of technological trajectory and the pursuit of an innovation strategy are central elements. The key notion of “lock-in” serves as a guiding concern, or focus of attention: what makes the people who manage business firms commit themselves, or lock themselves in, to certain technologies rather than others?

The overall world-view of such research might be called technocratic, since it is based on a belief in a “technological imperative” or what Georg Henrik von Wright has termed the myth of progress, by which social and economic development is primarily seen as an endless quest for newness, change and progress. The research usually seeks to identify the kinds of factors that foster and constrain competitiveness and innovation, and tries to disclose the systemic relations between companies and other “actors” that are thought to make regions more competitive in the international or global market. The methods of investigation tend to be derived from rather traditional forms of management research, such as quantitative surveys, and the interpretative frameworks are usually based on various kinds of economic concepts and models (“firm strategies”, “technological trajectories”, “selection mechanisms”, “systems of innovation”).

There is a fundamental positivist assumption or bias in most of this research, according to which science is seen as a relatively unproblematic process of truth-seeking and rational fact-finding. Underlying much of this research is the view that reality can be meaningfully reduced to
certain kinds of core elements, and that the kind of knowledge that is produced in this way can be useful in the making of public policy. In epistemological terms, the research is firmly rooted in a disciplinary, managerial logic, and the insights from other fields, such as history, psychology and philosophy, are generally neglected. The task of the scientist/researcher is to discover certain “facts” about reality that can then be utilized by the practitioners involved. As far as I know, relatively little research outside of this managerial “paradigm” has been done in Denmark with regard to the development of high-tech regions. There are research activities at the Copenhagen Business School that are more sociological in orientation, especially the recent study by Jesper Norus on biotechnology firms active in the so-called Medicon Valley near Copenhagen. And within my own group in technology and society at Aalborg University, Anne Lorentzen has conducted research on regional development initiatives from a more geographical perspective. These studies have not concerned the recent high-tech initiatives, such as the digital North Denmark programme.

2. The research project under review here seeks to provide an alternative approach to understanding regional high-tech initiatives. There is, we are told, a focus on “processes” that is meant to counter what is seen as a structural bias in much contemporary research. And yet, after reading the papers by Henrik Bruun and Reija Linnamaa, one wonders how alternative the research project really is. Of course, time and resources have been limited and it would be foolish to expect too much at this stage, but, in my opinion, there are some rather fundamental problems with the results presented that should be considered in future research.

The papers attempt, in different ways, to investigate regional high-tech initiatives from an explicitly social perspective. More specifically, all three papers view high-tech initiatives in terms of social processes. Henrik Bruun, in studying biotechnology development in Turku, offers a network analysis, primarily derived from Finnish scholars who have apparently developed a general taxonomy of network characteristics. In a second paper, on the digital North Denmark programme, Bruun makes use of the so-called actor-network theory of Michel Callon. And in the third paper, Reija Linnamaa explores the concept of regional competitiveness in relation to an ICT cluster in the Jyväskylä urban region with a qualitative, case study methodology. The three papers are, each in its different way, good examples of both the strengths and weaknesses of social approaches to technology and regional development. On the one hand, they show the value of using different
methods of research and examining what we might term the non-economic rationalities that are at work in regional high-tech initiatives. But on the other hand, they show how difficult it is to escape the reductionism and delimitation that is characteristic of most contemporary social and economic research. What is lacking is a more general, or generalist ambition, an attempt to combine economic and socio-cultural concepts and approaches.

In each paper, a particular concept is applied to the case being studied. In the Turku study, we are offered an ambitious framework of analysis, which is a kind of catalogue of different network characteristics: Symmetry, density, formality, transparency, hybridisation, integration, connectivity, consistency, empowerment, openness, dynamics and performance. This list is certainly of interest and there is no doubt that it points to factors that many economic analyses neglect. But the actual meaning of the different terms is not discussed in any depth, nor are they illustrated or exemplified in sufficient detail. The reader – or at least this reader – is thus unable to determine whether the information presented is valuable or not. The “key distinctions” and factors and even more crucially, the relations among these factors need to be discussed at much greater length. I would suggest a new paper that exemplifies the different network characteristics in relation to different technologies. The terms need to be given a much more substantive meaning if they are to provide insight into the dynamics of a contemporary initiative. While one can certainly sympathize with the ambition to be comprehensive, the actual analysis is, at least in my opinion, not particularly enlightening.

In the Jyväskylä study, a more descriptive approach is taken and the paper presents itself as something of an ethnographic “thick description”. The different actors and interests are briefly described, as a sort of cast of characters, and they are given voice by frequent citation from the extensive interviews that have been conducted. The focus is on tracing the process of high-tech development as history in the making, and the concept of creative tension is given a central place as a cultural driving force for developments of this kind. My main difficulty with the study is that the technology is absent or rather the actual technical developments that form the substantive subject matter of the ICT cluster are never discussed explicitly. As with the Turku study, the technological baby, so to speak, has been thrown out with the economic bathwater. And yet surely an adequate understanding of regional high-tech initiatives requires some effort to discuss the technical changes themselves, the actual contents of particular innovations or techniques and, with them, the particular skills and types of technical knowledge that are involved.
Another problem here is that the study fails to achieve sufficient critical
distance from the object of investigation. It is assumed from the outset
that the ICT cluster in Jyväskylä is a worthwhile undertaking and the task
for the investigator is to help make that cluster become more competitive
than other similar clusters. As such, the study does not address potential
“bad news” – e.g. issues of power, conflict and, for that matter, social
costs and consequences. By adopting a primarily descriptive
methodology and form of presentation, the study gives us no real insight
into the broader social and political processes at work. The micro-level
emphasis should, in this case, be complemented with a more ambitious
effort to depict the political and power relationships involved in the
initiative.

The North Denmark case presents a similar problem. In the early
1990s, Langdon Winner criticized the kind of sociology of technology
that is applied in this paper for being uninterested in politics. As he put it,
the approaches that he criticized opened the black box of technology to
social analysis, but, in the end, the box was empty. His own efforts in the
1970s to uncover the politics of artefacts had been replaced by an effort
to impute “agency” to artefacts, a kind of metaphysics of technology,
rather than a sociology per se. Indeed, the approach of Michel Callon and
his colleague Bruno Latour can be seen as an attempt to counter a socially
critical sociology with a micro, or local sociology of translation (see
Steve Fuller, Thomas Kuhn, University of Chicago Press, 2000, pp.
365ff.).

In the paper on Digital North Denmark by Henrik Bruun, Callon’s
actor-network theory is applied to the recent project of spending several
million Danish kroner on information technology. As in the Turku study,
the paper presents us with a well-written and well-structured overview of
a regional development initiative, but it provides little basis for any
critical or reflective judgment about the value of the initiative. That there
have been elements of problematisation, mobilisation and enrolment is
perhaps interesting to know, but the meanings of those processes for the
actors involved, for the analyst, or, for that matter, for Danish society, are
not sufficiently explored. Like the other two studies, the Jutland case tells
a story, but we are not given much guidance as to what the point of the
story really is.

3. In all three studies, I miss a clear formulation of the aim of the
investigation. The Finnish studies seem to have the aim of providing an
analysis that can be of value to practitioners, while the Danish study
seems to have a primarily academic or methodological aim, namely, to
make use of a certain terminology. A clearer statement of aims would have been helpful in evaluating these studies, and it is something that I encourage the project group to articulate. While the studies provide new approaches to regional development initiatives, it is unclear how the approaches are related to one another and what the ultimate value of such approaches might be. In this regard, it would have been useful to have discussed other studies of a more economic or commercial nature that have been made of the three regional initiatives, so that the reader might better appreciate what these new studies contribute. And it would also be important to discuss, at much greater length, the strengths and weaknesses of the methodologies adopted.

As I have previously indicated, I also find the studies far too limited in focus - to what might be termed the “form” of the three regional initiatives, while neglecting almost entirely an analysis of the contents (that is, the actual technological developments that are the subject matter of the processes). The analysts have not ventured into the world of technical development itself, but have kept the contents of the technology outside their framework of interpretation. Let me make three suggestions for how this social bias can be corrected.

On the one hand, I suggest that more attention be given to the different kinds of “information and communication technologies” and “biotechnologies”, in terms of their knowledge components, their specific areas of application, their “product cycles” and/or “life cycles”, their relations to relevant fields of science, etc. What is needed is a rudimentary attempt to explain the history of science and technology in these areas, as well as the particular skills and knowledge that are associated with these scientific and technological developments. There is much discussion these days of new forms of interaction between what was previously labelled “science” and what was seen as “technology” in these emerging fields of technoscience. Some historical background is, it seems to me, essential for understanding the significance of these contemporary initiatives.

On the other hand, more attention could be given to the various “learning processes” that are involved in the different organizations taking part in the three regional initiatives. There is a rich literature in organizational theory as well as in pedagogy and the sociology of knowledge about how individuals and organizations learn to do new things, and an attempt to make use of that literature could well be relevant to the research project. Rather than cultural tensions that have to do with loosely-defined values or routines, what are at work in many innovation processes are cognitive tensions having to do with different
styles of learning and different capabilities among individuals and organizations in using or adapting new kinds of knowledge to their activities.

Finally, more attention could be given to the different types of “skills” and competencies that the different actors possess and bring to their various forms of network interactions. While actor-network theory provides a framework for interpreting the “social relations” involved in scientific and technological production, it offers little help in understanding the ways in which those actors make scientific and technological knowledge. A substantial literature exists on the history of technology, as well as on the philosophy of science and technology that certainly has a place in the research project.

In conclusion, I feel that the papers provide an interesting beginning for the exploration of some of the cultural dynamics of high-tech regional initiatives, but they need to take much more seriously into account the actual cognitive aspects of these developments if they are to contribute to our understanding. The kinds of insights that can be gained from socio-cultural analysis are different from those that can be gained from economic analyses. But for socio-cultural analyses to provide insights, they must move beyond the modes of analysis presented in these papers and seek to investigate what might be termed the cognitive praxis of the processes under investigation (see Andrew Jamison, *The Making of Green Knowledge*, Cambridge University Press, 2001).

The research presented in these three papers is an impressive start for what should be a much more substantial effort. The papers show that it is indeed possible to tell interesting stories about regional development initiatives and that there are other possible “story-lines” than the purely economic or instrumental. Within their own terms, they disclose some of the social processes that are an intrinsic part of economic activity, but to be useful, they should be expanded to take the cognitive, or learning, aspect much more seriously than they do. The challenge for academic research in this area is to supplement the dominant economic approaches with richer and more comprehensive approaches, so that practitioners can reflect more clearly on the strengths and weaknesses of their initiatives, and also identify what might be nodes in need of development in their networks. As I see it, those nodes can be social, economic or cognitive, and are probably in most cases a combination of all three. In order to understand them, it is thus necessary for all three types of practice to be investigated.
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Stockholm, Sweden 
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A Matter of Perspective?

Some comments to the draft report from the project “In Search of Process Based Regional Policy” (PROB)

Knut H. Sørensen

Introductory remarks

The PROB project has produced three case studies, one on biotechnology and regional development focusing on Turku, Finland, one on the development of an ICT cluster in the Jyväskylä region, Finland, and one on the Digital North Denmark Programme in the North Jutland region, Denmark. All three case studies make for interesting and thought-provoking reading and they seem to be competently done and well written. The idea of focusing on processes rather than the structural context of regional development is clearly a good one, but perhaps not quite as original as it may appear from the case study papers.

The papers argue the importance of, in particular, locally available relevant knowledge, university-industry-local government collaboration and actors able to make things happen. In this way, the initiation, growth and stabilisation of focused networks is a sine qua non of regional development. However, the question remains to what extent regional government may nurture and manage such networks.

Trailing the discovery in the early 1980s of Silicon Valley as the ultimate success story of regional development, a whole industry of efforts has attempted to identify the Silicon Valley recipe. A main set of such recipes focused on the idea of Science Parks, trying to emulate the role of Stanford University in the establishment of new high tech companies. But there have also been arguments pointing to particular cultural conditions, inter-company relations combining competition and collaboration, the high turnover of highly skilled labour, etc. No region has been able to copy the success of Silicon Valley on the same level. Some regions have been able to develop high tech industries through conscious efforts to learn from the Silicon Valley experience, others have not. To my knowledge, there is no uncontested explanation of these differences.

It is my impression from all three case studies that the regions in question are influenced by the Silicon Valley experience, although no
direct references are made to this in the papers. This is not meant as a critical comment, but rather to point to the massive influence of this experience. I believe that, when assessing efforts to build high tech programmes for regional development, we need to be reminded of where this idea originated. All too frequently, the Silicon Valley experience is used with a disregard for context, implying that this is the same kind of place as marginal regions, for example in Europe, struggling to maintain their level of population.

I have been asked to comment on the case studies with a particular emphasis on whether Norwegian research on high tech development programmes have made similar arguments and whether the pattern of development of Norwegian regions is similar to what has been observed from the analysis of Turku and Jyväskylä. In addition, I will make some general remarks about some challenges raised in this type of research, in particular when it is supposed to provide a basis for policy action.

Comparisons to the Norwegian scene

To begin with, it should be noted that it is no straightforward matter to compare the Norwegian and the Finnish situation with regard to the role of high tech as the backbone of regional development strategies. First, there are differences in the understanding of what “regional” means. In the Norwegian context, regional policy is concerned with non-urban areas that are threatened by de-population. This means that, for example, Bergen or Trondheim or Stavanger would not be explicitly targeted as objects of regional policy. However, Bergen and Stavanger have hosted industrial networks that as early as the 1950s aimed to support industrial development in the region, although public support of these networks was weak. Arguably, no Norwegian local government has developed any clear, extensive local technology policy. The main effort has been to lobby to get investments from central government for infrastructure or to host national institutions. For example, in this way, Trondheim managed to become the location of the only technical university in Norway, making Norway the only known industrialised country to have a capital without a technical university.

Second, Norway has a very different industrial structure from Finland, with much more emphasis on the production of raw materials, including oil and gas. Salmon farming is probably the most important growth industry in non-urban areas. While there is a growing ICT industry, Norway does not have the sort of ICT locomotive that Finland has with Nokia. On average, Norwegian industry is less R&D intensive because it produces raw materials rather than consumer goods or machinery.
Third, Norway has been less concerned with the development of a strong innovation policy than Finland. Norwegian industrial policy has been dominated by financial instruments, rather than support of R&D investments. Industrial policy is also heavily influenced by liberal rhetoric and deregulation ideology, which does not facilitate the participation of local government in local innovation programmes.

Probably the most influential concept in Norwegian research as well as in policy related to regional innovation is Michael Porter's idea about the importance of industrial clusters. This concept is also found in the PROB case studies, but the case studies do not make any extensive engagement with the cluster concept.

Emphasis on networks, industrial as well as knowledge-based, is another similarity. However, Norwegian research has been more concerned with quantitative measures, like the large surveys made by the STEP group in Oslo. Also, Norwegian studies are more influenced by systems approaches like industrial districts or thinking in terms of strategic alliances. The PROB effort to apply actor network theory as a part of the theoretical and conceptual apparatus is not found in Norwegian studies of regional innovation.

The PROB case studies of Turku and Jyväskylä describe two regions where successful attempts have been made to establish a strong local activity in the area of biotechnology and ICT, respectively. As far as I can see, no Norwegian regions have been developed in a similar way. Arguably, the Trondheim area could be compared to Jyväskylä, since both regions have succeeded in establishing a strong knowledge base in the ICT area. Trondheim, with the Norwegian University of Science and Technology (NTNU) and SINTEF, musters a very strong research network related to ICT. Moreover, a number of new companies have been started in the last 10-15 years, some of which have been reasonably successful. While it is commonly held that Trondheim has not yet reached the level of industrial growth that one should expect, given its R&D base, there is still substantial activity.

A major difference between Trondheim and Jyväskylä seems to be in the relative level of engagement of local government. While the case study of Jyväskylä describes an active local government as a partner in setting up ICT innovation activities, local government in Trondheim has played a less active role. However, both NTNU and SINTEF have provided support for start-ups and have stepped up the level of support in the last couple of years. In addition, national programmes have played a major role.
Probably, the main difference is simply that there is no Norwegian counterpart to Nokia that could set up activities in the Trondheim area. Traditional industry in Trondheim has been dismantled over the last couple of decades and there is really no company or cluster of companies that can play a similar role as an industrial locomotive for a local ICT industry. This provides a different industrial logic for the ICT start-ups in Trondheim than those in Jyväskylä and probably Turku as well. In order to survive, start-ups in Trondheim have had to grow by exporting their products, directly addressing an international market. There has been no serious establishment locally of multinationals, with the exception of the factory that Siemens has run in Trondheim for a long time. However, this factory produces electrotechnical equipment rather than electronics or ICT products.

Thus, we may see a complex issue emerging, related to the relative importance of push and pull factors. My impression from the three PROB case studies is that they tend to emphasise push factors, probably since these are the factors that are most clearly open to influence through political measures, like R&D support, financial support for new high tech companies, network facilitating measures or the set-up of protected spaces for initial growth. However, pull factors are present in the accounts, and in my interpretation, these factors are more critical for success. No action within reach of a local or even central government has the same effect as heavy investments of large industrial companies with existing international links that facilitate sale of the goods.

This is not to say that efforts by local or central government are not important. On the contrary, they may even be the keys to the kind of local investment of large companies that we observe in the Turku and Jyväskylä cases.

Some other issues
While I like the three case studies provided by PROB, I also see some potentially important weaknesses. Some of these are discussed above and are related to fundamental problems with case studies of success stories: What do we mean by success, and is it possible to understand success in a way that transcends the understanding of participating actors?

Thus, it would have been useful to have access also to a failure story. Analysing failure in such situations often focuses on the distribution of blame and the identification of incompetent actors. In success stories, incompetence may be hidden behind the success. In failure stories, incompetence may become an explanation too easily made use of.
Arguably, there could be little difference between the actions and strategies of local government in the Turku and Jyväskylä cases and in less successful cases. I believe that knowledge is plentiful about how to go about facilitating high tech growth, which would tend to make public strategies quite standardised. Success may thus be a product of accident or a particular ability to get the right companies to establish local branches. This possibility is not sufficiently reflected in the case studies, which may imply that the policy advice that one tries to derive from the case studies is not that accurate. The idea of a process-based regional policy may still be a good and valid one, but it is sometimes quite difficult to see just what the critical processes are. Looking for critical processes, the processes that are more involved in producing success or failure, rather than trying to provide a kind of complete picture could have been an interesting alternative mode of analysis.

Finally, I have some reservations about the theoretical arguments made in the three papers. First, I think that Castells’ ideas of a new economy and concepts like space of flows are used as if it were obvious that Castells provides the correct understanding of the phenomena in question. It would take too long to really assess the ideas, but in the context of regional policy it is important to make a critical note about assumptions that new ICT makes issues of geographical space less pertinent. Silicon Valley itself provides ample evidence that space in the physical meaning is still of great importance. A lot of time and money is spent on physical encounters, even if mediated encounters are very frequent. Electronic mediation seems to be unable to replace physical encounters, which creates problems when starting new businesses "in the middle of nowhere".

Second, while I like the authors belief that there is great potential in using constructivist approaches like actor network theory, I feel that the way this is done in the case studies is problematic. A main reason for this is in the lack of concern for the semiotic nature of phenomena like technological development or networking. Action implies decision-making, which implies negotiations, which imply efforts at stabilisation and destabilisation of knowledge and points of view. There is probably a methodological difficulty here. To observe semiotics in action, one often needs access to data over time. The standard case study toolkit that seems to have been used in the PROB project, tends to make one focus more on structural features and ongoing arguments. Even if the case studies of PROB show a very skilled way of doing analysis, the actual observations and points made may not be as process-sensitive as one would have expected, given the goals of the project.
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A Commentary to the Sub-Project “In Search of Process-based regional development policy”

Göran Sundqvist

Introduction
The point of departure of the sub-project “In Search of Process-based regional development policy” (in the following referred to as the sub-project) is that a new environment, based on a globalised economy and rapid technological progress, puts new demands on public policy-making, e.g. regional governance. Moreover, regional policy-making has become more complex as more stakeholders, both on the international and national level, as well as companies and citizen groups have to be involved in creating management for promoting regional development. Often, this is described as a need for widening the opportunity structure for political action, in order to reach a credible outcome. From this point of departure, described in the “Introduction-paper”, we note several explicit assumptions of the sub-project, resulting in a clear policy objective:

- The assumption that a gap exists today between a new policy environment and an old policy making process, which indicate that policy-makers have to adapt or adjust to the new requirements in order to promote regional development; i.e., new policy approaches have to be developed.
- The assumption that the process of policy-making is of great importance in order to reach a successful result; i.e., the content of the policy process is not independent of the process itself, but is rather the result of the process. Moreover, it is stated that the study of processes is a neglected topic in social studies of regional development, as most studies are on structures and forget about the importance of processes.
- Therefore, an important policy objective of the sub-project is to support policy makers with adequate knowledge in order to set up better policy processes and to be aware of their importance, as well as to set up new conditions for regional governance.

In my commentary, I first critically examine the above-mentioned assumptions, while also focusing on the role of universities in regional development, as well as the role of the researcher analysing such
processes. Secondly, I examine the theoretical ambition of the sub-project. In the third part, a Swedish example is given, focusing on IT-infrastructure as a tool for regional development. Lastly, some comments on the three case studies are made before overall conclusions are drawn. It should be added that I interpret my task as reviewer to be critical, focusing on what I find to be lacking in the sub-project, in order to contribute to strengthening its further development.

The Controversial Terrain of the Research Questions

The changing conditions for academic knowledge production as well as for public policy-making have been part of a common understanding among many social scientists during the 1990s.

Firstly, the changing contract between academic research (universities) and wider society means that science policy has become an important tool for governmental support of research as well as for the exploitation of scientific results for political objectives. Different policy doctrines have been formulated to highlight this changing contract, which has been conceptualised as a transition from normal science to post-normal science, from mode 1 to mode 2, and towards the triple helix. This transition indicates that science has become involved in complex relations with other social sectors, i.e., relations of interdependence between science and society. (For a short overview see e.g. Martin & Etzkowitz 2000.) The difference between policy analysis (conclusions from empirical studies) and policy formulation (ideologies) is sometimes hard to assess from the conclusions drawn in the studies.

Secondly, the changing character of policy making is also a well-developed area of research among social scientists. Studies focusing on the interdependence between global (international) and local processes, including the dissolution of the closed boundaries of nation states, are quite common today (the theme of globalisation), as well as the more complex situation of public policy makers trying to discern and define their objects, without being captured by definitions made by other actors (e.g. Bauman 1999). The effects of the European Union on national policy making (in the member states) have been a popular area of investigation. A more specific topic related to this broad theme is the research on technocratic tendencies in modern public policy-making, especially in connection to all these science-based issues in need of public regulation as well as public support, e.g. biotechnology and information technology (e.g. Goldblatt 1996; Guston 2001).

These two tendencies of change, in academic knowledge production as well as in public policy-making, are converging in studies of the information society. Manuel Castells (1996) argues that new
information technology, in which he includes both biotechnology and microelectronics, is characterised by its penetrating effects on society. Information technology has become an integrated part of all human activities and is shaping a new basic form of society. Information technology is the prime mover in Castell’s analysis.

The tendencies described above are considered assumptions of the sub-project. However, it would have been appropriate not just to take them for granted, but to include a more critical examination of these tendencies. Critical scholars have noticed that the understanding of the role of new technology in society and its importance for economic and social development, are often exaggerated (e.g. Thrift 1996). The new (that which has changed) is emphasised at the expense of the old, and the important role of technology in creating change (the new) is highlighted. In the sub-project, however, the focus is not on purified technological systems. On the contrary, the emphasis is on social processes and agents that create knowledge production and technological applications as well as social welfare. However, there is a focus in the sub-project, both in the introductory paper and the three case studies, on the need for public policy to adjust (or more strongly to adapt) to the new conditions, for example, on the importance of technological progress and the need to capitalise on this progress in order to create social welfare. If these statements are unreflectively formulated as assumptions, the studies run the risk of being caught in a paradox, i.e., that what is highlighted as the new – the unique thing to capture – demands that everyone adapt in the same way. This makes the new model into just one of many blueprints and turns their implementation into a race that is all about being first, instead of doing what is really new and what one is good at. Too much emphasis on adaptation could, in the worst case, lead to being trapped by the latest policy doctrine.

I also want to emphasise the sub-project’s view on science and the role of the universities for regional development. In many European countries during the 1990s, major changes in public research policy doctrines have occurred (Guston & Kenniston 1994). In Sweden, the formulation of a new doctrine has been controversial, including differences of opinion between, on the one hand, political parties, and politicians and researchers on the other. However, the outcome has been a great victory for an instrumental attitude towards academic research, including an increase in funding from foundations, councils etc. and a decrease in faculty funding (Benner 2001, cf. Persson 2001). In short, this means a strong focus on social and economical utility along with diminished academic freedom and organisational autonomy. The flip side
of the coin is a focus on the impact of research on economic and social development (Sandström 2000). In Sweden in the 1970s, the focus was already largely on the social applicability of academic research, which led to a backlash in the 1980s when arguments for basic research were successfully raised. In the '90s the pendulum swung back to applicability, and the universities were urged to become more involved in economic and social development and above all to support industrial competitiveness (Sandström 2000).

My point is that research policy doctrines are changing and are also politically controversial, while there seems at present to be a broad consensus on an instrumental interpretation of the social role of academic research. Therefore, policies proposed by different actors have to be analysed by the researcher studying academic knowledge production (universities) and its importance for regional development. What is lacking in the sub-project is a critical analysis of the research policy landscape, and also a formulation of a reflected position. In short: the normative question of which policy doctrine is right has to be separated from the analytical question of investigating how doctrines are formulated and supported by the studied actors and how they form the basis for regional governance.

In addition, a more critical stand should also be taken towards the basic question behind this sub-project: the role of knowledge-based ventures in achieving regional development. Also this topic is highly controversial, with some scholars strongly supporting such initiatives while others are more sceptical. (For a sceptical attitude towards high expectations on universities as important factors for regional development see Sörlin & Törnqvist 2000.)

It is important to note that both the science-society relationship and the role of science and technology for economical growth and social development are highly controversial issues. However, this is not made very visible in the papers from the sub-project.

Theoretical Considerations

In this section, I wish to comment on the theoretical approach used in the three case studies. It is important to note that a common approach is not used in the studies; rather three different approaches are applied. However, I would like to focus on the following general concepts that do recur in all three studies: Actor, network, openness-closure and path-dependency of technological (as well as regional) change.

As already mentioned in the introduction, an assumption of the sub-project is the need for changing attitudes among policy makers. What is seen as a virtue is openness towards new “initiatives via informal
decision making”, i.e., a flexible actor collaborating in pragmatic ways. Actors’ attitudes of openness and readiness for change are emphasized as criteria of success. On the other hand, also highlighted is the path dependency of development – “lock-in mechanisms” – that give development a “deterministic air”.

This dual character of development could be compared to approaches in science studies, for example Thomas Kuhn’s (1970) concepts of pre-paradigmatic science vs. normal science, Harry Collins’ (1981) concepts of interpretative flexibility vs. closure and Michel Callon’s (1986) four phases of problematization, *interessement*, enrolment and mobilisation. Such concepts are used in analyses of processes going from uncertainty to certainty, where one hypothesis among several competing ones becomes verified and consensus is reached on how to interpret a scientific object. However, such a process does not always lead to success, but sometimes results in failure. The common theme in these studies is that the reason for success or failure is to be found in the world of actors and not in the natural world.

What makes a particular future real, compared to other possible futures, is actors’ expectations of the future, i.e., how they choose to define their own possibilities and how they adopt existing alternatives. In the so-called path dependency of technological evolution, the focus should be on actors’ choices and what Donald MacKenzie (1996) has called “the self-fulfilling prophecy in persistent patterns of technological change”, which could lead to the achievement of closure.

Important to note is that the above-mentioned pair of concepts should not be used in a normative way. When a crisis looms, whether it is a scientific crisis or an economic crisis such as in Jyväskylä in the early 1990s, it is of course good if actors take new initiatives. However, it is always difficult to find a recipe for success. Success has to do with enrolment and mobilization, but how to enrol people is not easy to deliver in a formula. What social studies could contribute are detailed case studies that illuminate characteristics and mechanisms of success stories (and of course also failure stories); this is precisely the intent of this sub-project.

What I want to add in relation to the sub-project is that it is not certain that we are witnessing success stories. The concepts of success and failure are relative and have to be considered as actors’ opinions on success and failure. Furthermore, the networks shown in the three case studies are too small to make it possible to evaluate their strengths. The reason for this is that they are narrow elite groups. The establishment of a successful network – starting at the phase of coupling and continuing
with enrolment and mobilisation – has to engage a lot of different actors. To put it bluntly, it is hard to see how wider actors, e.g., consumers and citizens, are engaged in the stories told in the three case studies, for example. Already in the second phase of network development, in what Bruun calls coupling, it is required that actors’ commitments to the project be strengthened and commitments to competing projects weakened, i.e., a strong focus on the project is required of the actors. In my opinion very few of the actors in the three case studies give the project concerned top priority and at the same time exclude all the alternatives. Furthermore, we do not know the priorities of many actors, perhaps considered as more peripheral but still of importance in order to create a strong network. These may or may not be interested in the project. What is shown is not vast mobilised networks, but networking in an earlier phase, perhaps coupling, and within small elite groups. Moreover, concepts developed in science studies could not in a self-evident way be applied in studies about regional development. Scientists are usually looking for a single truth; consensus among all scientists is what is wanted. But this ideal may not always be a good one for regional development; i.e., a single project for all to be engaged in. (This comment is perhaps most relevant to the North Denmark study, which explicitly uses the actor-network theory.)

One remark on actor-network theory (ANT): the theory is not based on the classical dichotomy between agency and structure; on the contrary, it denies this dichotomy. Actor and network are two sides of the same phenomenon. Network is not about Society, a territory or a field of structures, but “the summing up of interactions… into a very local, very tiny locus” (Latour 1999). In the three case studies we are given the impression that there is a context (an anonymous field of forces) in which actors can act on external forces. According to ANT this is a mistake, and reinforces the conceptualisation of the dichotomy between agency and structure that ANT wants to bypass. Actors create structures; they do not act on them.

My last comment in this part, further developed below, concerns the different character of the case studies. This is important to notice, in order to understand accurately the motives of the actors engaged in the projects. In the North Denmark case, an important motive for actors’ engagement is the possibility of funding (from the Danish state), while in the two Finnish cases, development comes much more from below.
Swedish IT-infrastructure and Regional Development

In this section, I wish to give a short description of the Swedish state initiative to support a locally developed IT-infrastructure. (For further details, see Sundqvist 2001, cf. SOU 1998:79). In relation to the sub-project, these comments are perhaps most relevant for the North Denmark case, and mostly in connection with the importance of state funding.

In the late 1990s, the Swedish parliament passed a new policy for information technology. One important objective for the state was determined: To take responsibility for the development and co-ordination of the information technology infrastructure, “which should respond to the needs of the economy and the citizens. The country’s information supply must be based on an effective, reliable and publicly accessible infrastructure” (Swedish Government Proposition 1995/96: 125). Ultimately, it is the Government’s responsibility to see to it that an infrastructure – a communication network of sufficient capacity – is accessible to the entire population of the country. However, private interests should primarily do the building of the IT-infrastructure. The policy of the government should be to bridge the new gaps created by the developments in the information society between different groups, and a regulated IT-infrastructure is considered necessary in order to create an information society open for all, as well as to promote Sweden’s competitiveness abroad.

The Government Proposition, An information society open for all, (March 2000) states that “government funding is... to be made available for the establishment of regional networks, and for the purpose of facilitating access to the broadband network in sparsely populated areas. A total of SEK 5.8 billion is to be provided for these measures. In addition, the Swedish National Grid is to undertake the construction of a backbone network connecting all municipal centres in Sweden at a cost of SEK 2.5 billion” (Swedish Government Proposition 1999/2000: 86). The ambition of the Government is that all people in Sweden should be connected to the broadband network as soon as possible, however no promises are made as to when and how. The proposed public funding – totalling SEK 8.3 billion – is not enough to guarantee that this will happen. It can provide support where the market is weak, but cannot guarantee that information highways, accessible to everyone in Sweden, will be constructed.

In Sweden vivid discussion has occurred in recent years about how to create an open community net for all players living and acting in the municipalities. A few Swedish municipalities have started to realise such a network, but most of them are still discussing how this should be done
and who will play what role in building information highways open to all. Some, however, argue that this should not be done at all as it is not a proper objective for a municipality to set forth.

To qualify for state funding, municipalities have to ensure that the private sector has no interest in building the infrastructure on a commercial basis. Furthermore, the funding is only meant for sparsely populated areas with less than 3000 inhabitants, and the municipality has to contribute between 10 to 70 per cent of the costs. These requirements were set up in January 2001 and to date, no municipality has applied for funding (PTS 2001). Part of the reason could be the economic recession that is most visible in the IT sector.

Today the situation is propitious for further case studies focusing on what Bruno Latour (1988) calls “trials of strength” in the creation of an information society open to all. The Swedish IT-infrastructure programme is a good example of state-supported local activities, where EU structural funds are also important sources for local development. The three case studies from the sub-project are also good examples of this phenomenon. In a situation of economic recession and perhaps less money available in external funds, it is of great interest to analyse the strength of the networks, and to what degree the actors involved consider the projects analysed as top priority. In this way, projects set up to raise funding, most of all because there is funding to raise, could be sorted out from the projects, which really are of basic importance for the actors. This is just what the mechanism of coupling tries to show. In Sweden today, there seems to be a situation where an IT-infrastructure accessible to all is not top priority for elected representatives in the municipal councils. The idea of the IT-infrastructure as an obligatory point of passage for the information society has been advocated most strongly by a small elite group, the IT Commission Group. This group, advising the Government on IT-issues, argues that the state should realise a complete new IT-infrastructure within a few years at a cost of SEK 60 billion (SOU 1999:134). However, the Group has not been able to carry out this idea; the necessary support to realise the vision was not established, and not even the Government was interested.

Perhaps the North Denmark and Jyväskylä cases, which both so far have been a success, could be further studied in a situation where economic recession and the decrease of the IT-hype become more visible, which could be viewed as trial of strength for the projects.

**Remarks on the Case Studies**

In this section I briefly comment on the three case studies starting with the Jyväskylä study. This study is, to my mind, the one least elaborated
The study is guided by the ambition to identify stages (three different stages are noted) and central turning points in the development of an ICT cluster in Jyväskylä, from 1960 to 2000. Despite the identification of important turning points and re-orientations it is argued (and this is also an ambition set up in advance), that regional development is path dependent. This is contradictory, while the re-orientations seem to me to be empirically well underpinned but the path-dependency (despite the conclusion made in the last section that “the overall development of the region and the development has been path-dependent”) seems in hindsight to be more an arbitrary conclusion. To my mind, the focus on turning points is more interesting than discerning stages and a path dependent development.

The empirically oriented description is well documented and convincing, as are chapters 5 and 6, where the important turning points are discussed in detail. I also note that in chapter 7, the critical point I made in section 2 above is mentioned (but not further developed), namely that regional development is a politically highly controversial issue. In this last part, it is also stated that elected representatives and citizens have been neglected in the process. This conclusion indicates that the size of the network could be discussed and is important also with regard to the strength of the network. This issue is not further elaborated on in the study but is important for understanding the character of the network. (See my comments in sections 3 and 4 above.)

Considering the level of theoretical elaboration, the Turku study is the opposite of the Jyväskylä study. In the Turku study, 13 key distinctions of networks are discerned and used as a framework for understanding what happened in the biotechnology sector in Turku, particularly in the 1990s. However, if the Jyväskylä study applies too vague a framework, the framework of the Turku study could be assessed as too rigid. In an effort to apply the 13 distinctions, the analysis becomes structural and ahistorical, and the story of the Bio Turku trajectory tends to fade away. Also, as the author points out, the story is quite complex, novel forms of decision-making are developed and “the locus of initiative has been constantly on the move”. As in the Jyväskylä study, there is also a focus on path dependency and what is called the Bio Turku trajectory, which focuses on lock-in processes, where actors are enrolled into the trajectory. However, it is also concluded that the Turku network is characterised by its openness, inclusiveness and many informal contacts. The centre of the network has also been shifting. Together, these factors mean that it is hard for the analyst to discern the trajectory, and it should be even harder to conclude that the development has been path dependent.
with strong lock-ins. This contradiction is not well developed in the study. The Turku study is interesting and complex (and based on many sources), and perhaps the ambition to apply the 13 key distinctions should be downplayed and the real strength of the network and a possible trajectory should be more critically examined in its historical process.

The North Denmark study is the most theoretically interesting of the cases. Here, analytical concepts are applied in a way that deepens our understanding of the process without distorting it. In one important respect this story is different from the Finnish studies, since an important part is the establishment of a programme – Det Digitale Nordjylland – funded by the Danish state in which different actors could apply for resources to fund individual projects. This creates a top-down approach, which is lacking in the two other studies. For future comparison of the three studies, this difference is important to note. Such comparison is mentioned at the beginning of the paper, however not developed in the conclusions, which gives a strange impression to the reader: why is so much said about the Finnish studies in the introduction and nothing in the conclusions? As mentioned in section 3 above, too much emphasis is placed on “the importance of the structural context” for this study to be a convincing application of the actor-network theory. Instead, efforts should focus on following the actors more closely. Furthermore, as also mentioned in section 3, to my mind it is not convincingly shown that the Danish project demonstrates the establishment of the enrolment and mobilisation phases. A mobilised network requires a vast diffusion of the network, influencing the beliefs and actions of the enrolled actors. The network described in the North Denmark study is not vast. As in the other studies, the focus is rather on a small elite group. Since the object under scrutiny is the diffusion of information technology in Northern Denmark, this is problematic for the assessment of the strength of the network.

Conclusions

Once again I will mention that I have interpreted it as my task as reviewer of this sub-project to be critical. I have focused on what is lacking but what could be strengthened in the revision of the three papers, and in the future development of the project. Accordingly, I want to add that the three studies give deep insights into the complex processes of regional development. As empirical descriptions of complex stories, they are important and interesting contributions.

My critical remarks could be summarised in the following three points:

268
• The lack of a critical attitude towards the controversial discussions on science policy, the societal role of universities and regional development. The studies are carried out in a politically controversial terrain and this should be emphasised, otherwise the studies run the risk of being captured in the political agendas of the most powerful actors.

• As part of a common sub-project, the studies would have gained from using a more coherent and shared theoretical framework, from which interesting comparisons could be made at a later stage. A few common concepts are applied in the studies, but not in an elaborate way. Perhaps this issue could already be considered in the revision of the three papers.

• The case studies are well documented and good contributions to an important academic field of specialisation. However, a more critical examination of the size and strengths of the networks involved is lacking. In a time of economic recession and diminished interest in ICT-related issues, there are good opportunities to give further consideration to the strength of the networks in the studied areas.

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Team Description

This report is an output of the sub-project “In Search of Process-based Regional Development Policy” (PROB-project) of the Research Programme on “Future Challenges and Institutional Preconditions for Regional Development Policy”. The research programme was organised and co-ordinated by Nordregio and financed by NÄRP (Nordic Committee of Senior Officials for Regional Policy). The project was carried out as a collaboration between two Finnish research teams and the Nordic Collaboration Network (NCN). The Finnish team is composed of the University of Tampere (UTA), Research Unit for Urban and Regional Development Studies (Sente) and the Helsinki University of Technology (HUT), Laboratory of Environmental Protection (LEP). The Finnish research team is composed of following researchers.

**Reija Linnamaa**, Lic. Sc., M.Sc., was a researcher in the Research Unit for Urban and Regional Development Studies (Sente) at the University of Tampere during this project. She has specialised in sub-regional co-operation, urban competitiveness and network management in the promotion of regional and urban development. She has published widely on these subjects in a range of books and journals. Among her publications are *Kaupunkiseudun elinkeinopolitiikka ja prosessien laatu* (*Urban development policy and the quality of policy processes* – co-authored by Markku Sotarauta), *Kaupunkiseudun kilpailukyvyn rakenteelliset ja dynaamiset elementit* (*Structural and dynamic elements of urban competitiveness*) and *Verkostojen utopia ja arki* (*Utopia and the everyday life of networks*, co-authored by Markku Sotarauta). She is now working as a consultant in HAUS, the Finnish Institute of Public Management.

**Henrik Bruun**, Ph.D., is a post-doctoral researcher at the Helsinki University of Technology, Laboratory of Environmental Protection. He does research on the socio-cultural dimensions of Finnish biotechnology and is a coordinator for two research projects on this topic. He holds a Ph.D. degree in human ecology from Göteborg University in Sweden, and a Masters’ degree in philosophy from the University of Helsinki. His doctoral dissertation, *Epistemic Encounters* (2000), presents a conceptual framework for analysing work across knowledge-related boundaries. He is the editor of an introductory book on human ecology (*Nora, Sweden: Nya Doxa*, 1999), and has published widely in scholarly journals, book chapters and other academic publications on interdisciplinarity, technology studies, human ecology and environmental philosophy.
Janne Hukkinen, Ph.D., is a professor of environmental strategies and technology assessment at the Helsinki University of Technology, Laboratory of Environmental Protection. His fields of expertise are institutions of environmental management, participatory research and planning, scenario methodologies, water policy in arid areas, long-term waste management strategies, environmentally sound product concepts, the role of experts in environmental policy and management and environmental management in northern areas and rapidly industrializing countries. Among his recent publications are:


Markku Sotarauta, Ph.D., is a professor of urban competitiveness and strategic development at the University of Tampere, Finland. He is also a director of the Research Unit for Urban and Regional Development Studies (Sente) and a Docent at the Tampere University of Technology. He specialises in strategic thinking, futures studies, leadership, core competence thinking and management in the promotion of regional and urban development. He has published widely on these subjects in a range of
books and journals and has presented related papers throughout Europe and Japan. Among his recent publications are:


Markku Sotarauta was responsible for the management and coordination of the project.

*The Nordic Collaboration Network (i.e., associated Nordic specialists)*

*Dr. Göran Sundqvist*, Section for Science and Technology Studies, Göteborg University. Sundqvist’s area of research is the sociology of science and technology, especially regulation and the theory of expertise. Currently, his empirical work focuses on:
i) the construction and implementation of information technology infrastructure in Swedish municipalities. The boundaries between private and municipal initiatives are investigated, as well as the boundaries between technical and political issues;

ii) the interlinks between scientific research, policy decision and technological implementation within the field of transboundary air pollution, in connection with the acid rain regime - CLRTAP. (This research is part of a larger Swedish programme supported by the Mistra foundation.)

Dr. Sundqvist has a Ph.D. in sociology and holds the position of senior lecturer at the Section for Science and Technology Studies, Göteborg University. Among his recent publications are Teknikstudier och IT, VEST Nr 1-2.99 (guest editor) and Samhälle, risk och miljö (1997, editor with Rolf Lidskog and Eva Sandstedt).

Professor Andrew Jamison, Department of Development and Planning, Aalborg University. Since 1996, Andrew Jamison has been a professor of technology and society at Aalborg University, having previously been associate professor and director of studies at the Research Policy Institute, University of Lund. He has a Bachelor's degree from Harvard (history and science, 1970) and a Ph.D. from Gothenburg (theory of science, 1983). His doctoral thesis, National Components of Scientific Knowledge, compared the history of science in Sweden and Denmark. He has conducted research on biotechnology, information technology and environmental politics in both Sweden and Denmark and is currently a member of the board of the Danish Centre for Environmental Social Science. He also served as a member of a committee under the Danish Technology Council to prepare a proposal for a Danish Technology Foresight programme. Recent books include Music and Social Movements, with Ron Eyerman (Cambridge 1998); Technology Policy Meets the Public, editor (Aalborg 1998); The Intellectual Appropriation of Technology, editor, with Mikael Hård (MIT 1998).

Professor Knut Holtan Sørensen, Centre for Technology and Society, Norwegian University of Science and Technology, Trondheim. Dr. Sørensen (b. 1950) received an engineering degree in applied physics in 1976 and took his Ph.D. in the sociology of organization and work at the Norwegian University of Science and Technology (NTNU), Trondheim, in 1982. Dr. Sørensen is co-founder of the Centre for Technology and Society at NTNU, where he has worked since 1988. In 1993, he was
appointed professor of Sociology. Since 1999, Dr. Sørensen has been professor and Head at the Department of Interdisciplinary Studies of Culture. He has been engaged on several committees in the Norwegian research council, a member of the Council of the Society for the Social Study of Science, 1993-1996 and chair of the Management Committee of the European COST project “The social shaping of technology” 1995-1997. He has published on a wide variety of topics in the field of technology studies. Among his recent publications are *The Spectre of Participation. Technology and Work in a Welfare State*, Oslo, 1998 (editor) and *Making technology our own? Domesticating technology into everyday life*, Oslo 1996 (editor, with Merete Lie).

*Dr. Richard Langlais*, at the time of the study employed at the University of Tromsoe, Norway, has been working on the application of network and co-operation theory to a highly information-technology-dependent initiative called the University of the Arctic. That project was connected to his research and consultancy in the field of environmental security, specifically with regard to northern regions and the Barents region in particular, on such questions as how Barents and Nordic co-operation in high-technology infrastructure can have relevance for the higher education needs of dispersed small northern communities. Prior to that (1996-2000), he was Senior Scientist for Interdisciplinary Social Sciences at the Arctic Centre, Rovaniemi, Finland. During 1999, he was also Interim Director of the Arctic Centre, where the role of science and technology in regional development is a primary concern. His Ph.D. (in human ecology, Gothenburg, 1995), entitled *Reformulating Security*, explored the choices society has in confronting its threats and in envisioning its future. His Bachelor’s degree (Honours, East Asian Languages and Literatures, University of Alberta, 1985) and graduate work in China and Taiwan provided a basis for the comparative study of social philosophy and organization. Included among his publications is his co-editorship of *Europe’s Northern Dimension: the BEAR meets the South*, recording the proceedings of the conference where Finland’s Prime Minister Lipponen launched his EU Northern Dimension policy. As this goes to press, Dr. Langlais is employed at the Laboratory of Environmental Protection, Helsinki University of Technology, in a research project entitled, *ManTra: Managing Transepistemic Innovation Processes*, with a focus on knowledge integration in biotechnology organizations.
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Nordic co-operation takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

The Nordic Council is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

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