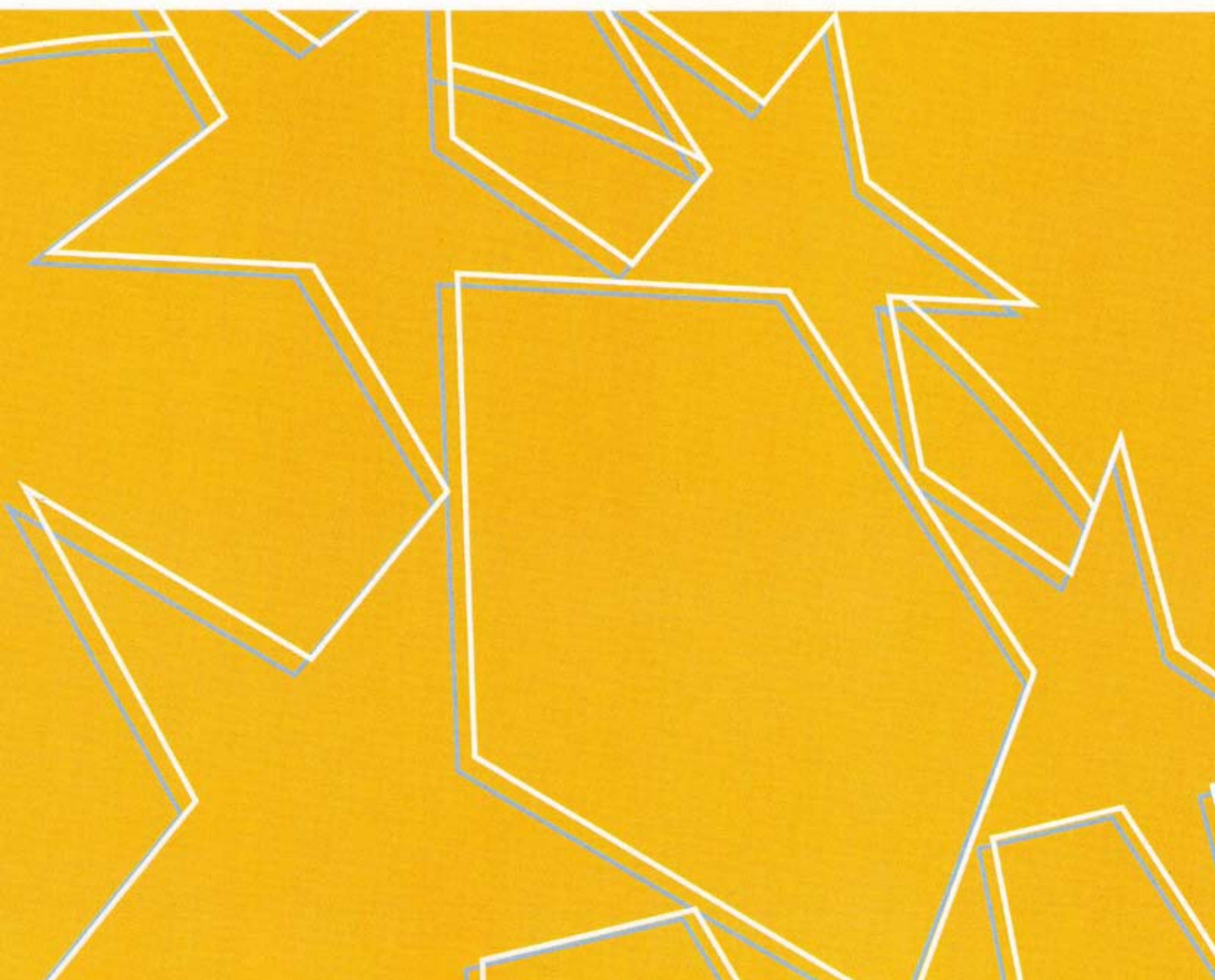


Interaction between higher education institutions and their surrounding business environment - Six Nordic case studies

Sigrid Hedin, Hjalti Jóhannesson, Jon Moxnes Steineke, Eija-Riitta Niinikoski, Lukas Smas and Lise Smed Olsen

NORDREGIO ELECTRONIC WORKING PAPER 2009:5



Interaction between higher education institutions
and their surrounding business environment -
Six Nordic case studies

Sigrid Hedin, Hjalti Jóhannesson, Jon Moxnes Steineke,
Eija-Riitta Niinikoski, Lukas Smas and Lise Smed Olsen

Nordregio 2009

Nordregio
P.O. Box 1658
SE-111 86 Stockholm, Sweden
nordregio@nordregio.se
www.nordregio.se
www.norden.se

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 of 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
2009

Contents

Nordic co-operation	4
The Nordic Council	4
The Nordic Council of Ministers	4
Preface	7
Introduction	9
Denmark: Aalborg University's involvement in ICT collaboration and regional development in North Jutland	11
Introduction	11
The historical development of collaboration initiatives in the ICT sector	11
Aalborg University's involvement in the ICT Sector Initiatives	13
Conclusions	16
Finland: Oulu Southern Institute and the Elme Studio	19
Oulu South – a region of entrepreneurship	19
Oulu Southern Institute – a regional unit of the University of Oulu	20
ELME Studio – an example of the collaboration undertaken by the Oulu Southern Institute	21
Conclusions	28
Iceland: Higher education in the field of renewable energy	31
Akureyri region in North Iceland	31
Res – School for Renewable Energy Science	31
The collaboration process of the RES initiative	33
Conclusions and implications	37
Norway: VRI Agder: Work-based learning with interventions from regional R&D institutions and HEIs	41
Introduction to the Vest-Agder and Aust-Agder Counties	41
The VRI Agder programme	42
The motivation for the VRI Agder Programme	43
The organisation of the VRI Agder programme	44
The funding of the VRI Agder programme	45
Development and outcomes of the VRI Agder Programme	46
Concluding remarks	47
Sweden: Science Park Jönköping - Jönköping University and Regional Development	49
Introduction	49
Jönköping University	50
The Science Park in Jönköping	51
Conclusions	53
Sweden: The role of Dalarna's Högskola in the Vinnväxt project 'Triple Steelix'	55
Introduction	55
Characteristics of the Dalarna region	55
The collaboration initiative Triple Steelix	57
Conclusions	65
References	67

Preface

This electronic working paper is a result of the project “Regional universities and university colleges, their regional impact on innovation, attractiveness and economic performance” commissioned by the Nordic Senior Officials’ Committee for Regional Policy, the Nordic Council of Ministers.

The study was prepared as an input to the conference “Regional universities and university colleges as drivers for local and regional development in the Nordic countries” organised by the Nordic Senior Officials’ Committee for Regional Policy of the Nordic Council of Ministers, the Ministry of Industry, Energy and Tourism and the Regional Institute of Iceland in cooperation with Nordregio in connection with the Icelandic Presidency 2009 for the Nordic Council of Ministers. Key questions for the conference were: If universities and university colleges are to serve as regional drivers, what pre-conditions must be met? What is the future of regional universities and university colleges concerning function and organisation?

The following persons have contributed to the content of this electronic working paper:

- Sigrid Hedin, Nordregio
- Hjalti Jóhannesson, University of Akureyri
- Jon Moxnes Steineke, Nordregio
- Eija-Riitta Niinikoski, Oulu Southern Institute
- Lukas Smas, Stockholm University
- Lise Smed Olsen, Nordregio

In addition to this electronic working paper there is also a printed working paper “Higher education institutions as drivers of regional development in the Nordic countries” including a synthesis of the case studies undertaken in the context of this project. That working paper can be down loaded from www.nordregio.se

Introduction

The last decade we have seen increasing emphasis on the development of a knowledge-based economy in order to boost competitiveness on world markets. Higher education institutions have been acknowledged as major players in this process. The two major tasks of universities are to provide education and research. In addition to these two tasks a third task, which in general terms stipulates cooperation with the surrounding society, has been added in all the Nordic countries. All these tasks are of importance in order to ensure development towards a knowledge-based economy in the regions.

The overarching question for the case studies presented in this electronic working paper was to discuss how universities and university colleges can work as an active instrument in regional development policy in the Nordic countries. This question can be connected with that there is a strong political belief in the notion that higher education institutions have an important role to play in further developing the knowledge-based economy.

The main aim of the six performed case studies was to illustrate how some Nordic higher education institutions collaborate with the surrounding business environments. The case studies cover

- the Aalborg University in Denmark,
- the Oulu Southern Institute, Oulu University, in Finland,
- the School for Renewable Energy Science (RES) in Akureyri, Iceland,
- the University of Agder in Norway
- Jönköping University in Sweden
- Dalarna University in Sweden.

The case studies attempt to illustrate how the universities participate in a specific initiative aiming at the further development of the regional knowledge-based economy in some way or another. The case studies offer examples of three approaches found in the current practice of knowledge sharing between higher education institutions and the business community (Reglab 2006), *education and lifelong learning*, *business formation and entrepreneurial activities*, and *research and development collaboration*. Furthermore, the case studies function as examples of how higher education institutions can be of use in regional development in general and for the local and regional business environment in particular. The case studies are based on interviews with key stakeholder and on document analyses.

An analysis and synthesis of the case studies can be found in Nordregio Working Paper 2009:3 *Higher education institutions as drivers of regional development in the Nordic countries*.

Denmark: Aalborg University's involvement in ICT collaboration and regional development in North Jutland

Lise Smed Olsen

Introduction

This case-study explores the cooperation arrangements in the region of North Jutland between the higher education institution (HEI), public authorities and private sector actors in the ICT knowledge field. The case-study aims to clarify the role of the HEI in these collaboration arrangements and thus also the effectiveness of the HEI's role as a driving force in regional development.

The collaboration arrangements in the region of North Jutland involve the Regional Growth Forum which monitors regional development and elaborates strategies to facilitate growth; the municipality of North Jutland; the HEI, Aalborg University (AAU); and the science park NOVI. Within the field of telecommunications there are two interest groups, NoRCOM and ICT Forum which in January 2009 merged into the new organisation, ictnorcom.

This case-study is based on face-to-face interviews with actors from different parts of the collaboration arrangements: the person responsible for ICT in the region of North Jutland; the Head of the Department of Business Studies at AAU; the Director of NOVI; and a co-founder of a consultancy firm in the ICT sector based at NOVI.

Before beginning the case study however a brief overview of the socio-economic characteristics of the region of North Jutland will be provided in order to introduce the local context in which the ICT sector is operating.

The North Jutland region covers an area of 7,933 km² comprising 11 municipalities and 578,839 inhabitants. Aalborg is the largest municipality in North Jutland with 195,145 inhabitants (Region Nordjylland, 2008). Statistics show that the region of North Jutland has experienced an overall reduction in population over the period 1997-2007, whereas the remaining four Danish regions have experienced population growth. The stagnation of population numbers in North Jutland has mainly occurred in the more remote municipalities, while Aalborg has seen an overall increase in population of 3%. Aalborg has thus experienced an increase similar to the rest of the country in terms of labour force numbers. The rise in employment opportunities has however occurred only within the high knowledge and income groups, as low knowledge-based labour-intensive job functions and thus opportunities have continued to decline (Vækstforum Nordjylland, 2008).

The ICT sector in North Jutland has for several years now been in a healthy position and thus the sector is afforded special priority in the regional business development strategy as developed by North Jutland's Growth Forum. The sector has however undergone significant restructuring since the 1990s when the production of mobile phones dominated. Meanwhile the number of ICT-service companies and consultancy firms has increased (Vækstforum Nordjylland, 2007).

The historical development of collaboration initiatives in the ICT sector

This chapter introduces the ongoing collaboration initiatives in the ICT sector in the North Jutland region. In order to understand the current situation, as of March 2009, where ictnorcom is being established and the partnership initiative BrainsBusiness has been formed as part of the regional Growth Forum strategy, it is necessary to provide an historical overview of the ICT sector in North Jutland and its ties to key actors in the industry, such as the university, AAU and the science park, NOVI. The various institutions and organisations are introduced in the order in which they were established.

Establishing Aalborg University and NOVI

Wireless telecommunication is a key part of the ICT sector for which Aalborg is now both nationally and internationally renowned. The success of the industry can be traced back to 1948 when *S.P. Radio* was established in Aalborg. During the 1960s and 1970s the company became one of the world's leading producers of maritime communications equipment. In 1973 the first spinoff firm, *Dancom* which in 1980 turned into *Dancall*, was founded by three engineers from *S.P. Radio* (Dahl *et al*, 2003). The two companies, *S.P. Radio* and *Dancall*, served as a "breeding ground" for the many spinoffs which have since then contributed significantly to form the wireless telecommunications industry in the region (Dalum, interview).

Aalborg University was established in 1973. According to Bent Dalum,¹ who took part in initiating the university, the political decision to establish AAU was a regional development project. It was considered necessary to build a university to attract and maintain people in the region. The first Masters' of Engineering graduates were

¹ Bent Dalum worked as a student politician representing natural sciences and the engineering programmes 1973-76, he finished his studies at AAU, MSc Economics, in 1979.

produced in 1979. The industry saw significant growth at the beginning of the 1980s, where *Dancall* in particular employed a large number of newly educated engineers. This meant that, generally speaking, the electro-engineers who had studied at AAU remained in the region thereafter (Dalum, interview).

The science park NOVI A/S was established in 1988. The initiative to establish NOVI was taken by Dalum and Knud Rindum,² AAU's Prorector at the time. The idea arose, as Dalum explains: "*We shared an office when I was a student employee. We saw that an industry was emerging*" (Dalum, interview). In the late 1980s North Jutland suffered from industrial decline and high levels of unemployment. The purpose of NOVI was to work in close cooperation with AAU to support a science-based knowledge economy and to promote business development in the region. The science park was based next to the university. Initially NOVI was established as a public limited company with 100 shareholders on the basis of a grant of DKK 35.5 million. In 1995, NOVI's emphasis shifted from physical infrastructure to the commercial and management aspects of the science-industry interface. At this stage a further DKK 24 million was invested as venture capital. In 1998 the venture capital and innovation activities were separated, with the establishment of NOVI Innovation as a separate, legally independent organisation of NOVI A/S. However, NOVI A/S is one of the shareholders of NOVI Innovation A/S. NOVI has been successful in its research park activities, and thus in 2006 the science park had grown from the original 5500 m² to 44000 m² (Rushforth *et al*, 2006).

Establishing NoRCOM

At the end of the 1980s, around the same time that NOVI was set up, the notion of clusters began to be used in Denmark. Dalum and colleagues at AAU participated in Michael Porter's research, "Competitive Advantage of Nations", and Porter spoke at a conference in Aalborg which attracted a large number of actors from the business community, the university and the public authorities. During this period, when Porter's research became widespread, Aalborg's reputation for having a good wireless telecommunications cluster was born. Dalum and colleagues define a cluster as a shared knowledge base and a common labour market. The concentration of wireless telecommunications firms in the region developed into a common labour market for wireless electro-engineers. By the late 1980s, one of the major challenges facing the wireless telecommunications industry was the need to develop GSM technologies. This led to a common development project at NOVI between two competing firms, *Dancall* and *Cetelco*. The alliance subsequently ended with each partner using the technology in different ways. By the beginning of the 1990s a number of international players such as *Ericsson* and *Nokia* had set up divisions

at NOVI. As word spread an international development hub for wireless telecommunications technology began to develop in Aalborg with NOVI at its centre (Dalum; Jespersen, interviews).

Similarly to the establishment of NOVI which occurred on the initiative of Dalum and Rindum, the initiation of NoRCOM included these two actors, the Director and the Chairman of the board of NOVI and the Director of a local bank, *Spar Nord Bank*. "*For a large part, personal relationships and friendships are what started this.*" (Dalum, interview). They decided to formalise the wireless telecommunications cluster and establish an organisation, and thus during the period 1995-97 the concept of NoRCOM was developed. A NoRCOM website was created, and Dalum and colleagues published articles in the Danish journal for the engineering industry "*Ingeniøren*". News of NoRCOM reached the local, national and international media with the cluster gaining significant publicity. This was also connected to the booming market for wireless telecommunications during the 1990s, which according to Dalum made the story "easy to sell". In addition, across the industry, even between the competing firms, support was given to the organisation. The main purpose of establishing NoRCOM was to signal that Aalborg was a development hub for wireless telecommunications companies, and thus to attract international companies as well as employees (Dalum, interview).

NoRCOM was formalised in 2000. Since then it has been run with the help of secretariat support from NOVI, with financing exclusively based on membership fees. Each member company has paid an amount corresponding to the number of employees involved in development activities, and thus the highest fees reached DKK 60,000 per year for some companies (Jespersen, interview).

Establishing ICT Forum

ICT Forum was established in 2005 on the initiative of the county of North Jutland, the municipality of Aalborg, a number of private companies, and AAU. The establishment of ICT Forum occurred in parallel with the creation of similar organisations, termed *IT Fora*, in the other Danish counties. Thus, it was undoubtedly a political decision to set up ICT/IT Fora.

On the ICT Forum's website, the rationale for establishing the organisation is described as follows: "*The purpose of establishing the organisation was to create a forum where all ICT stakeholders could meet in order to strengthen the varied and highly qualified ICT cluster in the area.*" (www.iktforum.dk). The founders of the organisation thereby refer to the wider ICT sector in the region as constituting a cluster.

The secretariat of ICT Forum is managed by AAU Innovation³ and is based at NOVI. The organisation is partly funded by public authorities and partly by

2 Knud Rindum was Associate Professor at the Department of Electronic Systems, and Prorector at AAU 1974-89.

3 AAU Innovation comprises the following units; the Knowledge Exchange Office, the Fundraising and Project Management Office, the Technology Transfer Office, and SEA (Supporting Entrepreneurship at Aalborg University). AAU Innovation was established with the aim of generating synergies between these units.

membership fees. The membership fees are lower than in NoRCOM, ranging from DKK 2000-5000 per year (Jespersen, interview).

Establishing BrainsBusiness – ICT North Denmark

In 2007 Denmark underwent a local government reform which replaced the previously existing counties with five regions while also reducing the number of municipalities. Through the local government reform process and new legislation on Business Support, the scope for business development changed dramatically. Thus a regional Growth Forum was established in the region of North Jutland as well as in the other regions of Denmark. The Growth Forum is a partnership body that brings together actors proposed by the Regional Council, local government, the private sector, the social partners and knowledge institutions within the region. The main role of the forum is to monitor regional development; elaborate strategies to facilitate growth; and recommend projects and activities for funding to the Regional Council. As noted in the introduction, the Growth Forum of the region of North Jutland has “strong clusters” as one of its focus areas in its business development strategy for 2007-10. Of the five such clusters mentioned the ICT sector is one (Region Nordjylland, Vækstforum, 2007).

Since 2007, a project, the ICT Partnership, approved by the Growth Forum has been run as a public-private partnership in North Jutland. The ICT partnership, which in 2009 changed its name to BrainsBusiness, comprises actors from the region, the municipality of Aalborg, AAU, and the organisations NoRCOM and ICT Forum which, as noted previously, and explained in greater detail in section below merged to become *ictnorcom*.

According to Thomas Kampmann, responsible for ICT in the region of North Jutland, one of the main purposes of establishing BrainsBusiness was that it would serve as an umbrella organisation bringing together the main stakeholders and coordinating activities in the ICT sector (Kampmann, interview). The overall goal of BrainsBusiness is to contribute to: “*The acknowledgement of the ICT Cluster in North Jutland as one of the most attractive and competitive ICT clusters in Europe.*” (www.brainsbusiness.dk). BrainsBusiness has six overall areas of activity, each with a sub-goal. The activities are: visibility and branding, innovation projects, innovation networks, knowledge-base and analysis, recruitment and investment, and a shared strategy.

The secretariat director of BrainsBusiness is an employee at the municipality of Aalborg. Each partner has brought the same amount of co-financing to the project. Furthermore, each partner has two representatives in the steering group and one representative in the secretariat. During its first three and a half years the project was co-financed by regional funds. For the period thereafter, the BrainsBusiness partnership applied for EU-funding

through the regional Growth Forum, with the application being approved (Kampmann, interview).

Merging NoRCOM and ICT Forum

The merger of NoRCOM and ICT Forum took place in January 2009. The details of the structure and function of the new organisation *ictnorcom* was set to be decided at the annual general meeting in April 2009.

The merger is taking place during a time of global financial crisis, a crisis which has also affected the wireless telecommunications industry in Aalborg. Some international companies have already closed their divisions in Aalborg down, and thus in January 2009 when Motorola closed its development division in Aalborg, a national magazine for the industry put a death notice on the front page with the headline: “With the Closure of Motorola the adventure of telecommunications in Aalborg has died in its sleep” (Jespersen, interview). The interviewees do not agree that the telecommunications industry has died, but the global financial crisis would seem to have influenced the decision of NoRCOM to merge with ICT Forum. For some international companies, it became a problem to convince their parent company that they should pay the membership fee to NoRCOM, and along with the closure of a number of wireless telecommunications firms in the region, NoRCOM started to lose members. Moreover, some members of NoRCOM believed that it would be beneficial to merge with ICT Forum due to its regional representation and from the municipality enabling them to gain political influence and increase their funding opportunities (Dalum; Pedersen, interviews). Another interviewee suggested that cooperation between NoRCOM and ICT Forum in the context of BrainsBusiness made it possible for the organisations to merge, because they learned that they had things in common and thus they started trusting each other (Kampmann, interview). The merger of the two organisations will be further scrutinized in the following chapter.

Aalborg University’s involvement in the ICT Sector Initiatives

The previous chapter described the history of collaboration initiatives in the ICT sector in the region of North Jutland. In the historical review it was found that Aalborg University has been involved in each of the initiatives. This chapter further explores the activities of the ICT collaboration initiatives in the region. Focus will be placed on the role of AAU in each of the initiatives. In addition, this chapter analyses the effects of AAU and the ICT collaboration initiatives on regional development.

NoRCOM and Aalborg University

The main purpose of establishing NoRCOM was to attract employees to the region and to make the cluster of wireless telecommunications firms visible. Based on the interviews, two main activities took place in NoRCOM: networking and lobbying.

Networking activities involved meetings, where engineers and computer scientists would discuss various issues without revealing their business secrets. Jesper Jespersen, Director of NOVI and member of NoRCOM's board of directors, states that the most successful example of knowledge sharing in the organisation were a series of meetings which took place twice a year, called "Wireless Wednesday". At the meetings each company made a brief presentation on their activities and goals. Subsequently, the presentations led to questions and debates. In some cases the smaller companies discovered that other companies had similar activities, and in this light technological co-operation agreements were forged on the basis of these meetings (Jespersen, interview). Another characteristic of the wireless telecommunications cluster, is that a number of spinoffs have emerged in the industry, and furthermore a majority of employees in the industry have studied at AAU. The fact that there are a number of links between people who have worked together and, in some cases studied together, has entailed that informal contacts are used e.g. when a company needs new knowledge. Research highlights that informal relations support the development of knowledge in companies that share the practice of the wireless telecommunications cluster (Reinau, 2007). The practice of the cluster has also been influenced by the teaching method used at AAU, termed 'problem-based learning', which involves group work often in cooperation with companies. This teaching method means that, generally speaking, newly educated engineers from AAU only need a short introduction period before they understand the specific practice of the firms in the cluster (Jespersen; Lautsten, interviews).

Based on information gained from the interviews, NoRCOM's lobbying activities have mainly been directed at the local authorities and at various other actors within the AAU. Initially the international companies in the NoRCOM cluster influenced the opening of an international school and an international college/high school. The international school soon ran into financial problems with the municipality of Aalborg wanting to shut it down. NoRCOM however intervened and managed to save the school from closure. The international companies in the area argued that closing the school would make it much more difficult for them to attract and retain suitable employees thus ensuring that, eventually, that they would have to close down with Aalborg losing its international appeal (Dalum; Jespersen; Lautsten, interviews).

An ongoing dialogue has subsequently taken place between NoRCOM and the Department of Electronic Systems at AAU on the development of the education programmes. In the main this has occurred between the representatives from AAU in NoRCOM's board of directors, but also with other more informal contacts at the university. In this way, the industry has been able to inform the university about the expected demand levels for engineers over a certain period of time and of possible requests for changes in the qualifications of

these engineers. AAU has then been able to take these recommendations into consideration when planning their education programmes (Jespersen; interview).

NoRCOM has generally supported AAU's research projects, but this cooperation has not been directly integrated into the organisation. Coordinating cooperation on research projects between AAU and the various NoRCOM companies did not take place through a formalised process. Cooperation often occurred through the informal network between the different actors in the cluster. "NoRCOM has never been a big apparatus, it has been a formalisation of the state of affairs. It has markedly been about making the cluster visible and backing up the university's research projects nationally and internationally." (Dalum, interview). An example of a major project at AAU, supported by NoRCOM, is the Centre for Tele Infrastructure (CTIF). CTIF was established in 2004 as a research and education centre concentrating on wireless technologies. Through CTIF a number of international students and employees from the wireless telecommunications industry have come to Aalborg. Lobbying activities to attain EU funding for the project was a task handled mainly by the actors in NoRCOM, among others Dalum. Part of the co-financing of the project was provided by NOVI. CTIF has now set up divisions in a variety of countries such as Greece, the USA, India and Japan. The Director of the centre continues to establish new contacts around the world, and thus the CTIF network is expected to continue to grow (Dalum, interview).

To sum up the findings in this section, the NoRCOM cluster has consisted of a network of electro engineers, who have over time met and exchanged knowledge without revealing their particular proprietary business secrets. Networking has mainly taken place through informal personal contacts, which have primarily been gained through the existing links between AAU and the spinoffs in the cluster. NoRCOM has served as a lobbyist in the local community by maintaining the international school in Aalborg. Other lobbying activities have mainly occurred in relation to AAU. Thus, NoRCOM has had an influence in the planning of engineering education programmes at AAU and in providing international projects for AAU, for example CTIF.

ICT Forum and Aalborg University

ICT Forum was established as a part of a nationwide network of IT *fora*, one difference however was that in North Jutland this body was called ICT Forum, thus including "communications" in the name. Based on the interviews, the main activities of ICT Forum were a variation of networking meetings, study trips, recruitment initiatives, and the compilation of a competence catalogue of ICT companies in the North Jutland region.

EB Denmark, the small consultancy firm of the respondent Jan Lautsten, has been a member of ICT Forum (now ictnorcom) since 2007. When Lautsten and

his business partner set up their business, they considered which of the two organisations they should join. In terms of services NoRCOM was the most appropriate, but they determined that the costs of membership were too high relative to the benefits. As a result they joined ICT Forum instead which was cheaper and had more members. The main advantage of membership for *EB Denmark* is that the company became part of a network through which they established contact with other companies in the region as well as with representatives from AAU.

Lautsten states that he has gained knowledge from the seminars organised in the context of the ICT Forum. These seminars typically involved broad subjects potentially of relevance to each company examples of such topics include marketing and organisational management. *“These are broad topics which you can discuss without getting product specific.”* (Lautsten, interview). Thus, similarly to NoRCOM, the companies in ICT Forum have attempted to protect their business secrets while engaging in network discussions. ICT Forum also organised study trips. *EB Denmark* joined a trip to Munich where there is an ICT cluster. This trip provided an opportunity to network with other firms and with representatives from AAU. At the beginning of 2008, the ICT sector in the region was suffering from a labour shortage, and therefore ICT Forum had a recruitment campaign in Zealand. In connection with this Lautsten believes it was an advantage that representatives from the municipality were present to inform potential employees to the sector that other job opportunities existed in Aalborg for their spouses. As such this is a good example of the role which was taken by the local authorities in the ICT Forum.

From the interviews, one can derive that the activities in ICT Forum and NoRCOM differed in the sense that NoRCOM focused on its members' shared specialisation in wireless telecommunications, whereas ICT Forum was a broader network comprising different professions, and thus overall the topics which were raised here were broader. Similarly to NoRCOM however, it seems that informal personal relations are also the most important in the day-to-day practice of *EB Denmark* which is a member of ICT Forum. New relations have been established through the forum, and Lautsten and his business partner have both studied at AAU and previously worked in a number of both large and small international companies in the region. The companies where they were previously employed were all members of NoRCOM, and thus they have links to this organisation as well. In addition, *EB Denmark's* location at NOVI means that they are based close to the university: *“(...) you meet people from the university in the canteen, where you can have a chat. This thing about seeing and being seen, it is also a reminder, like “that's right he still works at the university” (...).”* (Lautsten, interview). Thus, he states that when they need new knowledge, they go to people in their personal network either at AAU or to people they have met during their working life in the region. In connection with this, it is not surprising that Lautsten is positive towards the merger

of ICT Forum and NoRCOM. However, as it can be seen from the evidence provided in the following section, the four case-study interviewees have varying opinions on the merger.

ictnorcom and Aalborg University

At the time of writing the final decisions on the structure and function of the new organisation had yet to be established. As such, the future role of ictnorcom in connection with AAU had also not yet been finalised. Two elements have however been initiated: the previous ICT Forum website helped launch ictnorcom, and this is now the website of the new organisation; while in addition ictnorcom plans to establish professional networks within the organisation.

NoRCOM's website, which is still active, has been characterised as an “activist” website maintaining an ongoing debate on developments in the wireless telecommunications industry. The website has had a high number of international hits, indicating that people around the world have been aware of the cluster (Jespersen, interview). Dalum emphasises the difference between the website of NoRCOM and ictnorcom: *“NoRCOM's website is sort of an activist one (...) if there is no one, such as myself, who will keep it up and remain an activist then it will die out. Then it will become neat and tidy.”* (Dalum, interview). According to Dalum and Jespersen, the uniqueness of the cluster in North Jutland disappears with the merging of the two organisations. This is also connected to their definition of the cluster as a shared labour market for electro engineers. *“The international companies that have come to Aalborg have not come because of ICT Forum; they have come here because of NoRCOM and the development that was going on in the wireless industry.”* (Jespersen, interview). Thus the two interviewees disagree over the question of whether the international appeal of the wireless cluster is weakened by the merger. Dalum maintains that the C in ictnorcom is the organisation NoRCOM. This statement is partly confirmed by the respondent from the Region of North Jutland, who states that the C in the ICT sector has become smaller due to the recent spate of company closures. In addition, he argues that this is a natural consequence of a general trend that increasingly sees sectors merging as the boundaries between them disappear (Kampmann, interview). Dalum and Jespersen on the other hand argue that the merger is not an expression of merging sectors. They maintain that it has primarily been an organisational necessity due to NoRCOM's financial difficulties. They emphasise the differences between, on the one hand, a small firm in the IT sector which designs websites and a large international company specialised in telecommunications. As such he suggests that there is no purpose in bringing together such different companies for the purposes of networking or in order to exchange knowledge (Dalum; Jespersen, interviews).

Based on the interviews, ictnorcom plans to set up professional networks within the organisation. Consequently, it is expected that NoRCOM will have

its own network within the organisation, which is also connected to the fact that the former organisation brings with it capital to ictnorcom, capital which is locked solely for the group of former NoRCOM members (Lautsten; Jespersen; Dalum, interviews). The fact that the NoRCOM members will continue as a professional network within ictnorcom may indicate that in practice there will not be significant changes for the former NoRCOM companies after the merger. However, Jespersen contradicts this assumption. He emphasises that a major difference remains the political dominance of ictnorcom, and as he sees it, a lack of “fireballs” in the new organisation. With reference to political influence, Jespersen refers to the actors from AAU involved with ICT Forum. He argues that these actors who were politically focused were deliberately kept out of NoRCOM, whereas the actors involved were more focused on technological development. He maintains that the actors from AAU previously engaged in NoRCOM will not wish to participate in ictnorcom. As such, the cooperation between NoRCOM and the Department of Electronic Systems at AAU on the development of the education programmes will also become increasingly difficult to sustain (Jespersen, interview). Meanwhile one should note that these statements are not confirmed, as the actual organisation and outcome of the merger of the two organisations is yet to be realised. In reference to the importance of “fireballs”, Dalum refers to the director of the board of ICT Forum as a “fireball”, a major actor in the merger of the two organisations and someone who is also involved in the BrainsBusiness partnership (Dalum, interview).

BrainsBusiness and Aalborg University

BrainsBusiness has been established as a public-private partnership to serve as an umbrella organisation bringing together the main stakeholders and coordinating activities in the ICT sector. The BrainsBusiness partnership was initiated by North Jutland’s Growth Forum as part of its regional business development strategy, and thus a main purpose of the partnership is to strengthen regional development. BrainsBusiness manages funds from the regional Growth Forum which they distribute to project applicants in the ICT sector. AAU is a major actor both in terms of the allocation of funds to projects and as a partner in project applications.

The role of BrainsBusiness as an umbrella organisation is depicted in its measures to coordinate projects according to the focus areas of the ICT sector, and thereby also to work to coordinate the future development of the ICT sector in the region, and to find dedicated people to carry out these projects. The initiation of BrainsBusiness has entailed that the finances available to companies in the ICT sector has increased significantly. Kampmann refers to AAU as being a highly proactive actor in relation to EU, national and regional projects, often taking the role as leader. Thus, AAU is an important player in connection to technological development projects with ICT companies in the region. One reason for the frequent involvement of

AAU is that in applications to receive EU funds it is now a condition that either a minimum of five companies or a public organisation is involved in projects (Kampmann, interview).

The current global financial crisis which, as has already been noted has particularly affected telecommunications companies in North Jutland, has encouraged the BrainsBusiness partnership to establish a task force. The purpose of the task force is mainly to support the large number of unemployed persons in the sector. Thus, the partnership discussed possible solutions and generated documents and activities, which may subsequently be used in similar situations in other industries. As a result of the task force’s efforts, a network has been established for potential entrepreneurs, where they engage in mentoring activities. In addition, a number of initiatives in respect of the provision of further education for unemployed engineers in the region have been developed by AAU (Kampmann, interview). A similar operation was initiated in 1998-99, when there was a lack of software engineers in the region and at the same time high unemployment among building engineers. AAU in cooperation with a local software company initiated an education programme for building engineers to upgrade their skills and become better able to work as software engineers (Lautsten, interview). Thus, in times of difficulty in the ICT sector, AAU plays an important role, now in the context of the BrainsBusiness partnership and also previously in its contacts with local ICT companies, particularly in respect of upgrading their skills enabling them to better adapt to changing market conditions.

Conclusions

This section sets out a number of conclusions from the case study analysis with the aim of identifying the role of Aalborg University in the ICT collaboration arrangements and thus the role of AAU as a driving force in regional development

The case study analysis indicates that so called “fireballs” have been significant as a driving force in the initial collaboration initiatives between the wireless telecommunications companies and AAU. Thus, actors from AAU, Dalum from the Department of Business Studies and Rindum from the Department of Electronic Systems and the Prorector, played key roles both in establishing the science park NOVI and the cluster organisation NoRCOM. Based on the analysis, their personal relationship, also with actors in the private sector, and their professional commitment to strengthening the profile of the emerging wireless telecommunications cluster would seem to have influenced regional development. During the 1990s a development hub for international companies in the field of wireless telecommunications emerged in Aalborg with NOVI at its centre. The establishment of NoRCOM further strengthened the international profile of an emerging cluster in Aalborg.

International telecommunications companies increasingly set up divisions in Aalborg thus generating employment in the region. The interest organisation NoRCOM, representing the interests of the companies, demonstrated its local position of power when it managed to prevent the municipality from closing the international school in Aalborg. This was deemed important as closing the school would have meant that Aalborg would have become less attractive to international companies and their current and prospective employees. Based on the analysis, the international reputation of NoRCOM as a unique cluster of wireless telecommunications companies has undoubtedly strengthened regional development in North Jutland. NoRCOM was also a key actor in the award of a major project to AAU, Centre for Tele Infrastructure (CTIF), a research and education centre concentrating on wireless technologies. CTIF has set up divisions around the world and also attracted international students and researchers to AAU. CTIF is expected to continue to grow, and one can thus surmise that the process of strengthening the international profile of the wireless industry in Aalborg is also expected to continue.

With the establishment of ICT Forum which was set up in North Jutland as part of a nationwide network of IT fora, a more politically-oriented organisation was established. Thus the municipality of Aalborg was involved and provided co-funding for the organisation. ICT Forum was a broader network than NoRCOM including a wider range of IT companies in the region. Thus, ICT Forum did not have a close cooperation with one particular education department at AAU, where NoRCOM, for instance, had historically cooperated closely with the Department of Electronic Systems; instead ICT Forum was connected with AAU Innovation which provided secretariat support to the organisation. AAU Innovation comprises a knowledge exchange office, a fundraising and project management office, a technology transfer office and an office supporting entrepreneurship. These activities are directed at a wider range of industries. Before the advent of the global financial crisis, ICT Forum had a recruitment campaign in Zealand, where representatives from the municipality also participated. The interview with one of the organisation's member companies indicates that this initiative helped generate increased employment in the region. Further direct effects on regional development have not however emerged within the context of the interviews, though it should be borne in mind that ICT Forum was established only in 2005, and thus was still relatively new in 2009 when it merged with NoRCOM.

The current situation, as of March 2009, exhibits an increasing political strategic focus on the ICT sector. Ictnorcom and BrainsBusiness have both been established involving public authorities, and the BrainsBusiness partnership has been set up as a part of the regional Growth Forum's business development strategy. North Jutland's Growth Forum has allocated a significant amount of funding to CTIF, thereby demonstrating the region's support for the international project strengthening research and education in the field of wireless telecommunications. The role of AAU in the organisation ictforum is still unclear, however according to the respondent from the Region, in the BrainsBusiness partnership AAU has already been shown to be an active player in terms of engaging in and in many cases taking the lead in technological development projects in cooperation with the regional ICT companies. In connection with the current financial crisis, initiatives have been taken in the context of the partnership to offer further education to unemployed engineers in the region. Previously in times of crisis or changing market conditions, AAU has been engaged in similar competence upgrading initiatives with local companies in order to maintain employment in the region and adapt the workforce to changing market conditions. Based on the analysis undertaken here, the difference between AAU's previous engagement in regional development and its current involvement is that in the context of the BrainsBusiness partnership AAU's role in regional development has become more formalised, and thus AAU also now has an influence on the development of regional policies. BrainsBusiness manages funds from the regional Growth Forum which they distribute to project applicants in the ICT sector. In connection with this, all parties to the partnership: AAU, the region, the municipality and ictnorcom select which projects will receive funding, thereby influencing the development of the ICT sector in the region. Based on the analysis, R&D and education policies at AAU have previously been influenced by NoRCOM. It is, however, yet to be established whether ictnorcom will enjoy a similar level of cooperation with the university or the extent to which R&D and education policies will be influenced through the BrainsBusiness partnership.

Overall, AAU has been and remains an active player in regional development varying between different actors and fora as well as changing structural circumstances in the region.

Finland: Oulu Southern Institute and the Elme Studio

Eija-Riitta Niinikoski

Oulu South – a region of entrepreneurship

The Oulu South region is characterised by an industrialised countryside, an active international business community and the use of high technology in all branches of industry and agriculture. Numerous municipalities and small cities stretch across the three river valleys (Kalajoki, Pyhäjoki and Siikajoki rivers) of Northern Finland. The population of the area, located in the southern part of the Oulu province, the county of Northern Ostrobothnia, is about 87 000 inhabitants, which is about 25% of the county's population. In the main cities of the region the population is growing due to the high birth rate. The relatively large percentage of young people in the region is the highest in Finland, with 35% of inhabitants being under 25 years of age. According to the available statistics, the number of children and young people will remain relatively high into the foreseeable future. Regional challenges however include the increasing number of elderly people and the low number of people of working age.

There are about 4 400 companies in the area (25% of the total number of companies in the county of Northern Ostrobothnia) and about 32 500 workplaces in Oulu South region. The main employment sectors are welfare (5 500 workplaces), agriculture (5 000), metal and machinery industry (2 700), retail (2 500), wood processing industry (2 000), ICT (900), tourism (500). These sectors alone provide almost 60% of the jobs available in the region. In the profile of the Oulu South region the place given to entrepreneurship is notable. Young people are, according to a report from 2006, relatively entrepreneurial and oriented towards careers in business.



Figure 1: Oulu South region is an area of cooperation between three sub-regions, Nivala-Haapajärvi, Ylivieska and Haapavesi-Siikalatva

Over the last decade a number of important business sector indicators have seen both a steady and a positive development. The unemployment rate has over the period remained the lowest in Northern Finland. Growth in the metal and wood processing industries has been particularly good while growth in the welfare sector has remained steady. Although the effects of globalization especially on the ICT sector have been rather negative, the ongoing development of the area as a whole was undoubtedly successful up to the end of 2008. Indeed in the 2007 survey of the business sector expectations remained high, the highest in Northern Finland and high also when compared to Finland as a whole.

Oulu South offers a wide range of educational opportunities and has a proud record of promoting research and development undertaken in the area. The Central Ostrobothnia University of Applied Sciences has more than 1,000 students and a specific R&D unit called CENTRIA. The School of Health and Social Care of Oulu University of Applied Sciences has a unit of 200 students in Oulu South.

Oulu Southern Institute, as a regional unit of the University of Oulu, organizes academic study courses and carries out notable research to the benefit of the region as a whole. In addition to the higher education institutes a significant vocational education and training package is managed by the Educational Municipal Federation of the Kalajokilaakso Region and another federation of Siika-Pyhäjoki region. The educational organisations of third level (higher education) and second level (vocational education) signed a collaboration agreement on education, research and development in Oulu South already in June 2005. Based on the agreement a virtual organisation, Oulu South Educational Network (OEK - *Oulun Eteläisen korkeakoulukeskus*) was formed. It boasts joint development environments that are seen as generative knowledge hubs connecting multilevel streams of people, ideas, knowledge etc., RFMedia laboratory and ELME Studio are examples of this type of approach.

The educational level in Oulu South is relatively low. Secondary education is the educational level attained by 42% of the population over 15 years while just under 1% have acquired a doctoral degree. Eagerness to continue in education is quite high according to a number of surveys undertaken in recent years.

Oulu South region consists of 14 small municipalities and cities which form the three sub-regions (Nivala-Haapajärvi, Ylivieska and Haapavesi-Siikalatva). The name

Oulu South is a practical tool for regional development used by the three sub-regions. The name 'Oulu South region' has been used since 1995. The region has no single working centre, but several nodes, which means quite a lot of commuting in the area. To face the challenges of the future the municipalities and cities drew up a joint regional development plan in 2006, which became known as the Oulu South 2015 agreement. The strategic goals are as follows:

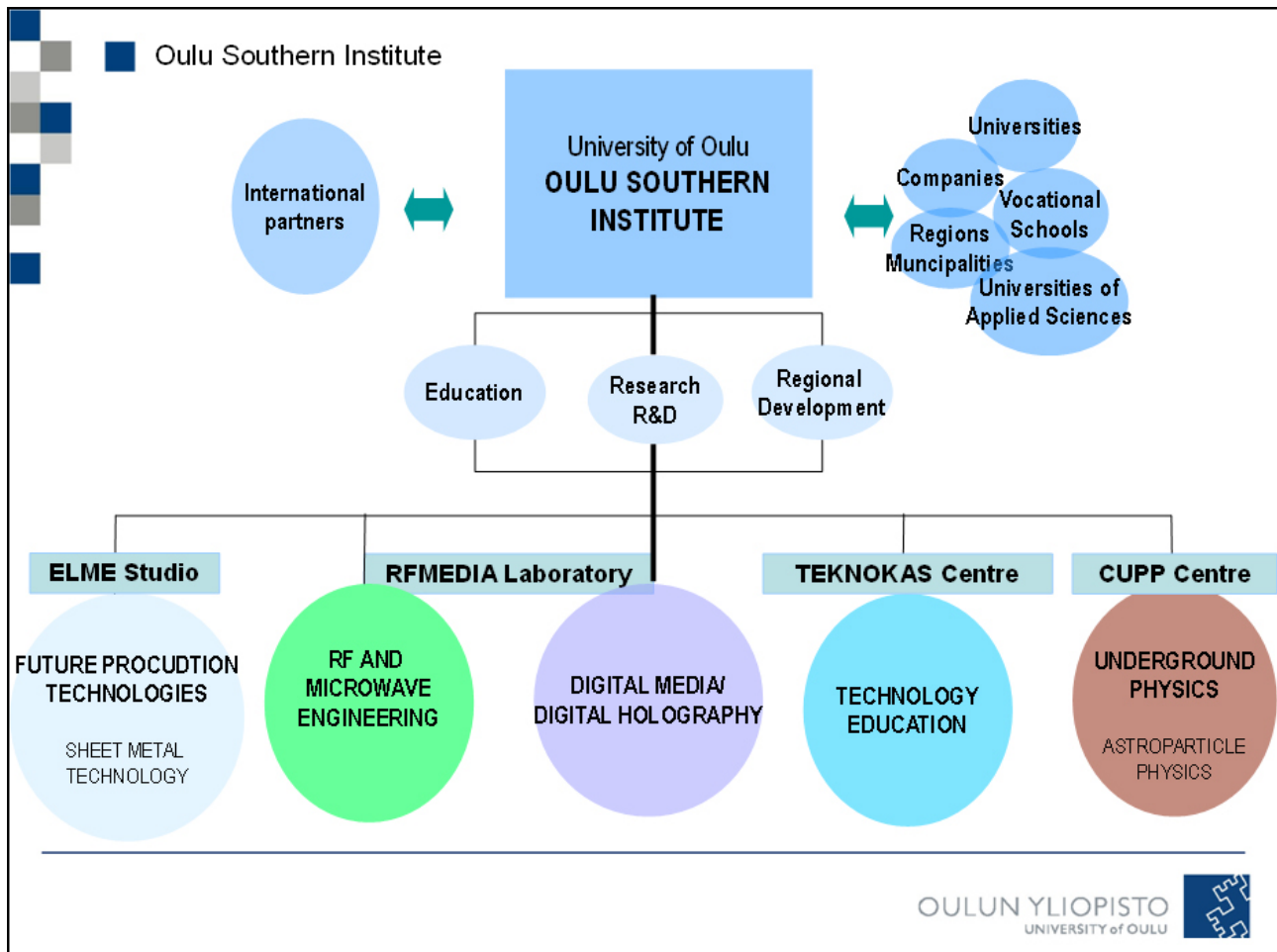
1. Dynamic business and industry region
2. Internationalization in education and R&D
3. Region of successful agriculture, and
4. Region of welfare and life quality.

The strategic approach employed by the region is that of 'networking'. Due to ongoing changes in the Finnish regional development programmes, the regional centre programme, which has united the three sub-regions, is being wound down and will come to an end at the close of 2009. The new programme, Cohesion and Competitiveness Programme (KOKO), will begin in 2010. The sub-regions

Oulu Southern Institute – a regional unit of the University of Oulu

Oulu Southern Institute is a regional unit of the University of Oulu. Its purpose is to promote and organize academic research, education and regional development in the southern part of Oulu province, in order to foster the growth and development of the region's industry and commerce.

The Oulu South region is well-known for its active business community. Even though most of the enterprises located in the region are either small or medium-sized, their production level is notable, and internationally oriented. Oulu Southern Institute operates in close collaboration with the vocational education organizations and units of the universities of applied sciences located in the region as well as other regional development organizations. This concept has proven to be beneficial for the region.



of Oulu South will have two KOKO programmes which are united by the common section of education, research and innovation themes. The higher education strategy of Oulu South agreed by the members of the Oulu South Education Network is the basis for the above-mentioned common section of two KOKO programmes.

Figure 2: Oulu Southern Institute and its main research fields

The main research fields of Oulu Southern Institute are technology education, underground physics/ astroparticle physics, RF & microwave/ wireless communication research, digital media/ digital holography and future

production technologies/ sheet metal technology. Research is undertaken in cooperation with the various faculties of the University of Oulu and with other universities and other national and international partners. The research group is led by a doctoral level research manager. Oulu Southern Institute plans and manages Master's and Undergraduate programmes for adults in the region in cooperation with various departments and faculties of the universities, provides student counselling and organizes examinations for distance-learning students. In terms of regional development their major input consists of taking part in the strategic planning of various organisations in the region and doing reports and surveys on topics concerning the development of the area or new initiatives.

Oulu Southern Institute is the youngest (and is soon to become the only remaining) regional unit of the University of Oulu. Established in 2000 it became a permanent unit of the University in 2004. The annual budget is about 2-3 M€; about 5% of which comes from the University of Oulu as basic financing, 95% of the annual budget is financed by various sources of project funding e.g. EU: Commission's 7th Framework Programme (FP7) and the Structural Funds (ESF, ERDF, Interreg), the Finnish Academy of Science, the Finnish Funding Agency for Technology and Innovations (TEKES), various foundations, municipalities, regional public organisations and private companies. There are currently about 40 full-time employees in the institute (incl. 7 persons with doctoral degrees and 25 with Master's level (MSc or MA) qualifications).

Oulu Southern Institute has access to an outstanding national and international partner network. Their international cooperation profile includes joint projects, visiting researchers and teachers and scientific publishing. Active cooperation is undertaken in various European countries (Great Britain, Germany, Poland, Sweden, Ireland, Italy, Switzerland and France), and beyond in Russia, Turkey, Australia, South Korea and the United States of America.

The administrative home of Oulu Southern Institute, the University of Oulu, provides access to an international scientific community performing high-quality research and education. The University promotes well-being and education in Northern Finland and is a significant player in the Finnish and European research based system of innovation and education. It was founded in 1958. With its 17 000 students and 3 000 employees it is among the largest universities in Finland with a wide scientific base. The university has 46 degree programmes in six faculties: Humanities, Education, Science, Medicine (incl. Dentistry & Health Sciences), Economics & Business Administration and Technology. Research is undertaken in 70 fields of science. Three research focus areas of note are Information Technology and Wireless Communications, Biotechnology and Molecular Medicine, Northern and Environmental Issues. The new initiatives of the university are advanced steel research, international business and

geo- and mining engineering. A significant part of the advanced steel research is done by the research group of Oulu Southern Institute.

ELME Studio – an example of the collaboration undertaken by the Oulu Southern Institute

ELME Studio, expertise network of electronics' mechanics and metal

ELME Studio (www.elmestudio.fi) located in Nivala is a production laboratory for electronics, mechanics and metals. The operational environment is administrated by Nivala Technology and Industrial Park Ltd. The core of the ELME Studio is the collaboration undertaken in the knowledge hub. The main actors besides the technology village are the Educational Municipal Federation of the Kalajokilaakso region KAM and its vocational college in Nivala, *Nivala Ltd*, which is a sub-regional development company, the University of Oulu and its regional unit Oulu Southern Institute. The R&D unit of the Central Ostrobothnian University of Applied Sciences, CENTRIA, also has some cooperative links with the ELME Studio.

ELME Studio is comprised of experts from various organisations helping enterprises in the metals and electrical mechanics sectors in the Oulu South area in order to promote their competitiveness by the means of business knowledge, research and product development.

ELME Studio is located in the Technology Centre of Nivala called Nitek with the Nivala Vocational College located nearby in addition to many companies specialising in the sector. Many other universities in Finland, Sweden and Germany, as well as other development organisations relating to the metals and electrical mechanics etc., sector are involved in ELME Studio's broad cooperation network.

The ELME Studio laboratory has access to a good variety of high technology equipment for sheet metal industry and tool manufacturing. Examples include a Zeiss Carmet 3D-coordinate measuring device used for quality assurance of the mechanical dimensions, a Trumpf Laser HLD 4002 with Motoman 3D robot used for developing laser machining processes such as 3D-laser cutting, laser welding, laser cladding and laser assisted heat treatment, a 5-axis high speed machining centre TajMac ZPS MCFV 1060 Contour with separate electric Jäger high speed spindle used in developing the process of high speed machining. Other bits of machinery used in welding, laser welding, bending machining etc., is located on the premises of the vocational college nearby.

The expertise level in respect of sheet metal displayed here is world class. It covers the whole product life cycle and chain from order through delivery and maintenance. It also includes planning and design, proto and pilot testing

and production-technical knowledge for manufacturing. This creates an extensive reservoir of 'know-how' in the research and development of sheet metal materials and production technologies.

The collaboration initiative

In the 1990s discussions took place about the need to further develop the business community and create new employment possibilities in the region. As Finland became a member of European Union in 1995 new approaches to and methods of regional development became possible. Many quarters shared the same interest and a few organisations began action to get the university committed in the region and to establish a regional unit. On the other hand, the need remained to utilize the regional development funds of the EU to better benefit the business life of the region by developing the existing industrial endowment while fostering joint development projects with entrepreneurs.

The regional strategic work began in 1995 both in the Nivala-Haapajärvi sub-region and in the neighbouring sub-region Ylivieska. The sub-regions created a common strategy as a part of the Northern Ostrobothnia strategy based on the needs of the region. The main questions here were how to get the university to do research in the region and how to help develop the most important business sectors, electrical mechanics and metal being one such area. When the European Union regional funding programmes were initially applied to Finland the borders for the various financial support levels divided the Oulu South area into three sub-regions.

In 1997-1998 a project entitled *The Top Projects of Oulu South 2000* was carried out. A component part of this project was conducted in the field of electrical mechanics and metal. Some outlines were drawn up with a view to further developing the sector. As a result of the regional strategic work and the ongoing discussion entered into on the issue projects entitled TUTKO I (in 1999-2001) and TUTKO II (in 2001-2003) were carried out. The idea behind these projects was to create a sheet metal branch educational unit in Nivala and to get the university interested in and committed to this goal. The area donated a professorship in sheet metal to the University of Oulu, located in Nivala for a fixed period (1999-2003) and invested in the laboratory and the required equipment. The professorship became permanent in 2004 in the Department of Mechanical Engineering. Since then a research manager from Oulu Southern Institute has been responsible for the research team.

At the end of the 1990s the municipalities and educational organisations of the region took further steps to foster the university's commitment. A *University research correspondent* project was carried out in order to find a way to establish an organisation to be responsible for the university connections and research projects. In May 2000 the *Kerttu Saalasti Foundation* was established by the

municipalities and educational organisations of Oulu South together with the University of Oulu. After a month, in June 2000, the University of Oulu established the regional unit, Oulu Southern Institute. The unit began as a three year project. By the end of 2003 the results of this project were deemed to be so good that the governing body of the university decided to give Oulu Southern Institute the status of a permanent regional unit.

In the late 1990s strategic work was also undertaken in the context of the *Nivala Technology and Industrial Park Ltd.* In the *Pohjoinen tuotantopiiri (Nordic Production Circle)* project the idea of and the model for a studio were created. Its focus was on support for the development of the production business field and on the development of the required expertise. The studio concept was piloted in Nivala in 2001-2002. The ProMetal network was founded in 2003 to connect the corresponding studios in Nivala, Raahe and Tornio. In 2003 the network became a member of the Finnish Centre of Expertise Programme. The roots of this collaborative venture can however be seen to date back to the 1970s when the Nivala Technology Village was founded to respond to the issue of structural change in the countryside. The development of the technology village undoubtedly enabled the sheet metal cluster to later be formed.

In addition to the work done in the context of the TUTKO projects, the foundations for the creation of the research expertise cluster were helped into place by two research and development projects, namely, *New Production Methods in Sheet Metal and Expertise in Laser Welding and High Speed Technology*. In 2008, the research activities were further elaborated in two research projects, *Usability of Ultra-High-Strength Steels and Roll Forming of Tailored Heat Treated Ultra High-Strength Steel Strips*. The research activities here focus on the properties of the new materials and on developing new applications for them. In the development project *Innovative Production Technologies* future production methods and processes are screened and assessed.

By 2008, the ELME research group had grown from its humble beginnings to now encompass a group of seven people, five of who work in Nivala, and with a further two in Oulu. The group has published and presented its research results in a number of international conference proceedings. The first invention was reported in 2009. The research manager of ELME worked as an exchange expert for six months in 2008 at the University of Erlangen-Nuremberg in Germany. ELME group is also an active partner in cooperation with Luleå University of Technology in Sweden. As of spring 2009 there were about 12 full-time employees working with the ELME Studio collaboration.

The purpose of the collaboration is to improve the opportunities open to industry in the Oulu South region, in Northern Finland and in Europe more generally. This is done through research, business development, R&D

activities and education. The mission is to seek solutions to the questions and issues arising from continuing to undertake industrial production in high cost regions (countries). To become as effective as possible in the electrical mechanics and metal sector in the Oulu South region, nationwide and internationally remains a shared goal.

The key research areas include laser technology applications and the creation of ultra-strong steel materials. Research on laser technology focuses on using this technology in the manufacturing of products from metal material in sheet form. Research activities focus on the properties of the new materials and on developing new applications for them.

The collaboration undertaken in the context of ELME Studio can be described as a consortium of independent organisations that have shared interests based on their own intentions and that see deeper collaboration as a beneficial way of reaching their goals. Each organisation has its own role in the collaboration. There is no leading partner. The common issues are discussed in ELME Studio meetings and in the steering group meetings of ongoing projects. ELME Studio is a regional network with national and international connections. The main participants of ELME Studio collaboration and their main roles are shown in table 1.

These actors or their units are located in the region. Each participant brings its own network to benefit the collaboration which means nationwide and international cooperation and collaboration. The ProMetal network

has its hubs in Nivala, Raahe and Tornio. The network is part of the Finnish Centre of Expertise programme/ Maritime Cluster. Other Finnish universities, particularly in Tampere, Lappeenranta and Helsinki, are also active partners outside the region. The research team's most active international connections are with the University of Erlangen-Nuremberg in Germany and Luleå University of Technology in Sweden. The actual level of collaboration with others depends on the individuals concerned and on their cooperation skills and enthusiasm.

About an hour away from the Oulu South region, in Kokkola, there is a research and development unit that works with the companies in the metal sector in the Kokkola region. These knowledge hubs do not seem to have very active communication. It was mentioned in one of the interviews that the activities undertaken in each do not really overlap and that both of the laboratories serve, in the main, companies in their own region. In the research and development projects run within the ELME Studio context, companies are also involved that are not located in the region but which value the work done in the context of collaboration and see it as being so beneficial that they fund some activities. These companies are particularly important in respect of the future potential to expand ELME Studio's activities.

In some of the interviews undertaken it was noted that the research and development unit CENTRIA of the Central Ostrobothnian University of Applied Science hopes to find both the means and the resources to enable it to take a more active part in the ELME Studio collaboration venture. One of the main partners noted however that the

Education, the second level (vocational)	Educational Municipal Federation of the Kalajokilaakso region (KAM) and its Vocational College in Nivala (NAO)
Education, the third level	Central Ostrobothnian University of Applied Sciences
Research	University of Oulu (Oulu Southern Institute and Department of Mechanical Engineering) Central Ostrobothnian University of Applied Sciences (CENTRIA research and development unit)
Production development and technology transfer	ELME Studio projects undertaken by different organisations University of Oulu/ Oulu Southern Institute Central Ostrobothnian University of Applied Science/ CENTRIA Educational Municipal Federation of the Kalajokilaakso region/ Vocational College in Nivala <i>Nivala Technology and Industrial Park Ltd.</i>
Pre-Incubation	<i>Nihak Ltd.</i> (regional business development agency) Educational Municipal Federation of the Kalajokilaakso region and its Vocational College in Nivala
Business Incubation	<i>Nihak Ltd.</i> (regional business development agency)
Business Services/ Business Development Services	<i>Nihak Ltd.</i> (regional business development agency) <i>Nivala Technology and Industrial Park Ltd.</i>
Infrastructure	<i>Nivala Technology and Industrial Park Ltd.</i> Educational Municipal Federation of the Kalajokilaakso region and its Vocational College in Nivala

Table 1 : Oulu South region's participants in ELME Studio collaboration and their main roles

challenge remained to create an operational model that would help even the micro-sized companies to take part in the development process. Nivala-Haapajärvi Sub-region is a very important funding partner and a regional development body which acts in the region's interest within the county of Northern Ostrobothnia and the province of Oulu.

The main partners in the collaboration view their own participation as an important part of their role in regional development. Participation is also linked to their general strategy and documented in various records (strategies, plans of action, annual reports etc.).

The motivation for collaboration

Shared interest is the main reason for main participants desire to take part in ELME Studio collaboration. Financial incentives provide another important motive. ELME Studio as a knowledge hub or a network of expertise has become a recognised 'brand' used both in and beyond the region.

The value attached to the work done in ELME Studio context by different organisations is reflected in the project funding awarded to the various project initiatives. Some interviewees noted that it is often easier to get funding for projects carried out in relations to ELME Studio collaboration than for other projects. The infrastructure and the equipment that have already been financed moreover generate a further important motive for collaboration. The investment endowment should thus, it is argued, be used as effectively as possible.

The commitment of the university to the region here plays a crucial role. The regional unit of the university was mentioned in most of the interviews as an important part of the shared interest behind the motives for collaboration. The collaboration of the main participants also had an effect on the planning and construction of the Nitek technology centre in Nivala in 2004.

The motivation for collaboration is based, primarily, on a realistic understanding of the limited resources available. A larger entity is useful here because it increases the possibility of creating something new; encourages new approaches to business and/or regional development, while often, in addition, generating new research resources etc. The value of funding such organisations, thus enabling them to take part in this kind of collaboration, is often simply highlighted with reference to the results generated.

Collaboration is seen as being beneficial for each organisation which receives its own strategic goals. Collaboration brings synergy to the actions undertaken while the facilities created and the collaboration entered into form favourable conditions that are effectively utilised.

The expected outcomes from the outset correspond to the motives for collaboration. The expertise in the network is expected to benefit the organisations themselves and the surrounding society, especially the business community in

the metal sector, while in addition improving the image of the region thus enabling it to more easily attract companies and experts as well as funding for the activities envisaged. An additional important outcome here was the creation of the research team here which was expected to have a long and productive 'lifetime', counted, potentially, in the tens of years.

The expected and experienced outcomes were also described as follows: the success of metal sector in the region, new business possibilities, new companies and workplaces, technology transfer, research results, new production technologies, new services and products for companies. In recessionary periods such collaboration is expected to slow the downturn while introducing novel ways in which to attempt to cope with it.

To review the effectiveness of the collaboration is said to be difficult. Each organisation revises the expected outcomes regularly as an administrative task of the project and as a part of their strategic follow-up procedure. Different methods are used and different factors are followed up. The need for better procedures in respect of the systematic sharing of information about the results and follow-ups was however raised in some of the interviews.

Organising the collaboration

All the main organisations taking part in ELME Studio collaboration see participation as being in their strategic interest. This point is also often mentioned in their strategic documents. For the University of Oulu participation brings greater research possibilities and the development of the Production Technology Laboratory in the Department of Mechanical Engineering as well as an ability to focus on the so-called university's 'third task'. For the Educational Municipal Federation of the Kalajokilaakso region it is a way to boost business life in the region through the encouragement of research and to get the newest knowledge into the use of vocational education. In its strategy, the *Nivala Technology and Industrial Park Ltd.* aims to develop the companies in the technology village and in the surrounding area. ELME Studio is also seen as an attraction to other companies. Some of the companies are involved in the projects out of tactical interest, but for most of them it is a strategic interest. For the Nivala-Haapajärvi sub region it is also an organisational interest in order to foster the growth of the region.

ELME Studio is a virtual network that has no partnership agreements as such. There are some signed agreements that were needed for project administration concerning among others the use of the laboratory facilities and equipment etc. Formal decisions are also made concerning the funding of the projects by various organisations and companies. The collaboration initiative and the actual collaboration are based mainly on the shared interest and trust between the collaboration partners. Secrecy regulations are taken into account in the projects with entrepreneurs/ companies.

Regular ELME Studio meetings four to six times a year were started in 2007. Minutes of these meetings are shared. Most of documentation of the organisation of the collaboration is in the project administration documents. In some of the interviews the idea of ELME Studio common strategy and action plan was brought up as a question that could be discussed among the participants.

The roles of the participants have not much changed during the collaboration. The main concept has remained the same.

Funding the collaboration

The collaboration arrangement in ELME Studio is funded from various sources of project funding. Research, development, investment, educational and other projects have been and are mainly funded by European Structural Funds (ESF, ERDF), the Finnish Funding Agency for Technology and Innovation (TEKES), the Regional Centre Programme (AKO), and the Centre of Expertise Programme (OSKE).

All project funding requires private financing varying from 10 to 30 or even 50 per cent of the total amount of the project budget. Covering this part of the budget depends on the project at issue. This can be seen as seed funding covered by the enterprises involved, Nivala-Haapajärvi sub-region, the city of Nivala, *Nivala Technology Village Ltd.*, *Nibak Ltd.*, and the Educational Municipal Federation of the Kalajokilaakso Region (KAM).

The need to diversify the available funding sources is one of the main aims of the ELME Studio collaboration. In the future, the European Commission, the Academy of Finland and various foundations will each hopefully fund projects in ELME Studio. Increasing the amount of enterprise funding is one possible approach to expanding the work done.

Activities performed within the context of collaboration

Work in the context of ELME Studio means joint projects, business and product development, new knowledge generated by research and new ways of applying research results. Collaboration consists of regular ELME Studio meetings four to six times a year. The directors of the main actors are present at these meetings. Those responsible for the research, development and enterprise contacts also participate in the meetings. Other unofficial meetings also take place. Project groups and the research team exchange information and share knowledge regularly as they plan and execute joint events and joint projects. Examples of such joint events include Laser Workshops organized at least once a year to gather together researchers, business people, business development actors and others interested in the current topics of electro-mechanics and sheet metal industry. Taking part and visiting the various exhibitions and fairs of the sector, as well as national and international

conferences are also seen as being part of the actual collaboration work. A lot of information is also delivered within the context of the project steering groups. The main actors of the ELME Studio are usually represented in the steering groups of various projects.

The shared laboratory and working facilities and equipment also encourage informal contacts. In addition, people working in the ELME Studio share the rest/coffee room, many of them have their daily lunch at the same restaurant etc. One interviewee mentioned the distance between the laboratory and the facilities of the vocational school being a problem even though it is just a few hundred metres. Closer contact and deeper collaboration between the research team and teachers of the vocational school is desired here.

Based on the interviews it can be said that the core participants are Oulu Southern Institute, the Educational Municipal Federation of the Kalajokilaakso region and its Vocational College in Nivala and *Nivala Technology and Industrial Park Ltd.* The companies involved in the projects, Nivala-Haapajärvi sub-region and Central Ostrobothnian University of Applied Sciences and its research and development unit CENTRIA could be seen as fringe participants of the Oulu South region. All the participants bring their networks into the collaboration which means to say the national and international aspects of cooperation in knowledge generation and work done in the context of ELME Studio collaboration. None of the interviewees recognized the existence of any gatekeepers. Collaboration is described as taking place within the context of an open environment while the operations model is based on the notion of shared interest. All the partners that are needed in each case are gathered together for the joint project.

The ELME Studio has not yet created actual spin-offs, but there are a few companies that use the new technologies and one new company that was founded because of the expertise generated in ELME Studio. The business development actors supply the research team with the needs and ideas that they encounter in their contacts. A need for new educational products or services was mentioned in one of the interviews. The knowledge generated in the research projects could however be exploited better in the vocational education. The key research areas of ELME are laser technology applications and the ultra-strong steel materials. The research into laser technology focuses on using laser technology in the manufacture of products from metal material in sheet form.

Knowledge generated during, and knowledge flows within, the collaborative process

Most of the activities in relation to ELME Studio collaboration are financed by authorities in the public sector. Use of the knowledge generated in these activities and projects is open to all the participating actors extending

even to anyone who is interested in the subject matter. In the phase of drafting new research ideas and new methods, the knowledge flow between the participants can be somewhat restricted. However, the new project plans are discussed in meetings with other actors.

Projects undertaken for outside enterprises and financed by them may however include the use of knowledge that is restricted in nature. Restricted access material relates to enterprise-specific issues. The knowledge generated in these kinds of projects is divided into public and confidential, if needed.

Expertise in ELME Studio collaboration generates different kinds of knowledge; technological and production knowledge, entrepreneurial guidance knowledge, managerial knowledge (networks and project management), and educational knowledge. In addition, the knowledge needed for regional development increases in respect of the collaboration. Skills and ability as regards technology transfer, knowledge distribution and marketing have also been extensively developed. Working in the context of ELME Studio collaboration was described by some of the interviewees as having the advantage of foreseeing the future and hoping that it will be developed.

The knowledge contributed by the other actors taking part in the collaboration is based on each actor's main role in the collaboration (see above table 1). The collaboration has proven to be a new way to generate knowledge for the needs of the regional business community in metal sector. A significant amount of the knowledge contributed thus far can however be seen as complementary. As the research becomes more intense and deeper ways of working together are developed there is a possibility that, according to the interviewees, more sequential knowledge benefiting all of the partners will be generated.

ELME Studio collaboration includes a high level of interaction between the actors. The directors of Oulu Southern Institute, Educational Municipal Federation of the Kalajokilaakso region and *Nivala Technology Village Ltd* take part in the regular meetings organized four to six times a year. Those responsible for the research, development and enterprise contacts also participate in these meetings.

A number of barriers to knowledge interaction were however identified. Projects undertaken with some companies might include the use of confidential or proprietary knowledge that is not disseminated to collaboration partners. Organisational, differences personality issues and unique working habits were also identified as barriers which occasionally cause misunderstandings leading to a loss of confidence between partners. As a particular weakness of the collaboration model the lack of basic funding was also mentioned. On the other hand, this means that the partners must work together to ensure continuous project funding. Communication within ELME Studio and throughout the broader network as a whole is seen as fundamentally

important while the lack of time is seen one of the major obstacles to a successful partnership. Priority is generally given to other issues; the research team for example focuses on the actual research. As such, the knowledge transfer process to other partners is seen as both laborious and time consuming. One reason for this is that most of the research results are in English. In addition the directors mentioned the lack of time as being the main barrier to knowledge interaction. Other than this little resistance to knowledge sharing within the collaboration was identified.

The knowledge generated in the context of ELME Studio collaboration is documented. It is codified in the form of project reports (intermediate and final reports), scientific articles, lectures in conferences and other events, other publications etc. Some of the knowledge is tacit knowledge contained within the teams, but also personal tacit knowledge. Some of this tacit knowledge is shared in the informal discussions between the collaboration partners and in the discussions with the representatives of the companies involved.

How to better understand the aspects of other collaboration partners was seen as one of the key challenges in respect of the flow of knowledge. The role of micro companies in the collaboration process was however questioned, in particular, how to find the most effective ways to benefit them, even though they generally do not have time or the resources to take part in the projects.

Collaboration development and outcomes

Collaboration has developed in providential circumstances. No particular obstacles have emerged thus far although a small number of short-term engagements in respect of project personnel at the beginning of the collaboration process did initially, complicate some issues. The situation has now however become more stable; researchers and other project employees in the projects are given as long contracts as is possible. Many of them have now worked for several years on the same project. Attracting funding from many different sources necessitates a significant amount of administrative work and often extensive negotiations with the funding organisations. This is time consuming.

The most significant result of the collaboration is the ELME Studio itself, a production laboratory in electrical mechanics and metal. It can be viewed as a forerunner for future production technologies in the sheet metal technology area. Collaboration has ensured cost competitiveness making the change from thin sheet metal based production to medium heavy sheet metal and even ultra-high-strength steel materials possible. This is reflected in the position of the sector's enterprises in the region while both the production base in general and the individual enterprises in particular have enhanced their positions as regards international competition. The results of the collaboration have enabled the implementation, application and commercialization of new technologies.

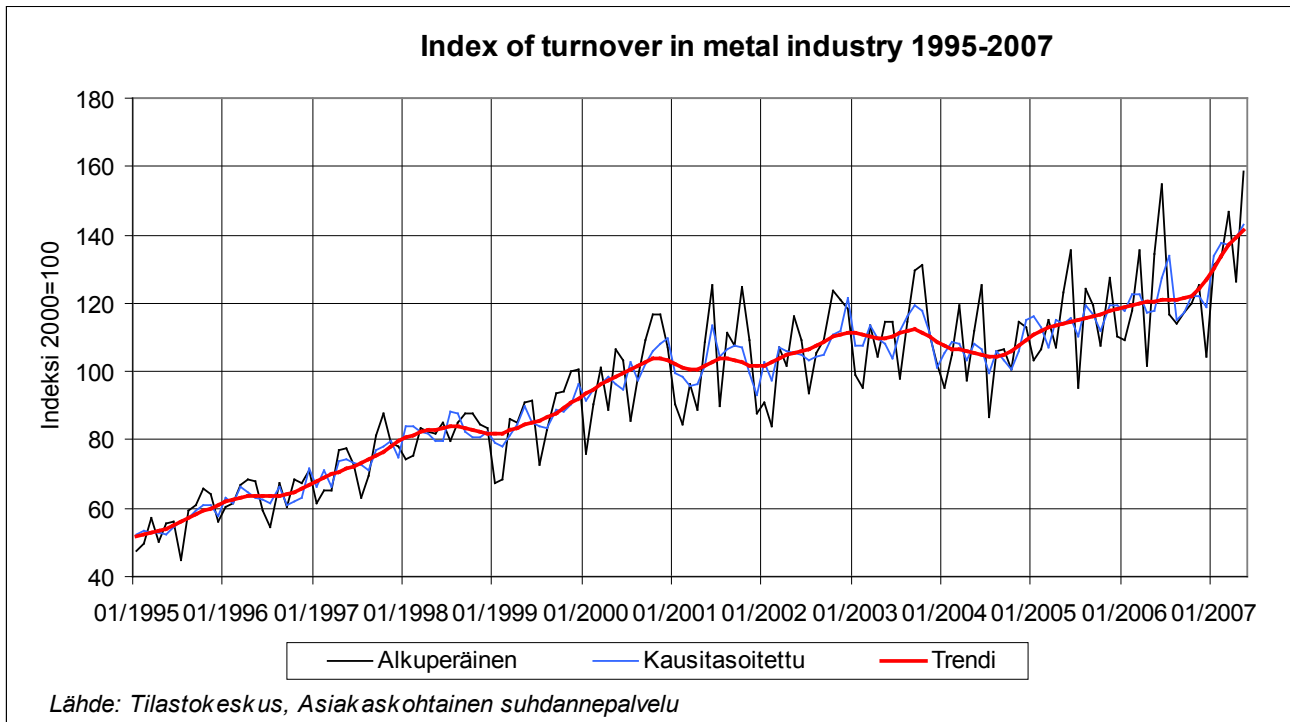


Figure 3. Index of turnover in the metal industry for the 1995-2007 period in the Oulu South region. Original = black line, quarter average= blue line and trend = red line. Source: Finnish Statistical Census

The high technology used in the collaboration specifically for sheet metal and tool manufacturing have also proved to be very significant. The various organisations concerned have been able to invest in the equipment with the help of EU-funding. This is essential for research purposes. Without the laboratory or EU-funding, there would be no ELME research group in the Oulu Southern Institute. Moreover, the professorship in sheet metal technology located on the main campus of the University of Oulu was made possible by the first development project in the studio. The professorship became permanent after the project phase 1999-2004.

Based on the interviews, it can be said that the collaboration process has responded well to the demands of the different local and regional stakeholders. Municipalities receive tax income from successful enterprises and from the employees in these enterprises as well as from the other organisations taking part in the collaborative process. In terms of the industrial life of the area more generally, collaboration has seen new possibilities emerge in the realm of project development, production technologies and marketing. To the educational institutions collaboration has meant the possibility of renewing their equipment, getting their latest research results into the educational programmes and the ability to educate their workforce in giving them the latest area-specific expertise. The research group has frequently made public their results in national and international conferences, in conference publications and in other articles. Collaboration has also attracted new enterprise-based research initiatives and development projects to the companies concerned. For each of the collaborative organisations the emergence of ELME Studio has encouraged a new approach to networking.

In December 2005, there were 182 metal sector companies in the Oulu South region. The number of metal industry companies has been approximately the same since 1995 (Finnish Statistical Census 2007). The metal sector in the region can be divided into three different branches. The first entails the production of metal products (excluding machinery), the second is machinery and the third branch is the mixed metal industry.

In the production of metal products the largest actors in the region are also among the largest industrial companies in Finland, for example, YIT Industria Ltd., Mecanova Ltd., Rautaruukki Ltd. and PPTH Norden Ltd. The products made by these companies include for example parts for mega structures like bridges or nuclear power plants. Metal product companies are mainly focused on the international market. In the machinery sector the companies concerned are generally small to medium-sized. The focus of their actions is predominantly on the national level with, in addition, a small but significant international client base. Companies in this branch manufacture agricultural machinery for example. In the mixed sector company size and product lines vary considerably.

Turnover in the Oulu South metal industry grew from 1995 to 2005. In fact, the volume of turnover has doubled over the last decade. This development in respect of turnover has not in overall terms however been reflected in the numbers employed in the area. Employment patterns can be divided into two phases: the first phase saw growth lasting from 1995 until 2001 while the second phase saw a period rationalization from 2002 to 2007. In the first phase positive developments within the sector did directly affect the level of employment, but since 2002 the quest for

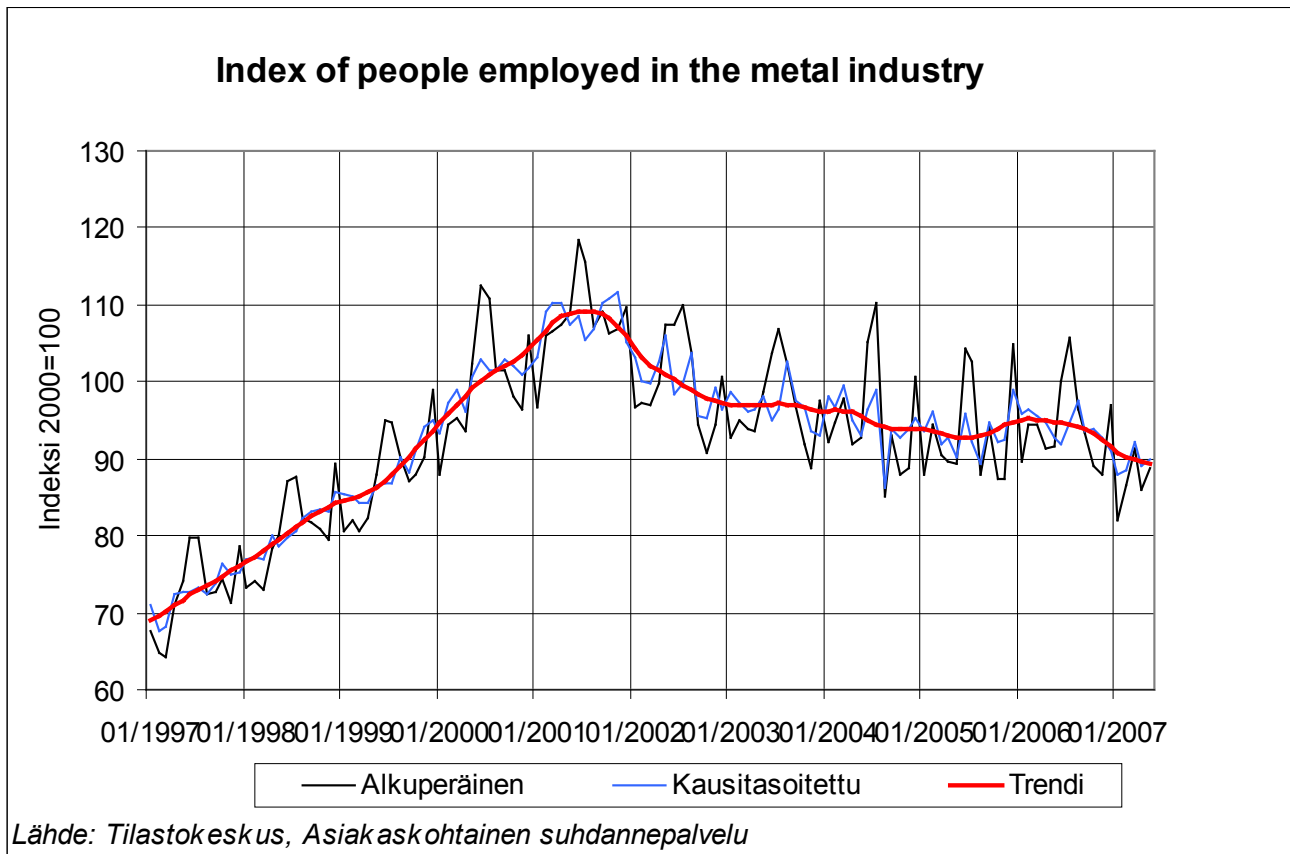


Figure 4. Index of employed in metal sector years 1995-2007 in Oulu South region.
Original = black line, quarter average = blue line and trend = red line. (Finnish Statistical Census)

rationalisation and efficiency has had a significant effect in employment terms. The productivity of the industry had however grown continuously.

Collaboration in the ELME Studio project remains active. The collaboration partners moreover remain committed to continuous research, development, education and business development. The work done in the innovation and development environment of ELME Studio is embedded in the participating organisations. The individuals concerned are also very important for the continuing success of the project. Long-term commitments here include the task of ongoing collaborative development and continual monitoring and updating of the work done by each participating organisation.

The collaboration, in which the research group of Oulu Southern Institute has been, and remains, active has helped to promote the regional engagement of the regional unit of the University of Oulu and its Department of Mechanical Engineering. Through this collaboration the university has become more closely involved with the regional business and industrial community as well as with local decision makers. Awareness of regional conditions is, moreover, essential for the success of the so-called 'third task' of the universities, namely, social interaction and social service.

Having the collaboration process funded by a variety of project financing programmes etc., can be seen as a rather vulnerable project model. Thus far however there have not been any major financing problems. The funding

organisations have generally appreciated the importance of the collaboration. The transition in European Structural Funds financing periods in 2006-2007 did however see a challenging period. It took almost two years after submitting the applications before the final decisions were made in some projects. To avoid losing much valued staff, some of the collaboration partners agreed to take the risk of starting the projects that had been giving at least an initially positive feedback by the funding organisations. This was possible because of the shared trust that existed within the context of collaboration.

On the other hand, the uncertainty of funding means that the collaborative partners are always ready and willing to react to the needs of the market. Even though, the aim is to construct a robust system to some extent in order to generate competitive advantages over competitors the creation of a high level of future expertise is also central to the *raison d'être* of collaboration.

Conclusions

The experience gained in the context of ELME Studio collaboration could be transferred to other industrial sectors' development and innovation environments as well as those of the service sector. Naturally, any new development has to be adapted to the specific conditions of other sectors and environments. The basic 'model' has however already been applied in the establishment of BIO Studio (bio energy), KIVI Studio (stone construction) and Herkku Studio (food supplies) in the sub-region of

Nivala-Haapajärvi. These studios are not, however, at the same advanced level as developments at ELME Studio.

To succeed, other studios or innovation and development environments need shared interest, social capital, people who commit themselves, trust, and respect and to work together in an open minded fashion. This kind of collaboration increases the understanding of the work done by the various partners.

The importance of having a regional unit of a university in the collaboration process is evident. An awareness of regional condition is essential for the success of the so-called 'third task' of the universities, the work of social interaction and of social service. Basically, the form of the research, education and regional development undertaken in Oulu Southern Institute can be transferred to other areas. Locally, applications have been made to develop other innovation environments and knowledge hubs of the Oulu Southern Education Network.

Based on the experience, it can be said that in order to foster the type of research that brings benefit to the local industrial community and other collaboration partners, it is very important that the research manager leading the research group maintains a constant and intense connection with the academic faculty as well as with the regional collaboration partners. The pattern of ELME Studio collaboration is seen as comprising a compact unity of thinking in respect of economic risks. The pattern can be transferred to other scalar levels even internationally, bearing the scaling risks in mind.

The results indicate that the collaboration pattern provides a workable method. The needs of the development of local industry are met. The image of the region has improved which has helped to create further possibilities for the region and its enterprises. However, the long term results of this kind of collaboration are not yet visible. In addition, more research i.e. on the economy of the thin sheet industry should in due course be produced.

ELME Studio is an innovation environment that includes all the elements needed for regional innovation development. It has influenced the Oulu South Educational Network and the Oulu South Higher Education Strategy as well as the strategic work done in the sub-region of Nivala-Haapajärvi and in the collaborative organisations.

Collaboration in ELME Studio is an outstanding example of the way in which a model which necessitates that projects are funded in many different ways can be made to work. The possibilities are greater in the context of a consortium or in an agreed collaboration group than in the situation in which each organisation acts individually or in the context of a loose cooperation agreement only. The use of the resources available is coordinated and target based. This collaboration model of ELME Studio can thus easily be recommended.

In order to further develop the ELME Studio collaboration approach to match the needs of the small and micro-sized companies, a process or a mechanism should be generated to provide knowledge, created in ELME Studio, in a form that even micro-sized companies can make good use of. The need however remains to foster better ways of communicating between researchers and entrepreneurs. One possibility here might be to find a technology-oriented editor to cooperate with the ELME Studio. In addition, updating the training sessions planned more closely with all of the collaboration partners may also provide a partial solution here.

In some of the interviews the idea of having a common strategy for ELME Studio collaboration was brought up. Collaboration is now based on shared interest between the strategies of the collaboration partners and the Oulu South Higher Education Strategy. An ELME Studio strategy which is even more fully a shared venture may however further promote the common expertise held within the various collaboration partners and thus help evolve collaboration in an even more prosperous direction. Such a strategy would undoubtedly include the interlocking aspects of research, education and business development.

Iceland: Higher education in the field of renewable energy

Hjalti Jóhannesson

Akureyri region in North Iceland

This case study focuses on RES – the School for Renewable Energy Science in the town of Akureyri in North Iceland⁴. Akureyri is, by Icelandic standards, a sizeable town of 17,500 inhabitants. The Akureyri region is the area around the Eyjafjörður⁵ fjord which is centrally located in North Iceland (see map below). The region is Iceland's most populous outside the capital area of Reykjavík and its adjacent towns and regions. The fjord itself is 60 km long and the main valley stretches out to the south of the fjord for an additional 60 km. High mountains surround the fjord to the west and the east. Akureyri lies about one hour's drive west of the most active volcanic belt on the island which runs diagonally SW-NE. This location has significant relevance in the context of RES since there is much potential here for increased geothermal harnessing. Furthermore there are many geothermal utilities in the area for domestic heating and several hydro power stations are either located in or within a few hours drive of the area.

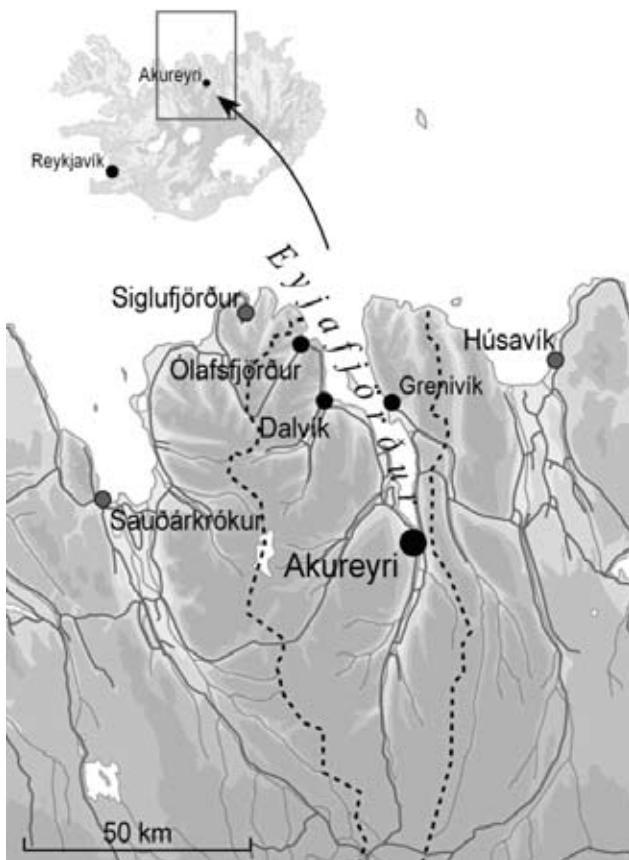


Figure 5: The Akureyri region.

4 This sub-chapter is to a large degree based on Hjalti Jóhannesson (2008).

5 The area is also referred to as the Eyjafjörður region.

6 See the homepage of RES: <http://www.res.is/>

7 See the homepage of RES: <http://www.res.is/>

The local economy of Akureyri which was for the most part of the 20th century termed 'the manufacturing town' of Iceland has recently undergone a radical structural change. During the last quarter of a century service functions of various kinds have replaced manufacturing as the most important sector of the local economy.

Major changes in the local economy stem from the establishment of the University of Akureyri in 1987. That development proved to be a major addition to the local economy coming at exactly the right moment as the traditional manufacturing sector was in decline as were many private businesses.

The region and Akureyri in particular has however now found its competitive edge in education and in the diverse services of today's knowledge economy. Since 1987 the University has grown considerably. The total number of students in 2008 was around 1,350 of which around 230 are graduate students. Students in the distance learning programme number around 430 with the University now seen as a leading player in the provision of distance education in Iceland. The number of full time staff is 185 including some 100 university teachers. As such, the University is obviously now a significant player in the local economy of Akureyri. Other important educational institutions include the two secondary schools with a total of around 2,000 students and a staff of approximately 250. Furthermore there is a privately run arts- and design school with a staff of 25-30 and approximately 40 students. The establishment of RES – School for Renewable Energy Science therefore fits well into the development of the local economy.

Res – School for Renewable Energy Science

RES at a glance

A graduate school for Master's degree students in renewable energy science, RES - School for Renewable Energy Science⁶ was established in Akureyri on May 9 2007 (University of Akureyri, 2009). It was initially located at the University of Akureyri (UNAK) campus with the University being one of its owners.

The main academic objective and goal of RES is, according to its homepage, to "offer excellent education programmes in renewable energy science and technologies, as well as to strengthen future cooperation between leading Icelandic and international academic and research institutions in the utilisation of renewable energies"⁷. RES aims primarily to admit outstanding foreign students with

a master's degree in engineering. The master's degree at RES is an intensive one year programme. The inaugural group, enrolled in February 2008, numbered just over 30 students from across Europe and United States while a further 40 students were enrolled in February 2009.

RES places emphasis on its location and its unique geological conditions (see map below) and other unique features of Iceland such as the highest use of renewable energy *per capita* in the world. Another reason for the location of RES in Akureyri and its close proximity to UNAK is the fact that the idea of establishing RES originated in the region and resulted to a large degree from the Akureyri Region Growth Agreement (ARGA) during the period 2004-2007. The current rector of RES, Björn Gunnarsson was at the time a Dean of the faculty of natural resource sciences at UNAK. Other higher education institutes such as the University of Iceland (UI) also maintain cooperation agreements with RES. UI is also in the process of becoming one of its owners thus giving RES a presence in the capital region. Finally one can say that RES extends far beyond the boundaries of Iceland as the school also maintains cooperation agreements with many foreign universities and institutes thus forming an extensive network which is vital for such a small institute.

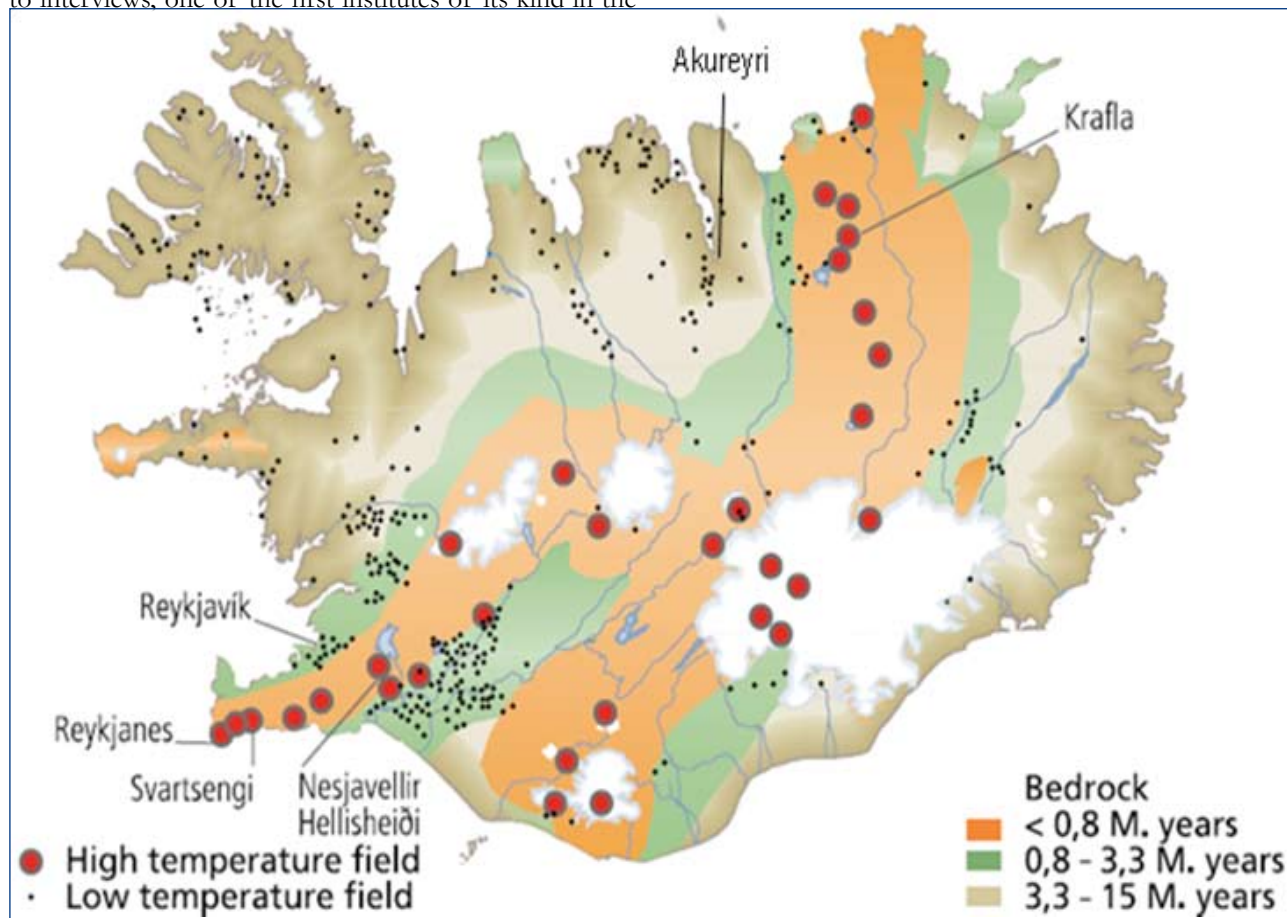
RES is a particularly interesting case since it is, according to interviews, one of the first institutes of its kind in the

world to offer such a broad educational scope in the field of renewable energy sciences.

The origins of RES

The origins of RES can in part be traced back to the Icelandic regional development policy period 2002-2005 which emphasised growth areas. This policy marked a significant departure from previous approaches as a specific growth area outside the capital region was identified, i.e. the Akureyri region. The proposal for the parliamentary resolution included five main objectives. One of these objectives relates to the idea of growth centres: "To make living conditions outside the capital region better by strengthening those areas which have most inhabitants, are most attractive for people and have the best opportunities to strengthen the economy, education, culture and public services".

Based on this general policy, the Minister of Industry (MI) decided to put forward a special plan to strengthen the Akureyri region as a growth centre, with Oulu in Finland to a large degree as the role model. This plan was published in the spring of 2004 and growth was to be sustained through the setting up of clusters in four specific sectors deemed in a preparatory study to represent the strengths of the region. ARGA was the first growth agreement carried out in Iceland. The initiative was financed by the government and various



Source: Björnsson, 2006.

Figure 6: The volcanic belt running diagonally across Iceland and the location of geothermal fields.

local actors; primarily some of the larger companies in the Akureyri region, notably the local cooperative (KEA). The following four clusters were identified with their facilitators being staff members of UNAK⁸:

- a) Education and research
- b) Health
- c) Tourism
- d) Food innovation

Thus close ties existed to UNAK from the outset of the growth agreement. None of these four clusters however addressed the energy sector specifically. The Education and Research Cluster (ERC) did however deal with projects that undoubtedly relate to the energy sector. Among these was the preparation for RES in cooperation with its board of directors and staff hired to begin work on the idea. According to the former chairman of the growth agreement⁹ this was a vital step in the establishment of the RES, which would not otherwise have materialized, at least not in this location.

The collaboration process of the RES initiative

The collaboration initiative

The RES initiative was first promoted at a meeting in 2004 between Þorsteinn Gunnarsson, Rector of UNAK¹⁰ and Davíð Stefánsson, who at the time was a consultant with the consultancy firm KPMG Advisory (now *Capacent*)¹¹. They were looking for growth possibilities for the region with a view to strengthening UNAK in relation to the newly established ARGA and were convinced that knowledge on renewable energy was something that Icelanders could offer to other countries. Soon, Björn Gunnarsson was contacted by Davíð Stefánsson and he became involved in the preparation of the new energy school. The working idea was born to establish an international energy school at UNAK with students from various countries. Soon the EFTA fund meant for supporting Eastern European countries was aimed at and work initiated in creating a network for cooperation between UNAK and other countries and universities, especially technical universities in Eastern Europe. An energy group belonging to ERC and the cluster's facilitator admirably supported this initiative which eventually was to receive funding from the ARGA and the Ministry of Industry, later the Ministry of Foreign Affairs.

According to the former cluster facilitator of the Education and Research Cluster of ARGA 2004-2007¹²

the mix of partner in RES's preparation was just right, all of whom were very talented people. Seven people in particular can be seen to have been significant in this process all but one located in Akureyri. These actors assumed different roles in other aspects of the preparation (not in any particular order). They included the Rector of UNAK, the present Financial Manager of RES, a consultant at KPMG Advisory (now *Capacent*)¹³, the International Relations Manager of RES, the Chairman of ARGA and the Facilitator of the Education and Research cluster of ARGA. Björn Gunnarsson, now Rector of RES supplied the scientific input and organized the curriculum. If support was needed from other actors this core group was very active in seeking additional input, finance and advice e.g. from the ministries, companies and diverse institutes. It was specifically noted by some interviewees that the Ministry of Education was not active in the collaboration process.

When the idea of RES emerged the only other similar programme in existence was the United Nations Geothermal Training Programme in Reykjavík (UNUGTP), established in 1978 and operated by the Icelandic state (UNUGTP, 2009). Subsequently however other similar initiatives were to be adopted though RES was the first to materialize¹⁴. It has also to be noted that significant competition exists among universities in Iceland, particularly between the state universities i.e. UI and UNAK and the private universities while the funding of private universities has been closely scrutinised in recent years by the state universities.

It is clear that RES emerged at just the right time for several reasons; many things were favourable in the environment. This relates to available funding and growth policies. Some interviewees who were working on the RES preparation phase today however stress that the support offered by the original Akureyri region growth agreement is no longer available. The new growth agreement does not offer the same kind of support for long time collaboration between partners. The most important factor here is of course the credit crunch and the deep recession in Iceland and across the globe more generally. This will be dealt with in greater detail in relation to policy issues later in this paper.

The motivation for the collaboration

The motivation for the cooperation was to make better use of the knowledge available and of the particular setting in Iceland to create a specialized education opportunity in the field of renewable energy and to create jobs in this field. The idea was to create a business model which would

⁸ The cluster approach was adopted in accordance with the methodology developed by Cluster Navigators (2003)

⁹ Now a member of the RES's board of directors and member of its executive committee.

¹⁰ He was also the chairman of the first Akureyri region growth agreement (2004-2007).

¹¹ Davíð Stefánsson is the chairman of RES's board of directors and its executive committee.

¹² Björk Sigurgeirsdóttir.

¹³ Living in Reykjavík but originally from Akureyri.

¹⁴ These were Reykjavík University, University of Iceland and Keilir – Centre of Excellence in cooperation with power companies.

be self-sufficient within 3-5 years and would stimulate research in this field as well as stimulating other businesses in the region. This was in line with the objectives of the growth agreement for the Akureyri region which had then just commenced in 2004.

The organisation of the collaboration

The current organisational structure of RES today is that of a limited liability company. However, the Chairman of its board of directors points out that according to an agreement between the shareholders RES should be a non-profit organization from the start. This business form was chosen to make it easier for the school to seek share capital and other funding. UNAK's financial status was difficult at the time. The University of Reykjavík used the same business model as RES. The partners involved in RES were as follows:

- Akureyri municipality
- Gift investment company
- KEA (a cooperative)
- Landsbanki (a bank)
- Landsvirkjun (the national power company)
- Norðurorka (Akureyri municipal power company)
- RARIK (a state-owned power company)
- Thekkingarvörður (a holding company, UNAK is one of its owners)

Thekkingarvörður was the partner established to initiate the project. This partnership remains similar to that originally envisaged with the exception that the University of Iceland (UI) is, according to information gained from the interviews, planning to become one of the owners. The largest owners are located within the Akureyri region

itself though the cooperation network is very extensive. According to the chairman of the board of directors and of the executive committee, individuals are perhaps missing from the partner mix. However it should be open to everyone interested in supporting the organization with finance or other types of contribution.

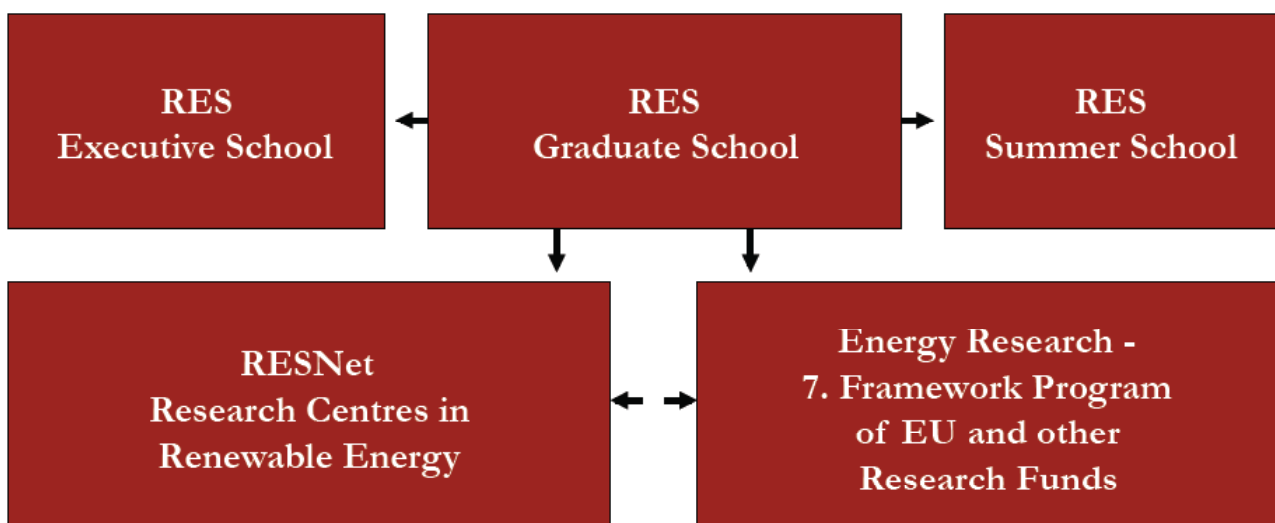
The figure 7 outlines the structure of RES and its five pillars. RES has cooperation agreements with 6 domestic and 29 foreign institutes in 17 countries and companies in the field of renewable energy research and teaching¹⁵ and is thus able to provide a very broad range of education in this field of study.

The core function of RES is the graduate school but there are four other pillars making up its operation as figure 7 above indicates. After RES began operating significantly more demand for the summer school and the executive school emerged than was originally anticipated noted its Rector.

The board of directors has five members who represent its owners and who are mainly concerned with policy formulation. The board usually meets three times a year but an executive board made up of three members from the board of directors meets more frequently. Staff meetings are held each week.

RES is divided into two main divisions dealing with management issues and academic issues. The Financial Manager is head of the former and the Rector is responsible for the latter. The RES office itself is actually a small workplace with only four fulltime and one part-time salaried employees; the Rector, the Director of

RES



Source: www.res.is (2009)

Figure 7: The structure of RES

15 According to the RES homepage www.res.is, 19 April 2009.

International Affairs and Public Relations, a Managing Director, Office Manager and a Project Manager for RES Summer School (part-time). In addition to this, there are four Academic Coordinators on RES's payroll. Last but not least are the 80 professors from various countries who teach at RES during short, intensive courses. This is estimated by the chairman of RES to amount to some 10-15 person-years. Furthermore, various individuals are working with RES even though they are not on the payroll. The Chairman of RES's board of directors emphasized the important role of the many that were active in the preparation of RES without financial incentives.

An important part of the overall package for students is that they graduate with a joint Master's of Science degree from UNAK and UI as RES is affiliated with both universities and they both act jointly as pillars of the RES operation. Both universities are accredited higher education institutions. In this way RES makes use of their framework and quality system. Specific collaboration agreements exist between RES and these two universities. This collaboration process is managed by a committee with 2 persons from each of these three institutes.

According to the Chairman the academic planning structure for RES has several US universities as its role model. The intensive one year study programme is divided into three phases; a) joint courses during a winter/spring semester, b) intensive summer courses in specialized fields of study and c) fall/winter semester which is based on research work and a final research project, carried out in diverse institutes and companies in Iceland and abroad¹⁶. The requirements for admission to RES are rather strict. A previous BSc degree with top grades in engineering or physical/natural sciences (chemistry, physics, geology and related fields) is a minimum. Students will have to demonstrate a good understanding of English, both in reading and writing. An admission committee will review student applications, transcripts, and interview students for the final selection¹⁷.

According to the interviewees the long and intensive preparation phase for RES was very important. The planning was carefully carried out and e.g. the network of cooperation with domestic and foreign actors was developed during this period. This was unusually extensive by Icelandic standards. This became obvious when studies at RES commenced in February 2008 and has subsequently given RES a head start over its competitors who were planning to offer study programmes in the same field. This is probably the main reason why UI is becoming one of the owners of RES. The chairman of RES moreover noted that the branding approach in respect of RES, produced by an Icelandic designer located in USA, was put in place

already in 2005-2006, two years before the institution was officially established. This was very important in creating the overall concept.

The funding of the collaboration arrangement

According to the Chairman of RES's board of directors the main source of funding was, in line with RES's business plan, share capital with each partner supplying 20 million ISK, a total of 140 million. These were *Landsbanki*, Akureyri municipality, KEA (cooperative), Norðurorka (power company), *Landsvirkjun* (power company), *Eignarhaldsfelag Samvinnuþrygginga*, (investment fund) and RARIK (power company). Furthermore *Thekkingarvörður* supplied preparatory work which was valued at 40 million ISK. Additional funding came from ARGÁ, The Energy Authority and the Icelandic Innovation Centre (IMPRA).

After RES was established, additional funding came, primarily, from the Ministry of Foreign Affairs (60 million ISK), ARGÁ and The Energy Authority. Now, the financing of the collaboration is also directed through its owners and the EFTA fund¹⁸. The parliament directly supported RES with 25 million ISK of extra funding in 2008. However the board of directors has not succeeded in its attempt to attract long time government funding as indeed other private universities are entitled to, but this has been applied for.

The Rector of UNAK argues that long term funding is vital for the development of the project while the Rector of RES also notes that there was lack of support from the Ministry of Education. RES has not been able to attract similar levels of funding to that of other private universities in Iceland, despite demands to do so by its board of directors. According to a member of the board of directors¹⁹, RES and UNAK have been discriminated against in this regard. The previous Minister of Education²⁰ had, according to three interviewees, mentioned that this school should better be located in Reykjavík as a part of the University of Reykjavík which is the largest private university in Iceland and which has been growing rapidly in recent years.

The financing that has been attracted through the EFTA fund has, primarily, been used to support students from Poland to study at RES. They have both got grants and their students fees have been paid in full. It is however planned that this situation will gradually be changed and that in the future more students will be asked to pay tuition fees as RES becomes a more established institute. This EFTA funding, even if it had been agreed upon, had not however been delivered to RES²¹ at the time of the

16 Some 50% of students are located outside Iceland during this final semester.

17 See the homepage of RES www.res.is visited 21 April 2009.

18 Financing issues and related problems will be further discussed in chapter 1.3.7.

19 Benedikt Sigurðarson.

20 24 May 2007- February 1 2009

interviews. This has caused much financial uncertainty and RES has had to draw much more on its own funds during these initial years than was initially planned. Another issue which has caused problems for RES is the global credit crunch and its particularly stark effects on the Icelandic economy. The crisis has impacted some of RES's owners quite significantly, especially the financial institutes and investment funds and thus impaired their capacity to act as active financial backers to RES.

Activities performed within the collaboration

According to the Rector of UNAK the formal agreement between RES, UNAK and UI includes the stipulation that UNAK and UI are the universities that the RES students receive their diplomas from. RES also has agreements with the power company *Landsvirkjun* and other companies over financial support, e.g. in the form of teaching at RES. The role of each partner has however changed with, for instance, UNAK being more active in the initial phases of RES. But since then, its role has changed. Now its involvement is limited, primarily, to the fact that UNAK's professors teach at RES and RES's students have access to the university and its services such as research labs, classrooms²², the canteen and library services etc. As such cooperation is now much more general in nature. Related to this is the fact that the RES offices have relocated away from the premises of UNAK. According to the Rector of RES however the support received from UNAK might have been more active at times. He however notes that the financial status of UNAK was difficult at the time when RES was set up and thus it did not have much ability to directly support RES. This was also one of the major reasons why RES did not become an integral part of UNAK.

Knowledge generated in and knowledge flows within the collaboration

Generally speaking significant transnational knowledge flows can be seen to be taking place through the RES initiative. This is to say flows between foreign professors who are in contact with professors at UNAK and UI and other teachers from companies and institutes. Furthermore this takes place between students from various countries. These students produce their final theses/projects at RES²³ and this is knowledge that stays within UNAK, UI and the companies/institutes that these students work with on their final projects. A significant flow of knowledge also exists from Iceland to the countries where the students originate. Þorsteinn Gunnarsson, Rector of UNAK emphasizes the knowledge transfer taking place via these student activities. Björn Gunnarsson, Rector of RES shares a similar vision stressing the importance of the international RES network²⁴. This is important for both

Iceland; to access global knowledge in this field and also for others to gain access to existing knowledge both in Iceland and in the field. According to the Rector of RES, it has not proved to be a hindrance to give others access to Icelandic knowledge in this field e.g. to visit and learn in detail about Icelandic power stations of different types.

According to the above there is much potential for knowledge development through the RES initiative, both in Iceland and in other countries which in one way or the other take part in the project.

Collaboration development and outcomes

The collaboration on RES is thought of as a long term commitment by those who were interviewed for the purpose of this study. A few specific obstacles in this regard were however mentioned by the interviewees. These concern, specifically, the funding and long term support by the government which has already been mentioned. As for the network of partners, that has not proved to be an obstacle and since the University of Iceland has become a partner in RES this will strengthen the network even further. According to RES's Rector, one of the reasons for UI joining RES is that UI will gain access to RES's vast network of foreign institutes and universities (the RESnet). The importance of this network was also mentioned by the Rector of UNAK. The RESnet, which was to a large degree built up during the preparation phase, has proved to be a very valuable asset for RES and is in fact a prerequisite for offering such specialized studies in such a remote location as that of Northern Iceland. It appears that gaining access to this network has also been useful for other partners such as the universities, energy research institutes such as Iceland Geosurvey (ÍSOR) and the Icelandic power companies. The collaboration itself does not appear to be vulnerable in a practical sense but since RES is operated as a specific unit instead of being a part of a university per se that may create some vulnerability. The staff members at its office are few and therefore changes in the staff complement could cause difficulties in the operation of the network around RES. The issue of funding was also brought up by interviewees as continuing uncertainty surrounds the issue of direct funding from the Icelandic state as has been outlined previously. Similarly some uncertainty is also attached to the EFTA funding stream and in respect of the financial strength of the owners of RES given current economic difficulties. But on the other hand, as the largest university in Iceland, the University of Iceland which has become one of the owners will likely strengthen it further. RES opened an office on the UI campus in the autumn of 2008 (University of Iceland, 2009). Timing also seems to be important. The start-up of RES was, according to its Rector, just right as the first students were enrolled in February 2008 this was

21 This funding is not paid directly to RES but through an EU country.

22 RES is now mostly using classrooms in its own premises.

23 Formally with joint Master's diplomas from UNAK and UI.

24 The RESnet.

prior to the major upsets that were to occur in the global and Icelandic economies. Discussions were held in respect of postponing the first enrolment of students for one year, until 2009 in order to better prepare the programme's launch. The Rector of RES however believes that if this had been postponed until 2009 RES would simply not have materialized, at least not in its current form and location.

According to the interviewees obstacles have been experienced in respect of the receipt of funding from the EFTA fund applied for by Poland. In this light, RES has had to draw upon more money from its own funds. Furthermore the financial crisis has caused some owners, especially those belonging to the financial sector, to be unable to support the project as initially planned.

Most interviewees stressed the importance of individuals in the government. This importance of specific individuals in decision making and policy is considered as particularly important for a small country such as Iceland. The previous MI²⁵ and later Minister of Foreign Affairs (MFA) supported the RES initiative extensively during her time in office. It has to be noted however that this minister was also a MP for the constituency that the Akureyri region belongs to. Two interviewees stressed this point²⁶. At the same time some a number of other politicians are considered not to have supported the initiative or to have even tried to hinder it.

Conclusions and implications

Implications for regional development

According to the Rector of RES, experience gained during the set up of the programme could be transferred to other policy areas and a similar view is shared by three other interviewees²⁷. There were other fields mentioned that could use a similar approach, but this then had to be based on specific circumstances and forwarded fields where the respective region or country holds a strong position. This approach has undoubtedly however worked in the case of RES. The Rector of RES has already identified a certain field of knowledge which might use the RES pattern and discussions have been held. The Rector of UNAK is not however quite as optimistic in this regard. According to him RES was a unique opportunity which will probably be difficult to replicate. It was noted however by several interviewees that the tools to do it are not currently available, relating to ARGAs as it was set up during 2004-2007 or indeed the necessary capital. An important element of ARGAs, as it was practised, were the cluster facilitators who were dedicated to support specific clusters. These are missing from the current growth agreement. As far as other geographical scales are concerned, the interviewees were not able to estimate the relevance of the RES experience. However, since it is in fact an operation

which operates on a large geographical scale, even if it is located in a remote setting in Northern Iceland, its story is probably of relevance for other geographical settings given that otherwise favourable conditions for education in some specific fields of study exist. Concerning the match between RES and the demands of the local labour market there is clearly a mismatch. This was something that was anticipated from the outset and therefore a network of professors from all over the world was organized to lecture at RES, i.e. the RESnet. A small setting is by no means an obstacle if the project is planned in this way. Transportation and communication networks however need to be of good quality. This calls for issues such as air transportation to be in good order which appears to be the case in the Akureyri setting, as there are very frequent flights between Akureyri and the capital Reykjavík. International connections to and from Iceland (Keflavík airport) are excellent. International flights are furthermore to some degree now also available from Akureyri at least during the summer months. As for a match between the local labour market and those who obtain their degrees from RES, that is not considered to be relevant in this case. Most students will return to their home countries and work there.

The Chairman of RES points to several possible spin-off effects. Even if RES is located in Akureyri further development may be in the location of specific renewable energy science modules which could be located in different parts of the world according to prevailing natural conditions or the knowledge level in the particular location, such as in relation to the study of wind energy, energy from sea currents or tidal waves and solar energy. In addition, the International Representative of RES points out that some 50% of students carry out their final project in universities, institutes or companies in other countries and thus that a significant transfer of knowledge, in the field of renewable energy, both in and out of Iceland is involved. Regarding spin-off effects in the local economy, tourism (edu-tourism) around RES is considerable due to the high number of professors teaching even for short periods.

According to the Rector of UNAK, the RES experience has helped open up a new perspective for UNAK in the field of regional development as there is now a new institute operating beside UNAK which gives significant opportunity for foreign connections to be made and can be considered a good example of the maxim, "think globally act locally".

Policy implications

It is important to note under this heading that RES was initiated during the period of the first growth agreement in Iceland, which was aimed at the Akureyri region. This was funded by the state and several companies and institutes. The clusters and individual projects got e.g. support from

25 31 December 1999 – 27 September 2005 and Minister of Foreign Affairs until 15 June 2006.

26 Benedikt Sigurðarson and Þórleifur Stefán Björnsson.

27 Benedikt Sigurðarson, Davíð Stefánsson and Þórleifur Stefán Björnsson.

the staff of the agreement, the so-called cluster facilitators. The methodology behind the growth agreement was to a large degree in accordance with the advice given by *Cluster Navigators Ltd.* (2003) to the Icelandic government. Four clusters were identified as being able to strengthen the economy of the region; education and research, food innovation, health services and tourism. The RES initiative however fitted nicely within the education and research cluster and attracted support from the respective cluster facilitator and other representatives in the cluster. A special energy group was also set up to work under the education and research cluster.

The idea behind RES was therefore born in this unique atmosphere and was nourished, at least to some degree, by this growth agreement. It is doubtful that RES would have materialized without the existence of this growth agreement according to some interviewees. The former growth agreement, based on the cluster approach, lasted for the period 2004-2007 but by then the preparation of RES was already almost complete with its formal establishment in 2007. These interviewees felt that the current growth agreement would not be able to create the right conditions for a project like RES to materialize. The Chairman of RES's board of directors has however a somewhat different view as he emphasises the role ARGA played in helping to make RES a *community initiative* and thus getting it support from the government by making reference to the growth agreement. The current growth agreement is based on the approach that specific projects can apply for funding. The basic criteria for funding are as follows²⁸:

- Cooperation between at least two actors, a minimum of half of which are private sector firms.
- Research and development with importance for projects which stimulate cooperation between higher education facilities and private companies but where such companies shall be major participators, marketing is important and projects shall lead to financial benefits for the participants.
- Outreach; projects should aim at marketing and export.
- Growth; projects shall aim at innovation and growth in the region.

According to the above list one would think that a project such as RES would fit nicely within the criteria. Doubts however remain. The funding is meant for individual projects and some interviewees²⁹ felt that support is lacking for long time projects in this type of growth agreement. This is in contrast to the former growth

agreement which had permanent staff working for its four clusters as facilitators and provided the right atmosphere for the project. One interviewee³⁰ noted that sufficient funds already exist for this type of project in Iceland. In addition, policy initiatives similar to those utilised in the context of ARGA during the period 2004-2007 are undoubtedly lacking. Furthermore it was noted by two interviewees that there are in total 7 growth agreements operating in Iceland at present and ironically most of them adhere to the form that was used in the ARGA during the period 2004-2007 even though that particular growth agreement subsequently changed its course as described in brief above.

According to the Rector of UNAK, one of the lessons to be learned from the RES experience is the need to build on local strengths in respect of knowledge and other fields. A good educational structure is, according to him, one of the best types of regional development one can think of. However, as the policy for higher education is currently practised in Iceland there is a feeling that private universities have been favoured at the cost of state universities³¹ and that the government at the time of RES's establishment would have preferred it to have been a part of the private university in Reykjavík. This policy is however implicit but confirmed by interviews. Making RES a part of UNAK therefore appears to have been ruled out quite quickly in the context of the process, as the government was neither in favour of this nor of private companies taking part in its financing. They did not want to support it if it was a government initiative. Therefore, RES was in fact forced to become a private initiative, partly due to the implicit policy stance of the government and partly due to the explicit wishes of other partners. To date, RES has not received tuition fee cover from the Icelandic state such as other higher education institutes, which are run as private companies, do. This is an issue of some concern for the owners and operators of RES.

Competition between the power companies and the universities is important. This is, in part, due to privatization in the Icelandic economy as most institutes and companies in this field were until recently government owned³². An initiative like RES is therefore valued as an important addition to the development of both the energy- and higher education sectors; therefore it does not come as a surprise that there has been competition between actors in developing education and research in this important field.

One interesting finding here is the importance of individual political actors. Interviewees³³ stress the

28 According to the homepage of Akureyri Region Business Agency, www.afe.is 19 April 2009. Translated and shortened by the current author.

29 E.g. a member of RES's executive committee and board of directors.

30 Björk Sigurgeirsdóttir, former Cluster Facilitator and present Manager of East Iceland Growth Agreement.

31 Private universities also receive tuition fees from the Icelandic state just as state universities do in addition to tuition fees from students who are, in turn, eligible for funding from the Icelandic state student loans fund.

32 Most of these are still government owned even if the legal framework has changed and some of them act as players in a competitive environment.

33 This view was shared by most interviewees.

importance of the 'good will' of the Minister of Industry during the period of the first growth agreement towards the RES initiative and later from the office of the MFA. Without this support RES would not have materialized. This minister was also a MP for the constituency where RES is located. This can be related to the stress the parliament's regional development policy 2002-2005 placed on the development of the Akureyri region as a counter-weight to the continuous rapid growth of the capital region. In this particular case a definite willingness existed to adhere to this growth centre policy. The lack of such willingness to adhere to policy decisions by politicians, the government and institutions in general is however a common complaint in Iceland. Thus, the policy itself, or a lack thereof, may not necessary be the problem. How it is pursued and adhered to by different actors is just as important. This may relate to the size of Icelandic society and how large a role individual actors can have in such a small community³⁴.

³⁴ There has been much public discussion on this general issue in Iceland after the onset of the global credit crisis that hit the country particularly badly in 2008.

Norway: VRI Agder: Work-based learning with interventions from regional R&D institutions and HEIs

Jon Moxnes Steineke

Introduction to the Vest-Agder and Aust-Agder Counties

The Agder region is the southernmost region in Norway, and is made up of Vest-Agder and Aust-Agder Counties. The two counties had a total population of 272,000 inhabitants in 2008, which constituted approximately 5.7% of the total population of Norway.

Aust-Agder and Vest-Agder each host 15 municipalities, most of which have small populations. The majority of the population is located in the coastline municipalities, and in particular in the two major urban areas around the regional administrative centres of Kristiansand and Arendal-Grimstad. Half of the region's population live in the three most populous municipalities (Kristiansand, Arendal and Grimstad). The greater Kristiansand area currently boasts some 150,000 inhabitants while the population of the Arendal-Grimstad area is almost 80,000 (2008).



Figure 8: Southern Norway (Aust-Agder and Vest-Agder counties)

The gross regional product has fluctuated between 75-90% of the national average (per inhabitant) since the late 1990s. Measuring the GRP per employee, the Agder region has however fared somewhat better, with values at 90-95% of the national Norwegian average since the late 1990s. This is mainly due to the fact that process industries, wood and wood products, and the production of basic metals still remains strong in the region. Since 2007, some of the major local producers in the processing

industries have organised themselves in the Eyde network, which currently incorporate twelve companies with a total turnover of some NOK 14 billion and has almost 3,000 employees. The main objective of the network is to improve the global competitiveness of the member firms, and to reduce the ecological footprint of the various processing industries. In addition, the members of the Eyde network are eager participants in regional triple helix initiatives (more on this later). The Eyde network is one of the main factors in explaining the fact that Vest-Agder remains one of the best performing counties in Norway in terms of total export values (oil and gas not included).

In addition, Agder hosts NODE, the Norwegian Offshore Drilling and Engineering cluster, which currently consists of some 45 Agder-based companies. It is an export-oriented cluster centred around three major producers of drilling and mooring equipment for the oil sector and their sub-suppliers.

In terms of general levels of education and employment, the Agder population ranks below the national average (table 2):

Table 2: Education level of the population 2007 (16 years or older; in %)

	Tertiary education (bachelor level)	Tertiary education (master and PhD level)
All		
Norway	19.9	6.0
Aust-Agder	18.8	4.0
Vest-Agder	19.4	4.1
Males		
Norway	16.8	7.6
Aust-Agder	15.6	5.6
Vest-Agder	16.1	5.8
Females		
Norway	23.0	4.4
Aust-Agder	21.9	2.4
Vest-Agder	22.7	2.5

Source: Norwegian Official Statistics

The comparatively low education levels are partly explained by the short history of multi-faculty HEIs in the Agder region. The University of Agder was established as

recently as in 2007, when Agder University College was accredited university status. Its precursor, Agder Regional College, was established as an experimental regional HEI in Kristiansand in 1969. In 1975, Agder Regional College became a permanent college and was transformed into Agder University College in 1994, when six state colleges located in Kristiansand, Grimstad and Arendal merged into a single institution. From 2010, the new University of Agder's activities will be consolidated to two locations – a main campus in Kristiansand and a smaller campus in Grimstad. The engineering and science campus in Grimstad has well-developed relations with local industry. Engineering and science is however only one of five faculties at the University of Agder, which currently include faculties of health and sport; humanities and education; fine arts; engineering and science; and economics and social sciences.

The profile of the University of Agder displays a high number of professional studies, which in the main provide graduates with employment opportunities in the public sector (nursing, education, social services, elderly care etc.). Only the faculties of engineering and science, and economics and social sciences, are able to maintain continuous relations with the regional business community, mainly by providing student out-placement opportunities.³⁵ The VRI programme is an attempt to systemise these and other working-life experiences strategically as well as operationally, and to reflect on the knowledge diffusion processes taking place in the interaction between HEIs, R&D institutions and private enterprise.

The VRI Agder programme

Regional development initiatives coupled with working-life research have a long history in the Agder region (Normann et al. 2007). In the mid 1990s, researchers at the then Agder University College joined forces with researchers from the regional research institute Agderforskning in a national business development programme called Enterprise Development 2000. In 2001, this programme was succeeded by the Value Creation 2010 programme, another national initiative with a range of regional offspring. Since 2007, the activities of the Value Creation 2010 programme has been overlapped by a new nationally initiated and regionally implemented regional R&D and innovation initiative, VRI.

VRI thus constitutes a continuation of several national R&D initiatives 1994-2017, aiming at the promotion of cooperation between major regional stakeholders in the development of skills and competencies in the regional business community:

1. Enterprise Development 2000 (*BU 2000*) 1994-2000
2. Value Creation 2010 (*Verdiskaping 2010*) 2001-2010
3. Tools for regional R&D and innovation (*VRI*) 2007-2017

This case study focuses on current practices organised within the VRI programme initiative in Vest-Agder and Aust-Agder Counties, and presents some preliminary

observations from the first two years of this latest regional collaboration initiative. Although all three initiatives listed above were initiated centrally, they are all implemented at the regional level. Considerable emphasis has been placed on ensuring that learning and knowledge transfer is taking place between the different regionalised parts of the programmes.

The three programmes mentioned above, which have to a large extent been cumulative and implemented by a stable set of public and semi-public regional actors, have all been formally organised as research programmes under the auspices of the Research Council of Norway, attracting significant amounts of central funding. In all three initiatives, regional HEIs were at the nexus of the collaborations, assisted by regional authorities, public R&D institutes, labour market organisations (LO – the Norwegian Confederation of Trade Unions and NHO – The Confederation of Norwegian Enterprise) and individual SMEs, mostly in manufacturing.

The BU 2000 initiative aimed at contributing to organisational issues, in particular workplace development and the implementation of organisational concepts like the continuing improvement of total quality management. The strategic focus evolved to incorporate strategies for increased value creation in a territorial context, by and large through the involvement of a large number of people in collaborative relations inside enterprises, as well as their interaction across organisational (firm) boundaries, creating networks of learning and innovation that build competence and improves competitiveness for the participating companies (Research Council of Norway, 1999).

Business network development was an important aspect of BU2000. The VS2010 initiative however introduced some novel aspects to these business development endeavours primarily by putting more emphasis on regional interaction and coordination and by introducing new concepts such as learning regions and social capital. One of the characteristics of the VS2010 initiative was the setting up of regional development coalitions, partnership structures that oversee and coordinate regional development and R&D activities that involve multiple regional actors. In Agder, the regional development coalition was conceived as a loosely knit regional partnership *Verdiskapingsalliansen for Agder*, which was established in late 2000. The regional partnership included from the outset the offices of the two regional state governors (*fylkesmenn*), the regional authorities, Agder research institute, University of Agder, the two labour market confederations and the regional representatives of Innovation Norway as well as the Norwegian Research Council. Later, Kristiansand and Arendal municipalities also joined the partnership at the behest of local politicians.

The VS2010 initiative operated on three levels – in the individual enterprise, within groups of firms or in business networks, and in socio-political processes at the regional

³⁵ See Karlsen (2007) for a systematic exploration of these activities in the context of Agder University College.

level. This contributed to the overall assessment in the national mid-term evaluation of the VC 2010 programme, which argued that VC2010 for all practical purposes was too inclusive and unfocussed and too broad to be practical.³⁶ VC2010 was to a large extent implemented by transferring the regional structures of the BU2000 programme to regional research institutes. Territorial knowledge management has been particularly demanding, not least since the way the VS2010 evolved created some unfortunate industrial 'lock-ins' in the regional business communities: the participating enterprises were mostly enrolled from mature industries, with mostly male employees and in enterprises well connected to the labour market organisations.

In Agder, the regional development coalition that emerged has not however enjoyed smooth passage, and this has led to conflict between various coalition partners and participating researchers. Many of the regional modules across Norway, including Agder, struggled to integrate the three levels; the corporate, the business network and the regional, in their activities.

Nonetheless, these conflicts have not made the regional stakeholders less hesitant in participating in the development of VRI as a new experimental instrument for regional R&D and innovation in Agder. They have approached this as a way of breaking up and reducing some of the 'lock-ins' observed in the VS2010 programme. The VRI Agder project applications to the Norwegian Research Council were rapidly developed in the spring of 2007. The urgency of the drafting process meant that the proposal was initially embedded with the regional business community through network organisations in the targeted industries – the Eyde and the NODE networks.

The motivation for the VRI Agder Programme

The motivation for the VRI Agder R&D and innovation programme is to

- Increase the value added in the private sector of the economy,
- Improve the qualitative content in collaborative endeavours involving the business community and regional HEIs, and
- Analyse and assess how different modes of knowledge production and learning boost innovation and value added in the Agder region.

These goals are tentatively realised by testing and applying various instruments in different industries. The VRI programme (2007-2009) in Agder targets four industries, and aims at increasing the innovation activity and competitiveness of the regional ICT industry, the oil and gas industry, the processing industry, and the cultural industry. The presence of firms in the cultural fields represents a major shift from the two previous programmes BU2000 and VC2010.

The innovation processes and learning modes of the four target industries were initially addressed in a web-based survey to local firms. In the autumn of 2007 and early 2008, almost 200 Agder enterprises received a questionnaire in which they were asked to respond to questions concerning the firms' core competences and learning, innovation activities, R&D and patenting activities, knowledge sources, regional factors that could promote or obstruct the firms' innovation activities, and their regional cooperation networks.

The survey provided some general insights into the modes of innovation and learning in the four industries. One finding was that geographical proximity to HEIs was of little importance to most of the responding firms. In fact, the HEIs and regional research institutes were generally of little importance as direct sources of knowledge for the firms' innovation activity and as innovation partners, or as a factor of importance in developing and maintaining the core competencies of the firm. The local knowledge linkages to HEIs and R&D institutions were particularly weak among the micro-enterprises which characterise firms in the region's culture industry (see table 3):

Table 3: Factors seen as important in developing and maintaining core competences. Share of surveyed firms ranking each factor as very important (in percent)

	ICT firms	Equipment suppliers	Process firms	Firms in the culture industry
Knowledge flows between employees	75	45	63	33
Individual learning in day-to-day work	83	91	88	63
Cooperation with customers and suppliers	83	91	25	3
Recruiting new employees	47	64	25	33
Long term cooperation with other firms	47	55	13	37
Systematic in-house R&D	36	45	63	33
Local 'buzz'	17	36	0	37
Cooperation with HEIs and R&D institutions	28	27	25	3

Source: OECD (2009), table 1.14.

³⁶ E. Arnold, A. Muscio, J. Nählinder and A. Reid (2005), Mid-term evaluation of the VS2010 Programme: a report to the research council of Norway. Technopolis.

The HEIs were, however, more significant as indirect producers of skilled personnel to the firms. More than ¾ of the responding firms in the 2007-2008 VRI survey recruited most of their highly educated as well as their skilled personnel from the regional labour market. The firms surveyed assessed access to highly skilled manpower as a regional factor that would be of particular significance in improving their competitiveness.

The organisation of the VRI Agder programme

Normann *et al* (op.cit.) have tracked the early evolution of the VRI programme as an illustration of a regional development discourse, noting that the VRI programme provides the counties (regional authorities) with a more prominent role in managing and leading the regional development coalitions compared with their role in the two preceding programmes, namely, the BU2000 and VC2010. Individual enterprises are also directly represented, and not merely by labour market or industry organisations. HEIs are also becoming more directly involved.

The VRI Agder programme has a dual structure, and is composed of an industrial collaboration project and a

separate research project. The projects are the result of separate applications submitted to the Norwegian Research Council, with the current projects being funded for an initial 3-year period. The two projects and the technical assistance complementing them constitute the VRI Agder programme.

The VRI Agder programme organisation is headed by a 17-member steering group. The steering group represent the Agder regional partnership and meet twice or thrice annually. It is composed of representatives of the public and semi-public bodies that developed the VRI Agdre project applications, complemented by individuals representing the enterprises taking part in this endeavour. In addition, VRI Agder has a five-member working committee, which meets more frequently. The programme has a joint coordinator as well as four appointed project leaders (PLs) – three in the industrial collaboration project and one in the research project (figure 9):

The role of the coordinator is to act as a mediator between the Norwegian Research Council, the VRI Agder steering group, and activities taking place at the operational level of the programme. The coordination function is located at Agder Research Institute.

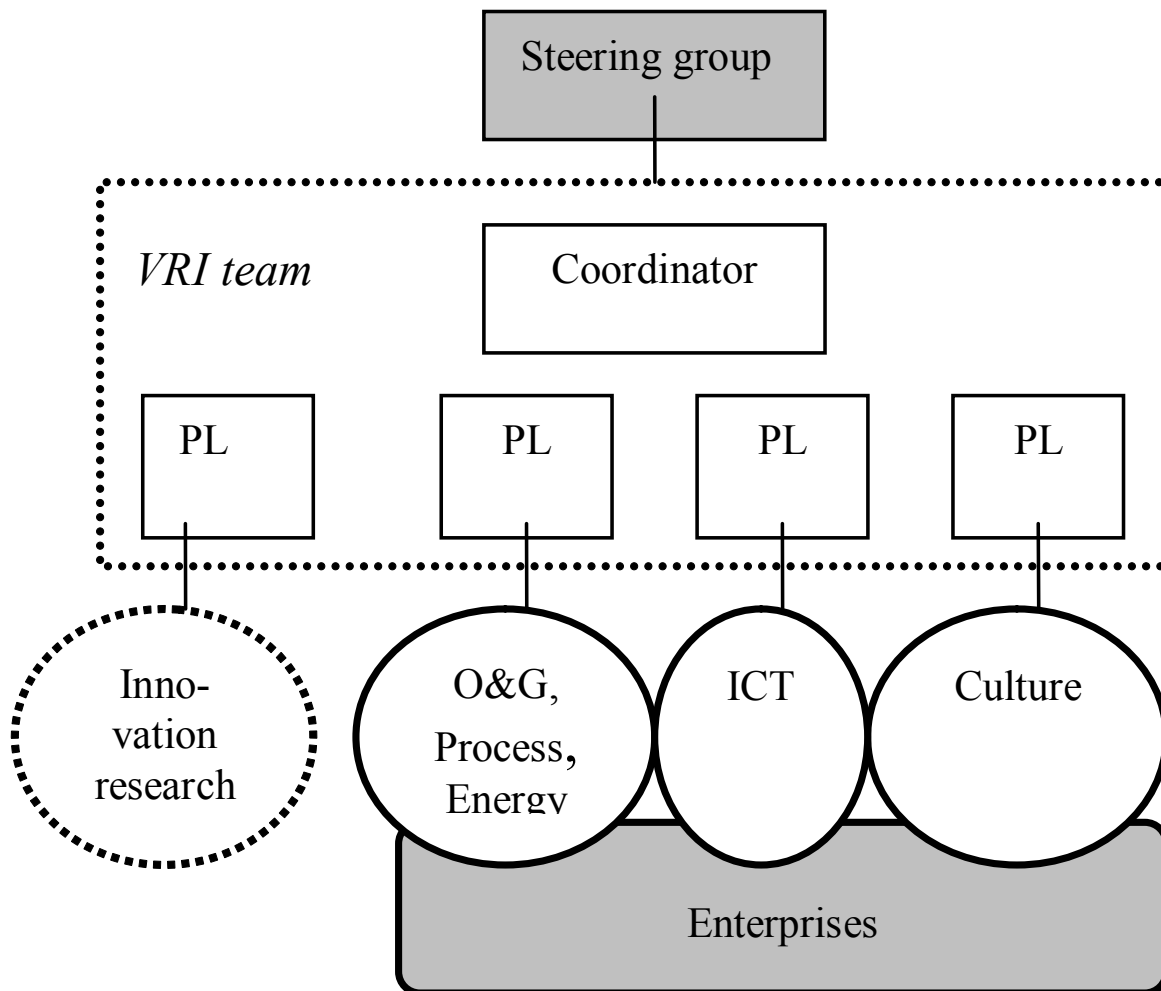


Figure 9: The organisation of the VRI Agder collaboration

The main tasks of the project leaders are to initiate activities within the three industry collaboration projects, and to identify interventions that might be applicable on a case-to-case basis. Such interventions might include foresight exercises, knowledge brokering activities, personnel mobility/exchange initiatives, or pilot studies. The four project leaders are located at the University of Agder (innovation research and innovation, R&D collaboration in and with oil & gas/process/energy), Agder Research Institute (innovation and R&D collaboration in and with the culture and experience industry) and Coventure AS, a semi-public business incubation company (innovation and R&D collaboration in and with the ICT cluster).

To enable learning and critical reflection within the projects, several collaboration and learning arenas will be tested³⁷:

- A regional arena, composed of the Agder regional partnership, the VRI Agder steering group and regional authorities involved in the management of VRI activities,
- Industry-specific networks, and business networks transgressing industry boundaries, and
- Corporate arenas catering for firm-specific VRI projects.

The industry collaboration project is complemented with a separate innovation project. The VRI Agder innovation research project has been based on a set of basic assumptions concerning the drivers of R&D and innovation in the four targeted industries in the VRI Agder collaboration project. These assumptions, which frame the set of interventions that are to be probed in the VRI Agder collaboration project 2007-2009 are laid out in the table below:

Table 4: VRI Agder innovation research project assumptions

	Oil, gas and processing industry	ICT cluster	Culture and experience industry
Labour/work organisation	Traditional hierarchies, strong unions in traditional processing industry but also flexible project organisations in other parts of the industry.	Decentralised organisation, individually autonomous, low unionisation, teamwork organisation.	Mainly project organisations and network collaboration. Temporary organisations with very low unionisation of the labour force.
Industry relations with the regional governance structure	Strongly localised and capital-intensive. Experience-based skills. Not an industrial focus area in regional governance networks, although oil and gas is emerging as increasingly significant.	Not very localised due to extensive application of codified knowledge. Remains a strategic focus industry in regional governance networks in Agder.	Significant dependence on public funding. The cultural and experience-based economy as a part of regional branding initiates many networking activities.
Industry learning and innovation processes	Based on tacit knowledge and competencies developed within the region. Linkages to global knowledge networks through foreign ownership of the major exporting companies in the region (MNCs).	Codified knowledge; dependency on recruiting highly educated and skilled personnel.	Local actors tightly coupled in temporary project organisations (festivals, events).

Source: modified from the VRI Agder research project application (2007).

The funding of the VRI Agder programme

In 2007-2009, the VRI Agder programme had a total budget of approximately NOK 30 million. The endeavour is co-funded by the Norwegian Research Council (50%), requiring regional co-funding of the remaining 50% of the budgeted expenditures. The two Agder counties provide the bulk of the regional funds (approximately 47-48 % of the total costs), with the rest co-funded by Innovation Norway and the local business community (person hours; see table 5).

The contribution of the Norwegian Research Council is financed centrally by three government ministries, with the Ministry of Local Government and Regional Development as the main contributor. In addition, the Ministry of Industry and Trade as well as the Ministry of Education and Research are also currently funding the NRC contribution to regional VRI projects.

Table 5: VRI Agder funding 2009 (NOK)

	2009
Norw. Research Council	6,300,000
Aust-Agder county	2,800,000
Vest-Agder county	2,800,000
Innovation Norway	200,000
Business Community	500,000
TOTAL	12,600,000

Source: Aust-Agder county administration. 2006/2315-3993/2009/X70

The distribution of funding between the different projects and activities has remained relatively unchanged

37 In this way, the VRI programme might be claimed to be just as complex and unfocussed as the VC2010 programme.

over the period from 2007 to 2009. For 2009 expenditure in terms of the VRI Agder projects is distributed as follows, about 63% is devoted to target industry projects (S1-S3 in table 6), 16% to the research project (Su2 in table 6), and 20% to user-driven knowledge transfer issues (learning, coordination, project management) and other organisational issues:

Table 6: VRI Agder expenditures 2009 (NOK)

Sub-projects (S) and support activities (Su)	2009
S1: ICT	2,660,000
S2: Cultural industries	1,920,000
S3: Oil/gas/energy/process industry	2,820,000
S4: Learning and collaboration	1,000,000
Su1: Project management, coordination	1,200,000
Su2: Research project	2,000,000
Su3: Gender mainstreaming (all projects)	500,000
Hours (firms)	500,000
TOTAL	12,600,000

Source: Aust-Agder county administration. 2006/2315-3993/2009/X70

The VRI Agder projects can best be described as public interventions, aiming at strengthening the regional innovation system as well as the interface between regional HEIs and the regional business community in a set of target industries. As many of the participating firms are recruited from established industry networks, the VRI Agder collaboration project constitutes an R&D and innovation service that firms in the target groups find relatively easy to take advantage of.³⁸

Development and outcomes of the VRI Agder Programme

In the target industries, various instruments were tested in the initial phase of the programme (2007-2008). In the ICT cluster, focus has been placed on company pilot studies on employee mobility and competence brokering. In the cultural field, competence brokering has also been the main activity. And finally, in oil/gas/energy and the processing industries initial efforts have focused on identifying factors that may help improve the mobility of personnel between the HEIs and major companies in the regional oil and gas sub-supplier industry.

Some of the interventions being developed are not new to the participating enterprises. Regional foresighting has for instance been applied in several waves in the NODE network to improve on the strategic development of the processing industry. The installation of regional R&D funds (*regionale forskningsfond*) has lent added prominence

to regional foresighting activities, as this new funding vehicle requires the development of regional R&D strategies. These strategies may be developed in tandem with foresighting processes.

In the autumn of 2008, the oil/gas and processing industry field was expanded to include energy production in general. The rationale here was to enable it to be better able to initiate collaboration activities between the University of Agder, Agder Research Institute and Teknova, a research institute for technology and science established in late 2007 as a joint venture between Agder Research Institute and the University of Agder.

Numerous industry-specific collaboration projects were funded by the VRI Agder programme in 2007 and 2008. In the energy, oil and gas and processing industry field a total of 13 projects were implemented, 7 of them involving the University of Agder in employee exchange arrangements (personnel mobility) with private enterprises. Teknova also took part in 2 personnel mobility projects. Most of these firm-specific projects were co-funded with a VRI contribution in the range of NOK 100,000-350,000. Activities carried out in the NODE and Eyde networks played a significant role here.

In the regional ICT cluster, VRI Agder funded a total of 19 different projects in 2007-2008. The projects were on average smaller than those carried out in the oil/gas/energy/processing industries sector, with VRI co-funding typically in the range of NOK 50,000-200,000. In the ICT cluster the interventions differed from those being tested in the oil/gas/energy/process industries, as no personnel mobility projects took place in the ICT cluster. Instead, the ICT firms prioritised pilot studies, internationalisation projects, knowledge brokering and networking projects. In almost all of the projects, the University of Agder was included as a project partner.

The cultural industry field has from the outset been identified as somewhat immature in the context of the regional innovation system. Much effort has been put into raising awareness within the cultural and experience-based industries about the opportunities for R&D and innovation support provided by the VRI Agder collaboration project. The 2007-2008 project activities centred on knowledge brokering activities, dialogue development, foresighting and action research initiatives. These priorities are in large due to the fact that the firms in the cultural and experience-based industries are unfamiliar with the process of developing dialogues with the research community in their innovation efforts.

The agents participating in the VRI collaboration initiative have identified a range of outcome targets in the short and medium term. In the *oil and gas/energy/processing industry*, the targets set for the 2007-2009 period have been identified as

³⁸ James Karlsen, personal communication.

- Increasing the number of collaboration projects between firms, and between firms/R&D institutions,
- Improving the exchange of competencies in international strategic management between the enterprises and regional HEIs, and
- Improving the presence of cooperation endeavours between the processing industry, suppliers to the oil and gas industries and regional HEIs.

These short-term objectives are primarily activity-based. In the longer term, the collaboration set more tangible targets. The collaboration aims at developing more project-based tertiary level studies at the regional HEIs, based on the regional demands of the industries concerned, and to apply current competencies in developing new industries and branches. In a 10-year perspective, the direct objective of the industry is to develop new technologies and products for sub-suppliers to the oil and gas industry.

In the ICT industry, the short-term objectives of the VRI interventions are mainly also qualitative. For 2007-2009, the participating firms in what they themselves identify as the Agder ICT cluster aim at

- Improving the number of collaboration projects between firms, and between firms/R&D institutions,
- Recruiting an increasing number of University of Agder graduates, and
- Increasing the entrepreneurial level/innovation level in the cluster

In the medium and longer term, the firms of the ICT cluster want to provide the regional cluster with a more prominent profile and identity, as well as increasing the number of international agents in the regional cluster.

The firms in the cultural industry have not established qualitative or quantitative targets to a similar extent.

Two main observations have been drawn so far from the activities of the VRI Agder programme. At the operational level, public and semi-public organisations and agencies have been very active in the programme. Their dominance has to some extent made VRI Agder more of a supply than a demand-driven initiative. This has raised the level of entry for many members of the regional business community, and appears to have eroded the relevance of the VRI programme for some prospective users in the private sector.

At the strategic level, the VRI Agder programme has involved representatives of the administration as well as the academic community of the University of Agder. This broad involvement signals to some extent conflicting interests in respect of the HEI in this regional partnership (the long term strategic vs. short term operational), has also proved to be something of a challenge in the context of the VRI Agder programme team.

Concluding remarks

The VRI Agder programmes' objectives and focus on a set of target industries is linked to the strategic regional plan of both Aust-Agder and Vest-Agder counties, as well as in the joint action programme of the two counties. The VRI objectives are also echoed in the strategic plan of the then Agder University College, which identified a) learning and knowledge development and b) business development and innovation as two of its five strategic focus areas for the future.³⁹ The targeted industries in the VRI collaboration project had earlier benefitted from targeted public support programmes.

The OECD has recently noted that the VRI programme, by transgressing academic and industrial as well as administrative boundaries, is a promising template for promoting regional innovation in a truly interactive manner:

"It is the aim of the VRI project, which with the exception of the Regional Innovation Strategy pilot actions of the EU Commission is a rather unique innovation policy programme in an international context by promoting broadly defined regional innovation systems, to achieve this [innovation activities based on localised, interactive learning and co-operation exploiting learning based competitiveness building on a Doing, Using and Interaction (DUI) mode of innovation]" (OECD 2009; 153).

Garmann Johnsen and Isaksen (2009; 16) are more specific, noting that

"the DUI-firms in Agder have informal, local relations, but few formal, local links. The science and technology innovation (STI)-based firms, on the other hand, have some formal links to regional knowledge organisations, but nearly none (sic.) informal ties".

In an assessment echoing Garmann Johnsen and Isaksen (*op.cit.*), the 2009 OECD review of the innovation system in Agder reports that Agder has "a fairly weak innovation system. The knowledge infrastructure is dominated by the university of Agder, and relatively few firms co-operate with universities and R&D institutions [...] The regional innovation system is thus fragmented in the sense of little direct knowledge flow between the two sub-systems" (OECD *op.cit.*: 41). Later in the same report, the OECD notes that university-region relationships are in general weak, especially with respect to the higher education faculties represented at the Kristiansand campus. The connectivity in the regional innovation system between HEIs and the private/public sector needs to be strengthened (OECD *op.cit.*: 158).

At the same time, several regional business networks and cluster cooperation initiatives such as Eyde and NODE appear to be functioning well. The NODE cluster of equipment suppliers has recently (2009) been awarded Centre of Expertise status by Innovation Norway. Eyde

³⁹ Agder University College (2005), Strategiplan – mot 2010 [Strategic plan – towards 2010] (June).

and NODE enterprises are prominent members of the set of enterprises engaged in the VRI Agder programme. The VRI Agder projects may thus be seen to be providing an opportunity to utilise these established business and industry networks to explore various modes of knowledge diffusion between organisations and networks in structurally very diverse industries. At the same time, the experiences drawn in the context of the various regional VRI programmes in Norway underline that the development of functioning regional partnerships is along term effort that requires continuous adjustment in terms of objectives, interventions and participants

Sweden: Science Park Jönköping - Jönköping University and Regional Development

Lukas Smas

Introduction

Jönköping University is involved in the regional development process in various ways throughout the Jönköping region. A particularly interesting collaboration can be seen to be forming around the Jönköping Science Park and in particular around the development of the Science Park-system. The system has evolved from the traditional science park approach into a novel model for regional development which has now been adopted throughout the region.

This paper is structured in four sections. The first section provides a brief overview of regional development while the second section looks at Jönköping University. The third section focuses on the development of Jönköping Science Park and the Science Park-system describing the collaborations in an accessible way. In the fourth section some conclusions are drawn about the collaborative processes around, and the knowledge dynamics generated through, the science park.

Regional development in the Jönköping region

Jönköping, located on the southern shore of Lake Vättern, is the main city in the Jönköping region. The

administrative region of Jönköping County is constituted by thirteen municipalities (Table 7). It is a region with strong entrepreneurial traditions but remains rather weak in respect of higher education⁴⁰.

Jönköping region is growing. The population is growing as are the local businesses and the university. It is prominently argued in the regional development plan that the city's geographical position - located in the middle of the triangle encompassing the three largest city regions (Stockholm, Gothenburg and Malmö) in Sweden - is an advantage.⁴¹

Jönköping County Council's (*Landstinget i Jönköpings län*) main responsibilities are the health and medical sector, which accounts for 96 % of its budget. It also has responsibility for public communication within the region and for regional development, which together amounted to 3 % of the budget in 2007.⁴²

Regional development is organised under four different headings. The first is education, with four regional colleges working in collaboration with the local municipalities. The second is cultural activities such as regional museums and theatres as well as consultancy work. The third area of responsibility is the international unit, which is connected

Table 7: Statistics about Jönköping region 2007 (Source SCB)

Municipality	Pop.	Pop.	Employment	Higher Education		
	Density	Absolute		< 3 year	> 3 year	Research
Aneby	12.5	6506	3202	457	445	6
Gnosjö	22.8	9657	5179	549	456	4
Mullsjö	35	7046	3490	574	557	9
Habo	31.5	10375	5475	921	981	20
Gislaved	25.7	29330	15080	1765	1619	18
Vaggeryd	15.6	12939	6716	897	872	17
Jönköping	83.1	123709	61596	13195	15465	408
Nässjö	31.5	29461	14152	2304	1975	32
Värnamo	26.9	32930	17183	2464	2582	35
Sävsjö	16	10937	5213	680	665	11
Vetlanda	17.5	26365	13203	1805	1752	24
Eksjö	20.4	16435	8039	1221	1731	49
Tranås	44.3	17920	8225	1255	1310	25
Jönköping County	31.8	333610	166753	28087	30410	658

40 Andersson & Sjölundh (2007), p. 10.

41 Regional Council of Jönköping County (2008).

42 Jönköping County Council's website.

to the Assembly of European Regions. Development is the fourth area of responsibility focusing on the monitoring of those companies in which the County has a specific financial interest, companies which include *Almi Företagspartner*, *Enterprise European Network*, *Länsteknikcentrum*, *Länstrafiken AB* and *Smålands Turism*.⁴³

In 2005 the main responsibility for regional development was shifted from Jönköping County to the newly established Regional Council of Jönköping County (Regionförbundet Jönköpings län). In a broader context this relates to a shift from regional policy to regional development policy with an increasing focus on the decentralisation of regional development to the regions⁴⁴. Three main programmes currently exist in respect of regional development the Regional Development Programmes (RUP), the Regional Growth programmes (RTP) and the Structural funds⁴⁵.

In the Regional Development Programme for Jönköping from 2008 the region is characterised as the creative heart of Sweden⁴⁶. In the programme Jönköping University is highlighted as being an important actor in regional development both in terms of providing education and enhancing the pool of skills available in the labour market but also through its promotion of innovative research and entrepreneurial spin offs. The offices of the Regional council are also located between the university and the Science Park. Jönköping municipality's business and trade policy strategy, the university and the Science Park are defined as strengths in the SWOT-analysis⁴⁷.

Jönköping University

Jönköping University has foundation status in legal terms. It is one of three private universities in Sweden (providing education up to PhD-level). The other two such universities are the Stockholm School of Economics and Chalmers University of Technology in Gothenburg. During a debate around the establishment of Jönköping University as a foundation, in the Swedish parliament Ulf Melin (m) former member of the foundation board of Jönköping University argued that a university in the form of a foundation is more dynamic, with more engagement and efficient decision processes. In addition he noted that collaboration between the university and businesses has more potential if the university is less connected to the state⁴⁸. The current president of the university Thomas Andersson also recognizes this freer role as important for consistent engagement and collaboration with society and in profiling the university⁴⁹.

The four other profile areas will be briefly discussed to provide a framework for the rest of the paper. The university is organised into four different schools; the

Jönköping International Business School, the School of Education and Communication, the School of Engineering, and the School of Health Sciences. These are all subsidiary organisations of the parental company which also consists of the University Services department. Economically the foundation had 718 MSEK in revenue in 2007 of which 552 MSEK came from state support, i.e. 77 % of the institution's income comes from the state⁵⁰.

The history of the university can be traced back to the 1897 but it was only established as a state university college in 1977 through the reformation of the higher education system in Sweden. In 1994 it was awarded foundation status and became a university with three different schools; the fourth School, of Engineering, was reformed and incorporated into the organisation in 2007⁵¹. Education, research, internationalisation, entrepreneurship and collaboration with society are the five profile areas of the university. The focus in this report is on collaboration with society and in particular business collaborations and the development of the Science Park.

Jönköping International Business School (JIBS) has perhaps the clearest focus on entrepreneurship and business-oriented collaboration. A close and reciprocal relationship with the surrounding community is seen as crucial and is integrated into the schools activities⁵².

To sum up, the JIBS offer their students both traditional entrepreneurship courses and facilities for students who want to start their own business. Many students set up their own business in parallel with their study. Considerable resources such as mentors and incubator facilities are needed to organise such activity, and significant support is obtained from both the university and the local business community. Most activities are very action-oriented, emphasising a high degree of student involvement, such as the Summer-entrepreneur programme, while requirements on the potential of the business ideas seem less prevalent. This allow for a high volume of activity and low threshold for students to participate.⁵³

Collaboration with the surrounding community

Jönköping University emphasizes collaboration and interaction with the community and is involved in a range of different collaborative projects related to education such as commissioned education and *alumni* activities, and research dissemination and funding. Research support from the region is a frequently reoccurring paragraph at the university board meetings. The university board has also for example decided to participate in a collaborative marketing project with Jönköping municipality and businesses in the

43 Jönköping County Council's website.

44 See Hudson (2005).

45 Ikonen & Knobblock (2007).

46 Regional Council of Jönköping County (2008).

47 The Municipality of Jönköping (2007).

48 Protokoll 1992/93:123

49 Andersson, T. (2007).

50 Jönköping University (2009).

51 Jönköping University web site.

52 Jönköping International Business School website.

53 Rasmussena & Sørheimb (2006).

region⁵⁴. The university meets with the municipalities and regional councils for annual deliberations, at the meetings representatives of both the Science Park and from the various schools take part⁵⁵.

The “*Knutpunkten* Career Centre” provides offering counselling, mentor programmes and seminars etc., provides a meeting place, between the labour market and the university for students. The technical and economically-oriented students are connected to a sponsor firm (fadderföretag) from the first year and there are currently over 800 firms in the sponsor pool. Students in the Schools of Education and Communication and Health Sciences undergo work-based education in collaboration with over 1000 schools and 350 municipal and regional health institutions. Two other projects mentioned on the university website related to the research and education sector are:

- Futurum. Collaboration between the School of Health Sciences and the County Council to stimulate and finance clinical research within the county and to facilitate education within the health and medical sector⁵⁶.
- JTH-project. A project which aims at establishing Jönköping as a national centre for product and production research and to help further develop the School of Engineering by endowing it with a PhD-programme. This is a collaborative project together with Chalmers University of Technology in Gothenburg and KTH (The Royal Institute of Technology) in Stockholm with additional support from The Regional Council of Jönköping County, Jönköping County Council, and the Chambers of Commerce.

The university is also involved in a regional development centre (PULS) together with the municipalities and the regional authorities. It is a project based on collaboration with an overarching focus on education and practically oriented research⁵⁷. Jönköping International Business School has extensive research within the area of regional economics and regional development. According to Charlie Karlsson, Professor in Economics it is the best research milieu in the field in Sweden⁵⁸.

The strategies of the university are (1) focus and specialization, (2) global, national, regional and local collaboration, and (3) Entrepreneurship, creativity and innovation. The Science Park is especially important for the third strategy:

In relation to its specialisation in the field of entrepreneurship, Jönköping University has established unique opportunities for students to start a business during their period of study, notably in connection with

the Business Lab located in the neighbouring Science Park Jönköping. Each year, about 50 enterprises are set up by students and researchers of Jönköping University.⁵⁹

The Science Park in Jönköping

Science Park Jönköping is an important node for both the university in particular and regional development more generally. It functions as an incubator and a platform for starting up firms as well as a meeting place for students, researchers, firms and institutions. In connection to the Science Park two other projects have evolved: The Science Park system and Jönköping Business Development.

The university is closely involved in developing Science Park Jönköping and its Business Lab, Business Incubator, and Business Growth units and in seeking funding from business. The park has 90 companies and also acts as a resource and source of know-how for existing enterprises. The university also owns the Jönköping Business Development investment company.⁶⁰

Science Park Jönköping

In May 2002 the Science Park in Jönköping was inaugurated⁶¹. Science Park Jönköping AB (SPJ) is an incubator primarily for knowledge intensive businesses (KIBs). The establishment has been owned since 2007 by Jönköping University and The Municipality of Jönköping through a joint non-profit association⁶². The science park is a platform for business development started up via a project in 1999⁶³ and was established as the firm *Creative Centre Science Park Jönköping City AB* in 2000⁶⁴. Until 2007 the Science Park was owned by the association *The Science Park System*.

The Science Park is organised into three different business areas, Business Lab, Business Incubator and Business Growth, which relates to the start up, development and growth of companies. The Business lab is a test site for new ideas from students and researchers as well as from the surrounding business environment. Therese Sjöholm, CEO of the Science Park characterises it as an “open source” environment⁶⁵. From the fruitful ideas advanced in this context firms can then be established and developed through the Business Incubator, although the incubator cannot house all new firms. The Business Growth unit contains established firms with their origins either in the university or outside it. Problems arising with the institutional border between the ‘inspiration’ group and the lab (incubator) aimed primarily at students on the one hand, and the Science Park on the other has been actively discussed on the university board⁶⁶. The science park has an extensive network of formal collaborative partners:

54 Jönköping University board minutes 2003-05-26

55 Halldorf (2007).

56 Futurum website.

57 Jönköping University (2009).

58 Charlie Karlsson interviewed in Norrlund (2007).

59 Jönköping University website: Strategic Development

60 Jönköping University (2008).

61 Science Park Jönköping AB (2003).

62 Science Park Jönköping AB (2008).

63 Science Park Jönköping website.

64 Science Park Jönköping AB (2001).

65 Andersson & Sjölundh (2007), p. 11.

66 Jönköping University board minutes 2001-05-28.

- *Avapatent* (intellectual property law consultancy)
- *Smålands Banken* (Danish bank: banking/finance)
- *Advokatfirman Glimstedt* (business law consultancy)
- *Gärde Wesslau Advokatbyrå* (Swedish and international commercial law)
- *Länsförsäkringar Jönköping* (banking/finance)
- *Öhrlings PriceWaterHouseCoopers* (general consultancy)
- *Swedbank* (banking/finance)
- *Visma* (supplier of software and services for accounting and administration)
- *Newsdesk* (PR-services and consultancy)
- *SEB* (finance and banking)

There are also a range of different financiers involved such as state and regional agencies (Vinnova, Innovationsbron Nutek, Regional Council of Jönköping County, Jönköping University, Jönköping municipality), private partners (*Företagarna, VSM Group*) and international agencies, such as the EU. This is also reflected in the board of the Science park which currently consists of Johan Svedberg (chairman), Handelskammaren/Svedberg Företagspartner; Ann-Marie Nilsson, Jönköpings municipality; Juha Alatalo, Högskolan i Jönköping University; Per-Arne Andersson, *Kinnarps AB*; Peter Olsson, School of Engineering; Carina Lundeholm, *CCJ Kommunikation AB*. Vinnova has, for example, granted funding for three firms in the Science park for research and development⁶⁷. The Science Park has developed from originally being a project platform into a robust firm in its own right.

The university board took a decision about principal ownership of the Science Park (or rather, the Creative Centre Science Park System) in 2000⁶⁸. In 2001 the university board visited the science park and was briefed on its activities. The board showed great interest in the project and decided to visit the park again in spring 2002⁶⁹. The university board is regularly updated on the development and activities at the Science Park. There is an emphasis, on the university board, on technical firms and on persistent firms⁷⁰. During 2003 approximately two different activities were arranged by the Science Park every month⁷¹. In 2005 a new organisational structure was discussed for the Science Park at the university board, which in 2007 resulted in an organizational separation between the Science Park System and the Science Park⁷². During the same time period a holding company was also established which was later named *Jönköping Business Development*⁷³.

Jönköping Business Development AB (JBD) is an investment company and a regional venture capital company, owned by Jönköping Science Park AB, Jönköping University, the Sixth AP-fond, the Federation of Swedish Farmers (LRF) and a number of other private investors. The objective of the firm is to contribute to the development of newly created firms in the region of Jönköping by providing financial support and access experiences and networks⁷⁴. SPJ Development AB was formed by the university and the Science Park in 2005 as a holding company. In 2007 the status of shares changed and there was a new issue of shares. Today the university holds 20% of the stock⁷⁵.

In 2008 the president of the university declared that: "Our Science Park is on its way from being a de facto underfinanced non-profit association to becoming a professional business organization with the potential to become one of Sweden's leading technical parks"⁷⁶

The Science Park System

The Science Park System is a non-profit association with the aim of enhancing business development and commerce in the Jönköping region and in Sweden more generally by supporting knowledge-intensive businesses and products. All of the municipalities in the Jönköping region are part of the organisation as well as Jönköping University, Jönköping County Council, the Chambers of Commerce in Jönköping, the Swedish Federation of Business Owners and the Confederation of Swedish Enterprise.⁷⁷

The overarching objectives of the Science Park-system association are to contribute to regional innovation and to act as a motor and/or platform for the development of synergies between business, public institutions and various other individuals. The aim here is also to create further possibilities for the creation of new businesses through the production of creative meetings and processes between the university and the private sector. The focus here is on knowledge-intensive businesses and growth-oriented companies.

The system consists of a number of nodes. A node should include a meeting place with physical facilities such as offices and conference rooms, business services such as financial and marketing support, as well as knowledge i.e. providing linkages to research and higher education.⁷⁸

67 Vinnova Forska&Väx, våren 2009.

68 Jönköping University board minutes 2000-08-29.

69 Jönköping University board minutes 2001-10-22.

70 Jönköping University board minutes 2003-08-25, 2003-10-20.

71 Jönköping University board minutes 2003-08-25.

72 Jönköping University board minutes 2004-12-06, 2004-04-19.

73 Jönköping University board minutes 2005-12-05, 2006-02-20.

74 Jönköping Business Development AB (2008).

75 Jönköping University (2009).

76 Andersson (2008).

77 Science Park-system in Jönköpings County website.

78 Ideella föreningen Science Park-systemet i Jönköpings län (2008).

With a view to its expansion and further development the Science Park-system is prioritized in the regional development plan. The work here has however been slow from the beginning and has only now become more established and seen as an important element in dealing with the economic downturn that has developed since the end of 2007.⁷⁹ In 2007 there were eleven nodes (or similar units) in ten of the thirteen municipalities in the county region⁸⁰:

- Arenum innovation och utveckling, Gislaved
- Entreprenörs- och Produktstudion, Träcentrum i Nässjö
- FöretagsFabriken, Värnamo
- Företagsinkubatorn, Logistikhuset i Nässjö
- Högskolecentrum, Eksjö
- Kreativ Arena, Vaggeryd
- Science Park, Jönköping
- Science Plant, Sävsjö
- Nuvab, Vetlanda
- Tranås Utbildningscentrum (TUC)⁸¹

The development and structure of the nodes differs from municipality to municipality. In Aneby, for example, work is going on between the municipality and businesses sector around the Novum house where a number of knowledge-intensive businesses have been established. In Gnosjö municipality's strategy of investigating the possibility of starting up a new node is proposed. Habo also has the intention of creating a node because of its close proximity and previous collaboration with Jönköping Science park. Although a number of private initiatives have been forwarded a similar development has emerged in respect of Mullsjö.

In 2007 the organisational structure of the Science park system was changed into a non-profit organisation with its current members and with this it withdrew its ownership of the Science Park. Jönköping Science Park was the origin of the Science Park system. It is today one of the nodes in the system. The Science park system extended the reach of the science park in the region.⁸² The initial decision on the Science park system was taken by the university board in 2001 which meant that the municipality would take care of the buildings and premises⁸³.

The change in organisational type was necessitated by the changes that occurred in the operational function of the Science Park System (SPS). The operational change is towards supporting the nodes and the municipalities' business strategies more actively. The association has one coordinator, employed on a 50% of full time basis, placed at the Science Park in Jönköping. The post is

funded indirectly through the Regional Council and other financiers via the association. In 2007 funds from the EU structural funds (NUTS II) were applied for and granted. The project is a collaborative venture with Kronobergs, Kalmar and Gotlands County. For Jönköping the project entailed approximately 5 million SEK over 3 years.⁸⁴

Conclusions

Jönköping Science Park and the Science Park-system have evolved in close cooperation with each other and have a mutual historical trajectory but are now two distinct entities with different objectives and structures. Jönköping Science Park is today a well established science park anchored in Jönköping municipality and within the university. The Science park system has, on the other hand, evolved into a regional development entity and expanded its geographical reach throughout the region.

The background to the collaboration which generated both the Science Park and the Science Park-system is captured by Sjölundh; "Science Park Jönköping was established as a non-profit association and a collaborative platform for the creation and growth of new enterprises."⁸⁵ The collaboration is closely fitted into the university strategy and the university's role in regional development. Since the initiation of the science park project other projects have followed such as Jönköping Business Development, and the further development of the Science Park System. The development and success of the Science Park can also be connected to the transformation of the university into a foundation which enabled it "to be less bounded by public laws and more prone to experimentation and specialisation"⁸⁶.

The main actors involved in the Science Park are Jönköping University and Jönköping municipality, but there are a range of other actors involved as mentioned above. In the Science park-system the municipalities together with the regional authorities are the main actors. In both collaborations all the main actors are located in the region. It is difficult to evaluate whether potential partners exist who are not currently taking part in the collaborative process, but there are already however a significant number of public and private, as well as research institutions, involved in the collaboration.

The main purpose of the Science Park continues to be taking care of, harnessing and developing ideas and projects from students and researchers into sustainable businesses while the Science Park-system has developed into a regional development tool or programme. The motivation from the university is based on the notion of shared interest on behalf of both students and researchers.

79 Regional Council of Jönköping County (2008).

80 Ideella föreningen Science Park-systemet i Jönköpings län (2008).

81 Science Park-system in Jönköping's County website.

82 Andersson & Sjölundh (2007). p. 11.

83 Jönköping University board minutes 2001-05-28.

84 Ideella föreningen Science Park-systemet i Jönköpings län (2008).

85 Andersson & Sjölundh (2007). p. 11.

86 Andersson & Sjölundh (2007). p. 10.

The university's involvement in the Science Park is strategic and long term; it is a formal relationship with funding and ownership. There are partnership agreements and joint ownership. The organisation has changed over time from the initial collaboration through the reorganisation of the owner relations, which necessitated a change in the roles of the other participants. In both the Science Park and the Science Park-system a highly formal and professional structure exists with both private sector firms and non-profit associations.

The funding has changed along with the development of the Science Park and the Science Park-system. In order to facilitate the activities joint associations and companies have been set up. External funding from various public and private partners has been crucial in the setting up of the various projects undertaken.

The Science Park-system is an example of the knowledge-dissemination approach used. The student ideas and the commercialisation of research also represent interesting knowledge flows. The type of knowledge produced by the Science Park primarily concerns the

commercialisation of products, something which can be related to symbolic knowledge and though experimental forms of knowledge also exist with the collaboration process, i.e. the Business Lab where ideas are tested.

The Science Park-system illustrates that experience can be transferred to other areas in the region. Nothing indicates that this region is unique in this regard, and it would probably be possible to transfer the system to other scalar levels. The project is helping to create a better match between the regional labour market and the regional economy. Considering the historical trajectories of the region with a focus on entrepreneurship the focus of the Science Park is on coordination.

The main policy implication here is that network-based organisation and financial support, both relating to information and knowledge as well as the funding and services, are crucial for the collaborative process. This case thus provides an interesting example of the interaction between research and development on the one hand and educational policy, business development and regional development policies on the other.

Sweden: The role of Dalarna's Högskola in the Vinnväxt project 'Triple Steelix'

Sigrid Hedin

Introduction

The following case study deals with how Högskolan Dalarna participates in the VINNOVA (Swedish Governmental Agency for Innovation Systems) financed Vinnväxt (Regional growth through dynamic innovation systems) project *Triple Steelix* (System for innovation in relation to advanced steel products and applications). Before describing the initiative in detail the introductory section includes a review of some of the socio-economic characteristics of the case study region and some general information about the university college.

Characteristics of the Dalarna region

The Vinnväxt project *Triple Steelix* covers the industrial region of Bergslagen. The industrial region of Bergslagen is a functional region that has no formal administrative borders. The region has traditionally been a mining district and is a historically and culturally distinct region of Svealand in central Sweden. Mining and the metallurgic industries have been important for the region since the middle ages. The geographical area of the industrial region of Bergslagen covers part of the counties of Västmanland, Gävleborg, Dalarna, Örebro and Värmland. The area is very rich in minerals. Mining has focused on iron ore extraction for centuries but other ores have also been mined. Most mines operating in the 1970s are however now closed. Today the steel industry in the industrial region of Bergslagen is internationally unique and has 0.4 % of the world's steel production. The industry is a world leader with a number of knowledge intensive steel products.⁸⁷ There are also other important economic sectors represented in the region such as tourism and the forestry industry, but they are not as strongly entrenched as activities related to the steel industry. In 2005 the unemployment rate in the region was slightly over the national average at 8 % compared to a national average of 7.3 %⁸⁸.

The Dalarna administrative region, which constitutes a part of the the industrial region of Bergslagen, is located outside the metropolitan areas and consists of rather peripheral areas with a lower population density than the national average at 10 inhabitants per km² compared to a

national average of 22. The number of inhabitants is 275 000. The population change from 2002-2005 indicates a population decrease, -1.1 promille compared to the national average 3.9 promille, although the regional centres such as Borlänge and Falun each have growing populations.⁸⁹

In the strategic document steering the development of Dalarna up to 2016, *Dalastrategin*, it is stated that Dalarna faces the problem of lacking a competent labour force. It is also noted that the competence of the labour force needs to be better adapted to the changing demands of both the private and public sectors. Moreover it is stressed that further efforts need to be made in respect of research and development and in improving the supply of competence.⁹⁰

On a general level less than 22 per cent of the population older than 25 years have a higher education. Many of the people with a higher education are employed in the health sector and in the municipal administration. This implies that the share of highly educated people within the industrial sector is low.⁹¹ The educational level in the region is also gender related. Traditionally it has been more difficult to recruit men to higher education. A higher education has for instance not been demanded for working in the male dominated industrial sectors historically prevalent across the region. This will however change in the future. The challenge here then is multifaceted in that it is necessary both to make sure that those employed in the industrial sector get an opportunity to enter further education and that women are encouraged to get an education and to seek work in the industrial sector.⁹² The future lack of competence is also closely connected with the demographic situation. Many people who have had a long working life experience will soon retire, and the competence they hold need to be replaced with an altogether different set of competences⁹³. Better competence levels are also needed to get a higher productivity level and higher value out of the production chain, this may be reached through, for instance, the modernisation of processes⁹⁴.

In a recent regional study it was stated that good accessibility to higher education is essential to improving the supply of competence in the region. Here better communication with the university cities of Uppsala and

87 Triple Steelix (2004).

88 Neubauer, J. et al (2007).

89 Neubauer, J. et al (2007).

90 Region Dalarna, *Dalastrategin*. Med förenade krafter mot 2016.

91 Region Dalarna, *Dalastrategin*. Med förenade krafter mot 2016.

92 Per Edén

93 Lennart Färje

94 Monika Brydsten

Örebro is mentioned.⁹⁵ These improvements in terms of infrastructure are also important in developing general accessibility, which makes it possible to live in Dalarna and work or study in Örebro or Uppsala⁹⁶.

Basic information on Högskolan Dalarna

Högskolan Dalarna was established in 1977. It currently has about 15 000 individual students; of whom around 6 000 are 'full time'.⁹⁷ The number of employed teachers and researchers is around 400. The university college has three 'academies'; Health and society (*Hälsa och samhälle*), Humanities and media (*Humaniora och Medier*) and Industry and Society (*Industri och samhälle*). At Högskolan Dalarna 40 programmes of study and more than 200 single subject courses in Education, Culture, Science and Technical Studies, Languages, Computer Science and IT, Sport and Health, Media and Aesthetics, Social Sciences and Economics, Health Care and Medicine and Tourism are offered. About a third of the students belong to the teacher-training course, with a further 25 per cent studying science and engineering. Interest in technical education has however decreased in recent years. Around 25 per cent of students study at the academy of health and society. The university has two campuses, one in Borlänge and one Falun. In addition to these campuses, education is also offered in Ludvika, Leksand, Filipstad and Sälen. Furthermore, distance education is also available and this form of education has increased significantly over the last five years. In 2008, 'distance learning' comprised a little less than half of the educational places offered counted as full year students.⁹⁸ It must however be stressed that many of the students participating in these courses actively visit the various campuses in addition to the distance learning aspects of their courses. Distance education also offers a flexible way of participating in the educational process for people who already have a family and who thus cannot easily attend the campus every day⁹⁹. The development of distance education also suggests that Högskolan Dalarna has branched out into the region and community of Dalarna in a way that more traditional educational institutions would not have done changing also traditional approaches to educational study. The potential also exists to use distance learning to offer education placements directly to companies¹⁰⁰. It is also clear that the offering of distance education has attracted women to engineering programmes implying that the rather gender segregated labour market in Dalarna may be set to experience a change away from traditional positions¹⁰¹.

According to the Higher Education Act and the Higher Education Ordinance, Högskolan Dalarna is commissioned to undertake research, provide education and co-operate with other actors in society¹⁰². The regional connection and anchoring, both with other public actors and the business community is stated in a number of the institution's strategic documents. This relates in particular to the requirement to offer education and research options based on the requirements of employers in the region. The overall philosophy of the university college is "we work in an international context with a national assignment and a regional responsibility"¹⁰³. According to representatives from Region Dalarna the regional anchoring of Högskolan Dalarna is well recognised. But the strategy needs to be implemented by individuals and may be developed further.¹⁰⁴

The regional linkage is also seen in the research strategy of Högskolan Dalarna for 2009-2012. This strategy was adopted in 2007 with six research fields being prioritised. These fields are to be 'applied' (in the sense of 'practical' knowledge), anchored in the education and undertaken in close cooperation with the business life of the region.¹⁰⁵ The research fields in the strategy connect with the *Dalastrategi*, but Region Dalarna has not actively participated in the development of the research strategy of Högskolan Dalarna¹⁰⁶.

Högskolan Dalarna participates in the *Pentaplus cooperation*, where several university colleges and universities such as Karlstad University, Örebro University, Mälardalens Högskola and the Högskolan in Gävle unite under the same organisation (federation) while retaining their institutional autonomy. The main reason for establishing a federation is to be able to establish an internationally competitive university with local autonomy by having a rational and quality-driven specialisation and division of labour between the participating universities and university colleges. This approach to cooperation includes the coordination of resources by developing common strategies as well as projects and arenas for interaction. Thus far there has been a coordination of language education, the establishment of a research school with a connection to teaching, the coordination of the education of specialist nurses, the development of modes of education on assignments etc. A common internationalisation strategy is also to be developed.¹⁰⁷ Per Edén stresses that Högskolan Dalarna also cooperates with other universities and university colleges in Sweden and abroad and this more general cooperation also remains important.

95 Region Dalarna (2008). p. 23-24.

96 Lennart Färje

97 Högskolan Dalarna (2008a). p. 1.

98 Högskolan Dalarna (2008a) and Högskolan Dalarna (2007).

99 Per Edén

100 Lennart Färje

101 Monika Brydsten

102 Högskolan Dalarna, http://www.du.se/Templates/InfoPage_____1149.aspx?epslanguage=EN

103 Högskolan Dalarna (2004).

104 Lennart Färje

105 Högskolan Dalarna (2007b).

106 Lennart Färje

107 Högskolan Dalarna (2008b). p. 24.

Dalacampus näringsliv is responsible for the strategic cooperation and collaboration that Högskolan Dalarna has with municipalities, county councils and the business community in the region. The aim here is to coordinate the demand and development of the competences required by the regional knowledge intensive sectors and other businesses. The role of contact point between the Högskolan Dalarna and its partner companies is undertaken through the development of projects, scientific and engineering education, and further education studies for those currently in employment, research and industrial placement based PhDs.¹⁰⁸

The *Näringslivsråd* (Business council) plays an important role in the development of contacts with the business community. External representatives are predominant here and the chairman is an external figure. In addition, there are also a number of branch councils, where the Högskolan Dalarna receives input concerning the needs specific sectors have in respect of education and research. In order to provide the business community with access to an adequate level of education Högskolan Dalarna has for instance developed a 2 year educational programme for people to train to become production or energy technicians. These programmes are a way of increasing recruitment into higher education while also offering further education to the already employed workforce.¹⁰⁹

Another important set of tools used by Högskolan Dalarna to remain in contact with the regional and local business life and with public employers are the so called *utvecklingslotsar* and *högskolelotsar*, development pilots and university pilot schemes. It would be impossible for a small organisation like Högskolan Dalarna to stay in contact with every employer in the region on its own. Instead locally anchored people are used and each municipality has a least one appointed *utvecklingslots*. That person performs the preliminary “need analysis” by visiting local employers and investigating their needs in terms of recruitment, further education and business development. At Högskolan Dalarna, all three academies have so-called *högskolelotsar*, which function as a contact between local companies and the Högskolan and help to allocate the resources offered in respect of education and research by each academy.¹¹⁰ This system is viewed as having been successful and thus far around 400 companies have participated in concrete actions thanks to these pilot schemes¹¹¹.

Another concrete example displaying the regional anchoring of the activities of Högskolan Dalarna is that contact with private and public employers begins during the first week of study in some programmes. In terms, for instance, of the technical education provided to students who want to become mechanical engineer students receive

a sponsor company and a project assignment that relates to that company. The involvement of SMEs is viewed as very important. In the Dalarna region there are around 10 large companies and, in addition, over 1000 SMEs of relevance for cooperation purposes. Through becoming involved with SMEs students realise that these smaller companies can also be considered as potential future employers. One advantage of working with smaller companies is that it is easier to work with a broader and sometimes also a multi-disciplinary approach in the projects and research tasks since those involved from the company side often have many roles in the company while at major companies specialisation is more common. In addition such individuals often function as mentors and guest lecturers. By entering into projects on assignment, these companies also gain access to the laboratories and analysis equipment available at Högskolan Dalarna. This project work is also developed into Master’s theses and other research assignments.¹¹²

The potential also exists for help to be given in the establishment of new companies. The Incubator run by Teknikdalen offers opportunities to develop and commercialise research results that have been developed on a public-private partnership basis.¹¹³

After this very brief introduction to Högskolan Dalarna, we will now turn to the specific initiative Högskolan Dalarna is a part of.

The collaboration initiative Triple Steelix

Background and purpose of the Vinnväxt programme and Triple Steelix

VINNOVA’s Vinnväxt programme aims at facilitating the creation of regional innovation systems. The Vinnväxt programme aims to promote growth and international competitiveness within the functional growth areas through problem-oriented research and development of innovation systems to internationally competitive levels. At a project level the programme is designed to support the concrete development of effective innovation systems in clearly defined functional regions. The aim is to make an impact at the policy level, for example, by influencing regional business policy, changes in development strategies for research and development organisations and developing new forms of cooperation between business, research and development and society. The programme is expected to make an effective contribution to the improvement of skills across all regions, to develop the operational skills necessary to work with the region’s leadership and to promote innovation systems. Implementation of the Vinnväxt programme began in 2002 and the selection

108 Högskolan Dalarna (2008c). p. 3.

109 Per Edén.

110 Högskolan Dalarna (2008c). p. 3.

111 Per Edén

112 Per Edén

113 Stiftelsen Teknikdalen & Per Edén

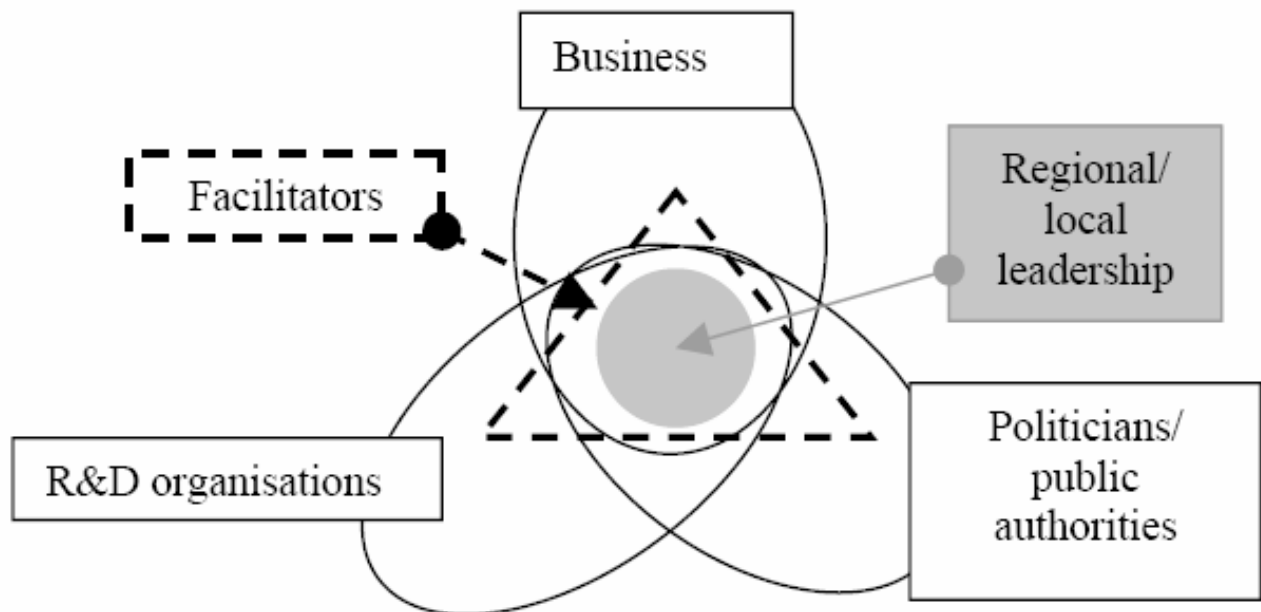


Figure 10: Triple helix model. (Source: Programme description p 10)

of projects is competitive. All selected Vinnväxt projects are based on a strategic idea, a strong research and innovation environment, strong regional leadership and active cooperation between the research and business communities as well as the public sector.¹¹⁴

The overall aim of the Vinnväxt project *Triple Steelix* is to develop the steel branch and infrastructure in the region in order for it to become a world leader. By bringing out new advanced technical solutions, the value of the steel can be further increased and the degree of refinement can be raised, thus creating new business.¹¹⁵

Moreover, *Triple Steelix* is expected to create a network and raise R&D provision and general competence levels in relation to steel thus contributing to the promotion of stable and successful enterprises across the region. This is to be achieved through wide-ranging co-operation within different applications and customer segments for advanced steel products. Consequently close cooperation between industry, society and the research community is needed in order to establish a dynamic innovation system tasked with creating new enterprises and improving existing one. Furthermore, *Triple Steelix* in the main supports small and medium-sized companies by creating direct accessibility to the broad knowledge-base in respect of steel and steel processing contained within the region. One possibility for researchers here is to test new ideas and help in the development of business strategy, production and marketing. This encompasses the creation of competitive enterprises and more secure jobs, long-term research efforts and technical development. Moreover it also

aims at the creation of attractive workplaces both for men and women. The Vinnväxt programme focuses, in particular, on research and strengthening cooperation between the research and industrial sectors. This is being performed in the *Triple Steelix* context by bringing research to the enterprises in those sectors where they often have previously had only limited contact.¹¹⁶

Initiators and currently involved main actors

A prerequisite for receiving Vinnväxt programme funding is the active participation of actors from the business community, research organisations, politics and public administration. Importantly this participation is based on the *triple helix* approach in which innovations are expected to take place within the three overlapping helices: industry, research and society. A long-term (12 year) objective of the programme is increased cooperation between actors in the triple helix. Moreover companies are encouraged to increase their cooperation with other companies and with other important players.¹¹⁷ Thus both public-private and private-private cooperation are encouraged by the programme.

The *Triple Steelix* project submitted an application to the Vinnväxt-programme in 2002. Jernkontoret (the Swedish Steel Producers' Association) stood behind the idea of the project together with some local actors and heads of business development in the municipalities. Even before the application was submitted smaller networks and projects had already been created in the region. The region

114 VINNOVA (2001) and VINNOVA, <http://www.VINNOVA.se/Verksamhet/Starka-forsknings--och-innovationsmiljoer/VINNVAXT/>.

115 Triple Steelix, <http://www.triplesteelix.se>

116 Triple Steelix, <http://www.triplesteelix.se>

117 VINNOVA (2001).

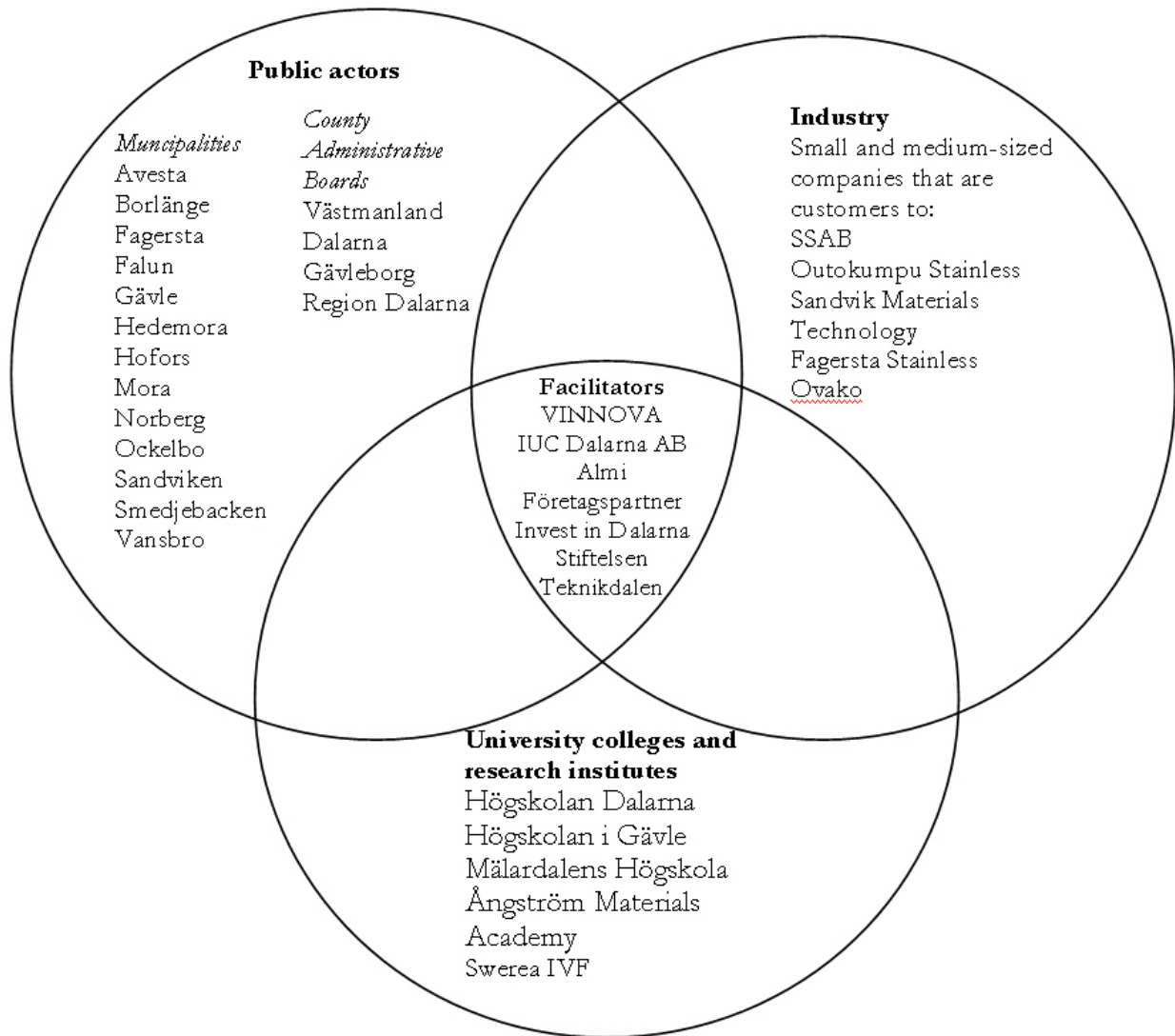


Figure 11: Triple Steelix actors

had e.g. organised networks between several enterprises within the material processing sector. In addition a number of other service enterprises existed within technical assessment; testing, IT and the environment developed from the needs of the steel industry. *The Rostfritt project and Network Tunnpått* provide examples of the important previously existing networks and organisations upon which Triple Steelix could build. These were used as a platform in the development of the application.

Triple Steelix did not succeed with the application in 2002, but received planning support (*utvecklingsanslag*) of 1.5 million SEK from VINNOVA in 2003 and made a successful application within the context of the second Vinnväxt call in 2004. The planning support made it possible to improve the application and expand the project by 11 million SEK including financing from eight municipalities, three county administrative boards, Region Dalarna, private enterprises and the universities.¹¹⁸ Planning support is considered very important for the project. It helped to anchor the project and gain additional

financing and legitimacy from the stakeholders. The fact that *Jernkontoret* is the project manager provided increased legitimacy for the project as well as better accessibility to the major steel companies¹¹⁹.

As mentioned above *Triple Steelix* is based on a “triple helix working method”, which is described as a goal-directed and non-bureaucratic cooperative venture between private enterprises, authorities and researchers where it is possible to quickly create, test and realise new ideas.¹²⁰ According to the process leader no major actor is lacking in the collaboration¹²¹.

The focus of *Triple Steelix* is on small and medium-sized enterprises (SME) and not explicitly on the globally competitive big steel companies in the industrial region of Bergslagen. In 2009, the six major process industries in the region and around 450 of the over 700 small and medium-sized enterprises related to steel manufacturing including service companies in the region, participated in the project's activities in various ways.¹²² The major process industries

118 Triple Steelix (2004).

119 Maria Engholm (gammal)

120 Triple Steelix, <http://www.triplesteelix.se>

121 Maria Engholm

122 Triple Steelix, <http://www.triplesteelix.se>

comprise Fagersta Stainless, Outokumpu Stainless, SSAB Tunnpåt and Sandvik Materials Technology. The involvement of the big companies is a prerequisite for the project, since the SMEs are often the sub-contractors that have grown up around the bigger companies. In addition, the larger process industries are also customers of the SMEs. Here the role of the major companies as demand setters is stressed since this implies that SMEs need to continuously develop in order to meet the demands from the bigger companies.¹²³ The idea of Triple Steelix is thus to create as much as possible around the larger companies and the potential they have for the region. Important private-private partnerships thus exist between the small and large companies where the small enterprises act as subcontractors. The variety of enterprises is also widening since the service enterprises also are addressed in Triple Steelix.

The research sector is represented by Höskolan Dalarna, Höskolan i Gävle/Sandviken and Mälardalens Höskola. Society as a whole is represented by 13 municipalities and the county administrative boards of Dalarna, Gävleborg and Västmanland.¹²⁴ The role of the public sector actors is to provide good conditions for industry to function, by creating financing and locational opportunities as well as an attractive environment in general for new and existing residents in the industrial region of Bergslagen.

Other actors include, for instance, Stiftelsen Teknikdalen (The Teknikdalen Foundation) and IUC Dalarna. Stiftelsen Teknikdalen aims to help innovators and small-scale entrepreneurs to develop their business ideas.¹²⁵ IUC Dalarna is a private limited company, where the majority of shareholders are local businesses. The aim is to develop companies, products and people in industry, mainly focusing on small and medium-sized companies in the wood and heavy industry sectors.¹²⁶

Geographical location of the main actors

During the *Triple Steelix* development process, the functional region has grown from the geographical core of 8 to 13 municipalities. The functional region covers parts of three different counties of Västmanland, Dalarna and Gävleborg. The direct focus of *Triple Steelix* is on the small and medium-sized enterprises despite their location. Administrative borders are thus not considered in this context as participating companies have not always been in the area of the participating municipalities. The development work is undertaken on the basis of the requirements of the enterprises while the issue of geography is only of secondary importance. This geographical approach thus implies that enterprises outside this region can be included.

The emphasis on a functional region also implies that the Höskolan Dalarna is only one of three university colleges in the “geography” of Triple Steelix. The point of departure is that *Triple Steelix* is working *with* and *through* the regional university colleges. But if the competence needed in a specific project is not available, the search continues in the rest of Sweden and indeed, beyond. It is however important to note that the competence provided by, and available at, the regional university colleges is utilised and not overlooked.¹²⁷

Collaboration and the role of HEI’s in regional development

The Vinnväxt programme can be seen as a complementary instrument to other regional development instruments. It is a national instrument targeted at the particular regional needs of certain already successful branches of the economy. *Triple Steelix* has been linked to the regional growth programme (RGP) of Region Dalarna and links well with the fulfilment of objectives mentioned in the *Dalastrategin*, such as the promotion of investment in research and development. *Triple Steelix* is not however explicitly mentioned in that strategy or the action plan dealing with the regional business life. Instead, more general modes of work for developing innovation systems and cooperation between companies are outlined in that document¹²⁸.

The local municipal actors have been actively involved in Triple Steelix from the beginning while the regional actors at the county administrative boards and the federation of municipalities (Region Dalarna) only became involved rather later. It is also the departments with the task of developing links with the business community that have the closest contact with local companies¹²⁹. Cooperation and the dialogue between Triple Steelix and Region Dalarna could however be developed further. Region Dalarna desires, for instance, better access to information concerning the strategic development of Triple Steelix. In addition, VINNOVA needs to recognise the role of regional actors better, regional financing is demanded but the level of involvement is often not specified.¹³⁰

Regarding the general role of Höskolan Dalarna in regional development, the cooperation with Region Dalarna and other actors such as county councils, company organisations, chambers of commerce is, in general terms, considered to be very important for Höskolan Dalarna. The establishment of the six prioritised focus areas in the research strategy is directly connected with the regional development programme *Dalastrategin*.¹³¹ Region Dalarna considers that the regional anchoring of Höskolan Dalarna became better when the Höskolan

123 Maria Engholm

124 Triple Steelix, <http://www.triplesteelix.se>

125 Stiftelsen Teknikdalen, <http://www.teknikdalen.se/367.php>

126 IUC Dalarna, <http://www.iucdalarna.se/english/index.htm>

127 Maria Engholm

128 Monika Brydsten

129 Lennart Färje

130 Monika Brydsten

131 Per Edén

repositioned itself some years ago with the development being based on the resources available. This implied that regional resources become more important. The cooperation between Region Dalarna and Högskolan Dalarna is exemplified by the fact that Region Dalarna has a representative in the Board of the Högskolan. In addition, there is a representative of Region Dalarna in the *Näringslivsråd*. There is also cooperation here concerning a number of specific themes.¹³² One particular theme here is the prioritised research area *Regionala Förändringsprocesser*.¹³³

Representatives of Region Dalarna stress the importance of having a regional university college that is engaged with its regional surrounding and works with local and regional actors in order to use them as regional drivers. Here it is important that the regional surrounding is recognised as being able to offer good empirical material and is not viewed as being too “provincial”¹³⁴.

In terms of broader regional development the need to discuss the question of whether forms of education other than that at the university level are needed remains something that needs to be discussed and further developed. For smaller service companies, i.e. tourism, study circles may be an option. Also the discussion of developing vocational higher education institutions is important in generating a higher level of basic competence in the region¹³⁵.

The motivation for collaboration within the Triple Steelix project

The motivation behind the Vinnväxt programme is that innovation takes place within the framework of complex processes as a result of a variety of actors *learning from and interacting* with one another. Moreover it is based on the idea that both experience and research show that geographic proximity can produce competitive advantages based on unique types of research, development and business cooperation, together with learning and skills. According to the programme description, regions which have an understanding of this, of their own business, research and educational organisations and of their political and public bodies will be able to cooperate and coordinate their resources effectively (as in the triple helix). They will also be able to consciously develop their competitive advantages and promote regeneration and innovation capabilities which will lead to new growth.¹³⁶

Most central for the *Triple Steelix* cooperation envisaged are the needs of the small and medium-sized companies. According to Maria Engholm in the industrial region of Bergslagen Vinnväxt is needed for two reasons: growth and attractiveness. Through increasing growth within small and medium-sized companies, a more differentiated

industrial profile is created within the steel branch. In turn, this creates a more attractive environment for the workforce, enabling them to become more mobile and willing to change workplaces and work tasks.

The currently advantageous situation of the steel-related industrial sector in the Bergslagen region is built on a proud industrial history but one which Triple Steelix is striving to ensure continues well into the future. It is recognised however that companies cannot continue to function in the same way as previously if success is to be continued into the future. The world market is open and the competition is strong. Before the existence of Triple Steelix acknowledgement of the existence of a “cluster” with significant competences in respect of steel production covering a large geographical area was definitely lacking. Furthermore, there are around 700 SMEs working in the same sector and where there is potential for cooperation. Triple Steelix is thus important in ensuring that the steel sector remains internationally competitive. Here better links to R&D providers is considered to be important. If Triple Steelix did not exist the risk would be that business was conducted on a localised level. In addition an altogether different industrial structure would exist where many companies had folded or at the very least evidenced a much lower competence level. The risk would also be that many would have been taken over by larger international companies suggesting that regional responsibility would have been much lower.¹³⁷

The core of *Triple Steelix* is its related geography and the fact that a branch specific competence exists. This implies that most problems can be solved. For the companies involved, the money offered in the cooperation process is not that important, rather the contact network, the opportunity to solve problems and the access granted to competence reservoirs are the driving forces behind participation.¹³⁸ The main reason for companies to participate in Master’s thesis projects is to gain a contact with the university environment *per se*, not only access to a free workforce and research laboratories.¹³⁹

In the context of the Vinnväxt programme the demand exists for the involvement of higher education institutions in order to be able to create an innovation system. The focus of Triple Steelix is connected to one of the most highly prioritised research areas of Högskolan Dalarna. In an evaluation of the Triple Steelix the Högskolan Dalarna is recognised as having an active role in the collaboration process.¹⁴⁰ However, the recent evaluation stresses that more effort is needed to ensure the inclusion of SMEs in research activities. Here there may be a need to develop a joint research and technology development strategy with for instance the Högskolan Dalarna.¹⁴¹

132 Lennart Färje

133 Monika Brydsten

134 Monika Brydsten

135 Monika Brydsten

136 VINNOVA (2001).

137 Maria Engholm

138 Maria Engholm

139 Bengt Löfgren

140 Cooke et al (2008). p. 22

141 Cooke et al (2008). p. 45.

The cooperation venture and ongoing relations with the universities both in the region and beyond, such as, for instance, the Royal Institute of Technology in Stockholm and the University in Luleå is highlighted as being of considerable importance in order to ensure that companies get access to i.e. recent research results. The regional university colleges are considered to have a high competence level in areas of particular interest to the steel and engineering industries, i.e. material science at Högskolan Dalarna.¹⁴²

Organisation of the Triple Steelix

The Triple Steelix project is considered to be a learning process and one with different needs at different phases. This has appeared e.g. as personnel changes. For example when the project was emerging from the planning phase into the operational phase a change in the project leader occurred due to the changes in needs involved. The learning process is supported by the follow-up research, evaluation and process support offered by the Dahmén Institute. The Institute works in many different ways to support the Vinnväxt programme. To provide process support it works with indicators from the project management perspective and models of project development.¹⁴³

Triple Steelix is designed to function as a platform for different partnerships enabling actors from the three “helices” to find each other and to solve common problems. *Triple Steelix* has four fields of operation: sheet steel, stainless steel, machining, and services & service. Each operation field is independent and has responsibility for their own area of concern. Overall responsibility for the whole *Triple Steelix* project is lodged with the board consisting of representatives of industry, society and research in the region. Process management at the regional level with a process leader composes the executive leadership for *Triple Steelix*. The process leaders have a reference group with a number of experts from various fields, e.g. steel processing, business development and information and marketing. These persons divide their time between *Triple Steelix* and work in various enterprises, research institutes, municipalities and county administrative boards.¹⁴⁴ This organisation is considered to be of great importance ensuring the flow of information and spillover effects from activities performed within the projects.¹⁴⁵

Högskolan Dalarna participates as a project partner in many of the projects run by *Triple Steelix*. In addition, Högskolan Dalarna participates in regular meetings concerning the general development of *Triple Steelix*. Högskolan Dalarna also has representatives in the Triple Steelix steering and research groups. Furthermore, a specific individual is employed half time at Högskolan Dalarna

and half time at Triple Steelix in order to work proactively exploring the needs of companies and developing these needs into projects.¹⁴⁶

Triple Steelix does not engage in business agreements. Competition is avoided and instead the focus is on issues that could be pursued cooperatively with Triple Steelix offering a neutral platform where competitors can meet and cooperate. The role of Triple Steelix is thus to create the conditions that facilitate cooperation and to understand and articulate the needs of the companies concerned. It is then up to the companies to participate in projects. In order to succeed with the tasks of *Triple Steelix* it is important to understand how politics and business work. It is important also to create the circumstances in which people learn to understand each others’ worlds.¹⁴⁷

What happens after the 10 years of funding from VINNOVA is something that has not been dealt with yet. The Board will begin to address this strategic question after 5 years of running the project. Hopefully, Triple Steelix activities have resulted in improved relations and contacts between public actors, research institutions and companies during the project period. The question remains however whether a ‘hub’ such as Triple Steelix is still needed when the project ends. Discussion currently centres on the issue of different parts taking greater responsibility in order to achieve a better fit.¹⁴⁸

Funding of the Triple Steelix project

VINNOVA provides the Vinnväxt “winner regions” with funds of up to 1.1 million euro per year for a period of 10 years. Actors in the “winner regions” must contribute with matching funding.

The financing of *Triple Steelix* is very complex. VINNOVA has disbursed *Triple Steelix* 60 million SEK over ten years implying that the yearly basic funding from VINNOVA is 6 million SEK. The project initiators (municipalities, private enterprises, and educational institutes) will invest at least the same amount of money in the form of financial and personnel resources within the ten years the project runs. The EU has also granted support for the project. Overall basic financing within the ten years is 160 millions SEK.

In 2009 the turnover was around 30 million SEK. The co-financing from other actors becomes greater and greater each year. Today a major part for the *Triple Steelix* activities is financed by SMEs. The finances from SMEs go in the main directly to projects.¹⁴⁹

Triple Steelix is also constantly on the lookout for new financing alternative, i.e. from the Structural Funds, international funding, other VINNOVA calls etc., which

142 Triple Steelix (2008).

143 www.dahmeninstitutet.se

144 Triple Steelix, <http://www.triplesteelix.se>

145 Maria Engholm

146 Per Edén

147 Maria Engholm

148 Maria Engholm

149 Maria Engholm

can finance activities that fit the goals of Triple Steelix. The *Triple Steelix* project can use the basic funding to match funding from i.e. the EU Structural Funds. It is considered to be more important to get financing to the right project than simply to get money, so it is important to have a clear goal orientation in respect of the projects. The political will exists to use the Structural Funds, since this make a difference and contributes to ensuring that the projects belong to a context.¹⁵⁰ In addition researchers always welcomed initiatives from which research could be financed.¹⁵¹

Activities performed within the Triple Steelix

During the period 2004-2005 the Triple Steelix attained legitimacy and progressed onto the operative phase of the programme including the promotion of the projects themselves with the questions over “what” and “how” receiving increasing interest.¹⁵² This can be related to the fact that the Vinnväxt-programme and Triple Steelix are viewed as part of a wider learning process. It is important to bear in mind here that the broader goals of the project concern the development of an innovation system.

In 2009 *Triple Steelix* had around 30 projects running. The projects cover different fields of interest; for instance the development of a “rolling ski”, cooperation between a foreign university and a company in Mora and the creation of a research centre for developing a prototype of forming.¹⁵³

From the project management’s point of view it is stressed that the projects are to be defined by the target groups. All members participating in a specific project are to be active cooperation partners and a project is built on the “common good” principle. This approach is usually successful contributing to a process of ongoing development where passivity is avoided. The establishment of core values, goals and strategies is however essential to ensure that people work towards the same goals. In this respect, goal orientation, strategic work, modesty, information activities, listening and not taking anything for granted all help in avoiding conflict.¹⁵⁴

The selected Vinnväxt regions are offered so-called ‘process support’ in the form of seminars, coaching, follow-up and the exchange of experiences for programme participants. Examples of support activities include seminars for communicating concepts and ideas; analysis and process support for project planning and implementation; active learning i.e. ongoing tracking and assessment and the active exchange of experiences through participation in forums. The projects are

evaluated every third year in order to determine whether they are complying with the demands set by VINNOVA. VINNOVA demands that the allocated money is used also on follow-up research and foresight processes.¹⁵⁵ Follow-up research has, for instance, investigated the *Triple Steelix* status and the efficiency of the cooperating parties. In addition an analysis was conducted of the companies that were active in *Triple Steelix*. Their turnover, product range, etc., were then compiled in a manner that assists *Triple Steelix* in prioritizing the right input for the right company.¹⁵⁶ This study will be made annually in order to study the development of the companies in the *Triple Steelix* geographical region.

Women have also become an important issue in creating attractive regions. The K2 project aims to promote women’s competence within the steel and engineering branch by increasing gender equality both in big steel producers and in all small enterprises that work within, or are related to, the steel branch. It highlights women in different ways and supports enterprises in the creation of more equal working places. The work is carried out by supporting enterprises in drafting an equality plan and the K2 project also offers advice for equality work and the recruitment of women.¹⁵⁷

Högskolan Dalarna has a staff member half time employed at Högskolan and half time for Triple Steelix. That person actively visits the municipalities and companies in order to investigate their needs while connecting them to the resources of the Högskolan. Having a background as an educator it is easier for this person to envision how the problem that the company wants solved can best be developed into a Master’s thesis. Here it must be stressed, however that the company is generally happy just to have the blueprint of the component needed, while the student must compile a full report in order to pass the exam. That Högskolan Dalarna provides the students with the contact with SMEs is essential, since this is a way for the students to discover these kinds of companies. If students do not have their own contacts, they tend to browse the Internet finding only the major employers. This match-making is also a way of rendering the smaller companies available to foreign students.¹⁵⁸

Knowledge generation and flows within the context of Triple Steelix

The existence of the robust learning process that the implementation of *Triple Steelix* implies is very important for the educational institutes particularly in respect of their ability to respond to industry’s needs in respect of labour force and R&D issues.

150 Maria Engholm
151 Per Edén
152 Messing (2006b)
153 Maria Engholm
154 Maria Engholm
155 Christensen, L.

156 Messing (2006a)
157 Triple Steelix (2008) and Triple Steelix, <http://www.triplesteelix.se>
158 Bengt Löfgren

Triple Steelix concentrates to a large extent on enterprises and ideas that have already come far in their technical development and therefore have a significant potential for growth. Some important development and research fields have already been identified. An important and growing part of Triple Steelix concerns the desire to strengthen the increasing number of service enterprises connected to the steel industry, e.g. within IT process control and in terms of technology for environmental measures.¹⁵⁹

The involvement and participation of large companies is of significant importance to Triple Steelix because they can provide legitimacy and create confidence. These large companies also have significant reservoirs of competence and knowledge that can be used in the projects. They also receive something in return since the labour market in the region is developing and is becoming more differentiated. This is regarded as a prerequisite for the region in order to be able to recruit competent manpower, and the company structure increases the mobility of labour between the various companies in the region.¹⁶⁰

Projects run within the Triple Steelix cooperation ensure that larger enterprises' R&D divisions become available or are utilized by the small enterprises. This is important for the six process industries since this in turn offers them access to competence while mandating their participation in the regional innovation system.¹⁶¹

The research undertaken within the context of *Triple Steelix* is "needs-motivated" and applied. The driving force for new knowledge is curiosity and is based on the fact that the SMEs have a problem needing to be solved. Here the role of Triple Steelix is to offer a meeting place. People working with Triple Steelix discover specific SME needs in respect of research and development conducted by visiting companies. Such activities can cover everything from developing Master's theses work to connecting Högskolan Dalarna with a partner institute or international university.¹⁶²

Within Triple Steelix there is a regional, national and international approach focusing on the quest for knowledge and competence. Administrative borders are not to be a barrier. It is important to have an inflow of new knowledge, people and capital to the region and to avoid a self-subsistent household approach.¹⁶³

The main target group, the small and medium-sized enterprises, is categorised as both upstream and downstream companies. Significant amount of knowledge and competence exists in respect of the development of materials, however a distinct lack of research and competence exists in respect of what happens after the process industry

does its work, i.e. *what* you do with the material. Here more research in respect of the behavioural and "soft" aspects as well as on service production is needed. How, for instance, does cooperation between subcontractors and major process industries work concerning i.e. agreements. More knowledge on these issues would also undoubtedly generate further business opportunities.¹⁶⁴

Having staff employed half time by *Triple Steelix* and half time at other employers, i.e. university colleges in the region, private companies and public actors is a way of encouraging the flow of information and knowledge generated by activities performed within *Triple Steelix*.¹⁶⁵

Concerning knowledge transfer, it is continually stressed by Högskolan Dalarna that communication is very important and different systems for knowledge transfer must be developed and adapted to the 'customer'. In order to generate SME involvement and engagement in research it is important to disseminate a more 'popular' version of research results.¹⁶⁶

Other universities offering education, such as the Royal Institute of Technology and Chalmers are also present in the region. Competition is not however stressed, instead it can be considered as the higher education institutions are good at different things.¹⁶⁷

Collaboration development and outcomes

The Vinnväxt programme aims at facilitating regional innovation systems. The long-term goal is to build a well-functioning regional innovation system. The main outcomes of the programme are innovations, increasing regional capacity, new networks, and the construction of a learning process. As stated previously the Vinnväxt programme adopts a long term approach of 10 years and also a rather robust funding arrangement. This is considered as essential in establishing an innovation system. The long term approach is also very important in getting companies more fully engaged in the project. This is one way to ensure that they will get something back.¹⁶⁸

The short term (2 years) outcome effect is envisaged as the establishment of strategic cooperation between research, economic life and the public sector in the functional region; and the putting in place of a research strategy for growth. In the long term perspective (10 years), new knowledge and technology are to be generated, while competence and experience of the commercialisation of new knowledge and technology are to be gained. In addition, growth within enterprises and structures for internationalisation are also to be created.¹⁶⁹

159 Triple Steelix, <http://www.triplesteelix.se>

160 Maria Engholm

161 Maria Engholm

162 Maria Engholm

163 Maria Engholm

164 Maria Engholm

165 Maria Engholm

166 Per Edén

167 Bengt Löfgren

168 Maria Engholm

169 VINNOVA (2001).

Triple Steelix has concretely implied for Högskolan Dalarna that around 10 PhD students could be employed in various companies, the establishment of a research school on processing and also the financing of more PhD students working on energy processes and the environment. Since Högskolan Dalarna does not have the right to issue PhDs cooperation with the Royal Institute of Technology in Stockholm has been important.¹⁷⁰ In addition, a number of Master's theses have been developed in Högskolan Dalarna in connection with Triple Steelix. Here Triple Steelix can offer a payment to the student for performing the work. This creates an incentive for students to work for smaller companies who could not otherwise offer payment on their own.¹⁷¹

According to Högskolan Dalarna Triple Steelix also makes a difference in respect of the creation and maintenance of a contact network. Before Triple Steelix each teacher had their own contact with different companies. If teachers left they took their contacts with them. Triple Steelix has now ensured that this ad hoc cooperation with companies has become more structured and that more teachers have contact with private companies in this manner.¹⁷² Högskolan Dalarna considers Triple Steelix to be an important tool in order to ensure that things and ideas do not fall between two stools since it unites many stakeholders in the steel industry.¹⁷³ Furthermore, Högskolan Dalarna has further developed its reputation thanks to Triple Steelix. The companies within the programme often conflate Triple Steelix and Högskolan Dalarna and even if the students are financed by Triple Steelix it is often Högskolan Dalarna that gets the credit.¹⁷⁴

One challenge to the ongoing cooperation process between private companies and researchers is that the worlds of research and business often envisage things differently or indeed envisage different challenges altogether. Different incentive structures also steer development in this respect. In the academic world, demand and needs-driven research in cooperation with SMEs is not often rewarded and acknowledged as meritorious. Here changes need to be made on the national level. Access to and contact between SMEs and research and higher education institutes would be easier if it was recognised as meritorious for the researcher. Currently things need to be packaged in special projects for innovation systems, such as Triple Steelix, in order to better connect the different worlds. Furthermore one must be aware of the fact that there are other differences between the business and academic worlds, for instance concerning the approach to communication. This awareness is essential in order to work with the establishment of an

innovation system.¹⁷⁵ Högskolan Dalarna also actively tries to encourage collaboration between companies and staff employed at the university college. There are for instance so-called cooperation prices (*samverkanspriser*) for companies, teachers and researchers. At the national level there has also been a recent proposal that collaboration experiences may function as a qualification in order to get a lectureship.¹⁷⁶

Region Dalarna also stresses that there is a gap between companies and the Högskolan, that needs to be bridged by developing modes of work, a common language and new methods.¹⁷⁷ In general terms, Triple Steelix is considered to be a good initiative that really helps companies in the region. There are few such initiatives built primarily on the involvement of, and cooperation with, companies.¹⁷⁸

One weakness of Triple Steelix may be that the strict focus on the engineering workshops implies that sectors such as carpentry and sawmills are excluded. Högskolan works with these industries, but not Triple Steelix. The results of Triple Steelix projects may however be applied in those industries. The situation is in many cases the same the only difference is that the work is carried out with different materials. Here there is a problem since the Jernkontoret (the Swedish Steel Producers' Association), as the main stakeholder of Triple Steelix, is not that interested in the development of other branches.¹⁷⁹ Region Dalarna however stresses that the "clusters" in Värmland, Gävleborg and Dalarna are encouraged to cooperate. It is however important to establish "trust" before cooperation is deepened in order to get an efficient exchange of results. Cooperation also exists between the various cluster initiatives within the region.¹⁸⁰

Conclusions

The Vinnväxt projects builds on the 'triple helix' model and on the idea of building well-functioning regional innovation systems in a long-term perspective. The basic idea is to promote an existing area of strength and create more growth and enterprises around an existing branch in a functional region. The Vinnväxt project Triple Steelix is an explicit initiative facilitating the establishment of an innovation system related to the steel industry and anchored in a functional regional context.

The role of Högskolan Dalarna is important in the investigated initiative since higher education institutions form an essential part of the process of establishing regional innovation systems. However, since the Triple Steelix covers a *functional* region, there are two other

170 Per Edén

171 Bengt Löfgren

172 Bengt Löfgren

173 Per Edén

174 Bengt Löfgren

175 Maria Engholm

176 Per Edén

177 Monika Brydsten

178 Lennart Färje

179 Bengt Löfgren

180 Lennart Färje

university colleges in the “geography” of the region. In addition, other higher educational institutions in Sweden and the rest of the world are involved in Triple Steelix projects. This triple helix cooperation clearly displays the importance and also the practice of that competence and knowledge is received both from the regional context but also from other domestic or foreign higher education institutions. This is a way of ensuring access to the competence needed to solve the specific problems of the companies involved in order to make them internationally competitive.

Högskolan Dalarna has a rather explicit *regional approach to research and education*, which it has developed in recent years. Meeting the demands of regional employers, both public and private is essential. Here the education of teachers and nurses is important, but also that of engineers specialised in the steel sector.

It is obvious that Högskolan Dalarna needs to participate in *networks* with other universities and university colleges, both formal and informal, in order to be competitive. Here the *PentaPlus* cooperation initiative provides an interesting approach.

The focus of education and research has increased in respect of *small and medium-sized companies*. The number of SMEs is around 15 000 in Region Dalarna, while major companies number only 10. The reason for targeting SMEs is that they are considered to have an untapped potential, both concerning the benefits they could receive for hiring higher educated staff and by developing needs-driven research in cooperation with university colleges. It is also important that the students discover that SMEs provide

an importance source of potential employment. This ambition corresponds well with the demand to develop a more knowledge-based economy in the region through the medium of SMEs.

The level of education also includes a *gender dimension*. Those people with a higher education in the region have traditionally been teachers and nurses. Across the region it has been more difficult to recruit men into higher education since they have traditionally worked in industry. Now most jobs demand a higher education, so more men must have a higher education before entering into working life. It is however also important that women are attracted to engineering and science programmes, and men to the teacher and nursing education programmes in order to have a less gender-segregated labour market.

The Triple Steelix initiative has an explicit goal of increasing *regional attractiveness* in the sense that by supporting the development of SMEs the business community becomes more differentiated and more attractive to the workforce. This in turn implies that companies, both smaller and larger, can more easily recruit the competences they need.

The research undertaken at Högskolan Dalarna seems to be *needs-driven* and connected with SMEs. It is, moreover, clear that there is a “niche” market here that can be serviced by the regional university college. Basic theoretical research can be done at the major universities. The research approach in Triple Steelix is predominately ‘applied’ to a specific problem and/or a specific company and this seems to work very well for all concerned.

References

- Reglab (2006). Universiteter som regionale vækstmotorer, REG LAB fokusanalyse nr 3.
- Denmark: Aalborg University's involvement in ICT collaboration and regional development in North Jutland
- Dahl, S. D., Pedersen, C. Ø. R., and Dalum, B. (2003). Entry by Spinoff in a High-tech Cluster, DRUID Working Paper, No 3-11.
- Reinau, K. H. (2007). Local Clusters in a Globalized World, Paper to be represented at the DRUID Winter Conference 2007.
- Rushforth, J., Arbo, P., Puukka, J., and Vestergaard, J. (2006). Supporting the contribution of Higher Education Institutions to Regional Development, Peer Review Report, Jutland-Funen in Denmark, Organisation for Economic Co-operation and Development, Directorate for Education.
- Vækstforum Nordjylland (2007). Vækst og balance, Erhvervsudviklingsstrategi for Nordjylland 2007-10.
- Vækstforum Nordjylland (2008). Regional Vækstredgørelse 2008, Analyserapport.
- Websites
www.iktforum.dk
www.brainsbusiness.dk
- Interviews
Bent Dalum, Head of Department of Business Studies, AAU, 16 March, face to face
Jan Lautsten, Co-owner, EB Denmark ApS, 13 March 2009, face to face
Jesper Jespersen, Director, NOVI, 16 March 2009, face to face
Thomas Kampmann, Responsible for ICT, Region of North Jutland, 13 March 2009, face to face
- Finland: Oulu Southern Institute and the Elme Studio
Ahonen, M. (2006). Selvitys Oulun Eteläisen alueen opiskelijoiden kiinnostuksesta yrittäjyyttä ja kauppatieteellisiä opintoja kohtaan. Raportti. Oulun yliopisto, Oulun Eteläisen instituutti. http://www.oulu.fi/oeinst/pdf/yrittajyysaikeet_ja_kiinnostus_kauppatieteita_kohtaan.pdf
Central Ostrobothnia University of Applied Sciences. <http://www.cou.fi/eng/>
Educational Municipal Federation of the Kalajokilaakso Region. http://www.kam.fi/in_english/
ELME Studio. web site www.elmestudio.fi, visited in March and April 2009.
ELME Studio/ research. web site <http://www.oulu.fi/elme/ELME2/index.html>, visited in April and May 2009.
- Jokela, H., Niinikoski, E. (2009). PC-free control system of forest harvester with remote control possibilities. FKD Report for REKENE project. University of Oulu, Oulu Southern Institute. Unpublished report.
- Jokela, H., Niinikoski, E., Saine, A. (2009). Creating ICT based innovation in traditional machinery. TKD Report for REKENE project. University of Oulu, Oulu Southern Institute. Unpublished report.
- Kalajokilaakson koulutuskuntayhtymä.
Naturally Hi-Tech. Oulu South. Brochure.
- Nihak Oy. <http://www.nihak.fi>, visited in April 2009.
- Nivala-Haapajarvi Sub-region. <http://www.nivala-haapajarvi.fi>, visited in April 2009.
- Nivalan Teollisuuskylä Oy. <http://nitek.nivala.fi>, visited in April 2009.
- Oulun Eteläisen korkeakoulustrategia 2005-2010. <http://www.oulu.fi/oe/pdf/OE%20strategia%20.pdf>
- Rantanen, J. (2009). Keski-Pohjanmaan, Pietarsaaren ja Oulun Eteläisen alueen korkeakoulurakenteen kehittäminen. Selvitys/kehittämisorjetti 31.1.2009. Keski-Pohjanmaan liitto & Pohjois-Pohjanmaan liitto.
- Saine, A., Selkälä, J., Rohunen, A. (2008). ICT/METAL Oulu South - a brief regional portrait (WP5). Draft version 30.04.2008. Unpublished report.
University of Oulu. <http://www.oulu.fi/english/>
- Interviews
Jokela, Harri, researcher, Oulu Southern Institute, University of Oulu
Jussila, Esa, executive manager, Nivala-Haapajarvi sub-region
Kokko, Eelis, director of Oulu Southern Institute, University of Oulu
Lauhikari, Antti, director of Centria, the R&D unit of the Central Ostrobothnia University of Applied Sciences
Mäntyjärvi, Kari, research director of electronics' mechanics and metal research group (ELME), Oulu Southern Institute, University of Oulu
Tirkkonen, Jari, development manager, Nivala Industrial Village Ltd
Valtanen, Kari, city manager of Nivala and CEO of Nivala Industrial Village Ltd
Yli-Olli, Heikki, director, Educational Municipal Federation of the Kalajokilaakso region KAM
- Iceland: Higher education in the field of renewable energy
Bjornsson, S. (2006). Geothermal Development and Research in Iceland. Reykjavik: National Energy Authority and Ministries of Industry and Commerce. [available on the internet: <http://www.os.is/Apps/WebObjects/Orkustofnun.woa/swdocument/6864/Geothermal+Development+and+Research+in+Iceland.pdf>].
- Cluster Navigators Ltd. (2003). Developing clusters. Cluster Facilitator's Manual, The Twelve Step Process: Prepared for Ministries of Industry and Commerce. Prepared by Cluster Navigators Ltd. New Zealand. Reykjavik: Cluster Navigators.
- Jóhannesson, H. (2008). REKENE. Akureyri region, draft issue. A brief regional portrait (WP5) [an unpublished report delivered for the Nordic research project REKENE]. Akureyri: University of Akureyri Research Centre.

Websites

AFE – Akureyri Business Agency (2009). The homepage of AFE, <http://www.afe.is/>

RES - School for Renewable Energy Science (2009). The homepage of RES, <http://www.res.is>

University of Akureyri (2009). The homepage of University of Akureyri, <http://www.unak.is/>

University of Iceland (2009). The homepage of University of Iceland, <http://www.hi.is/>

UNUGTP (2009). The homepage of United Nations University Geothermal Programme, <http://www.os.is/id/472>

Interviewees

Arnbjörn Ólafsson, International Relations Representative of RES, 14. May 2009.

Benedikt Sigurðarson, former Chairman of KEA cooperative, Chairman of Akureyri growth agreement and present member of RES's executive committee and board of directors, 25 March 2009.

Björk Sigurgeirsdóttir, former Cluster Facilitator of education and research cluster of Akureyri Region Growth Agreement 2004-2007 and current Manager of East Iceland Growth Agreement, 20 April 2009.

Björn Gunnarsson, Rector of RES, 23 March 2009.

Davíð Stefánsson, Chairman of the RES board of directors and of its executive committee, 21 April and 14 May 2009.

Þorsteinn Gunnarsson, Rector of University of Akureyri, 17 March 2009.

Þórleifur Stefán Björnsson, former International Relations Representative of RES, 26 March 2009.

Norway: VRI Agder: Work-based learning with interventions from regional R&D institutions and HEIs

Agder University College (2005). Strategiplan – mot 2010 [Strategic plan – towards 2010] (June).

Arnold E., A. Muscio, J. Nählinder, and A. Reid (2005). Mid-term evaluation of the VS2010 Programme: a report to the Research Council of Norway. Technopolis Ltd.

Garmann Johnsen, I.H. and A. Isaksen (2009). "Innovation modes, geography of knowledge flows and social capital". Paper presented at the DRUID-DIME Academy Winter Conference in Aalborg January 22nd -24th.

Karlsen, J. (2009). Personal communication (April 30th 2009).

Karlsen, J. (2007). The regional role of the university. PhD thesis, Department of Industrial Economy and Technology Management, Norwegian University of Science and Technology (April).

Normann, R. et al. (2007). "A practical normative approach to development – some initial experiences with VRI processes in the Agder region". Paper prepared for the action research conference Making the 'practical turn' practical: collaboration across nationalities, professions and varieties of action research Oslo, September 10th-

12th.

OECD (2009). Entrepreneurship and the innovation system of the Agder region, Norway. Final report. LEED programme, OECD, Paris (June).

Research Council of Norway (1999). Benchmarking of Enterprise Development 2000. An impact evaluation and a comparative analysis of programme design. RCN Division of industry and energy, Oslo.

Research Council of Norway (2009). VRI (2007-2017) Annual report 2008.

VRI Agder (2009). 2009 Action Plan (2. version, May 13th).

Sweden: Science Park Jönköping - Jönköping University and Regional Development

Andersson, T. (2008). "Kvaliteten måste garanteras inom högskolans verksamhet", *Högskriften Personal tidning för Högskolan i Jönköping*, Vol. 18, No. 2. Available online: http://www.hj.se/dokument/hogskriften/Nummer_2_2008.pdf

Andersson, T. & Sjölundh, T. (2007). Engaging Science Parks and Incubators to Meet the Needs for Skills Upgrading in SMEs: The Case of Jönköping (Revised version, March 2007). Science, University and Society No 2007 – 001, Jönköping University. Available online: <http://hj.diva-portal.org/smash/record.jsf?pid=diva2:4546>

Halldorf, L. (2007). "Överläggningar med länets kommuner", *Högskriften Personal tidning för Högskolan i Jönköping*, Vol. 17, No. 2. Available online: http://www.hj.se/dokument/hogskriften/Nummer_2_2007.pdf

Hudson, C. (2005). Regional Development Partnerships in Sweden: Putting the Government Back in Governance, *Regional and Federal Studies* 15: 311-327

Ideella föreningen Science Park-systemet i Jönköpings län (2008). Årsredovisning 2007. Available online: <http://diarie.nassjo.se/diabasexternt/famdok.asp?DSN=0&P=16095>

Ikonen, R. & Knobblock, E. (2007). An Overview of Rural Development in Sweden, in Copus, Andrew K (ed.) *Continuity or Transformation? Perspectives on Rural Development in the Nordic Countries*. Nordregio Report 2007:4

Jönköping Business Development AB (2008). Årsredovisning 2007.

Jönköping University (2008). Research and education strategy 2009 – 2012 (Revised October 2008). Available online: http://www.hj.se/dokument/pdf/forskning/Strategy_HJ_eng.pdf

Jönköping University (2009). Årsredovisning 2008.

The Municipality of Jönköping (2007). *Näringslivsstrategi 2007-2013*. Available online: <http://www.jonkoping.se/download/18.17ebf16e114dad55939800046127/Naringslivsstrategi+2007-2013.pdf>

Norrlund, S. (2007). "Vi har den främsta forskningsmiljön för regional utveckling", *Högskriften Personal tidning för Högskolan i Jönköping*, Vol. 17, No. 2. Available online: <http://www.hj.se/dokument/hogskriften/>

- Nummer_2_2007.pdf
- Protokoll 1992/93:123, Riksdagsdebatt Riksdagens snabbprotokoll Måndagen den 7 juni Kl. 9.00
- Rasmussena, E. A. & Sørheimb, R. (2006). Action-based entrepreneurship education, *Technovation* 26: 185–194
- Regional Council of Jönköping County (Regionförbundet Jönköpings län) (2008). Regional development programme up to 2020 (RUP). Available online: <http://www.regionjonkoping.se/Templates/Article1.aspx?PageID=e2ec9155-88bb-4e13-acc8-c18b6b73efb8>
- Science Park Jönköping AB (2008). Årsredovisning 2007.
- Science Park Jönköping AB (2003). Årsredovisning 2002.
- Science Park Jönköping AB (2001). Årsredovisning 2000.
- Vinnova Forska&Väx, våren 2009. Available online: <http://www.vinnova.se/upload/dokument/Press/Pressmeddelanden/2009/Forska&V%C3%A4x%20v%C3%A5r%202009%20lista.pdf>
- Databases
- Affärsdata (accessed through Stockholm Univeristy Library 2009-05-04). http://www.ad.se/ff/ff_main.php
- SCB (Statistics Sweden) Statistical database (accessed 2009-05-04) <http://www.ssd.scb.se/databaser/makro/start.asp>
- Websites
- Futurum (accessed 2009-05-03) <http://www.lj.se/futurum>
- Jönköping Business Development AB (accessed 2009-05-03) <http://www.development.nu/web/Hem.aspx>
- Jönköping County Council (Landtinget i Jönköpings län) (accessed 2009-05-03) www.lj.se
- Jönköping International Business School (accessed 2009-06-24) <http://www.ihh.hj.se/>
- Jönköping University (accessed 2009-05-03) <http://www.hj.se/>
- Regional Council of Jönköping County (Regionförbundet i Jönköpings län) (accessed 2009-05-03) <http://www.regionjonkoping.se>
- Science Park Jönköping (accessed 2009-05-04) <http://www.sciencepark.se/default.aspx>
- Science Park-system in Jönköpings County (Science Park-systemet i Jönköpings län)(2009-05-03) <http://www.spsystemet.se/>
- Sweden: The role of Dalarna's Högskola in the Vinnväxt project 'Triple Steelix'
- Christensen, L. Clusters and regional innovations systems in Sweden. http://www.nordicinnovation.net/_img/sweden_aland_backgrunder.pdf
- Cooke. P. et al (2008) Vinnväxt II – Generalsit and Specialist Evaluation of process and knowledge development 2004-2007, VINNOVA Report, VR 2008:12.
- Dahmén Institute, <http://www.dahmeninstitutet.se/index.php?page=20>
- Högskolan Dalarna (2008a). Verksamhetsplan och budget 2009, DUC2008/1898/10.
- Högskolan Dalarna (2008b). Årsredovisning 2007 för Högskolan Dalarna, DUC 2008/224/20.
- Högskolan Dalarna (2008c). InnoWent Högskolan Dalarna – en regional arena för samverkan och hållbar tillväxt. Projektbeskrivning.
- Högskolan Dalarna, http://www.du.se/Templates/InfoPage___1149.aspx?epslanguage=EN
- Högskolan Dalarna (2007). Strategisk handlingsplan (SHP) för Högskolan Dalarna 2008-2010, DUC 2007/1612/10
- Högskolan Dalarna (2007b). Forskningsstrategi för Högskolan Dalarna 2009 – 2011, DUC 2007/1613/10.
- IUC Dalarna, <http://www.iucdalarna.se/english/index.htm>
- Neubauer, J. et al (2007). Regional Development in the Nordic Countries 2007, Nordregio Report 2007:1.
- Messing, J. (2006a). Företag aktiva inom Triple Steelix initiativet hösten 2006.
- Messing, J. (2006b). Triple Steelix initiativet – de samverkande aktörernas aktuella syn på initiativet och dess utveckling.
- Region Dalarna (2008). Regional systemanalys Dalarna, Slutrapport.
- Region Dalarna, Dalastrategin. Med förenade krafter mot 2016.
- Stiftelsen Teknikdalen, <http://www.teknikdalen.se/367.php>
- Triple Steelix, http://www.triplesteelix.se/start__1
- Triple Steelix (2008). Halvårsrapport.
- Triple Steelix (2004) Ansökan Vinnväxt 2004-06-16.
- VINNOVA, <http://www.VINNOVA.se/Verksamhet/Starka-forsknings--och-innovationsmiljoer/VINNVAXT/>
- VINNOVA (2001). Regional growth through dynamic innovation systems. Programme description as a basis for internal support and decision-making.
- Interviews
- Brydsten, Monika, Region Dalarna, 28 April 2009
- Engholm, Maria, Triple Steelix, processledare, 16 April 2009.
- Edén, Per, verksamhetsledare, Dalacampus Näringsliv, Högskolan Dalarna, 21 April, 2009
- Färje, Lennart, Region Dalarna, 28 April 2009
- Löfgren, Bengt, Högskolan Dalarna, Triple Steelix, 24 April 2009

Interaction between higher education institutions and their surrounding business environment - Six Nordic case studies

NORDREGIO ELECTRONIC WORKING PAPER 2009:5

This electronic working paper is a result of the project “Regional universities and university colleges, their regional impact on innovation, attractiveness and economic performance” commissioned by the Nordic Senior Officials’ Committee for Regional Policy, the Nordic Council of Ministers.

The overarching question for the case studies presented was to discuss how universities and university colleges can work as an active instrument in regional development policy in the Nordic countries and illustrate how some Nordic higher education institutions collaborate with the surrounding business environments. The case studies cover

- the Aalborg University in Denmark,
- the Oulu Southern Institute, Oulu University, in Finland,
- the School for Renewable Energy Science (RES) in Akureyri, Iceland,
- the University of Agder in Norway
- Jönköping University in Sweden
- Dalarna University in Sweden.

An analysis and synthesis of the case studies can be found in Nordregio Working Paper 2009:3 *Higher education institutions as drivers of regional development in the Nordic countries*.



NORDREGIO
Nordic Centre for Spatial Development

Nordregio

P.O. Box 1658

SE-111 86 Stockholm, Sweden

nordregio@nordregio.se

www.nordregio.se

www.norden.org



norden

Nordic Council of Ministers