

Bridging Innovation Systems between Northern Finland and Sweden

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Seppo Saari, Research Director
Digipolis Research, Kemi-Tornio University of Applied Sciences,
University of Oulu & VTT, Finland

Abstract

This paper presents the existing cross-border co-operation between innovation systems in Northern Finland and Sweden with some practical cases. As part of the development of Bothnian Arc co-operation universities in the region did make a plan called Knowledge Arc. In the year 2002 published paper several cross-sectional shared interest areas were defined and further actions planned. In this paper co-operation between research, SME companies and industries is presented with cases including product development between companies and assisted by universities and other organisations as well as company initiated applied research between universities, companies and technology park companies. On innovation system level case of expanding Swedish ProcessIT Innovation system to Finland is described and discussed. The system takes advantage of research-industry-SME collaboration in applied research and product development based on strong, modern process industry cluster covering the whole Bothnian Arc region with total turnover of 30 000 million euros. The industries make a good local sophisticated customer for development phase. Co-operation in innovation systems has started also in innovation research. Two researchers are working on technology park questions with doctoral dissertations as goal and simultaneously searching for good practices and functions to be development especially in smallish parks outside of major university towns. Second task in the project is joint research school operation; esp. seminars have and will be arranged. Third goal is to develop joint European co-operation.

Keywords: Technology park, regional innovation system, cross-border, SME, industry

1 Introduction

According to memberships in the Bothnian Arc Association, the Bothnian Arc region is formed as described in figure 1 (Bothnian Arc Association) consisting of coastal zone that was industrialised already in the 19th century. Process industries based on natural resources (forest, minerals) are in an important role with annual turnover of 30 000 million euros in region from Skellefteå to Kokkola. In the 1980's and especially in the 1990's ICT, telecommunication and related services started to get higher role in the regional economics. In the two last decades ICT and telecommunication companies with Nokia as engine have formed a strong cluster in the Finnish part of the Arc. According to statistics of Multipolis ry, the number of jobs in the technology parks in the year 2004 was about 18 000 in over 450 companies (Frederiksen 2005). On Swedish side development has been dominated by smaller ICT companies with own products and branch offices of larger companies. As described, there are both similarities and differences in the industrial and business structures in the Bothnian Arc between the two countries.



Figure 1. Map of the Bothnian Arc

Similarities and differences can be found also in technological research and development. One of the biggest reasons to it can be the size of research units, which are larger in Finland. Quite similarly to the technology companies, in Northern Finland the research is in many cases very targeted to narrow technology fields while in Northern Sweden the base is closer to end-user companies. One example of this is the ProcessIT Innovation network coordinated by Luleå Technical University and having Umeå University, process industries and smaller companies with in the cooperation. Research is targeted on the needs found by mapping from the process industries.

The geographical proximity and similar industrial structure are the main base for the cooperation within the Bothnian Arc Association that has defined tourism, education, communication, industry and health and welfare to be the main areas of joint development.

2 Bothnian Arc of Knowledge Programme

In early 2002 the universities of Oulu and Lapland, Luleå technical university and the three universities of applied sciences (Oulu, Kemi-Tornio and Rovaniemi) published a joint programme with name Bothnian Arc of Knowledge (2002). The programme does include definition of focus areas for joint development (Figure 2). The focus areas are defined as crossing points of business areas and the application areas. The business areas are ICT, metal, forestry, wellness and experience industry. The application areas are spatial development, ICT, transport and logistics plus environment and sustainable development.

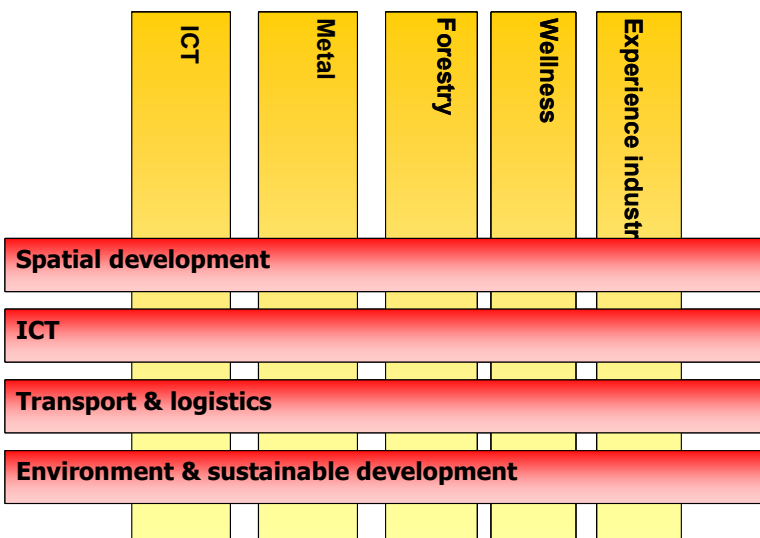


Figure 2. Focus areas in the Bothnian Arc of Knowledge Programme

As third dimension the programme also defines action plan; what type of joint actions was planned to be done. These actions were targeted in:

- education co-operation,
- virtual education and cooperation (the Virtual Bothnian Arc of Knowledge),
- making joint research applications in European Union framework programmes,
- developing of Triple-Helix co-operation (Higher education – private – public),
- postgraduate school activities and
- founding of joint information office and secretariat.

More detailed plans are described in the programme paper.

3 Development in Co-operation

The goals for the co-operation have been set by defining the areas of co-operation and actions to be taken. Measurable goals have not typically been defined. In the following the development has been described with some cases.

3.1 Inter-Company Co-operation

Cross-border co-operation between companies consists mainly of trade, ownership and founding branch offices in the other country. There are also cases where companies have made e.g. product development or other innovation related cooperation, but then the partners are often from other parts of the countries at least based on some interviews done among companies.

In Interreg III A North programme high expectations has been set on cooperation between companies in the programme area including Northern parts of Finland, Sweden and Norway. So far there has not been many development projects run by private companies. (www.interregnord.com) One of the few is Kemikalix project that was a product development project between two companies: Selmic Oy from Kemi and CareTech Ab from Kalix. CareTech Ab develops and sells security telephones, in-house systems, alarm transmitters, alarms receivers plus door and lift phones. Selmic Oy is a Kemi based company having offices and factories both in Kemi and Oulu. It's main products are customer specific micro modules (LTCC and HTCC) and assembling of integrated circuits. In early 2004 CareTech Ab was renewing it's wrist bearable alarm unit. It found Selmic Oy to be a potential supplier for electronics design and production. With help from public sector actors companies applied financing from Interreg IIIA North and national financiers. The project was financed and it was realized in year 2005. Mechanical supplier from China and industrial design company from Sweden were involved. Renewed product will be launched in October 2006.

A typical feature in this case is that companies did not know about each others before they were introduced by public actors. This gives e.g. higher education institutions and other public actors a big role in networking.

3.2 University-Company Co-operation

University-company co-operation means here joint research co-operation. Innovation system level co-operation and intermediary activities will be discussed in next chapter. Two cases will be described.

BeJord (Behandling av förenade jordar, Treatment of Contaminated Soils) is a project between two Swedish companies (Ragn-Sels Ab, Normark Jord Ab), two finnish companies (Kalottikone Oy, Savaterra Oy), Luleå technical university and Digipolis Research / University of Oulu technology research unit in Kemi. LTU's role is in developing methodology for treatment of mixed contaminated soils with both organic materials and heavy metals. In Kemi the goal is in developing analysing and measurement methods and methodology for field use. The work will be part of two doctoral dissertations. (Maurice & al, 2006)

SensorBand is a multidiscipline research project dealing with methods and technologies to detect hazard situations from the body of at home living elderly people. The partners are electrical

engineering and health care departments of Luleå technical university, Digipolis Research /University of Oulu Kemi unit, institute of medical technology of university of Oulu plus one company from Kalix, Sweden and two companies from Kemi, Finland. Also in this project there are three doctoral candidates doing the research; one in Kalix, one in Kemi and one in Oulu. In research the role of Oulu is to find the reliable ways to identify falling and other non-wished situations, Kemi role is to study the reliability questions and Kalix role is to find the effective ways for signal processing. (Saari & al 2006)

3.3 University-University co-operation

The co-operation between universities and universities of applied sciences has been going for in some scale for long time. In the year 2004 University of Oulu got a smallish financing from the Finnish ministry of education to activate and coordinate the work. Since that the number of joint activities and the volume has grown to a new level. This concerns both company-university co-operation, university-university co-operation and innovation system level co-operation. This chapter deals with two cases: Education and research co-operation in information security and joint postgraduate school project PhD-Polis.

The planning and development in information security education and research co-operation started with visit from Oulu to Luleå in April 2004. It became obvious that partners can benefit from each others expertise. The network was immediately fulfilled with the department of law of the university of Lapland and data processing department of Kemi-Tornio university of applied sciences. The first phase was a planning project in year 2005. The project consisted of market research, learning each others courses and expertise and planning of a major project that was started in early 2006 (Saari & al, 2005). The main project covers development of courses on the Internet using several methods, first implementation of the courses in Master programmes at universities of Oulu and Luleå and professional specialisation studies at Kemi-Tornio University of applied sciences, start-up of joint research and planning of future cooperation. The project will end in December 2007 but the co-operation will be continued also afterwards with goals also in joint Master programme and joint participation in EU's 7th framework programme.

The PhD-Polis project was an Interreg IIIA North partially financed project consisting of two post-graduate research projects:

- MICA focusing on problems in robotic solutions for elderly and disabled (mica.csee.ltu.se/mica_menu.html) and
- p4 focusing on acoustic and optical measurements in pulp and paper industries.

The project partner in subproject MICA where Luleå technical university and the department of industrial design of University of Lapland both having one PhD student working in the project. In P4 the partners were LTU and the university of Oulu both having also one PhD student in the project. The results will be published later in form of doctoral dissertation added with some papers published already earlier.

3.4 Innovation System Level Co-operation

A look at Interreg IIIA North's web pages tells that intermediary organisations are very active in their efforts to develop the cooperation over the border. In fact this type of work started already in the 1990's in the European Union RIS programme continuing then with RIS+ and TRIP (e.g. Trip Northern EU 1999-2001 final report, 2002). The technology parks were the major actors in all of these projects. The work has later been done mainly with partial financing of Interreg II A and III A programmes. In this chapter the focus is on activities done by technology parks and universities concentrating in high technology with partial financing from Interreg A programmes.

Technology parks have continued the work with Kemin Digipolis Oy and Teknikby Aurorum Ab from Luleå as leading partners in projects NEO and NEO². The focus has been in enlarging the Northern Finnish Multipolis collaboration to Northern Sweden and also to Northern Norway. Other forms of work have been road shows spreading information of companies to companies, arranging seminars and conferences and creating new cross-border inter-company and other development

and research project based on company needs. NEO focuses on several sectors: ICT, e-health, process industry maintenance, electronic and digital media. (www.neonorth.org)

NEO's focus is in several technology and business sectors and focuses both on innovation and trade. Some of the other innovation system networking and bridging projects run by universities and research institutes focus on research and development co-operation between company and university groups.

NET (Kartläggning och utveckling av det norra miljöklustern, Mapping and Development of the Northern Environmental Cluster) project was run by Digipolis Research / University of Oulu in Kemi and LTU in the years 2004 and 2006. Projects main goal was to map the cluster in Northern parts of Finland and Sweden, find the needs for research, education and training and plan future so-operation (Lagerkvist & al, 2005, www.bothnian.net). Earlier described BeJord project is also a result of the project.

Luleå Technical University has for a some years been leading ProcessIT Innovations network. The goal is in new and better applications with high technology and knowledge intensity to process and manufacturing industries. The network covers Umeå university, most of the process industries in Northern Sweden and ICT companies. In the model the basic idea is that SMEs and other product and service companies take use of the basic and applied research results in new products and services. The traditional way to co-operate between research and industry has been to solve the problem between them. In ProcessIT model the goal is that research organisations do the research based on mapped needs from industries, but companies develop products or services. Goal is new sale from the region. Another advantage compared to research- industry co-operation is that industries will also in future have a supplier developing the equipment further and maintaining it. (www.processitinnovations.se)

The promising model having already some results is now being enlarged to Northern Finland with help of ProFi project (Nätverking ProcessIT Innovations och MNT Northern Finland, Networking ProcessIT Innovations and MNT Northern Finland) (Saari & al 2005). University of Oulu, VTT Oulu unit and Digipolis Research (incl. Kemi-Tornio University of applied sciences and University of Oulu technology research unit are involved. Steering group consists additionally of representatives of process industries, maintenance and SMEs. Also TEKES and VINNOVA have their representatives present at the meetings. The goals are to launch the network in Northern Finland, map needs and possibilities, arrange workshops around specified topics, prepare joint research and development project and prepare for joint participation in EU's framework programmes.

3.5 Innovation Research Co-operation

The previous chapters have concerned activities that can be seen as processes in a cross-border innovation system. The latest addition is co-operation in innovation research. In March 2006 the Institute of Industrial Economics of the University of Oulu and Institute of Industrial Economy of the Technical University of Luleå arranged first joint seminar for their post-graduate research students. As continuation conference on innovation research will be arranged in Oulu in December 2006.

The conference is arranged with financial help from InnoCentra project having three goals (Project plan, 2006):

- research on the technology parks in the Bothnian Arc region,
- joint seminars and conferences to develop co-operation in research and
- joint networking in other parts of EU for participation in EU's 7th framework programme.

Two postgraduate students are doing the research. One question deals with the interorganisational exchange relations and innovation in science parks" and the other with "knowledge management in SMEs in smaller technology parks". Both studies have been started recently and first results will be published first in the conference in December.

4 Conclusions

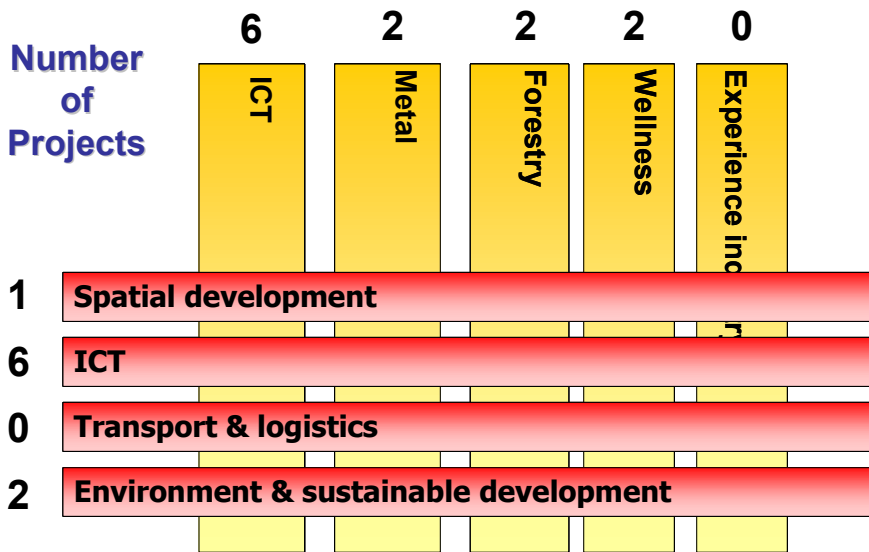


Figure 3. Activities vs. Focus Areas in the Bothnian Arc of Knowledge Programme.

In figure 3 the activities done so far have been compared to the Bothnian Arc of Knowledge programme. The figure shows that most of the focus areas have been covered. The weigh point has been in ICT and applying it in other branches. In transport and logistics as well as experience industry there has not been any activities at least on project level.

	PhD Polis	InforSec	Environment	ProcessIT	Wellness tech	InnoCentra	INOX Boreus
Education co-operation		X					
Virtual Knowledge Arc		X					
Research applications, EU FW		X		X		X	
Networking; univ-private-public	X	X	X	X	X	X	X
Cluster-based activities	X	X	X	X	X	X	X
Postgraduate school, research	X		X		X	X	
Information office							

Figure 4. Activities vs. Action Plan in the Bothnian Arc of Knowledge Programme

Reviewing the results against the action plan of the Bothnian Arc of Knowledge programme shows that the projects under study cover well the goals set in university-private-public networking and that the projects serve the chosen clusters. Research and postgraduate school are also well covered, while education co-operation and virtual education co-operation projects are rare. The idea of information office has not been realised because of there has not been any specific financing for the programme as planned in the original programme.

The future based on existing activities is very much the following:

- First doctoral theses to be published (2006)
- 7 PhD students (2006...)
- Joint research school in innovation research (February 06...)
- Joint courses in information security (September 2006...)
- Companies publish new joint products (October 2006...)
- At least 3 framework projects will be prepared before end of the year 2007
- TEKES will probably be involved in national financing in next period giving new possibilities for applied research

So far the Interreg IIIA North programme has helped to start the co-operation. In future the programme area will be widened to Northern Ostro Bothnia that gives new possibilities. Also in the future Kemi-Tornio region's centrally located actors will probably have a central role in development of co-operation.

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