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New Technologies and Innovation Capacity – Boosting Economic Transition Processes in the Less Favoured Regions

A conference paper to be presented in:

Peripheries, Centres and Spatial Development in the New Europe
43rd Congress of the European Regional Science Association
27-30 August, 2003
Jyväskylä, Finland

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Parts of the paper have earlier presented in:

Reinventing Regions in a Global Economy
Regional Studies Association International Conference
12th – 15th, April 2003, Pisa, Italy
Gateway 2: Regional Restructuring

"*Local Innovation Systems" Project Phase I Workshop*
Organised by
MIT/ Industrial Performance Center
6-7 January 2003, Cambridge, MA/USA

ABSTRACT

In the era of knowledge society many regions and local communities/ towns are trying to compete with larger, growing cities over the knowledge and intellectual capital resources. Regional or local *knowledge environment* has become more important. Building innovation capacity and the institutional capacity as one part of it could be a development tool to some lagging behind-regions, (which are called as less-favoured regions) and quite often do not have universities of their own or successful industries. There are regions, which are building their institutional base by forming university-industry collaborated knowledge transfer institutions and models through networking. Furthermore, these institutions are taking part in the local networks shaping the *technological change* or *transformation* in the region. For the beginning there is a need for structures and *institutional base* strong enough to create critical mass or capabilities. Further there is a need for *relationships,* which are many times in the forms of *networks,* between organisational and non-organisational, formal and informal institutions. Thirdly, the *process of institutionalisation* is also a crucial element of the development in the less favoured regions (see Healey et al. 1999, Amin & Thrift 1995, Henry 2001).

The aim of the presentation and the paper is to study what kind of collaboration models local actors, research and development institutions and local enterprises have formed in the less favoured region in order to improve technology transfer and further local innovation capacity and technological change. Further the aim is to describe the possible actions appeared in these case regions towards the transformation process from traditional R & D work and production to knowledge based and networked development activities. In the less-favoured region, is the obvious development (since the change of 80-90's) just happened there, or is it an outcome from the conscious development work? What is the role of universities and other HEIs in this transformation process?

Seinäjoki and Pori sub-regions are the examples of disadvantaged regions in Finland (either peripheral areas or without clear university based education or research), which are building a strong institutional base of higher education (and research) institutions and university-based knowledge transfer systems in order to promote innovations and business development. The category of industrial development to be applied in these cases is a diversification of industries that are already present in the region, from traditional manufacturing to applying new technologies. The studied technology areas are certain parts of *automation technology,* more particularly *intelligent products and systems* (mechatronics and applied software).

NOTE 1. The paper is referred to the Phase I part of "Local Innovation Systems" Project (10/2001-12/2004) funded by the Finnish Technology Agency (Tekes) and carried out in co-operation with MIT/ Industrial Performance Center HUT/IMI; Univ. of Cambridge and Univ. of Tokyo. A Seinäjoki part of the paper has earlier been presented in the "Local Innovation Systems" Project Phase I Workshop organised by MIT/ Industrial Performance Center in 6-7 January 2003, Cambridge, MA/USA.

NOTE 2. This paper has not gone through language check by professional English Translator or native English speaker. In the case of misunderstanding due the language use, please contact the author.

1. Introduction to the theme

Regional or local *knowledge environment* and further *innovation environments* for specific business areas have become more important. Furthermore, the new institutions are taking part in the local innovation networks shaping the *technological change* or *transformation* in the region. This is done for the benefits of all parties, local businesses, universities or other higher education institutions and local/ national development authorities. If there in a certain region is not a lot of formal and informal research and development institutions and especially interaction between them, actors find it more difficult to transform information (resources) to new knowledge and innovations. This kind of regions are could be called as "less favoured regions" or "disadvantaged" regions. The problem is getting worse, if the "innovation and R&D culture" (innovative milieu) is not competitive with other regions, towns and cities. In that kind of case, the R&D organisations as well as companies could have difficulties to get skilled work force.

Building innovation capacity and the *institutional capacity* as one part of the innovation environment could be a development tool for some less-favoured regions. These are regions, which are building their institutional base by forming university-industry collaborations, knowledge transfer institutions and models mostly through networking and creating linkages to the wider, national and global knowledge networks. Institutional capacity consists of variety of elements, which basically can be defined as capabilities to create, use and form linkages the local actors to valuable resources pools, institutions and networks. The elements of the institutional capacity as treated in this study are shown in the figure 1.

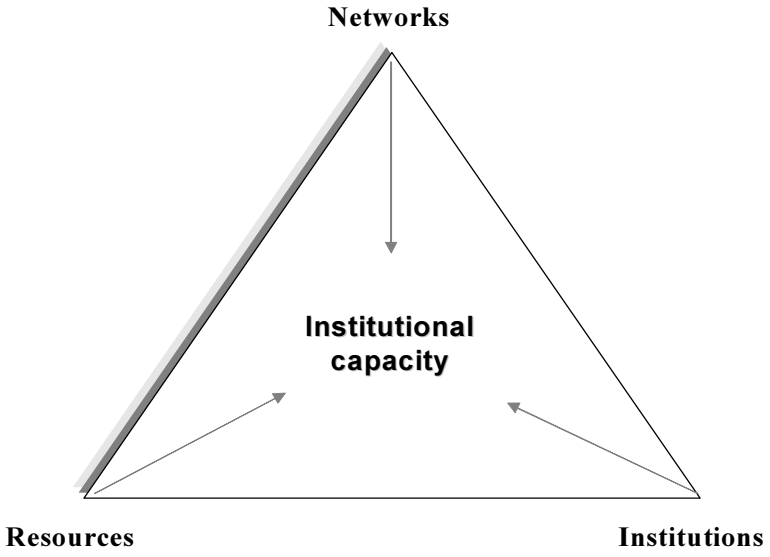

Figure 1. The elements of institutional capacity in the less favoured regions. Simplified framework of the study.

Seinäjoki and Pori town regions are the examples of less-favoured regions in Finland (either peripheral areas or without clear university based education or research), which are building a strong institutional base of higher education (and research) institutions and university-based knowledge transfer systems in order to promote innovations and business development. Both areas could be called as less-favoured regions, as they are either peripheral areas with declining or turbulent economic situation, or without clear public or-

ganisational R&D infrastructure with university based education or research. The development actions done in these less favoured regions could be divided to following themes[1]:

- *Building the institutional base and technological infrastructure,*
- *Developing the competence base through development programmes,*
- *Creating and intensifying internal and external knowledge networks.*

The presentation is referred to the Phase I part of "Local Innovation Systems" Project, which is a study about economic transformation of region and /locations and especially the continuing processes that lead to changes over relevant period of time in the combination of products and services that are produced in that region. Regional economic transformations will be more or less successful depending (in part) on the capacity of the region to develop and/or to absorb new technologies. This is explained by the local needs of knowledge resources and the partnerships and alliances made by individual actors (entrepreneurs, development agencies, university units, municipalities, technology centres etc. .). In general, the LIS project has two broad research goals:

- *To understand the conditions associated with the development of a sustainable local innovation system, or the transition from one kind of system to another.*
- *To understand the role, behaviour and performance of local innovation systems during a period of increasing globalization.*

The special interest lies in the contributions made by universities and other public research institutions to these processes. National, regional and local authorities and development organisations, including universities, are trying to support innovation processes through different knowledge networks and new type of collaboration. The concern just is, if the universities or their networks (sub-campuses, university "centres" etc) should be answer to all of the aspects or to all possible knowledge needs faced in the less favoured regions? What possible roles university networks do have in the scheme of new knowledge creation and transformation in regions? What is the regional view of the possible roles, what roles university networks are expected to fill?

In order to answer to these questions, there is a need to take in concern all the possible different roles and aspects the universities are working for in the regions. All the aspects from the problem solving to the search of new technologies and knowledge are crucial. The range in the new knowledge creation is from direct problem-solving (partly R&D work, testing) through interpretation and to a voyage of "discovery" (quite often basic, indirectly profitable research) as Sotarauta, Linnamaa and Suvinen (2003) formulate it.

[1] In this paper the actions taken in the case regions are shown as realising the above categorising. Therefore the following chapters and sections of the paper are written in order to concretize these ideas. Especially the chapter 4 is following this thematic.

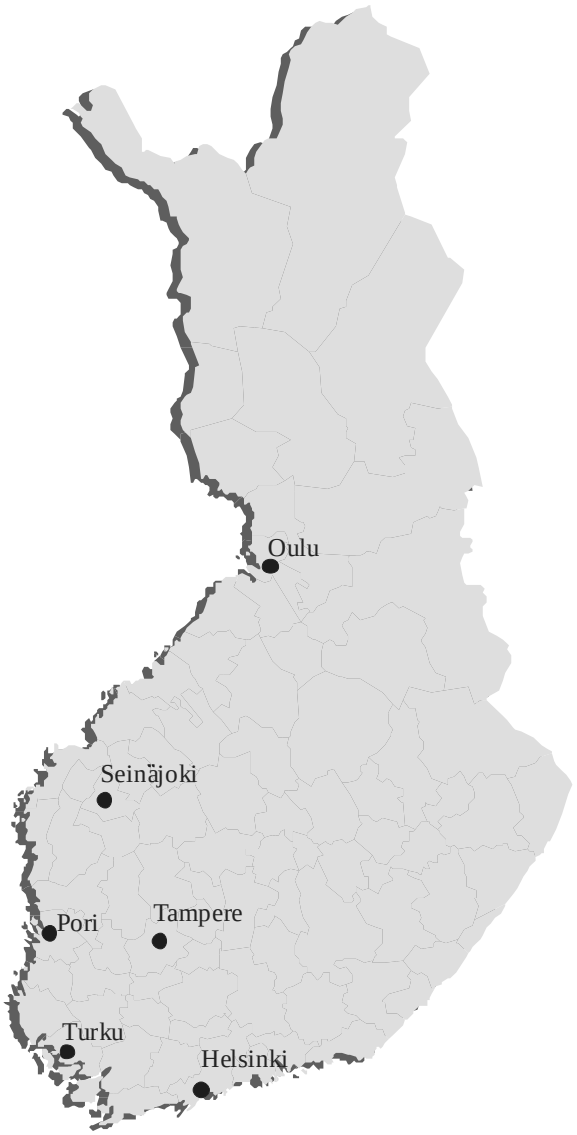

Figure 2. The LIS case study locations in Finland.

The category of industrial development to be applied in the Seinäjoki and Pori case studies is a diversification of traditional industries to technologically related industries. The studied technology development processes are certain developments of *automation technology in the region,* more particularly the infusion of *intelligent products and systems, mechatronics and applied software*. Seinäjoki and Pori town regions have specialised and applied expertise in mechanical engineering, automation and intelligent engineering solutions, where the main market areas are in Finland and worldwide.

The case study is a qualitative study and is based on written materials, statistics, reports etc. gathered from these regions and 40-50 thematic interviews. Four groups of people are been interviewed: I policy-makers (general developers), II entrepreneurs at the target industry/ technology area, III substance developers from technology and science parks/ centres of expertises and IV substance developers from the HEIs and research institutes. There are totally 29 interviews from Seinäjoki region and 13 from Pori region.

1. Building institutional capacity by combining resources and forming networks

RESOURCES AS A PLATFORM FOR CAPABILITIES

Know-how, innovations and learning have become key issues in the new regional development logic. This in turn means that economic actors or players have to be part of the *knowledge networks* where the most essential knowledge is built and formulated. Learning and knowledge supporting and human resources based environment is based on the local *institutional settings* and the *relationships* and *partnerships in and between* different *institutions.* In the local institutional settings, the relationships and the range of institutions in a certain area can be *weak* or *strong* due the passed development path.

Institutional settings in the specific region can be seen as a form of "development cluster" where the firms as well as public, private and semi-public research and development institutions form a kind of local development network with institutional relationships. Local *innovation capacity* is formed by institutions and relationships between these institutions, supporting the individual organisation's capabilities to innovate as well as relationships to the outside the region. It could be seen that the local innovation network is a part of the *local institutional thickness* (Henry & Pinch, Amin & Thrift, Cooke, Cooke & Morgan etc). The components and processes for the institutional thickness are following (Amin & Thrift, 1994, 1995):

- A strong institutional presence, a plethora of diverse institutions (supporting innovations)
- High levels of interaction amongst the institutional network and a social atmosphere of shared rules, conventions ("innovative milieu"[2])
- Structures and patterns of coalition
- A mutual awareness of a common enterprise or industrial purpose among participants and institutions (innovative milieu).

The institutional capacity consists both the resources be found through interactions between local actors and development networks (in the regions) and through the interactions to partners outside the region or local networks. Institutional capacity is mostly worked through *local development networks*. Behind the innovation supported focused networks there are most often wider, urban economic development networks. The urban economic development network is divided to the *general development agencies* (public, or semi-public institutions) and the *specialised development agencies.* General developers work for building such an economical environment that individual actors and institutional bodies could improve their capabilities to form new knowledge and innovations, while specialised developers work for deeper and more specialised course of development in their specific branch and further combine the aims of the development work through customer's and personalities separate and often not so shared needs. Specialised developers work with some certain, locally important business or development area (Sotarauta 1999, 2000, 2001, Linnamaa & Sotarauta 2000, 2001, Raunio 2000).

Institutional thickness or thinness could be seen as a frame to region's capacity to support actors (enterprises etc.) and their capabilities to innovate. Actor's capability to innovate depends on both external possibilities (laws, regulations, economical trends and possibilities) and capabilities to use own resources and make new competencies from them. The capabilities which certain individual institution has, affect beside the institution's own

[2] As Dennis Maillat 1996, 1998 has defined it.

abilities but also the local environment and institutional settings in the locality. If the locality or region is capable to support institution's innovation and knowledge processes separately or in a partnership with other institutions, has the institutions better options to create new resources and through creation and use of specific knowledge to transform it to core competencies.

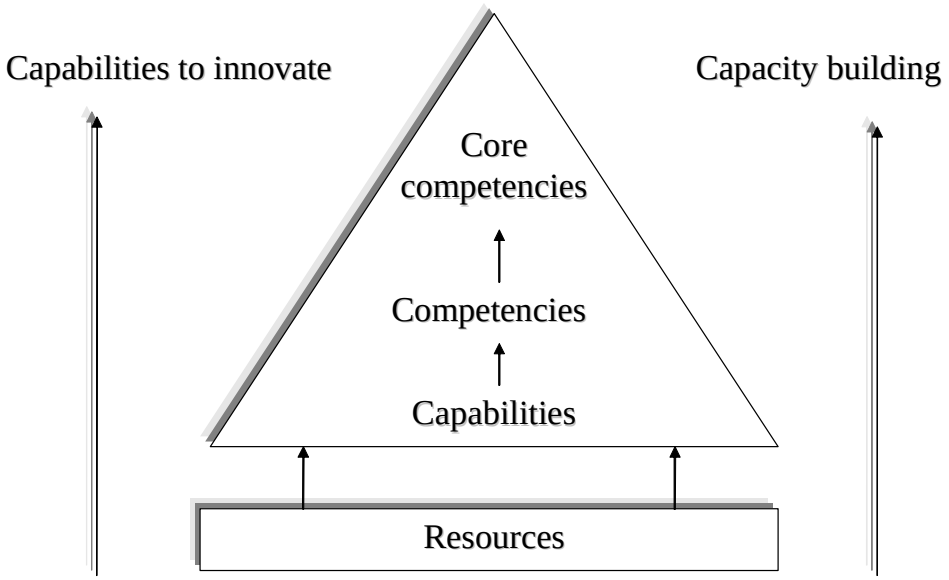

Figure 3. From Resources to competencies (Modified from Javidan 1998, Sotarauta 2000)

FROM RESOURCES AND CAPABILITIES TO INNOVATION PROCESSES

Regional innovation capacity and institutional thickness or thinness could be seen as a frame to region's capability to support actors (enterprises etc.) and their capabilities to innovate. One possible path to create the institutional thickness in the less favoured regions is to strengthen *the resources of institutional capacity* and the interactions between different types of resources. More detailed way, the institutional capacity, which could also be defined as a capability to use institutional capital, is the capability to use different kind of knowledge related resources (Healey et al. 1999).

The institutional capacity consists both the resources be found through interactions between local actors and development networks (in the production system) and through the interactions to partners outside the region or local networks. The logic in this could be seen in the light of process, where forming resources could be defined as a process. Kebir and Crevoisier (2002) have defined resources as all the possible objects or intentions available for the basic elements for production process (p.4).Resources are something there to exist *per se*, but it is up to relevant local actors ("development cluster"), if the resources are transformed to useful elements for the production process, i.e. "actualised" for commercial knowledge and purposes. Objects are transformed to resources and competitiveness through identification, creation, implementation and destruction in the (re) production system.

Reflecting the ideas Healey et al. (1999), the key issue for governance arenas (and networks) is whether they lie in the core or the periphery of the power field and power games where participants of the networks seek to act and find valuable resources. Local institutional base is affecting to the capability to form the competitive capacity through *knowledge resources, relational resources and mobilisation resources*, where knowledge re-

sources and relational resources are crucial for the creation of the mobilisation capabilities. Institutional capacity is mostly worked through *local knowledge orientated development networks* as shown in the following figure (figure 4).

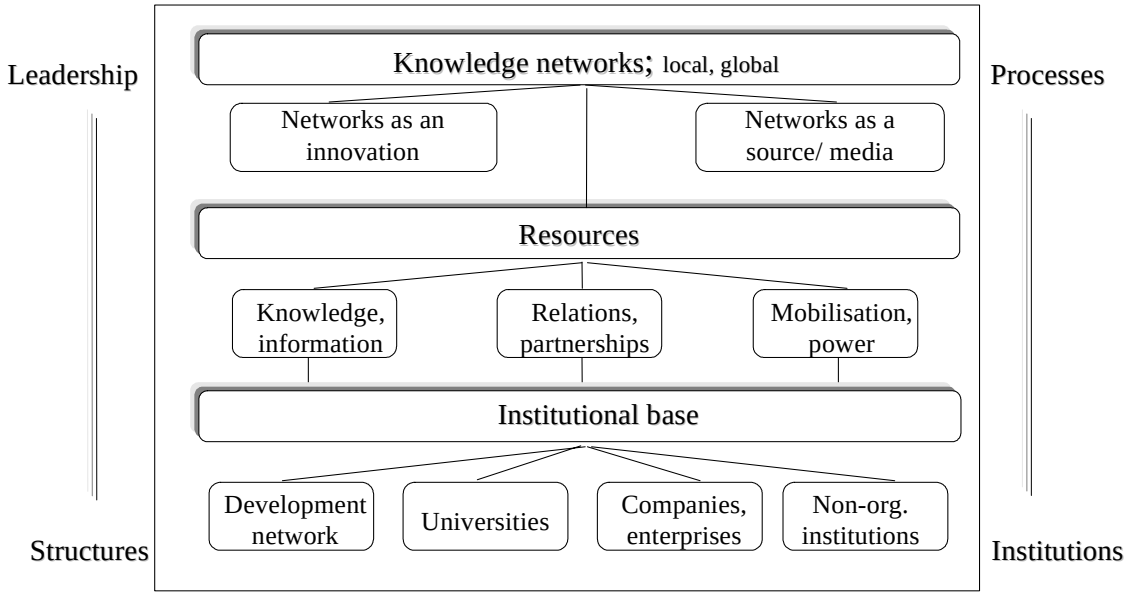

Figure 4. Innovation capacity building and institutionalization process in the regions[3].

In a networked and knowledge orientated society these capabilities are essential for different development bodies to own and express. There are, according to Healey et al. (1999) a need to built mobilisation capacity and institutional competencies from it. Institutional capacity is built on some institutional base where the participants have certain abilities to also use these institutional settings. To activate and create mobilisation recourses the development network bodies should have several abilities. According to Sotarauta (2001) and Karlöf (1995) there are several special skills and abilities, which are needed when resources are changed in to competencies and capabilities:

- Ability to look new activities and to define guidelines for activity,
- Ability to co-operate, to involve people, and to encourage other people to reach goals,
- Ability to speed up, boost the course of action and to change the course of action when the economical environment changes,
- Ability to create an innovative and enthusiastic working or development environment,
- Ability to shape the future and big pictures of the future, to show the possible paths and to take advantage of the unclear situations and unknown future
- Ability to create new knowledge from the boarder areas of the new and old.

Behind the innovation supported focused networks there are most often wider, urban economic development networks. The urban economic development network is divided to the *general development agencies* (public or semi-public institutions) and the *specialised development agencies.* General developers work for building such an economical environment that individual actors and institutional bodies could improve their capabilities to form new knowledge and innovations and specialised developers work for deeper and more spe-

[3] Kosonen 2001, 2001b, 2002

cialised course of development in their specific branch and further combine the aims of the development work through customer's and personalities separate and often not so shared needs. These are specialised to work with some certain, locally important business or development area (Sotarauta 1999, 2000, 2001, Linnamaa & Sotarauta 2000, 2001, Raunio 2000).

2. Institutional capacity localised: Seinäjoki and Pori town regions as locations for emerging technologies

Seinäjoki and Pori town regions have specialised and applied expertise in mechanical engineering, automation and intelligent engineering solutions, while the main market areas are in Finland and worldwide. The category of industrial development to be applied in the study is a diversification of industries that are already present in the region. The studied technology areas are certain parts of *automation technology,* more particularly *intelligent products and systems, mechatronics and applied software*. Current status of the knowledge environment in the Seinäjoki and Pori town regions is described in the following sections.

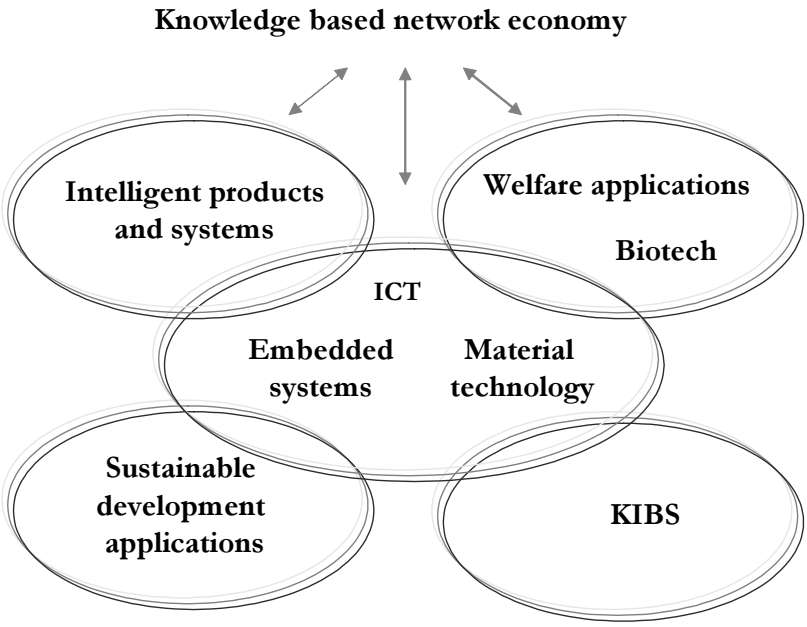

Figure 5. Intelligent products and systems as a part of new technology opportunities in the knowledge based network economy[4].

SEINÄJOKI

Seinäjoki town region (app. 70 000 inhabitants) is a central service centre for large traditionally agricultural area called **South Ostrobothnia** (app. 200 000 inhabitants) where the ICT-sector and the new technologies are just emerging as a new applied technology intensive sector. Seinäjoki town area has been growing steadily last 40 years while whole South Ostrobothnia has been loosing its population with a very strong tendency. In Seinäjoki town region the level of education is higher than Finnish average, but in the whole South Ostrobothnia the level is education is one of the lowest in Finland. Also the level of R & D

[4] Modified from Tekes Technology Strategy 2002, p..9.

expenditure is one of the lowest in Finland in the whole region, but is growing fastest in the Seinäjoki town region. Following are some key figures illustrating the recent development in the Seinäjoki town region and also in South Ostrobothnia:[5]

- Population in South Ostrobothnia in 2000: 195 615, percentage from the whole country 3,8 (194 105 in 2002)
- Population in Seinäjoki town region (Northern Seinäjoki): 58 694 in 2000 and in 59 175 in 2001.
- Population in Seinäjoki town region: growing with 0,8 %
- Population in South Ostrobothnia: declining with 0,4 % (2002)
- Change in higher education level of work force (1997-2000) in Seinäjoki sub-region: 125,4 %
- Employment in high tech businesses (percentage from total work force) in South Ostrobothnia (in 2000): 2,6 %, while whole country: 9,6 %
- GDP per capita (whole country =100) in South Ostrobothnia: 68,8 in 2000 and 71 in 2001, while the best region in Finland (Uusimaa) reaches the level of 141,3 in 2000 and 2001 to 138
- Expenditure on R & D by regional GP in South Ostrobothnia (in 2000): 0,8 %, while average in the whole country was 3,9 %.
- Change on R & D expenditure in Seinäjoki sub-region 1995-2000 (whole country, 20,4% =100): 370

The key-technologies in the intelligent products and systems in Seinäjoki area are mechatronics, electronics and software ("smart-tronics"). In the future the main working areas are system integration and virtual reality as a tool for testing in the manufacturing process planning and simulation. In the South Ostrobothnia intelligent products and systems are closely connected to *embedded systems* as mechatronics, software and metal process engineering and therefore defined as a part of the metal cluster. The intelligent products and systems line of entrepreneurship in South Ostrobothnia has its background in the agricultural related machinery and metal production, especially foodstuff, forest, animal breeding, metal process production etc. sub-branches. Lately in the industry agglomeration, there has grown new by services as software and logistical systems providers their background and/or biggest customers in traditional metal and machinery production.

There are approx. 770 companies (with 3 380 employees) in the region, which are either applying or developing intelligent products and systems (mechatronics and software) in some part of their production processes (Statistics Finland, 2002[6]). They are forming a part of the national metal cluster. This concentration of metal manufacturers and service providers is the strongest industrial sector in the South-Ostrobothnia region. The sector is also the heaviest exporting sector from the industrial branches and enterprises located in the region. The exports value of the metal sector in the 1999 was 200 million euros (Centre of Statistics). The annual turnover of the leading 40 companies together is approx. 600 million euros. The existing companies are working in their special niche-areas and most often quite alone or independently from other South Ostrobothnian enterprises or regional company networks. Therefore the links to the sub-contractors are quite often weak. From the total metal sector company amount, 770 firms, app. 10-20% are intentionally growth-orientated, while most of the companies are micro-level companies without modern high-tech competencies. Leading companies in the area are EPEC Oy, Done Logistics Oy,

[5] Sources: The Statistics Finland: regional statistics account, the Regional Council of South Ostrobothnia (web-pages) and Seinäjoki Technology Centre Ltd.

[6] The industry areas: Metal product manufacturing, machinery, electronics and optical instruments (manufacturing), vehicles, PC-consultancy, software design, programming and consultancy, research.

GeraCap Oy, Lillbacka Oy, Saraware Oy, and Sofor Oy. Leading companies are technology developers (innovators), supporters and service providers (technology transfer and consultancy), or appliers and utilizers[7].

The leading companies[8], although there are not many of them, are in mostly the world top providers in their specialised branches and markets. Both the leading companies and especially the main contractors (customer companies) are producing most of their products for exports. This kind of 'invisible export' takes quite big share from the annual turnover of the local firms. To local SME's the first step to take towards the international markets is to act as a sub-contractor for the bigger, exporting companies. Region's leading companies are providing and developing automation technologies or related "intelligent solutions" to some leading global companies in the forest and mining engineering, logistic chain companies, Food and beverage industry, construction industry, machinery and industry production developers, cold containers equipment producers etc.

PORI

Pori town region is the eight biggest town or city region[9] in Finland and one of the four administrative sub-regions (town regions) in the region **Satakunta**. Satakunta is located on the southwest coast of Finland nearby the sea (Gulf of Botnia). There are 28 municipalities in the region, and the total population of the region was 236 308 in 2001 and 235 416 in 2002. In the Pori town region there were 115 870 inhabitants in 2001 and in the town of **Pori** there were app. 76 000 inhabitants (75 955 in 2001). Together with the town of Ulvila, where the most of the automation technology firms are located, these two municipalities reaches the population number as app. 90 000 inhabitants and forms the urban centre for the region.[10].

Satakunta region in its turn represents 4.7 % of the nation's population, but 8 % of Finland's total industrial production. From the industries located in the region, electric and electronic products manufacturing, food processing, textiles and light engineering are usually found in small or medium sized enterprises. There are app. 93 000 working places in Satakunta, while the majority of those are located to the Pori town region, 45 600 working places. Although, the unemployment rate in the region is one of the highest in Finnish regions: 16, 1 % in the year 2001. At the same time total unemployment rate in Finland was 12, 5% and in the Pori town region even higher, 17, 8 %. The education level of the active work force is also lower than Finnish average in the biggest Finnish cities, as the 56, 3 % of all persons older than 15 years had degree education while Finnish average 57, 7%. Among biggest 15 cities, Pori region performed in 1998-1999 lowest figures being in the same group with other non-university towns (Kotka, Lahti) and Lappeenranta, which in its turn have education in very narrow areas[11].

Compared to Finland's GDP Satakunta equals lower than Finnish average. In the year 2001 the GDP per capita in Satakunta was 87, while Uusimaa equals as 138 (whole country =100). In the Satakunta region the total GDP was 24 749 million FIM in the year 1999 while in the year 2001 it was 4 727 million euros[12]. The GDP in Satakunta was broken down by sector in 1999 at the following way: Agriculture and forestry 7 % , manufacturing

7 Source: LIS Phase I interviews, SeiTek 2002 report: Mechatronics and embedded systems, 29.4.2002.

8 Leadership is defined here as the innovation leadership by technological or marketing leadership, not necessary by size or current dominance in the markets.

9 Source: Kunnallistilasto 6/2002. (Statistics about the Finnish municipalities) Suomen Kuntaliitto 30.5.2002.

10 Sources: The regional Council of Satakunta, web-pages (3.4.03) and Regional Development Centre Programme Pori Town Region (2000), Statistics Finland and Kunnallistilasto 6/2002, Suomen Kuntaliitto.

11 Source; The Regional Council of Satakunta (3.4.03) and the Regional Centre Programme - Pori Town Region (2000).

12 Sources: The Statistics Finland (Tilastokeskus) May 2003 and Kunnallistilasto 6/2002. Suomen Kuntaliitto.

39 % , construction 5 % , trade and transport 15 % , other services 18 % and public services 16 %.

Biggest branches are (classified by employment share) are industry/ manufacturing, health- care and services, retail and selling, trade and transport, research and telecommunications. From manufacturing branch, the biggest companies are working in the following fields: copper processing, heavy engineering, mechanical wood processing, electrical engineering, energy production, chemical industries, information technology and telecommunication, automation and engineering, port and airport services and facilities. Biggest companies, which have their offices or plants in the region, belong also to the biggest R&D investors of Finnish industry. Such are: Metso Paper Oy and Metso Automation Networks Oy (Metso Corporation the 2nd biggest in the year 2001 and 2002, expenditure in R&D functions 150 in 2001 and 156 million euros in 2002), ABB Service Oy (ABB in Finland 3rd biggest in 2001 and 5th in 2002, 109 and 92 million euros), Sonera (Sonera in Finland 7th biggest in 2001 and 10th biggest in 2002, 82 and 53 million euros), UPM-Kymmene (12th biggest in 2001 and 13th biggest in 2002, 45 and 46 million euros), Outokumpu Pori-copper (Outokumpu Corporation 14th biggest in 2001 and 11th in 2002, 41 and 47 million euros), Kemira Pigments (Kemira corporation 15th in 2001and 12th biggest in 2002, 39 and 46 million euros), and Yomi Solutions (a part of Yomi group with 4, 0 million euros in 2002 and Elisa Communications concern, 16th biggest in 2001 and 15th biggest in 2002, 36 million euros at both years)[13]. Some global firms have their plants or operations in Satakunta also, as Siemens Corporation, Kone and KCI Konecranes, and in the automation field, Swisslog Ltd (100% Swiss ownership).

As the manufacturing is one of the biggest economic sectors in Satakunta in terms of both employment and GDP, the decrease of employment places in manufacturing and primary production has been difficult to compensate in the region. There has been promising development in some new technology industries and services; where the number of jobs has increased. In particular, telecommunication, computing and other services for businesses have provided the fastest-growing source of employment in recent years.

According to the strict definition of automation and electronic production technology firms, the local concentration is about 60 firms with app. 500 employees in 2001 and with the broad definition including automation technologies, ICT (with welfare technologies) and electronic production technologies the field had app. 1400 employees with app. 150 plants and 380 million euros annual turnover in the year 2001[14].From this there are about 5 leading firms. The leading firms in the field in Pori and Rauma town regions are: Swisslog Oy (earlier Cimcorp Oy), Siemens (or the functions Siemens used to own in the region), Satmatic Oy, Urho Tuominen Oy (UTU), Corob Oy, MKT-Finland Oy, KMT-Tekniikka Oy, Piir-Group Oy, Robotiikka Oy/ Hollming (in Rauma) and a department of the Metso - Automation Networks Oy.

The leading firms in the automation field are classified as whole systems and machinery providers (conductors). These are selling directly their products to the end-customers, which in the case of automation most often are other industrial companies (food and beverages production, mechanical wood processing, metal work, machinery, instruments production etc.). The concentration of automation and electronic production firms are linked to each others in most cases, either through sub-conducting or by ownership. The leading firms have their roles locally as technology developers (innovators), technology supporters

13 Source: Finnish biggest entrepreneurial investors to R&D in 2001 and 2002, ranged in June 2002 and in June 2003 by Tekniikka & Talous Magazine of Talentum Plc.

14 The first definition is from The Vision of Satakunta Region 2010 by Satakunta and Rauma Chambers of Commerces and Swot Conculting, 2003, the second definition is from The Regional Technology Strategy Satakunta 2001 by Employment and Economic Development Centre for Satakunta, Tekes and the Regional Council of Satakunta Region.

(technology transfer and consultancy), or appliers and utilizers as end-customers. The challenge for the businesses is to transform the quite often excellent technology knowledge to new products and systems. Main market areas for the leading companies are Finland, Nordic Countries, EU-countries, Transition countries in Europe (EU partnership countries in the Eastern Europe) USA, China and other rising Asian economies.

3. Strengthening the local knowledge environment in the less favoured regions

There are models, which are formed to work as development tools for less-favoured regions to booze their economical processes and which are built in the era of multi-level development work and partnerships (global, national, local). These are for example polytechnics, Centres of Expertise Programmes, Regional Development Programmes and the "university centres" of subsidiary campuses of the universities located to bigger cities in Finland. These are the models which are also in use in the both case locations. Local actor groups do attempt to strengthen the local innovation and industrial environment by following the current themes and ideas (frameworks, innovation systems as one current theme), which are quite often the strongest ones in the region. The actions are taken in the era of certain interpretation of (see Sotarauta & Viljamaa 2003) what is important for the region and what is not. The development actions done in these two less favoured regions could be divided to three parts:

I Building the institutional base and the technological infrastructure

II Developing the competence base through development programmes[15]

III Creating and intensifying internal and external knowledge networks

In this development environment, the current modification and infusion to new technologies took a longer time than in many other regions, but once in the process, the pathway of the development is widely agreed upon. The local development agents in the Seinäjoki and Pori town regions are now enhancing the use of high-tech applications (automation, telecommunication, electronics, robotics and other intelligent products and systems) in all industrial production and they are building the local innovation-supportive environment to strengthen this pathway and create new future possibilities for local companies as breakthrough for new emerging industries.

In a traditionally agriculture-based region such as South Ostrobothnia, the traditional interpretations are not necessarily the same as in Finnish society in general. Similarly, in the traditional industrial location as Pori-Ulvila area and the whole Satakunta, industrial development has been prioritised higher than many other development schemes. Figure 6 shows how early entries with new initiatives create novel future possibilities in the economic development process in certain regions. The question is whether the agents in the Seinäjoki and Pori town regions have actually succeeded in planting the new seeds of the new era. In other words, one can ask whether they have started to work for building innovation competencies too late and whether institutional capacity in the region is lagging too much behind other regions.

15 In this paper I have concentrated on the institutional settings and university networks and less to the variety of the roles of the development programmes.

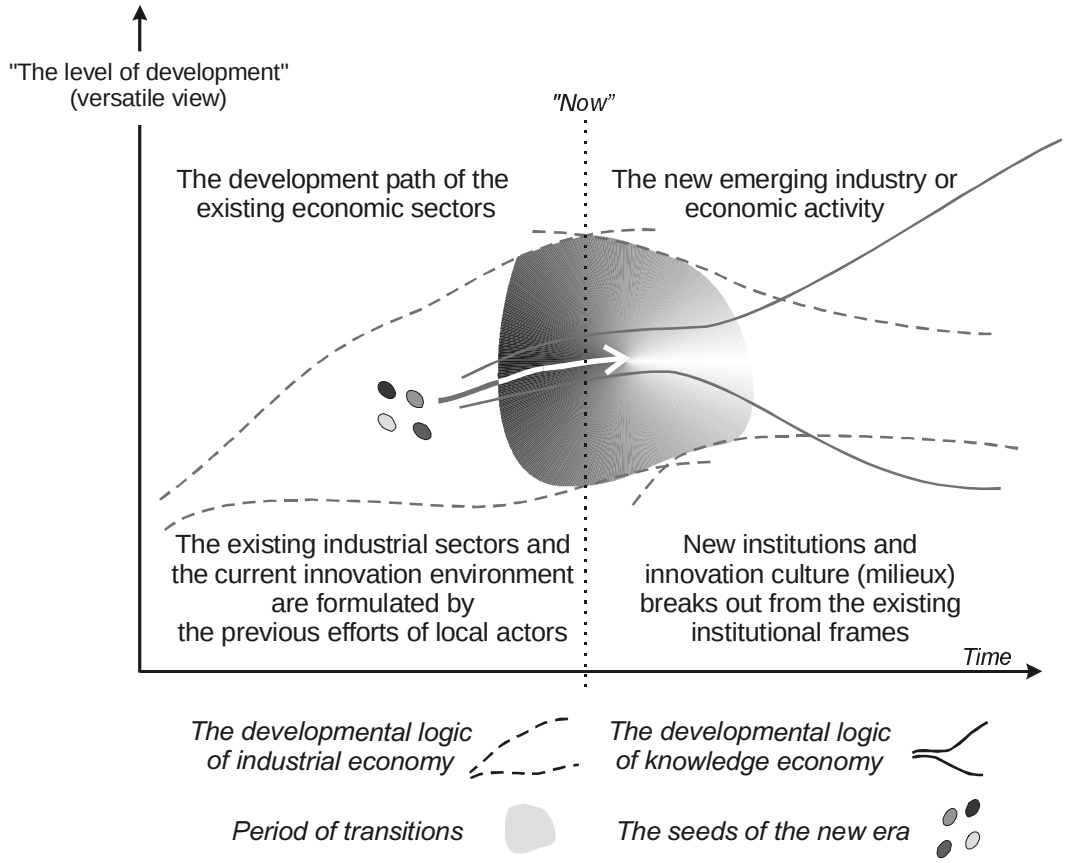

Figure 6. The development process of major economic sectors in certain regions[16].

I Building the institutional base and the technological infrastructure

In the current economic situation in both regions, local actor groups do strengthen the local innovation and industrial environment by following the current themes and ideas (frameworks, innovation systems as one current theme), which are quite often the strongest ones in the region. In the Seinäjoki region the emphasis is now in the construction and conceptualisation of Seinäjoki Innovation and Technology Village (technology park) and the EPANET university network and research community. The applied R & D work done in the intelligent products and services and further automation branch, is a part of the increased general R&D expenditure in the region. This increase has been strongest in the Finland in the years 1995-2000[17]. The recent inputs to the higher education and research system in the system and the region's enterprises good performance in the applied research field have grown the figures notable.

In Pori the university institutions are established at the area since the end of 1980's, first the Pori unit for Tampere University of Technology (TUT) and soon after the Pori Unit for Turku School of Economics and Business Administration (TSEBA). These are working in close co-operation with the Satakunta Polytechnic and the PrizzTech Science & Technology Park. They form together a concentration of university units and a campus at Pori. The campus area is nowadays called the Pori University Centre and the concentration of the university units as Pori University Consortium. In the Pori town region there are reached a

16 Modified from Sotarauta & Viljamaa 2003, p. 64.
17 Source; Statistics Finland and , Seinäjoki Technology Centre Ltd.

common understanding of the development areas in recent years through the economic situation of the region and through the multiple strategy work done in the region.

SEINÄJOKI

As an outcome of strategic work done in the Seinäjoki area, most of the new development institutions are education, research and/ or development organisations. There are some research and higher education institutions (HEI's) in Seinäjoki region but not state-related independent research institutions at the research- university level. Most of the institutions are established at the area since the end of 1980's, and are administratively bonded to outside the region located organisations and therefore are not independent organisations.[18] One of these is Seinäjoki Polytechnic. Others are mostly university filial, which together for a campus at Seinäjoki. The Town of Seinäjoki and the Seinäjoki Polytechnic have established a technology centre (Seinäjoki Technology Centre Ltd) and a joint- technology park (the Innovation and Technology Village) to Seinäjoki. With these actions, the Town of Seinäjoki and Seinäjoki Polytechnic are constructing an innovative physical environment for several other specialized R&D agencies and high tech companies. University units in Seinäjoki are:

- **South Ostrobothnia Summer University** (7) – founded 1960
- **University of Tampere**, Institute for Extension Studies (app. 25 employees) – founded 1981 and Research Unit for Urban and Regional Development Studies (Sente) – founded 1998
- **University of Helsinki**, Institute for Rural Research and Training (app. 35) – founded 1988
- **Sibelius Music Academy** Training Centre – founded 1991
- **University of Vaasa**, Seinäjoki Unit (app. 10) founded 1998

Seinäjoki Polytechnic is based on earlier existed technical, business, and etc. colleges or schools. It offers nowadays a total of 21 undergraduate and 2 graduate degree programmes in the following fields of study: natural resources, business and administration, technology and communications, health care and social services, tourism, catering and institutional management, and culture. In its institutions, there are approximately 3200 students and 275 staff members. The role of Seinäjoki Polytechnic as an only *regional-based higher educational* institute in the region is pointed out in many reports, strategy papers and evaluations. In the Polytechnic's own strategies, it is targeting to become an applied research and higher education organisation.

In the Seinäjoki town region, there are several development institutions and technology transfer centres, which are supporting applied research and technology-transfer, testing and incremental innovation development. Some of these development agencies are targeted more general R & D work or ICT development work generally. These institutions offer services through large development programmes (Centres of Expertise, Regional Development Centre Programme etc.), through single applied R & D projects targeted directly for the businesses or through partnership based and networked development work. The R & D institutions and technology transfer centres, which have (or could have) some contributions in the ICT field and intelligent products and services expertise, are presented in the following table (table 1).

[18] This definition is excluding companies' research centres, human medical and veterinary medicine research organisations (part of hospitals etc) and third sector research institutes and Seinäjoki Polytechnic.

Table 1. Specialized R&D development organisations in the field of intelligent products and systems.

Parent organization (or ownership)	Institution	Specialized activities
Seinäjoki Polytechnic (Municipalities in Seinäjoki town region).	**All institutions**	Educational, research and testing offices and labs, open for industry on the basis of agreement
*	**Seinäjoki School of Engineering**:	Information Technology, Mechatronics, Software Engineering, Embedded Systems.
*	**Technology and Business Centre (SeiTek)**	Mechatronics and product simulation.
*	**Virtual reality technology centre / FRAMI**	**CAVE** and research and testing labs for the polytechnic and industry
University of Tampere	**The Institute for Extension Studies (TYT), Seinäjoki Unit**	ICT applications, communication technology and networks, wireless solutions in **WIRLAB.**
University of Helsinki	**Seinäjoki Institute for Rural Research and Training, (Makes)**	ICT applications for the foodstuff SMEs.
University of Vaasa	**University of Vaasa, Seinäjoki Unit**	eBusiness, ICT applications for the peripheral areas (e.g. services).
Private (Town of Seinäjoki and foodstuff companies)	**Foodwest Oy (Ltd)**	Product and process development in the foodstuff sector .
Private	**LifeIT Plc**	Medical information technology.
South Ostrobothnian Hospital District and **Seinäjoki Polytechnic**	**The Digital Medical Laboratory / MEDIWEST Health Care Technology Centre**	Digital display technologies, broadband networking, remote picture archiving, digital consultation station, wireless communication technologies.
Town of Seinäjoki and **Seinäjoki Polytechnic**	**Seinäjoki Technology Center Ltd**	Intelligent products and services, ICT technology park. Management of Seinäjoki Innovation and Technology Village and Seinäjoki Centre of Expertise.
Private	**Seinäjoen Tietoraitti Oy**	Tele- and communications network support and management.
Private	**EPEC Ltd**	Embedded systems company, active in public-private partnerships
Private (local metal and manufacturing firms, municipalities).	**Steel Center Oy, Kauhava**	Manufacturing and steel production management, R&D, embedded solutions, services and consultancy, education services.
Private (local firms and municipalities)	**LC Logistics Center Oy, Kauhajoki**	Information systems; software and services, logistics development, logistics-related business and technology strategy consulting, regional technology development services.

There are app. 600 study places (start-up places) for the undergraduate level in the ICT education in the South Ostrobothnia in the university units and Seinäjoki Polytechnic. Measured from the volume point of view, **Seinäjoki Polytechnic** is controlling mostly the ICT education in the region. Seinäjoki Polytechnic is the main educational institution at the ICT field in the region and it has app. 200 starting places per year. Main schools in the ICT field are **Seinäjoki School of Engineering**[19] and **Seinäjoki Business School**[20]. The degree programmes related to ICT field are: software production, electronic business, business information technology and partly media entrepreneurship. Seinäjoki School of Engineering offers education at the information and communication technology, and this degree programme is the biggest degree programme in the institutions. The achieved degrees are Bachelor of Engineering. It has app. 90 start-up places every year, divided to mechatronics, software engineering and embedded systems and further intelligent production processes, virtual technology and simulations. **Seinäjoki Polytechnic Technology and Business Centre SeiTek** operates in connection with the School.

There has been also university level ICT related education about 15 years in the region. University of Tampere, **The Institute for Extension Studies TYT, Seinäjoki Unit** has organised applied information technology education as continued and extension courses since 1987. **University of Tampere** has offered information and communication technology extension education also for adult students from the year 2003 onward. **Tampere university of Technology** is offering extension study type educational courses for 20-50 adult students for engineers in the production technology from the year 2003 onward. Together the Tampere universities will offer app. 60 start-up places at the Masters Degree level.

University units and Seinäjoki Polytechnic with different faculties and schools are functioning together with companies offering tailor-made extension and professional courses to adult workers in the local companies. Adult students in the Seinäjoki School of Engineering are app. 70. At the intelligent products and systems technology line the professional courses are concentrating to key-technologies in the field and partnership companies include: Lillbacka Oy, EPEC Oy, and Done Logistics Oy. Others, are relying more to Vaasa area in education, Engineering Masters Degree in the University of Vaasa and partly some subject from Vaasa Polytechnic and Raahe Polytechnic.

The leader companies in the branch have their own remarkable R & D projects together with national and international partners, for example VTT, technical universities, polytechnics, other companies, centres of expertises, etc, international private R&D labs. Funding for these research projects are collected from also national and international sources: SITRA, Tekes, regions (national and EU-wide Structural funds), districts, partly cities and municipalities, venture capital firms (for example from Germany), national Government and EU research framework programmes, so as to mention some sources.

PORI

In Pori there is also research and educational institutions (HEI's) but these institutions are relatively young and not totally independent research institutions at the research- university level. In fact, many of the university units are established in the region in last five years.
The university institutions are established at the area since the end of 1980's, first the Pori unit for **Tampere University of Technology** (TUT) and soon after the Pori Unit for **Turku School of Economics and Business Administration** (TSEBA). Later these formed a joint subsidiary unit (The University Centre), which specialises in IT (information technology) and business management (business having started in 1997).

[19] Year of foundation: 1967, merged with Seinäjoki, Polytechnic in 1992.
[20] Year of foundation: 1952, merged with Seinäjoki Polytechnic in 1992.

The university units are mostly university filial, which together form a concentration of university units and a campus at Pori. These are working in close co-operation with the PrizzTech Science & Technology Park and are currently located by the river Kokemäenjoki at the town centre. The campus area is nowadays called the Pori University Centre and the concentration of the units as Pori University Consortium. The Pori University Centre consists of following five university institutions or units:

- **Tampere University of Technology, TUT,** The Pori Unit (app. 100 employees)
- **Turku School of Economics and Business Administration, TSEBA,** The Pori Unit (app. 30 employees) and the
- **University of Turku, UTU,** (app. 15 employees)
- **University of Tampere, UTA**, (app. 10 employees)
- **University of Art and Design, UAD,** (together with other institutions app. 10 employees)

The Satakunta Polytechnic is a large polytechnic with education in five[21] study fields and 23 degree programmes, which three of them are in English, incl. technics and maritime management (it is only institution in Finland in sea transportation education), energy, food production, health and social care, economics and business administration and services. The Polytechnic has expanded itself to five towns in the Satakunta region; it has units in Pori, Kankaanpää, Harjavalta, Rauma and Huittinen, although the Institution is owned by the city of Pori. At the beginning of the study- year 2002 there were together app. 6 600 students in the Polytechnic with app. 1 950 new students[22]. The staff includes app. 500 employees totally, from which about 300 are full-time.

The Satakunta Polytechnic has located at the area already much earlier, although as it has been under the status of polytechnic since 1997. There is also varied higher education available in Satakunta, but the region does not have a multi-faculty university. There is a teacher training faculty in Rauma, belonging to the University of Turku, the other university-level research institutions in the Satakunta region are: three research institutes or research centres of the Tampere University of Technology (Vammala, Kankaanpää and Rauma) three Research Institutes of the University of Turku, Pyhäjärvi Institute and the Satafood Development Centre.

PrizzTech Ltd specialises in R&D functions to the expertise lines of Satakunta Centre of Expertise Programme and the energy technologies and the welfare and telemedicine technologies. The Satakunta Centre of Expertise has two lines of expertises: distant technologies (telecommunication networks, distant technologies in automation field, new media/ content software and distant medical technologies) and material technology (magnetic metallurgies, multiple metallurgies, drinking water materials).

In many of the regional development strategies, development programme papers etc. there were named some public development organisations or authorities, which would be important in the actual development work, both in the regional level and for development work done in the individual firms or organisations. The other, more common public development actors are: Finnvera Oyj/ Pori, The Pori Employment and economic Centre of Satakunta, the regional Council of Satakunta, The Pori town region and the city of Pori (and Ulvila) and the Employer Services of Pori (Porin Työnantajapalvelut). The relevant development organisations or institutions for the growing fields of ICT, automation, electrics and electronic production in Pori town region are presented in the table 2.

[21] Business, Fine Art and Media Studies, Social Services and Health Care, Technology and Maritime Management and Tourism

[22] Pori Higher Education Cooperation Strategy 2002, only in Finnish

Table 2. Specialized R&D organizations (developers) in the automation and ICT fields.

Parent organization (ownership)	*Institution in hand*	*Specialized activities*
Satakunta Polytechnic (Town of Pori).	**All institutions**	Education and regional development activities (degree education, extension studies, courses for entrepreneurs and private sector etc).
*	**Department of Engineering and Maritime Management**	Planning of R&D programmes for local businesses, responsibility of regional development in technical aspects. Educational, research and testing offices and labs, open for industry on the basis of agreement
*	**O'Sata® - Centre for Research and Development and O'Sata Enterprise Accelerator®**	Entrepreneurship services for local businesses and students, enterprise accelerator for students start-ups, R&D services, and cooperation between the polytechnic and local businesses.
*	**Automation Research Center**/ O'Sata® - Centre for Research and Development	Coordination of automation technology R&D programmes, research management of automation technology.
Pori University Consortium	TUT, TSEBA, UTA, UTU and UAD Pori Units or R&D project organisations	Higher degree education, related technology expertise, cooperation with local, national and international ICT companies, basic research and education in ICT, Telemedicine, Electronic production and Industrial management. University Library and Post- Graduate School.
Tampere University of Technology TUT	**The Pori Unit**	Higher degree technical education, basic and applied research in ICT related issues. Extension studies and joint projects for local business life.
PrizzTech Ltd (Town of Pori and varied public-private owners)	**Technology Centre and Science park facilities**	Facilitate services for Pori University Consortium and the technology park,
*	**Satakunta Center of Expertise**	Expertise field of *distant technologies* and *material technology*. The co-ordinator of the Pori Regional Centre Programme and the Rauma Regional Centre Programme.
Porin Seudun Kehittämiskeskus Oy (owned by four municipalities and local entrepreneurship foundations)	Regional economic development organisation	One of the specialised development areas; automation technology firms and entrepreneurship.

In the field of automation and higher technologies **the Satakunta Polytechnic** offers higher education in the **Department of Technology and Maritime Management**, which has units in Pori and Rauma town regions. The Department offers higher education, R&D

programme planning and other partnership tasks for local industry. The Department is an active partner in defining, forming and coordinating different development programmes in order to restructure the local business life towards higher technology orientated businesses and industry. Local companies and industry could influence directly to the Department and the whole polytechnic in their problem-solving typed issues and education needs[23]. The Department has totally app. 1870 students and 150 staff employees (The Satakunta Polytechnic, web-information).

In addition, the Polytechnic has two separate research and development units**, O'Sata®-Centre for Research and Development**, and **CACE - Centre for Adult and Continuing Education,** which operates in all five towns. The Research and Development Centre O'Sata® offers some specialised operations of R&D functions especially in the automation technology field through its **Automation Technology Research Center** and the O'Sata Enterprise Accelerator®. The other specialised operations of R&D functions for local businesses, entrepreneurs, students and other development actors in the regions include: Automation (Automation Technology Research Center), eBusiness and Management, Intelligent networks, Logistics, Maritime safety, Electronics, Energy and environment, New social and health care services and finally the O'Sata Enterprise Accelerator®, which is a kind of technology park for student start-ups and spin-offs.

II Developing the competence base through development programmes

In generally, there are a wide range of development programmes with possibilities for public funding, and are targeted to the strengthening of balanced regional development and restructuring. The regional policy programmes as well as regional technology policy strategies aim to speed up economic development based on the regions' own strengths and expertises. Most of these programmes are implemented in the regions and their funding is allocated via specific measurement and controlling activities, while parts of the system rely more on lobbying from national and international financing. Some of the regional development programmes rely more on networks than on regional or national institutions, and are based on a nationwide competitive bidding system. Behind the establishment of the new programmes at the state level was the awareness of the change in the regional structure, as indicated by the ever stronger concentration of population in the Helsinki metropolitan area and in the largest university cities and regional centres (Tampere, Turku and Oulu).[24]. The implementation of the new programmes went further after the EU membership period started in 1995, when the range of funding instruments expanded.

CENTER OF EXPERTISE PROGRAMME

The national Centre of Expertise Programme (CoE) supports regional strength, specialization of regions and collaboration among different centres of expertise. The Centres of Expertise Programme is an objective programme created in accordance with the Regional Development Act (1135/93) and the result of the programme is a network of centres of expertise around Finland. One of its objectives is to concentrate local, regional and national resources on the development of selected, internationally competitive fields of expertise. Access to the programme has required a competitive mix of research- based know-how, innovative and growth-orientated measures in the proposed programme, business linkages

23 This is noted in the LIS Pori interviews (total number of interviews in Pori 10 before 1.4.03).
24 Source: The web pages of the Ministry of the Interior on 02 May 2003 and 21 May 2003.

and effective organization. The centres of expertise also compete for annual basic financing allocated by the state, which guarantees constant development work.

The programme has been carried out by eleven centres of expertise in Finland from 1994 to 1998 and fourteen regional centres of expertise (Seinäjoki Centre of Expertise in the foodstuff sector is one of these) and two national centres of network expertise have been named for the programme phase 1999-2006. There was a mid-term evaluation in autumn 2002 (published in spring 2003 by the Ministry of the Interior) and at the same time there was an opening for new lines of expertise, mostly in existing centres of expertises. The regional programme work is coordinated by a national work group of the centres of expertise.

The original **Seinäjoki Centre of Expertise** was founded in 1998 (in the foodstuff sector) and it was organized through Foodwest Ltd, a food technology centre. A new line of expertise, *intelligent products and systems*, has been established in the winter 2002/2003. The Seinäjoki Centre of Expertise is coordinated by the Seinäjoki Technology Centre Ltd together with Foodwest Ltd (from the beginning of the year 2003). The **Satakunta Centre of Expertise** was founded in 1998 as well and is coordinated by the PrizzTech technology Centre organisation. The two lines of expertises are: 1. material technology with linkages both the technical universities, especially TUT, and big industrial units located in Pori, 2. *distance technologies*, in which the automation technology, telemedicine, electronics etc are involved. In distance technologies field the Polytechnic, town of Pori and other general development organisations are linked to the programme.

REGIONAL CENTRE PROGRAMME

Nationally the aim of the Regional Centre (Development) Programme (RCDP) is to develop a *network of regional centres* based on the particular strengths, expertise and partnership capabilities of urban regions of various sizes. The Finnish Government supports the development work of the urban regions nominated to the programme (through a specific bidding process) by granting annually some basic funds amounting to a half of the accepted expenses. In 2002 and 2003 basic funds of approximately 8.2 million euros per year were granted to the regions. In the future the resources of national regional policy are meant to be directed to these regional centres[25]. RCDP is implemented in 34 regions, among which are the Seinäjoki and Pori town regions. The programme was launched in March 2001 and the programme period lasts until year 2006 (until the end of the current EU Structural Fund period).

The ePohjanmaa Programme, a Regional Centre Programme of the Seinäjoki region, focuses on emphasizing more general regional cooperation and public-private partnership building in the construction of the innovation-supportive environment. The Seinäjoki Technology Centre Ltd coordinates the programme locally and is in charge of the cooperation with other neighbouring programme areas. The strength of the ePohjanmaa Programme has been the strong participation of local firms; all in all, about 150 firms are involved in the actions of the programme. For many ICT firms, *The ePohjanmaa Programme* was the first programme to take actions in order to enhance the use of new technologies in local manufacturing, production and services.

The **Regional Development Programme of Pori** town region was established at the same year than in Seinäjoki and benefit the experiences and suggestions of the Tekes Regional Technology Strategy work which went on in the Satakunta region in 2001. The Pori region programme concentrated on welfare applications and the new collaboration in the welfare-related technologies. Also the emphasis was on the local collaboration, although

25 Sources: the web pages of the Ministry of the Interior on 02 May 2003 and 21 May 2003 and the bulletins published by the Seinäjoki Technology Centre Ltd.

the local businesses were not in the same role in the programme than in Seinäjoki. The technology Centre facilitator PrizzTech Oy is the co-ordinator both of the Pori town region programme and the Rauma regional centre programme.

III Strengthening research and knowledge networks in the less favoured regions

COOPERATION WITH TUT

Tampere University of Technology TUT was established in 1965 in Tampere as the "University for Industry". Nowadays it is large university of technology on the Finnish scale with 13 degree programmes, 10 faculties, 33 departments, 11 500 degree students, and 1 850 staff member, mostly located in Hervanta Campus, Tampere. TUT has been active in the technical and educational reach-out work for years, even decades in some educational fields. Earlier it had active cooperation with industry and the private sector, but it took place mainly either in the university or in the companies in the Tampere region. Now technology transfer has a new content with cooperative technology research and development work. In order to be a competitive partner in this work, TUT has recently expanded its services and education actively to new areas (both academic and geographical areas). As an outcome of this conscious activity, TUT has started educational or research cooperation in ten new locations in Western Finland since the beginning of the twenty-first century[26]: in Hyvinkää, Jalasjärvi, Kankaanpää, Kokkola, Lahti, Nastola, Rauma, Seinäjoki, Valkeakoski and Vammala. In the towns of Pori and Salo the university has provided continuation and extension education since the 1980s in the fields of electronic production (in Pori and Salo), telecommunications (in Pori) and industrial production (in Pori).

In **Seinäjoki** town region, from the beginning of 2003 there have been extension studies available in industrial production organized by the Tampere University of Technology (TUT). Not even does the University have a specific unit or R&D centre in the region; it is an active partner in different cooperation models established in the region as continuing and extension education, high-technology infrastructure construction (funded mainly by other partners), especially in the Seinäjoki Technology and Innovation Centre (Mediwest and FRAMI) and the new virtual reality technology laboratory CAVE, and finally in the EPANET research community with three fixed-term professorships and several researchers. Only the medical information technology professor and his research team have been working long enough to have relevant outcomes available; the other two professors have just been nominated or are currently under the nomination process. The EPANET professorships are in the following research areas: Medical information technology (in Mediwest); virtual reality technology, especially in the embedded systems (in the Seinäjoki Technology and Innovation Village); and the plastic composites research team in the municipality of Jalasjärvi in southern South Ostrobothnia.

Cooperation with Tampere University of Technology was one of the main purposes for the EPANET research network and some other efforts made by both the local authorities and, interestingly, the leaders in the Seinäjoki Polytechnic. There was even some university-level education available in the region provided by the existing university units (Universities of Helsinki, Tampere and Vaasa) but no sufficient higher-level technical education or research. Therefore the local actor groups found it necessary to build partnerships with universities of technology around the region. TUT was the nearest one and a "natural partner" in that sense; however, the reasons for inducing TUT to start cooperating with South Ostrobothnian actor groups were somewhat more complex than that.

[26] Source: TTY & Co. 1/2003, April (in Finnish)). Brochure of the Tampere University of Technology.

In **Pori**, cooperation with Tampere University of Technology has years of the history of the cooperation. TUT Pori Unit was the first university unit to be located in Pori, although soon after the TSEBA Pori unit became also involved to development and education activities in Pori and Satakunta. TUT is still most strongly involved to Satakunta of the Pori University Consortium HEIs and the professor(s) of TUT Pori unit are in the lead of the Pori University Consortium. In the other way around, the TUT Pori unit performs second best unit in the whole TUT institution.[27].

The TUT Pori Unit does not have education or research targeted directly to the traditional automation field, but in the fields of telecommunication, distant technologies, electronic production and for example industrial management, they could give their contribution for the automation industry. It offers also degree education in the fields of: Information Technology, Industrial Management and Engineering and Electronics Production, as well as in the following scientific areas: software engineering, information and communication technology, digital signal processing, multimedia, electronics production and flip chip technologies, industrial and technology management, telemedicine and modern learning environments[28].

EPANET- RESEARCH COMMUNITY IN SEINÄJOKI

In the knowledge-based network set-up the idea is to create networks with major universities inside and outside the region. There is in the Seinäjoki area a new effort to create higher educational and research network, which is in its turn quite unique in the Finnish scale. The network; *South Ostrobothnian University Network* (EPANET), is a co-operation network of six Finnish universities[29] at the Seinäjoki town region. EPANET concept is working for the idea of developing a new kind of research culture in co-operation between universities, research institutes and enterprises.

The core of the network is loosely organised group of around 16 fixed-term research professors, which in their turn will gather a group of researchers around themselves. The network is expected to form a new kind of creative community with 50-60 researchers working especially with themes found in the local business environment. Above figure shows some open questions rose in the EPANET context. Funding is organised mostly by local sources (1,5 million euros per year), including leader companies. Enterprise share of the costs are around 20% (from 11% up to 35%) of the individual professorships[30]. The EPANET- professorships are contributing most the applied research work in intelligent products and systems, such as: virtual technology (mechatronics and machinery production processes), embedded systems, *e*Business, entrepreneurship in traditional industries, production systems and logistics, medical information technology and Information and communication technologies.

EPANET network is expected to fill many gaps in the applied research resources in the region caused the lack of research traditions and absence of independent (especially technical) university. The idea is to get a broad understanding of phenomenon and problems of the regional based industry by combining tacit knowledge with theory, as well as using approaches of different disciplines. The idea is not, however, to function as direct problem solving and research transfer institution to companies, but merely search and find new re-

27 Source: LIS Pori interviews, and TUT information brochures.

28 Sources: The TUT Pori Unit web-pages (03.04.03), Annual Report of the Pori University Centre 2001, Pori Higher Education Cooperation Strategy 2002.

29 Universities are: University of Helsinki, University of Tampere, Tampere University of technology, University of Turku, University of Vaasa, Sibelius Academy.

30 Source: University Association of South Ostrobothnia and the Phase I interviews.

search questions arising from traditionally industries (agriculture, foodstuff, forestry, machinery, furniture, carpets) and culturally quite fragmented environment.

The basis for the network was laid during the starting a Research Programme project, implemented by the local university association in 1999-2001. As a result of the work an agreement for the university network came through, which was an expression of the will of the six Finnish universities and the key regional development organisations in order to create new R & D work in the region. The model was also in the need of an active network co-ordinator and background organisation, which in this case is the University Association of South Ostrobothnia. The network is also offering an independent training project (EDUEPANET) has been created to support the development of research work. It involves the planning and implementation of training projects supporting mostly post-graduate education. There are several points of views, which rise high expectations for the EPANET model as a new model in the Finnish higher education and research system[31]:

1. From the institutional point of view the *network is built up together with universities*, which have their main campuses elsewhere. In the EPANET-model the recruited professors belong to the staff of the host universities but they are working mostly in and for Seinäjoki region.
2. The second point is the *active role of Seinäjoki Polytechnic* has in the network. The collaboration between university institutions, Polytechnic, private companies and then regional development organisations is sewn into the network as the functioning model..
3. The third point is *the form of funding*. The network is funded by EU structural funds, municipalities and their co-organisations, regional council, private companies, technology transfer organisations, Seinäjoki Polytechnic and the Ministry of Education.
4. The fourth point is the targeted research areas. Focus is on the combination of *new applications of IC- technology* and *promotion of entrepreneurship*, especially in the SME context. In the choice of the fields of research, the emphasis is laid on applied research and product development in the expanding branches in the region, which in their turn have their strength in the traditional branches and sub-clusters.
5. The fifth point is the focus of the EPANET-network which is on the *human intellectual resources* (human/ social capital) instead of the physical constructions or academic departments. The idea has been to create flexible research community where different universities, regional polytechnic and development organisations could co-operate.
6. The sixth point is the *conceptualisation method* used in the construction of the model. In the process of setting up the network, there were forms of foresight and game theory methods in use. The designers of the model thought through the several possibilities and alternatives to form and attract people and their background organisation to join the network.
7. The seventh point is the *ambitious but believable story*. To work the EPANET- concept needed to fulfil some premises, which in their turn affected the acceptance of the story. Therefore in the construction of the network the inductive development strategy was in use.

EPANET- network is strengthening the institutional academic infrastructure in South Ostrobothnia as allocating new knowledge and relational resources and forming a new type of *research community*. In this perspective it is an *organisational innovation* at the regional level, and also at the national level. However, there is laying some critical issues to be solved. First of all, there is an underlying question if EPANET is a series of projects or an institution? Further, is there enough co- operation between professors and their research groups, between professors and their host universities and departments and between professors and external partners? There is a also constant struggle over practical issues, pres-

[31] Found in the Phase I interviews and information given by the representatives of the network.

tige, power, imaginary aspects, resources etc. is going on (though not between professors). As managing point of view, EPANET is beginning to be too big for University Association of South Ostrobothnia and therefore reorganisation and a reinterpretation is needed. At first all this was in the background, because a big task required collective efforts – effort is still collective but new nuances are emerging all the time. This caused the EPANET-"ideology" become almost forgotten and suppressed by daily routines. The next steps would be widening awareness and skills building, strengthening knowledge and human intellectual capital resources, and *strengthening the knowledge and innovation networks*.

UNIVERSITY CONSORTIUM IN PORI

In the Pori **town region**, the university units are mostly university filial, which together form a concentration of university units and a Pori university campus. The university campus in old but rebuilt cotton factory is nowadays called the Pori University Centre, which includes the Pori University Unit[32] (specialises in IT and business management) and other university units in the town region. The Satakunta Polytechnic in its turn is spread over the city and does not form a certain unified polytechnic area or campus. The concentration of the university units has now a status as the *Pori University Consortium*.

Strictly defined the Pori University Consortium consists of five university institutions or units as **Tampere University of Technology TUT**, The Pori Unit, **Turku School of Economics and Business Administration TSEBA**, The Pori Unit, **University of Turku UTU**, **University of Tampere UTA**, and the **University of Art and Design UAD**, but in reality also the two **polytechnics** and the technology centre **PrizzTech Ltd** are involved in the consortium. The oldest university institutions are established at the area the end of 1980's, first the Pori unit for Tampere University of Technology (TUT), which also the biggest unit in Pori, and soon after the Pori Unit for Turku School of Economics and Business Administration (TSEBA). The joint units or operations for consortium are Pori Science Library and the Pori Graduate School, which is organised by the Tampere University of Technology/ Pori Unit, but is open for other post graduate students in the region as well as for the full-time teachers of Satakunta Polytechnic.

Pori University Consortium is one of the six similar types of university unit concentrations in Finnish less favoured regions[33]. The Pori University Consortium as well as the other similar consortiums in Finland are specialised to certain sectors and are working in the growth sectors of the society (at least in the local level) and therefore have close linkages to the local economic life, are well networked at the local and national (some also at the international) level. These consortiums have also special regional development tasks, which are to develop the local businesses but same time to modernize the traditional business base of these regions and strengthen the local actor's abilities to build new competencies on the top of the old ones. It seems that in the national level these university consortiums are seen as a linkage between universities and polytechnics in the areas where there are not independent science universities (LIS/ Pori Interviews).

The Pori University Consortium specializes in technology, economics and business management, humanistic sciences, welfare research, arts, short sea studies and possible in the 2003 autumn to medical studies. The common R&D fields for all these organisations are: research of telecommunication networks and the telecommunication research environment, electronics/ electronic production, monitoring systems based on GIS technologies, eBusiness development and the welfare technologies. Adult and extension studies in different fields are offered since 1987, but in recent five years the university units in Pori

[32] "Porin Korkeakouluyksikkö" in Finnish.
[33] Pori, Lahti, Mikkeli, Kokkola, Kajaani and Seinäjoki.

(Pori University Consortium) started to give whole degree education in Pori for high school graduates as the following table (table 3) shows.

Table 3. The student amounts in degree education in Pori University Centre.

Year*	**TUT**	**TSEBA**	**UTU**	**PhDs and Lics in Graduate School)**
1999	478	62		1
2000	483	92		4
2001	530	116	40	5
2002	577	150 (app.)	40	5
Total student amount in 2003[34]*	700	200	80	90
Student intake/ autumn 2003	155	50	40	-

*Educational year lasts from the autumn to autumn.

The Pori University Consortium has worked from the network typed basis, but now pressured by the external partners (especially funding partners) it has been forced to start change the structure and a start a new institutional process in order to form a strong regional higher education institution. Its possibilities to strengthen the existing resources are seen to be in threat by the tendencies of expanding educational and R&D fields. As the emphasis lay in the structures and institutions, the necessary networking seems to be underdeveloped at this moment.

The messages from the local industry and business life have stressed the need for increased cooperation between the Polytechnic, Pori university units and PrizzTech Ltd (see for example Ahmaniemi, Kautonen and Tulkki 2001, Satakunta Visio 2005 and 2010). Further, one of the biggest emerging issues in this concept is the cooperation in R&D functions and enterprise services. In principle TUT Pori Unit is the unit for basic research and higher technical education in specific fields, while polytechnic is a local educational unit with some applied R&D functions and PrizzTech in its turn a coordinator of different regional development programmes, the facilitator for business park, spin-offs etc and the business advisor. In reality, all the three (or four if O'Sata® is counted as a separate organisation) are working with mixed examples of the above R&D issues.

Therefore, these organisations have started in the year 2002 new round of cooperation strategies for the technology development where they defined their own strength areas but also the common fields, where they should work together. In this work, they rely much on the Satakunta Technology Strategy (made in 2001), which was made together with local municipalities, (national) regional development authorities, local higher education institutions and the intermediary organisations between education units and entrepreneurs and local industry.

34 In the figure there is also included the extension studies students and post graduates of Pori Graduate School of TUT Pori Unit. Sources: The TUT Pori Unit web-pages (03.04.03), Annual Report of the Pori University Centre 2001, Pori Higher Education Cooperation Strategy 2002.

4. Some challenges for institutional capacity building in the less favoured regions

There are variety of development orientated models, which are formed to function as development tools for less-favoured regions to boost their economical processes, and which are at least partly built in the era of national competitiveness and public-private partnerships. The other mechanisms are merely based on the local strengths, capabilities and awareness to stimulate the local economic change. Outward linkages and especially the linkages with R &D institutions and HEIs such as universities and polytechnics are the most relevant and promising mechanisms in many less favoured regions in Finland.

This study is about creating and intensifying linkages with the universities through new type of knowledge networks in Pori and Seinäjoki town regions, but the situation seems to be alike in many other locations and towns as Mikkeli, Lahti, and Kokkola etc. In the beginning there has been a need for *building an institutional base and technological infrastructure* through construction of new physical settings or creating new institutions. In these case regions are in the institutionalisation process (see Amin & Thrift 1995, Henry 2001) to create new type of the development culture, habits and common development view for supporting innovations and knowledge creation (innovative milieu). Secondly there has been either a willingness or opportunities for *developing the competence base through specialised development programmes.*

Seinäjoki town region is nowadays enhancing the level of know-how in the region through conscious development efforts to form a concept of a network of academic institutions in South-Ostrobothnia and through investments in technology and business environment (technology centre & park etc.) for technology intensive and knowledge based businesses. The emphasis is now in the "Innovation and Technology Village" (technology park) and in the EPANET- research community. The network is strengthening both the basic academic infrastructure and putting forward the institutionalisation process for academic and business related knowledge environment. In the choice of the fields of research, the emphasis is laid expressively on *applied research* and product or service development in the expanding branches in the region. However, in this network based model the existing HEIs, people and their competencies are in the core of the actions; not departments, HEI offices or other permanent constructions.

In Pori town region the relevant higher education and new technology R&D institutions as well as similar type of development programmes are older than Seinäjoki, but still in the constant change due the local and national interests and decisions. In Pori the institutionalisation process is already in its second round: now the emphasis is on rebuilding and reorganising the existing R&D institutional structure and forming new networks internally in the region. The main effort for Pori town region is to coordinate the regional development work in partnership (to form an operational network for economic development work) and the construction of Pori University Consortium. Actors in the region have formulated a common understanding of the development areas in recent years through the economic situation of the region and through the multiple strategy work done in the region.

In the whole Satakunta region the ideas of the information society were adopted in a very early phase[35]. The work is being continued by the Satakunta Polytechnic (O'Sata and the Department of Technology and Maritime Management), The University Unit of Pori (especially TUT, Pori Unit), PrizzTech Ltd, the Town of Pori and some local companies.

[35] According the information given from the Regional Council of Satakunta.

Lately, the active partners of the "technology and economic development network" have defined the potential areas of development, which are at the focus areas in the region. Automation is one of these fields.

In the process of building innovation capabilities, one of the critical points is the openness to outside world and new knowledge gained from wider national and international networks. In the Pori and Seinäjoki town regions, there is an open question of the mobilisation of knowledge and more precisely, the *leadership* of the of the innovation processes. This is also somehow problematic in the South Ostrobothnia region due the historical and cultural reasons (see for example Ståhle & Sotarauta 2002). To lead the process, there is a need for special regional or local development leadership (see Sotarauta 2001). To gain leadership, partners of the development network are in the need of *mobilisation resources* (see Healey et al. 1999). Network leaders should for example to be able to identify and lead the process through widely acceptable routes, where all interested parties can take a part. The following figure(figure 7) shows the crucial elements of the creating and building institutional capacity in the less favoured regions such as Pori and Seinäjoki.

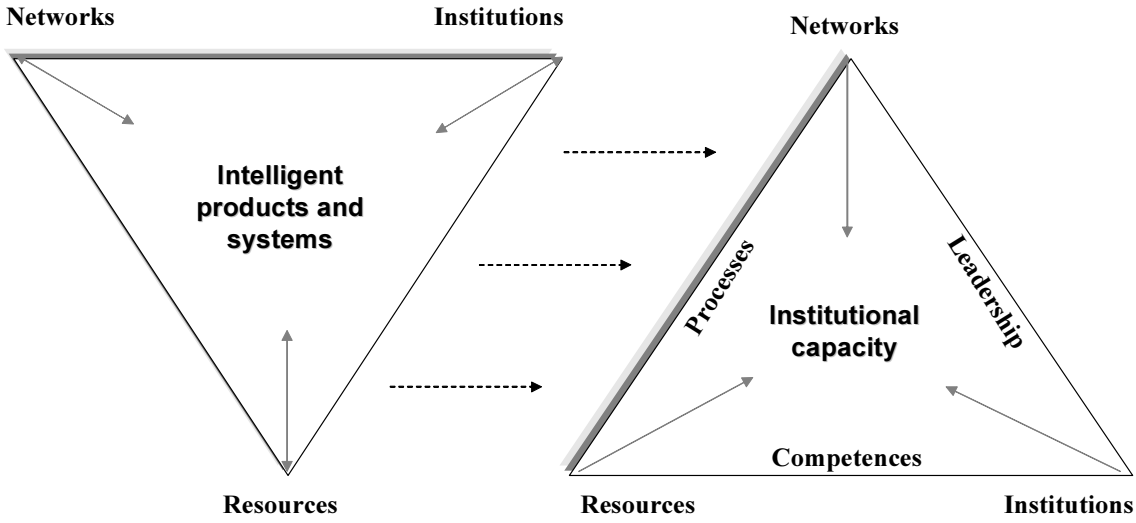

Figure 7. From institutions, resources and networks to the processes, competences and leadership as the elements of institutional capacity.

As a result of the economic situation and the consciousness of the needs of the emerging industries, there has been in both town areas serious efforts as *creating and intensifying internal and external knowledge networks,* especially with universities and HEIs. In both town regions there are still space for new local types of innovation networks. Once networks are created and formed the actors in networks should further be able *to create new spaces* (arenas) for action and collaboration and strengthen valuable existing ones. Some organisations are supposed to act as change agents and form new arenas for the collaboration. EPANET- model in Seinäjoki offers *a partnership area for co-operation* between different universities as well as between universities and Seinäjoki polytechnic and between universities and local businesses. The problem is that these connections and partnerships have been relatively undeveloped and poorly used for allocation of new knowledge and other essential resources.

In the Pori town region the network linkages are relatively weak (to certain knowledge branches and institutions), and the existing linkages are not in their turn well connected to the regional or local networks. This means local organisations have some linkages, but that

does not really influence the local knowledge pool. The University Consortium is still seeking this kind of role, especially the way how to collaborate between the Polytechnic, the technology centre PrizzTech Ltd and the local industry. At this moment the collaboration works between university units and polytechnic, between university unit and companies or between polytechnic, technology centre and companies.

As in the both town regions, these companies are selling products and intelligent systems to other industries and companies, these firms in the region have to have as much capabilities to develop or at least transform new technologies to new solutions and applications as their main customers. In this work the local or national innovation environment actors (universities, polytechnics, technology centres, local and national authorities etc) could have an essential role. To achieve and maintain this role is a difficult task, but it could be useful for all the parties in the innovation development network.

Without the common understanding of the partnership roles and diversification of actions, it is difficult to gain necessary leadership and therefore to mobilise all the necessary resources. In order to achieve this, there is a need to build networks around certain specific development tasks and to gather, reform and combine knowledge in the way the future challenges are faced and used for economical success. The network-typed innovation support mechanisms including institutions as universities, polytechnics, municipalities or their economic development organisations, industry and other entrepreneurs and technology centres acting locally/ regionally, nationally and in some cases internationally could be said to be critical for the local economical development, especially when individual economical actors are small and have relatively poor pool of resources.

Figures and Tables

[36] Kosonen 2001, 2001b, 2002
[37] Modified from Tekes Technology Strategy 2002, p..9.
[38] Modified from Sotarauta & Viljamaa 2003, p. 64.

Literature and readings

AMIN, A. & THRIFT, N. 1994. Living in the global". In Amin A. & Thrift. N. (eds): *Globalization, Institutions and Regional Development in Europe.* pp.1-22. Oxford University Press. Oxford.

AMIN, A. & THRIFT, N. 1995. Globalization, Institutional ”Thickness” and the Local Economy. In Healey, P. & Cameron, S. & Davoudi, S. & Grahm, S. & Madani-Pour, A. (ed.) *Managing Cities: The New Urban Context.* pp. 91-108. John Wiley & Sons Ltd.

AHAMANIEMI, R., KAUTONEN, M. & TULKKI, P. 2001. Tietointensiiviset yritysverkostot Porin alueella. Working Papers 63/ 2001. Work Research Centre. University of Tampere. City-Offset Oy, Tampere, Finland.

COOKE, P. 1998. Introduction. Origins of the concept. In: Braszyk, H-J. & Cooke, P. & Heidenreich, M. (eds.) *Regional Innovation Systems.* pp. 2-25. UCL Press.

COOKE, P. & WILLS, D. 1999. Small Firms, Social Capital and the Enhancement of Business Performance Through Innovation Programmes. In *Small Business Economics* 13: 219-234, 1999. Kluwer Academic Publishers, Netherlands.

HEALEY, P. & MAGALHAES de, C. & MADANI-POUR, A. 1999. Institutional Capacity-Building, Urban Planning and Urban Regenaration Projects. In Sotarauta M. (ed.) 1999. *Urban Futures. A Loss of Shadows in the Flowing Spaces?* Futura- a Quarterly Magazine of Finnish Society for Futures Studies. Volume 18, No. 3/1999.

HENRY, N. & PINCH, S. 2001. Neo-Marshallian nodes, institutional thickness, and Britain's "Motor Sport Valley", thick or thin?. *Environment and Planning A* 2001. volyme 33.

JAVIDAN, M. 1998. Core Competence: What Does it Mean in Practice. *Long Range Planning*, Vol. 31, No 1. 60-71.

KARLÖF, B. 1995. Johtamisen käsitteet ja mallit. Porvoo.

KOSONEN, K-J. 2000. Innovaatiojärjestelmät ei-yliopistokaupunkien kilpailukyvyn ylläpitäjinä ja kehittäjinä**.** An article in: Kurki, S., Linnamaa, R. & Sotarauta, M. (ed.). 2000. *14 näkökulmaa alueelliseen kehittämiseen: Seinäjoen I aluekehitysseminaarin julkaisu.* (*14 Viewpoints on the Regional Development*: a publication of the Seminar of Regional Innovative Development, held in Seinäjoki, November 3-4, 2000). University of Tampere. Research Unit for Urban and Regional Development Studies. Sente- publications 5/2000. Tampere.

KOSONEN, K-J. 2001. Institutionaalinen kapasiteetti ja alueellinen innovaatiokyvykkyys. ("The Institutional Capacity and the Regional Innovation Capability in the Less Favoured Regions", in Finnish.) An article in: Sotarauta, M. & Mustikkamäki N. (ed.). *The Eight Elements in Regional Competitivity (Alueiden kilpailukyvyn kahdeksan elementtiä).* Finnish Association of Local Authorities. ACTA nro 137. Helsinki 2001.

KOSONEN, K-J. 2001b. Institutional Capacity and Regional Innovation Capability in the Less Favoured Regions. Conference Paper. *European Regions and the Challence of Development, Integration and Enlargement.* RSA International Conference. Poland 15-18 September 2001. (Also available at the RSA webpages.)

KOSONEN, K-J. 2002. Building Innovation Capability in the Less Favoured Regions – University Collaboration as a Tool” . Conference paper presented in: “From Industry to Advanced Services- Perspectives of European Metropolitan Regions” 42nd European Congress of the Regional Science Association, Dortmund, August 27-31, 2002.

LC LOGISTICS CENTER Oy, 2002. Center of Expertise Programme 2003-2006 for Kauhajoki region, Kauhajoki 2002.

LINNAMAA, R. 1999. Kaupunkiseudun kilpailukyvyn rakenteelliset ja dynaamiset elementit. In: Sotarauta, M. (ed.) *Kaupunkiseutujen kilpailukyky ja johtaminen tietoyhteiskunnassa.).* Finnish Association of Local Authorities. Acta 106. Helsinki.

LINNAMAA, R. & SOTARAUTA, M. 2000. *Verkostojen utopia ja arki. Tutkimus Etelä-Pohjanmaan kehittäjäverkostosta*. (*Utopia and the everyday life on networks. Research on development network of South-Ostrobotnia)*. University of Tampere. Research Unit for Urban and Regional Development Studies. Sente- publications 7 / 2000. Tampere.

LOGISTIA PARK. 2002. Information brochure 1/2002 of Kauhajoki Logistia Park. Kauhajoki.

SAARI, H. 2002. Report on Mechatronics and embedded systems 29.4.2002. SeiTek/ Seinäjoki Polytechnic 2002. Unpublished.

SEINÄJOKI TECHNOLOGY CENTRE Ltd 2002. Center of expertise programme “Uusi Ameriikan Raitti”, Seinäjoki Technology Centre Ltd. Seinäjoki 2002.

SEINÄJOKI REGION. 2002. Marketing Seinäjoki Region information brochure “Hyvä Yritys 2002”, I-print, Seinäjoki 2002.

SOTARAUTA, M. 2000. Kaupunkiseudun ydinkompetenssien kehittäminen. (Core competencies in the promotion of urban economic development) In: Kostiainen, J. & Sotarauta, M. (ed.) 2000. *Kaupungit innovatiivisina toimintaympäristöinä (Cities as innovative milieux).* pp.127-154. Finnish Association of Graduate Engineers TEK ry. Helsinki.

SOTARAUTA, M. 2001. Leadership, Power and Influence in Finnish Local Government: A Tentative Typology of Leaders and Their Ways of Influencing. A Conference-paper presented in: *Oxford Planning Theory Conference- New Issues: New Theory*. June 20–21,2001. Oxford, UK:

SOTARAUTA, M. & LAKSO, T & KURKI, S. 1999. *Alueellisen osaamisympäristön vahvistaminen. Etelä-Pohjanmaan korkeakouluverkoston toimintamalli*. University of Tampere. Research Unit for Urban and Regional Development Studies. Sente-publications 4 / 1999. Tampere.

SOTARAUTA, M., LINNAMAA, R. & SUVINEN, N. 2003. Tulkitseva kehittäminen ja luovat kaupungit. Arvio Tampereen mahdollistavasta mallista ja osaamiskeskusohjelmasta. Alueellisen kehittämisen tutkimusyksikkö - Sente ja Tekniikan Akateemisten Liitto TEK ry. Sente-julkaisuja 16/2003. Tampereen yliopisto. Cityoffset Oy, Tampere.

SOTARAUTA, M. & VILJAMAA, K. 2003. Mitkä tekijät tekevät kasvukeskuksesta kasvukeskuksen? In: Sotarauta, M. &Viljamaa, K. (ed.) 2003. Tulkintoja kaupunkiseutujen kehityksestä ja kehittämisestä. Kooste usean tutkimuksen tuloksista. (Interpretations about development of city-regions: Compilation of several studies). pp. .33–64. The Finnish Association of Graduate Engineers TEK ry. Cityoffset Oy, Tampere.

SOUTH OSTROBOTHNIAN UNIVERSITY NETWORK- EPANET 2002. Information brochyres. University Association of South Ostrobothnia EPKY. Seinäjoki, Finland.

STÅHLE, P. & SOTARAUTA, M. 2002. Alueellisen innovaatiotoiminnan tila, merkitys ja kehityshaasteet Suomessa. Esiselvitys. Tulevaisuusvaliokunta, Teknologian arviointeja 13. Eduskunnan kanslian julkaisu 8 / 2002.

TEKES. 2002. Technology Strategy. Helsinki 2002.

TUTKIMUS- JA KEHITTÄMISTOIMINNAN OHJELMA, 1998 and 2001. Seinäjoen ammattikorkeakoulusta soveltavan osaamisen korkeakoulu. Seinäjoen ammattikorkeakoulun julkaisusarja B. Raportteja ja selvityksiä 1 and 9. Seinäjoki.

Information searched from internet

Regional Council of South Ostrobothnia, information page in www.epliitto.fi/eng/index (9.12.02)

Seinäjoki Polytechnic, web- pages: (http://www.seamk.fi/english/) (9.12.02)

Talentum Plc. Finnish biggest private investors of R&D in 2001, ranged in 10.6.2002 by Tekniikka & Talous Magazine. http://terkniikkatalous.talentum.com

Tampere University of Technology, Pori Unit, www.pori.tut.fi (20.1.03 and 3.4.03)

Turku School of economics and Business Administration, Pori Unit, http://www.tukkk.fi/info/english/ (20.1.03 and 3.4.03)

Turku School of economics and Business Administration, Pori Unit/ Business Development Centre, http://www.pori.tukkk.fi/ltt-kehityskeskus/main/ (3.4.03)

Regional Council of Satakunta, information page in http://www.satakunta.fi/inenglish/ (20.1.03 and 3.4.03)

Satakunta Polytechnic, web-pages in http://www.spt.fi/ (11.2.03, 24.3.03 and 3.4.03)

Satakunta Polytechnic, Research and Development Centre O'Sata, information page in: http://www.spt.fi/osata/