

RITTS 4445 EAST FINLAND  
"EFFORTS"  
STAGE 2

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## **ABSTRACT**

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The RITTS 4445 East Finland project is funded by the European Union (DG Enterprise), National Technology Agency of Finland and the Regional Councils of Pohjois-Savo, Kainuu and Pohjois-Karjala.

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The central benefits from the process in the case of RITTS East Finland ("EFFORTS") are 1) profound research on the needs of firms, the East Finnish economy and the system of regional innovation, which already by now has been utilised in various development actions in the three counties of RITTS East Finland 2) definition of areas of rapid development (innovation frontiers) and visions of important industries in East Finland NUTS-2 region, and 3) identification of a number of potential vertical (cluster-specific) and horizontal development actions by regional actors, or areas of co-operation in innovation and technology policy between the three counties of RITTS East Finland.

This report briefly summarises stage 2 of the project. At this stage the steering committee of project saw it important to map out the regional systems of innovation and the co-operative potential of the East Finnish counties in innovation and technology policy more thoroughly than was done in stage 1 of the project. The analysis (stage 2) aims to 1) identify county-specific strengths of industries and industrial clusters in East Finland, and 2) link the results of the RITTS process to other regional development strategies to increase their validity.

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# 1. INTRODUCTION

This report briefly summarises stage 2 of the project RITTS East Finland. This stage of the project has been co-ordinated by the Regional Council of Pohjois-Savo and the other contractors have been the Regional Councils of Kainuu and Pohjois-Karjala. The practical research has been done by the Karelian Institute of the University of Joensuu during 1.1.-30.4.2001.

Due to changes on a point of substance and organisation of the project the initial work plan of the project was revised for stage 2<sup>1</sup>. Most importantly, the steering committee saw it important to map out the regional system of innovation and the co-operative potential of the East Finnish counties in innovation and technology policy more thoroughly than was done in stage 1 of the project. The analysis aims to 1) identify county-specific strengths of industries and industrial clusters in East Finland, and 2) link the results of the RITTS process to other regional development strategies to increase their validity. Also, the fourth county of the East Finland Objective-1 structural fund region, Etelä-Savo, is partly included in the analyses performed in stage 2. The Regional Council of Etelä-Savo, however, decided not to join the RITTS-project.<sup>2</sup> The project (stage 2) has been funded by the National Technology Agency and the three Regional Councils.

This report is divided into 5 sections. The (theoretical) basis for regional systems of innovation and development policy based on industrial clusters will be reviewed in section 2. Section 3 views the areas of emphasis ("cluster industries") in the East Finnish development policy. The development propositions based on the discussions in the so-called "cluster work groups" are presented in section 4 and the framework for implementation in section 5.

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<sup>1</sup> The co-ordinator in stage 1 was the Upper Savo Development Company in Iisalmi. Further analyses, consultation with the cluster work groups and refinement of the framework for action accordingly substitute the tasks "regional work groups" (task 21) and the tasks meant for refining of the framework for action (tasks 22-29). The large "Regional Conference" (task 210) to communicate the development policy to the wider audience is scheduled to be organised in August 2001 in Kuopio.

<sup>2</sup> Thus, this report and all the ideas presented in it are a product of the co-operation by the three first mentioned counties only (Pohjois-Savo, Kainuu and Pohjois-Karjala). Also the term "East Finland" refers in this report to these three counties only. The term "regional" is used to refer to individual counties.

## **2. REGIONAL COMPETITIVENESS AND INDUSTRIAL CLUSTERS: BACKGROUND**

### **2.1. Regional systems of innovation**

The meaning of location for firms' competitiveness changes due to globalisation and internationalisation of information systems and sourcing. In addition to traditional local raw material resources the new competitiveness emphasises factors like local motivation, local relations and localised information. Whereas everything that can be acquired from arms length can be imitated by competitors, localised information is weakly articulated, tacit, personalised, protected and difficult/ expensive to transfer. Hence, the sustainable competitive advantages in global competition rest increasingly, paradoxically though, on localisation and local conditions (see, e.g., Porter 1998). This incremental change characterises the current development that is taking place in the East Finland also.

Firms innovate to differentiate from their competitors, i.e., increase their competitiveness. In practice, a competitive advantage based on innovation often is related to the firm's long-term and trust-based co-operative relationships, which are only partly founded on official contracts. A network of this type of relations (the "architecture") helps the firm to produce new innovations and is very difficult or impossible to imitate by competitors (Kay 1995). Processes of innovation are not, however, linear (consumer demand or technology push), but there are many feedbacks in such processes (see, e.g., Kautonen et al. 2000).<sup>3</sup>

In theory, the spatial influences of technological development result from the fact that, for any given key technology at any point of time, exist the most favourable local environments to develop. Especially high technology operations tend to concentrate spatially. For instance, 85 % of the production and 98 % of the exports of high technology industries in Finland originated from three counties: Uusimaa, Varsinais-Suomi and Pohjois-Pohjanmaa (in 1995 the respective proportions were 95 % of the production and 99 % of exports). It is important, however, to note that future key technologies will create differences between regions as well, and will not necessarily concentrate regionally in a similar manner to the key technologies of the day. According to the National Technology Agency (TEKES 1997), key technologies of the future

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<sup>3</sup> The linear perception of innovation is also emphasised by the RITTS-methodology based on demand-intermediary-supply – framework (see CURDS et al. 2000).

include, among others, applications of bio- and nano-technology, special knowledge of which exist, e.g., in the Universities of Kuopio and Joensuu.

The concept of a regional system of innovation is often used to outline the new spatial competitiveness. A model of a regional system of innovation is shown in Figure 1. Generally this system includes:

- Enterprises
- Customers
- Subcontractors and other partners of firms
- Competitors
- Research institutes
- Funding and intermediary organisations
- Educational establishments

Special elements of the Finnish regional system of innovation can be seen also in:

- The Centres of Expertise
- Citizen-based information society

By dividing it into four main levels of action, one can also depict a regional system of innovation: high expertise, industrial clusters (production and service), business services, and the level of mobilisation (Figure 2, cf. Alomar 1995). Top knowledge or high expertise can be developed mainly in the context of universities, polytechnics and Centres of Expertise. At the level of clusters one can observe and develop, e.g., networks formed by firms and educational organisations. The business service level includes local development organisations, such as business support units of municipalities, industrial villages and development consortiums by "seutukunnat" (NUTS-4). At the mobilisation level, the targets for different kinds of information society projects and projects focused on special groups (such as unemployed persons) are citizens.

The RITTS East Finland region consists of three of four counties of the NUTS-2 (or Objective-1 Structural Fund Programme) region of East Finland, which are to a significant degree different in their strengths and strategies and are reasonably large, though are on average sparsely-populated areas in the north-eastern part of the European Union. By its geographical size, the RITTS East

Finland region is one of the largest among the over 100 RITTS or RIS regions in Europe. The existence of a common East Finnish system of regional innovation is arbitrary: rather there are three (four if the region of Etelä-Savo was included) regional systems of innovation that are in interaction with other regional and industry-specific, and the national system of innovation.

## **2.2. Cluster-based development policy**

The national industrial policy of Finland was reformulated in the 1990s using the concept of industrial clusters. Industrial clusters are networks of firms and actors tied together by information and product flows (see Jääskeläinen 2001). This general tendency has continued in the new millennium: currently, for instance, the policy includes development of technology strategies for the national industrial clusters. In East Finland, industrial clusters have been a target of analyses since the mid-90s and the picture of the cluster structures is sharpening as the work continues. In some areas (industries, regions), though, the concept has been applied only more recently. The importance of the industrial clusters for the economy of East Finland came out strongly also in stage 1 of the RITTS project.

A development policy utilising the cluster concept has a solid basis in modern network and growth theories. The central factor in this grounding is the existence of positive externalities. Industrial clusters are often breeding grounds for new regional firms and even industries. Geographical proximity, as such, is not a necessity for different parts of a cluster, but, in practice, helps the co-operation between the different parts and creates advantages that are impossible to achieve from arms length (see, e.g., Porter 1998). Any development policy, however, cannot create clusters – rather the question is about improving the preconditions for their development. A natural point of departure for this policy is the identification of clusters. One cannot, though, presume that regional industrial clusters would be complete without a wider geographical context. Sometimes, rather, the policy deals with "potential" or "methodological" clusters.

It should also be noted that not all operations by firms rely on information which is cluster-specific or spatially specialised. This is the case, e.g., in basic skills in marketing, managerial issues and internationalisation, which influence the technological competitiveness of firms as well. Similar "horizontal" needs of firms involve access to start-up and venture capital. The point of view of industrial clusters is only one approach to regional systems of innovation, which is complementary to other approaches (such as the points of views of industries or technological systems).

### 3. REGIONAL MEANING OF THE "CLUSTER INDUSTRIES" IN EAST FINLAND

Industrial clusters can be depicted only partly on the basis of statistical data. This is due to the fact that the material and information flows and the co-operation between firms in a cluster is not limited to any single industry. By aggregating data from different sources and from groupings of industries one can, however, to some extent perceive cluster-specific agglomerations of production, which have an important role in a regional system of innovation.

Figures 3-13 give a number of different views of the significance and recent development of industrial activity in the four counties of the East Finland Objective-1 region. Figures 3 and 4 depict the geographical location of the strongest regional deviations (from the economic structure of the whole country) in the Objective-1 region of East Finland (criterion: location quotient greater than 1,7; see footnote)<sup>4</sup>. Proportions of selected groups of industries of the counties' total value added in 1999 is shown in Figure 5. Figure 6 presents the location quotients in 1999 and the growth of value added in 1995-99 by selected groups of industries. The geographic distribution (by the NUTS-4 region) of the value added of these groups of industries is given in figures 7-13.<sup>5</sup>

Figures 3 and 4, for their half, indicate only the strongest (positive) deviations from the economic structure of the whole country. Figure 3 presents the deviations which come up at the NUTS-3 level (county = "maakunta") and Figure 4 shows the deviations which come up at the NUTS-4 level ("seutukunta"). The areas drawn on the map have been sharpened using NUTS-5 level data (municipality = "kunta"). The maps clearly show the different areas of emphasis between the counties. Strictly speaking, the areas, however, cannot be associated with regional strengths since the location quotient criterion ( $>1,7$ ) is arbitrarily chosen and influenced not only by the

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<sup>4</sup> In practice, the analyses are mostly based on data on value added in 1995-99 by county (NUTS-3, "maakunta") and by "seutukunta" (NUTS-4). In Figures 3 and 4 the location of the agglomerations of production have been drawn on the map by using the location quotient method. A location quotient is a ratio between the proportion of an industry's production in a region divided by the proportion of the industry's total production in the country. Thus it depicts the weight of an industry in the regional economy in relation to the average weight of the industry in the whole country. A value greater than 1 indicates that the industry has more weight in the regional economy than in the country on average.

<sup>5</sup> The analyses omit service industries, the value added of which is indirect or calculable (such as real estate business or railway transport). Figures 3 and 4 also omit agriculture and forestry, the location quotients of which are high everywhere in East Finland (with the exception of a few urban municipalities). The same applies with the public sector (the state, municipalities and joints of municipalities). Central service-based activities of the health/ well-being and culture industries are impossible to measure through the value added data available. As to information technology, the analysis concerns only the production of electrical and optical appliances and telecommunication services.



production of the industry in the region, but also by the size of the regional economy and the size of the industry in the whole country. Hence the location quotients of different industries are not comparable. Furthermore, the larger and more diverse the economic basis of a regional economy, the less deviations come up using this method.

When analysing figure 6 it should be noted that the growth here is given as an index (1995=100) by industry group and by county. The development of the indices are naturally influenced by their starting level in 1995. Hence, the regional effects of the growth should be interpreted together with the location quotients (LQ): the smaller the location quotient the smaller the regional impact of the development of value added of the industry is. On the basis of the location quotients and the recent development of value added by region, groups of industries which have special emphasis in the regions of East Finland (high location quotient) and which have experienced positive growth period in 1995-99 are:

- Tourism/ Kainuu
- Plastic-metal/ Pohjois-Karjala
- Food products/ Pohjois-Savo, Etelä-Savo, Kainuu, Pohjois-Karjala
- Forestry and wood-processing/ Pohjois-Savo

During the period concerned in the regions, the regional groups of industries (with a high location quotient) that had slightly less growth than the same groups of industries in all of Finland are:

- Forestry and wood-processing / Etelä-Savo, Pohjois-Karjala, Kainuu

Groups of industries (by region), the growth of which has recently been faster than in the whole country on average, but which have less significance in the regions of East Finland than in the country on average are:

- Tourism/ Pohjois-Karjala
- Plastic-metal/ Kainuu

Of the groups of industries studied, only the development of the electronics and telecommunication industries falls behind the development of the same sectors in the whole country. This is by no means surprising, remembering that the industries have experienced an

unparalleled growth period in Finland due to Nokia's success. All the other groups of industries have grown at the NUTS-2 level faster compared to the combined regional GDP of the four counties.

On the basis of sectoral statistical data compiled by industrial clusters, the cluster of forestry and wood industries is, in terms of the value added in 1999, by far the largest and most significant of the cluster branches. The value added by this cluster is widespread in East Finland, but especially the cluster forms a notable strength for the region of Etelä-Savo. Local agglomerations of value added are most visible in the case of rubber and plastics industries (NUTS 4 region of Joensuu), and, due to their significant economies of scale, the paper and pulp industries (Kajaani, Joensuu and Varkaus NUTS-4 regions). Also, the production of metal products, machinery and equipment is largely centralised in a few locations (Joensuu, Varkaus and Ylä-Savo NUTS-4 regions). The food cluster, including agriculture and production of food products and beverages, has the largest impact in the Pohjois-Savo region (especially Ylä-Savo NUTS-4 region), but appears as a strength in all the counties. The growth of tourism has in recent years been strongest in Kainuu region, where the cluster has also the largest regional impact. In total, the "cluster industries" cover more than 30 % of the total value added in East Finland (in 1999), and indicate a level of value added that is about a quarter larger than that of the industrial sectors alone. These figures, however, are still striking underestimations of the significance of these areas of emphasis in the common development policy, because they lack the sectors of health and well-being, and culture, which cannot be assessed through statistics. The recent reasonably positive development of the cluster industries, together with their large impact on the regional economies, support policy that is based on identifying and enhancing the strengths and technological spearheads of the clusters.

The analysis in stage two suggests, among other things, that there are notable agglomerations of knowledge and firms around the Centres of Expertise: in the health and well-being industries, the pole of which is the Centre of Expertise in Kuopio (Pohjois-Savo), as well as in the areas of the forestry and wood-processing and the metal and plastic industries, the Centres of Expertise of which are located in Joensuu (Pohjois-Karjala). The role of the Centre of Expertise is also evident in the culture industry of Kainuu (music especially), which has importance not only for the development of culturally-based firms, but also for tourism industry in East Finland. Furthermore, significant co-operative networks, both nation-wide and regional, exist in the food industry, which has special meaning for the region of Etelä-Savo.

## **4. "CLUSTER WORK GROUPS" AS AN EAST FINNISH DISCUSSION ARENA**

The methodology used in the definition of frontiers of innovation, visions and co-operative potential between the counties is unusual: the conclusions are based on the work by the so-called "cluster work groups" which have been established in common areas of emphasis or industrial clusters in all four counties. Joint meetings of the cluster work groups are meant to gather together managers of firms, experts and development authorities from all the four counties of East Finland once or twice per year. Formal co-operation was started in autumn 2000.

During the spring of 2001 all but the metal-plastic group had a seminar or meeting concerning innovation policy:

- Health and well-being, 20.2.
- Forestry/ wood processing, 28.2.
- Food products, 8.3.
- Culture, 13.3.
- Information technology, 14.3.
- Tourism, 22.3.

Overall, the meetings of the cluster work groups have proved to be positive discussion forums characterised by an immediate value added by becoming acquainted with other people, firms and the regional strengths across East Finland. Actions, however, should be taken to establish the arena for co-operation by designating resources for it, and to encourage enterprises to participate in the work even more than at present.

From a methodological point of view, the exercise carried out shows that much of the innovative potential of a region, which is out of the reach of the holistic approach and sampling methodology, can be identified by using a case-study methodology. In this methodology the findings are not used to generate generalisations but they remain distinctive and innovative spearheads in the strategy.

### **4.1. Points of emphasis in the development work**

The work by the cluster work groups in the spring of 2001 focussed on innovation and technology policy. Some of the results have been gathered in Table 1: Areas of rapid

development or strength of the industries of emphasis in East Finland (left column), future visions (middle) and potential fields of co-operation/ areas of potential technology synergy (right column). It is proposed that, in order to develop these commonly important industries in East Finland through co-operation between the counties, emphasis will be put on these areas.

Development of competitiveness through technology is contemporary and important in all of the cluster industries. A common need for the industries is to develop knowledge and applications of the constantly changing information technology. The aims in this action vary from making production or logistics more efficient, to meeting the increasing importance of internet applications in marketing. The meaning of the latter-mentioned issue is elevated by the expected increase in e-trade and internet marketing in the near future due to, e.g., adoption of a digital-TV network and to a rise in the number of mobile internet applications. Furthermore, national and international networking by enterprises should be encouraged.

Table 2 presents some horizontal development themes. In regard to the topic of promoting entrepreneurialism in general, an important pilot project in this field is the regional “Entrepreneurship Programme of Pohjois-Karjala” launched in January 2001.<sup>6</sup> This programme includes 12 groups of actions to promote entrepreneurialism in the region and is based on a large group of regional actors (including, e.g., the university and the polytechnic, the regional council, the Employment and Economic Development Centre and regional organisations of entrepreneurs). The programme also includes monitoring of the successfulness of the actions.

Also, the proactive mentoring scheme for regional locomotives has been started in Pohjois-Savo and potential for extending this project to the whole of East Finland is being studied. As well, there have been earlier projects using a similar concept of common learning of enterprises in other regions of East Finland and these experiences are mainly very positive. Also the very positive experiences from the citizen-based information society projects defend continuing and extending this kind of action.

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<sup>6</sup> Entrepreneurship Programme of Pohjois-Karjala – Actions proposed to enhance entrepreneurship. Yrittäjyys Hanketyöryhmä, Joensuu, January 2001 (in Finnish).

## 5. FRAMEWORK FOR IMPLEMENTATION

Points of departure for a strategy supporting innovation and technology transfer in the East Finland Objective 1 region, which were raised for discussion during stage two of the RITTS process are:

- The determinant for co-operation in innovation and technology policy should be the value added through this co-operation – not the administrative borders of a region such as those determined by NUTS-2. This is due to the fact that the production, knowledge and support service structures as well as the natural directions of co-operation of the East Finnish counties differ strongly from each other;
- By its nature any strategy is a process. It is important to create co-operative forums and actions which help to take into account the needs of firms and which help to make good choices and lay emphasis on the right areas in development policy, not only now but also in the future;
- The strategy should be based on the regional and cumulative strengths of knowledge of industrial clusters, but also be open to the development of new key technologies. The role and regional impact of the key parts in the regional systems of innovation, such as the universities and, especially, the Centres of Expertise should be developed further. However, it should also be taken into account that the technological competitiveness of firms lie in their basic business skills, such as marketing, management, internationalisation, and the availability of venture capital;
- The strategy should enhance the development and creation of actions which improve firms' ability to adopt and apply information that exists outside of firms and which create "tacit information" which is central to sustainable competitiveness. For generating tacit information, more important than reading is using and embedding personalised skills;
- Finally, the strategy should take into account the meaning of image in luring inward investments and a skilled work force.

In the technology vision for 2006, East Finland is known in Europe as a region where innovative actions and cultures, a modernised and diversified economic base, technological competitiveness of firms and intensified regional system of innovation produce strong value added through the means of interaction, innovative processes and agglomeration. There are incomparable capabilities, and agglomerations and networks in East Finland in the areas of forestry and wood-processing, health and well-being technology, the metal and plastics industry, information

technology and production of natural and functional food products. These are outwardly orientated, internationally competitive and support the formation, location and growth of new firms. In the areas of culture and tourism East Finland is readily accessible, original and attractive through the means of modern information technology.

The framework of implementation is shown in Figure 4. The framework consists of three main elements: the cluster-based development of the common areas of emphasis in the Objective-1 framework programme, development of the operation of the Centres of Expertise, and actions taken in the regional technology-based development strategies by the Employment and Economic Development Centres. In addition, some of the development themes discussed are in the operational area of the regional universities and polytechnics, which are encouraged to take these into account in their development strategies. Due to the fact that the East Finnish universities have rather different orientations, it is advised that they take full advantage of their international networks to develop their local relations<sup>7</sup>. In all, the two-level implementation framework, where some actions concern the RITTS region (and potentially the whole of Objective-1 region) and some are regional, reflects geographical economic logic for East Finland and the partially different strategic orientation of the counties.

The general targets of the Objective-1 programme are to reduce unemployment to around 7 % by the end of the period, slow the population outflow and turn the region into an internationally competitive, fast-growing area. The programme has four operational priorities each financed by a single EU fund plus a multi-fund technical assistance priority: Priority 1 – Business development and improvement of the business environment (ERDF); Priority 2 – Strengthening expertise and improving the skills of the workforce (ESF); Priority 3 – Rural development (EAGGF); and Priority 4 – Infrastructure and sound environmental development (ERDF). The seven industries (clusters) presented above have been chosen as common areas of emphasis in the programme. A benefit of the cluster-specific (vertical) problem solving and development of technology and its transfer support is that it is based on the same approach that is being used in the formulation of the national industrial policy. This line of action also involves development of the operation of the recently established cluster work groups, which represent industry-specific, but East Finland-wide innovation and discussion forums.

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<sup>7</sup> For example, the University of Joensuu is a member of the European Consortium of Innovative Universities (ECIU) and together with the University of Twente organised a seminar on the topic of “Universities and their local partners – Future options for European regions” in March 2001. The seminar resulted in two practical co-operative themes within the network which are in the areas of the medico-cluster and teaching technology. For more on the ECIU regional development group, see, e.g., Schutte and van der Sijde (eds.) (2000): *The University and its region*. Twente University Press.

The network of Centres of Expertise represent a very important consultative body for innovation and an element of the regional systems of innovation. The objective of the national Centre of Expertise Programme is to improve the competitiveness of different regions and to increase products, enterprises and jobs based on top technology or high expertise. In order to obtain the set objective, the programme contributes to the following:

- realisation of projects according to business life requirements;
- encouragement of co-operation between industry, research and education;
- quick transfer of the newest information and know-how to enterprises;
- exploitation of local creativity and innovations;
- improvement of business opportunities for activities demanding know-how;
- encouragement to independent regional development and to the creation of a common strategy.

During the current period of operation (2000-2006) there are sixteen Centres of Expertise in Finland. Two of these, the Centres of Expertise of wood products and the Centre of Expertise of food products, are nation-wide networks. Three of the Centres of Expertise are located in East Finland (Centres of Expertise of forestry and wood-technology and plastic-metal, health and well-being and culture-music; in addition the region of Etelä-Savo co-ordinates the development of natural food products in the nation-wide network of centres of food products). Already during their short time of operation the Centres of Expertise have proved to be successful in the creation of employment and new local firms.

The regional technology-based development strategies by the counties' Employment and Economic Development Centres (including the regional units of the National Technology Agency) will be drafted in the summer-autumn of 2001. These four county-specific strategies will have an important role in putting the recent results of studies on the needs of local firms and regional strengths into practice. The work out of the strategies lies not only in the results of the RITTS process, but are partly based on information gathered by outside consultants. The advantage of Employment and Economic Development Centres is their solid, direct contact with firms in their region, and their knowledge of the firms in the general development of business, as well as in technology development. Thus, they have the readiness to be pro-active in the development of technology and its transfer in firms, among other things, by combining technology mentoring as a regular part of all development of business operations.

The fourth element in the framework for implementation – evaluation and monitoring – will consist of evaluations of the impact of the other three elements of the framework for implementation, and no double system for evaluation will be constructed.<sup>8</sup> The first evaluation of the operation and impact of the Centres of Expertise, e.g., will take place in 2002. The Objective-1 programme has its own evaluation and monitoring system which concerns the whole of East Finland. This mainly consists of intermediate and final evaluations, and project-specific evaluations. Also, the regional strategy processes of the Employment and Economic Development Centres will be monitored at the county level. However, further consideration should be given to the improvement of monitoring the development of innovation in the Objective-1 region of East Finland.

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<sup>8</sup> The setting-up of a potential additional evaluation and monitoring task was discussed during the RITTS process, but due to the nature of implementation of the proposed actions and the overlap with other monitoring and evaluation work, a separate system was seen to be inefficient. For the proposal of a general framework for evaluation and monitoring, see the stage 1 report, and for the proposal of general indicators for evaluation and monitoring of the regional economic and innovative development, see the stage 2 report.



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Table 1. Summary of the discussions by the “cluster work groups”

Area of emphasis	Areas of rapid development/ strength	Vision 2006	Technology synergy/ potential co-operative areas
<p><b>Health and well-being</b></p>	<p>Pohjois-Savo (incl. The Centre of Expertise in Kuopio):</p> <ul style="list-style-type: none"> <li>• Health care technology: Diagnostics, medical equipment, information systems (areas of special knowledge: visualisation, measurement of bio-signals, expert databases in health care, new media in health care, wireless collection of information, laboratory automation and robotics, diagnostic technology, ergonomic products and their design, modelling and usability)</li> <li>• Diagnostics, medical equipment, information systems in health care sector</li> <li>• Development of medicines: planning, screening, synthesis and production of drugs, study of effectiveness of drugs, biotechnological development of drugs, clinical research on drugs</li> <li>• Food biotechnology, clinical nutrition, special food products, healthy and safety of food products</li> <li>• Agro-biotechnology</li> <li>• Product development in the area of social and health care services</li> </ul> <p>Pohjois-Karjala:</p> <ul style="list-style-type: none"> <li>• Application of health care technology: visualising methods, expert databases of the health care sector, new media production in health care, collection data, development of service systems</li> <li>• Social care technology: application of ICT technology, expert databases in social care, new media production in</li> </ul>	<p>The health and well-being industry has grown as one of the central forms of entrepreneurial activity. Gaps in the well-being of the population have become smaller. The existence of high quality health and well-being services is guaranteed. Productivity of these services has risen and there are exports of special services outside of East Finland</p> <p>East Finland is a forerunner in the fields of:</p> <ul style="list-style-type: none"> <li>• Research and development and entrepreneurialism in health and well-being technology and the development of drugs</li> <li>• Services and technology supporting independent accomplishment</li> <li>• New service solutions in health and social services</li> <li>• Research and entrepreneurial activity in food safety</li> </ul>	<ul style="list-style-type: none"> <li>• Development of nutrition as a part of national health (special food products, development of nutritional treatment services, functional food products)</li> <li>• Alleviation of social and health problems due to the ageing of the population (technology supporting home care, development of drugs, solutions to problems that relate to ageing)</li> <li>• Technology and innovations which raise the productivity of social and health services (e.g., common databases in the health care sector, product development in the area of health and social care)</li> <li>• Development of preconditions for entrepreneurialism in the area of social care, marketing of special services outside the regions (child care, geriatrics, drug addiction treatment)</li> </ul>

	<p>social care, development of services and technology supporting independent accomplishment, design, usability, ergonomic products</p> <ul style="list-style-type: none"> <li>• Product development in the area of social and health care</li> </ul> <p>Etelä-Savo (strategy to be outlined):</p> <ul style="list-style-type: none"> <li>• Social innovations</li> <li>• Production of services</li> </ul> <p>Kainuu (strategy to be outlined):</p> <ul style="list-style-type: none"> <li>• Physical education and exercise as a well-being factor</li> <li>• Health care in armed forces</li> <li>• Development of service systems, new forms of services</li> <li>• Agro-biotechnology</li> </ul>		
<p><b>Forestry/ wood</b></p>	<p>Combining of different materials and technologies to produce wood products, the properties of which are specific to the subject of application.</p> <p>Specific areas of technological knowledge (among other things):</p> <ul style="list-style-type: none"> <li>• Measurement equipment technology, biotechnology (Kainuu)</li> <li>• Thermoplastic wood, wood composite technology and forest ecology (Pohjois-Karjala)</li> <li>• Forest cultivation, forest harvesters, energy wood (Pohjois-Savo)</li> </ul> <p>The Centre of Expertise in Pohjois-Karjala: areas of special knowledge:</p> <ul style="list-style-type: none"> <li>• Material properties of raw materials from wood</li> <li>• Business operation, production economy and forest and wood technology</li> <li>• Information and expert databases in the</li> </ul>	<p>The top knowledge base in the field of forestry and wood technology is extensive and established; the Centre of Expertise in Pohjois-Karjala forms a strong centre in the field and it is utilised maximally in East Finland.</p> <ul style="list-style-type: none"> <li>• Top technological knowledge, among other things, in measuring instrument technology, composite technology (wood and other natural fibres), management of forest ecological systems, and the production of forest harvesters.</li> <li>• The degree of processing and the lure of labour and investments rises along the technological level and technology image of the sector.</li> </ul>	<ul style="list-style-type: none"> <li>• Efforts to raise the technology image of forestry/ wood to secure the supply of skilled labour and experts in the future</li> <li>• Research and development projects on wood construction</li> <li>• Development of knowledge in healthy housing and ergonomics; co-operation with the University of Oulu and Pohjois-Karjala Polytechnic in the design of new innovative wood products</li> </ul>

	<p>field of forest and wood economy</p> <ul style="list-style-type: none"> <li>• Recycling and energy use of wood</li> <li>• Environmental knowledge and communication in the field of forestry and wood.</li> </ul> <p>(The Centre of Expertise has a strong national co-operative network)</p> <p>Top basic research at the University of Joensuu: forest ecology and management of forest resources, influences of global warming on boreal forests.</p>		
<p><b>Food industry</b></p>	<p>Areas of emphasis in development:</p> <ul style="list-style-type: none"> <li>• Further processing of naturally cultivated raw-materials, natural food products, development of natural additives to replace artificial additives</li> <li>• New technology and analysis methods in food industry (e.g., artificial nose used in analysis)</li> <li>• Identification of the requirements of consumers who have special diets (e.g., allergic persons), and development and commercialisation of suitable special products</li> <li>• Development and production of functional food products; clinical food research and food safety</li> <li>• Development of marketing and logistics systems</li> <li>• Development of production processes and packaging of food</li> <li>• Neighbourhood food production</li> </ul> <p>Division of responsibility in the main development areas:</p> <ul style="list-style-type: none"> <li>• Pohjois-Savo: food safety, biotechnology</li> <li>• Etelä-Savo: natural food products (also in the national Centre of Expertise ELO)</li> <li>• Pohjois-Karjala: training/ marketing</li> </ul>	<p>Expertise in food products represents top-level national:</p> <ul style="list-style-type: none"> <li>• Processing of naturally cultivated food raw-materials into special food products</li> <li>• Development of technology and methods of analysis required in this operation</li> <li>• Clinical research into food products and the development of food safety.</li> </ul> <p>By 2006 the commercial potential of natural food products (customer segments) will have been identified and there will be the intense further processing of food products into special products that are suitable for different groups of customers.</p>	<p>Utilisation of networks of firms and actors in the food industry; learning processes and potential advantages in the areas of:</p> <ul style="list-style-type: none"> <li>• Product development and management of production processes (incl. machinery and equipment)</li> <li>• Packaging technology, marketing</li> <li>• Transport/ logistics systems</li> </ul> <p>Synergy also in the development of:</p> <ul style="list-style-type: none"> <li>• IT applications, traceability (chains of origin), quality systems and reliability of delivery.</li> </ul>

	<ul style="list-style-type: none"> <li>• Kainuu: biotechnology</li> </ul>		
<b>Culture</b>	<p>Kainuu: "Virtuosi" Centre of Expertise:</p> <ul style="list-style-type: none"> <li>• Services and contents production, especially in the field of chamber music, expertise in the organisation of festivals</li> <li>• Digital and internet applications of services (music, audio, notations, photographs, text, recording, managing)</li> <li>• Network services</li> <li>• Pedagogical materials in music</li> </ul> <p>Expertise in multimedia (e.g., centre for Kalevala culture "Juminkeko", Information Society Centre)</p> <p>Etelä-Savo: "Innovation frontier" in combining the technical and ideological set of values</p> <ul style="list-style-type: none"> <li>• Culture industry and contents production</li> <li>• Internet as a new channel of distribution</li> <li>• Development of entrepreneurialism in the area of culture</li> </ul> <p>Pohjois-Karjala:</p> <ul style="list-style-type: none"> <li>• Through, e.g., the taking advantage of its Orthodox cultural heritage</li> <li>• Contents production, multimedia</li> </ul> <p>Pohjois-Savo: (to be outlined)</p>	<p>East Finland becomes a forerunner in the means and results of displaying culture and people of culture:</p> <ul style="list-style-type: none"> <li>• Through new technology (internet, multimedia), East Finnish culture is a distinctive part of European culture</li> <li>• Entrepreneurialism and commercialism in culture is well developed</li> </ul>	<ul style="list-style-type: none"> <li>• Development of network pedagogy and virtual teaching in music</li> <li>• Projects aiming at commercialisation (product development) and development of entrepreneurialism in culture; especially as it relates to the utilisation of new technology (multimedia, internet and AV-technology, culture tourism)</li> </ul>
<b>Information technology</b>	<p>Areas of emphasis in development: Pohjois-Savo:</p> <ul style="list-style-type: none"> <li>• IT-applications in the health and well-being sector, support systems for home-care; programmes production, mobile systems, process control systems, new media; training and research and development of entrepreneurialism (in "Tietoteknia")</li> </ul>	<p>East Finland as a forerunner in:</p> <ul style="list-style-type: none"> <li>• Developing, testing the environment and applying of virtual teaching and teaching technology;</li> </ul> <p>Top expertise in:</p> <ul style="list-style-type: none"> <li>• Process control and integrated systems</li> <li>• Measurement technology and signal handling</li> <li>• IT-applications in the health and well-being</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement of support for starting and expanding firms; expertise in networks and internationalisation, finding partners abroad; venture capital</li> <li>• Development of training and making the gap between firms and education smaller</li> <li>• Research and development of</li> </ul>

	<p>Kainuu:</p> <ul style="list-style-type: none"> <li>Automation and process control; integrated systems, measurement technology, signal and image handling; information society ("IS-Centre")</li> </ul> <p>Etelä-Savo:</p> <ul style="list-style-type: none"> <li>Contents production and educational network technology (e.g., virtual university and virtual high school); IMT-centre to be established</li> </ul> <p>Pohjois-Karjala:</p> <ul style="list-style-type: none"> <li>Citizen-based applications of information technology (network for citizens, NetCenter –model), a county-wide network as an environment for providing public services, high-tech knowledge in the Science Park</li> <li>IT-applications to make business operations more efficient, information management, publishing and telematics, internet technology, signal handling, colour analysis, optical vision, GIS, teaching technology</li> </ul>	<p>sector</p> <ul style="list-style-type: none"> <li>Citizen-based solutions in information society.</li> </ul> <p>Employment and number of students in IT has grown fast.</p>	<p>integrated systems (especially Pohjois-Savo and Kainuu, the University of Oulu)</p> <ul style="list-style-type: none"> <li>Development of teaching technology; network teaching as a means of survival for educational institutions in peripheral regions; development of administration for commercialisation of network teaching</li> <li>Development of user-friendly service systems</li> <li>Development of programming expertise in the areas of emphasis</li> </ul>
<p><b>Tourism</b></p>	<p>Areas of emphasis in East Finland:</p> <ul style="list-style-type: none"> <li>Development of booking and information system, internet applications based on data-bases, logistics, booking systems for programme and accommodation through the internet</li> <li>Finnish University Network for Tourism Studies (based at the Savonlinna campus of the University of Joensuu)</li> </ul> <p>Product development:</p> <ul style="list-style-type: none"> <li>Utilisation of new technology, virtual technology in tourism</li> <li>Taking advantage of the value of physical training and top sports in tourism (especially in Pohjois-Savo and Kainuu), products based on unspoiled nature and wilderness</li> </ul>	<ul style="list-style-type: none"> <li>Co-operation in development projects and joint marketing well organised, East Finland distinguishable, attractive and readily accessible through new technology</li> <li>Management of IT-solutions and the use of IT in marketing widespread, East Finland-wide information system with an intranet established</li> <li>Special knowledge in tourism based on top sports, rural landscape, culture and Russian tourists</li> </ul>	<ul style="list-style-type: none"> <li>Utilisation of expertise of IT in the development of tourism, contents production, IT-solutions in marketing (e-trade, mobile technology, use of chip cards as a means of payment)</li> <li>Applications of communication for marketing and the GIS in tourism</li> <li>Development of an East Finland-wide regional data-base (indicators, trends, statistics), development of a common intranet for actors and enterprises</li> </ul>

	<ul style="list-style-type: none"> <li>• Development of packages of services</li> </ul>		
<b>Metal and plastic industry</b>	<p>Pohjois-Karjala (especially the Centre of Expertise):</p> <ul style="list-style-type: none"> <li>• Material technology (e.g., polymer catalysis technology, polymer materials) and 3-D product development and design and production of moulding tools</li> <li>• Injection moulding technology, pultrusion technology</li> <li>• Moulding tool and measurement technology</li> <li>• Telematic service systems for plastic and metal industries</li> <li>• Thermography</li> <li>• Training services</li> <li>• CAD-CAM-CAE techniques</li> <li>• Working of metal and plastic</li> </ul> <p>Etelä-Savo:</p> <ul style="list-style-type: none"> <li>• Railway vehicles and equipment</li> <li>• Engineering related to the forestry industry</li> <li>• Electrical appliances</li> <li>• Networking</li> </ul> <p>Pohjois-Savo (among other things):</p> <ul style="list-style-type: none"> <li>• Product development and system supplies</li> <li>• Coating and welding technologies</li> <li>• Transfer of technology into firms (e.g., CAD/ CAM)</li> <li>• Networking and specialisation according to the needs of customers</li> </ul> <p>Kainuu: (to be outlined)</p>	<p>An increasing number of top companies with local supply networks operate in global markets.</p> <p>East Finland is a forerunner in the plastic and machine tool industry. The East Finland Plastic and Metal Centre (the Centre of Expertise) is one of Europe's leading agglomerations in product development and training in plastic and metal industries.</p>	<ul style="list-style-type: none"> <li>• Product development, e.g., in the area of health care equipment and electronic and measurement equipment</li> <li>• Improvement of the image of engineering industry to secure supply of skilled labour.</li> </ul>

Table 2. “Horizontal” development propositions

“Horizontal” development propositions
<ul style="list-style-type: none"><li>• Establishment and <b>provision</b> of the operation of the “cluster work groups” as industry-specific innovation and co-operative forums in East Finland (<b>contacting surface??</b> with firms, place to meet for firms, network of experts, gatherings and organisation of different kinds of events); actors: Regional Councils</li><li>• Improvement of the regional effectiveness and encouragement of the entrepreneurialism of the universities (utilisation of international networks of the universities in the development of operational models); actors: Universities</li><li>• Development of common learning processes of firms (pilot projects, e.g., a project involving regional locomotive companies and their subcontractors (Pohjois-Savo), “Osaava Pohjois-Karjala II” – project for plastic and metal firms (Pohjois-Karjala)); actors: Employment and Economic Development Centres, TEKES, Centres of Expertise</li><li>• Further development of the role of The Centres of Expertise in the regional systems of innovation (e.g., support for networking by firms, furthering of clustering and agglomeration; development of training for firms and transfer of technology); actors: Centres of Expertise</li><li>• Promotion of entrepreneurialism (pilot project: “Entrepreneurialism programme for Pohjois-Karjala): actors: large groups of regional actors, including universities, polytechnics, Employment and Economic Development Centres, Finnvera, entrepreneurial organisations, municipalities</li></ul>



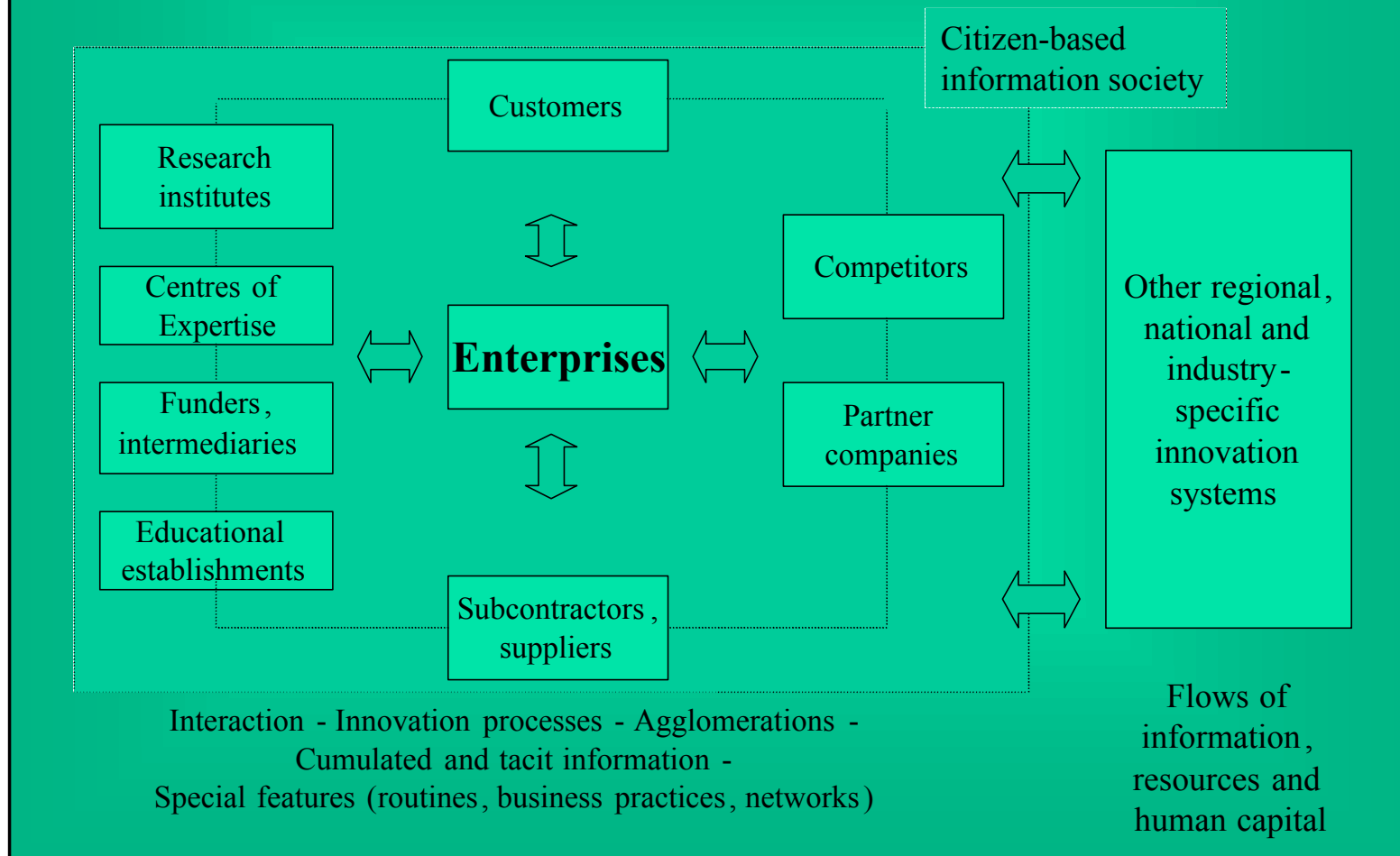
Table 3. Indicators for monitoring the general economic and innovative development of regional economies

Objective	Indicators
<p>General economic development (by county, Objective -1 region, comparison to the national average)</p>	<ul style="list-style-type: none"> <li>• Income               <ul style="list-style-type: none"> <li>• GDP per capita, per capita development</li> <li>• Growth of GDP</li> <li>• Comparison to EU-15 average</li> <li>• Other indicators of income</li> </ul> </li>   <li>• Population               <ul style="list-style-type: none"> <li>• Population structure</li> <li>• Population growth and migration</li> </ul> </li>   <li>• Employment and unemployment               <ul style="list-style-type: none"> <li>• Number of employed persons and jobs by sector</li> <li>• Number of unemployed persons and the rate of unemployment</li> <li>• Supply and demand for employment</li> <li>• Forecasts</li> </ul> </li>   <li>• Value added               <ul style="list-style-type: none"> <li>• Value added by industry</li> <li>• Location quotient analysis by industry</li> <li>• Productivity (value added per job, values added per working hour, value added per capital unit invested)</li> </ul> </li>   <li>• Exports               <ul style="list-style-type: none"> <li>• Development of exports by industry</li> <li>• Number of export firms</li> <li>• Proportion of exports in the total value of production</li> </ul> </li>   <li>• Investments</li>   <li>• Firm structure               <ul style="list-style-type: none"> <li>• Number of firms</li> <li>• Start-ups and new firm formation ratio</li> <li>• Start-ups by persons with university background</li> </ul> </li>   <li>• Development of clusters               <ul style="list-style-type: none"> <li>• Industrial classification by cluster</li> </ul> </li> </ul>

Development of innovation	<ul style="list-style-type: none"> <li>• Research and development <ul style="list-style-type: none"> <li>• R&amp;D outlays</li> <li>• R&amp;D outlays by firms</li> <li>• R&amp;D outlays in the public sector</li> <li>• R&amp;D outlays by industry</li> <li>• R&amp;D intensity</li> <li>• R&amp;D outlays as proportion of the regional GDP</li> <li>• R&amp;D outlays per capita</li> <li>• R&amp;D outlays per enterprise</li> <li>• R&amp;D staff in firms, number and proportion of the total personnel</li> <li>• R&amp;D staff in the public sector, number and proportion</li> <li>• TEKES funding</li> <li>• Number of patents</li> <li>• Number of patents per firm</li> <li>• Production by the OECD technology classification of industries</li> <li>• Project specific evaluations</li> </ul> </li> </ul>
Indicators of competitiveness	<ul style="list-style-type: none"> <li>• Education <ul style="list-style-type: none"> <li>• Number of persons with higher education degree, proportion of the population</li> <li>• Number of degrees from vocational education institutes, proportion of population</li> </ul> </li> <li>• Indicators for competitiveness <ul style="list-style-type: none"> <li>• "VATT/TK " indicator (NUTS-4)</li> <li>• Efficiency analysis of entrepreneurs (under construction, NUTS-4)</li> <li>• "BTV" indicator (unweighted average of deviations)</li> </ul> </li> </ul>
Indicators of social capital	<ul style="list-style-type: none"> <li>• Development of social capital <ul style="list-style-type: none"> <li>• Degree of participation and social networks</li> <li>• Image-capital, external (immigration/ emigration –index, attractiveness as a region to live and work in, etc.)</li> <li>• Image-capital, internal (confidence indicators, etc.)</li> <li>• Safety and social integration (crime etc.)</li> </ul> </li> </ul>

# A regional system of innovation

(cf. Kautonen 2000, Autio 1998, Porter and Sölvell 1998)



RITTS/EFFORTS 2, Timo Lautanen, University of Joensuu

Figure 1. Model of a regional system of innovation

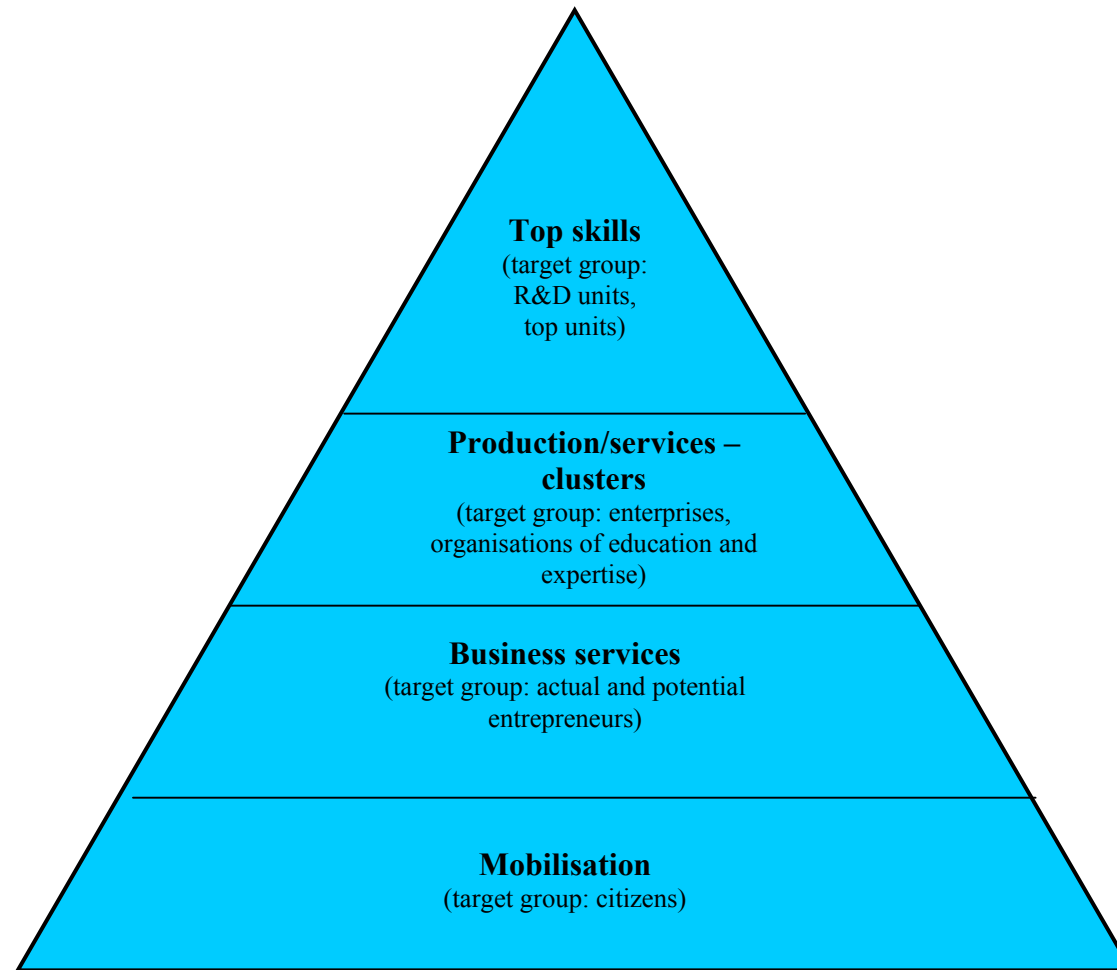


Figure 2. Levels of a regional system of innovation

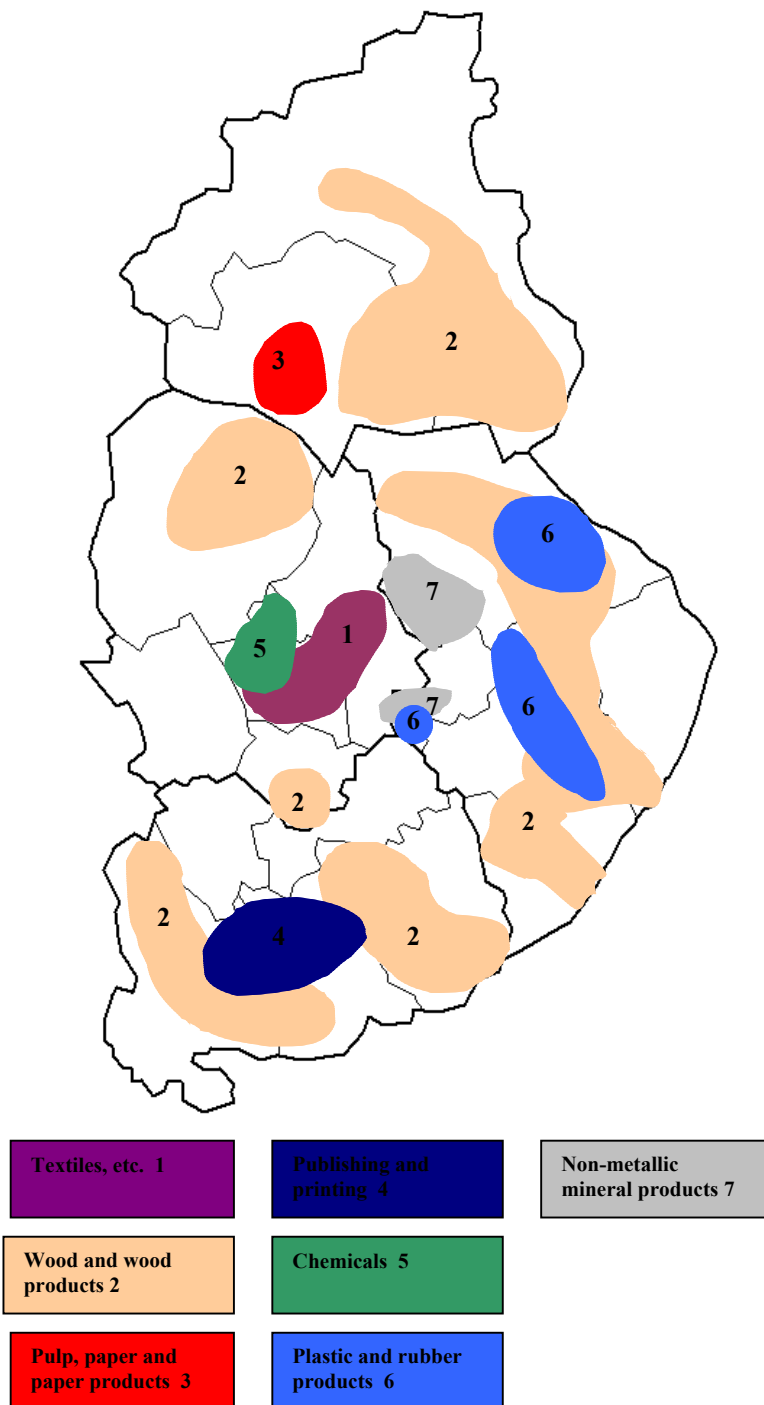
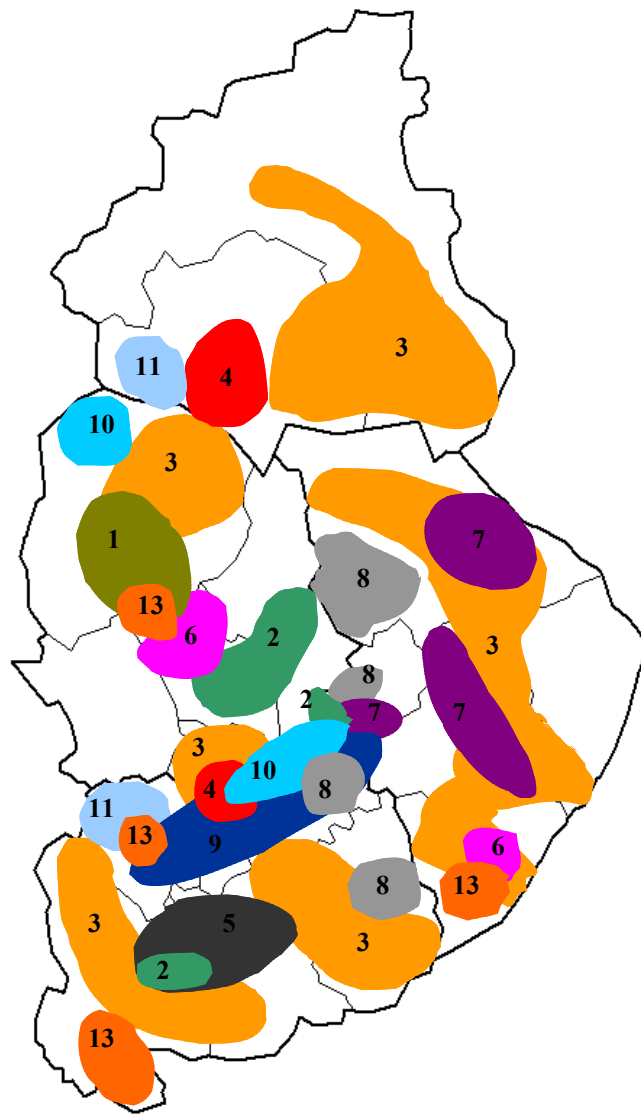


Figure 3. Regional (NUTS-3) deviations from the economic structure of the country ( $LQ > 1,7$ )



Food products 1	Pulp and paper 4	Plastic and rubber 7	Machinery and equipment 10
Textiles, etc. 2	Publishing and printing 5	Non-metallic mineral prods 8	Transport equipment 11
Wood, and wood products 3	Chemicals 6	Metals, metal products 9	Other manufacturing 12

Figure 4. Regional (NUTS-4) deviations from the economic structure of the country ( $LQ > 1,7$ )

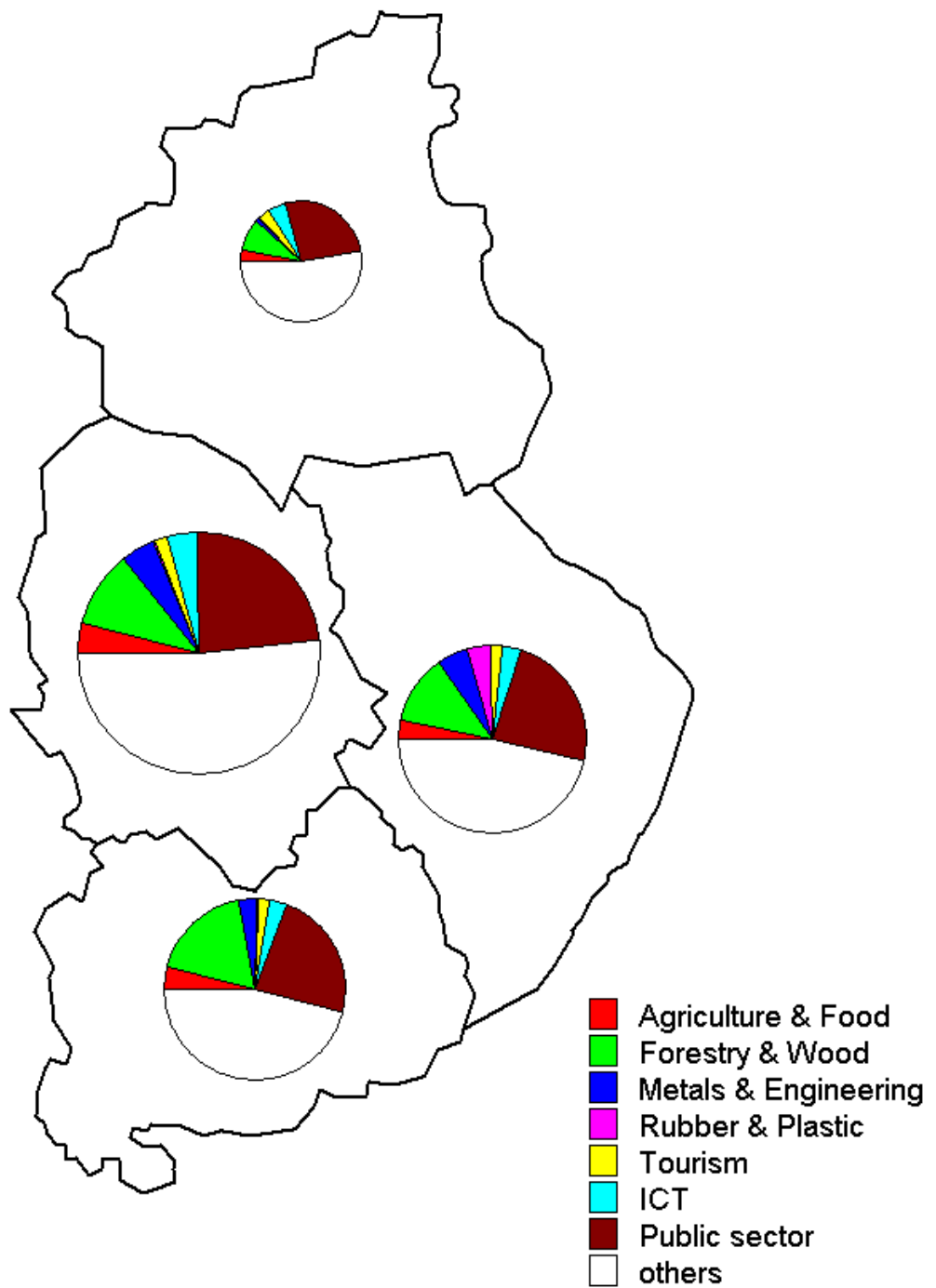


Figure 5. Proportions of selected groups of industries of the regional economies in 1999 (The size of the circle indicates the proportion of the region in the total value added by the four counties)

County/group of industries	LQ	Growth 1995-99*
E-S (Etelä-Savo): Agri. and food	1,3	101,2
E-S: Forest and wood	4,3	96,8
E-S: Plastic and metal	0,6	98,5
E-S: Tourism	0,7	90,7
E-S: ICT	0,1	33,0
P-S (Pohjois-Savo): Agri. and food	1,4	102,6
P-S: Forest and wood	2,4	112,4
P-S: Plastic and metal	0,8	87,4
P-S: Tourism	0,6	88,3
P-S: ICT	0,3	88,8
P-K (Pohjois-Karjala): Agri. and food	1,1	115,4
P-K: Forest and wood	2,9	96,9
P-K: Plastic and metal	1,6	145,8
P-K: Tourism	0,8	115,5
P-K: ICT	0,2	59,2
K (Kainuu): Agri. and food	1,0	108,3
K: Forest and wood	2,1	92,6
K: Plastic and metal	0,2	104,2
K: Tourism	1,2	158,9
K: ICT	0,5	53,5
E-F (All counties): Agri. and food	1,2	105,3
E-F: Forest and wood	2,9	100,9
E-F: Plastic and metal	0,9	109,4
E-F: Tourism	0,8	104,1
E-F: ICT	0,2	61,9

- LQ = location quotient 1999
- \*Finland = 100,0,
- GDP<sub>r</sub> = regional GDP = 90,0

Food products (dark blue):

Forestry and wood products (green):

Metal-plastic (red):

Tourism (yellow):

IT (light blue):

Stone (grey):

Food products, beverages, tobacco, agriculture

Forestry, sawn and planed wood and wood products, other manufacturing (mainly wooden furniture)

Plastic and rubber products, basic metals, metal products, machinery and equipment

Accommodation and catering, services for transport, travel agencies

sähkötekniikan ja optisten laitteiden valmistus

non-metallic mineral products, quarrying

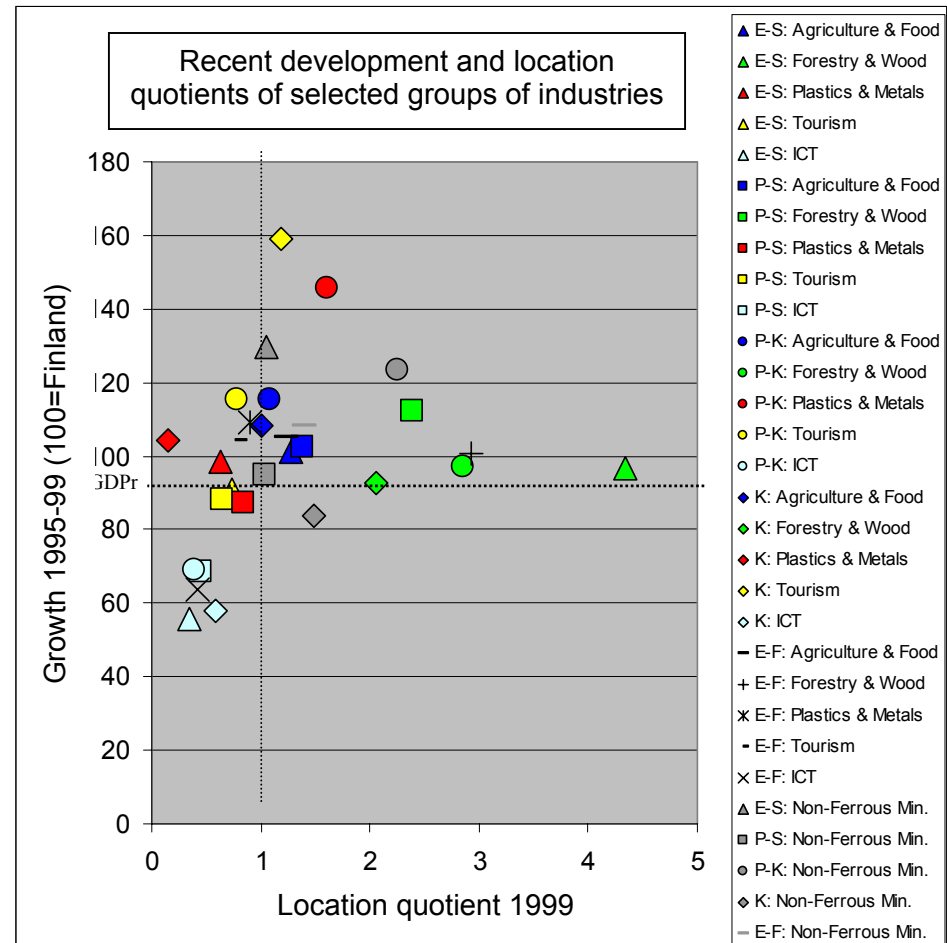


Figure 6. Development of the value added in 1995-99 and the location quotients in 1999 of selected groups of industries in East Finland



Figures 7 - 13. Distribution of the value added by selected groups of industries, 1999, by NUTS-4 region (preliminary information; different figures are not comparable with each other).

## Food products, beverages, tobacco, agriculture

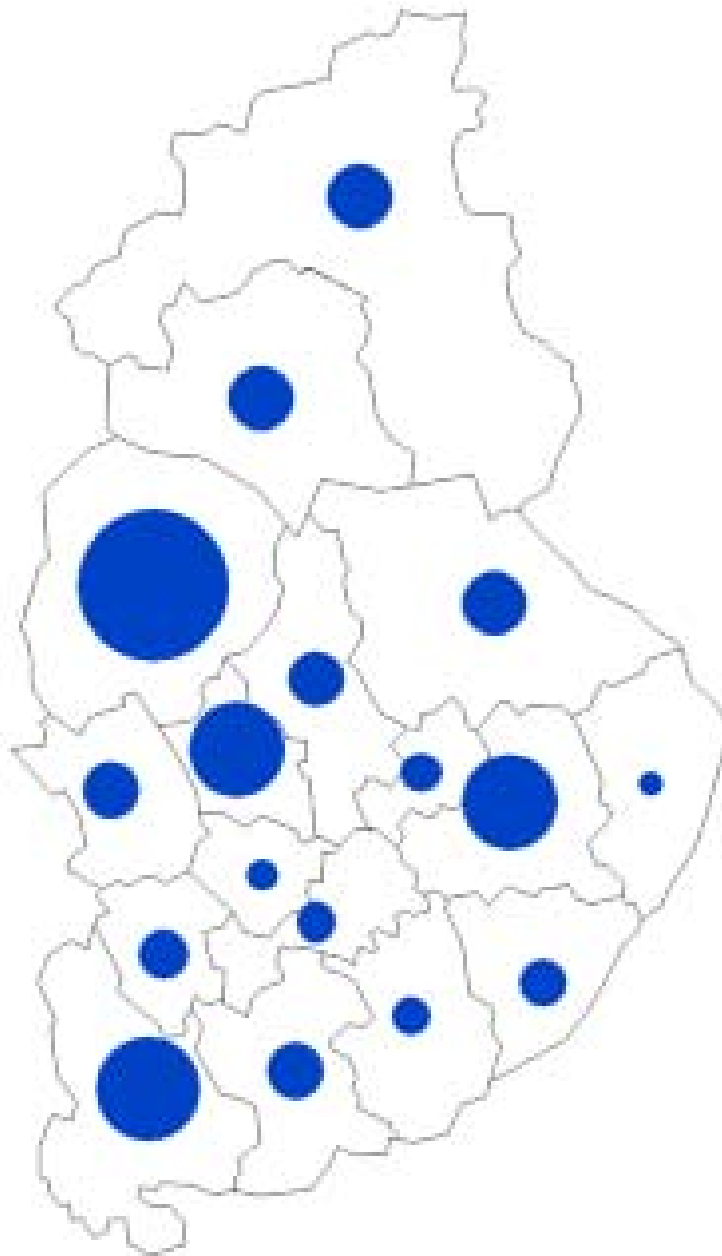


Figure 7. Distribution of the value added, 1999, by NUTS-4 region.

## Plastic and rubber products

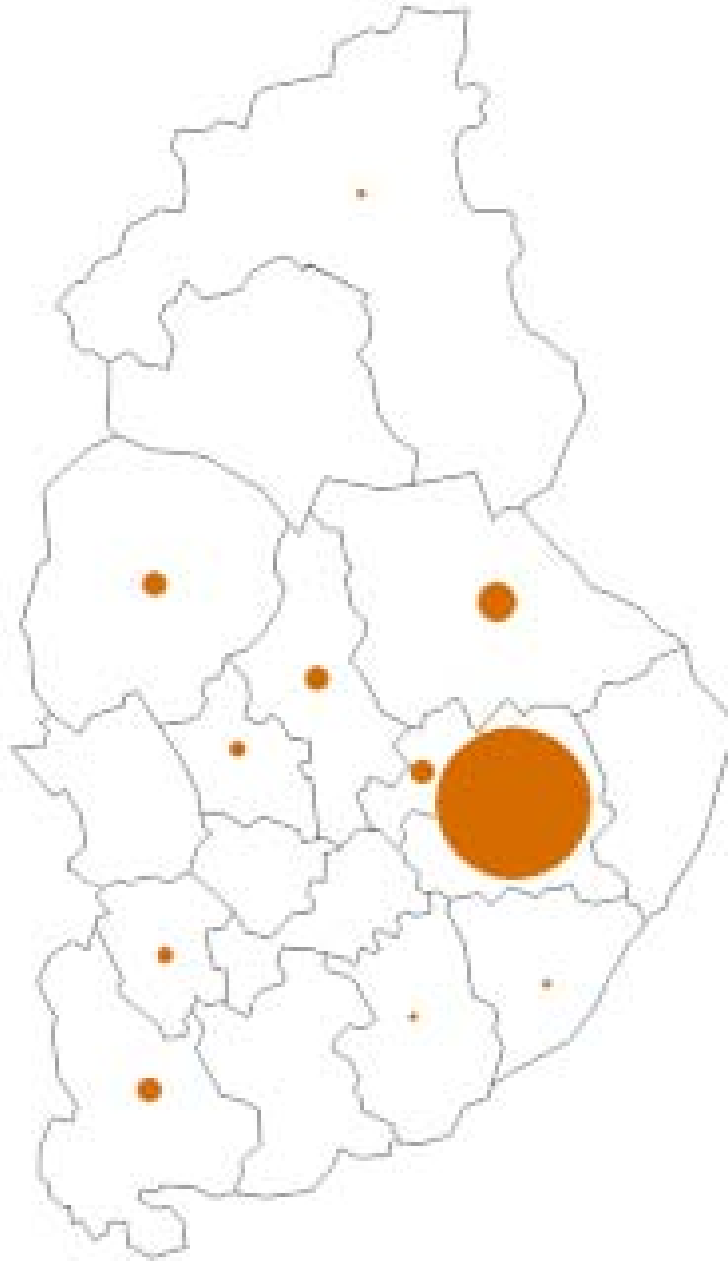


Figure 8. Distribution of the value added, 1999, by NUTS-4 region.

## Forestry, mechanical wood-processing, wood products



Figure 9. Distribution of the value added, 1999, by NUTS-4 region.

## Pulp and paper

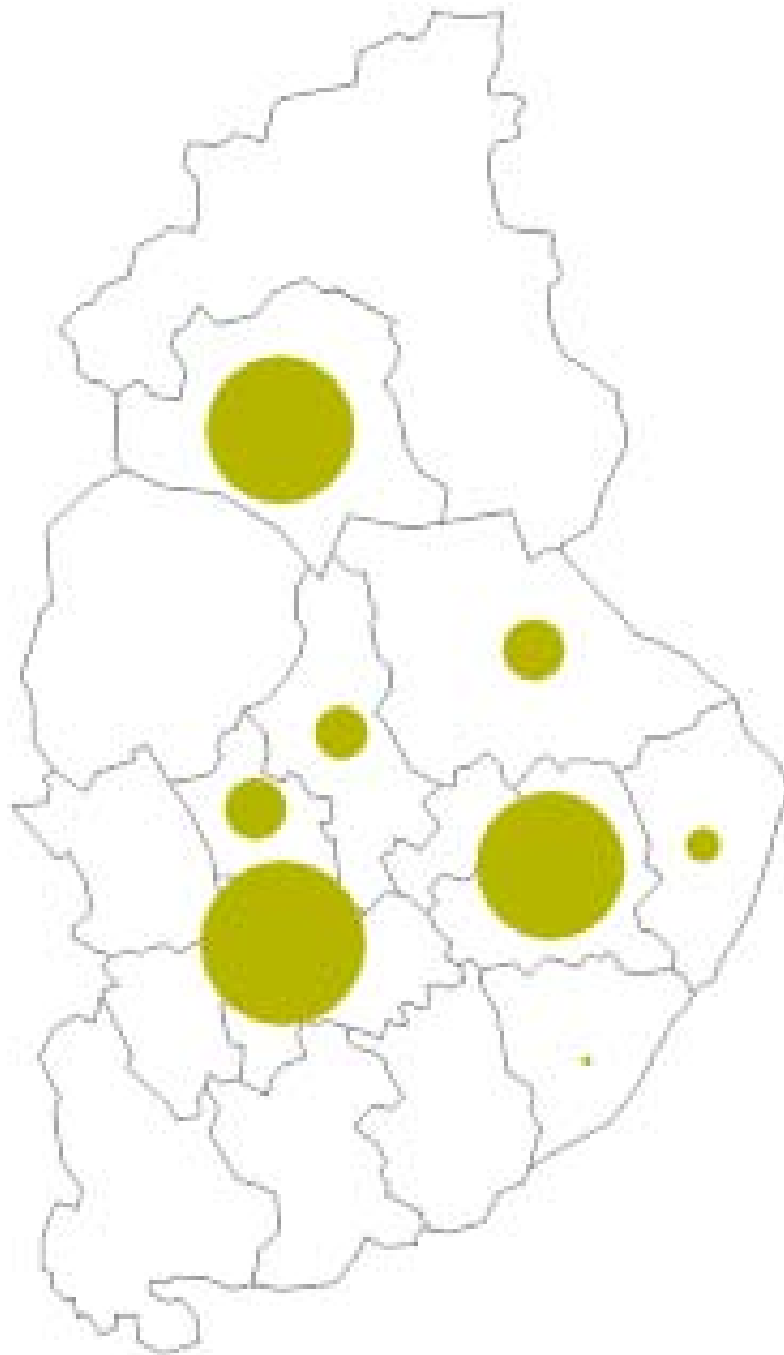


Figure 10. Distribution of the value added, 1999, by NUTS-4 region.

## Basic metals, metal products, machinery and equipment

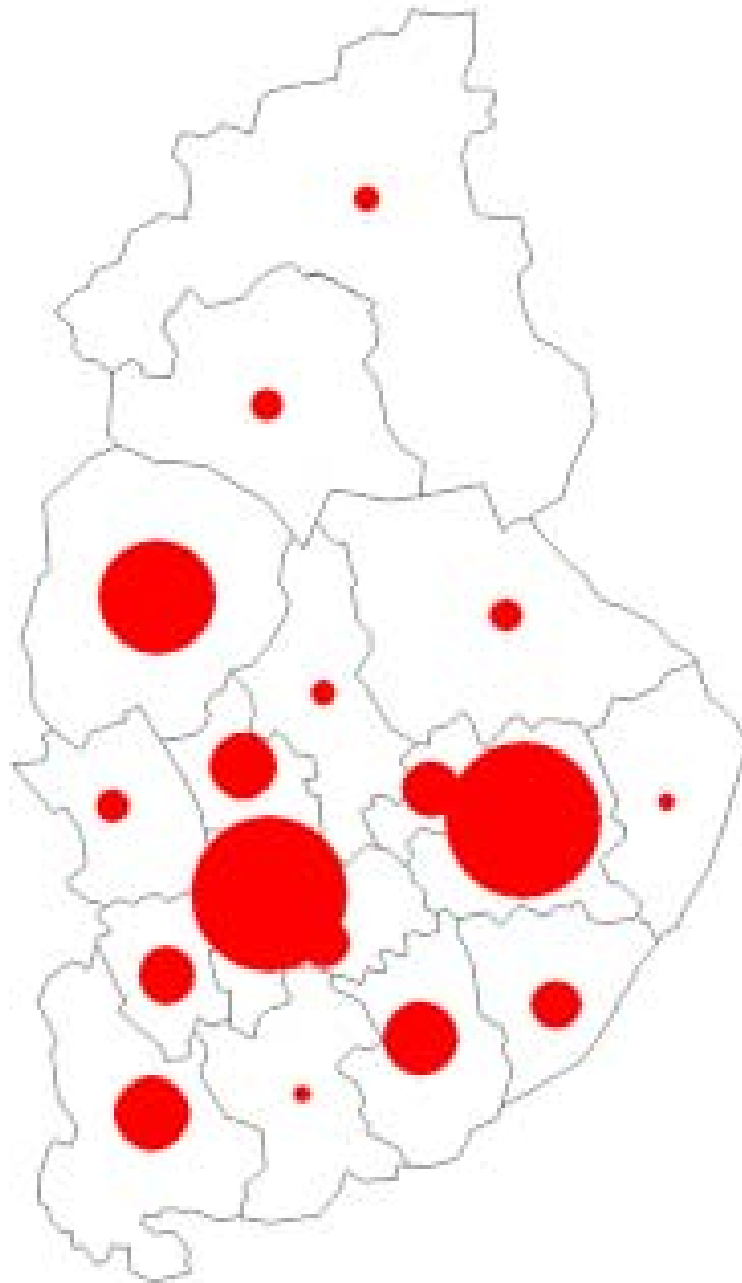


Figure 11. Distribution of the value added, 1999, by NUTS-4 region.

## Accommodation and catering, travel services

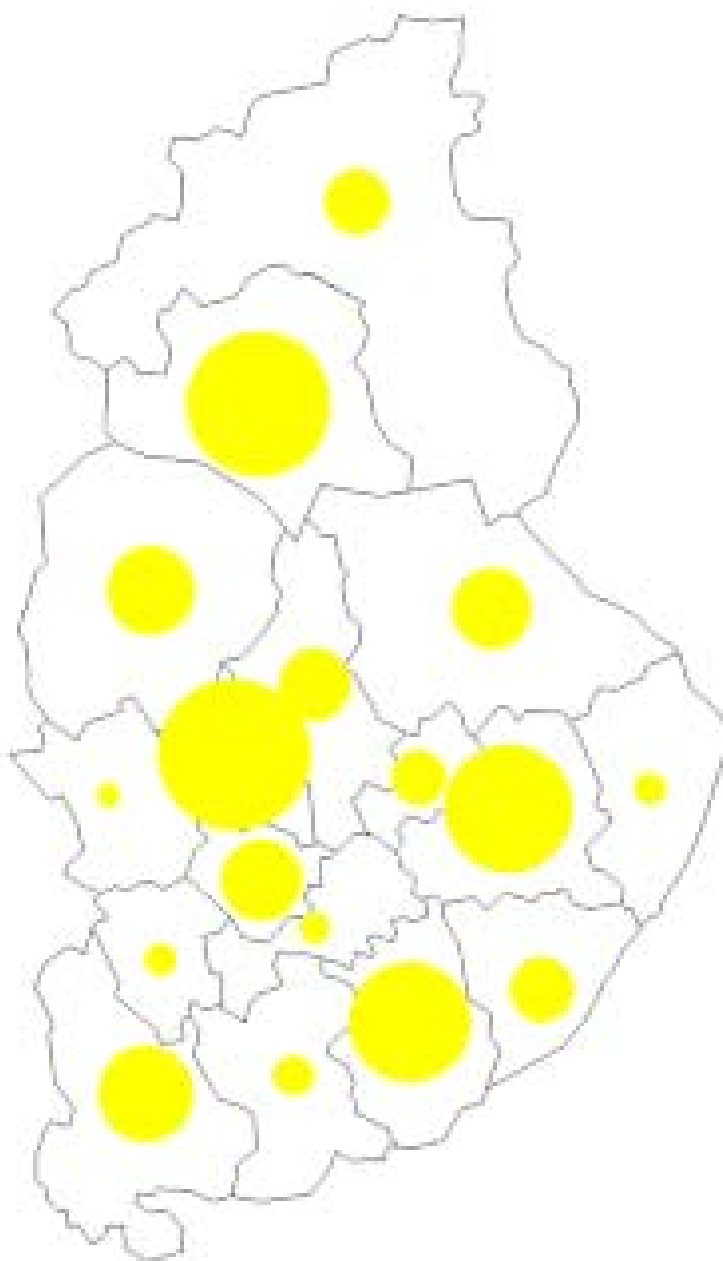


Figure 12. Distribution of the value added, 1999, by NUTS-4 region.

## Electrical and optical appliances, telecommunication services

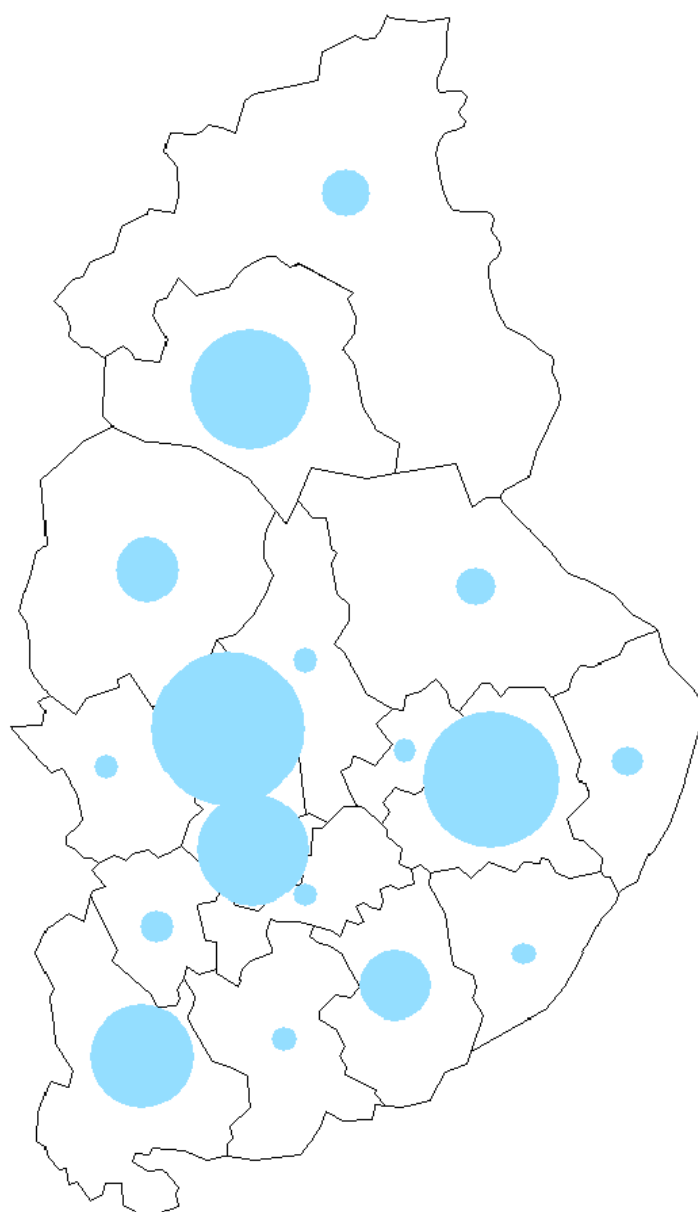


Figure 13. Distribution of the value added, 1999, by NUTS-4 region.

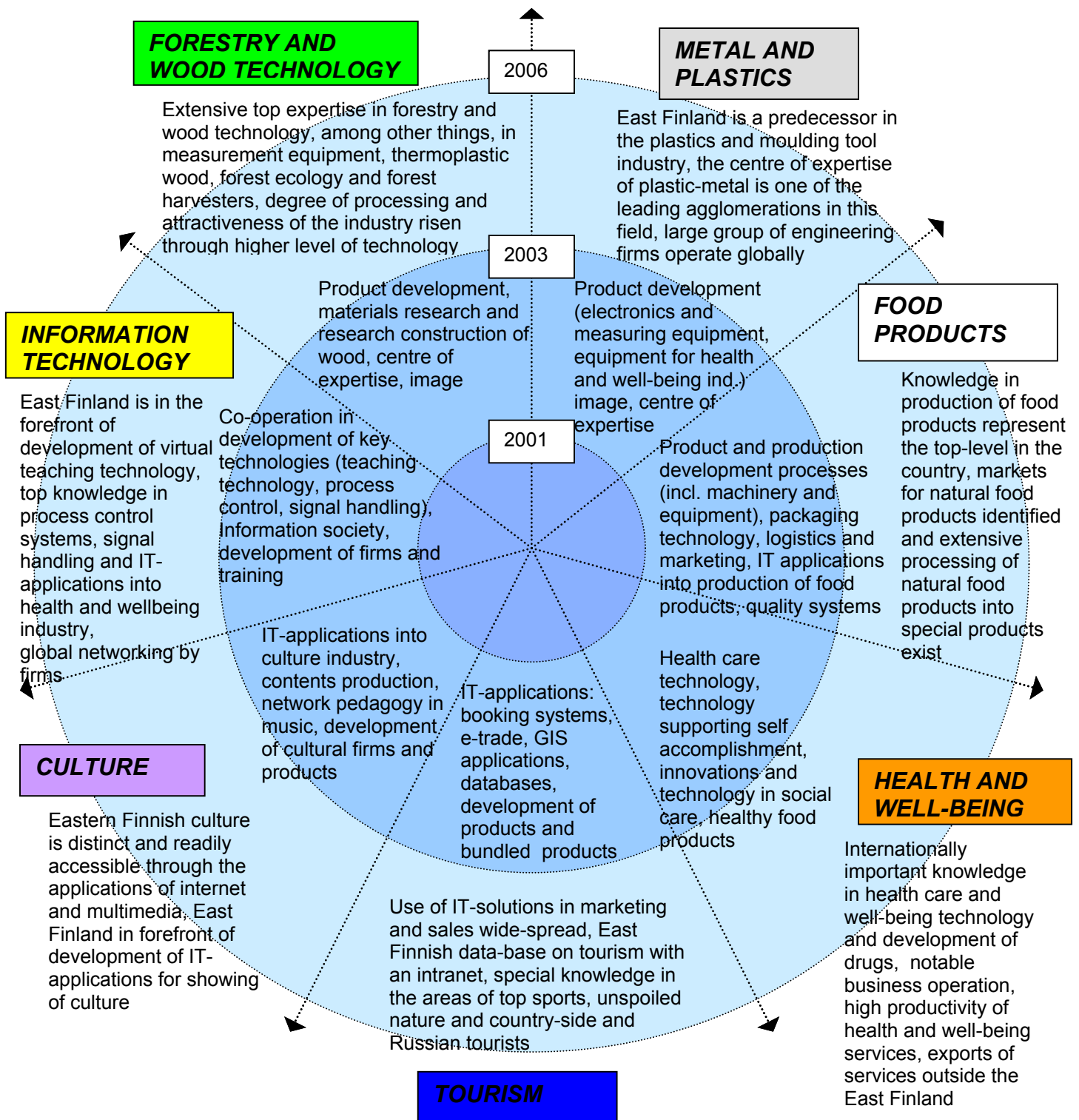


Figure 14. Potential fields of technology co-operation between the counties (inner circle) and future visions (outer circle) by area of emphasis in the East Finland Objective 1 region



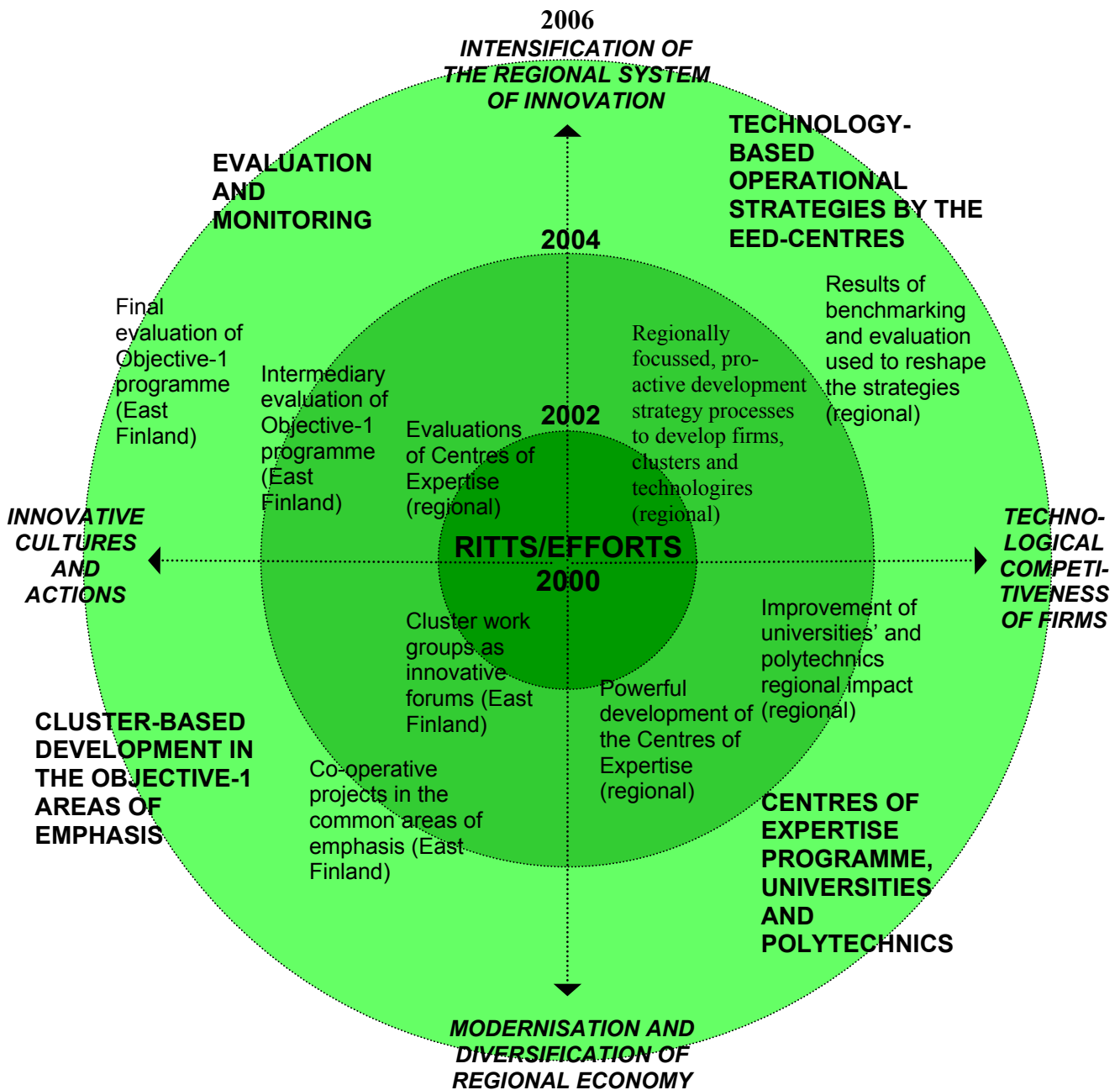


Figure 15. Framework for implementation