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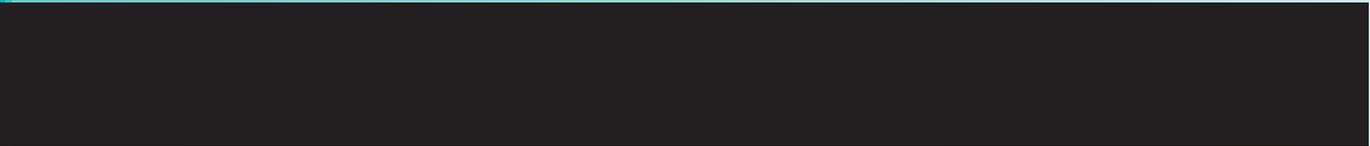
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JANNE TUKIAINEN

# ICT Cluster Study Helsinki Region



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ICT CLUSTER STUDY  
HELSINKI REGION

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4.11.2002

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## 1. INTRODUCTION

Macro-Economic and Urban Trends in Europe's Information Society (MUTEIS) is a research project financed by the European Commission. It is lead by the International Institute of Infonomics in the Netherlands, where Professor Luc Soete is in charge of the whole project. There are four countries selected for this research: Finland, Ireland, the Netherlands and Sweden. In each country the role of ICT is studied in two urban regions. One is more core region and the other a peripheral region that has found a specific "urban niche" in the Information Society. Regional analyses of the project are conducted by national partners of the MUTEIS project.

In the Finnish case the selected areas to be studied are the Helsinki region and the Oulu region. Professor Heikki A. Loikkanen from the University of Helsinki is in charge of the Finnish partnership in the MUTEIS project. Dr. Ilkka Susiluoto is Senior Researcher of the project working at the University of Helsinki. Janne Tukiainen (University of Helsinki) and Vuokko Mustonen (University of Oulu) are researchers of the project. This report by Janne Tukiainen is part of MUTEIS project which analyses the ICT clusters in the selected regions.

The purpose of this study is to describe and analyse economic ICT activity in Helsinki region as part of MUTEIS research project. The main question is: what explains the dynamics or success of a cluster? To answer this we study general local spatial-economic conditions, cluster specific conditions and organising capacity and the importance of all these factors. Focus is put on studying networking and co-operation between and within all the relevant actors in the ICT cluster that is the private sector, different knowledge institutes and the public sector. In addition the purpose is to find and assess the possibilities of local public policy to promote the success of local ICT cluster. The study is mainly based on interviews of local companies, knowledge institutes and public sector officials. To complement this information, also statistical data and existing literature is utilised.

In chapter 2 the profile of the region and its economy is presented. Chapter 3 describes the ICT cluster of Helsinki region. Chapter 4 explains the dynamics and strategic interactions in the cluster. Chapter 5 confronts the main question asked before and assesses the importance of different factors that should theoretically affect the cluster. And finally chapter 6 concludes with policy recommendations. Next in introduction we present the methodology and definitions of this study and the interviewing process.

### 1.1 Methodology and definitions

The ICT cluster is defined as the local ICT business sector plus the local knowledge sector plus any other local organizations active in the ICT activities plus strategic networks of the cluster actors. The composition of the ICT business sector is shown in annex 2. In the text both words ICT cluster and ICT sector are used. Usually by ICT sector we mean only the business sector and by cluster the sum of all the actors.

For this study a total of 25 interviews were made in which 26 interviewees were interviewed. Fifteen companies, five knowledge institutes and four public sector organizations were included in the interviews. A list of people interviewed and some information on the institutes or companies they represent is in annex 1. Interviews were made during 7.5. – 4.7.2002 in Helsinki and Espoo. Other municipalities were not present in the group as almost all the ICT activity in the region is in these two cities. Most of the interviewees were approached first by a telephone and then an e-mail was sent. Six large companies were first sent a letter. Most of the people contacted agreed to the interview.

All the knowledge institute and public organization interviewees as well as 11 of the company representatives were chosen based on recommendations of researchers familiar with the local ICT sector and other interviewees. Four companies, one small company from software, hardware, telecommunication and content fields each, were chosen randomly. The interviews were semi structured. Three different formats were used: one for company executives, one for knowledge institutes and one for public sector representatives. Although the format was same within these groups the represented questions actually varied depending on the situation. If some interesting new subject came up during interview that path was pursued instead of the format. Also time limit affected in most situations so that some questions had to be left out. Thus the interviewee had unknowingly much influence on the structure of the interview.

## **2. PROFILE OF THE REGION AND ECONOMY**

In this chapter a short description of Helsinki region's regional structure, population and economic development is given. The purpose is only to present some properties of the region by numbers. There is no intention to get behind the numbers and to speculate on the reasons behind the existing situation and what has caused that development.

### **2.1 Regional structure and population of the Helsinki region**

The Helsinki region consists of 12 municipalities, Helsinki, the capital of Finland, being the centre of the economy and the labour market. Helsinki is a versatile city with more than half a million people and a diversified economy. Being the capital of the country, it is the home of the most important political and economic decisions, and it also has among other things a large and varied supply of cultural services and lively street life. (Susiluoto 2002.)

On the west side of Helsinki lies the municipality of Espoo, a city of over 200 000 inhabitants, hosting the Technological University as well as a notable concentration of high technology research and production. North of Helsinki is Vantaa, about the same size as Espoo and hosting the Helsinki-Vantaa international airport. The small and wealthy town of Kauniainen is within Espoo's borders. These four municipalities together constitute the Helsinki Metropolitan Area (HMA). In this area, the Helsinki Metropolitan Area Council (YTV) has a special position in

certain planning and co-operation activities. The outer part of the Helsinki region consists of the remaining eight municipalities, with a total population of some 250 000. All the parts of the Helsinki region mentioned above have shown a rapid population growth in the last decade. (Susiluoto 2002.)

In addition to the above there is a NUTS 4 concept of the Helsinki region, with a population only slightly below the above Helsinki region. For simplicity these two concepts will be used interchangeably in the text. Data availability has governed the choice between the regional definitions in different circumstances; this does not have a notable effect on the general results. Also the Uusimaa Province, a somewhat larger unit than the region should be noted. The provinces form the NUTS 3 level in Finland, and they have a specific role in regional development planning. (Susiluoto 2002.)

Table 2.1: Population in 2001, Helsinki region and Finland.

|                                        |           |
|----------------------------------------|-----------|
| Helsinki                               | 560 000   |
| Espoo                                  | 217 000   |
| Vantaa                                 | 180 000   |
| Kauniainen                             | 9 000     |
| Helsinki Metropolitan Area (HMA) total | 965 000   |
| Other Helsinki region                  | 249 000   |
| Helsinki region total                  | 1 214 000 |
| NUTS 4 Helsinki Region                 | 1 198 000 |
| Uusimaa province (NUTS 3)              | 1 318 000 |
| Finland                                | 5 195 000 |

Population of Helsinki metropolitan area has increased faster than in the rest of the country since beginning of the 1990's. With moderate economic growth the population of Helsinki region is expected to increase with 300 000 persons during the next 25 years. Thus the region's population would be over 1,3 millions in 2010 and about 1,5 millions in 2025. Share of people speaking other than Finnish or Swedish as their mother tongue has increased from 10000 to over 40000 in last ten years in Helsinki region. Even though the region is becoming more multi cultural the share of foreign people is still quite low. (City office of Helsinki 2002.)

## 2.2 Economic development and structure

The last decade of the 1900's saw strongly varying economic developments in Finland. Until 1990 a boom prevailed, caused by the international economic developments, the liberalisation of financial markets and by the economic policy of that time. In the early 1990s, rapid growth turned into a deep economic depression due to stagnation in the global economy, a collapse in Finland's

eastern trade as the Soviet Union disintegrated, as well as pursued domestic policy. In the worst depression years 1991-93 Finland's national product fell by ten per cent on aggregate, and unemployment reached unprecedented levels. 1994 saw signs of a new rise of the Finnish economy, a rise that continued strongly throughout the 1990s – when Finland also became a member of the European Union. With this rise, the country's industrial structure changed as the leading export industries, namely paper and pulp and metal industry, were joined by the electronics industry as leading motors of economic growth in Finland. In 1996-2001, average GDP growth was 4.4 per cent. Unlike earlier periods of rapid growth, this last one has been more regionally selective: strong population and job increase has taken place in only a handful of urban regions, first and foremost in the Helsinki region (Susiluoto and Loikkanen 2001). In 2001, an economic downturn was observed in Finland as well as in the world economy. However, in the latter part of 2002 the Finnish economy is expected to recover, as exports of electronic products and other manufacturing will increase. A new forecast of September 2002 gives a 1,9 per cent growth for this year, almost 3,7 per cent for 2003 and a 3 per cent average for 2002-2006 (Elinkeinoelämän tutkimuslaitos 2002). Basically the Finnish economy is in a good state, and several global competitiveness reports have recently placed Finland at the top. (Susiluoto 2002.)

In addition to population growth the Helsinki region has economically been one of the fastest growing areas in Europe for the last years. Both the growth of production and employment has been faster in Helsinki region than in the rest of country in 1995-99. Knowledge intensive industries, telecommunication and business-to-business services have been the engines of growth. (City office of Helsinki 2002.)

The average unemployment rate in Helsinki region was under 2 % in 1980's and 13,1 % in beginning of 1990's. The unemployment rate was 4,4 % in fourth quarter of year 2001. At the end of year 2000 there were 650 000 employed people in the region and the employment rate was 70,5 %. Youth unemployment has decreased at the end of 1990's but long term unemployment is persistent. (City office of Helsinki 2002.)

Education level is high in the Uusimaa province especially in the HMA. In particular the share of academically educated is very high. One of the challenges for education is the large share of immigrants. Half of Finland's immigrant population of 42300 persons live in the Uusimaa province and most of these in the Helsinki region. Their education requires some new methods and educational programs. (City office of Helsinki 2002.)

The instability between demand and supply in the housing markets has increased. The Helsinki region would need approximately 13 000 new apartments per year. The share of housing expenditure of household consumption has increased on the national level in the 1990's. The price of housing has increased rapidly in the Helsinki region. In the surrounding municipalities housing costs are lower. (City office of Helsinki 2002.)

The past development of the Helsinki region concerning segregation seems somewhat exceptional in international terms. Earlier development of the Helsinki region was characterised by a slow but steady levelling out of spatial socio-economic differences. Recent studies however suggest that the trend has turned: socio-economic differences between housing areas have been slowly increasing. In Helsinki one main driving force seems to be the new economic growth of the information sector, which emphasises the role of education as a labour market resource. Within the urban region, the western areas with a better-educated population are leading the upswing. Consequently, the already existing educational divide of the city is gradually breeding both unemployment and income differences. (Vaattovaara 2002.) According to reported crimes the safety level has remained stable in Helsinki when measured with violence and property crimes but on the other hand crimes related to narcotics have increased from 1996 to 2000 by 25 % (City office of Helsinki 2002.)

Helsinki region's share of Finland's GDP was almost one third in 1999. Of all the new jobs created in information sector between 1993 – 99 over 50 % were located in HMA. Employment rates were between 70,7 – 74,1 % in the three of the region's largest cities. The average of all the other cities in Finland was 61,2 % and the average of all Finland was 63,4 %. (Helsingin kaupunki and Oulun kaupunki 2002.)

GDP per capita in Helsinki region is clearly above European average but below some of the European competitor city regions. In international comparison of capitals city of Helsinki ranks highest in environment quality (Mercer 2002). Percentage of foreign inhabitants is in its own class in Helsinki (3,5 %) when compared to rest of Finland and gaining on other Nordic capitals (7,1 – 9,7 %) but clearly lower than in other European bigger cities. Employment situation in Helsinki region has developed favourably. Many competitor city areas in Europe are struggling with bigger unemployment problems. (City office of Helsinki 2002.)

### **2.3 Economic development of the ICT sector**

Finland has received a lot of international attention due to its fast economic growth and structural changes. Finland's economy has been made an example of how ICT production and ICT use can change the economic structure and increase productivity and economic welfare. ICT sector's effect on Finnish economy has come mainly from ICT production: In the 90's Finland rose to be one of the leading telecommunications technology producer. The structural change was enormous both internationally and in comparison to Finnish economic history. An important ICT cluster even in international comparison has evolved in Finland. On the other hand in the long run the more important factor will be the use of new technology. In this regard Finland has been more on the average than in the lead (Jalava and Pohjola 2002). ICT's effects on the productivity have come mostly from production. (Koski et al. 2002.)

The recent economic downturn that started in spring 2000 with the burst of the IT-bubble has affected the ICT sector in many ways. Many large companies have fired a lot of employees, for

example Nokia about 1000 employees in Finland. However most of these people have gained new jobs very painlessly. Still the number of unemployed IT-professionals rose above the “magic limit” of 1000 in Uusimaa province. Other effect is that wage demands have become lower and also it has become easier to hire employees. In the boom that was almost impossible to many firms. “IT-recession” has also decreased the number of applicants to IT related studies in universities by tens of percents at worst. (Kauppalehti 16.9.2002 and the interviews.)

### **3. DESCRIPTION OF THE ICT CLUSTER**

This description is based mainly on statistical presentation. On some occasion it will be complemented with information gained from the interviews or the existing literature. We will present description on size, composition and locational developments of the cluster. And we present the key companies of the cluster and take a closer look on three different types of companies: a local star firm, a start-up firm and a foreign firm. Also a look is taken on local education and research infrastructure and on other relevant actors. Also some discussion on local policies concerning the cluster is presented at this point.

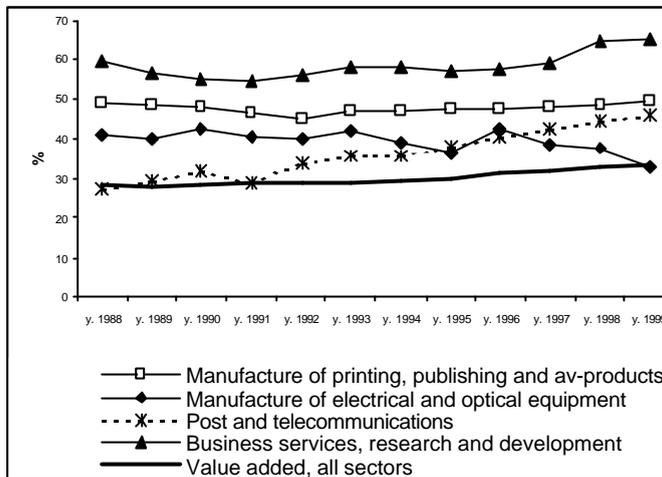
#### **3.1 Size and composition of the ICT sector**

The size and composition of the ICT sector can be measured in many ways. In this presentation we use value added, number and size of plants, number of start-up firms and number of employees. To allow international comparison we focus mostly on relative shares. Additional figures are represented in annex 3. The value added data uses a different definition of the ICT sector due to availability of statistics. In other cases by the ICT sector the business lines in annex 2 are meant.

##### **3.1.1 Value added of ICT sector**

By looking at chart 3.1 we notice that Helsinki region’s share of Finland’s ICT production is larger in all ICT related sectors than Helsinki region’s share of all production. The latter rose from 28 % in year 1988 to 33 % in year 1999, and consequently the region’s economic importance in Finland has grown. The region’s role is most dominant in business services and research and development, the region’s share being fairly stable around 60 %. Also manufacture of printing, publishing and av-products has remained stable around 50 %. Clear changes in shares have happened in manufacture of electrical and optical equipment that has decreased from around 40 % to 30 % over the period 1995-99 and post and telecommunications that has increased from 28 % to 46 % over the period 1988-99. We notice that Helsinki region has always been centre of ICT production in Finland and that the telecommunication industry lead by Nokia has become increasingly concentrated in Helsinki region over the years. On the other hand some manufacturing industries have been able or forced to move production to other parts of Finland.

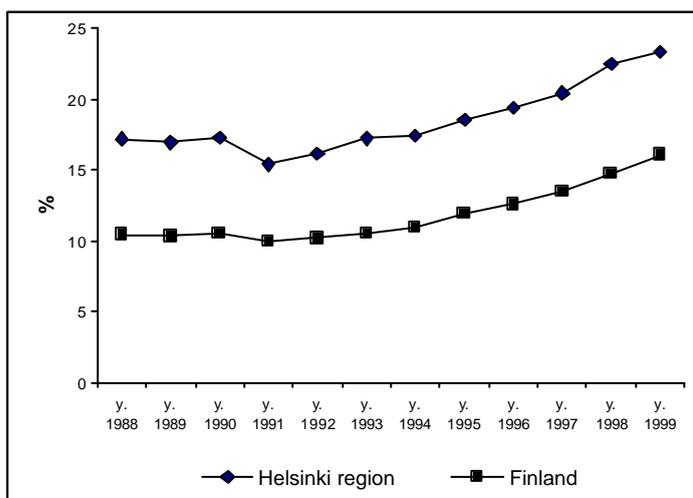
Chart 3.1. Helsinki region's relative share (%) of value added of ICT related sectors of Finland total 1998-99.



Source: Statistics Finland

From Chart 3.2 it can be seen that while the sector's importance has grown everywhere in Finland, Helsinki region is much more dependent on the ICT sector than the rest of the country. Although the sector's share of total production has risen over the years 1988-99 in Finland from around 10 % to 16 % and in Helsinki region from 17 % to 23 % it should be noted that these numbers are lower than what is sometimes thought. The picture of Finland being just a "Nokia-land" is somewhat exaggerated. Absolute value added figures in Helsinki region and Finland are presented in charts 3.3 and 3.4 in annex 3.

Chart 3.2. ICT related sector's share (%) of total value added of all sectors.

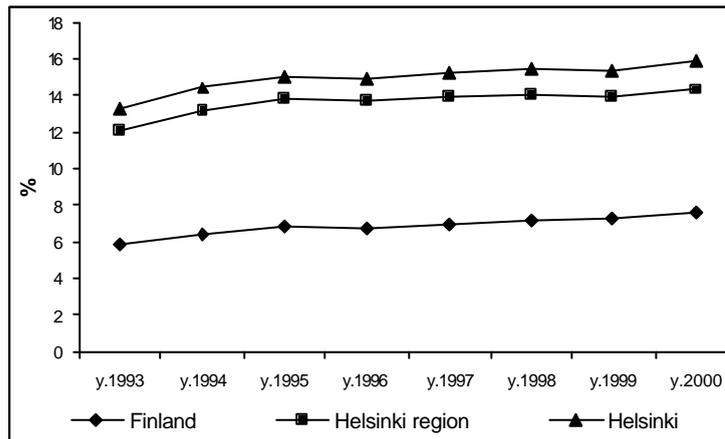


Source: Statistics Finland

### 3.1.2 Plants and employment in the ICT sector

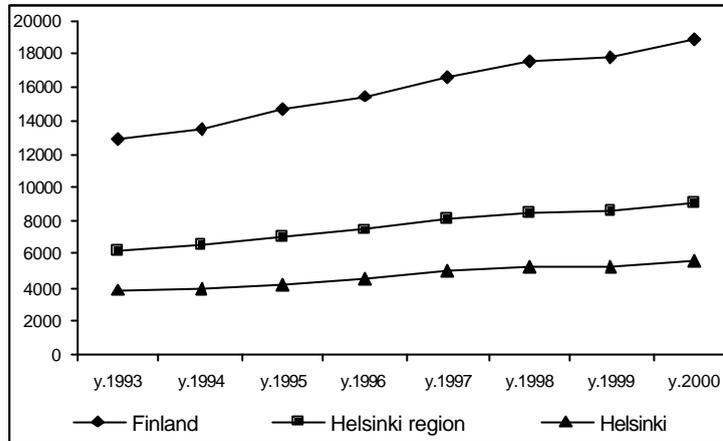
By a plant we mean a single office or manufacturing facility. So one company can have many plants. As shown in chart 3.5 ICT plants' share of all plants in the area is about twice as large in Helsinki region than in all of Finland and even larger in city of Helsinki. ICT sector's importance in the economy measured by the number of plants has increased consistently over study period throughout the country. In Finland the share has increased from 5,9 % to 7,5 %, in Helsinki region from 12,1 % to 14,3 % and in Helsinki from 13,3 % to 15,9 % over the years 1993-2000. As ICT sector's value added share is larger than its share of plants it can be concluded that ICT plants generate more value added than plants of other economic activity on the average. This conclusion has some reservations due to fact that the definition of ICT sector is somewhat different in these two cases. The total number of ICT plants is shown on chart 3.6. Helsinki region's share of ICT plants of all ICT plants in Finland was 47 - 49 % during the study period.

Chart 3.5. ICT plants share (%) of all plants in all sectors.



Source: Statistics Finland

Chart 3.6. Total number of ICT plants.



Source: Statistics Finland

The amount of existing ICT plants have increased constantly in Helsinki region in years 1993-2000 in all employment size categories as shown in table 3.1. The great majority of these plants are very small companies with only 0-4 employees. (See also chart 3.7, annex 3. National data is presented in chart 3.8 and data on city of Helsinki in chart 3.9.)

Table 3.1. All ICT plants in Helsinki region by number of employees and share of each size category of total in 1993-2000.

|               | 0-4  | %  | 5-49 | %  | 50-249 | % | 250-499 | % | 500-999 | % | 1000+ | % | Total |
|---------------|------|----|------|----|--------|---|---------|---|---------|---|-------|---|-------|
| <b>y.1993</b> | 4599 | 75 | 1338 | 22 | 143    | 2 | 20      | 0 | 6       | 0 | 1     | 0 | 6107  |
| <b>y.1994</b> | 5050 | 78 | 1273 | 20 | 129    | 2 | 21      | 0 | 6       | 0 | 2     | 0 | 6481  |
| <b>y.1995</b> | 5419 | 78 | 1389 | 20 | 138    | 2 | 27      | 0 | 7       | 0 | 1     | 0 | 6981  |
| <b>y.1996</b> | 5748 | 77 | 1566 | 21 | 147    | 2 | 29      | 0 | 6       | 0 | 1     | 0 | 7497  |
| <b>y.1997</b> | 6351 | 79 | 1550 | 19 | 145    | 2 | 26      | 0 | 7       | 0 | 4     | 0 | 8083  |
| <b>y.1998</b> | 6730 | 79 | 1530 | 18 | 167    | 2 | 27      | 0 | 9       | 0 | 5     | 0 | 8468  |
| <b>y.1999</b> | 6774 | 79 | 1575 | 18 | 195    | 2 | 26      | 0 | 13      | 0 | 4     | 0 | 8587  |
| <b>y.2000</b> | 7073 | 78 | 1726 | 19 | 220    | 2 | 30      | 0 | 14      | 0 | 4     | 0 | 9067  |

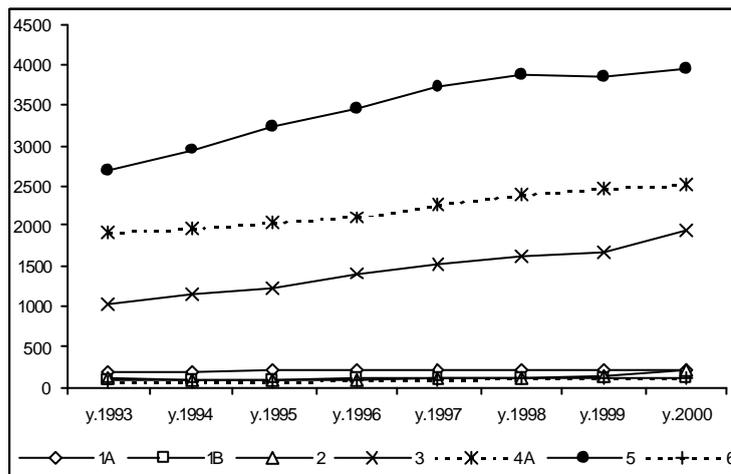
Source: Statistics Finland

Chart 3.10 presents absolute figures of ICT plants in Helsinki region categorised according to lines of business in annex 2 in short: hardware (1A, more ICT oriented), hardware (1B), telecommunication (2), software (3), content (4A), other services (5), research and development (R&D, 6). It can be seen that there are three large industries and four small industries when measured by number of plants. Other services have clearly most plants, then comes content and after that software. The amount of plants in these industries has increased throughout the study period. The same phenomenon happens in all the four smaller industries. This chart doesn't really tell us anything about the importance of that particular industry as some industries have bigger

plants than other. Chart 3.11 and chart 3.12 in annex 3 present the absolute numbers of ICT plants in Helsinki and Finland respectively.

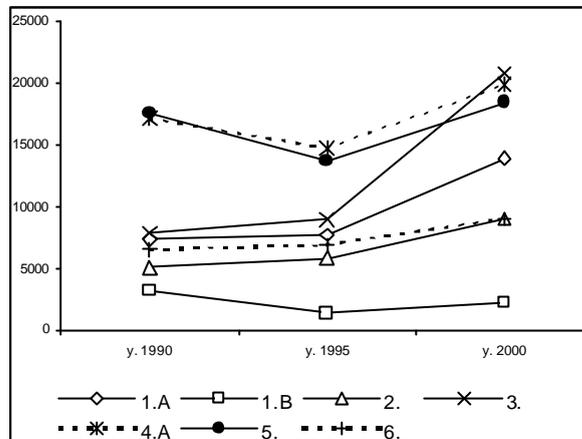
In chart 3.13 the importance of each industry in terms of employment is presented. Comparing this with chart 3.10 we comment on the typical size of plants in each industry. Now all the three larger industries in terms of number of plants also employ most people. In the year 2000 the all employ roughly the same amount. It means that on the average software plants are bigger than content producers and they bigger than other services plants. Of the other four industries all are important employers with the exception of hardware 1B so they have bigger plants. Interesting in chart 3.13 is that the more traditional sectors, hardware 1B, content and other services, suffered most from the economic recession of early 1990's as they have employed less people in 1995 than 1990. At the same time the employment increased in hardware 1A, telecommunications, software and R&D. The Finnish economic boom of the latter part of 1990's is reflected on all sectors expect hardware 1A as significant increase in people employed. Same phenomenon can be observed in chart 3.14 in Finland and chart 3.15 in Helsinki.

Chart 3.10. All ICT plants in Helsinki region by lines of business 1993-2000.



Source: Statistics Finland

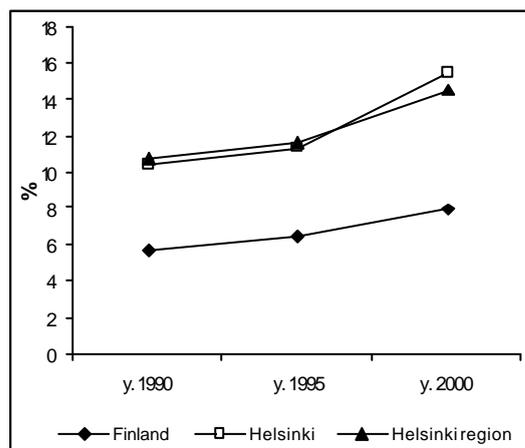
Chart 3.13. Number of employees in different ICT sectors in the Helsinki region.



Source: Statistics Finland

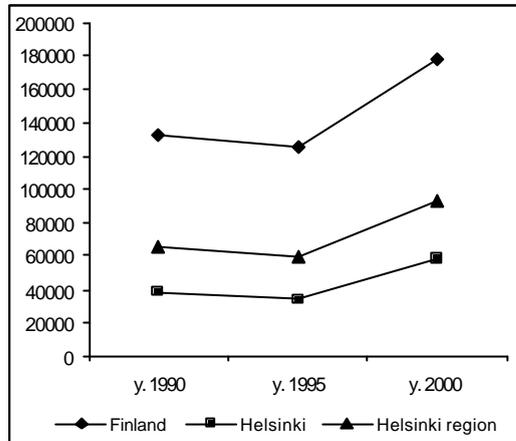
ICT employees share of all employees differs somewhat from plant shares. According to chart 3.16 Helsinki and Helsinki region have almost equal shares of ICT employees, although plant share in Helsinki was larger than in Helsinki region (chart 3.5). This means that larger plants are located in Espoo. ICT sector's employment share in Finland rose from 5,7 % in 1990 to 7,9 % in 2000. At the same time it rose in Helsinki region from 10,7 % to 14,5 %. Chart 3.17 shows total number of employees in all ICT sectors in absolute terms in Helsinki, Helsinki region and Finland. Helsinki region's share of all ICT employees in Finland was 47-53 % during the study period. When ICT sectors share of increase in total employment is calculated from 1995 to 2000 we get 17,2 % in Finland, 25,1 % in Helsinki region and 31,9 % in Helsinki.

Chart 3.16. ICT employees share (%) of all employees in all sectors.



Source: Statistics Finland

Chart 3.17. Total number of employees in all ICT sectors.

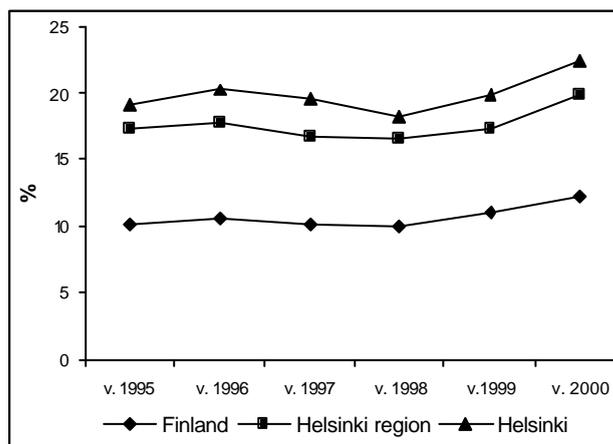


Source: Statistics Finland

### 3.1.3 ICT start-ups

Data on start-ups is presented in charts 3.18 to 3.22. The first observation is that ICT start-ups share is a lot larger than that of ICT plants share in all the areas (3.18). In Finland it is about twice as large and in Helsinki region and Helsinki about 50 % larger. Consequently there is a very lively start-up activity in the ICT sector, witnessing the dynamism of the sector. ICT start-ups share remained quite constant in years 1995-1998 and increased rapidly 1998-2000 in Finland from 10 % to 12,3 %, in Helsinki region from 16,6 % to 19,7 % and in Helsinki from 18,2 % to 22,4 %.

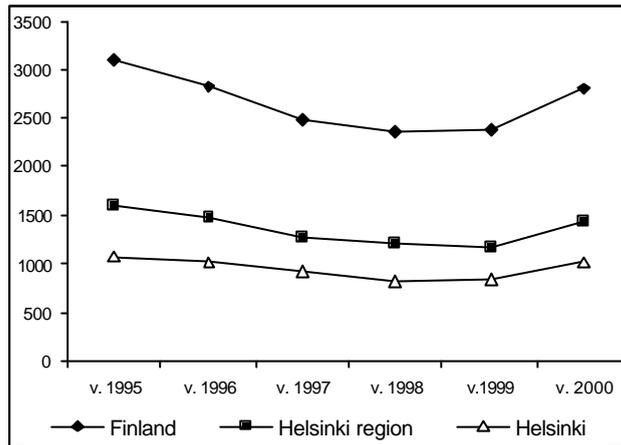
Chart 3.18. ICT start-ups share (%) of all start-ups in all sectors 1995-2000.



Source: Statistics Finland

The absolute number of ICT start-ups decreased from 1995 to 1998 and then increased from 1999 to 2000 as can be seen in from chart 3.19. Helsinki region's share of all ICT start-ups was about 50 % during the study period, again a high figure.

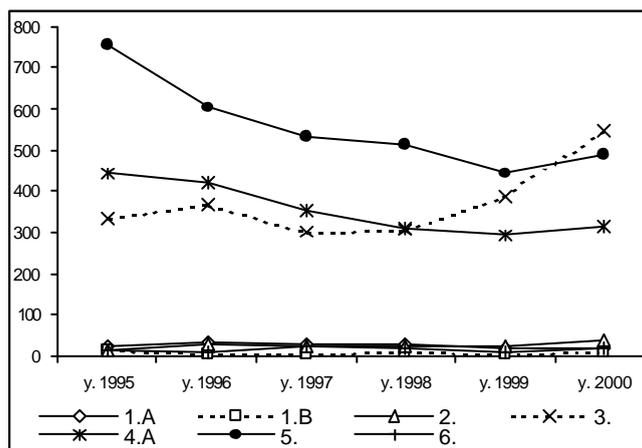
Chart 3.19. All ICT start-ups 1995-2000.



Source: Statistics Finland

The most significant observation from chart 3.20 is that the observed growth of ICT start-ups in 1999-2000 comes mainly from growth of software industry that has experienced significant growth in 1998-2000. The phenomenon is the same in Helsinki and in Finland (see charts 3.21 and 3.22 in annex 3.)

Chart 3.20. ICT start-ups in Helsinki region by lines of business 1995-2000.



Source: Statistics Finland

### **3.1.4 Summary on size and composition of the ICT sector**

Helsinki region's share of Finland's ICT production is larger in all ICT related sectors than Helsinki region's share of all production which rose from 28 % in year 1988 to 33 % in year 1999. Helsinki region has always been centre of ICT production in Finland and the telecommunication industry lead by Nokia has become increasingly concentrated there. Helsinki region is much more dependent on the ICT sector than the rest of the country. The sector's share of total production has risen over the years 1988-99 in Finland from around 10 % to 16 % and in Helsinki region from 17 % to 23 %.

ICT plants' share of all plants in the area is about twice as large in Helsinki region than in all of Finland. In Finland the share has increased from 5,9 % to 7,5 % and in Helsinki region from 12,1 % to 14,3 % over the years 1993-2000. Helsinki region's share of ICT plants of all ICT plants in Finland was 47 - 49 % during the study period. The great majority of ICT plants are very small companies with only 0-4 employees. Other services industry has clearly the most plants, then comes content and after that software.

ICT sector's employment share in Finland rose from 5,7 % in 1990 to 7,9 % in 2000. At the same time it rose in Helsinki region from 10,7 % to 14,5 %. Helsinki region's share of all ICT employees in Finland was 47-53 % in 1990-2000. The ICT sectors share of increase in total employment from 1995 to 2000 is 17,2 % in Finland and 25,1 % in Helsinki region. The employment increased in hardware 1A, telecommunications, software and R&D even during the economic recession of early 1990's.

ICT start-ups share is a lot larger than that of ICT plants share in both areas. In Finland it is about twice as large and in Helsinki region and about 50 % larger. ICT start-ups share remained quite constant in years 1995-1998 and increased rapidly 1998-2000 in Finland from 10 % to 12,3 %, in Helsinki region from 16,6 % to 19,7 %. Helsinki region's share of all ICT start-ups is about 50 %. The growth in the amount of ICT start-ups in 1999-2000 comes mainly from new software start-ups.

### **3.2 Key companies in the cluster**

In this section three short cases are presented: a star firm Nokia Plc that naturally is also the most important key company of the cluster, a foreign firm Spirea Ab, actually the only foreign among those interviewed and a start-up firm Innofactor. In addition a brief presentation of the other key companies of the cluster is given.

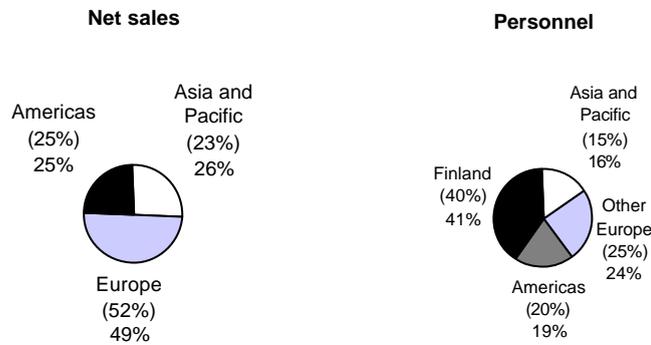
### 3.2.1 Local star firm Nokia

From its inception 1865, Nokia was in the communications business as a manufacturer of paper - the original communications medium. Technology came with the founding of the Finnish Rubber Works at the turn of the 20th century. Nokia Corporation was formed in 1967 by the merger of Nokia Company - the original paper-making business - with the Finnish Rubber Works and Finnish Cable Works. The '60s were the start of Nokia's entry into the telecommunications market. A radio telephone was developed in 1963, followed in 1965 by data modems - long before such items were even heard of by the general public. In the 1980's, everyone looked to micro computers as the next 'big thing' and Nokia was no exception as a major producer of computers, monitors and TV sets. The world's first international cellular mobile telephone network, NMT, was introduced in Scandinavia in 1981 and Nokia made the first car phones for it. In 1987, the political goal was set to adopt GSM throughout Europe on July 1st 1991. Finland met the deadline, thanks to Nokia and the operators. Politics and technology have continued to shape the industry. The '80s and '90s saw widespread deregulation which stimulated competition and customer expectations. The corporation divested the non-core operations and focused on telecommunications in the Digital Age. ([www.nokia.com](http://www.nokia.com).)

Today Nokia Plc is the leading supplier of mobile phones in the world (market share about 37 % in 2001 and 19 % in 1997 and targeted long term market share 40 %) and also a leading supplier of mobile, fixed and IP networks (targeted long term market share 35 %). A broadly held company (116 239 shareholders of which 9,3 % were Finnish 31.12.2001) with listings on six major exchanges, its net sales totalled EUR 31,2 billion in 2001 and profits were EUR 3,36 billion. The firm altogether employed 57716 people on the average, of which 27320 were in mobile phones and 22040 in Nokia networks. In Finland the number of employees was 23654, of which about 10 000 in the Helsinki region. At the end of the year Nokia had 18600 employees in R&D activities which is 35 % of the total personnel (53849 31.12.2001). Nokia had 18 production facilities in 10 countries, research and development in 15 countries, and its sales covered over 130 countries in 2001.

The biggest market for Nokia is still Europe although the markets in Asia are growing rapidly and their share of net sales is increasing. 41 % of Nokia's employees work in Finland which is a surprisingly high figure considering the fact that Finland's share of net sales was only 1,5 %. The operations in Helsinki region are leading and organizing of global activities, and product development.

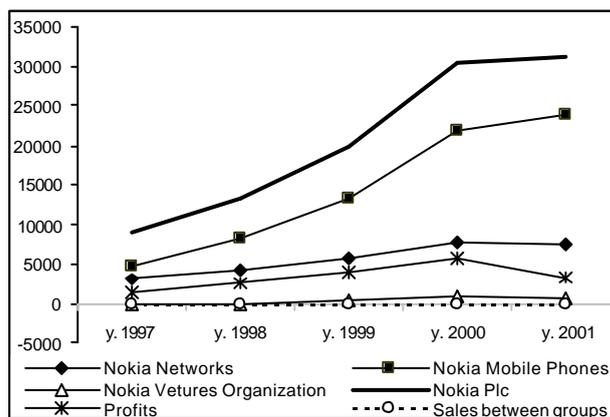
Chart 3.23 Shares of net sales and personnel by market areas 2001 (2000).



Source: Nokia 2002a.

From chart 3.24 we can see that Nokia’s net sales and profits increased rapidly 1997-2000 but in 2001 the growth on net sales stopped and profits decreased due to global economic conditions. However Nokia did manage to increase its markets shares and overall outperformed its competitors. Recently the net sales have decreased (6% to EUR 6 935 million in 2Q 2002 from EUR 7 346 million in 2Q 2001) whereas profits are increasing as pro forma operating profit increased to EUR 1 260 million in 2Q 2002 from EUR 1 137 million in 2Q 2001 (Nokia 2002b). Nokia Mobile Phones is the most important part of the company especially in terms of net sales and profits but also employment.

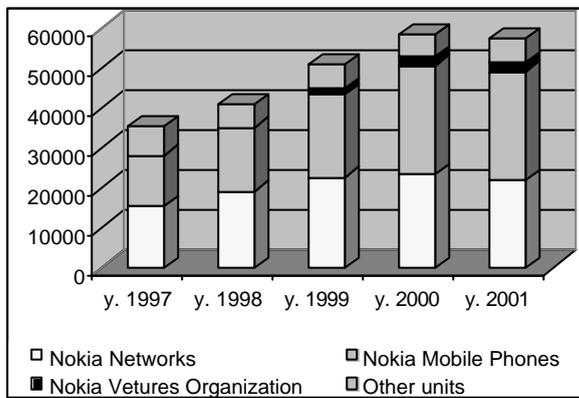
Chart 3.24 Nokia’s net sales by business group and total profits 1997-2001.



Source: Nokia 2002a.

The number of Nokia's employees almost doubled from 1997 to 2000, but in year 2000 the trend turned, as average employment was 57721 in year 2001 but at the end of the year they employed only 53849 and 30.6.2002 only 53028 employees. More cut backs in employment are expected. Nokia's impact on Helsinki region's ICT labour market is huge. A few years ago when Nokia wanted to employ almost all the graduates of Helsinki University of Technology (HUT) the availability of qualified employers was very poor and many companies were struggling with the problem of very high wage demands and lack of employees. Now when Nokia is reducing its work force also in Helsinki region the balance between demand and supply is better. Of course the overall slowdown of economy and ICT economy in particular is another important and related factor.

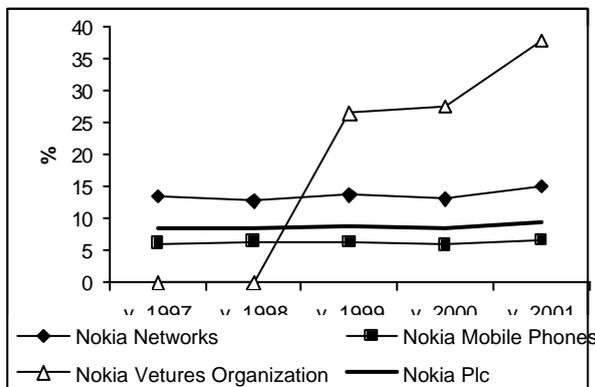
Chart 3.25. Nokia's average amount of personnel by business group 1997-2001.



Source: Nokia 2002a.

In Chart 3.26 Nokia's R&D expenditures are shown. The R&D's share has remained quite constant 9-10 % . Nokia networks and Nokia ventures organization are more R&D oriented than Nokia mobile phones.

Chart 3.26. Nokia's R&D expenditures share (%) of net sales by business group in 1997-2001.



Source: Nokia 2002a.

Companies with the size of Nokia have usually co-operation schemes of all kinds with all kinds of actors. Especially Nokia because they consciously intent to operate in co-operation networks and in increasing amounts. With other large players in the field they have important strategic co-operation for example concerning standards. All kinds of joint projects, outsourcing and partnerships are common. Outsourcing is common especially with smaller companies. Nokia has been very good in public relations and active in presenting its views according to many interviewees, for example in questions concerning physical or mental infrastructure of the country. In a great number of questions it has been at least an active conversation partner. Even so public relations are not as important to Nokia or to businesses overall as private or even university contacts according to many company interviewees. With universities Nokia has all kinds of activities: concrete development projects, joint projects, lectures and teaching are given to both directions, research funding, sponsoring, hiring trainees and directing theses just to mention some.

Nokia is a very important firm for both the whole Finnish national economy and for the Helsinki region. It has been the leading engine in the growth of the ICT sector in Finland, transforming the economy of the country and modernizing its export structure. Also in the Helsinki region the direct and indirect growth effects of Nokia (and more generally the ICT sector) are great; for example a notable part of all new office space construction in the area has lately been Nokia- and ICT-connected. Other indirect benefits include the emergence of the region as a favourable location for international business also more generally. This demonstration effect is expected to have positive impacts on the region's long-term development. (Susiluoto 2002.) Many of the interviews stressed Nokia's importance for the Finnish economy and for the region's economy in particular. That was also seen as a risk for the future development of the sector but only in the short period. In the long run the most important factor for the sector's development was seen to be the presence of large pool of ICT professionals and they wouldn't vanish even if Nokia did. In addition to indirect effects mentioned above the fact that Nokia has trained a large pool of professionals with skills in doing international business was seen as big booster for the sector in future.

### **3.2.2 Foreign firm Spirea**

Spirea Ab is a fabless semiconductor company developing a suite of low-cost, highly integrated and low power radio and System-on-Chip (SoC) solutions for the Wireless Local and Personal Area Network (LAN and PAN) markets, using leading-edge CMOS design techniques for radio, mixed-signal and digital designs. Spirea is currently developing products for WLAN and Bluetooth in CMOS technology. ([www.spirea.com](http://www.spirea.com).)

Spirea was founded in 1999 and operation started in 2000. The main office is in Kista in Sweden. Its Finnish side office was founded in 2001 and it is located in Innopoli building in Espoo where all of the six Finnish employees work. It has one other side office in Columbus in Ohio. The company is in a phase of R&D and marketing but no commercial products are yet ready. The

reason for starting operating in Finland was the availability of high quality specialized work force. All of the six employees have higher degree academic training. The electronic circuit design laboratory in Helsinki University of Technology (HUT) is a very good and in fact the only source of labour. The other reason for locating in Finland is a joint project that is starting together with that laboratory with Tekes funding. Thus HUT is really the only reason for locating in Finland. In fact the company is founded based on an idea of two professors. Some students have been participating in the company's projects and when they have graduated side offices have been founded to hire them.

Spirea sees it important to locate near HUT even though its private sector partners are international. It has a few partners in product development where each company has its own part in a project for example WLAN-card where Spirea develops the radio part. Also marketing is done jointly. Spirea has had no contacts with local or state government except with tax officials.

### **3.2.3 Start-up firm Innofactor**

Innofactor Ltd is specialized in digital multi-channel solutions, which are based on dynamic Internet server technologies e.g. databases and XML. Solutions include industry-customized intranet and extranet systems, e.g. resource management, digital calendars and course administration. Innofactor also produces single-customer tailored digital multi-channel communication systems utilizing the same technologies. All the solutions can be accessed on line with any computer or cellular phone, soon also with digital television. Solutions are built using Innofactor's generic software modules and customized to fulfil customers' needs. Innofactor also provides server services mainly to its customers. (<http://innofactor.com>.)

Innofactor started to operate 1.1.2000. Their first office was in Innopoli and they moved to Innopoli 2 after its construction was completed. The other option was Helsinki city centre. They have one sales office in Oulu where one employee visits regularly from Helsinki. Company's net sales were about EUR 0,83 millions in year 2001. It employs some 25 employees of which about ten work part time. Most of the employees are still studying and most of them for a higher academic degree, generally in HUT. It is very typical in Helsinki region's software industry to employ students especially from HUT. Currently about five employees have a higher academic degree and about five have a polytechnic degree.

The company's typical customer is a knowledge intensive service oriented medium sized company or organization. Most of its customers as well as suppliers are located in Helsinki region from where about 2/3 of its net sales originate. Other important area is Oulu. Together with the rest of Finland they account for about 1/6 of the net sales. The share of exports is about 1/6 of the net sales and it is expected grow as Innofactor is heavily starting to increase inputs to internationalisation.

HUT is very important partner to Innofactor. They have developed their course administration software product together partly with help of Tekes funding and also have made interfaces together and also done some joint product marketing. They have active co-operation in recruiting – mainly with the student union of HUT. The fact that Innofactor's CEO has taught in The HUT for about 10 years helps in organizing and forming active co-operation that takes many forms. Innofactor has no other contacts with public sector except as potential customers.

Private partners are seen as very important for the company. First of all they contribute to the local area's attractiveness and image and that is important when company is trying to grow internationally. Innofactor has private partners in three activity fields: technology, software and visual design and marketing and distribution. The firm is building partnerships with selected information security companies, telecommunications vendors and operators. Co-operation is needed to be able to offer more comprehensive services to customers. Innofactor also co-operates in product development. Innofactor is currently looking for a strategic partner to be their marketing and distribution channel in Europe.

### 3.2.4 Other key companies

Listed on the Helsinki Exchanges since May 1999, when it was established through a combination merger, **SanomaWSOY** is Finland's leading media group and also the largest company in the media field in the Nordic region. The net sales of this firm totalled EUR 1.7 billion in 2001, and its employees now number some 18 000. SanomaWSOY's companies have a long history in the Finnish media dating back to the nineteenth century. Publisher Werner Söderström Corporation (WSOY) was founded in 1878, and newspaper company Sanoma Corporation in 1889. Both companies have played an important and prominent part in Finland's cultural development over the years. SanomaWSOY's sectors now extend from news and information to books, learning solutions and entertainment. Its two main national newspapers, Helsingin Sanomat and Ilta-Sanomat, are the largest in Finland, particularly the former having a dominant position and being quite important in public opinion formation. Sanoma Magazines is today the fifth-largest magazine publisher in Europe, publishing magazines in 10 countries; in five of these, it is the market leader. WSOY is Finland's largest publishing house and the market leader in general literature, educational materials, and a number of specialist publications. (Susiluoto 2002.)

**Elisa Communications Corporation** is a nationwide telecommunications group. The core business areas comprise service operator, mobile, network and German operations. The Group's revenue in 2001 amounted to EUR 1.44 billion of which approximately 80 % is made in Helsinki region. The 120-year old Elisa has grown from a local telco to an international group offering comprehensive telecommunication services and solutions. Its employees now number some 8200 of which about 6000 are located in Helsinki region. It has 1.15 million fixed subscriptions, of which 36,300 broadband subscriptions, 1.35 million mobile subscriptions 501 million minutes of

mobile calls and 104 million SMS messages. Elisa is with its 300 000 stockholders the most widely owned corporation in Finland. ([www.elisa.com](http://www.elisa.com) and Interview.)

**Sonera Corporation** is a leading provider of mobile and advanced telecommunications services. Sonera is growing as an operator, as well as a provider of transaction and content services in Finland and in selected international markets. The company also offers advanced data solutions to businesses, and fixed network voice services in Finland and neighbouring markets. In 2001, Sonera's revenues totaled EUR 2.2 billion, and profit before extraordinary items and taxes was EUR 0.45 billion. Sonera employs about 7,400 people. Sonera has over 2.4 million mobile subscribers. In March 2002 Sonera and Swedish Telia announced their plan to merge. The combination of the companies will create the leading telecommunications group in the Nordic and Baltic region. ([www.sonera.com](http://www.sonera.com).)

With 12,000 employees of which 57 % are located in Finland and annual net sales of EUR 1.1 billion of which 56 % are made in Finland, **TietoEnator** is a leading supplier of high value-added IT services in Europe. The Group has locations in 21 countries; in addition to Europe also in the USA and in China. TietoEnator specializes in consulting, building and hosting its customers' core business systems in the digital economy. A major part of all products and services in this society are produced, distributed and consumed digitally via data networks. TietoEnator is playing an active role in building this global society. The Group's services are based on a combination of deep industry-specific expertise and latest information technology. TietoEnator aims to be a strategic IT partner to its customers. This requires focusing on businesses in which the company can achieve superior expertise and, in this way, offer significant added value to its customers. The company started its business operations in Finland in 1968 under the name Tietotehdas Oy. In 1999 the acquisition of Enator Ab was made. ([www.tietoanator.com](http://www.tietoanator.com).)

### 3.3 Local ICT education and research infrastructure

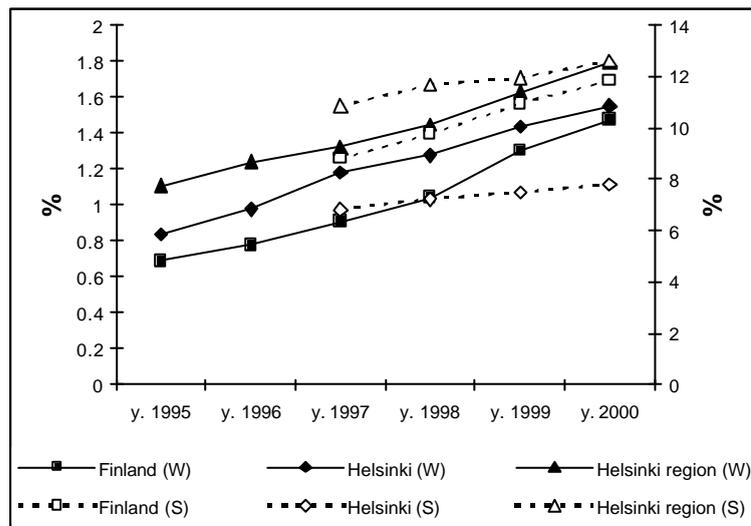
One cannot stress the importance of local education and research to the ICT sector too much. To almost all of the interviewed companies the local education was the first or second most important reason for locating in the region. Or as one interviewee put it: "all ICT clusters have been born around an ICT oriented university, that is the most important criterion". Local education facilities provide the ICT sector with high quality work force that is essential for such human capital or knowledge resource dependent industry as ICT is. Education and research facilities are also very important as breeding ground for new companies and providers of new knowledge.

There are many education facilities that provide ICT oriented education in the Helsinki region. Of the six universities in the area three provide ICT related education. The first and foremost in its importance to the ICT sector is HUT. Although University of Helsinki is the clearly the largest university in Finland it does not provide that much technological training. Third one is University of Art and Design Helsinki in Arabianranta. Education and research in fields of design and audiovisual communication is increasingly important to ICT sector. There are eight very different

polytechnics in Helsinki region. Of these two are significant from ICT sector's point of view. These are Helsinki polytechnic Stadia and EVTEK institute of technology.

From chart 3.27 it can be seen that the ICT students share of working age population in 1995-2000 and share of all students in 1997-2000 have grown in all areas. The ICT students share of working age population has grown in Helsinki region from 1,1 % to 1,8 %, in Helsinki from 0,8 % to 1,5 % and in Finland from 0,7 % to 1,5 %. So the share has doubled in Finland in years 1995-2000. That is a result of determined government education strategy which aims to raise the education level overall and in particular increase the amount of ICT oriented training. The ICT students share of all students has increased in Helsinki region from 10,9 % to 12,6 %, In Helsinki from 6,8 % to 7,8 % and in Finland from 8,8 % to 11,8 %. Helsinki region's education structure is much more ICT oriented than it is in Finland or Helsinki, especially HUT and to less extent EVTEK raise that share. In city of Helsinki the share ICT students of all students is low because there are many students in the city but not that much ICT education.

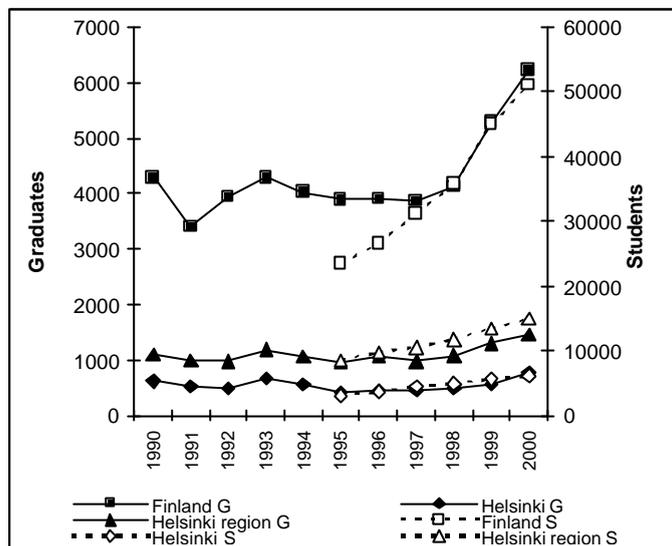
Chart 3.27 ICT students share (%) of working age population (W) (15-64) 1995-2000 (left hand axis) and share of all students (S) 1997-2000 (right hand axis).



Source: Statistics Finland

These absolute figures in chart 3.28 show that the growth in the amount of students has been especially high in Finland. In Helsinki region it has been more modest. The amount of graduates has remained quite stable in Helsinki region and Helsinki but in Finland that also has grown rapidly especially 1998-2000.

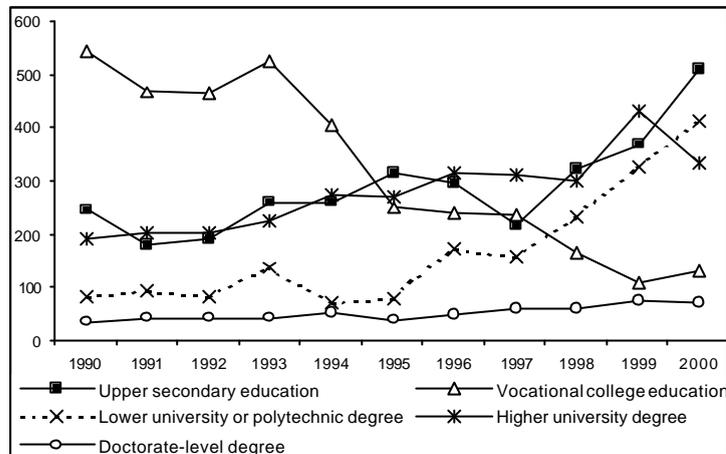
Chart 3.28 Total number of ICT students (S) 1995-2000 (right hand axis) and ICT graduates (G) 1990-2000 (left hand axis).



Source: Statistics Finland

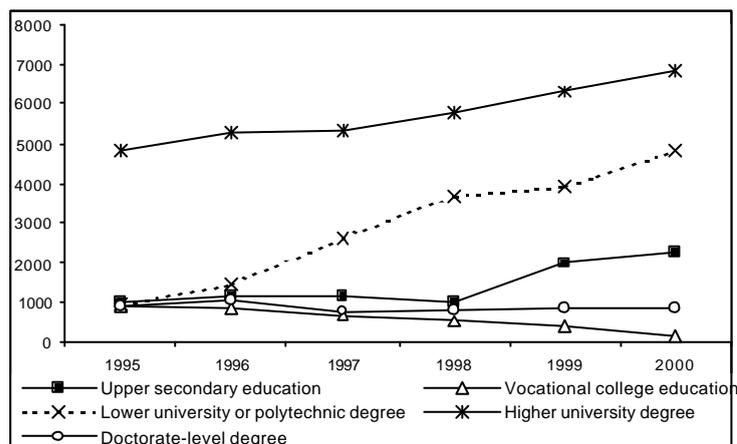
In charts 3.29 and 3.30 the absolute amounts of ICT graduates and students in Helsinki region respectively categorized by education level are shown. Most notable fact is the huge increase in the number of lower university and polytechnic degrees in both cases. Same trends can be seen in Finland and in Helsinki in charts 3.34 – 3.37 in annex 3. This is due to the new educational system implemented in 1995, the polytechnic. Also the amount of higher university degrees students and graduates has increased steadily. Also upper secondary education has increased. On the other hand ICT oriented vocational college education has decreased to almost non-existent during the study period. This is because many of the schools that used to offer this level education have been changed to polytechnics.

Chart 3.29. IT-graduates in Helsinki region.



Source: Statistics Finland

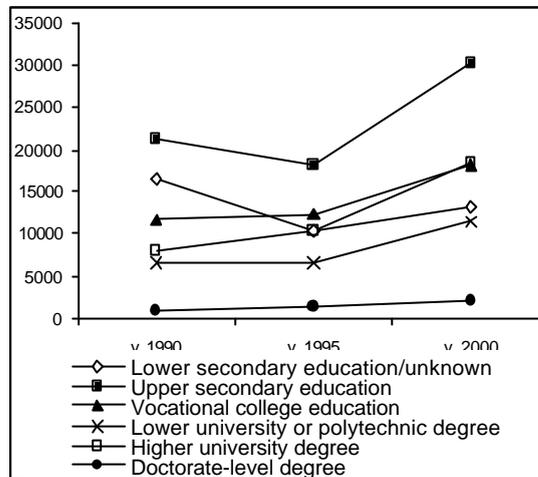
Chart 3.30 IT-students in Helsinki region.



Source: Statistics Finland

When we look at education structure through ICT sectors employment situation in Helsinki region as is done in chart 3.31 we notice that the biggest group is upper secondary education. The fact that this group measured with number of students is not very large when compared to others leads us to conclusion that the ICT sector employs a lot of people whose education background is not necessarily ICT oriented. The ICT sector has employed people with both higher and lower academic training in increasing amounts throughout the study period. That amount increased even during recession period 1990-1995 when the amount of lower educated people decreased. The economic boom of 1995-2000 increased employment in all the education groups.

Chart 3.31. Number of employees in all ICT sectors by education level in Helsinki region.



Source: Statistics Finland

Although the increase in the ICT education has been huge over the last years the supply of high quality work force is still lower than demand. It is a problem for the growth of the sector especially in the long run. There are two ways to address this problem and both of them pose challenges of their own. The first is to increase the domestic supply. This can be achieved by increasing ICT education aimed at new students or unemployed or workers in other sectors. This can't be done endlessly because all of the population has not the interest nor the ability for higher level education and the society has need for people with all kinds of levels of education and all kinds of skills. Many of the interviewed companies had experienced some problems with the increased amount of education. The student material and thus job seekers have become more varied where before a degree used to be almost a certain guarantee of high quality. This increases the search costs of labour. This problem is bigger with polytechnics. Usually higher university degree is still a guarantee of high quality at least in technical sense. The problems some interviewees perceived in universities were the lack of training in commercial skills and project management. One other problem with the education sector in general was thought to be the difficulty of attracting good teachers because public sector wages cannot compete with those of the private sector. The other solution to the labour supply problem is attracting students and work force abroad. In this matter the biggest problems that can be addressed, as one cannot do much about the climate are the bureaucracy and the taxation. But these are not under jurisdiction of the local government.

There is a great number and variety of research institutes in Helsinki region of which many have connection to ICT sector through business sector contacts or research focus. The presentation of all these would take way too much time and space so we just present the most important from ICT sectors point of view. These are **HUT** and **The Technical Research Center of Finland (VTT)**.

VTT is an impartial expert organisation that carries out technical and technoeconomic research and development work. VTT offers also information services. It is a contract research organisation involved in many international assignments. With its more than 3000 employees of which 2159 work in Helsinki region (Espoo), VTT provides a wide range of technology and applied research services for its clients, private companies, institutions and the public sector. VTT carries out three types of activities: commercial activities, joint projects and self-financed projects. Of its employees 12 % are doctors and 7 % licentiates, 48 % have university degree, 29 % have college level and polytechnic and 4 % basic level education. Turnover is about 200 million euros. They serve annually over 5000 domestic and foreign customers. ([www.vtt.fi](http://www.vtt.fi)) VTT is the biggest and the most important research institute in Finland. Besides its research it is of great importance to the ICT sector as producer of spin-offs.

### **3.4 Other relevant actors in the cluster**

There are many other relevant actors in the ICT cluster besides the business sector and the education and research institutes. These can be categorized in a few different ways. One is to divide them into public and private actors. Other is to divide them to local and national actors. The first approach is not that easy for many actors are public private partnerships. Therefore we take the latter approach.

#### **3.4.1 Relevant national actors in the cluster**

The most important ministry level actor is the **Ministry of Trade and Industry (MTI)**. Of course the Ministries of Education and Transport and Communication are also important actors but MTI is directly more active in the sector. The pillar of MTI's mission is to take care of competitiveness of companies especially that of SMEs. In ICT sector this can be achieved by promoting efficiency of the existing ICT businesses, promoting use of ICT in traditional sectors or promoting birth of new companies or totally new business fields. MTI works its policies through the National Technology Agency (Tekes), VTT and 15 Employment and Economic Development Centres (TE-centres) in case of Helsinki region the Employment and Economic Development Centre for Uusimaa (TE-centre Uusimaa).

**Tekes, the National Technology Agency** founded in 1983 finances R&D projects of companies and universities in Finland. The funds are awarded from state budget via the Ministry of Trade and Industry. In 2001, Tekes funded 2261 research and development projects to a total value of 387 million euros. Two thirds of this funding was aimed in the form of grants and loans at company research and development projects and one third at university and research institute projects. ([www.tekes.fi](http://www.tekes.fi)) 31 % of the funding was directed at ICT sector. Of all the funding the share of Uusimaa province is about 40 %. The regional distribution of Tekes funding follows roughly the regional distribution of companies R&D inputs. From chart 3.1 we can draw a loose assumption that about 60 % of ICT sectors R&D is done in Helsinki region. That figure also came up in some interviews. Thus the ICT funding of Tekes in Helsinki region amounts to about EUR

70 millions annually. This is not a statistical figure but just an estimate. Thus Tekes is by far the largest funding provider in the region. The central idea in funding is to give companies and research institutes incentives to co-operate. Co-operation between other companies or research institutes is required to receive funding. Another objective is to promote new entrepreneurship. Besides project funding Tekes has technology programs for example the Spin-program in Innopoli. Of some 225 employees in Tekes approximately about three quarters have a higher academic education.

Most of the interviewees saw Tekes as the most important public organization in the cluster and its actions were seen as very important and effective. As one interviewee put it: many of today's successful companies would be just departments of TietoEnator without Tekes. Many of the interviewed companies have been or are currently receiving Tekes funding in some projects. The only critic it received was the its slow decision making pace. For companies that are aiming at fast international growth or are in a very fast developing field have no time to wait for Tekes funding decisions because the product has to be at the market faster than Tekes can make its funding decisions.

**Employment and Economic Development Centres (TE-centres)** provide a comprehensive range of advisory and development services for businesses, entrepreneurs, and private individuals. Their aim is to support and advise small and medium-sized enterprises at the various stages of their life cycles, to promote technological development in enterprises and assist in matters associated with export activities and internationalisation, to implement regional labour policies, to plan and organise adult training within the official labour policy framework and to promote and develop farming and rural enterprise activities, to develop fisheries and to influence and participate in regional development in general. ([www.te-keskus.fi](http://www.te-keskus.fi)) TE-centres have 15 different service products, including concrete funding and advisory services. ICT cluster is seen as a key cluster in their mission. An example of service concerning ICT sector is the providing subsidised consulting services for the SMEs. These consults help the companies to start using new ICT technology. TE-centres have also technology agents who promote new entrepreneurship in ICT sector. Services of Tekes are also provided in TE-centres and they have a lot of co-operation. They also have good contacts with organizations that promote international trade for example state owned company Finnvera.

Another important national actor in the sector is **Sitra, the Finnish National Fund for Research and Development**. It is an independent public foundation under the supervision of the Finnish Parliament. The Fund aims to promote Finland's economic prosperity by encouraging research, backing innovative projects, organising training programmes and providing venture capital. The Fund was set up in conjunction with the Bank of Finland in 1967 in honour of the 50th anniversary of Finnish independence. The Fund was transferred to the Finnish Parliament in 1991. Sitra aims to further economic prosperity in Finland by developing new and successful business operations, by financing the commercial exploitation of expertise and by promoting international competitiveness and co-operation. The focus of Sitra's corporate funding is directed

towards enterprises that are at the start-up stage. Sitra's corporate funding activities are divided into four sections: technology, life sciences, regional funds and PreSeed funding. In addition there is the commercialisation of technology. Sitra cooperates with public-sector bodies such as the Finnish National Technology Agency (Tekes), the Finnish Industry Investment Ltd., Finnvera, the Academy of Finland, and Employment and Economic Development Centres (TE-centres). In addition, Sitra tries to coordinate its funding with that of other providers of capital. Sitra's funding decisions were EUR 64 millions in year 2001. ([www.sitra.fi](http://www.sitra.fi))

There are six technology-transfer companies in university cities in Finland. These form a close-knit circle cooperating in the task of commercialising research results. They help companies and people thinking of going into business to identify, assess, protect and commercialise different technologies. Sitra owns about a third of these technology transfer companies. The only company in Helsinki region is Licentia Ltd. ([www.sitra.fi](http://www.sitra.fi))

### **3.4.2 Other relevant local actors in the cluster**

**Innopoli Ltd** with new Innopoli 2 building is a concentration of high-tech research, training and business facilities at the Otaniemi Science and Technology Park, the latter also including the campus of the Helsinki University of Technology. It is about 20 minutes from downtown Helsinki. The surrounding Otaniemi Area is home to 5000 technical research and product development professionals from all around the world, as well as some 11 000 students. 88 % percent of owners are private but city of Espoo owns 7 %, other public organization for example Sitra 4 % and local universities 1 % of Innopoli. Its turnover was EUR 4,6 million. Innopoli itself, together with its affiliate Incubator, is a 22 000 sq. m. complex, providing over 200 technology-based tenant companies with space, synergy and practical help. Innopoli sees as its most important mission to act as a business generator for Helsinki region's Universities and research institutes. Innopoli prides itself on a full range of business services, such as top-of-the-line communications connections, legal advice, marketing enterprise and conference facilities. Innopoli has also organised the Spinno program, whose objective is to create new and viable technological enterprises. Also a mentor program has been created to provide support to new businesses. In this program tested leaders of established companies share their knowledge and expertise with newly-hatched entrepreneurs. In April 2002, The European Commission nominated Innopoli and Otaniemi Science Park as members to the Club of Excellence Network, the aim of which is to co-operate in the field of producing and developing innovative enterprises. Most of the interviewees saw Innopoli as an important actor in the cluster. But on the other hand one interviewee said that there is nothing special about it. It is just another real estate company and a one with very high rents at that.

**Culminatium Ltd** is a co-operative organisation whose task is to promote transfer of technological innovation from the conceptual level, through the research phase and onwards to the production level. This goal is achieved by increasing co-operation between the scientific community and companies and by co-financing various projects. The shareholders of

Culminatum are the Helsinki Region's universities and vocational universities, the cities and chambers of commerce of the Helsinki Metropolitan Area and the Uusimaa Regional Council. The city councils of the Helsinki Metropolitan Area have assigned responsibility to Culminatum Oy for preparing a science and technology strategy for the region and a common development strategy for the universities and associated business operations. Noteworthy examples of this work include the feasibility study conducted in spring 2001 into establishing an international information technology university in the Helsinki Metropolitan Area and the preliminary examination of the Uusimaa 2000 decade expertise land use strategy. Investigative work for both of these projects is continuing at Culminatum. Culminatum also provides practical support for starting firms by looking for academic research results potentially eligible for commercial utilisation. In this "Tuli"-project, researches are aided financially in order to make it possible to set up a firm. The educational Spinno program has to the purpose of giving basic abilities to entrepreneurship. The Spinnoseed financing project invests in firms starting in high technology business. Also a mentor program is in use. The main responsibility of Culminatum is to implement The Centre of Expertise Programme. (Susiluoto 2002.) The budget of Culminatum was about EUR 2 million in year 2001. It currently employs ten academically educated people.

The idea behind the **Centre of Expertise Programme**, launched in 1994, is to focus local, regional and national resources on the development of internationally competitive fields of know-how. The Programme covers the whole country and it is carried out in regional Centres of Expertise, appointed by the Council of State, that work closely with universities and companies in their respective sectors. The Ministry of the Interior has an important role in the national co-ordination of the Centre of Expertise programme. The Helsinki Region Centre of Expertise Programme consists of five separate Centres of Expertise: Adaptive Microsystems (located at Otaniemi Science Park in Espoo), Gene Technology and Molecular Biology (at Helsinki Science Park), Cultural Industry (Cable Factory in Helsinki), Software Product Business (Innopoli in Espoo) and the Centre of Expertise for New Media (Helsinki University of Art and Design at Arabianranta, Helsinki). The second period of the programme was launched in 1999 and will continue until 2006. The programme establishes effective channels of innovation-oriented communications for selected fields of know-how; this enables enterprises to take advantage of the expertise, research findings and technology of the region's universities, institutes of higher education and research facilities. The aim is to produce new, internationally competitive commercial operations, thus helping to ensure that the Helsinki Metropolitan Area holds its own against international competition and retains its status as the country's principal engine of economic growth. (Susiluoto 2002.)

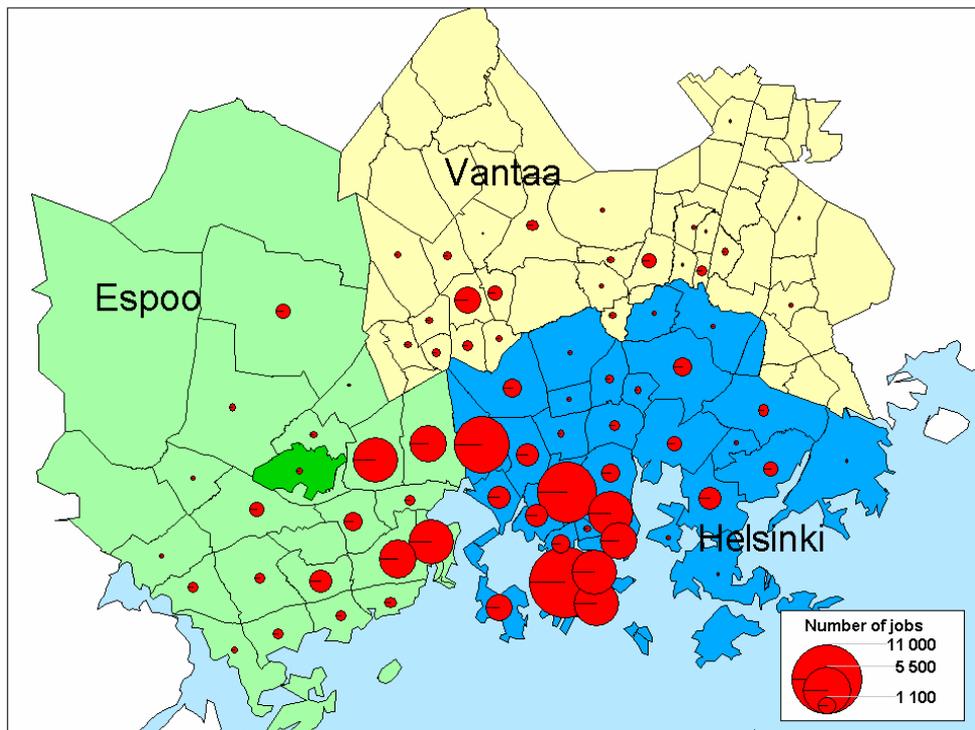
Other actors in the cluster are The Federation of Finnish Enterprises and The Chambers of Commerce in the area but these active in all business areas not just ICT. Also venture capital companies are very important for the cluster. The venture capital situation in Finland has improved a lot over the last few years. Today the situation is good and there are many companies that provide venture capital. Capital is available although the companies are more careful now than few years ago before the IT-bubble bursted. All the important Venture capital companies in

Finland are located in Helsinki region. The biggest one that specialises in ICT sector is Eqvitec Partners. They manage three funds: the EQVITEC Technology Fund I (with about EUR68 million) for equity investments in technology growth companies, which is now fully drawn down, the EQVITEC Technology Mezzanine Fund (EUR57 million) for investments using mezzanine instruments to support the capital requirements of more established technology companies and the EQVITEC Technology Fund II (EUR133,8 million).

### 3.5 Locational developments

From picture 3.1 we can see the locational distribution of ICT sector in HMA shown by number of ICT employees in each district is. The sector is concentrated to south and west of HMA. ICT activity is almost non-existent in eastern Helsinki, northern Espoo and Vantaa. All of the interviewees were well aware of these facts. Ruoholahti, City Centre, Pasila and Pitäjänmäki are the largest concentration in Helsinki. In Espoo these are Otaniemi, Tapiola, Leppävaara and Kilo. In Espoo the sector has evolved around HUT and in Helsinki around traditional business concentration of City Centre. Ruoholahti on the other hand is a result of city planning policies. The ICT sector is more concentrated in only a few areas than many other industries.

Picture 3.1. The locational distribution of ICT sector in Helsinki Metropolitan area according to number of jobs by city districts.



Source: *Ö Kaupunkimittausosasto, Helsinki 125/2002.*

### 3.6 Public policies concerning the cluster

The economic crisis of the early 1990's hit also the Helsinki region hard. In addition to all the difficulties that followed, there was also at least one positive result: a growing awareness for internationalisation and new visioning. One result of the awakening was Helsinki's first internationalisation strategy, initially formulated in 1995 and exemplifying new attitudes regarding co-operation and development. The city's long run success was perceived to depend on education, science and research. In addition, cultural and environmental factors were seen as important. The strategy includes several practical and large activities and projects that were initiated or implemented, including the Centre of Expertise Program, Helsinki Science Park, the Art and Design City, Biomedicum and the European City of Culture Project 2000. Regarding communications and logistics several projects connected with the strategy are presently under way, including the Helsinki-Vantaa airport and the new harbour planned for Vuosaari. The city has also stepped up its co-operation with the local universities in many areas. (Susiluoto 2002.)

The **city of Helsinki** has no specific ICT strategy. It sees all businesses equally important. It has consciously chosen not to be very active and let the markets decide the development. For example Helsinki decided to let the development of broadband infrastructure to the private sector. Helsinki uses mostly traditional methods in promoting economy: city planning, transportation and housing policy, services, infrastructure, education etc. It is involved in some projects for example incubators as noted above. In these projects its role is mostly "to invest in walls". Most companies saw Helsinki's chosen strategy of not being very active as a good one. They saw city as a provider of an efficient setting in which the companies can operate. Some firms wished the city to be more active in ICT issues, but in what way they couldn't say. One thing that came up was the wish that city of Helsinki and the whole public sector would act as a more demanding and innovative customer. Their strategies were seen as well though in general but too much on the safe side. For example the public sector could demand new technology to make the production of health services more efficient. That would also promote new business activities. Also the city's purchasing processes should be simplified as it is difficult for the smaller companies to participate in them.

Helsinki's western neighbour **Espoo** has grown rapidly during recent years, and now has approximately 214 000 inhabitants; growth is also expected to continue. In its own municipal vision, Espoo emphasises its position as a city of high technology, education, culture, research and innovation that functions as a part of the metropolitan region. Espoo hosts Helsinki University of Technology, the Otaniemi Science and Technology Park with all its research institutions, as well as the Innopoli research centre. The key values in the Espoo vision are customer orientation, tolerance, innovation, partnership and cost-effectiveness. (Susiluoto 2002.) Espoo is more active in its ICT policy than Helsinki. It invests in incubators for example about EUR 9 million in Innopoli 2, in broadband company Otaverkko and in technology centres. It has active co-operation projects with local universities and research institutes for example developing

a Life Science Center together with local companies, HUT and University of Helsinki. Even though Espoo has been more active in its ICT policies than Helsinki, the fact that there is a lot of ICT activity in Espoo was seen more as a natural development than a result of the local policies.

**Vantaa** is Helsinki's northern neighbour with a population of approximately 178 000 inhabitants. Well being and safety, sustainability, competitiveness, the ability of the local economy to react to changes, flexibility in the supply of public services and local democracy are the primary factors in Vantaa's vision. In the overall strategy for the Helsinki Region, Vantaa wishes to be the logistic node in the new Northern European business centre. Vantaa's logistic importance is connected with having the Helsinki-Vantaa airport in its area; the development of the airport and its related services are an essential component of Helsinki Metropolitan Area's gateway strategy. An extensive new business park, Aviapolis, has been planned near to the airport. (Susiluoto 2002.)

Many of the interviewees wished for more regional co-operation between the municipalities in the region. For companies the municipal borders are artificial, it does not matter for them whether they are Espoo or Helsinki. Thus the region should be developed as one area at least what comes to its business policies. But public officials, at least those responsible for fiscal matters see these borders more clearly than firms. Van den Berg et al. (2001) criticised the public sector of the lack of regional vision and common strategy in the region. However this situation has improved recently.

An important step for regional co-operation has been taken in the **Urban programme for the Helsinki Metropolitan Area** competence and cohesion. It was accepted 12.4.2002. The making of this programme was started by the mayors of the HMA cities and by executive directors of the HMA Council and the Uusimaa Regional Council in October 2000. The aim is to strengthen competitiveness, knowledge and citizen participation in the region. Three priorities have been chosen: strengthening of high competence and multidimensional knowledge base, strengthening of individual competence through social means, and strengthening of social inclusion, participation and social cohesion. In addition to the organisations mentioned above, also Ministry of the Interior, Culminatum and the Association of Finnish Local and Regional Authorities are represented in the project. There are eight concrete programs concerning ICT sector. These are: closer co-operation with Tallinn for example in incubator activities; the founding of private international university; the development of Helsinki Business Campus around economic schools to help in commercialising new innovations; increasing co-operation between universities and science parks for example by introducing new bus transport route "science line"; starting of an innovation research project; preparing Logistics Centre of Expertise; promoting new birth of business around mix of information technology and medicine and creating an e-learning integrator. (City office of Helsinki 2002.)

One important recent co-operation plan is **The Helsinki Metropolitan Area Vision 2020**, based on an assumption of annual population increase of 8000 persons. Net inbound migration is expected to be rapid, a significant number of migrants being young, approximately 20-25 years of

age. Natural population will account for less than half of annual population growth. This vision aims at an ecologically, socially and economically sustainable urban region. The industrial structure would focus on R&D work and production based on top-level expertise and sophisticated technology, supported by high quality services. Convenient accessibility by all modes of transport is seen as important. High-priority goals also include equality and social responsibility as well as a high environmental standard and natural diversity. (Susiluoto 2002.)

**The Helsinki Metropolitan Area Council (YTV)** has a special position in certain planning and co-operation activities in the region, being unique of its kind in Finland. The operational jurisdiction of the Council includes the municipalities of Helsinki, Espoo, Vantaa and Kauniainen, and its main task is to promote the development of the metropolitan area by providing services for public transport, waste management, air quality management and development planning. In planning the role of the Council is not binding, but rather limited to co-operation and research work. It should also be noted that the members of the Council are not elected directly by voters but by the municipalities; this is also the case for the **Uusimaa Regional Council**. The function of the Council is based on a special act. To promote regional co-operation and safeguard balanced development in the region the Council prepares so-called Co-operation Plans (YTO) approximately every five years. (Susiluoto 2002.) YTV introduced an intelligent travel card to its public transport system this summer. It works also in Helsinki City Transport system. Also there is an intelligent route guide to be found on the internet site of YTV (<http://pathfinder3.meridian.fi/ytv/fi/>).

#### 4. DYNAMICS AND STRATEGIC INTERACTIONS IN THE CLUSTER

This chapter is based purely on the interviews. We take look at linkages between and within the firms and research and education institutes.

##### 4.1 Interfirm relationships

Van den Berg et al. (2001) concluded that in the telecom cluster in Helsinki interfirm cooperation of several kinds occurs very frequently. The limited scale of Finnish market and the traditionally non-hierarchic, informal way of working in Finland favours strategic networking. Generally people know and trust each other and common interests are easily recognised. This study confirms their observations and concludes that they apply to the whole ICT sector and not just the telecom sector.

Active interfirm relations are very common and take many forms in Helsinki region ICT cluster. Other firms were seen as the most important co-operation group. The different forms are, in order of frequency of occurrence in the interviews: Project based co-operation for example providing a large service and/or product package together for a large client. Long term co-operation in product development where both companies have their own specialised area. Marketing co-operation so that product that is developed together is marketed together, or different products are

marketed together for the same customer. For some companies other firms are important as customers and for some they are important as sub-contractors. Sub-contracting relationships can go both ways at the same time. Also licensing, selling other companies products and co-operation in standardizing came up in the interviews. In some cases other companies were seen also important as creators of area's image, thus helping export.

The fact that firms with whom they co-operated located close was important to one third of the interviewed companies although most considered closeness to be helpful. Close co-operation with local firms was not more common than close international or national contacts in the interviews. On the other hand, for most firms the majority of customers and suppliers were located in Helsinki region. Partners were most often found through personal contacts rather than organizational contacts. The role of intermediary companies such as Innopoli was not seen as very important. Small firms usually had one or two closer partners. The bigger companies had lots of all kinds of partners both among small and large companies. Small companies were typically used as partners or sub-contractors in projects.

#### **4.2 Co-operation between firms and education and research institutes**

In general linkages between business and education are numerous. Again we list the various ways to co-operate in the order of how many of the interviewees mentioned them. Because of the small number of interviewed companies, the results only give some idea of the importance of various linkages. The most important role of local education facilities was the providing of qualified workers. About half of the companies had joint projects with universities for example in R&D. These were often Tekes projects. In a few cases these products that were developed together were also marketed together for example in seminars. One common phenomenon in the cluster was the large amount of students working or training in companies. Companies also employed students to write their graduation theses. Many firms ordered and funded research. Employees of some companies gave lectures in universities and in some cases university staff gave lectures to firms. This is a habit that should be encouraged. The universities have not understood to utilise the full potential of using experts of business world as lecturers. Universities and research institutes were also important customers for some companies. The most common partner was HUT, then University of Helsinki and Helsinki School of Economics. The universities were seen as important also because they improved the region's image. Although most of the companies saw the universities as very important and essential for them, there were some companies for whom the universities were not important in any way and who had no contacts with them. Generally the companies were not very active in trying to influence the amount or quality of ICT education, rather only few companies had made such efforts either through organizations or directly.

#### **4.3 Linkages between knowledge institutions in the region**

Traditionally there has been very little contact between different universities and research institutes in Helsinki region. This has changed somewhat over the last few years. It has been

perceived that business sector needs more people with wide range of skills and education and in the future even more so. It is hoped that for example purely technology minded people would learn some business skills also. Also synergies have been perceived in organizing courses together. For example University of Helsinki, HUT and Helsinki School of Economics have organized together a minor subject of software business. Another example is the founding of Helsinki Institute for Information Technology, a joint research institute of University of Helsinki department of Computer Science and HUT with about 100 employees. Also departments of economics in University of Helsinki, Helsinki School of Economics and Swedish school of Economics and Business Administration are putting their research units together. Universities and research institutes compete for research funding but they also have joint research projects. For example many Tekes and Academy of Finland projects are large and have many research teams from many institutes and companies working together. There are also plans for the “science line”, a bus route that would connect the campuses in Helsinki region to help students, teachers and researchers move between different universities.

## **5. Confrontation with the framework of reference**

In this chapter we present and test our hypotheses. These are hypotheses on cluster specific conditions, organizing capacity and general conditions. To call these chapters as tests of hypotheses is somewhat misleading as we don't have enough data with what to test and the hypotheses themselves do not present clear assumptions in quantitative way. These “tests” simply concern looking at the adopted assumptions in the light of the opinions brought up in the 25 interviews. The hypotheses are based on previous work by van den Berg et al. (1997).

### **5.1 Tests of the hypothesis concerning cluster specific conditions**

We assume that there are cluster-specific conditions that influence the development of the cluster in an urban region. Of these the first relevant aspect is initial size and development of the cluster. Hypothesis one is that *the initial size and previous development of the cluster influence the present development of the cluster*. This hypothesis receives support in the interviews. Many of the interviewees pointed that critical mass is essential for success of cluster and that in Helsinki region this mass exists. Critical mass means that market is large enough to support specialist activities such as ICT specialised law, marketing, accounting and consulting services. Others mentioned as a benefit the transfer of knowledge from company to company through shared pool of labour. ICT employees switch jobs at high pace and thus they transfer knowledge. In large cluster there are enough highly skilled people for most companies to get part of this resource. Also all the partners one could think of and all the normal components of relevant activities are found in the area. Sometimes it could be easier to find a partner from a smaller pool of potential partners but bigger pool guarantees that a suitable partner exists.

Hypothesis two is that *the presence of one or more cluster engines is a determinant of a cluster's functioning*. Also this idea is supported by the interviews. In Helsinki region the presence of

Nokia has clearly been and still is a determinant of cluster's functioning and it has made the cluster more successful and in fact the cluster has evolved around it. Among the many benefits that Nokia gives to cluster are international image. It also acts as main customer for many smaller firms, it transfers technology to the cluster as spin-offs and it trains employees to do international business, further transferring this knowledge to cluster through job switchers.

Third hypothesis is that *the degree of strategic interaction is largely decisive for cluster's performance*. This hypothesis is also supported by the interviews although we have no ways to measure the degree of this interaction or exactly compare it with other clusters. It came up in the interviews that networks within and between the actor groups are very important. Sub-contracting enables companies to concentrate on their core business and specialisation increases the effectiveness of cluster. Co-operation increases customer base as larger and more difficult projects can be done together for more demanding customers. Co-operation also transfers knowledge between universities and research institutes and companies. These are just some of the mentioned benefits.

The fourth and the last hypothesis concerning cluster specific conditions is that *the level of new firm creation is important to the cluster* and thus policies aiming at increasing new firm creation are beneficial to the cluster. The statistics concerning start-ups were presented in chapter 3.1.3. It was shown there that ICT start-ups are more common than start-ups in other industries and that in Helsinki region ICT start-ups made up a large share of all start-ups. Many of the interviewed public sector and knowledge institute representatives agreed to the importance of start-ups as creators of new innovations, jobs and technology transfer. There are many policies aimed at promoting start-up activity in Helsinki region. Most of these have been dealt before. The policies were seen as important and mostly effective. Thus we can agree with hypotheses four. However a reservation should be put on this conclusion as most of those who saw the policies as effective were the ones implementing them. Usually the companies had not heard of them or saw them as too slow. Another issue is that the start-up policies, that usually include funding, consulting, contacts etc, use in many ways the same tools that venture capital companies offer to the companies they invest in. Thus it can be argued that if the venture capital market is efficient there is no need for start-up policies.

## **5.2 Tests of the hypothesis concerning organizing capacity**

Organizing capacity is defined as ability of the urban management to enlist all actors involved in the ICT cluster and with their help generate new ideas and develop and implement policy designed to respond to developments and create conditions for sustainable development of the cluster (Van den Berg et al. 1997). Related to organizing capacity our hypothesis is that *well-defined and shared vision and strategy on the development possibilities of a cluster is indispensable for an efficient allocation of resources and efforts to promote the cluster*. We should note here the somewhat problematic nature of the concept, as organising capacity is

somewhat non-operational and practically not measurable, contrary to for example cluster size, start-up rates or presence of cluster engine.

This is the first hypothesis than is not necessary confirmed. What is the role of local government in ICT cluster and what should it be are not easy questions. Many of the interviewed companies saw that the local government should have no special role in ICT sector. The purpose of the municipality is to provide basic infrastructure: if you have a working business what more do you need? And many felt that local authorities should not interfere with doing business. On the other hand many saw for example supporting incubators as good policy. This is not an easy question as the opinions and arguments go both ways. We conclude that organizing capacity is not indispensable for an efficient allocation of resources. It can have some effect but it is not indispensable. The core of the cluster is the private sector and they are the only actors that matter in the end. Of course well planned city ICT strategies can help but they are not decisive. It might be that local policies can be more important in smaller cities or regions. The best policy for a city is to do well its traditional jobs, like city planning, provision of services, infrastructure and education, thus helping the local economy as a whole, not just ICT. That is basically the strategy of Helsinki. On national level the state can provide sufficient inputs in a single sector like ICT. For example Tekes and national educational policies have been important for ICT sector.

Historically public policies have been an important stimulus for the birth of the cluster. Liberalisation of telecommunication markets and active role of state in developing mobile communication paved the way for Nokia's success and thus for the entire cluster. But these things are still public sector's traditional roles in taking care of business infrastructure. One important thing that state and local authorities could do for the development of the cluster is to act as large demanding customer. That would be an important stimulus for birth of new entrepreneurship. Another improvement that many interviewees hoped for was more regional co-operation. Fortunately steps have recently been taken in that direction.

Another hypothesis is that *political and societal support are necessary conditions for cluster policy*. It could not be exactly determined in this study whether there is societal support or not and whether it makes a difference. Overall it was felt that most of the population see the presence of the ICT cluster as a good thing. Political support exists but it does not stimulate much actions. The companies in the sector are not involved in policy making. It seems that city of Helsinki has acted in line private sector's wishes and consequently has not been very active. Thus it seems that the support of private sector is needed to work ICT policies. Public-private partnerships such as Culminatium, Innopoli and Science parks have done efficient work, even though it has been somewhat marginal for the whole development.

### 5.3 Tests of the hypotheses concerning general conditions

The first general condition that we look at is demand conditions. Our hypothesis is that *a strong local or regional demand for the cluster's products is likely to have a beneficial impact on the cluster's development*. This seems to be self evident. Of course local demand has a positive effect on the cluster's development and thus our hypothesis is confirmed. Another question is, how important or essential it is. For example Nokia is a big customer for many firms that are located near it, but for the cluster engine Nokia itself the local demand is largely irrelevant. For the smaller companies local demand is more important, but it still might not be the main reason for location choice. Many interviewed companies did not see it as necessary to locate near customers. Labour availability was often seen as a more important factor.

Secondly we state that *accessibility of the urban region plays role in the development of clusters*. This is supported by our interviews. Good internal transport connections were seen as an important factor in choosing location, as those things are important to ICT sector's most important input, workers. It was also important to have good external connections. Good connection to airport was one decisive factor when foreign side office locations were decided. The opinions that interviewees had on the quality of regional accessibility varied much. It varied from poor to excellent both internally and externally, especially opinions concerning internal accessibility varied hugely. Connections of Helsinki-Vantaa airport were usually thought as good but some also felt that Helsinki is one hour too far from "the rest of the world". Congestion situation in the region is good in international comparison for there is much space. But transport planning officials of the city received much criticism. Public transport systems were generally seen as good but many felt that city planning was purposely hindering private car use, which is essential for doing business, on purpose. Taxi services were seen as excellent. The improvement that most of the interviewees hoped for was the expansion of Metro to Espoo.

The third and last hypothesis on general conditions is that *the quality of in the urban area influences the growth of the cluster*. It is most certainly so. This is again due to the fact that a high quality labour force is the most important input in the ICT sector and thus the most important factor in location decisions. And attracting enough workers to satisfy needs of a large cluster is impossible if the quality of life is low in the region. The quality of life in Helsinki region is thought to be very high. Its strengths are safety, location close to nature, good environment quality, good education and working possibilities as well as good supply of cultural and other services. The biggest weaknesses were high living costs, in particular housing costs, high taxation and cold climate. As one interviewee put it: it is hard to get foreign employees as we have lower salaries, higher taxes and things cost more than abroad. The biggest challenge to local municipalities is housing. Local authorities are aware of this but there is no apparent solution.

## 6. Conclusions and policy recommendations

There is a large and successful ICT cluster in Helsinki region. It amounts to about half of the total ICT sector in Finland in many measures. The ICT cluster is very important for the region's economy. Besides describing the cluster, this study has tried to come up with lessons that (local) government could use to promote the success of the cluster. The following conclusions are based on the opinions that came up in the 25 interviews made in this study.

The future of the cluster is likely to be bright although it is not anymore or will easily be a global leader. The sector's dependency on Nokia is not a risk in a long run as know how remains in Finland regardless of decisions of Nokia. There is a critical mass present and thus the cluster develops on its own. Nevertheless there are some things that the public sector should look at.

Human resources are the most important input in ICT sector and thus for most of the interviewed companies the local education was the most important reason for locating in the region. The local education infrastructure is of high quality, and the foremost educational institute in its importance to the ICT sector is Helsinki University of Technology. The lessons that were learned in this study are that education institutes should utilise private sector more as lecturers for example. Also the supply of high quality work force is still lower than demand. Supply can be increased domestically or by attracting foreigners. There are problems with increasing the amount of ICT students as it will affect the quality of student material, and thus job seekers become more varied in their skill level, which in turn increases the search costs of labour. This problem is bigger with polytechnics. The problem with universities is the lack of training in commercial skills and project management. One other problem with the education sector in general is the difficulty of attracting good teachers because public sector wages cannot compete with those of the private sector. In attracting students and work force abroad, the biggest problems are climate, bureaucracy and taxation. The government should make it easier for all workers and especially ICT workers outside EU to come to Finland.

National public actors are more important from cluster's point of view than the local ones. Especially Tekes is very important and its funding should be secured also in the future. Tekes should fasten its decision making process. According to the interviews, local actors do not necessarily need a specific ICT strategy. Although for example incubators are useful, they can be private and more importantly, policies that promote the entire business sector also help ICT sector and are more important for it. The traditional ways of local policy such as city planning, taking care of infrastructure, services, education etc. are still most important. The Metro line should be expanded to Espoo. Insufficient housing also hinder cluster's development but that problem is generally recognised.

Recent measures for increasing regional co-operation are very welcome and those activities should be developed further. Regionally local municipalities and other public institutions form together an actor big enough to influence the development of the cluster significantly. It would

also benefit the cluster if public actors would develop a courageous and innovative ICT consumer strategy, considering their own role as consumers. That could create new entrepreneurship. Also the public purchasing processes of ICT products should be made simpler, as it is difficult at present for the smaller companies to participate in these processes.

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[www.sitra.fi](http://www.sitra.fi)

## Annex 1. The interviews

Table 1.1 Interviewed companies.

Net sales are in EUR 2001 millions and share of exports is shown in parentheses. Number of employees is shown as Helsinki region/ Finland/ Total if necessary (if only one figure all are in HR). Includes possible subsidiaries. The share of higher university educated employees is in the parentheses.

| Interviewee                                  | Company                 | Activities                | Net sales               | Nro of employees                       |
|----------------------------------------------|-------------------------|---------------------------|-------------------------|----------------------------------------|
| CEO Jyrki Narvanto                           | Baycom Oy               | Sales (Telecom)           | 1,5 (0 %)               | 20 (0 %)                               |
| Sales manager Jari-Heikki Laine              | DMT Computer Finland Oy | Sales (Hardware)          | 4 (0 %)                 | 10 (0 %)                               |
| Investment director Jari Miekonen            | Eqvitec Partners Oy     | Venture Capital           | 260 (fund)<br>(a. 15 %) | 18 (100 %)                             |
| Vice President, Corp. Comm. Jyrki Antikainen | Elisa Communication Oyj | Telecom services          | 1400<br>(under 5 %)     | 6000/<br>7300/8200<br>(14 %)           |
| CEO Sami Ensio                               | Innofactor Oy           | Software business         | a. 0,83<br>(a. 15 %)    | a. 20 (20 %)                           |
| General partner Artturi Tarjanne             | Nexit Ventures Oy       | Venture Capital           | 100 (fund)<br>(a. 30 %) | 12 (a. 70 %)                           |
| Competence strategy manager Pekka Heinonen   | Nokia Oyj               | Telecom manufacture       | 31191<br>(98,5 %)       | a.10000<br>/23654 /57716<br>(majority) |
| Division director Kimmo Koivisto             | Novo Group Oyj          | IT services               | 295                     | a.1200<br>/2270/2400                   |
| Senior Partner Juha Wilén                    | Planet Logistics Oy     | Logistics consulting      | a. 0,5<br>(70 %)        | 4 (25 %)                               |
| General Manager Timo Knuutila                | Spirea Ab               | Semiconductor development | 0                       | 6 (only subsidiary)<br>(100 %)         |
| Director of Technology Ilkka Hiidenheimo     | Stonesoft Oyj           | Software business         | 54 (98 %)               | a.150/210 /350<br>(majority)           |
| Director of Technology Petri Karjalainen     | Talentum Oyj            | Media                     | 106,7 (0 %)             | a.900/1000+<br>(over 30 %)             |
| CEO Matti Nieminen                           | Tietoespecialistit Oy   | Software services         | a. 0,33<br>(0 %)        | 4 (25 %)                               |
| CEO Samuli Rauhala                           | Usercom Finland Oy      | Marketing                 | a. 0,66 (not much)      | 6 (0 %)                                |
| Jussi Autere                                 | VDSL Systems Oy         | Hardware manufacture      | a. 1<br>(a. 90 %)       | a. 55/55/57<br>(a. 50 %)               |

Table 1.2. Interviewed knowledge institutes and public sector organizations.

| <b>Interviewee</b>                                                    | <b>Organization</b>                                    | <b>Activities</b>                                                               | <b>Budget EUR<br/>2001 millions</b> |
|-----------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------|
| CEO Eero Holstila                                                     | Culminatium Oy                                         | Carry out Cente of Expertise Program                                            | 2                                   |
| Business development manager Kari Ruoho                               | City of Espoo<br>Business Development Unit             | business development                                                            |                                     |
| Business development manager Nyrki Tuominen and Ombudsman Urmas Aalto | City of Helsinki<br>Business Development Unit          | business development                                                            |                                     |
| Professor Eero Hyvönen                                                | Univ. Of Helsinki,<br>Dep. Of Computer Science         | Education and research                                                          | 6                                   |
| CEO Ilpo Santala                                                      | Innopoli Oy                                            | Real estate company,<br>business generator                                      | 4,7                                 |
| Project manager Tero Kuitunen                                         | Ministry of Trade and Industry                         | Responsible for operation conditions of enterprises etc.                        |                                     |
| Project manager Tarmo Lemola                                          | Ministry of Trade and Industry                         | Responsible for operation conditions of enterprises etc.                        |                                     |
| Division director Kari Kankaala                                       | Sitra                                                  | Foundation                                                                      | 64 (funding)                        |
| Technology director Eero Silvennoinen                                 | Tekes                                                  | R&D financing                                                                   | 387 (funding)                       |
| Project manager Marja Toivonen                                        | Employment and Economic Development Centre for Uusimaa | create sustainable growth, profitable business activities and job opportunities |                                     |

## **Annex 2. The lines of businesses belonging to the ICT business sector**

### 1A. Hardware:

- 30 Manuf. of office machinery, computers and other information processing equipment
- 313 Man. of insulated wire and cable
- 321 Man. of electronic valves and tubes and other electr. components
- 322 Man. of TV and radio transmitters and apparatus for line telephony and line telegraph
- 725 Maintenance and repair of office, accounting and computing machinery

### 1B. Hardware:

- 323 Man. of TV and radio receivers, sound or video recording or reproducing apparatus
- 332 Man. of instruments and appliances for measuring, checking, testing, navigating and other purposes expect industrial process controlling
- 333 Man. of industrial process control equipment

### 2. Telecommunication:

- 642 Telecommunications

### 3. Software:

- 721 Hardware consultancy
- 722 Software consultancy and supply
- 723 Data processing
- 724 Data base activities
- 726 Other computer related activities

### 4A. Content:

- 221 Publishing
- 744 Advertising
- 921 Motion picture and video activities
- 922 Radio and television activities
- 924 News agency activities

### 5. Other services

- 5143 Wholesale of electrical household appliances and radio and TV goods
- 5165 Wholesale of other machinery for use in industry, trade and navigation

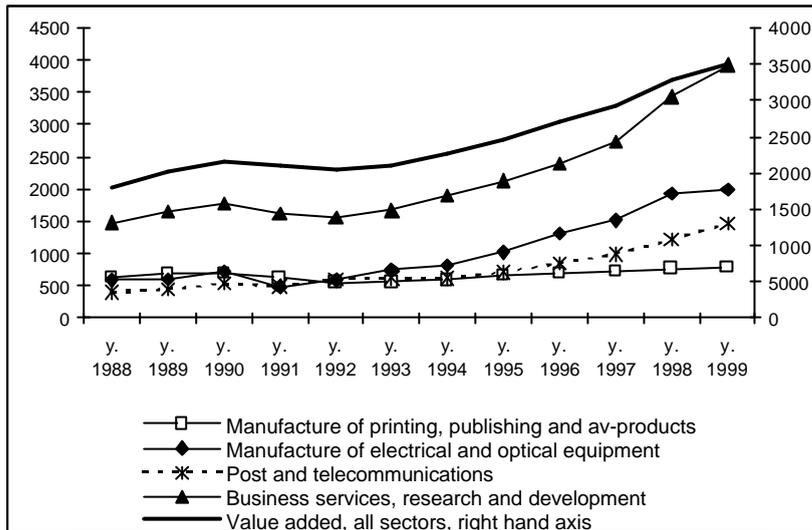
- 7133 Renting of office machinery and equipment including computers
- 7414 Business and management consulting activities

6. Research and development

- 731 Research and development on natural sciences, engineering and technology
- 732 Research and development on social sciences

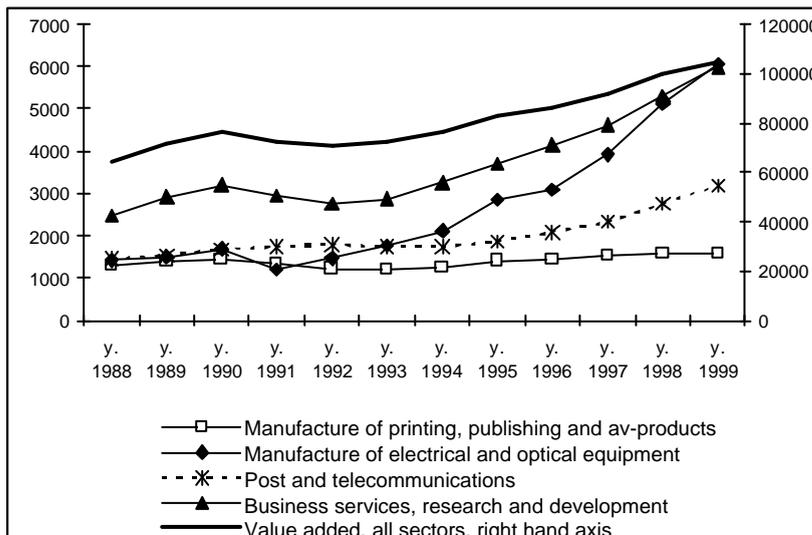
**Annex 3. Additional charts describing the ICT sector**

Chart 3.3. Value added (millions of euros, current prices) of ICT related sectors (left hand axis) and all sectors (right hand axis) in Helsinki region 1988-99.



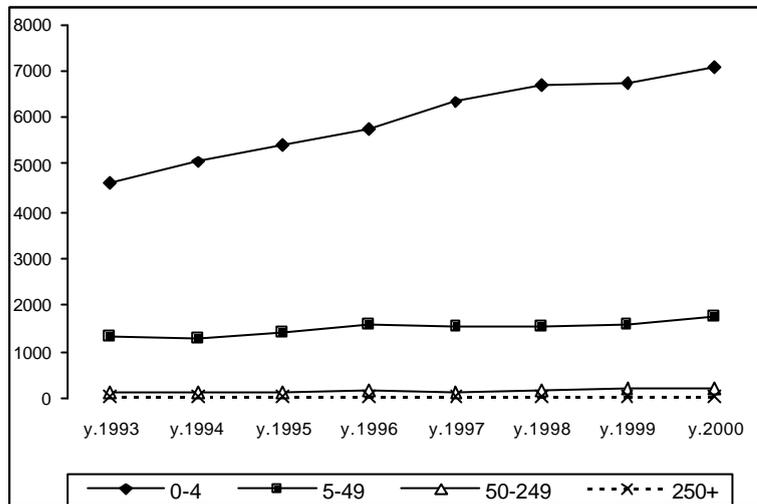
Source: Statistics Finland

Chart 3.4. Value added (millions of euros, current prices) of ICT related sectors (left hand axis) and all sectors (right hand axis) in Finland 1988-99.



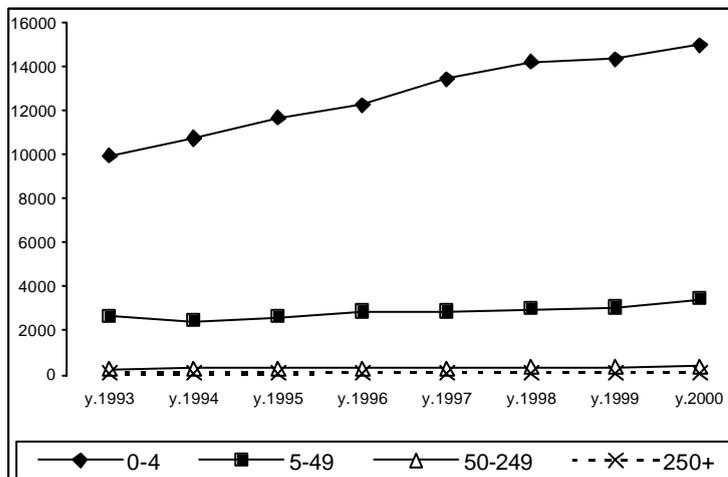
Source: Statistics Finland

Chart 3.7. All ICT plants in Helsinki region by number of employees 1993-2000.



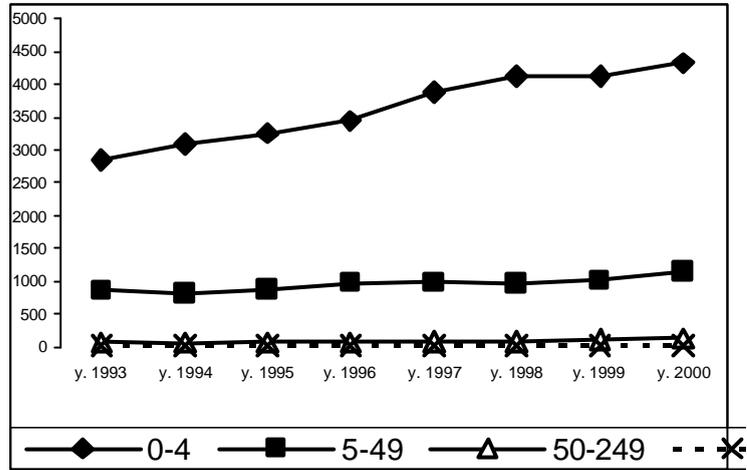
Source: Statistics Finland

Chart 3.8. All ICT plants in Finland by number of employees 1993-2000.



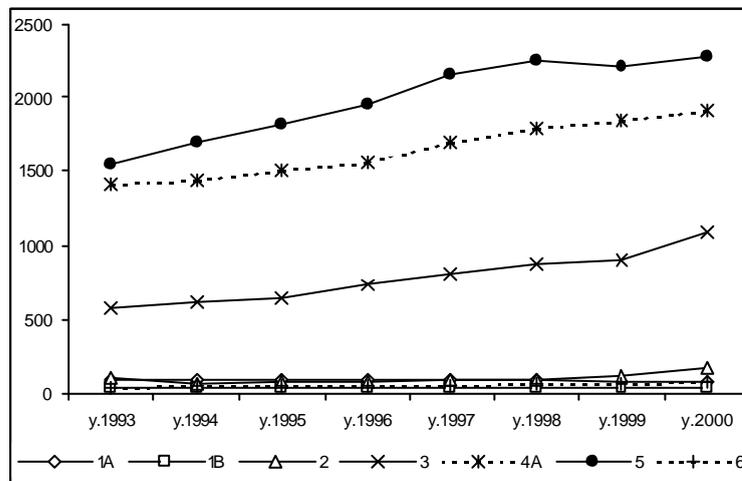
Source: Statistics Finland

Chart 3.9. All ICT plants in Helsinki by number of employees 1993-2000.



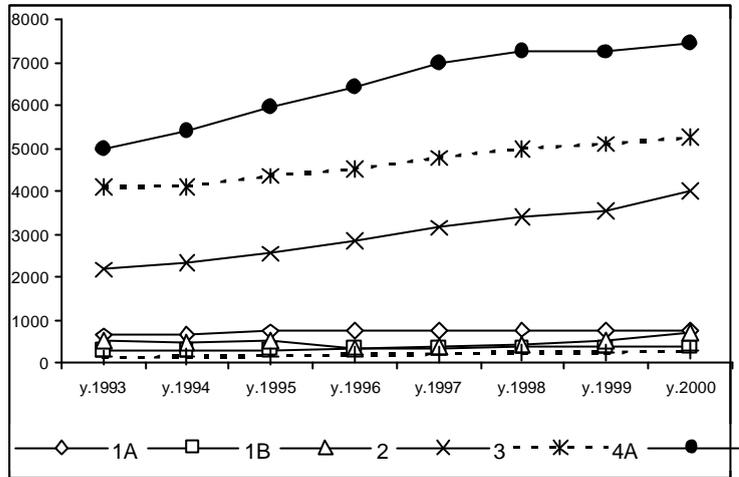
Source: Statistics Finland

Chart 3.11. All ICT plants in Helsinki by lines of business 1993-2000.



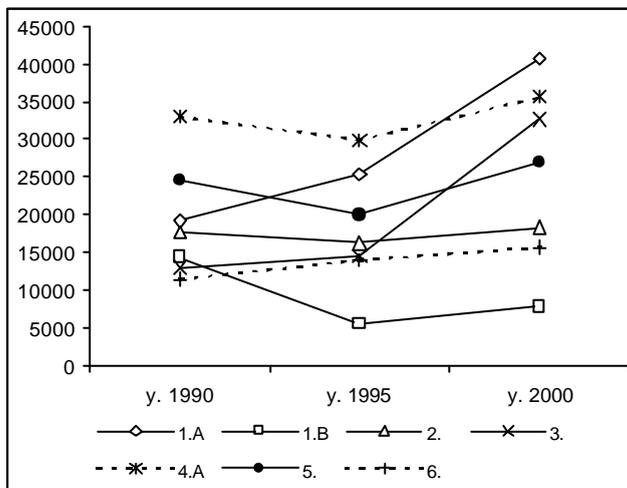
Source: Statistics Finland

Chart 3.12. All ICT plants in Finland by lines of business 1993-2000.



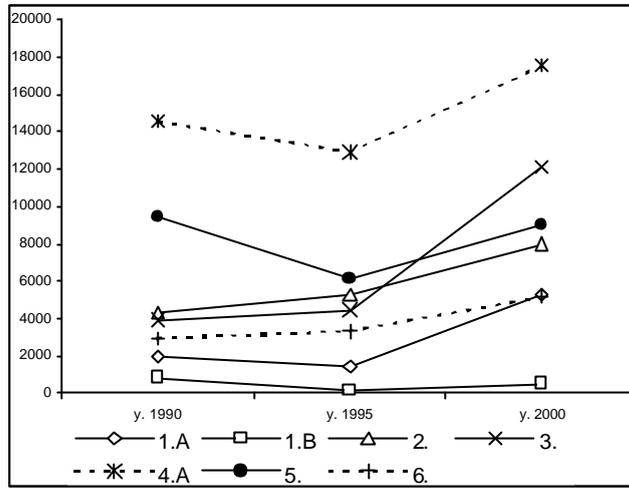
Source: Statistics Finland

Chart 3.14. Number of employees in different ICT sectors in Finland.



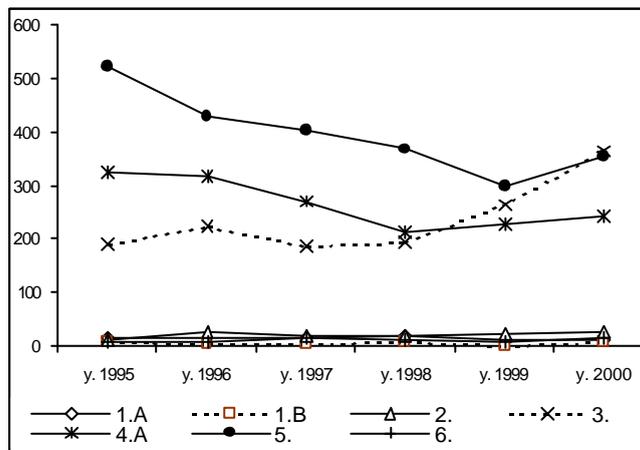
Source: Statistics Finland

Chart 3.15. Number of employees in different ICT sectors in Helsinki.



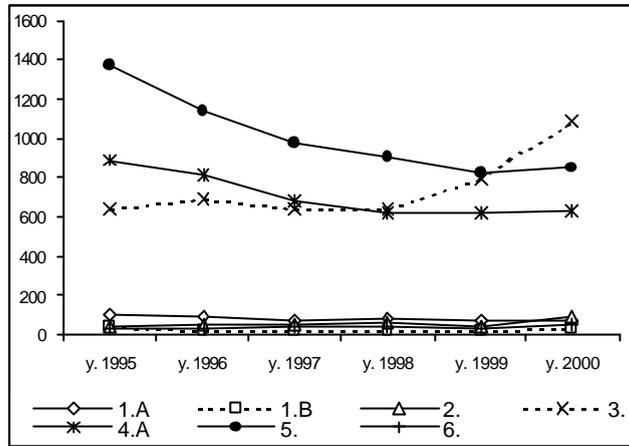
Source: Statistics Finland

Chart 3.21. All ICT start-ups in Helsinki by lines of business 1995-2000.



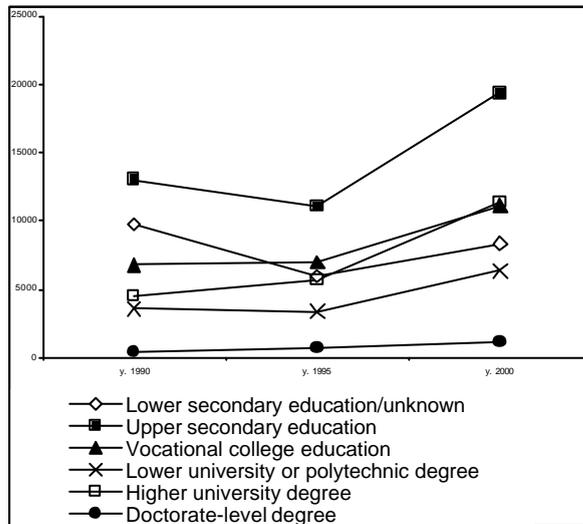
Source: Statistics Finland

Chart 3.22. ICT start-ups in Finland by lines of business 1995-2000.



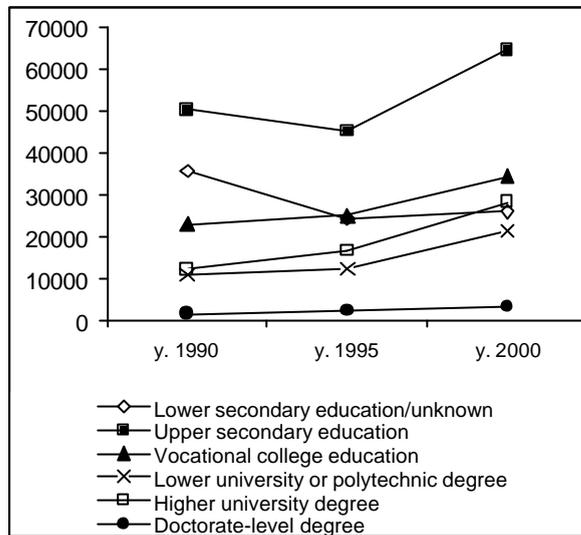
Source: Statistics Finland

Chart 3.32. Number of employees in all ICT sectors by education level in the Helsinki.



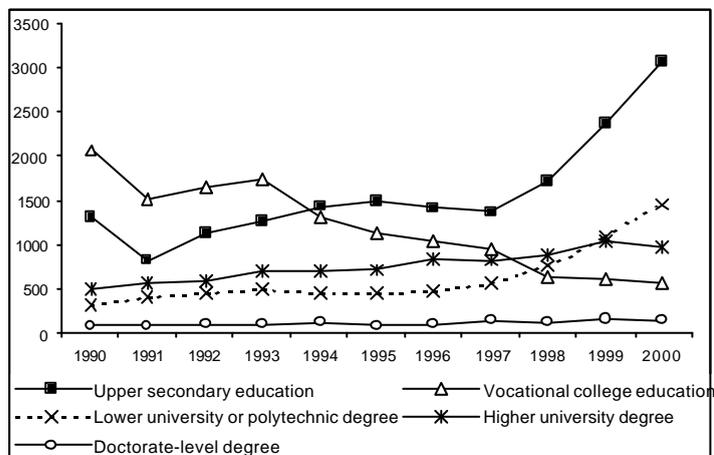
Source: Statistics Finland

Chart 3.33. Number of employees in all ICT sectors by education level in the Finland.



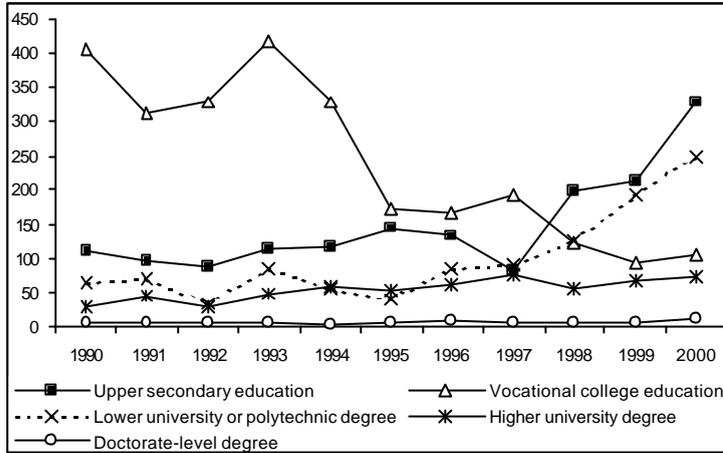
Source: Statistics Finland

Chart 3.34. IT-graduates in Finland 1990-2000.



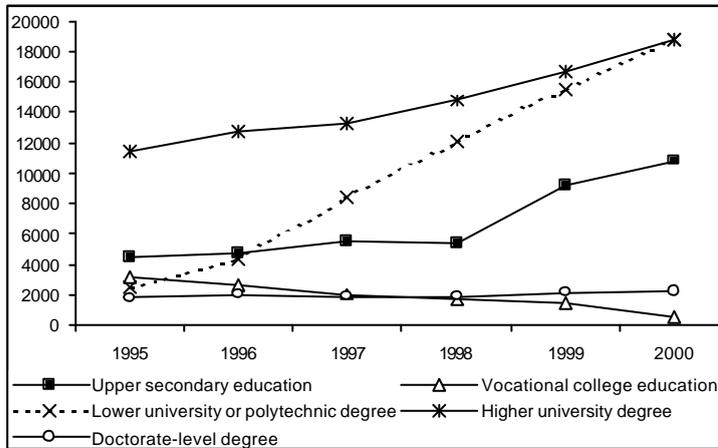
Source: Statistics Finland

Chart 3.35. IT-graduates in Helsinki 1990-2000.



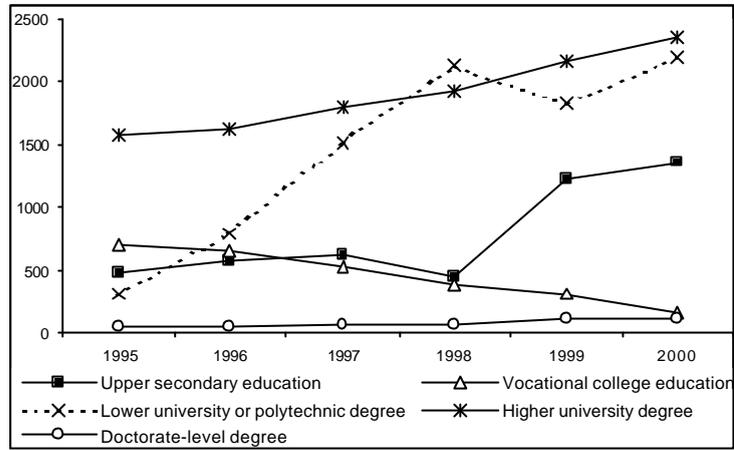
Source: Statistics Finland

Chart 3.36 IT-students in Finland 1995-2000.



Source: Statistics Finland

Chart 3.37 IT-students in Helsinki 1995-2000.



Source: Statistics Finland