Statistics Finland

On the Road to the Finnish Information Society IV

On the Road to the Finnish Information Society IV

Statistics Finland
2004

Inquiries:

Mervi Niemi
+358-9-17 341
mervi.niemi@stat.fi

Cover photograph: Getty Images

Layout: Hilkka Lehikoinen

ISBN 952–467–265–0

Edita Prima Oy, Helsinki 2004

Foreword

On the Road to the Finnish Information Society IV is the fourth compilation volume to be published by Statistics Finland on the subject of the information society. The present publication uses data produced by Statistics Finland and by diverse other bodies concerning the development of the information society.

In the light of a number of indicators, development of the information society was rapid in Finland in the 1990s. The information sector expanded, the diffusion of mobile phones, computers and Internet connections was quick and the adoption of information society skills was supported by increased provision of education in the field. This fast development has in many respects moderated since then.

The information society is a globally important subject, whose development is monitored and scrutinised on a variety of fora. The information society extends to all areas of society – it is not an isolated part of social development but a phase of it. Themes associated with legislation and improvement of communications, and questions linked with data security can be attached to it.

This publication exploits statistical data to describe the latest trends in the development of the information society in Finland while at the same time continuing the times series Statistics Finland has previously published on its progress so far. The publication extends to several topics and areas of society. It examines the technical and human infrastructure of the information society, business, production and employment in the information sector, use of information technology in working life and its impact on productivity, and the way the Finns make use of information and communications devices and the services they facilitate.

Statistics Finland express their gratitude to all who have provided material for this publication or otherwise helped in its production.

Helsinki, December 2003

Kaija Hovi
Director, Business Structures

On the Road to the Finnish Information Society IV was produced by a large number of people. Except for Chapter 6 the authors work at Statistics Finland.

Lea Parjo produced the Sections concerning the different facets in examinations of the information society (1.1) and on the international framework for statistics on the information society (1.2). Mauri Nieminen wrote the Chapter concerning population development (2). The authors of the Section on education and employment (4.1) were Ritva Kaukonen and Tarja Ylipekka while the one on training provided by enterprises (4.2) and on the importance of literacy in the information society (4.3) were written by Tarja Seppänen. Tero Luhtala is responsible for Section 5.3 depicting research and development expenditure. Changes in employment in the information sector (Section 7.1) have been described by Jari Tarkoma, and Pekka Myrskylä wrote the Section on employment in the information sector (7.3). Salme Kiiski produced the Chapter on changes in working life (8) while Marko Ylitalo wrote the one on the use of information and communications technology at work (9). Aarno Airaksinen is responsible for the Chapter on information technology and e-commerce in enterprises (10). Virpi Minkkinen wrote the Section on library services (11.2) and Tuomo Sauri the one on digital mass media (11.3). Lea Parjo and Juha Nurmela take the responsibility for Chapter 12 on Finns and information and communications devices.

Jukka Jalava, Researcher at the Helsinki School of Economics and Business Administration, wrote the Section on the impact of information and communications technologies on productivity (6.1), while Mika Maliranta, Head of Unit at the Research Institute of the Finnish Economy, ETLA, and Petri Rouvinen, Research Director at Etlatieto Oy, a research and information services subsidiary of, are responsible for the Section on information and communications devices as source of social wealth (6.2).

The publication was compiled by Mervi Niemi who is also responsible for the texts other than those listed above. Kari-Pekka Niemi gathered and updated the data and produced the publication's tables and graphics.

Contents

Explanation of symbols

– Magnitude nil
.. Data not available or too uncertain for presentation
* Preliminary data

1 Introduction

1.1 Facets in examinations of the information society

Although the information society – as the phrase by which this phenomenon has been referred to in Finnish debate in the past couple of decades – has stayed conceptually the same, it has undergone quite a few changes in terms of its content, with shifts of emphasis from one aspect to another over time. One reason for this is that the English language words data, information and knowledge all translate into a single Finnish word. In the 1970s, discussion about the information society related strictly speaking to the knowledge society, putting emphasis on the education, new knowledge and learning that affect economic activity and competitiveness. However, in the 1980s, the same phenomenon was examined from a highly technical perspective – not yet from that of information society but from a pure information technology aspect. Computers began to be used for other things besides mathematical calculations. Their processing capacities increased and personal workstations and PCs invaded offices and production plants.

This underscoring of technology continued throughout the 1990s, at the same time as mobile phones and Internet use made their breakthrough. Finland's economy was driven by the production and foreign trade of information technology. The activities of enterprises operating in the field were monitored intensively. Towards the end of the decade, interest also began to focus on the everyday use of information technology – on equipment penetration. Indicators for measuring the development of economy and equipment stock were developed in international statistical co-operation. The English-language Information Society framework of reference received the follow-up concept of Knowledge-Based Economy. A policy of the European Union – The Information Society for Us All – also underlines that the information society concerns all citizens.[1] The 1970s meaning of the information society was not forgotten in Finland, however, and the term "society of knowledge and skills" was simultaneously referred to in debate.

At the onset of the 2000s, the emphasis began to move increasingly on competence, or knowledge and learning. All citizens should possess

1 Green Paper 'Living and working in the information society: people first', European Commission, July 1996 and Building the European Information Society for Us All, European Commission, 1997.

information society skills. Production, job generation and foreign trade in information technology remained important description topics, but at the same time interest also arose in the usage of information technology – who uses it, for what purpose and how often. Studies conducted in 2003 and ongoing development projects focus on the impacts of information technology on productivity, business practices, purchasing behaviour, social networks, and so on.

In Finland, as well as in the other Nordic countries, social impacts were incorporated into information society policies from quite early on, although the main interest initially lay with technology and economic effects. The target of the Ministry of Education's Information Strategy for Education and Research 2000–2004 is to make Finland into one of the world's leading competent and interactive societies.[2] The "Citizenship Skills in the Information Society" project sets out from the premise of a learning civic society, where the objectives are bringing the acquisition of sufficient information society skills within reach for all citizens, and motivation and encouragement of the citizens to utilise these possibilities in the way that best suits their own life situation.

In the information society, citizenship skills must meet the needs of a networking, constantly changing and globalising way of life. The "Citizenship Skills in the Information Society" project has categorised these skills as follows:

1. Technical skills,
2. Communication skills,
3. Skills in acquiring and using information,
4. Consumer skills, and
5. Influence on information society policy.

Among the topics that connect closely with the debate about information society are the new economy, digital economy, Internet economy, virtual society, network economy and network society, in all of which information and communications technology plays a central role although the perspectives of examination may vary.

2 Ministry of Education (1999).
http://www.minedu.fi/julkaisut/pdf/tietostrategia/toimeenpanosuunnitelmaENG.pdf

1.2 International framework for statistics on the information society

United Nations

At the global level, the United Nations has been drawing attention for some considerable time now to the digital divide that has opened up between the industrialised and developing countries. The UN and its specialised agencies have been organising summits around the information society theme since the turn of the millennium. Of these agencies, the Educational, Scientific and Cultural organisation, UNESCO, the International Telecommunication Union, ITU, the World Health Organisation, WHO, and different Regional Economic Commissions have produced reports on the development of the information society or at least on the global utilisation of information and communications technology. The UN also ratifies recommendations in the field of statistics, and the industrial definition of the ICT sector has been endorsed by it.

OECD

Research conducted by the Organisation for Economic Co-operation and Development, OECD, into the impacts of information and communications technology on economic growth and productivity contributes decisively to the description of the information society. Further topics of their studies include the social effects of information and communications technology and the measurement of human and social capital. Skills and competence are the prerequisites to the ability to function, as well as to social development, in an information society. Risks of exclusion from the information society are analysed with the concept of digital divide. The OECD plays an important role in clarifying concepts for statistics on the information society and in harmonising statistical surveys concerning the use of information technology. A uniform battery of questions is now available for business and household surveys on ICT, a recommendation, now also endorsed by the UN, is available for defining the ICT sector, a harmonised classification key exists for ICT goods, and discussion about defining the information sector is ongoing. Thus, the national statistical institutes in the USA, Japan, Australia and Europe can produce comparable data. The upcoming areas of emphasis for the Working Party on Indicators for the Information Society (WPIIS) will be measurement of the impacts from the use of information and communications technology in enterprises and development of a battery of survey questions relating to it, defining of ICT services, and measurement of investments in ICT.

European Commission

In 1999, the Commission of the European Union launched the extensive eEurope project with the aim of bringing the benefits of the information society within reach of all Europeans. The eEurope 2005: An Information Society for All Action Plan is a follow-up to the eEurope 2002 Programme, adopted at the Feira European Council in June 2000. eEurope forms part of the Lisbon strategy for making the European Union the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion by 2010.[3]

The eEurope 2002 Programme has been stated to have increased the numbers of citizens and enterprises with access to the Internet and adapted the regulatory environments for electronic commerce, and for electronic communication networks and services. To create the knowledge-based economy, eEurope 2002 concentrated on increasing Internet connections in Europe. Put succinctly, the aim of the eEurope 2005 Action Plan is that by the year 2005 Europe should be able to offer modern, public network services (more advanced electronic government, learning exploiting ICT, electronic health care services) and a dynamic electronic business environment, facilitated by wide availability of broadband access at competitive cost and by secure information networks. In other words, utilisation of broadband-based information and communication infrastructure to develop secure services, applications and contents with the objectives of improving the European Union's competitiveness and the opportunities of all population groups and areas to participate in the information society.

In Finland, the bodies responsible for the implementation of the measures under the eEurope 2005 Action Plan are the Ministry of Finance, Ministry of the Interior, Ministry of Social Affairs and Health, Ministry of Trade and Industry, Ministry of Education and the Ministry of Transport and Communications.

Eurostat

The task of Eurostat, the Statistical Office of European Communities, is to compile and publish official, harmonised statistics concerning the European Union and the eurozone. Harmonised data on the information society have been collected in connection with surveys concerning the use of ICT in enterprises and households. Many of the indica-

3 European Commission (2002).

tors thus obtained relate to structural indicators and to the eEurope 2005 Programme.

Nordic countries

Besides by similarity of cultures, Nordic statistical co-operation is also strengthened by long, shared statistical traditions. In the Nordic welfare states, comprehensive public services and social security systems are principally maintained with tax revenues, with the objective of guaranteeing all citizens equal rights to certain services. The same principle is also applied to the ability to perform in the information society and exploit its services. Out of common interest, the Nordic statistical institutes have also made considerable input into the monitoring of the progress of the information society and into the development of reporting methods. They have been producing joint reports on the use and economic importance of information and communications technology since 1998. Recent development efforts have focused on methods for measuring the use of information and communications technology in the public sector.

Finland

The Programme of the 2nd Government of Paavo Lipponen (1999–2003) was the first Finnish government programme to address the information society extensively as one entity and set central targets concerning it. In its last report, the National Information Society Advisory Board listed [4] the central objectives as strengthening of technology policy, knowledge and competence, and improvement of conditions for content production. As the matters that must be addressed it quoted electronic communication with public authorities, bringing information society services within reach of everybody and introduction of new technologies in both the public and the private sector.

The Government Strategy Document serving the implementation and monitoring of the programme of the Government in office (Vanhanen 2003–) contains four intersectoral policy programmes, one of which concerns the information society. The aim of the programme is to boost competitiveness and productivity, to promote social and regional equality and to improve citizens' well-being and quality of life through effective utilisation of information and communications technologies. The Information Society Policy Programme aims to maintain Finland's status as a leading producer and user of information and communications technology. The programme is used for co-ordinating

4 Ministry of Finance (2003).

the central government's own measures horizontally to ensure that their implementations do not overlap or conflict with each other.[5]

Statistics Finland

Statistics depicting the special characteristics of the information society can be produced by reclassifying data already collected for other statistical purposes. For example, certain groups in the standard industrial classification form the ICT sector and certain codes of the standard classification of education are considered to represent education in the information technology and media field. Statistics Finland participates in the delineation of these within the framework of the OECD, amongst others. Only data that cannot be reliably obtained from other sources are collected separately. Examples of this would be an inquiry conducted among enterprises concerning their use of the Internet and e-commerce, and a survey concerning the use of information technology among the population. Even these surveys are developed in international co-operation, yet bearing in mind special, domestic needs. Fresh data are constantly required on rapidly developing phenomena and even aggregation of data can be used to gain insight into the impacts of the information technology on productivity.

The research project "The Finns and the Future Information Society", which was started in 1996, produced data on how well people in Finland were equipped with the skills needed in an information society, as well as on experiences in the use of information technology. The project was followed up by interview surveys conducted in 1999 and 2002. Six-monthly reports have been produced since autumn 2000 on Finnish consumers' distance shopping, including online purchases via the Internet. In addition, the development of equipment stock in households has been monitored quarterly with Statistics Finland's Consumer Survey. The responsibility for the production of Telecommunications Statistics was assigned to Statistics Finland at the beginning of 2003. The framework of official statistics allows for diversified reporting about the evolution of the information society in Finland.

This publication neither analyses any future visions of the information society, nor any possible associated threats, or success criteria or social policy lines for the information society, but depicts the development and state of the society and especially the information society in Finland in the light of statistics.

5 Prime Minister's Office (2003).

1.3 Statistical perspective on the information society – definition of the information sector

The first international recommendations for a definition of goods and services production in the information sector were issued by the OECD towards the end of the 1990s. Some internationally comparable data concerning the development of the information society are already available, and work on harmonising national data and increasing comparable data is ongoing. Absence of definitions poses a crucial problem when statistics are to be compiled on a phenomenon. Precise definitions and concepts are the foundation on which harmonised statistics can be built, but their construction is often very difficult and time consuming work.

Statistics Finland launched a project to develop a statistical system for describing the information society in 1996 and the first statistical report from the project "On the Road to the Finnish Information Society" was published in spring 1997. "On the Road to the Finnish Information Society II" came out in summer 1999, and this was followed in 2001 by the third report in the series, "On the Road to the Finnish Information Society III", to which this compilation report is a further sequel.

The publication in hand adheres to the concepts and definitions used in Statistics Finland's previous publications depicting the information society. The information sector is comprised of the ICT sector (ICT = information and communications technology) and content production. When the economic impacts of ICT are combined with the information sector, this is referred to as the information economy. The information economy and the social impacts of ICT together form the information society.

Part of an international recommendation has been drawn up for the information sector. The OECD has confirmed the branches to be used in describing the production of goods and services in the ICT sector[6]. Like Statistics Finland's previous publications on the information society, the present publication follows this OECD definition, according to which the production of goods and services comprises the following branches[7]:

6 See e.g. OECD (2002).
7 Standard Industrial Classification 1995 (SIC 95, Statistics Finland (1993)).

Production of goods

3001 Manufacture of office machinery
3002 Manufacture of computers and other information processing equipment
3130 Manufacture of insulated wire and cable
3210 Manufacture of electronic valves and tubes and other electronic components
3220 Manufacture of television and radio transmitters and apparatus for line telephone and line telegraphy
3230 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
3320 Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
3330 Manufacture of industrial process control equipment

Production of services

51432 Wholesale of radio and television goods
51641 Wholesale of computer hardware
51652 Wholesale of telecommunications equipment and electronic components
642 Telecommunications[1]
7133 Renting of office machinery and equipment including computers
72 Computer and related activities

1 The OECD definition of ICT service production embraces activity 642 Telecommunications. In countries where telecommunications transmission activities are included as part of radio and television activities, activity 922 should also be included in the definition.

The OECD recommendation does not yet cover information and content production, so the present publication uses a definition that was in use in Finland earlier, in which the following content production activities also come under the information sector:

Content production

221 Publishing
7413 Market research and public opinion polling
7414 Business and management consultancy activities
744 Advertising
921 Motion picture and video activities
922 Radio and television activities
924 News agency activities

At times the information sector needs to be described in broader terms and in these cases the definition is also extended to the following content production activities:

In addition, the broadly defined information sector contains the following content production branches

222	Printing and service activities related to printing
223	Reproduction of recorded media
73	Research and development
71401	Renting of videotapes
7483	Secretarial and translation services
(923	Other entertainment activities)
(925	Library, archives, museums and other cultural activities)

The information sector mainly refers to branches involving the production of goods, services and content, although in some employment examinations it may be preferable to talk about the broadly defined information sector. Where such an approach is adopted, it is indicated separately. The broadly defined information sector may also contain libraries that provide information services, etc., as no established definition exists for it. From the national perspective, it is of course also possible to monitor trends in any branch that is of interest or can be justifiably claimed to come under the described topic.

Industrial products typical of the information society are defined here according to the criteria of a draft recommendation of the OECD. However, the draft has not been officially approved as yet. The main groups of these products are communications equipment, consumer electronics, computers, office machinery, industrial electronics and electronic components. The categories are listed in more detail in an appendix to Chapter 5.

1.4 Statistical data on the state of the information society

After the recession of the early 1990s, Finland's economy grew strongly throughout the latter half of the decade. Output went up, the rate of unemployment that had soared to nearly 20 per cent in the early 1990s fell, and international comparisons ranked the country's

competitiveness among the best in the world. At the same time, the information society was evolving fast, and Finland was even viewed as the global frontrunner in the development of the information society. The ICT sector was a major contributor to the positive economic development, the diffusion of mobile communications equipment and Internet access was rapid, and opportunities for information technology and media studies were increased – to quote just a few examples depicting this development.

What is the state of the Finnish information society after the turn of the millennium?

Demographic development sets its own challenges to society, its progress and the measures that are to be implemented in it. Chapter 2 of this publication presents an overview of the population structure and demographic development in Finland. Chapters 3 and 4 describe the infrastructure of the information society, first from the technological perspective and then from the human angle, examined against data on information technology and media studies and on employer-sponsored personnel training. Chapter 5 examines entrepreneurial activity, production and foreign trade in the information sector, as well as investments into research and development while Chapter 6 focuses on the impacts of the information and communications technology on productivity and efficiency. Employment and jobs in the Finnish information society are studied in Chapter 7.

The economic importance of the information technology branches is growing and the use of information technology is increasing in working life. Chapter 8 discusses the changes that have happened in working life. The use of information technology at work is examined in Chapter 9, while Chapter 10 studies its use in enterprises, and e-commerce. Chapter 11 considers public administration, library, mass media and banking services. Topics studied in Chapter 12 include diffusion of the usage of information and communications equipment among ordinary people in Finland.

Sources

European Commission (2002), eEurope 2005: An Information Society for All, Action Plan presented to the Seville European Council, 21–22 June 2002, Brussels 28 May 2002

European Commission (1996), Green Paper "Living and Working in the Information Society: People First", COM(96)389, July 1996

European Commission (1997), Building the European Information Society for Us All

Ministry of Education (1999), Information Strategy for Education and Research 2000–2004 Implementation Plan, www.minedu.fi/julkaisut/pdf/tietostrategia/toimeenpanosuunnitelmaENG.pdf

Ministry of Finance (2003), On the development of the information society during Prime Minister Paavo Lipponen's Second Government, Report of the Information Society Advisory Board to the Finnish Government, 11 December 2002, Helsinki, (in Finnish only)

OECD (2002), Measuring the Information Economy 2002, Paris

Prime Minister's Office (2003), Government's Strategy Document 2003, Government's intersectoral policies and programmes, Helsinki

Statistics Finland (1993), Standard Industrial Classification 1995, Handbooks 4, Helsinki

Statistics Finland (1997), On the Road to the Finnish Information Society, Helsinki

Statistics Finland (1999), On the Road to the Finnish Information Society II, Helsinki

Statistics Finland (2001), On the Road to the Finnish Information Society III, Helsinki

Statistics Finland (2002), Standard Industrial Classification 2002, Handbooks 4, Helsinki

2 Population growth in Finland slowing to a halt – the population is ageing

- The Finnish population is ageing – age groups over 65 are growing rapidly.
- People are moving in ever greater numbers to large population centres.
- Finland's birth rate has long been low – labour is needed from foreign countries.

Population number and structure are both important factors from a social development point of view. Population growth has often been considered an important social policy objective: the thinking has been that economic growth is not possible without population growth. Hence the vicious circle: economic growth requires population growth, and the growing population requires economic growth.

However, population trends in different countries over the past few decades lend only partial support to this theory of a vicious circle. In industrial countries economic growth has occurred during a period of slowing population growth. At the same time increasing automation has reduced the need for labour. On the other hand, many countries have needed immigrants to compensate for the labour shortage resulting from the population structure. Sweden and Germany are two prominent examples.

Population development is the net effect of three factors: fertility, mortality and migration. These three factors impact the development of both the size of the population and its age structure. In recent years the population's age structure has assumed ever greater significance in industrial countries: service needs are different in different age groups, which further underscores the importance of the age structure. In countries where the number of older people is growing, more resources need to be invested in the provision of care for those people than in countries where the growth of the elderly population is slow.

Population development and the age structure in Finland are typical of the industrial world. Finland has long ranked among those countries with low population growth, less than one half a per cent per annum. In addition, the country's population is ageing somewhat faster than in other countries.

Fertility at the same level for the past 30 years

Fertility in Finland has been at virtually the same level for the past 30 years, with no more than minor annual fluctuations. The total fertility rate reached its historical low at 1.5 in 1973, then climbed rapidly to 1.7 – and has remained at the same level to the present day. The fertility rate in Finland today is one of the highest in the EU and in fact the whole of Europe.

Regional differences in the fertility rate have also remained unchanged for a number of years. The rates are highest in the regions of Ostrobothnia on the northwestern coast, from Vaasa beyond Oulu. In these regions the fertility rate has in fact exceeded replacement level, i.e. a total fertility rate of 2.1. By contrast in southern Finland – which is where the majority of the population lives – fertility has remained around the national average.

Life expectancy increasing

At the moment the statistical life expectancy of a newborn baby boy in Finland is 74.9 years; for girls the figure is 81.5 years. Mortality has declined significantly since World War II: this has increased the life expectancy of both men and women by more than ten years.

Increasing life expectancy obviously has far-reaching implications for the population's age structure and by the same token for different sectors in society. People spend more years in retirement and need health care services longer. On the other hand people also live longer in good health. And as people live longer, the number of old people in the population obviously increases. This is also what is happening in Finland.

Finland has not needed immigrants

Finland has not been a particularly attractive destination for immigrants. One reason is no doubt our distant location, but the main factor is surely the country's age structure: there has been an ample supply of people of working age right through to the present day. In fact there has not been enough work to go round even for all the babyboomers born after the Second World War; some of them decided to emigrate. Although immigration into Finland increased in the 1990s, there is still no acute demand for foreign labour – but times change. For the time being the number of foreign immigrants has increased primarily in groups with poor employment prospects, most notably refugees and people remigrating from Ingria.

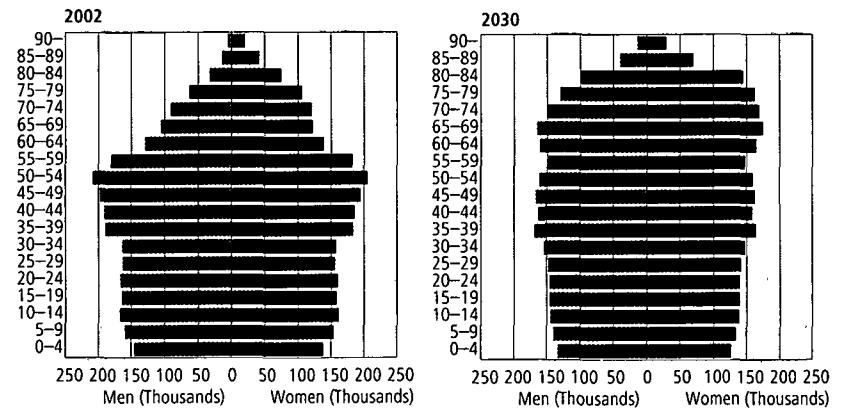
Babyboomers are shaping the age pyramid

Finland's age pyramid has been primarily shaped by fertility trends. Fertility declined in the 1930s, which meant that each new age cohort was smaller than its predecessor. This was followed by the instability of the war years, which saw annual fluctuations in the size of birth cohorts. The figures peaked after the war in 1946–1950, but fertility still remained high for some time beyond 1950 – although it did steadily decline through to the late 1960s.

The babyboom generation that was born in 1946–1950 has shown up as a clear bulge in the age pyramid. Indeed today, the age pyramid is no longer a pyramid but resembles the shape of an onion. The babyboomers are now approaching retirement age, representing the biggest age cohorts in Finnish history. The numerical predominance of women over men is clearly in evidence, especially in the oldest age groups: after all women live eight years longer than men.

According to Statistics Finland's population projection for 2030 (see below), all age groups in the country will by then be roughly the same size from zero through to age 70.

Figure 2.1
Age structure of the population in 2002 and 2030.
Source: Statistics Finland, Population statistics.



From agrarian society to information society

Internal migration has had a profound impact on Finnish society over the past few decades. The industrial structure has changed dramatically since the Second World War. In the immediate aftermath of the war Finland was still a typical agrarian society: almost half of the ac-

tive workforce earned a living from agriculture. The speed and intensity of the changes that then followed have no parallel anywhere in the world. By 1960, the numbers engaged in agriculture had declined by one-fifth, and were dwindling ever faster. Today, less than 100,000 people work in agriculture, one-tenth of the figure in 1950.

The transition of agrarian society through a service society to the information society is perhaps most clearly seen in how the population's age structure has changed at the respective ends of the migration flow. The movement of the working-age population out of rural areas into population centres, is not without its consequences. When a young person decides to leave, it is not just this one person the community will be losing; they are also losing someone who might one day set up a family and all the children that may be born to that family.

Natural population growth rate gives cause for concern

Natural population growth refers to the number of live births minus the number of deaths in a period. When the number of births is higher than the number of deaths, the population grows. When the number of deaths begins to exceed the number of births, the population will begin to dwindle. When this continues long enough, the population will decline until eventually it will have disappeared altogether.

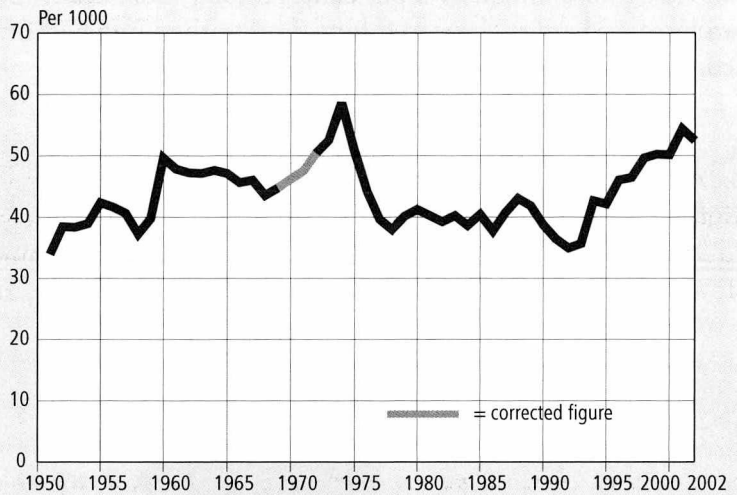
For the time being this idea of natural extinction is of course a purely theoretical proposition, but negative natural population growth is bound to throw up a whole host of problems that will need to be resolved. Foremost among these problems is obviously the question of how to maintain the vitality of regions most severely hit by population loss, as the local population continues to age. With less children in the region, schools are the first to close their doors; other services are soon affected as well. All that remains is an ageing population.

Internal migration peaked in the early 1970s

Internal migration between municipalities peaked in the early 1970s when the babyboomers moved out from the countryside into towns – first to continue their studies and when the job market back home dried up, to look for work elsewhere.

Internal migration plateaued in the 1980s and declined during the recession of the early 1990s. Towards the end of the decade the figures started to rise again. The rising trends of internal migration are at least part attributable the 1994 Act on the Municipality of Domicile, which gave everyone the right freely to choose their municipality of residence.

Figure 2.2
Internal migration per 1000 population in 1951–2002.
Source: Statistics Finland, Population statistics.



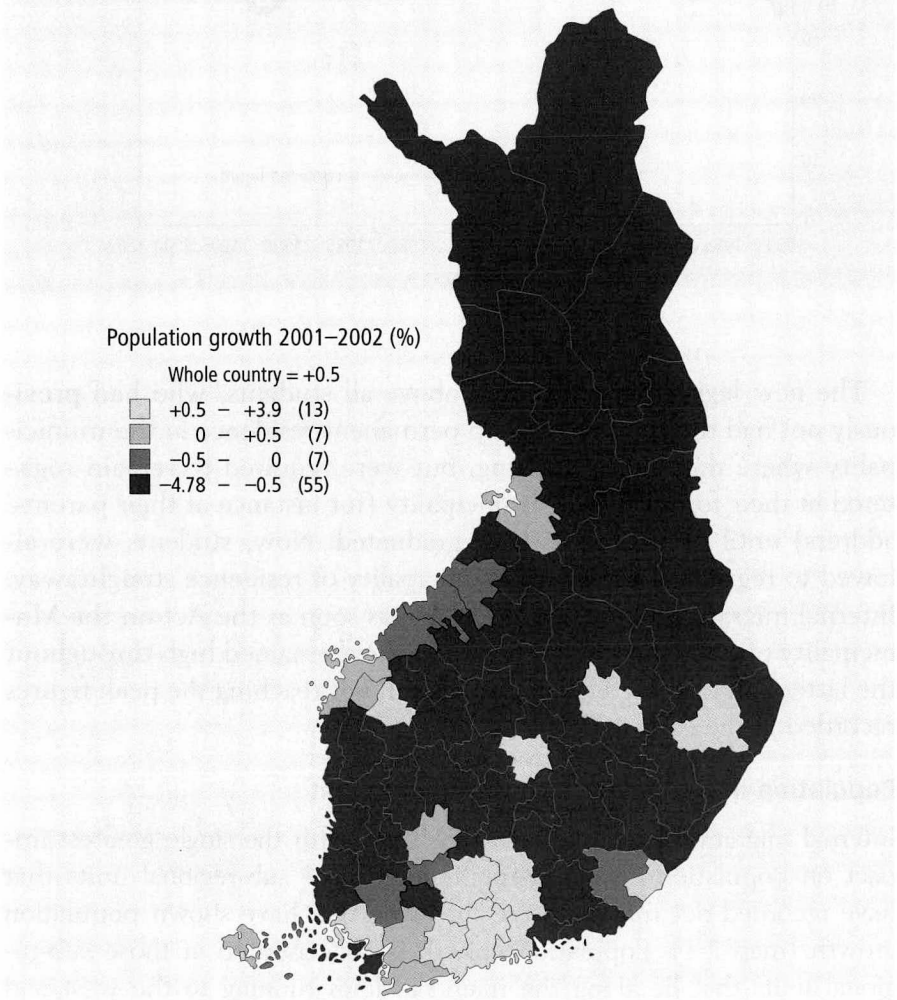
The new legislation concerned above all students, who had previously not had the right to take up permanent residence in the municipality where they were studying, but were required to remain registered in their former home municipality (for instance at their parents' address) until such time as they graduated. Now, students were allowed to register at their new municipality of residence straightaway. Internal migration figures began to rise as soon as the Act on the Municipality of Domicile took effect, and they remained high throughout the latter half of the 1990s, although still not reaching the peak figures recorded in the early 1970s.

Population development by sub-regional unit

Internal migration has long been the factor with the single greatest impact on population development. Indeed those sub-regional units that have recorded net migration are the same that have shown population growth (map 2.1). Population growth is concentrated in those sub-regional units that lie along the main rail lines running to the west and north out of Helsinki. In addition, almost all the country's university cities feature amongst the growing sub-regional units. There are only a few sub-regional units on the northwestern coast between Vaasa and Oulu that have continued to show population growth in spite of their net migration losses. This is primarily on account of their high fertility rates.

In 2001–2002 a total of 20 sub-regional units recorded population growth and the remaining 62 recorded losses. Among those recording net migration, 13 were units that in 2001–2002 showed population growth in excess of one half of a per cent. Among those recording net migration losses, 55 units showed figures higher than one half of a per cent during the same period.

Map 2.1
Population development by sub-regional unit in 2001–2002, %.
Source: Statistics Finland, Population statistics.



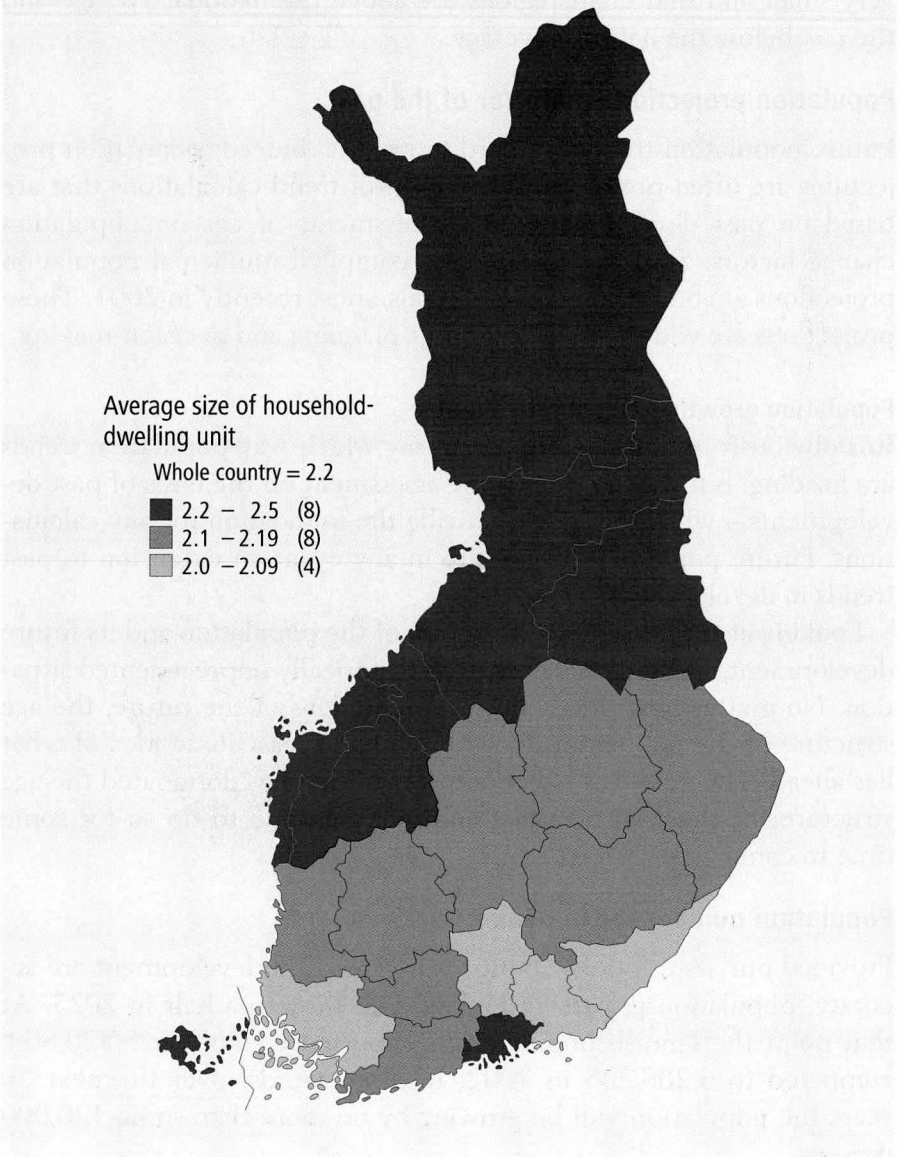
Size of household-dwelling unit on the decline

The declining average size of the household-dwelling unit is primarily due to the low fertility rate and the ageing of the population. Popula-

tion ageing in particular is pushing up the number of people living alone: increasing life expectancy means there are also growing numbers of widows and widowers.

In 1970 the average size of the household-dwelling unit was 3.0 persons. Since then the average size of the unit has slowly come down. In 2001, the figure stood at 2.2.

Map 2.2
Average size of household-dwelling unit by region in 2002.
Source: Statistics Finland, Population statistics.



Studied by region, the trends are largely consistent with those observed for fertility and population ageing (map 2.2). Average household-dwelling unit size is larger from the northwestern coast all the way through to the remote corners of Lapland. Part of the reason lies in these regions' higher fertility rates. By contrast in the southern parts of the country the average size of household-dwelling units is lower than in other parts of the country, with the single exception of the region of Itä-Uusimaa.

However, it is important to observe that the regional differences in the average size of the household-dwelling unit shown in the map are very small and that eight regions are above the national average and the rest below the national average.

Population projection – a mirror of the past

Future population trends are hard to predict. Indeed, population projections are often produced in the form of trend calculations that are based on past developments and assessments of certain population change factors. Statistics Finland has compiled municipal population projections at about three-year intervals, most recently in 2001. These projections are widely used to support planning and decision-making.

Population growth is slowing to a halt

It is obviously extremely difficult to say which way population trends are heading, but we can offer some assessment on the basis of past developments – which of course provide the foundation for any calculations. Future population trends are in any event an extension to past trends in development.

Looking at the current age structure of the population and its future development, we find ourselves in an historically unprecedented situation. No matter how uncertain our predictions of the future, the age structure of the population today provides at least some idea of what lies ahead. The post-war babyboom generation has dominated the age structure for the past 50 years and will continue to do so for some time to come.

Population number set to peak in 2023

Provided our assumptions about future trends in development are accurate, population growth in Finland will slow to a halt in 2023. At that point the Finnish population is expected to number 5,320,800, compared to 5,206,295 in 2002. In other words, over the next 20 years the population will be growing by no more than some 120,000 persons.

Over the following decade through to 2030, the number of children and people of working age will decline, whereas the number of older people in age groups over 65 is set to increase. Significant changes are also forecast in the regional distribution of the population. If the trends established over the past few years are going to continue, we will see continued growth in the current population growth areas – primarily as a result of internal migration.

Having said that, many rural areas have by now been virtually depleted of people who are of the age to move, and future internal migration will increasingly consist of movement between urban areas.

People are ageing

However the fact remains that if the current trends continue, we will see a marked increase in the number of people aged 65 or over. Right now the age structure of the country is at a stage of development where increasing numbers are approaching retirement, and over the next few years the numbers aged 65 or over are set to increase in both absolute and relative terms. While the number of people over 65 now stands at less than 800,000, by 2030 it is estimated that the figure will have risen to almost 1.4 million. People aged 65 or over currently account for 15 per cent of the population, projections for 2030 suggest the proportion will have grown to one-quarter.

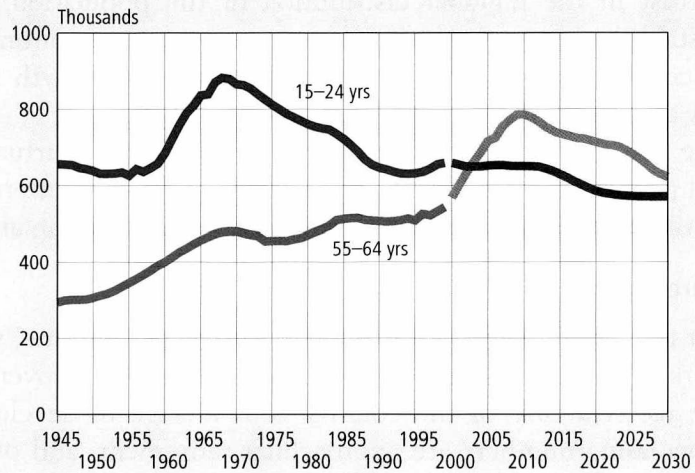
More immigrants

Another significant change in the population's age structure is that the number of people of working age is set to decline. The reason lies obviously in the persistently low fertility rate. So far the number of people approaching working age (in the age bracket 15–24) has exceeded the numbers exiting the workforce (in the age bracket 55–64), but by now this situation has been reversed (Figure 2.3). This obviously is reflected in the number of people of working age. If the numbers in the active workforce are to be kept at their current level, a greater influx of immigrants will be needed to meet the shortfall.

The immigration of foreign labour adds an interesting new dimension to future population development. As was pointed out earlier, Finland has not needed to recruit people from other countries: the post-war babyboom generation secured a sufficient supply of labour.

However so rapidly is the population now ageing that the numbers exiting the population of working age are greater than the numbers entering the workforce: we are approaching a situation of "demographic labour shortage". As the population has ceased to grow by natural means, growth needs to be artificially bolstered through immigra-

Figure 2.3
Age cohorts entering and exiting working age in 1945–2030.
Source: Statistics Finland, Population statistics.



tion. If we want to maintain our workforce at its current level, we will need to bring in immigrants in the very near future.

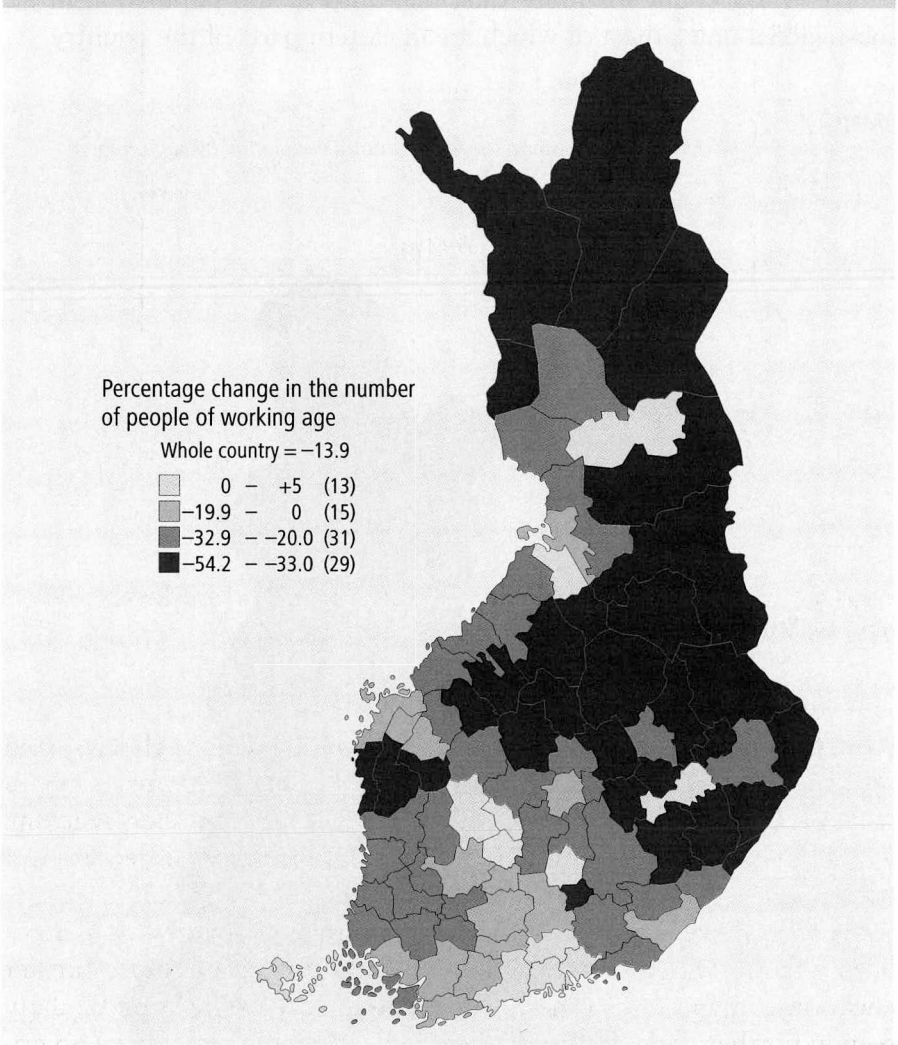
Trends of depopulation and ageing

In recent years internal migration in Finland has increasingly consisted of movement between urban municipalities. Fertility has been low in most parts of the country, and as a consequence the numbers reaching working age have continued to dwindle. As long as children are not born, there are also no new potential movers.

What is more, since the recession the creation of new jobs have been effectively restricted to growth centres, which of course further encourages migration to these areas. The effects are most particularly seen in northern and eastern Finland, where people really have no option but to move elsewhere in search of work. In the years to come the population will become more and more concentrated in a limited number of areas.

Map 2.3 describes the change in the population of working age from 2002 through to 2030. In most districts the numbers will decline, in today's growth centres less rapidly than in other parts of the country. In 29 sub-regional units, the population of working age will shrink by at least one-third.

Map 2.3
Percentage change in the population of working age (20–59 years) in 2002–2030 by sub-regional unit.
Source: Statistics Finland, Population statistics.

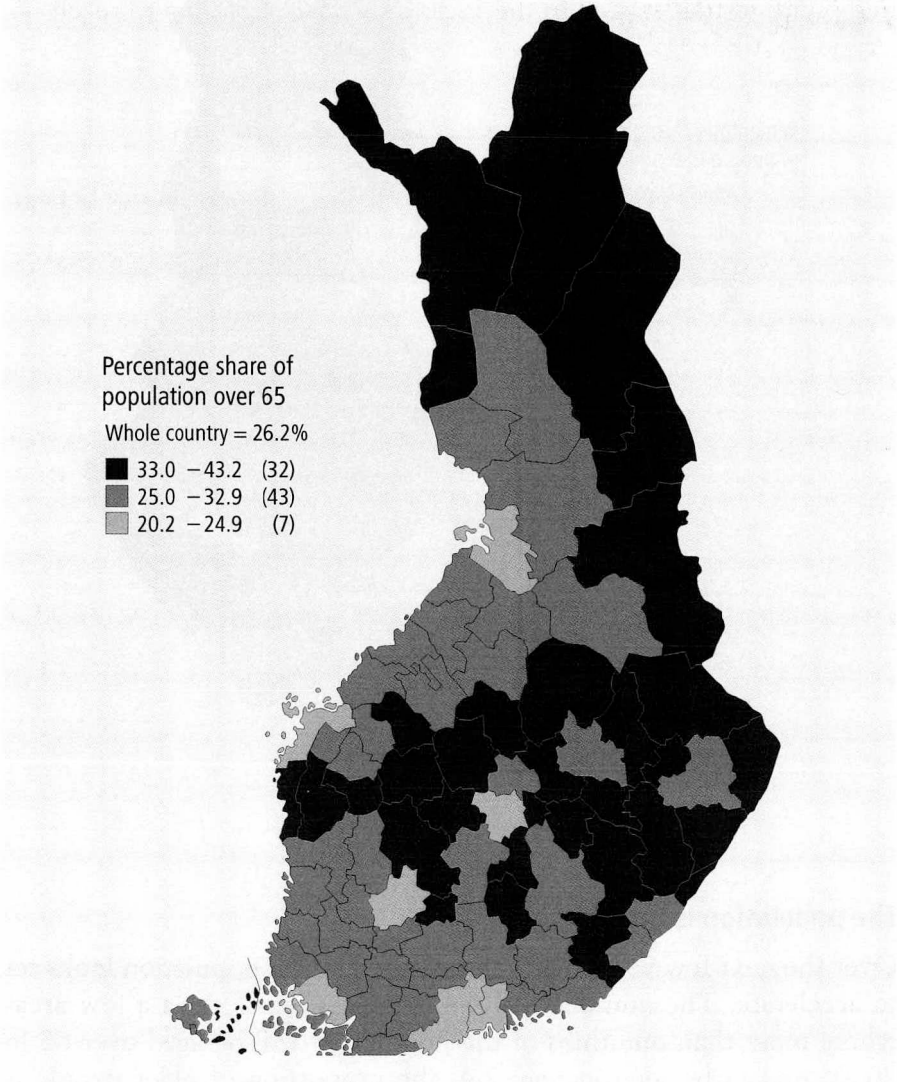


The population is growing older

Over the next few years the ageing of the Finnish population looks set to accelerate. The numbers will be rising fastest of all in a few areas where more than one-third of the population will be aged over 65 in 2030. As can be seen in map 2.4, the proportion of older people is greatest in those sub-regional units that have suffered net migration losses.

In 2030 the proportion of older people will remain at less than one-quarter in no more than seven sub-regional units. Already these units show the highest levels of positive net migration. By contrast older people will account for more than one-third of the population in 32 sub-regional units, most of which are in eastern parts of the country.

Map 2.4
Age groups 65 or over as a percentage share of the total population by sub-regional unit in 2030.
Source: Statistics Finland, Population statistics.



Summary

Population development in Finland is currently at an interesting phase. The population of working age is heavily concentrated in a handful of growth centres, while the population in other parts of the country is ageing at an accelerating pace. These trends in development are going to have a decisive impact upon the future service structure.

Given the age structure of the population in many areas, it is clear that maintaining the vitality of the countryside is going to be no easy challenge. The long distances in Finland only make the situation worse. It seems that the concentration of people into urban municipalities – a trend that started in the 1950s – is now beginning to reach its end-point: the rural population is being depleted. It is to be hoped that the future information society will be able to provide new tools and services for people living both in scarcely population regions and in congested population centres.

3 Technical infrastructure of the information society

- Although the telephone business in the wired network has decreased in Finland, an increase in broadband services has increased correspondingly the use of wired network capacity.
- Finland ranks high in the world in terms of the number of mobile phone subscriptions per capita, which was as high as 87 in 2002.
- If we calculate the average number of students per educational workstation in Finland for 2002, the figure for comprehensive and upper secondary schools was 9, for vocational schools/education institutes and polytechnics 4, and for universities 14.
- The prices for GSM mobile phone calls have fallen in recent years, while domestic calls in fixed network have become more expensive.
- Compared with the OECD average, Finnish telecommunications charges are reasonable. In particular, corporate telecommunications prices were well below the OECD average in 2002.

3.1 Telecommunications networks

In order for the information society to develop properly, an advanced technical infrastructure such as good telecommunications connections is required. A telecommunications networks that are comprehensive in coverage and efficient (i.e. have high information transfer capacity and speed) are the foundation for a technically sound infrastructure. For example, broadband services requiring high data transmission capacity also require a broadband infrastructure.

The oldest telecommunications network is the conventional wired telephone network. Other telecommunications networks include mobile, data transmission, cable TV and satellite communications networks.

Wired telephone networks and subscriber lines

The wired network telephone business has declined in Finland in recent times. At the same time, the number of conventional telephone lines has fallen, too. The number of wired telephone network lines peaked in 1997 at 2.85 million. In 2002 the lines numbered 2.73 million. This figure includes not only conventional wired telephone lines

Table 3.1.1
Number of wired telephone subscriber lines, change from previous year, number of subscriber lines per 100 population and share of ISDN channels of all wired lines in Finland in 1990 and 1995–2002.
Source: Statistics Finland, Telecommunications in Finland 2002.

Year	Subscriber lines	Change, %	Subscriber lines/ 100 inhabitants	Share of ISDN channels, %
1990	2,669,697		53.4	
1995	2,799,379		54.7	0.8
1996[1]	2,801,924	0.1	54.6	3.0
1997	2,850,374	1.7	55.4	7.0
1998	2,841,497	–0.3	55.1	10.8
1999	2,850,305	0.3	55.1	16.8
2000	2,848,809	–0.1	55.0	21.6
2001	2,806,172	–1.5	54.0	23.3
2002[2]	2,725,607	–2.9	52.4	26.1

1 Revision of the compilation basis of statistics
2 Number of primary ISDN subscriber lines has been multiplied by 30 to obtain number of channels (multiplier used in 2001 was 25)

but also ISDN[1] lines which enable data transfer. The number of ISDN lines has grown annually since 1993, which is why the total number of wired telephone lines has not fallen in the same proportion as conventional telephone lines only (measured without ISDN).

In 2001, the OECD countries had an average of 54.3 wired network lines per one hundred population. This is about the same as in Finland, while in the other Nordic countries the figure is over 70, except in Iceland with 67.2[2]. The number of lines exceeded 70 per hundred population in Luxembourg and Switzerland[3].

Although the wired network has experienced declining telephone use in recent years, Internet use and the increasing number of broadband connections have increased its significance. Indeed, the use of the wired network is increasingly focused on data transfer.

Data can be transferred on both the wired and mobile networks and in networks specifically designed for data transmission. Most conventional fixed access networks have been designed for voice traffic using copper cable. But as data services have become more common, techniques have been designed to improve the data transfer properties of

1 ISDN (Integrated Services Digital Network). A data transfer connection capable of simultaneously using two separate connections – i.e. of transferring two information flows such as speech, text, data or graphics on one telephone line. There are two types of ISDN subscriber lines – a basic rate ISDN subscriber line equals two conventional lines and a primary rate ISDN subscriber line equals 30 conventional lines.
2 Statistics Denmark, Statistics Finland, Statistics Iceland, Statistics Norway, Statistics Sweden (2002) and OECD (2003).
3 OECD (2003).

access networks. There are many types of data transfer techniques and lines. One is Frame Relay, which is a packet-switched data transfer technology designed for fast data transfer. Today data connection is increasingly formed with xDSL (Digital Subscriber Line) technology[4].

A data transfer connection, or Internet connection, can be established not only via the wired telephone network or data transfer network but also by a cable modem which enables a fast access to Internet via a cable TV network.

A broadband infrastructure creates the conditions for the design and introduction of new services. According to a survey commissioned by the Ministry of Transport and Communications, an estimated 98 per cent of the Finnish population were within a few kilometres of the nearest optic cable in 2002.[5]

Broadband connections spread quite slowly at first in Finland. They were introduced in 1999, and by the end of 2001 the number of ADSL connections was estimated at about 60,000.[6] Broadband connections grew rapidly in popularity only in 2002 and by the end of the year the number of broadband connections was 274,000 according to the Finnish Communications Regulatory Authority. Slightly over 180,000 of these were telecommunications operators' DSL connections and 54,000 were cable modems[7]. In 2003, the number of broadband connections has continued to rise, with their number being estimated at 350,000[8] in July.

In June 2002, the OECD countries with the most broadband connections in proportion to population were Korea, Canada, Sweden, Denmark and Belgium. The OECD average for broadband connections per one hundred population was 3.8, while the corresponding EU average was 2.3.

Cable TV started in Finland in the early 1970s. Cable television networks grew fastest in the late 1980s, when the number of subscribers to them grew by over 30 per cent annually. In 1990s, annual growth was more moderate, slowing to about a few per cent.[9] At the end of 2002, there were 1,040,000 connections in cable TV networks, representing

4 xDSL is a general term for technologies using different DSL (Digital Subscriber Line) techniques. These techniques enable fast data transfer over conventional telephone lines. ADSL (Asymmetric Digital Subscriber Line) is a data transmission technique which uses existing copper cables to create a fast fixed connection to the Internet and other multimedia and data services. This type of connection is always on. There are also Symmetric Digital Subscriber Lines (SDSLs) and High Speed Digital Subscriber Lines (HDSLs) for example.
5 Ministry of Transport and Communications (2003a).
6 Ministry of Transport and Communications (2002).
7 Statistics Finland (2003).
8 www.mintc.fi and the Finnish Communications Regulatory Authority.
9 Ministry for Transport and Communications (2001).

Table 3.1.2
Broadband access, December 2000 – June 2002.
Source: OECD, Communications Outlook 2003.

Country	Total December 2000	Total December 2001	DSL June 2002	Cable modem June 2002	Other June 2002	Total June 2002	Per 100 inhabitants June 2002
Sweden	105,300	484,200	344,000	127,600	150,000	621,600	7.0
Denmark	67,399	239,275	233,000	121,789	5,784	360,573	6.7
Belgium	145,013	434,674	362,000	259,036	23,824	644,860	6.3
Austria	138,000	293,000	136,000	207,800	..	343,800	4.2
Netherlands	330,000	538,200	192,000	432,400	..	624,400	3.9
Finland	30,000	68,000	119,000	51,000	..	170,000	3.3
Germany	187,000	1,938,500	2,500,000	39,100	50,000	2,589,100	3.1
Spain	58,415	474,282	660,861	180,191	..	841,052	2.1
France	185,911	619,343	730,000	233,579	..	963,579	1.6
Portugal	25,154	97,136	5,203	145,304	..	150,507	1.5
United Kingdom	57,693	350,000	299,000	452,994	..	751,994	1.3
Italy	114,900	415,000	585,000	0	100,000	685,000	1.2
Luxembourg	0	1,230	2,670	15	..	2,685	0.6
Ireland	300	400	1,200	800	..	2,000	0.1
Greece	72	72	72	0	..	72	0.0
EU	**1,445,157**	**5,953,312**	**6,170,006**	**2,251,608**	**329,608**	**8,751,222**	**2.3**
Korea	5,426,365	8,146,001	5,734,690	3,287,464	36,363	9,058,517	19.1
Canada	1,392,600	2,730,000	1,330,800	1,848,000	..	3,178,800	10.2
United States	6,009,189	12,783,214	5,082,856	9,200,000	1,785,406	16,068,262	5.6
Iceland	2,035	10,478	12,900	0	500	13,400	4.7
Japan	634,732	2,839,348	3,300,926	1,626,000	87,100	5,014,026	3.9
Switzerland	60,891	133,877	101,177	180,000	..	281,177	3.9
Norway	17,287	87,855	75,000	46,300	..	121,300	2.7
New Zealand	10,334	27,579	39,000	4,500	..	43,500	1.1
OECD	**15,104,353**	**32,997,628**	**22,036,793**	**18,654,012**	**2,247,377**	**42,938,182**	**3.8**

an increase of 4 per cent on the previous year. Forty-four per cent of all Finnish households are connected to the cable TV network.[10]

One of the basic services of companies engaged in the cable TV business is to transfer terrestrial and satellite television broadcasts in the cable network. The companies' own programme production has been relatively marginal. Cable operators began to offer Internet connections through cable modems in 2000.[11]

The digital television network enables two-way communication between end user and broadcaster. Digital television was started in Fin-

10 Finnish Cable Television Association.
11 Ministry for Transport and Communications (2001).

land in August 2001, but has not been very popular so far. In autumn 2003 around 126,000 households, or 6 per cent of them in Mainland Finland, had purchased a digital TV set-top box to receive digital broadcasts either via antenna or cable[12]. In addition, 57,000 households had at that time satellite digital set-top boxes.

Mobile communications networks and mobile telephone subscriptions

Mobile communications has been making rapid advances. The analogue mobile communication system NMT (Nordic Mobile Telephone) originally used only in the Nordic countries was introduced in the early 1980s. A decade later the digital GSM technology (Global System for Mobile Communications) was launched. The last analogue phone calls in Finland were made at the end of 2002. While waiting for the actual launch of the third-generation mobile communication technology[13], GSM technology has been improved further. One of these includes GPRS technology[14], launched in 2001 which enables fast data connections in GSM networks.

Table 3.1.3
Number of mobile phone subscriptions and number of subscriptions per 100 population in Finland in 1980, 1985, 1990 and 1995–2002.
Source: Statistics Finland, Telecommunications in Finland 2002.

Year	Mobile subscriptions			Subscriptions/ 100 inhabitants
	Digital	Analogue	Total	
1980	–	23,482	23,482	0.5
1985	–	67,639	67,639	1.4
1990	–	257,872	257,872	5.2
1995	380,703	658,423	1,039,126	20.4
1996	830,585	646,391	1,476,976	28.8
1997	1,523,356	568,435	2,091,791	40.6
1998	2,498,793	347,192	2,845,985	55.2
1999	3,073,943	199,490	3,273,433	63.4
2000	3,672,762	55,863	3,728,625	72.0
2001	4,137,337	38,250	4,175,587	80.4
2002	4,516,772	–	4,516,772	86.8

12 Finnpanel Oy.
13 IMT-2000 is an international third-generation mobile communication system, the European version of which is UMTS (Universal Mobile Telecommunications System). UMTS is a mobile communications standard based on broadband technology. It employs CDMA technology and has sufficiently high speed and capacity to handle multimedia.
14 GPRS (General Packet Radio Service) A wireless packet-switched (GSM-based) data transfer technology.

Mobile communications became hugely popular in Finland after the early 1990s and the number of mobile phone subscriptions grew quickly. In 1999 they outnumbered wired telephone subscriber lines. At the time, there were 63 mobile phone subscriptions per one hundred population. In recent years the figure has continued to rise, and in 2002 the subscriptions numbered 4.5 million or 87 per one hundred population.

Finland is by international comparison one of the world's top countries in mobile communications. The number of connections relative to population was high right from the beginning. In recent years their popularity has rocketed in other countries, too. The OECD average number of mobile subscriptions was 53.9 per one hundred population in 2001. The corresponding figure in the EU countries was 74.3.

International comparison of mobile subscriptions and number of subscribers relative to population is not without problems. This is caused

Table 3.1.4
Cellular mobile penetration in 1996–2001 and number of cellular mobile subscribers in 2001.
Source: OECD, Communications Outlook 2003.

Country	Subscriptions/100 inhabitants						Mobile subscriptions
	1996	1997	1998	1999	2000	2001	2001
Luxembourg	10.8	16.0	30.5	48.2	69.2	98.0	432,400
Italy	11.3	20.7	35.6	52.7	73.8	87.1	49,950,000
Austria	7.4	14.4	28.5	53.1	75.4	83.1	6,758,000
Netherlands	6.5	10.8	21.3	42.9	69.1	81.3	13,000,000
Sweden	28.2	35.8	46.4	57.9	71.8	80.5	7,158,000
Finland	28.8	40.7	55.2	63.3	72.0	80.4	4,175,587
Portugal	6.7	15.3	30.8	46.8	66.6	79.3	7,977,500
United Kingdom	11.6	14.1	21.9	40.2	72.7	77.1	46,282,000
Greece	5.1	8.9	19.6	37.0	56.0	75.0	7,963,742
Belgium	4.7	9.6	17.2	31.2	54.9	74.9	7,690,000
Denmark	25.0	27.3	36.4	49.4	63.0	73.9	3,960,165
Spain	7.6	11.0	17.9	37.6	60.0	73.3	29,495,278
Ireland	8.0	14.0	25.5	42.7	53.3	72.2	2,770,000
Germany	7.1	10.0	17.0	28.6	58.6	68.3	56,245,000
France	4.2	9.9	19.2	35.2	50.3	62.6	37,028,266
EU	**9.0**	**13.9**	**23.5**	**39.6**	**63.4**	**74.3**	**280,885,938**
Iceland	17.2	24.3	38.7	62.3	76.5	82.6	235,400
Norway	28.8	38.1	47.5	61.5	75.0	81.7	3,689,246
Switzerland	9.4	14.7	23.9	42.8	64.6	72.9	5,275,000
New Zealand	12.8	18.9	33.1	40.5	57.1	62.9	2,422,000
Korea	7.0	15.0	30.2	50.3	57.0	61.4	29,045,596
Japan	21.4	30.3	37.4	44.9	52.6	58.8	74,819,186
United States	16.6	20.6	25.6	31.5	39.8	45.1	128,500,000
Canada	11.5	14.2	17.7	22.7	28.4	34.9	10,858,323
OECD	**11.0**	**15.5**	**22.1**	**32.3**	**45.8**	**53.9**	**611,851,690**

by the statistical treatment of prepaid subscriptions. It is possible that if there is included in the statistics a considerable number of prepaid cards/subscriptions no longer used, statistics may become distorted and show much higher subscriber figures than is the case in reality.

In Finland the number of prepaid subscriptions of all mobile subscriptions is only a few per cent, but in the other Nordic countries the figure is much higher, slightly over 40 per cent in Norway and 49 per cent in Sweden in 2001. Elsewhere in Europe and in many OECD countries prepaid subscriptions are even more popular.[15]

3.2 Information networks

An information network refers to the technical operating environment in which information network services such as information searches and transactions are available. The Internet is the most important of these operating environments. Information networks operate physically in telecommunications networks. Therefore Internet services can be considered as value added services of telecommunications networks.

Internet

The number of hosts connected to the Internet (computers or other devices) is one of the commonest indicators of Internet use. Each host has a network identifier, domain name, with an IP address. These names are based on what are known as top level domains, which are further divided into national domains (such as .fi) or generic domains, such as .com (commercial company).

The number of hosts connected to the Internet can be monitored with mechanical calculations. They assume that the physical location of an Internet host can be deduced from the Internet address, or network identifier. Country-specific figures are usually calculated on the basis of the end part of the address. A host with a specific country identifier (such as .fi for Finland) is assumed to be located in that country. Addresses ending in an organisation type identifier are by default assumed to be located in the United States, from which these addresses (such as .com) are reserved. But there is no reason why for example a Finnish organisation could not obtain a .com address in the United States. Hence these methods of calculation do not necessary provide exact and correct country-specific information on the number of hosts.

15 OECD (2003).

Another reason why the figures do not give a realistic picture is that computers behind a firewall are usually excluded from these calculations. As firewalls are becoming more common, statistical information on the number of computers connected to the Internet may not be accurate.

According to a sample survey, OECD has previously tried to allocate generic domains (gTLDs), such as .net, and .com to their actual host country. But according to the latest statistics this has no longer been done.

Table 3.2.1
Internet hosts by domain in 1998–2002.
Source: OECD, Communications Outlook 2003.

Country	Domain	Hosts, thousands		
		July 1998	July 2000	July 2002
Netherlands	.nl	515	1,082	2,150
Belgium	.be	154	361	833
Spain	.es	243	539	1,682
Ireland	.ie	45	86	97
United Kingdom	.uk	1,191	2,081	2,508
Italy	.it	321	1,574	2,959
Austria	.at	132	350	721
Greece	.gr	40	106	185
Luxembourg	.lu	6	12	18
Portugal	.pt	45	117	267
France	.fr	431	983	2,053
Sweden	.se	381	624	1,188
Germany	.de	1,154	1,917	2,923
Finland	.fi	514	704	986
Denmark	.dk	190	370	872
Iceland	.is	21	38	65
Japan	.jp	1,352	3,413	8,714
Canada	.ca	1,028	1,815	3,130
Korea	.kr	175	476	412
Norway	.no	312	504	634
Switzerland	.ch	206	418	668
New Zealand	.nz	178	310	420
United States[1]		7,786	11,817	14,296
gTLDs[2]		18,006	57,225	101,723
World total		**36,739**	**93,048**	**162,128**

1 Includes .us, .edu, .mil, .gov, .arpa domains
2 Generic Top Level Domains includes .com, .net, .org, .int, .biz, .info domains

According to a Ministry of Transport and Communications survey, there were some 1,212,000 Internet connections in Finland at the end of 2002 compared with 950,000 a year earlier. (The number of Internet connections in households, and the use of the Internet is discussed in more detail in Chapter 12 of this book, and the number of Internet connections in companies in Chapter 10.)

The OECD has compiled statistics on the number of Internet subscribers. These figures only cover Internet subscribers to fixed networks, since mobile Internet connections are still so rare. In 2001 the highest numbers of Internet subscribers in proportion to population were in Iceland, Korea and Denmark. The average number of Internet subscribers in the OECD countries was 19 per one hundred population, and slightly lower in the EU. The Finnish figure for Internet subscribers in proportion to the population was around the OECD average.

Table 3.2.2
Number of Internet subscribers to fixed networks in 1999–2001.
Source: OECD, Communications Outlook 2003.

Country	December 1999	December 2000	December 2001	Per 100 inhabitants 1999	Per 100 inhabitants 2001
Denmark	1,135,393	1,684,167	2,023,462	21.3	37.8
Sweden	1,880,000	2,306,800	2,849,000	21.2	32.0
Netherlands	2,834,375	3,783,784	4,000,000	17.9	25.0
United Kingdom	7,400,000	12,600,000	13,600,000	12.4	22.7
Austria	486,364	992,000	1,675,000	6.0	20.6
Finland	564,000	810,000	950,000	10.9	18.3
Luxembourg	11,411	24,500	80,000	..	18.1
Portugal	474,389	1,299,465	1,823,529	4.7	18.1
Germany	9,000,000	11,066,102	14,900,000	11.0	18.1
Ireland	405,000	583,636	600,000	10.8	15.6
Italy	5,200,000	7,800,000	8,300,000	9.1	14.5
Belgium	735,303	1,150,214	1,424,516	7.2	13.9
France	3,030,000	5,263,000	6,986,500	5.2	11.8
Spain	2,241,092	3,222,400	3,673,959	5.7	9.1
Greece	199,960	271,278	505,000	1.9	4.8
EU	**35,597,287**	**52,857,346**	**63,390,966**	**9.5**	**16.8**
Iceland	49,125	117,500	168,000	17.7	58.9
Korea	10,860,000	19,040,000	23,114,431	23.3	48.8
Switzerland	898,000	1,666,341	2,221,960	12.6	30.7
Norway	717,921	1,178,552	1,237,597	16.1	27.4
United States	49,723,100	68,481,217	77,500,000	18.2	27.2
Canada	3,341,000	4,759,000	7,030,000	11.0	22.6
Japan	10,590,000	18,126,945	24,061,695	8.4	18.9
New Zealand	480,000	542,234	644,000	12.6	16.7
OECD	**117,264,667**	**174,956,639**	**212,874,375**	**10.5**	**18.7**

3.3 Computer resources

The degree of computerisation is one indicator of the level of an information society's technical infrastructure. Below we will describe the number of computers in proportion to one hundred population and the number of personal computers per one hundred white-collar employees, and present the latest information on the level of information technology resources in central government and in schools.

Number of computers per one hundred population

The World Competitiveness Yearbook 2003 lists the number of computers in proportion to population per country. The United States tops the list, with Sweden second at 69 computers per one hundred population in 2002. According to these statistics, there were 66 computers per one hundred population in Finland, which put Finland third on the list after the US and Sweden.

Table 3.3.1
Number of computers per 100 population in some countries in 1995, 1998, 2000 and 2002.
Source: The World Competitiveness Yearbook 2003, original source: Computer Industry Almanac.

Country	Computers per 100 inhabitants			
	1995	1998	2000	2002
United States	36.0	49.9	58.1	73.9
Sweden	25.5	44.4	57.6	68.7
Finland	24.6	44.2	57.3	66.2
Iceland	30.0	43.9	57.3	64.9
Norway	28.1	43.7	57.2	65.7
Denmark	25.0	39.6	56.1	65.8
Australia	24.1	43.1	55.6	63.0
Canada	26.2	40.0	54.9	64.7
Switzerland	19.7	35.1	48.8	64.1
New Zealand	22.8	35.7	48.7	57.1
Netherlands	21.1	34.0	46.8	60.5
United Kingdom	21.5	32.3	44.2	52.6
Singapore	20.7	34.4	44.0	59.6
Hong Kong	..	31.0	41.4	43.4
Ireland	17.8	30.3	40.9	51.6
Belgium	..	28.5	40.2	50.9
Austria	..	29.0	40.2	47.6
Japan	..	27.2	38.9	47.7
Germany	17.4	26.8	37.3	48.0

The number of personal computers per one hundred white-collar employees

The greatest number of personal computers per employees in 2001 was in Norway with 155. The corresponding figure in Finland was 76, which is slightly under the EU average.

Table 3.3.2
Number of personal computers per 100 white-collar employees in 1998 and 2001. Source: EITO, original sources: EITO, IDC, OECD.

Country	Computers per 100 white-collar employees	
	1998	2001
Norway	123	155
United States	118	138
Ireland	93	116
Sweden	93	107
Switzerland	97	104
Denmark	74	88
United Kingdom	65	85
Netherlands	69	82
Austria	68	81
France	59	77
Finland	72	76
Spain	57	73
Belgium/Luxembourg	57	71
Germany	55	71
Italy	50	62
Greece	49	59
Portugal	27	46
Japan	27	46
EU	..	**77**
Western Europe	..	78

Central government computer resources[16]

There were 154,816 personal workstations in use in central government at the end of 2002, compared with 116,091 at the end of 1997. The number of workstations in proportion to staff was 1.3 per person, which was the same as one year before. In 2002, 14,994 workstations were in customer use.

The entire staff in almost all organisations had either an internal or external e-mail account and access to public Internet services. Only six per cent of the central government offices and agencies did not have intranet services.

School computer resources[17]

There was an average of 11 students per workstation designated for educational use in Finland's educational institutions[18] in 2002. The corresponding figure in 2001 was 12. But compared with earlier years, the computer equipment was older in many cases. Practically all educational institutions had a network connection in 2002, although connection speeds varied and were often insufficient. An average of 89

16 Ministry of Finance (2003).
17 Ministry of Education (2003).
18 Covers general education, vocational education and voluntary adult education.

per cent of workstations could access the Internet, and 79 per cent of the educational institutions had a local area network.

In 2002, both comprehensive and upper secondary schools had an average of nine students per workstation in educational use (in 2001 the corresponding figure was 10). Computers with Internet access accounted for 84 per cent of all workstations in comprehensive schools and 94 per cent in upper secondary schools (80 and 93 per cent, respectively, in 2001). Regional variation was marginal. In comprehensive schools, Åland had 5.6 students per one computer and Kymenlaakso 10.7. In upper secondary schools, the situation was the best in Åland (4.7) and the weakest in Uusimaa and Satakunta (11.1). The number of computers in educational use was proportionally highest in the comprehensive and upper secondary schools of rural municipalities.

In 2001 and 2002 there were four students per workstation in vocational institutions. Ninety-two per cent of the computers could access the Internet. Polytechnics, too, had an average of 4 students per workstation, and Internet access was at 97 per cent.

In 2002, there was an average of 13.7 students per workstation at universities (14.2 in 2001). If only undergraduates who had registered for the academic year are included in the calculations, the figure matched the 2001 level of 11 students per workstation. Ninety-seven per cent of workstations at universities are supplied with Internet access.

The number of computers in educational use has increased sharply, but they still do not reach the recommended levels in all types of educational institution. Some of the equipment is also too old, which means that they may not be able to perform the necessary tasks. Over half of the comprehensive schools and most of the upper secondary schools and vocational schools have fixed network connections, but the connection speeds are sometimes insufficient. Polytechnics and universities, on the other hand, have fast fixed network connections. Electronic transactions are becoming more and more common also in educational institutions, which requires proper network connections.

3.4 Prices of services

In 2002 telecommunications charges in Finland fell slightly (on average less than one per cent) on the situation in 2001. The prices of GSM phone calls fell the most, by an average of 3.4 per cent. The prices of international calls remained at the 2001 level[19], while local

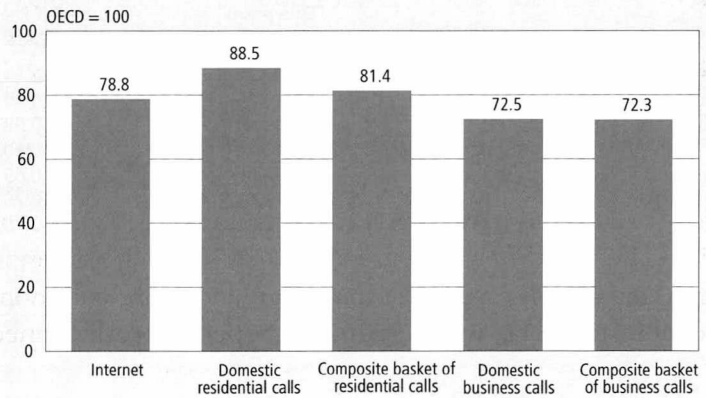
19 This change does not cover IP calls, which, as they become more common and due to their cheap price, may have a considerable effect on households' telecommunications charges.

Table 3.4.1
Price development in voice communications in Finland in 1995–2002, 1995=100.
Source: Ministry of Transport and Communications.

Year	Mobile calls	Local calls	Long-distance calls	International calls	Total
1995	100.0	100.0	100.0	100.0	100.0
1996	85.3	103.5	92.4	87.8	93.0
1997	78.8	108.2	92.1	86.1	90.7
1998	73.4	121.1	92.8	69.4	88.7
1999	68.4	126.1	97.5	62.8	85.8
2000	66.1	135.5	101.3	59.0	85.6
2001	64.2	141.8	105.0	57.7	85.2
2002	62.0	147.6	108.8	57.7	84.6
Change, % 2002/01	–3.4	4.1	3.6	0.0	–0.7

call charges rose by 4.1 per cent on 2001 and long-distance calls by 3.6 per cent. The information is based on the annual survey commissioned by the Ministry of Transport and Communications on the price development of telecommunications services and charges.[20] According to

Figure 3.4.1
Telecommunications charges in Finland as compared with the OECD average, August-September 2002, OECD=100.
Source: OECD, Communications Outlook 2003.



20 Ministry of Transport and Communications (2003a). The "Price level of Finnish telecommunications charges 2002" survey describes telecommunications charges in fixed telecommunications networks and mobile communication networks in the beginning of 2003, and price changes during 2002. The survey also covers the price level of the biggest telecommunications operators' Internet services. The survey monitors the price development of services offered to households.

the survey, the price of text messages fell in 2002 by 11.4 per cent compared with the previous year.

Compared with the OECD average, Finnish telecommunications charges are moderate. In fact, on the basis of 2002 information, the telecommunications charges of companies in particular are considerably lower than the OECD average.

International call prices for both households and companies are below the OECD average in Finland. The price baskets for international calls have been calculated in US dollars according to purchasing power parity separately for households and companies.

GSM phone calls were in 2001 considerably more economical in Finland than in many other OECD countries. The trouble with the comparison is that country-specific figures are based on the price information of only one operator. The information in Table 3.4.3 is based on the average use of mobile phone services. As with the price basket for international calls, the price baskets for GSM mobile phone calls have been calculated in US dollars according to purchasing power parity.

Table 3.4.2
OECD basket of international telephone charges, August 2002, charges according to purchasing power parity.
Source: OECD, Communications Outlook 2003.

Country	Enterprises USD PPP	Households (incl. VAT) USD PPP
Switzerland	0.27	0.34
Norway	0.26	0.40
Netherlands	0.40	0.58
Sweden	0.38	0.60
Luxembourg	0.48	0.65
Belgium	0.63	0.75
Germany	0.52	0.78
Ireland	0.59	0.82
France	0.42	0.82
Denmark	0.53	0.85
United States	0.51	0.97
Finland	0.84	1.09
Iceland	0.71	1.12
Canada	0.83	1.14
Austria	0.99	1.50
Spain	1.09	1.57
Italy	1.16	1.67
New Zealand	1.25	1.67
Portugal	1.24	1.70
United Kingdom	1.29	1.76
Greece	1.23	1.86
Japan	2.16	2.18
Korea	3.61	4.29
OECD	**1.29**	**1.78**

Table 3.4.3
OECD basket of medium user mobile telephone charges, August 2002, charges according to purchasing power parity, including VAT.
Source: OECD, Communications Outlook 2003.

Country	Operator	Fixed USD PPP	Usage USD PPP	Total USD PPP
Finland	Radiolinja	40.37	333.76	374.13
Canada	Telus Mobility	306.32	89.43	395.75
Iceland	Telecom	81.37	339.59	420.96
Denmark	TDC Mobil	116.81	310.52	427.33
Luxembourg	Tango	167.36	263.38	430.75
Portugal	Vodafone	260.12	182.48	442.60
Japan	NTT DoCoMo	249.11	196.64	445.74
France	SFR	243.53	206.14	449.67
United States	Cingular	409.07	46.20	455.27
Korea	SK Telecom	273.43	206.11	479.55
Sweden	Comviq	132.79	347.44	480.22
Switzerland	Sunrise	273.51	245.55	519.05
Austria	Mobilkom	151.36	373.74	525.10
Norway	Telenor	211.23	329.82	541.05
United Kingdom	Vodafone	333.30	218.44	551.75
Netherlands	KPN	340.00	215.12	555.12
Belgium	Mobistar	485.93	69.33	555.26
Ireland	O2	284.26	352.65	636.91
Germany	T-Mobile	271.08	370.29	641.36
Greece	Cosmote	612.02	69.95	681.97
Spain	MoviStar	11.03	687.71	698.74
Italy	Omnitel	81.69	620.88	702.58
New Zealand	Telecom 025 TDMA	205.57	624.69	830.27

3.5 Investments in information society infrastructure

Information technology expenditure as a proportion of GDP

According to the *European Information Technology Observatory 2003*, information technology expenditure as a proportion of GDP was 3.8 per cent in Finland in 2002, the highest figures having been recorded in Sweden (5.1) and the United States (4.9). With the exception of Japan, the information technology expenditure as a proportion of GDP in the examined OECD countries has fallen in recent years.

Table 3.5.1
Information technology expenditure as a proportion of GDP in some OECD countries in 1999–2002.
Source: EITO 2003, original sources: EITO, IDC, OECD.

Country	Information technology expenditure as a proportion of GDP, %			
	1999	2000	2001	2002
Sweden	5.6	5.4	5.3	5.1
United States	5.6	5.9	5.5	4.9
United Kingdom	4.7	4.9	4.7	4.5
Switzerland	4.8	4.8	4.7	4.4
Netherlands	4.8	4.7	4.3	4.2
Finland	4.1	4.0	3.9	3.8
Japan	3.2	3.4	3.6	3.7
Norway	4.3	3.9	3.8	3.6
Denmark	4.2	4.1	3.8	3.6
France	3.7	3.6	3.6	3.5
Germany	3.4	3.5	3.4	3.2
Austria	3.1	3.3	3.2	3.1
Belgium/Luxembourg	3.2	3.3	3.3	3.0
Ireland	3.4	3.1	2.7	2.4
Portugal	2.4	2.4	2.4	2.2
Italy	2.2	2.2	2.2	2.1
Spain	2.2	2.1	2.0	1.9
Greece	1.6	1.7	1.6	1.4

Sources

EITO 2003, European Information Technology Observatory 2003.

IMD (2003), The IMD World Competitiveness Yearbook.

Ministry of Education (2003), Information society structures in educational institutions, Results of the 2002 survey, Ministry of Education working group memoranda and surveys 2003:20, Helsinki

Ministry of Finance (2003), Review on ICT within the Government of Finland 2002, Studies and Reviews 3/2003, Helsinki

Ministry of Transport and Communications (2001), Cable television activity in Finland in 2000, Publication 38/2001, Helsinki (in Finnish only)

Ministry of Transport and Communications (2002), Telecommunications Statistics 2002, Helsinki

Ministry of Transport and Communications (2003a), Optic cable in Finland's trunk and local networks in 2002, Publication 20/2003, Helsinki (in Finnish only)

Ministry of Transport and Communications (2003b), Price level of Finnish telecommunications charges 2002, Publication 15/2003, Helsinki

OECD (2003), Communications Outlook 2003

Statistics Denmark, Statistics Finland, Statistics Iceland, Statistics Norway, Statistics Sweden (2002), Nordic Information Society Statistics 2002, Helsinki

Statistics Finland (2003), Telecommunications in Finland 2002, in the Science, technology and research series 2003:2, Helsinki

4 Human Infrastructure of the Information Society – Education and Training

- In 2001, there were 17,100 new students enrolled in information technology and media studies in Finland, which was 13 per cent of all enrolments. Four years earlier, the corresponding figure was just under 8 per cent.
- A total of 7,800 students graduated in information technology and media studies in 2001, 68 per cent of them men and 32 per cent women. The number of degrees and other qualifications in this sector almost doubled between 1997 and 2001.
- Data for 2001 show that those with information technology or media qualifications found jobs within 12 months of graduation more easily than those with qualifications in other sectors. Compared with 1999, however, jobs were slightly more difficult to find.
- In 1999, half of all employees in Finnish private sector companies took part in training courses, whereas in the EU countries (and Norway) the corresponding figure was 38 per cent.
- 87 per cent of information sector enterprises organised training courses for their staff in 1999. Only 73 per cent of enterprises in other sectors organised similar training. Information sector enterprises also offered more training relative to all employees and training participants than other corporate sector enterprises.
- The information sector spent on training approximately EUR 1,200 per employee per year, which is EUR 500 more than the rest of the enterprise sector.
- The educational structure (i.e. the educational background of information sector employees) is the single most prominent factor explaining why the information sector is so active in training. Data for 1999 show that the higher the proportion of highly educated persons in a company, the higher is also the tendency to organise training.

4.1 Education and entry into the labour market

The following paragraphs take a look at post-compulsory education that leads to a degree or other qualification. The information is based on Statistics Finland's Student Register and Register of Completed Education and Degrees and on Employment Statistics. The section begins with a description of the education system and the educational structure of the entire population. This is followed by an analysis of new information technology and media students, students who have completed these studies, employment of students during their studies

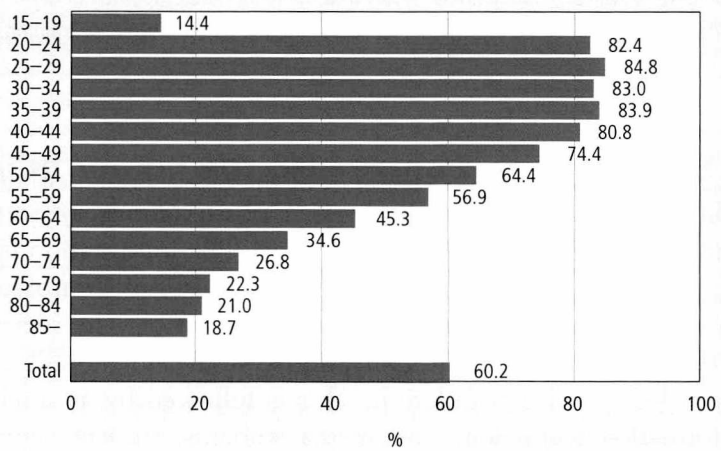
and job prospects of graduates. The information has been presented in accordance with Statistics Finland's Standard Classification of Education.

The Finnish education system is composed of primary, secondary and tertiary education. An upper secondary education, whether vocational or general, qualifies students for tertiary studies. The general upper secondary education ends in a matriculation examination, while those who choose a vocational education get a basic vocational qualification. This can be completed through conventional classroom education, through a competence-based qualification or by training as an apprentice. Upper secondary qualifications also include further and specialist qualifications with competence-based tests, qualifying the students to apply for polytechnic training in the same field. Tertiary education currently includes both polytechnic and university education. Tertiary degrees include polytechnic and university degrees.

4.1.1 Educational structure of the population

The educated population refers to the number of persons who have completed degrees or other qualifications in upper secondary general or vocational education, at polytechnic or university level, or who have completed competence-based tests following initial vocational, further vocational or specialist vocational training. The data presented here are based on each individual's highest, most recent qualification. If a person has completed both the matriculation examina-

Figure 4.1.1
Proportion of persons with post-compulsory degrees or qualifications in different age groups in 2001.
Source: Statistics Finland, education statistics.



tion and vocational qualifications, the latter is applied for purposes of classification.

At year-end 2001, there were a total of 2.6 million people in Finland who had completed qualifications at the above-mentioned levels. In the population aged 15 or over, 60 per cent had degrees or other qualifications. The figure was 61 per cent for men and 60 per cent for women.

The level of education was much higher among young people than among older age groups. The age group 25–29 had the highest level of education, where 85 per cent had a post-compulsory education. Persons over 65 had the lowest level of education.

4.1.2 New students enrolling in information technology and media studies

In 2001, the number of new students in information technology and media studies stood at 17,100. Since 1997 the figure has been rising each year by about 2,000. New students in these fields accounted for 13.3 per cent of all new students in vocational training, polytechnics and universities.

Table 4.1.1
New students in information technology and media studies in 1997–2001.
Source: Statistics Finland, education statistics.

	New students total	Information technology and media studies			
		Men	Women	Total	% of new students
1997	109,507	6,727	1,720	8,447	7.7
1998	113,433	8,040	2,433	10,473	9.2
1999	125,362	9,194	3,955	13,149	10.5
2000	131,202	9,346	5,170	14,516	11.1
2001	128,766	11,153	5,944	17,097	13.3
Change (1997=100)					
1997	100.0	100.0	100.0	100.0	
1888	103.6	119.5	141.5	124.0	
1999	114.5	136.7	229.9	155.7	
2000	119.8	138.9	300.6	171.8	
2001	117.6	165.8	345.6	202.4	

In 2001, men accounted for 65 per cent of the new students of information technology and media studies. In five years the number of men had grown 1.5-fold and that of women more than trebled.

59 per cent of new students in tertiary education

In 2001, over half of the information technology and media studies students were at the tertiary level. The largest number of new students was recorded for studies leading to the degree of Bachelor of Engineering in Information Technology. Table 4.1.2 describes the numbers

Table 4.1.2
New students in selected fields of information technology and media studies in 1997–2001.
Source: Statistics Finland, education statistics.

	1997	1998	1999	2000	2001
Upper secondary					
Vocational Qualification in Information Technology	1,913	2,199	2,503	317	106
Vocational Qualification in Visual Expression	–	–	–	–	229
Vocational Qualification in Communications	279	449	734	938	127
Diploma in Systems Design, vocational qualification in Business	–	–	213	2,275	3,219
Tertiary					
Diploma in Systems Design, college degree	491	585	19	13	14
M.Sc. In computer science	718	876	967	1,065	1,289
Bachelor of Engineering, information technology	2,356	2,766	2,444	2,339	3,509
Bachelor of Engineering, telecommunications	326	463	507	526	361
M.Sc. In Technology, information technology	658	804	953	939	994
M.Sc. In Technology, telecommunications	–	–	–	214	273
Bacherlor of Business Administration, information processing	804	1,433	1,884	2,009	2,174
Bacherlor of Business Administration, library and information	80	97	70	60	66
M.Sc. (Econ. & Bus Admin.), information systems science	77	78	147	314	297
M.A. in communication studies and information research	70	88	91	117	137
M.Pol.Sc., communication studies	25	30	23	32	37
M.Soc.Sc., communication studies	78	79	90	86	91
B.A. in Media Studies	317	386	530	571	808

Table 4.1.3
Number of new students in information technology and media studies by field of study and level of education in 1997–2001.
Source: Statistics Finland, education statistics.

	1997	1998	1999	2000	2001
Field of education					
Humanities and arts	786	1,006	1,716	1,955	2,468
Men	340	451	757	791	964
Women	446	555	959	1,164	1,504
Social sciences, business and law	1,170	1,739	2,242	2,546	2,726
Men	694	953	1,117	1,329	1,517
Women	476	786	1,125	1,217	1,209
Science	1,221	1,470	2,501	5,281	6,023
Men	874	1,030	1,555	3,223	3,707
Women	347	440	946	2,058	2,316
Engineering, manufacturing and construction	5,270	6,258	6,690	4,734	5,880
Men	4,819	5,606	5,765	4,003	4,965
Women	451	652	925	731	915
Field of education total	8,447	10,473	13,149	14,516	17,097
Men	6,727	8,040	9,194	9,346	11,153
Women	1,720	2,433	3,955	5,170	5,944
Level of education					
Upper secondary	2,192	2,648	5,396	6,146	6,960
Men	1,869	2,220	3,707	3,435	3,856
Women	323	428	1,689	2,711	3,104
Tertiary	6,255	7,825	7,753	8,370	10,137
Men	4,858	5,820	5,487	5,911	7,297
Women	1,397	2,005	2,266	2,459	2,840

of new students in certain fields of information technology and media studies.The number of new students at the tertiary level has grown by 150 per cent in five years, and by 300 per cent at the upper secondary level. Most of the education at the upper secondary level is completed as further or specialist training, through study or work.

4.1.3 Persons with qualifications in information technology and media studies

Some 122,900 post-compulsory qualifications were completed in Finland in 2001. Matriculation examinations numbered 35,500, vocational qualifications 52,500 and university degrees 34,900.

Some 7,800 information technology and media studies qualifications were completed in 2001. They accounted for 9 per cent of qualifications and degrees in vocational training, polytechnics and universities. In all, 68 per cent of these qualifications and degrees were completed by men and 32 per cent by women. In the first three years un-

Table 4.1.4
Degrees and qualifications completed in 1997–2001
Source: Statistics Finland, education statistics.

			Degrees and qualifications in vocational schools or colleges, polytechnics and universities				Qualification obtained in the regular system of education
	Lower secondary	Matriculation examination	Vocational education	Polytechnics	Universities	Total	
1997	64,247	35,026	59,806	5,956	16,050	81,812	181,085
1998	66,726	34,701	60,361	6,971	16,557	83,889	185,316
1999	67,043	34,493	59,834	9,890	17,214	86,938	188,474
2000	65,937	35,886	55,477	14,178	16,845	86,500	188,323
2001	63,747	35,508	52,545	18,045	16,822	87,412	186,667

Table 4.1.5
Number of people completing degrees and qualifications in information technology and media studies in 1997–2001.
Source: Statistics Finland, education statistics.

	Information technology and media education			% of all qualifications and degrees taken in vocational schools and collges, polytechnics and universities
	Men	Women	Total	
1997	3,203	906	4,109	5.0
1998	3,345	888	4,233	5.0
1999	4,216	1,099	5,315	6.1
2000	4,674	1,952	6,626	7.7
2001	5,329	2,482	7,811	9.0
Change1997=100				
1997	100.0	100.0	100.0	
1998	104.4	98.0	103.0	
1999	131.6	121.3	129.4	
2000	145.9	215.5	161.3	
2001	166.4	274.0	190.1	

der review, the percentage of men grew somewhat, whereas in 2000 and 2001 the percentage of women increased significantly. Between 1997 and 2001, the number of information technology and media studies qualifications and degrees almost doubled.

In 2001, 47 per cent of the qualifications in information technology and media studies were completed in the fields of engineering, manufacturing and construction, and 28 per cent in natural sciences.

Thirteen per cent of information technology and media studies qualifications had been completed in the fields of social sciences, business and law, and 12 per cent in humanities and arts.

The number of information technology and media studies qualifications at the upper secondary level increased between 1997 and 2001. In 1997, 34 per cent and in 2001 over 50 per cent of information technology and media studies qualifications were completed at the upper secondary level.

By year-end 2001, some 88,300 people had completed an education in information technology and media studies in Finland, and, for 63,600 of them this was their highest educational qualification. Men accounted for 71 per cent of this figure.

Altogether 52 per cent of information technology and media studies graduates were under 35, while 28 per cent of the people with post-compulsory qualifications (other than matriculation examination) were under 35.

Table 4.1.6
Degrees and other qualifications completed in information technology and media studies in 1997–2001 by field of study, level of education and gender.
Source: Statistics Finland, education statistics.

Field of education Level of education	1997	1998	1999	2000	2001
Humanities and arts	172	343	405	778	930
Upper secondary	30	191	272	484	498
Tertiary	142	152	133	294	432
Social sciences, business law	906	507	512	686	986
Upper secondary	0	0	0	0	16
Tertiary	906	507	512	686	970
Science	600	640	849	1,830	2,208
Upper secondary	5	18	139	983	1,630
Tertiary	595	622	710	847	578
Engineering, manufacturing and construction	2,431	2,743	3,549	3,332	3,687
Upper secondary	1,370	1,696	2,199	2,035	2,166
Tertiary	1,061	1,047	1,350	1,297	1,521
Upper secondary total	1,405	1,905	2,610	3,502	4,310
Tertiary total	2,704	2,328	2,705	3,124	3,501
Total	**4,109**	**4,233**	**5,315**	**6,626**	**7,811**
Men	3,203	3,345	4,216	4,674	5,329
Women	906	888	1,099	1,952	2,482

Table 4.1.7
Population with degrees and other qualifications in information technology and media studies by field of study, level of education and gender in different age groups as at 31 December 2001.
Source: Statistics Finland, education statistics.

	Total	Age group					
		15–24	25–34	35–44	45–54	55–64	65+
Humanities and arts	3,035	647	1,500	520	174	183	11
Upper secondary	1,781	514	546	396	135	180	10
Men	981	207	322	253	74	119	6
Women	800	307	224	143	61	61	4
Tertiary	1,254	133	954	124	39	3	1
Men	493	28	396	53	13	2	1
Women	761	105	558	71	26	1	0
Social sciences, business and law	13,944	400	5,974	4,756	1,850	700	264
Upper secondary	9	0	1	5	1	2	0
Men	3	0	1	2	0	0	0
Women	6	0	0	3	1	2	0
Tertiary	13,935	400	5,973	4,751	1,849	698	264
Men	5,199	223	2,621	1,576	551	181	47
Women	8,736	177	3,352	3,175	1,298	517	217
Science	13,958	379	4,086	5,182	3,769	517	25
Upper secondary	3,991	240	732	1,218	1,579	201	21
Men	2,084	169	432	567	827	82	7
Women	1,907	71	300	651	752	119	14
Tertiary	9,967	139	3,354	3,964	2,190	316	4
Men	6,086	91	2,211	2,237	1,335	212	0
Women	3,881	48	1,143	1,727	855	104	4
Engineering, manufacturing and construction	32,614	7,218	12,638	8,149	3,891	483	235
Upper secondary	14,175	6,716	5,154	1,190	625	260	230
Men	13,222	6,506	4,804	974	531	221	186
Women	953	210	350	216	94	39	44
Tertiary	18,439	502	7,484	6,959	3,266	223	5
Men	16,874	407	6,812	6,392	3,048	210	5
Women	1,565	95	672	567	218	13	0
Total	**63,551**	**8,644**	**24,198**	**18,607**	**9,684**	**1,883**	**535**
%	100	13.6	38.1	29.3	15.2	3.0	0.8
Men	44,942	7,631	17,599	12,054	6,379	1,027	252
Women	18,609	1,013	6,599	6,553	3,305	856	283

4.1.4 Employment during information technology and media studies

Among all students who in autumn 2001 were in education leading to qualifications, 42 per cent alternated between study and work. In the case of information technology and media students the corresponding figure was 50 per cent. The number of students working during their

studies has increased since 1999 in all fields of education by 4 percentage points and in the information technology and media fields by 2 percentage points. Information on employment was obtained from Statistics Finland's Student Register and Employment Statistics, which describe the situation for the last week of December 2001. With respect to tertiary students, 55 per cent of all students and 55 per cent of students of information technology and media studies were working

Table 4.1.8
Employment among students at year-end 2001 by age.*
Source: Statistics Finland, education statistics.

Level of education	Age	All fields of education			Information technology and media studies		
		Students, total	Students employed	Per cent employed	Students, total	Students employed	Per cent employed
Total		**569,709**	**238,013**	**41.8**	**54,636**	**27,116**	**49.6**
	–19	210,405	39,313	18.7	7,877	1,298	16.5
	20–24	161,988	66,180	40.9	22,720	8,808	38.8
	25–	197,316	132,520	67.2	24,039	17,010	70.8
Upper secondary		286,187	81,860	28.6	14,661	5,073	34.6
	–19	199,421	36,866	18.5	6,088	992	16.3
	20–24	35,305	13,820	39.1	3,146	1,054	33.5
	25–	51,461	31,174	60.6	5,427	3,027	55.8
Tertiary		283,522	156,153	55.1	39,975	22,043	55.1
	–19	10,984	2,447	22.3	1,789	306	17.1
	20–24	126,683	52,360	41.3	19,574	7,754	39.6
	25–	145,855	101,346	69.5	18,612	13,983	75.1

during their studies. With respect to upper secondary students, the corresponding figures were 29 per cent and 35 per cent.

4.1.5 Employment upon completion of qualifications in information technology and media studies

We now move on to look at how persons completing qualifications in information technology and media studies succeed in finding a job. The data are derived from Statistics Finland's register-based employment figures, describing the situation during the last week of 2001.

Of all those completing tertiary qualifications, 86 per cent had found a job within 12 months, while the figure for information technology and media studies graduates was 92 per cent. Of those with upper secondary qualifications, a little over half had found a job within a year, but their chances were the better the longer the time

Table 4.1.9
Persons completing post-compulsory qualifications in 1990, 1993, 1995, 1999 and 2000 by level of education and principal activity at year-end 2001.*
Source: Statistics Finland, education statistics.

	Qualification completed in	Persons with qualifications	Principal activity at year-end 2001* Employed %	Student %	Unemployed %
Upper secondary total					
	1990	32,826	72.4	4.2	12.4
	1993	35,933	72.9	7.8	10.4
	1995	44,012	68.5	14.9	8.7
	1999	71,488	56.4	30.2	8.6
	2000	76,273	52.1	25.3	10.6
Information technology and media studies					
	1990	133	73.7	2.3	10.5
	1993	796	83.2	4.5	8.0
	1995	1,072	81.5	7.6	7.0
	1999	2,212	61.3	24.8	10.6
	2000	2,840	53.3	20.1	16.8
Tertiary total					
	1990	27,835	87.9	1.9	4.4
	1993	35,626	86.1	2.7	5.1
	1995	35,638	85.4	3.3	5.5
	1999	35,700	86.2	5.4	4.4
	2000	34,429	86.0	5.2	5.2
Information technology and media studies					
	1990	2,120	89.2	1.6	4.4
	1993	2,582	90.1	2.2	3.8
	1995	2,128	91.4	2.7	2.9
	1999	2,496	93.9	1.6	2.6
	2000	2,894	91.6	3.1	3.8

since their graduation. Freshly graduated tertiary level students found jobs just as easily as those who had graduated earlier. Among those completing upper secondary qualifications in information technology and media studies, 17 per cent were unemployed twelve months after graduation. This figure is higher than with graduates from other upper secondary fields. Among tertiary-level graduates, information technology and media studies graduates were better employed than graduates in other tertiary level fields.

Employment trends were declining for information technology and media studies graduates and still rising for other fields

Graduates from information technology and media studies found jobs within a year of graduation better than graduates from other fields of education, but not as easily as two years earlier. However, graduates

Table 4.1.10
Employment of persons with a post-compulsory qualification by age within a year of graduation at year-end 1999 and 2001*.*
Source: Statistics Finland, education statistics.

Age	Percentage of graduates			
	Total		Information technology and media studies	
	1999*	2001*	1999*	2001*
Total	**58.4**	**62.6**	**74.2**	**72.6**
–24	44.0	47.3	50.3	47.1
25–34	79.6	82.6	88.9	87.0
35–44	82.7	85.4	85.1	82.9
45–	81.9	83.2	82.5	76.7
Men	56.2	58.4	72.4	70.0
–24	38.9	39.9	48.4	43.7
25–34	84.1	85.6	90.0	88.0
35–44	85.0	86.3	87.7	82.7
45–	79.9	80.3	80.2	76.5
Women	60.2	65.9	81.3	80.2
–24	48.2	53.4	67.9	67.7
25–34	75.7	80.3	85.5	84.0
35–44	81.4	84.9	79.3	83.3
45–	82.7	84.6	86.3	77.0

Table 4.1.11
Principal activity of selected graduates in information technology and media studies within a year of graduation in 2001.*
Source: Statistics Finland, education statistics.

	Persons with qualifications 2000 total	Principal activity at year-end 2001*			
		Employed	Students	Unemployed	Other
		%	%	%	%
Upper secondary					
Vocational Qualification in Information Technology	1,723	43.1	26.5	16.4	14.0
Further Qualification for Computer Mechanics	182	70.9	8.8	16.5	3.8
Further Qualification in Information Processing	463	69.8	9.9	17.7	2.6
Specialist Qualification in Information Processing	45	71.1	13.3	11.1	4.4
Vocational Qualification in Communications	260	63.8	12.3	20.8	3.1
Further Qualification in Audio-visual Communication	141	70.9	9.9	15.6	3.5
Tertiary					
Diploma in Systems Design (college degree)	483	84.7	5.6	8.3	1.4
M.Sc.. computer science	185	95.7	0.5	1.1	2.7
Bachelor of Engineering. information technology	587	95.4	1.4	1.4	1.9
Bachelor of Engineering. telecommunication	160	95.0	1.3	1.3	2.5
M.Sc. in Technology. information technology	298	97.0	0.7	0.3	2.0
Bachelor of Business Admin., information processing	418	92.3	2.9	3.8	1.0
M.Sc. (Econ. & Bus. Admin.). information systems science	54	96.3	–	1.9	1.9
B.A. in media studies	124	82.3	4.8	12.9	–
M.Pol.Sc., communications studies	42	90.5	–	7.1	2.4
M.Soc.Sc., communications studies	50	82.0	6.0	6.0	6.0

from other fields had found jobs better than two years before. Women generally found more jobs than men; women graduates' employment figures were about 10 percentage points higher than those of men. However, employment situation was the best among 25–34-year-old men with qualifications in information technology and media studies.

Looking at how people with different qualifications in information technology and media studies have found employment within 12 months of graduation, we observe that virtually all of those with tertiary qualifications were in gainful employment, whereas some of those with upper secondary qualifications were out of work. Table 4.1.11 describes the principal activities of completers of certain fields of studies.

4.2 Training organised by enterprises

Enterprises participate in the improvement of adults' information society skills by organising training for their staff. The following takes a look at the training provided and the training structure of the employees. Lastly we take a look at training provided by information sector enterprises.

4.2.1 Training financed by enterprises

The information below is based on the 1999 Continuing Vocational Training Survey (CVTS2)[1], carried out in the 15 EU countries and Norway and in nine other countries applying for EU membership. The survey focused on private sector enterprises with at least 10 employees, excluding the agricultural and forestry sectors.

Training organised by enterprises was divided into two parts in this survey: 1) formal training courses and 2) other training, including various pre-scheduled training and introduction periods, other arrangements related to job rotation and training assignments, participation in study groups and quality circles, self-learning and distance learning, and conferences, lectures and seminars with an educational function. Apprenticeship training was not included. Detailed information about participation – concerning the type of participants, training hours, training costs, and fields of training – were compiled on training courses only.

The Nordic countries are at the top in organising employer-sponsored training. Training courses were organised the most by enterprises in the Nordic countries, the Netherlands and the UK, with the figures ranging from 75 per cent (Finland) to 88 per cent (Denmark). The number of enterprises organising other type of training was proportionately also the highest in the Nordic countries, the UK and Ireland.

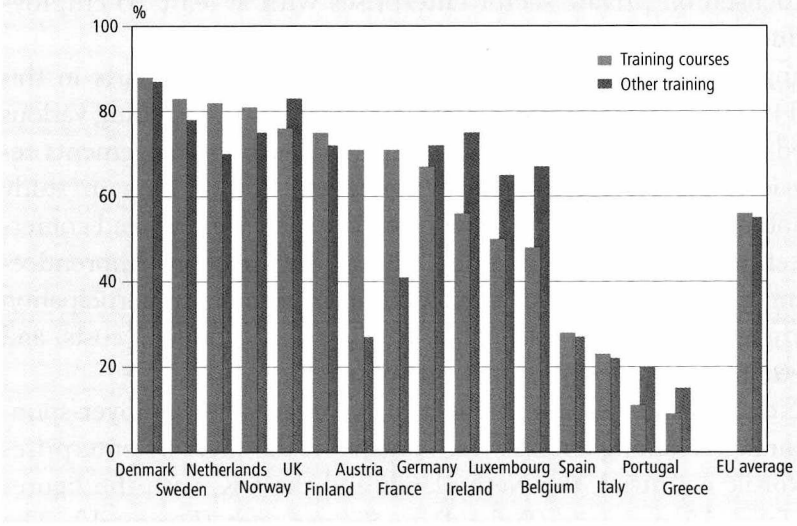
1 For more information on Continuing Vocational Training Survey, see Statistics Finland web pages: http:/tilastokeskus.fi/tk/he/yrhenkkoul_etusivu.html.

Greek, Portuguese, Italian and Spanish enterprises organised the least training. The information on training organised by enterprises dates from 1999. (Figure 4.2.1)

Of the training organised by enterprises, training courses accounted for only a fraction more than other types of training. The focus seems to be shifting from training courses to learning on the job. While it is easy to compile exact data on participants, numbers of training hours or precise contents with respect to training courses, this process is more difficult with respect to learning on the job. The data below describe training courses organised by enterprises in the EU countries (and Norway).

The average in the EU countries in the tables and charts (EU average) have been calculated by the total sum of parameters by country, divided by the number of countries. In Eurostat statistics concerning the CVTS2 survey, the figures for the EU average usually take into account the number of enterprises and employees per country. This means that measured in terms of population and numbers of enterprises the EU averages incline towards the big EU countries, such as Germany, France, the UK and Italy.

Figure 4.2.1
Percentage of enterprises organising training in the EU countries and Norway.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.



Participation rate highest in the Nordic countries and the UK

An average of 56 per cent of enterprises in the EU countries organised training courses, with an average of 38 per cent of all employees participating. The participation percentage rises to 48 per cent, if only

employees of the enterprises that are organising the training are included. (Table 4.2.1 and Figure 4.2.2)

There are various types of country profiles in organising training courses. The participation percentage is usually the highest in countries where the number of enterprises organising training is also high, such as in the Nordic countries and the UK. Yet in Austria and Germany, where over two thirds of enterprises organised training, only about a third of all employees participated in training.

A distinct group was formed by Greece, Portugal, Italy and Spain where the percentage of enterprises organising training and people participating in it were the lowest. Yet in the enterprises in Portugal, Italy and Spain that organised training for their employees, a relatively high percentage (44% – 47%) of the employees attended.

Half of the employees in the private sector participated in training courses in Finland. As the employees in the studied Finnish enterprises numbered about a million (1,012,000) in 1999, it means that about half a million participated in training.

Table 4.2.1
Percentage of enterprises organising training and of employees having participated in it in the EU countries and Norway.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.

	Enterprises organising training	Percentage of participants of all employees	among enterprises organising training
	%	%	%
Sweden	83	61	63
Denmark	88	53	55
Finland	75	50	54
UK	76	49	51
Norway	81	48	53
France	71	46	51
Belgium	48	41	54
Netherlands	82	41	44
Ireland	56	41	52
Luxembourg	50	36	48
Germany	67	32	36
Austria	71	31	35
Italy	23	26	47
Spain	28	25	44
Portugal	11	17	45
Greece	9	15	34
EU Average	**56**	**38**	**48**

Finland: If only the employees of enterprises that are organising training are included, the participation percentage rises to 54 per cent, which is a fraction above the figure obtained if the employees of all enterprises are included (50%). The difference is caused by the fact that enterprises not organising courses are excluded from the basic figure. The small difference in these figures is explained by the fact that more training is offered in larger enterprises, which employ a much greater number of the total number of employees than small enterprises do. Some 75 per cent of enterprises organised training courses, but on the other hand these enterprises employed 92 per cent of all employees under review.

Figure 4.2.2
Proportions having participated in employer-sponsored training among all wage and salary earners in EU Countries and Norway.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.

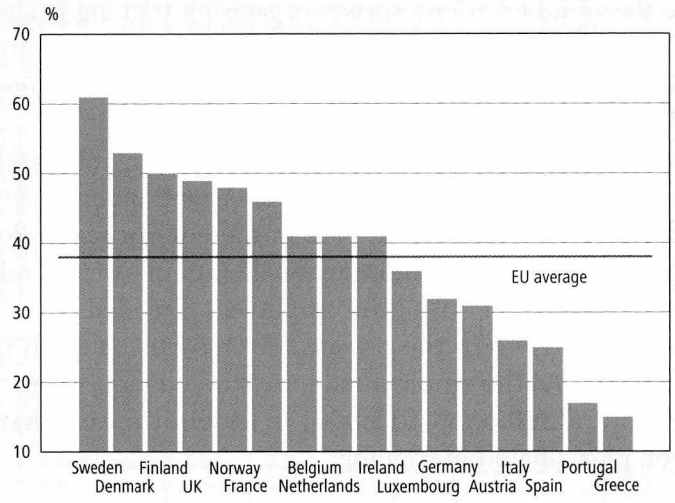


Table 4.2.2
Percentage of participants in training courses and the number of training hours in EU countries and Norway
Source: Statistics Finland, Continuing Vocational Training Survey 1999.

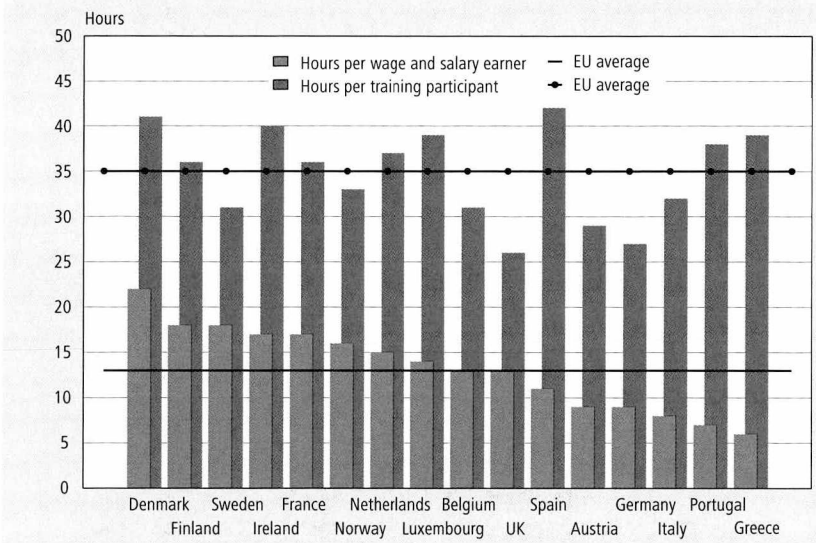
	Percentage of employees participating %	Training hours per employee	per training participant
Denmark	53	22	41
Sweden	61	18	31
Finland	50	18	36
Ireland	41	17	40
France	46	17	36
Norway	48	16	33
Netherlands	41	15	37
Luxembourg	36	14	39
Belgium	41	13	31
UK	49	13	26
Spain	25	11	42
Austria	31	9	29
Germany	32	9	27
Italy	26	8	32
Portugal	17	7	38
Greece	15	6	39
EU average	**38**	**13**	**35**

Two days of training per employee in the EU countries

Enterprises in the EU countries organised about 13 hours (i.e. about two days) of training per employee. The Nordic countries, Ireland and France were at the top of the list. Greece, Portugal, Italy, Germany, Austria and Spain were below the average in the EU countries. The number of hours spent of training per participant averaged 35. The numbers of hours per all employees and of those participating in training are presented in Table 4.2.2 and Figure 4.2.3, respectively.[2]

Finnish enterprises organised an average of 18 hours (about 3 days) of training per employee. This figure is 36 hours (6 days) per employee for those who actually participated in the training.

Figure 4.2.3
Training hours per wage and salary earner and training participant in EU Countries and Norway.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.



Costs of training two per cent of labour costs in the EU

Training costs[3] form an average of 2.0 per cent of labour costs in the EU countries. Direct costs account for 1.1 per cent, on average, which is only slightly higher than the share of the labour costs of the partici-

2 The data on the hours of training per employee are internationally comparable, because the hours are in proportion to all employees. The number of training hours per training participant indicates how many hours in training per participant are offered by enterprises.

pants during the training, i.e. 0.9 per cent of total costs. In most countries the share of direct costs was higher than that of the labour costs, with the exception of France, Belgium, Spain and Greece. (Table 4.2.3)

The proportion of training costs of labour costs was above the EU average in the Nordic countries, Holland, Ireland and France.

In Finland, training costs accounted for 2.4 per cent of labour costs, and the share of direct costs was slightly higher than that of the labour costs of total costs.

Enterprises in Finland spent an average of EUR 760 on training per employee. The largest single expenses were labour costs during the training period, which accounted for 46 per cent of the total costs. Organisers' fees were almost as high at 40 per cent of the total costs. The participants' travel and subsistence payments and costs of premises, equipment and materials and contributions to collective funding ar-

Table 4.2.3
Training costs as a percentage of labour costs in the EU countries and Norway. Source: Statistics Finland, Continuing Vocational Training Survey 1999.

	Training costs as a percentage of labour costs		
	Total[1]	Direct costs	Salary costs
	%	%	%
Denmark	3.0	1.7	1.4
Netherlands	2.8	1.7	1.1
Sweden	2.8	1.6	1.3
Ireland	2.4	1.5	1.0
France	2.4	1.0	1.2
Finland	2.4	1.3	1.1
Norway	2.3	1.4	0.9
Luxembourg	1.9	1.0	1.0
Italy	1.7	1.2	0.6
Belgium	1.6	0.6	0.9
Germany	1.5	0.9	0.7
Spain	1.5	0.5	0.9
Austria	1.3	0.8	0.5
Portugal	1.2	0.7	0.6
Greece	0.9	0.4	0.5
EU Average	**2.0**	**1.1**	**0.9**

1 Direct training costs and salary costs for the training period together constitute gross training costs. Because of receipts from collective funds and contributions to collective funding arrangements, the figures may not tally in the 'Total' column.

Data on the UK are not shown because they are not comparable.

3 Training costs can be divided into indirect and direct costs. Indirect costs consist of the labour costs of the participants during the training. Direct costs consist of the fees of the training organisers, the participants' travel and subsistence payments, costs of premises, equipment and materials, and contributions to collective funding arrangements. The total training costs refer to indirect and direct costs minus any subsidies and receipts from collective funding arrangements, government or other sources.

rangements were lower, some 14 per cent of the total costs. The total costs are lowered by receipts from collective funds, which accounted for 4 per cent.

Information technology attracted the most interest

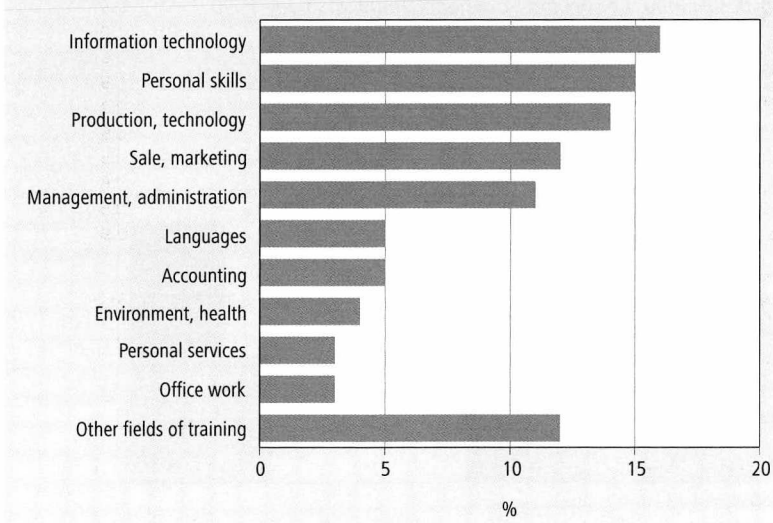
Measured by the number of training days, training organised by Finnish enterprises focused on information technology (automatic data processing and computer use), personal skills required in working life, and production and technology subjects. The above together account for almost half of all training days. (Figure 4.2.4)

The same fields of training were the most popular in the EU, too, although in a different order. Information technology accounted for 17 per cent of training days in the EU countries, the same as technology and production, while training days for personal skills in the workplace accounted for 10 per cent.

4.2.2 Employer-sponsored training in the information sector

The information sector will be henceforward separated into its own group and compared with the rest of the enterprise sector (i.e. the corporate sector minus the information sector). Industries belonging in the information sector have been described in the introductory chapter.

Figure 4.2.4
Distribution of course training hours by field of training[1] in Finland.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.



1 The training content is based on an international classification (CEDEFOP/Eurostat: Fields of Training).

The majority, or 87 per cent, of Finnish information sector enterprises organised training courses for their employees. In the rest of the enterprise sector, the percentage of enterprises organising training was much lower at 73 per cent. (Table 4.2.4)

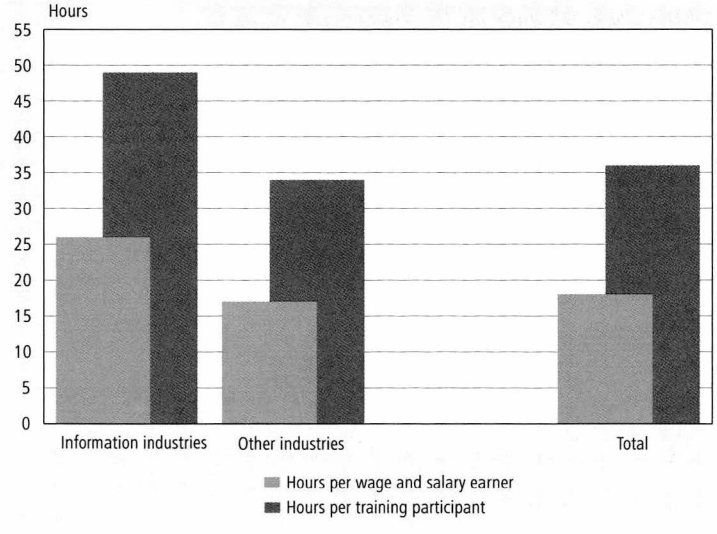
Some 10 per cent of the enterprises covered by this survey (enterprises with at least 10 employees, excluding the agricultural and forestry sectors) were operating in the information sector.

A slightly higher percentage of information sector employees attended training than employees elsewhere in the enterprise sector. About half, or 50,000 employees, attended training courses in the information sector.

Table 4.2.4
Training organised by information sector enterprises in 1999.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.

	All enterprises	Percentage of enterprises that organised training	Training participated in by persons	Percentage of all employees	Hours of training per all employees	Hours of training per training participant
	N	%		%	hours	hours
Information sector	1,303	87	50,200	52	26	49
Other sectors	12,149	73	457,000	50	17	34
Total	**13,451**	**75**	**507,200**	**50**	**18**	**36**

Figure 4.2.5
Training hours per wage and salary earner and training participant in different sectors.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.



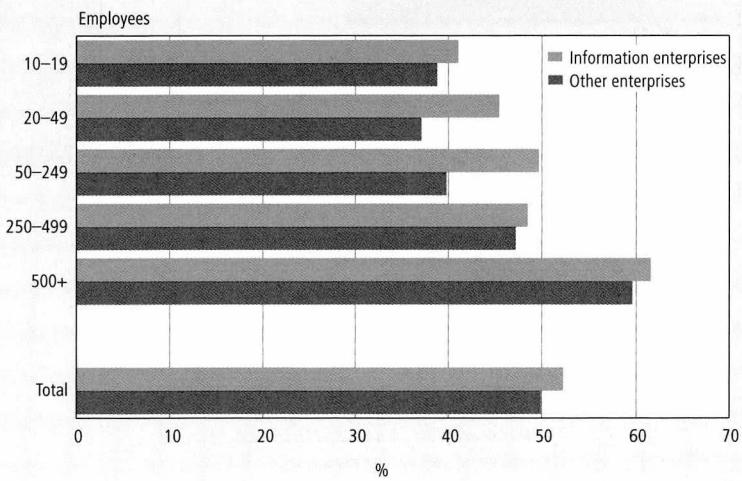
The volume of training organised by information sector enterprises was also higher than elsewhere in the enterprise sector. Information sector enterprises averaged 26 training hours per employee, or 49 training hours per training participants. (Figure 4.2.5)

Large enterprises in both the information sector and elsewhere in the enterprise sector offer the most training

More of the staff in large enterprises received training than in small enterprises. While only about 40 per cent of the staff in enterprises employing fewer than 20 people participated in training, in enterprises with at least 500 employees the figure was 60 per cent. In particular, employees working for information sector enterprises with a staff of 20 to 249 participated more in training than did employees working for enterprises of similar size in other sectors. (Figure 4.2.6)

The most popular field of training in the information sector was information technology and production and technology training. IT training in information sector enterprises averaged about 6 hours per employee, while this figure was a good two hours in other enterprises. The same applied to production and technology training (same figures). In the information sector, an average of almost 4 hours was spent in personal skills training, and one hour less in other enterprises.

Figure 4.2.6
Proportions of wage and salary earners having participated in course training in the information sector and in other enterprises by size of enterprise.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.



Enterprises' training structure and level of training activity in the information sector

The educational structure (i.e. the educational background of the employees) is the single most prominent factor explaining why the information sector is so active in training. Since the survey did not record the employees' educational background, this information was obtained from Finnish registers. The figures and tables below describe the training structure of information sector enterprises and compare it with the training structure in other sectors.

An above-average percentage of staff in information sector enterprises had completed post-compulsory education. A characteristic of almost 40 per cent of the enterprises in the information sector was that the proportion of staff holding a qualification was high. In this survey, a high percentage means at least 85 per cent. Only some 20 per cent of enterprises in other sectors reached the same level of qualifications. (Figure 4.2.7)

The percentage of staff with a tertiary degree was also much higher in information sector enterprises than in other sectors. A good quarter of information sector enterprises had a high percentage of employees (that is, at least half of the staff) with a tertiary degree. In other sectors, the corresponding figure was only 13 per cent. (Figure 4.2.8)

Figure 4.2.7
Distribution of enterprises in the information sector and in the rest of the enterprise sector by proportion of employees with degrees and qualifications.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.

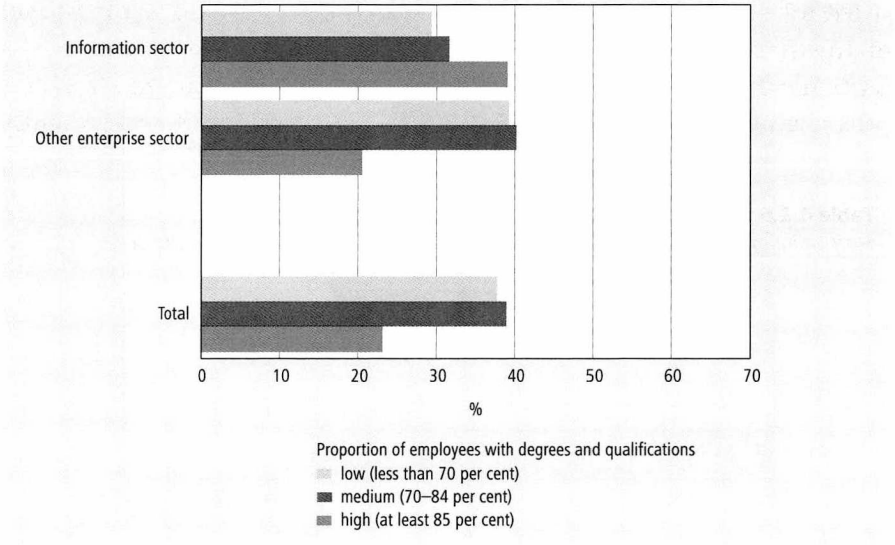
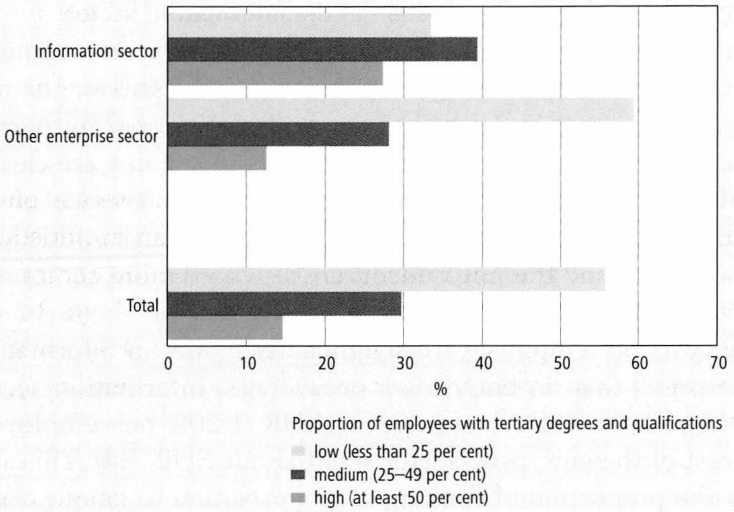


Figure 4.2.8
Distribution of enterprises in the information sector and in the rest of the enterprise sector by proportion of employees with tertiary degrees and qualifications. Source: Statistics Finland, Continuing Vocational Training Survey 1999.



The higher the percentage of staff with a tertiary degree the higher the figures indicating activity in training matters. In enterprises where less than 25 per cent of the staff had a tertiary degree, slightly over a third took part in training. In enterprises where at least half of the staff had a tertiary degree, almost 60 per cent took part in training. (Table 4.2.5)

The percentage of training participants and the amount of time spent in training were the highest in the enterprises where at least half of the staff had a tertiary degree. The effect of training structure is particularly visible in the amount of money spent on training. In enterprises where at least half of the staff have a tertiary degree, slightly

Table 4.2.5
Staff training parameters by training structure in information sector enterprises. Source: Statistics Finland, Continuing Vocational Training Survey 1999.

Employees with tertiary degree	Percentage of companies organising training	Percentage of all employees	Hours of training per employee	Training expenses per employee	Training cost as a percentage of labour costs
	%	%	hours	euros	%
Under 25%	66	37	19	618	2.2
25–49%	96	56	21	1,080	3.0
50% or more	91	59	39	1,948	5.0
Total	**87**	**52**	**26**	**1,227**	**3.5**

over EUR 1,900 was spent annually on training per employee. This is almost three times more than in enterprises where less than a quarter had a tertiary degree.

Employer-sponsored training parameters in the information sector

Altogether 87 per cent of information sector enterprises organised training courses, which was nearly 15 percentage points above the rest of the enterprise sector. About half of the staff participated in training in both sectors. However, the numbers of hours in training are clearly different. Information sector employees attended an average of 26 hours of training, which was almost 10 hours more than in other sectors. Training plans and training budgets are also used more commonly in information sector enterprises. (Table 4.2.6)

Training costs per employee are significantly higher in information sector enterprises than in enterprises on average. Information sector enterprises spent an annual average of EUR 1,200 per employee, while the rest of the enterprise sector spent about EUR 700. This also reflects on the proportion of training costs in relation to labour costs, which in information sector enterprises was one percentage point higher than the corporate sector average.

All parameters in information sector enterprises were clearly higher than in the other corporate sectors, which indicates that information sector enterprises consider employer-sponsored training an important issue. Over the past few decades especially industries connected with information work have undergone strong change and growth. Constantly changing infrastructure and new production and service technologies require continuous renewal of skills from employees. The higher training figures are also explained by the educational structure of the staff. The information sector has more highly educated staff than the rest of the enterprise sector which actively seeks to train itself more. Perhaps the work done in information sector enterprises re-

Table 4.2.6
Staff training parameters in the information sector and other sectors.
Source: Statistics Finland, Continuing Vocational Training Survey 1999.

	Percentage of companies organising training	Percentage of participants	Hours of training per employee	Training plan made by	Training budget made by	Training costs per employee	Training costs as a percentage of labour costs
	%	%	hours	%	%	euros	%
Information sector	87	52	26	34	40	1,227	3.5
Other sectors	73	50	17	23	26	711	2.3
Total	**75**	**50**	**18**	**24**	**27**	**760**	**2.4**

quires plenty of training by its very nature. On the other hand, one may ask whether information sector employers are more aware of training issues, or whether staff training is a necessity for enterprises' survival.

4.3 Importance of literacy in the information society

A sufficient level of literacy is essential to operate in the modern information society and to study new things. The literacy level of Finnish young people and adults has been assessed in two extensive international surveys: the Programme for International Student Assessment (PISA)[4] and the Second International Adult Literacy Survey (SIALS)[5].

PISA studied how well 15-year-olds master the key skills needed in the future, namely literacy, mathematics and natural sciences. The results show that the literacy level among Finnish young people is the best in the OECD countries and the mathematical and natural science skills are among the top countries, too.

In international literacy surveys, literacy is defined more broadly than the mere ability to read. It is a comprehensive skill involving the ability to understand and use printed text, graphs and figures in basic tasks in the course of one's duties and in the daily context. Literacy enables people to operate in the information society and also enhances lifelong learning. This is considered a key skill which should be developed throughout one's life.[6]

The multiplicity of skills that constitute literacy was assessed in three different dimensions: prose literacy, document literacy and quantitative literacy, or literacy related to basic arithmetic.

Performance was graded on a scale of five levels of literacy, 1 being the lowest and 5 the highest. In international comparison, 3 is considered sufficient for the information society, enabling the person to take an active part in society and studies.[7]

4 The PISA survey was participated in by 28 OECD and 4 non-OECD countries. The data were collected in 2000. In Finland, the target population consisted of 5,317 students, most of them 9th graders. Responses were obtained from 4,864 students. For more information about the survey, see http://www.jyu.fi/ktl/pisa/.

5 The Second International Adult Literacy Survey was participated in by 20 countries and it was carried out between 1997 and 2000. The Finnish survey data were collected in spring 1998 from the Finnish-speaking population aged between 16 and 65. The sample size was 4,250 and the number of respondents 2,928. For more information about the survey, see http://www.jyu.fi/ktl/sials/.

6 Linnakylä, P., Malin, A., Blomqvist, I and Sulkunen, S. 2000.

7 Linnakylä et al. 2000.

According to the adult literacy survey, 16-65-year-old Finns have a high level of literacy by international standards. When viewing Finland at the national level, there are clear differences in adult literacy. Two thirds of the population have a good level of literacy, i.e. they fulfil the literacy requirements for the information society and lifelong learning in all three aspects of literacy. One third of the population is clearly lagging behind, with their literacy at the two lowest levels in at least one dimension. These people can read in the traditional meaning of the word, but their literacy does not reach the level required in the information society and in lifelong learning.[8]

There were distinct variations between age groups. Literacy was generally the better the younger the age group. Of the adult population, 16-45-year-olds did much better in all aspects of literacy than 46-65-year-olds. The differences can to a large extent be explained by the formal education level and its gradual rise over time. On the whole, the more formal the training, the higher the level of literacy.[9]

Sources

Continuing Vocational Training Survey 1999. Research material. Statistics Finland. (see also http://tilastokeskus.fi/tk/he/yrhenkkoul_etusivu_en.h

Linnakylä, P., Malin, A., Blomqvist, I. and Sulkunen, S. 2000. Literacy at Work and in Everyday Life. (in Finnish: Lukutaito työssä ja arjessa.) International Adult Literacy Survey in Finland.

Statistics Finland 2002. Continuing vocational training survey (CVTS2) 1999. Koulutus 2002:6.

Välijärvi, J., Linnakylä, P., Kupari, P., Reinikainen, P. and Arffman, I. 2002. The Finnish success in PISA - and some reasons behind it.

8 Linnakylä et al. 2000.
9 Linnakylä et al. 2000.

5 Business, Production and Foreign Trade

- Entrepreneurial activity in the information sector continued to expand in 2001. The number of enterprises in the sector was 15,660, which together had some 160,000 employees and a combined turnover of EUR 48 billion.
- Enterprises in the information sector accounted for some 18 per cent of the turnover of all enterprises in Finland and for 12 per cent of private sector personnel.
- The information sector is heavily concentrated in the region of Uusimaa. In 2001 more than one-half of all people employed in the information sector worked in establishments in Uusimaa.
- The value of the output of information technology products amounted to EUR 14.6 billion in 2001, down by 0.4 per cent on the previous year. Other industrial production, on the other hand, showed an increase of 1.7 per cent in value terms.
- Information technology exports amounted to around EUR 10 billion in 2002, representing 22 per cent of total Finnish exports. The single most important product group was that of communications equipment, which accounted for 84 per cent of the exports of information technology products. Imports of information technology products represented 16 per cent of total imports.
- In 2001 just three EU countries showed a positive foreign trade balance in information technology products, viz. Ireland, Finland and Sweden.
- Finnish R&D expenditure as a proportion of GDP stood at 3.4 per cent in 2001. The only EU country that spends more on R&D is Sweden.
- It is estimated that R&D expenditure in Finland in 2002 amounted to almost EUR five billion, with the enterprise sector accounting for almost 3.5 billion. Enterprises in the information sector account for more than two-thirds of total research spending in the private business sector.

5.1 Structure of the information sector

The industries engaged in goods and service production in the information sector are here defined in line with the OECD recommendation from 1998 (see Introduction). Apart from goods and service production, the information sector also comprises content production, which is not covered in the OECD definition. There is as yet no universally accepted international framework for content production and the industries it comprises. Therefore in this publication it is used the same national definition as has been applied in earlier Statistics Finland publications on the

information society. The industries that are classified under content production in the information sector are listed in connection with the definition of goods and service production in the introductory chapter.

This Chapter describes the performance of enterprises engaged in the information sector in 1995–2001. Most of the data are derived from Statistics Finland's Business Register. Industries are classified on the basis of the 1995 Standard Industrial Classification (SIC-95)[1] instead of the new classification from 2002.

5.1.1 The information sector in entrepreneurial activity

In 2001 there were a total of 224,800 enterprises in Finland that had a combined turnover of EUR 272 billion.[2] Both the number of enterprises and the number of employees increased by around 20 per cent from 1995 to 2001. Turnover figures grew even more rapidly. The total turnover of Finnish enterprises increased by 64 per cent from 1995 to 2001.

Measured in terms of turnover, the information sector accounted for 18 per cent of entrepreneurial activity in Finland in 2001, compared to around 9 per cent in 1995. In 1995 some 8 per cent of all people working in business and industry were engaged in the information sector, by 2001 the figure had risen to 12 per cent.

In 2001 there were 15,660 enterprises in the information sector, which together employed around 160,000 people and showed a turnover of EUR 48 billion.

The information sector has grown very rapidly in comparison with all entrepreneurial activity in Finland. The turnover of information sector enterprises tripled from 1995 to 2001. The strongest growth was recorded in goods production, but turnover in service and content production also showed faster growth than in all enterprises. Likewise, staff numbers increased more rapidly in the information sector than in all enterprises. From 1995 to 2001, the numbers employed in the information sector increased by almost 50 per cent. The biggest increase was seen in companies engaged in service production. Appendix 5.1 shows the number of enterprises, personnel numbers and turnover figures for the information sector, certain other industries and in total business and industry in Finland. In addition, Appendix 5.2 provides turnover statistics for the information sector by industry in 1995–2001.

1 The industrial classification (SIC-95) is used at its most accurate, i.e. the 5-digit level. In most cases international comparative data are only available at lower levels. The industrial classification is harmonised in all EU countries to the 4-digit level.

2 No turnover data are available for industries 65-67 'financial intermediation'.

Figure 5.1.1
Information sector personnel and turnover as a percentage of all enterprises' personnel and turnover in 1995–2001.
Source: Statistics Finland, Business Register.

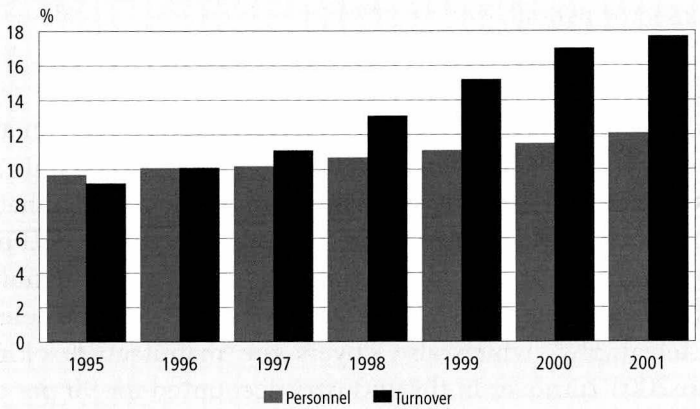
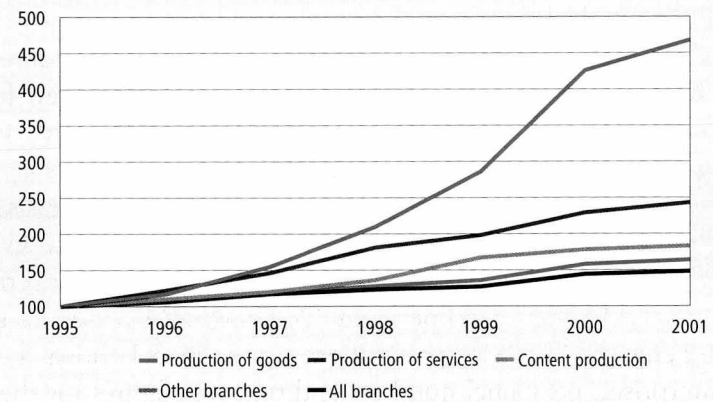


Figure 5.1.2
Turnover trends in the information sector and in all enterprises in 1995–2001, 1995=100.
Source: Statistics Finland, Business Register.



5.1.2 Enterprises in the information sector

Enterprises operating in the information sector are highly heterogeneous. Many of the industries involved have seen rapid advances both in the development of new products and new technologies; this applies among others to computer and related activities, telecommunications and the manufacture of telecommunications equipment. At the

same time new opportunities have been opened up for new entrepreneurs and enterprises. The development of information technology has created new markets for sometimes highly specialised businesses. Indeed the number of enterprises in the information sector has increased from the mid-1990s to 2001 much more sharply than in the enterprise sector overall.

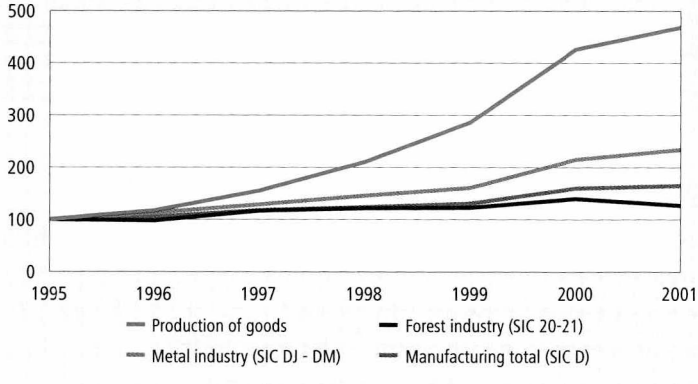
Goods production

Goods production enterprises in the information sector are on average bigger than service and content production enterprises in this sector. In 2001 there were some 700 enterprises in goods production with a total turnover of EUR 27 billion and a labour force of 49,000 people. The most significant branch in goods production was the manufacture of television and radio transmitters and apparatus for line telephone and line telegraphy, which also covers the manufacture of mobile phones. In 2001 turnover in this industry accounted for 90 per cent of the total turnover in information sector goods production: the figure was EUR 24 billion compared to just over EUR 3 billion in 1995.

Turnover in goods production in the information sector increased by almost 370 per cent from 1995 to 2001, while at the same time the whole metal industry recorded an increase of around 130 per cent. In the forest industry turnover growth was far more modest; in fact in 2001 the figures declined from the previous year.

Goods production in the information sector has become a very significant branch of the metal industry. In 1995 it accounted for just

Figure 5.1.3
Turnover trends in information sector goods production, in the forest and metal industries and in manufacturing as a whole in 1995–2001, 1995=100.
Source: Statistics Finland, Business Register.



one-quarter of the industry's total turnover, by 2001 that proportion had increased to one-half. In relative terms the numbers employed in information sector goods production have also grown faster than in the metal industry in general. From 1995 to 2001, the information sector accounted for some 45 per cent of the increase in employment in the metal industry.

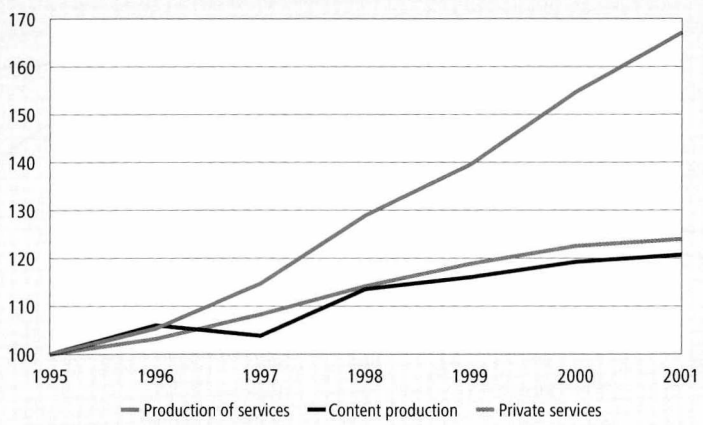
In 2001 goods production turnover in the information sector was around one-quarter of total business and industry turnover.

Production of services

Service production in the information sector involves very different kinds of industries. This category includes the wholesale of entertainment electronics, telecommunications and computer and related activities. In relative terms the number of enterprises involved in the information sector has increased most in service production: from 1995 to 2001, the number of enterprises increased by 42 per cent. Service production is also the biggest employer in the information sector: in 2001 the total number of employees in service production was almost 68,000.

Measured in terms of turnover, the most important field of service production in the information sector is telecommunications, which in 2001 accounted for 36 per cent of the total turnover in information sector service production. The next most important industries are the wholesale of computer hardware and computer and related activities.

Figure 5.1.4
Trends in numbers employed in the information sector service production and content production and in other private services 1995–2001, 1995=100.
Source: Statistics Finland, Business Register.



Content production

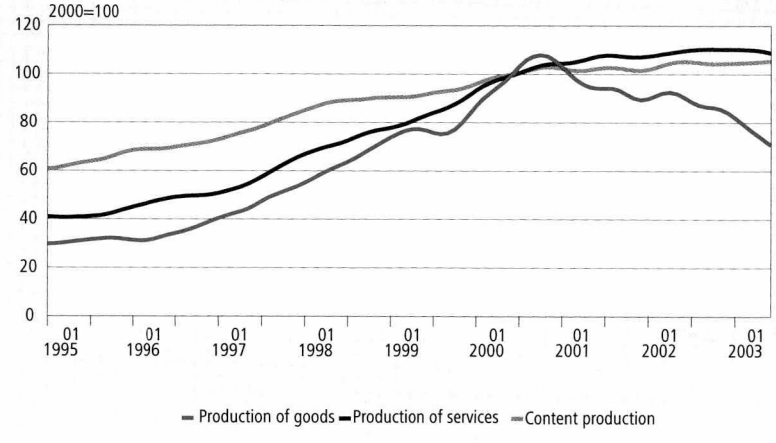
Enterprises engaged in content production are on average smaller than other enterprises in the information sector. However, the number of enterprises is more than one-and-a-half times greater than the total number of enterprises in goods and service production. The turnover of content production enterprises in 2001 amounted to EUR 6 billion. The single most significant industry was publishing, which accounted for 40 per cent of total turnover. Content production employs less people as goods and service production. In 2001 the total number of personnel was just under 43,000, and the increase in numbers employed since the mid-1990s has not matched the rate seen in goods and service production.

Recent turnover trends in the information sector

As we have seen above, turnover in the information sector developed favourably from the mid-1990s through to the end of 2001. The data on turnover are based on annual statistics provided by The Register of Enterprises and Establishments depicting total annual turnover by industry.

Statistics Finland's data on short-term business trends provide a useful tool for monitoring recent development in turnover in the information sector. Monthly short-term business statistics are indicators of economic trends which are produced from data obtained with Statistics Finland's monthly enterprise survey and the Tax Administration's payment control data. The indicators describe development by indus-

Figure 5.1.5
Turnover trends in the information sector January 1995 – June 2003, 2000 = 100.
Source: Statistics Finland, short-term business trends.



try over time. An examination of short-term business trends reveals that turnover growth in goods production was in fact reversed in late 2000, and the figures have continued to decline ever since. In service production and content production, too, turnover trends have slowed down since 2001.

5.1.3 Information sector establishments by region

The same enterprise may have one or more establishments in different regions. By region, the information sector can be described by using data on establishments.

Business in the information sector is heavily concentrated in the region of Uusimaa. In 2001, half of all information sector establishments were based in Uusimaa, 55 per cent of personnel in the information sector worked in these establishments and some 56 per cent of the sector's turnover came from these establishments. Other major regions in this analysis include Pirkanmaa, North Ostrobothnia and Varsinais-Suomi, which take in the major cities of Tampere, Oulu and Turku, respectively.

Table 5.1.1
Regional breakdown of personnel and turnover in information sector establishments and percentage of establishments of all industries by region in 2001.
Source: Statistics Finland, Business Register.

	Information sector breakdown, %		Information sector's share of all industries, %	
	Personnel	Turnover	Personnel	Turnover
Whole country	**100.0**	**100.0**	**12.0**	**17.7**
Uusimaa	55.1	56.4	19.4	23.9
Itä-Uusimaa	0.4	0.3	3.0	1.9
Varsinais-Suomi	8.4	17.3	11.2	32.7
Satakunta	1.4	0.6	3.9	2.5
Kanta-Häme	1.2	0.4	5.0	3.5
Pirkanmaa	9.1	8.2	12.4	19.0
Päijät-Häme	1.5	0.8	4.9	5.1
Kymenlaakso	0.8	0.4	2.8	2.4
South Karelia	0.9	0.4	4.5	3.2
Etelä-Savo	0.7	0.3	4.0	4.1
Pohjois-Savo	2.0	1.0	6.8	6.3
North Karelia	0.8	0.4	4.5	4.7
Central Finland	3.4	2.3	9.6	11.3
South Ostrobothnia	0.7	0.3	2.9	2.5
Ostrobothnia	1.5	0.8	5.8	4.9
Central Ostrobothnia	0.4	0.1	4.5	2.6
North Ostrobothnia	9.6	9.0	18.7	30.1
Kainuu	0.9	0.3	10.0	7.3
Lapland	0.9	0.4	4.3	3.3
Åland	0.2	0.2	4.4	6.0

From 1997 to 2001, both the number of information sector establishments and personnel numbers have increased in all regions with the single exception of Itä-Uusimaa, where the number of personnel working in the information sector decreased by around one per cent during this period.

The number of information sector establishments as a proportion of all establishments varies widely from one region to another. In 2001 this proportion was highest in Uusimaa at 12 per cent, compared to a national average of 7 per cent. The next highest figures were recorded in Pirkanmaa (6.3%), Päijät-Häme (5.6%) and Central Finland (5.6%).

In 2001 more than 19 per cent of the personnel of the establishments in Uusimaa worked in the information sector. North Ostrobothnia, too, had a very high figure at close to 19 per cent. In Varsinais-Suomi, Pirkanmaa and Kainuu, the corresponding proportions were around 10 per cent or slightly less.

In 2001 the information sector in Varsinais-Suomi accounted for the largest proportion of the turnover of all establishments within a region, at almost 33 per cent. In North Ostrobothnia, information sector establishments accounted for 30 per cent of the region's total turnover. In Uusimaa and Pirkanmaa, too, turnover in the information sector accounted for a higher than average proportion of total regional turnover.

5.1.4 The information sector in Finland and the other Nordic countries

In 2000 a total of some 510,000 people were engaged in goods and service production in the Nordic information sector, representing almost 9 per cent of the total private sector labour force. In this analysis ICT services are divided between wholesale, telecommunications and computer and related activities. Twenty-eight per cent of the labour force were engaged in goods production, over one-third or 35 per cent in computer and related activities, 20 per cent in wholesale and 17 per cent in telecommunications.

These figures are drawn from the report Nordic Information Society Statistics 2002, compiled jointly by the Nordic statistical agencies.[3]

Goods production in the information sector has a particularly prominent role in Finnish and Swedish manufacturing. For example, in 2000 the information sector accounted for around 10 per cent of total

3 Statistics Denmark, Statistics Finland, Statistics Iceland, Statistics Norway, Statistics Sweden (2002). The report uses the OECD's definition of information sector goods and service production. The industries of content production were excluded from the analysis. The report includes materials from all the Nordic countries and draws mainly on the business registers of the respective countries.

Figure 5.1.6
Goods production in the information sector as a proportion of total industrial goods production in the Nordic countries in 2000.
Source: Nordic Information Society Statistics 2002.

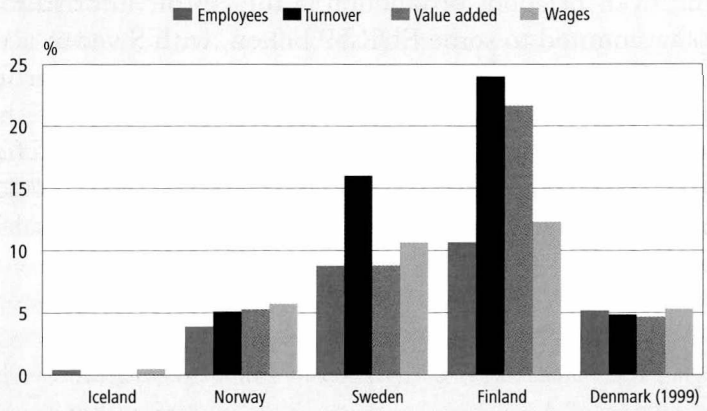
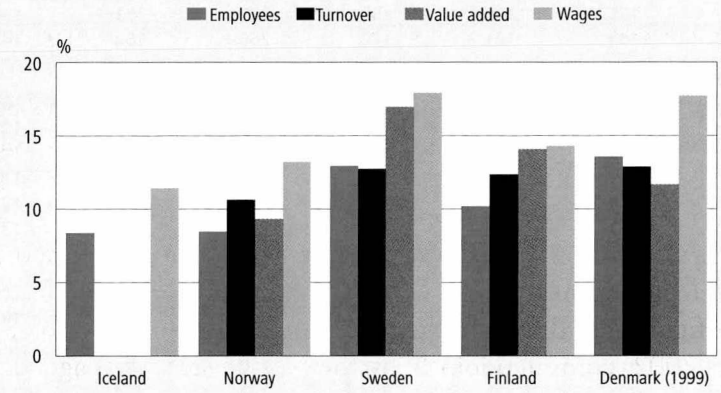


Figure 5.1.7
Service production in the information sector as a proportion of total service production in the Nordic countries in 2000.
Source: Nordic Information Society Statistics 2002.



labour force in manufacturing in both countries. Measured in terms of turnover, the information sector accounted for 24 per cent of manufacturing turnover in Finland and for 16 per cent of manufacturing turnover in Sweden.

ICT services employed 8–14 per cent of the total personnel of the services sector in the Nordic countries in 2000. Services in the information sector accounted for almost the same proportion of the total turnover of all services, i.e. 11–13 per cent, in all the Nordic countries excepting Iceland.

Total turnover for goods production in the Nordic information sector in 2000 amounted to some EUR 59 billion, with Sweden accounting for 46 per cent and Finland for 41 per cent. Total turnover for service production in the information sector in 2000 was EUR 97 billion. The breakdown by country is different than for goods production, although Sweden again accounts for the largest proportion (38%). In all countries the most significant service branch is that of wholesale.

Table 5.1.2
Turnover trends in current prices in the Nordic countries from 1995 to 2000, (1995=100).
Source: Nordic Information Society Statistics 2002.

	Production of goods	Production of services			Total ICT services	Total private sector[1]
		Wholesale	Telecommunications	Consultancy services		
Norway						
1995	100	100	100	100	100	100
1996	112	105	112	116	109	106
1997	126	111	128	155	123	116
1998	128	119	143	195	138	125
1999	155	126	155	233	151	131
2000	183	121	172	266	158	141
Sweden						
1995	100	100	100	100	100	100
1996	117	98	91	112	99	101
1997	136	112	106	124	113	111
1998	161	130	123	156	134	118
1999	188	131	127	197	146	124
2000	221	135	138	232	158	137
Finland						
1995	100	100	100	100	100	100
1996	117	122	120	113	120	107
1997	155	148	147	119	141	119
1998	210	161	194	177	172	129
1999	286	175	207	196	187	137
2000	426	191	272	234	219	159
Denmark						
1995	100	100	100	100	100	100
1996	110	112	97	92	105	103
1997	118	128	108	122	123	109
1998	123	144	122	153	141	113
1999	142	142	124	182	146	117
2000	182	162	155	184	165	136

1 NACE 15-37, 45, 50-74, 92, 93

From 1995 to 2000[4], turnover for goods production, as well as for service production, in the information sector showed the strongest growth in Finland. The statistics for 1995–2000 show that in all the Nordic countries, the turnover for service and goods production in the information sector grew more rapidly than in the total private sector.

5.2 Production and foreign trade

Industrial production and foreign trade that is typical of the information society can be studied by industry, enterprise or product. The following examination for goods production is made by product and the development of service and content production is assessed in the light of certain industry data.

5.2.1 Production in the information sector

Goods production

The product grouping used in this report is based on OECD and Eurostat draft definitions of information and communications technology products. Products that are typical of the information society are described as information technology products. The main categories of information technology products are as follows (the full list of products is attached as Appendix 5.5):

Communications equipment	Consumer electronics
Computers	Office machinery
Industrial electronics	Electronic components

The manufacture of information technology products showed strong growth in the 1990s. In the early 1990s the value of production as a proportion of total output was just a few per cent, but by 2001 the figure had risen to 17.6 per cent. In 2001 the total value of information technology production stood at EUR 14.6 billion, slightly down on the figure one year previously. From 1995 to 2001 the value of information technology production increased two and a half times over, while the figure for all manufacturing increased just one and a half times over.

4 Turnover data for Iceland were available for 1998–2001.

Table 5.2.1
Production of information technology goods in Finland by product group in 1995–2001. Source: Statistics Finland, Commodity Statistics.

Product group	1995		1996		1997	
	EUR million	%	EUR million	%	EUR million	%
Communications equipment	3,999.4	67.9	4,704.7	71.5	5,879.5	81.7
Consumer electronics	174.9	3.0	118.7	1.8	159.8	2.2
Computers	864.1	14.7	862.8	13.1	536.5	7.5
Electronic components	601.0	10.2	617.4	9.4	327.7	4.6
Office machinery	4.3	0.1	2.9	0.0	5.8	0.1
Industrial electronics	249.1	4.2	272.1	4.1	291.1	4.0
Total	**5,892.7**	**100.0**	**6,578.6**	**100.0**	**7,200.4**	**100.0**

Product group	1998		1999		2000		2001	
	EUR million	%	EUR million	%	EUR million	%	EUR million	%
Communications equipment	8,065.6	86.0	10,152.7	87.3	13,634.1	92.9	13,528.5	92.6
Consumer electronics	138.3	1.5	106.5	0.9	100.4	0.7	93.5	0.6
Computers	543.6	5.8	590.8	5.1	63.7	0.4	72.6	0.5
Electronic components	358.8	3.8	396.8	3.4	469.5	3.2	503.2	3.4
Office machinery	5.8	0.1	3.7	0.0	–	–	–	–
Industrial electronics	261.5	2.8	385.7	3.3	401.6	2.7	408.5	2.8
Total	**9,373.6**	**100.0**	**11,636.2**	**100.0**	**14,669.3**	**100.0**	**14,606.3**	**100.0**

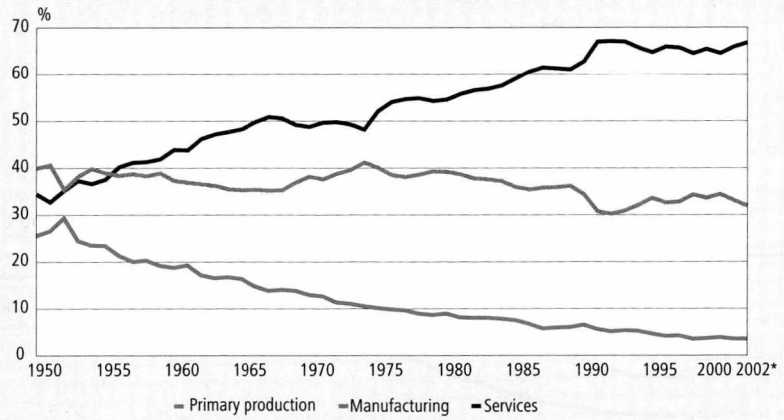
The single biggest category of information technology products is that of communications equipment. In 2001 the value of production in this category stood at EUR 13.5 billion, although compared to 2000 the value of production actually dropped by more than EUR 100 million. In 2001 communications equipment accounted for almost 93 per cent of the total value of all information technology production, while in 1995 the figure was around 68 per cent.

The rapid growth of information technology production and related business has been boosted by several technological and economic factors, such as an increase in the support made available for research and development, technological advances and the continuous growth of markets for communications equipment.

Service production

The value of service production as a proportion of Finland's GDP exceeded the figures for industrial manufacturing in the 1950s. The share of services continued then to grow rapidly and by the 1990s, the figure exceeded 60 per cent. Services have continued to gain in significance in recent years, and preliminary data for 2002 indicate that service production accounted for almost 67 per cent of GDP value

Figure 5.2.1
GDP by sectors of the economy in 1950–2002, per cent.*
Source: Statistics Finland, National Accounts.



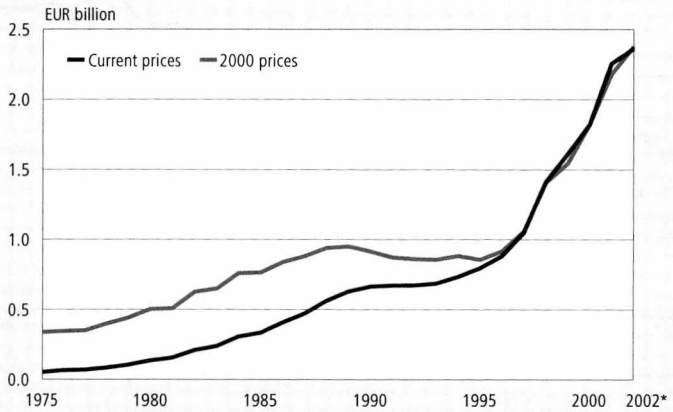
added. Services are not only a major source of employment, but they also play a significant part in the application of new technology.

Service production in the information sector comprises the wholesale of entertainment electronics, computer hardware and telecommunications equipment as well as telecommunications, rental of office machinery etc., and computer and related activities (see Introduction for a definition). Goods production in the information sector can be described on a product basis, but no comprehensive statistics are available on specific categories of services produced in this sector. It is particularly difficult to produce long time series on the development of service production. The following discussion of the development of service production in the information sector is based on changes in valued added generated in computer and related activities as well as in telecommunications.

Computer and related activities include hardware consultancy, software consultancy, manufacture and consultancy, data processing, database and network activities as well as the maintenance and repair of office machinery and computers.

Value added in computers and related activities (at both current and fixed prices) has increased rapidly since the mid-1990s. In 2002 value added was almost three times higher than the figure recorded in 1995. Preliminary data indicate that computer and related activities accounted for 1.9 per cent of GDP in 2002.

Figure 5.2.2
Value added in computer and related activities in 1975–2002 at current and fixed (2000) prices, EUR billion.*
Source: Statistics Finland, National Accounts.



Telecommunications comprises telephony and other telecommunications, data transfer services and the provision of Internet connections. Value added in telecommunications has shown particularly strong growth in Finland since the mid-1990s: the figure in 2002 was over three times higher than in 1995. Mobile communications has had a very major impact on the growth of telephony. Even though the

Figure 5.2.3
Value added in telecommunications in 1975–2002 at current and fixed (2000) prices, EUR billion.*
Source: Statistics Finland, National Accounts.

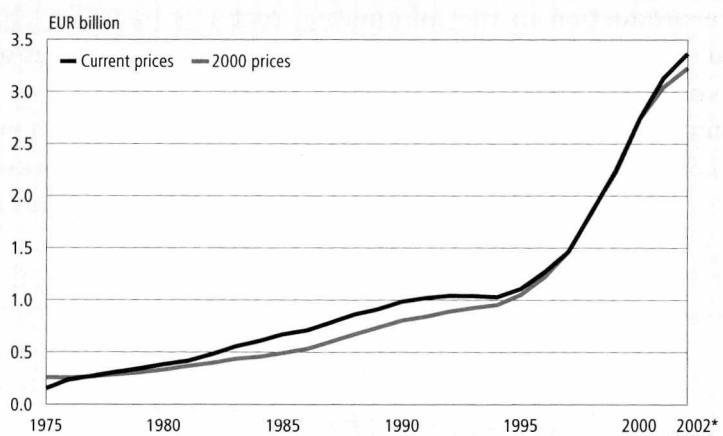


Table 5.2.2
Gross value of telecommunications in Finland in 1995–2002, EUR million.*
Source: Statistics Finland, National Accounts.

Breakdown	1995	1996	1997	1998	1999	2000	2001	2002*
	EUR million							
Local telecommunications	503	530	572	616	731	813	811	666
Long-distance telecommunications	85	75	71	68	71	69	62	65
International telecommunications	198	182	175	188	183	207	231	251
Mobile communications	377	530	775	1,081	1,385	1,776	1,998	2,265
Data transmission	160	157	166	211	260	404	489	551
Program transmission	16	17	19	19	92	102	123	155
Value added services and other telecommunications	362	504	606	785	802	1,068	1,287	1,406
Total	**1,701**	**1,994**	**2,384**	**2,967**	**3,523**	**4,438**	**5,001**	**5,359**

markets are growing very rapidly with the development of technology and new services, telecommunications still accounts for a relatively modest share of GDP. Preliminary data for 2002 put the figure at 2.8 per cent.

Content production

Content production refers to the creation, development, manufacture and distribution of information products intended for sale. They may be either printed or in electronic, multimedia, computer software or audiovisual form, such as radio or television programmes, films or videos.

No comprehensive statistical data are available on the value of content production, but an examination of changes in mass media does help to give some idea of how this field has developed. However, it is important to note that although mass media continue to represent the most significant component of content production, it would be wrong to reduce content production to mass media. For example, the development of mobile communications has opened up a market for an entirely new line of content production (logos, games, etc.).

Turnover in the mass media has grown steadily since the mid-1990s. There have been no marked changes in terms of how it is broken down between the print media, electronic media and recorded media. The print media continue to account for the biggest share of total turnover: in 2001 the figure was 72 per cent.

Table 5.2.3
Turnover in the mass media in 1990 and 1995–2001, EUR million.
Source: Statistics Finland, Finnish Mass Media.

	1990	1995	1996	1997	1998	1999	2000	2001	2001 %	2001/ 2000 change, %
	EUR million									
Printed media										
Dailies (7–4-times a week)	748	782	795	831	886	926	965	956	27.0	4.5
Non-dailies (3–1-times a week)	114	104	107	103	110	116	114	113	3.2	5.3
Free sheets	55	47	50	52	59	82	91	88	2.5	40.0
Magazines and periodicals	500	494	525	558	589	614	631	622	17.6	4.3
Books	372	341	373	392	400	419	450	458	12.9	4.7
Printed advertising material	264	219	259	261	274	289	306	314	8.9	5.5
Total	2,053	1,988	2,109	2,197	2,318	2,446	2,556	2,551	72.0	5.5
Electronic media										
Nationwide television and radio	340	423	431	457	487	494	516	519	14.7	1.5
Other radios	40	31	30	32	29	29	30	33	0.9	0.0
Cable television	53	56	63	58	61	63	69	72	2.0	2.7
Online information and Internet services	19	34	37	42	46	52	64	64	1.8	12.5
Total	451	545	561	588	623	638	679	688	19.4	2.5
Recorded media										
Phonograms	112	106	114	122	126	120	125	128	3.6	–4.7
Videos	51	53	62	62	70	71	70	66	1.9	1.7
DVD records	–	–	–	–	1	4	12	29	0.8	666.7
Cinemas	31	34	34	38	43	48	48	48	1.4	10.6
CD-ROM records	–	8	25	34	37	34	36	33	0.9	–9.1
Total	195	201	235	256	276	277	291	304	8.6	–0.1
Mass media total	**2,698**	**2,734**	**2,905**	**3,041**	**3,218**	**3,361**	**3,526**	**3,543**	**100.0**	**4.4**
2001 prices	3,327	3,027	3,198	3,308	3,451	3,563	3,615	3,543		
Mass media as % of GDP	3.1	2.9	2.9	2.9	2.8	2.8	2.7	2.6		

Turnover figures in this Table are presented at end-user level, eliminating overlap between different branches. i.e. the turnover statistics for different branches are mutually exclusive. The figures include domestic consumption and imports, but not exports. The figures for several branches are estimates.

Data for newspapers and magazines for 1992 and onwards are not directly comparable with earlier statistics. Data for freesheets in 1999 are not directly comparable with earlier figures. Data for book sales and nationwide radio and television for 1996 and onwards are not directly comparable with earlier statistics.

5.2.2 Foreign trade

The volume and trends in exports and imports of industrial information technology products provide useful indicators of the national economy's competitiveness in key strategic sectors as well as of the integration of the national economy with international trends in development from an information society point of view. The analysis here of exports and imports of information technology products is based on the product categories and products listed in Appendix 5.5.

Imports and exports of information technology products and their share of Finland's foreign trade by value increased significantly after the early 1990s.[5] These products accounted for around 7 per cent of total Finnish exports in 1990 and for around 25 per cent in 2000. The figures for imports were 10 per cent and 19 per cent, respectively. Since 2000, however, the proportion of information technology products has been decreasing somewhat, both in exports and imports. In 2002 these products accounted for around 22 per cent of exports and for some 16 per cent of imports. In 2002 the value of information technology exports from Finland was just over EUR 10 billion, the figure for imports was almost EUR 6 billion.

Finnish imports and exports increased from 1992 through to 2000, but in 2001 and 2002 foreign trade has taken a downward turn. The foreign trade balance has shown a surplus since 1991. Imports and exports of information technology products have followed a similar pattern, although the balance for these products did not show a surplus until 1995. During the 1990s the value of foreign trade in information technology products increased much more rapidly than the value of all foreign trade. As was the case with foreign trade in general, imports and exports of information technology products also began to decline in 2001. At that point the value of foreign trade of information technology products declined, especially in relative terms, more than the value of all foreign trade. Foreign trade continued to decline slightly in 2002.

Since the early 1990s, information technology exports have grown much rapidly than imports. The surplus in the foreign trade balance continued to grow from 1995 through to 2000, when the figure was EUR 5.5 billion. In 2002, the surplus stood at EUR 4.6 billion.

The biggest single export category among information technology products is that of communications equipment. In 2002 products in this category accounted for 84 per cent of all information technology

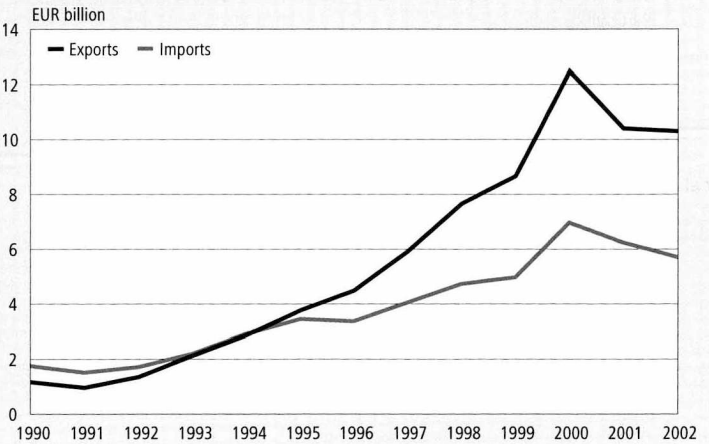
5 The data on foreign trade are from the database on international trade maintained by the OECD and from the National Board of Customs' ULTIKA database.

Table 5.2.4
Foreign trade in information technology products by product group and total foreign trade in 1990–2002, EUR million.
Source: National Board of Customs, ULTIKA.

Product group	1990	1995	1996[1]	1997	1998	1999	2000	2001	2002
	EUR million								
Communications equipment									
Exports	548.8	2,389.6	3,013.5	3,974.4	5,522.9	6,664.9	10,513.1	8,653.4	8,632.9
Imports	297.5	476.3	570.5	676.9	864.1	1,070.6	2,300.6	2,056.3	1,699.7
Balance	251.3	1,913.3	2,442.9	3,297.5	4,658.7	5,594.3	8,212.5	6,597.1	6,933.1
Consumer electronics									
Exports	153.4	169.0	159.1	219.5	225.5	121.5	114.5	139.2	163.2
Imports	245.7	239.8	245.0	251.1	340.9	345.3	476.4	370.0	360.4
Balance	–92.3	–70.8	–85.9	–31.7	–115.4	–223.8	–361.9	–230.8	–197.2
Computers									
Exports	208.7	768.1	752.2	975.6	918.1	801.2	440.9	363.7	304.4
Imports	615.1	1 078.9	1 057.7	1 268.9	1 535.8	1 511.6	1 406.3	1 380.9	1 274.4
Balance	–406.3	–310.8	–305.4	–293.3	–617.8	–710.4	–965.4	–1 017.2	–969.9
Office machines									
Exports	7.4	16.0	18.9	26.8	37.3	23.0	19.0	24.2	19.6
Imports	107.1	91.3	91.9	122.1	136.2	139.4	122.2	144.5	125.2
Balance	–99.7	–75.3	–73.0	–95.4	–98.9	–116.4	–103.2	–120.3	–105.7
Industrial electronics									
Exports	184.0	258.2	365.8	487.9	532.8	589.8	698.6	740.1	757.3
Imports	217.8	334.2	333.3	367.1	380.2	379.8	465.8	492.2	454.2
Balance	–33.8	–76.0	32.5	120.8	152.5	210.0	232.8	248.0	303.1
Electronic components									
Exports	67.4	167.5	175.4	232.6	423.9	461.7	689.0	482.9	419.0
Imports	262.0	1,217.0	1,056.1	1,350.6	1,460.1	1,509.0	2,180.4	1,778.5	1,773.4
Balance	–194.6	–1,049.5	–880.8	–1,118.0	–1,036.2	–1,047.3	–1,491.4	–1,295.6	–1,354.5
Information technology products total									
Exports	1,169.7	3,768.4	4,484.8	5,916.7	7,660.5	8,662.1	12,475.1	10,403.5	10,296.3
Imports	1,745.3	3,437.6	3,354.5	4,036.8	4,717.4	4,955.7	6,951.7	6,222.3	5,687.4
Balance	–575.5	330.8	1,130.3	1,880.0	2,943.0	3,706.4	5,523.4	4,181.2	4,608.9
Other products									
Exports	15,872.2	25,836.2	26,854.3	29,880.4	31,118.4	30,583.4	37,009.2	37,396.9	36,797.9
Imports	15,582.6	18,183.8	20,481.0	23,040.6	24,348.7	24,735.5	29,885.7	29,668.4	29,722.4
Balance	289.6	7,652.4	6,373.3	6,839.8	6,769.7	5,848.0	7,123.5	7,728.5	7,075.5
Foreign trade total									
Exports	17,042.0	29,604.6	31,339.2	35,797.2	38,778.9	39,245.5	49,484.3	47,800.4	47,094.1
Imports	17,327.9	21,621.4	23,835.6	27,077.4	29,066.1	29,691.2	36,837.4	35,890.7	35,409.8
Balance	–285.9	7,983.2	7,503.6	8,719.8	9,712.8	9,554.4	12,646.9	11,909.7	11,684.4

1 Content of product categories revised in 1996

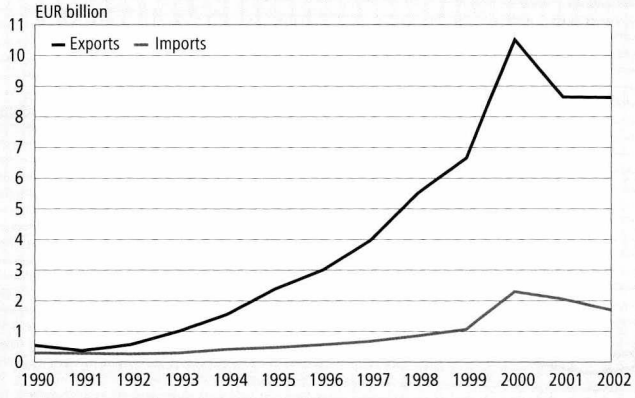
Figure 5.2.4
Value of information technology exports and imports in Finland in 1990–2002, EUR billion.
Source: National Board of Customs, ULTIKA.



exports, compared to 47 per cent in 1990. In 2002, communications equipment exports from Finland represented some 18 per cent of the total value of Finnish exports – a significant proportion indeed. The second biggest export category among information technology products is that of industrial electronics, which in 2002 accounted for some 7 per cent of the total value of information technology exports.

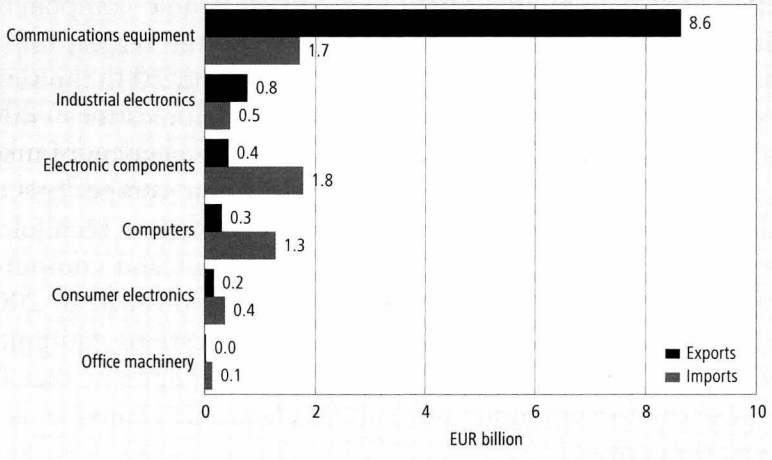
Information technology imports are not as heavily concentrated in one product category as are exports. The biggest product groups are communications equipment, computers and electronic components. Computers and electronic components used to be the biggest import products in information technology, but in 2000 and 2001 the single biggest category in value terms was that of communications equipment. In 2002 electronic components reclaimed the position of major import category in value terms. Imports of electronic components accounted for 31 per cent of the total value of information technology imports; the figures for communications equipment and computers were 30 and 22 per cent, respectively. From 1990 through to 2002, the value of imports has grown most in communications equipment and electronic components: for communications equipment that figure has grown almost six times over and for electronic components almost seven times over.

Figure 5.2.5
Value of communications equipment exports and imports in Finland in 1990–2002, EUR billion.
Source: National Board of Customs, ULTIKA.



In 2002 foreign trade in information technology products remained at a somewhat lower level than one year previously. The value of exports dropped by one per cent and the value of imports by almost 9 per cent. The surplus of foreign trade in information technology products thus increased by around 10 per cent.

Figure 5.2.6
Value of information technology exports and imports in Finland in 2002, EUR billion.
Source: National Board of Customs, ULTIKA.



In 2002 the major product category in the foreign trade of information technology was that of communications equipment. The surplus in foreign trade of communications equipment increased, with the value of exports remaining at more or less the same level as in 2001 but the value of imports dropping by about 17 per cent. Another product category that showed a balance of trade surplus in 2002 was that of industrial electronics. This, however, represents only a relatively minor part of foreign trade in information technology. In value terms the deficit in foreign trade was greatest in the product category of electronic components.

Information technology imports and exports in the EU countries, the United States, Canada, Japan and China

There are quite marked country differences in information technology imports and exports, suggesting that different countries have become integrated into the process of information society development in very different ways.[6]

Information technology exports as a proportion of total exports increased in most OECD countries throughout the 1990s. The figures declined in just one EU country, namely Italy. However, this trend was broken in 2001 when the export of information technology products as a proportion of total exports declined in several countries. After the early 1990s information technology imports also increased as a proportion of total imports in almost all countries reviewed, but in virtually all of them the proportion declined in 2001 as compared to 2000.

Within the EU area, information technology exports as a proportion of total exports has shown the strongest growth since the early 1990s in Finland, the Netherlands and Greece. As for imports, the share of information technology products has increased most in the above-mentioned countries as well as in Ireland.

In an EU comparison, exports of information technology products as a proportion of total exports was highest in Ireland, where in 2001 the figure was almost 40 per cent. Finland and the Netherlands ranked second and third in this comparison. In Japan, information technology products have accounted for around one-quarter of the country's total exports since the early 1990s; in 2001 the proportion stood at 24 per cent. In China, too, exports of information technology products have

6 The international comparison of exports and imports of information technology products typical of the information society is based on the same product group classification as in the previous sections. The data are derived from the OECD's database on international trade.

Table 5.2.5
Information technology exports as a proportion of total exports in 1991–2001, per cent. Source: OECD.

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Ireland	21.3	19.5	22.4	23.3	27.5	28.0	30.5	29.5	32.7	34.3	39.3
Finland	6.3	7.6	9.5	11.2	12.9	14.1	16.3	19.5	21.8	25.0	21.5
Netherlands	8.8	9.1	10.9	11.6	12.6	14.9	16.9	19.4	21.1	22.7	20.4
United Kingdom	12.3	12.0	13.8	15.4	16.6	17.0	16.3	18.4	19.0	20.6	19.8
Luxembourg	..	..	..	..	..	..	..	..	9.7	12.2	14.2
Sweden	9.1	9.1	9.5	10.6	12.0	14.0	15.8	16.0	18.1	19.3	12.7
France	7.4	7.3	7.5	7.8	8.6	9.3	10.2	10.8	10.9	12.1	10.6
Germany	7.6	7.2	7.4	7.9	8.1	8.1	8.5	8.7	9.3	11.0	10.2
Austria	8.4	6.5	6.8	6.9	5.1	5.2	6.1	6.5	7.0	8.5	8.6
Denmark	6.0	6.1	6.0	6.9	6.8	7.0	7.8	8.2	8.2	8.7	8.4
Portugal	4.4	4.5	4.3	5.0	6.1	5.2	5.5	5.6	6.9	7.5	8.2
Belgium	..	..	4.5	4.4	4.6	5.0	5.0	5.4	5.5	6.2	6.1
Spain	4.7	4.6	4.9	4.8	4.9	4.8	4.8	5.2	5.4	5.4	5.3
Italy	5.5	5.4	5.7	5.5	5.6	5.2	5.0	4.9	5.0	5.3	5.3
Greece	0.7	0.8	1.4	1.2	1.3	1.4	1.9	2.3	2.8	4.3	3.7
EU countries total	**8.2**	**8.0**	**8.4**	**8.9**	**9.5**	**9.9**	**10.5**	**11.2**	**12.0**	**13.4**	**12.5**
Japan	25.7	25.5	25.9	26.7	27.3	26.1	25.9	25.1	25.4	26.8	24.3
United States	14.9	14.8	15.5	16.7	17.8	17.8	18.7	20.0	21.6	23.6	21.0
China	..	6.9	7.8	9.2	10.7	12.3	12.7	14.9	16.7	18.8	21.0
Switzerland	5.7	5.5	5.4	5.5	5.8	5.9	5.9	5.9	6.2	6.5	6.0
Canada	6.3	6.1	5.6	6.0	6.4	6.4	7.0	6.9	6.6	8.2	5.8
Norway	2.4	2.6	2.5	2.9	3.0	2.7	3.0	3.8	3.4	2.5	2.8
Iceland	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2

rapidly increased: by 2001 they accounted for the same proportion of total exports as in the United States at 21 per cent.

In 2001 Ireland also recorded the highest figure for imports of information technology products as a proportion of total imports at 34 per cent. This figure was also very high in the Netherlands and China.

In 2001 the value of information technology exports was highest in the United States. In the mid-1990s, the biggest information technology exporter, measured in value terms, was still Japan. Among EU countries the biggest exporters of information technology products in 2001 were Germany and Great Britain.

In value terms the major importer of information technology products is the United States: the total value of US imports of information technology products in 2001 was USD 188 billion. Among EU countries the biggest importers of information technology products were Germany and Great Britain.

In the early 1990s the country with the biggest foreign trade surplus in information technology products was Japan, where the exports/imports ratio in 1991 was 5.19. However this surplus has been shrinking

Table 5.2.6
Information technology imports as a proportion of total imports in 1991–2001, per cent. Source: OECD.

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Ireland	16.2	16.4	20.4	22.2	26.8	25.6	27.4	30.2	31.1	34.0	34.2
Netherlands	11.3	11.1	12.9	13.0	14.4	16.3	18.9	21.7	23.6	24.6	22.6
Finland	9.9	10.5	12.2	13.9	15.3	13.9	14.7	16.1	16.5	18.7	17.1
United Kingdom	12.6	12.6	13.9	14.8	15.9	16.2	15.5	16.6	17.7	20.3	16.7
Sweden	11.3	11.4	12.5	13.2	14.9	14.4	15.4	16.0	15.4	16.8	14.3
Germany	9.9	9.8	10.4	10.9	10.9	10.6	10.8	11.9	12.7	14.1	14.1
Luxembourg	..	..	..	..	..	..	..	..	10.0	12.0	13.4
Denmark	9.3	9.8	10.4	10.9	11.2	11.7	12.0	11.6	12.6	13.4	13.0
France	9.6	9.6	10.2	10.2	10.5	10.7	11.5	12.3	12.2	13.2	12.0
Austria	9.3	8.4	8.8	9.1	8.1	8.1	9.1	10.2	11.1	11.2	10.7
Portugal	8.1	7.8	7.3	7.2	8.0	7.7	7.7	8.7	9.1	9.0	9.6
Italy	9.1	8.9	8.8	9.0	9.0	9.1	9.3	9.6	10.0	10.1	9.2
Spain	9.7	8.7	8.5	8.2	8.0	8.8	8.5	8.9	9.6	9.5	8.8
Belgium	..	..	5.2	5.1	5.4	6.0	6.4	6.7	7.3	7.7	7.7
Greece	4.6	4.6	5.7	6.0	5.3	4.7	6.1	7.5	8.8	8.4	7.5
EU countries total	**10.2**	**10.1**	**10.5**	**10.9**	**11.3**	**11.5**	**12.0**	**13.0**	**13.7**	**14.8**	**13.6**
China	..	10.0	10.8	12.3	13.2	12.3	14.1	18.5	21.3	22.8	23.7
Japan	6.6	6.9	8.0	9.5	12.4	13.8	13.8	14.7	15.8	17.6	16.8
United States	15.0	15.8	16.7	18.0	19.7	18.7	18.8	18.1	18.5	19.1	16.6
Canada	12.6	13.0	12.9	13.5	14.4	14.2	13.8	13.6	14.1	15.4	13.2
Norway	8.3	9.2	9.7	9.7	10.4	9.4	9.8	10.0	10.8	10.9	11.2
Switzerland	8.4	8.4	8.8	9.4	9.6	9.6	9.7	10.0	11.0	11.3	10.0
Iceland	6.7	6.9	6.8	8.4	8.3	8.3	8.4	8.9	9.1	10.7	8.7

over the past ten years: in 2001 the exports/imports ratio was down to 1.67. In the EU area the balance of trade in information technology products in 2001 was positive in Ireland, Finland and Sweden. In Ireland and Finland the exports/imports ratio was even slightly higher than in Japan.

Finland's balance of trade in information technology products has shown quite an exceptional pattern. In the early 1990s the exports/imports ratio was around the average for EU countries, with only a few countries showing with a bigger deficit. However Finland's balance of trade then swung in the opposite direction within a very short space of time, and in recent years the exports/imports ratio has been among the highest in the EU.

Table 5.2.7
Foreign trade in information technology products in 1991, 1996 and 2001, USD billion. Source: OECD.

Country	1991			1996			2001		
	Exports	Imports	Exports/ imports	Exports	Imports	Exports/ imports	Exports	Imports	Exports/ imports
Ireland	5.2	3.4	1.53	13.5	9.2	1.47	30.4	17.5	1.74
Finland	1.5	2.2	0.67	5.7	4.3	1.34	9.5	5.7	1.68
Sweden	5.0	5.7	0.89	11.6	9.2	1.26	9.6	9.0	1.07
United Kingdom	22.5	26.4	0.85	44.1	46.7	0.94	55.8	56.3	0.99
Netherlands	11.7	14.2	0.83	26.7	26.4	1.01	35.8	38.5	0.93
France	15.8	22.1	0.72	26.4	29.8	0.89	31.8	36.5	0.87
Germany	30.5	38.6	0.79	41.3	47.1	0.88	58.5	68.4	0.86
Belgium	..	..	..	8.6	9.6	0.89	11.9	14.1	0.85
Luxembourg	..	..	..	..	..	..	1.2	1.5	0.78
Austria	3.5	4.7	0.73	3.0	5.5	0.54	5.6	7.4	0.75
Denmark	2.3	3.2	0.71	3.5	5.3	0.67	4.2	5.7	0.73
Italy	9.4	16.7	0.56	13.2	19.0	0.69	13.2	22.2	0.59
Portugal	0.7	2.1	0.33	1.3	2.7	0.48	2.0	3.8	0.53
Spain	2.7	9.0	0.30	4.9	10.9	0.45	6.1	13.7	0.45
Greece	0.1	1.0	0.06	0.2	1.3	0.12	0.4	2.1	0.18
EU countries total	**94.9**	**149.2**	**0.64**	**177.6**	**226.9**	**0.78**	**244.2**	**302.3**	**0.81**
Japan	80.9	15.6	5.19	107.3	48.1	2.23	97.8	58.6	1.67
China	..	..	..	18.5	17.1	1.08	55.8	57.8	0.97
United States	59.6	76.1	0.78	103.7	152.7	0.68	153.3	188.3	0.81
Switzerland	3.5	5.6	0.62	4.7	7.5	0.63	4.9	8.4	0.59
Canada	7.6	14.9	0.51	12.2	24.3	0.50	15.1	29.2	0.52
Norway	0.8	2.1	0.39	1.3	3.3	0.40	1.6	3.7	0.44
Iceland	0.0	0.1	0.01	0.0	0.2	0.01	0.0	0.2	0.02

5.3 Research and development

R&D[7] resources have continued to increase in the new millennium: investments into the effective use of research knowledge and technological know-how have continued to increase. The utilisation and the promotion of researched knowledge and technology are recognised as crucially important for the competitiveness of the national economy, employment and welfare in society. Finland's success in the international marketplace depends upon a high level of education and research, innovative know-how and the use of the very latest information and communication technology.

7 Research and development refers to systematic activity aimed at increasing knowledge and understanding and to the application of that knowledge for the discovery of new applications: the key criterion is that R&D shall discover or create something essentially new. R&D comprises basic research, applied research and experimental development. For guidelines of R&D statistics see Frascati Manual (OECD (2002)).

The foundations for R&D driven by knowledge and know-how are largely laid within different policy sectors. Investment in R&D has also been one of the key targets in the government's science and technology policy. There is a broad consensus that the government's additional funding programme for research and development in the late 1990s was well targeted and highly productive. According to the National Science and Technology Policy Council, renewed effort is needed to get productive R&D back on track again, which in practice will require increased public investment in R&D beyond the estimated level of GDP growth. Indeed R&D will be intensified over the next five-year period in line with government decisions.

Government budget outlays for R&D amounted to EUR 1.4 billion in 2002; the appropriations for 2003 add up to the same sum[8]. R&D funding as a proportion of public spending, excluding central government debt servicing, is 4.4 per cent.

Most of the data for this article come from Statistics Finland's Research and Development statistics, which have been compiled regularly since 1971 (and annually since 1997). The figures are based on data obtained from business enterprises, universities, polytechnics and central university hospitals as well as public sector organisations on research and development work carried out in Finland. A separate survey has been conducted on innovation activities in enterprises.

5.3.1 R&D expenditure

R&D investment increased very rapidly in Finland during the latter half of the 1990s. It seems that this phase of rapid growth has now ended, although spending has continued to grow slowly in the past few years. In real terms R&D expenditure has almost doubled during the period from 1995 to 2001, with the average annual growth rate standing at 13 per cent. In 2001, spending was up by some EUR 200 million, in real terms 1.5 per cent on the figure for the previous year. One year earlier, the growth rate was still in excess of 10 per cent. In 2001 R&D expenditure in Finland amounted to EUR 4.6 billion, in 1995 the figure was less than EUR 2.2 billion. It is estimated that the figure for 2002 was almost EUR five billion.

The structure of R&D has changed during the course of the 1990s. More than three-quarters or 78 per cent of the growth between 1995 and 2001 is explained by the sharp increase in R&D spending in the business sector. On average, business enterprises have increased their investment in R&D by almost 16 per cent a year. At the same time, investment

8 Statistics Finland (2002a).

Table 5.3.1
R&D expenditure and proportions by sector and development of expenditure in real terms in 1995–2002, 1995=100.
Source: Statistics Finland, Research and Development Statistics.

Year	Business enterprises			Public sector[1]			Universities[2]			Total	
	EUR million	%	index[3] 1995=100	EUR million	%	index[3] 1995=100	EUR million	%	index[3] 1995=100	EUR million	index[3] 1995=100
1995	1,373.4	63.2	100	374.4	17.2	100	424.6	19.6	100	2,172.4	100
1997	1,916.7	66.0	137	408.6	14.1	107	579.5	20.0	134	2,904.9	131
1998	2,252.8	67.2	156	443.9	13.2	113	657.8	19.6	147	3,354.5	147
1999	2,643.9	68.2	183	470.1	12.1	119	764.8	19.7	171	3,878.8	170
2000	3,135.9	70.9	211	497.4	11.2	122	789.3	17.8	171	4,422.6	188
2001	3,284.0	71.1	213	500.9	10.8	119	834.1	18.1	175	4,619.0	189
2002[4]	3,446.7	70.7	221	520.8	10.7	122	905.2	18.6	187	4,872.7	197

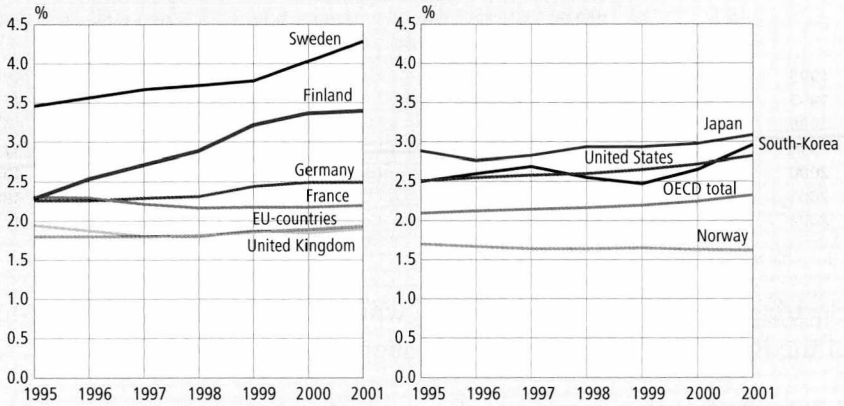
1 Includes private non-profit sector.
2 Includes central university hospitals since 1997 and polytechnics since 1999.
3 Deflated by GDP market price index (GDP 2000-2002 based on premilinary data).
4 Estimate based on questionnaire responses and other calculations

in R&D by enterprises as a proportion of total R&D expenditure has increased from 63 to 71 per cent. In 2001 the R&D expenditure of enterprises amounted to almost EUR 3.3 billion, with manufacturing accounting for EUR 2.6 billion or some four-fifths of the total. Enterprises not only engage in R&D themselves, but also provide funding for an ever greater share of all R&D activities. In 1995 they accounted for 58 per cent of all funding, in 1999 for more than 69 per cent.

In the public sector (central government, public research institutes and private non-profit sector) R&D expenditure has shown rather slow growth: over the period from 1995 through to 2001, average annual growth was around five per cent. R&D spending in the higher education sector has increased largely on account of increasing research funding from external sources. Inclusion of the expenditure of polytechnics in the statistics has also put the figure up. On average, spending has increased by 12 per cent a year.

In recent years major industrial countries have shown rather slow growth in their research intensity, i.e. R&D expenditure as a proportion of GDP. The figures for research intensity have grown distinctly in Finland, between 1995 and 2001 from 2.3 per cent to 3.4 per cent. The only EU country that invests more in R&D is Sweden, where the GDP share of R&D in 2001 was 4.3 per cent, compared to an average annual of some 1.9 per cent in EU Member States. Other top countries in the OECD group include Japan, South Korea and the United States. The highest figure of all, however, is recorded in Israel at 4.8 per cent of GDP.

Figure 5.3.1
R&D expenditure as a proportion of GDP in selected EU countries and other OECD countries in 1995–2001.
Source: OECD, Main Science and Technology Indicators 2003/1.



5.3.2 R&D expenditure by industry

The information sector is here depicted by the following industries:

- publishing and printing (SIC 22)
- manufacture of electrical electronic and technical equipment (SIC 30–33)
- post and telecommunications (SIC 64)
- business services (SIC 70–74)

In 2001 the R&D expenditure of enterprises belonging to industries typical of the information society amounted to almost EUR 2.3 billion, or more than two-thirds of total R&D expenditure in all business enterprises. In 1995, this proportion was still below 60 per cent. The manufacture of electrical electronic and technical equipment alone accounted for over half or 52 per cent in 2001.

In real terms the R&D spending of enterprises typical of the information society have increased 2.6-fold from 1995 to 2001, with average annual growth standing at 17 per cent. During the same period R&D expenditure in the whole business sector has increased 2.2-fold, while in industries other than those typical of the information sector the figure is 1.6-fold. Industries typical of the information sector account for 79 per cent of the real increase in R&D expenditure recorded in 1995–2001. This is largely attributable to the manufacture of electrical

Table 5.3.2
R&D expenditure and proportion of enterprises' R&D expenditure in 1995–2001 in industries typical of the information society.
Source: Statistics Finland, Research and Development statistics.

Year	Publishing and printing		Electro-technical industry		Post and tele-communications		Business services		Total	
	EUR million	%	EUR million	%	EUR million	%	EUR million	%	EUR million	%
1995	5.7	0.4	585.2	42.6	40.1	2.9	151.3	11.0	782.3	57.0
1997	6.4	0.3	902.7	47.1	62.5	3.3	198.2	10.3	1,169.7	61.0
1998	6.1	0.3	1,135.9	50.4	76.3	3.4	214.4	9.5	1,432.7	63.6
1999	5.3	0.2	1,421.1	53.8	97.3	3.7	256.2	9.7	1,780.0	67.3
2000	6.9	0.2	1,725.0	55.0	97.3	3.1	364.0	11.6	2,193.2	69.9
2001	12.3	0.4	1,700.6	51.8	115.6	3.5	426.2	13.0	2,254.6	68.7

electronic and technical equipment, which accounts for almost four-fifths of the R&D expenditure of "information society industries".

5.3.3 Research expenditure by product group

Research and development within a given industry may be concerned with several different products, which is why it is also useful to look at R&D at the level of product groups. Research and Development statistics apply a classification of 56 product groups[9], the following six of which are the most typical of the information society:

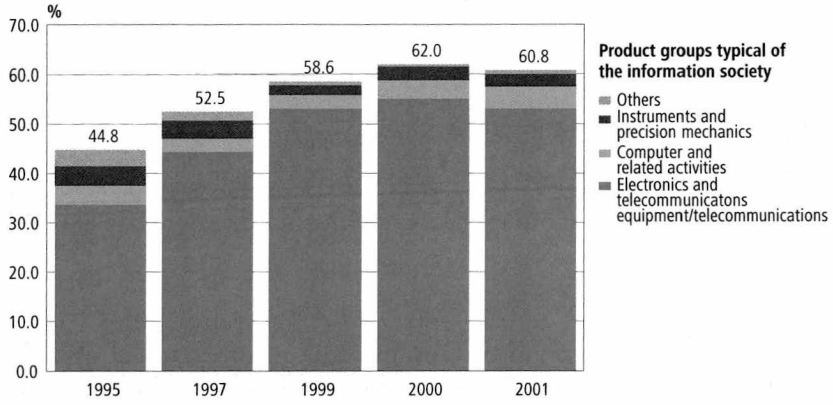
- electronics and telecommunications equipment, telecommunications
- computer and related activities
- instruments and precision mechanics
- radio and television receivers, sound and video recordings
- computers and office machinery
- publishing and printing.

In 2001, R&D expenditure in these product groups amounted to EUR two billion, or 61 per cent of total R&D expenditure in the private business sector. The corresponding figure in 1995 was 45 per cent. More recently, this growth has slowed down, but still remained strong throughout the latter half of the 1990s. In real terms the R&D expenditure for products typical of the information society increased in 1995–2001 on average by 20 per cent a year. At the same time the growth of R&D expenditure in other product groups was not nearly as dramatic, standing at just over 7 per cent a year.

In 2001 the product group of electronics, telecommunications equipment and telecommunications accounted for over 87 per cent of the R&D expenditure on products typical of the information society

9 Statistics Finland (2002a).

Figure 5.3.2
Information technology R&D expenditure as a proportion of total R&D expenditure in the private business sector in 1995–2001.
Source: Statistics Finland, Research and Development statistics.



and for over half or 53 per cent of total R&D spending in the private business sector. As from 1995, the R&D expenditure on products in this category have increased in real terms by almost 23 per cent a year. The share of this product group peaked in 1999 at more than 90 per

Table 5.3.3
Private sector R&D expenditure by product groups in 1995–2001.
Source: Statistics Finland, Research and Development statistics.

Product group	1995		1997		1999		2000		2001	
	EUR million	%	EUR million	%	EUR million	%	EUR million	%	EUR million	%
Electronics and telecommunications equipment, telecommunications	461.7	33.6	849.8	44.3	1 403.6	53.1	1 726.9	55.1	1 742.7	53.1
Computer and related activities	54.0	3.9	52.1	2.7	74.2	2.8	119.3	3.8	147.6	4.5
Instruments and precision mechanics	54.0	3.9	69.8	3.6	52.4	2.0	83.2	2.7	80.2	2.4
Radio and television receivers, sound and image recording	12.3	0.9	7.5	0.4	8.4	0.3	7.0	0.2	9.6	0.3
Computers and office machinery	28.2	2.1	21.9	1.1	8.3	0.3	2.6	0.1	5.6	0.2
Publishing and printing	4.9	0.4	5.1	0.3	1.9	0.1	3.4	0.1	9.6	0.3
Total	**615.1**	**44.8**	**1,006.2**	**52.5**	**1,548.8**	**58.6**	**1,942.4**	**61.9**	**1,995.3**	**60.8**
R&D expenditure in other product groups	758.3	55.2	910.5	47.5	1,095.1	41.4	1,193.5	38.1	1,288.7	39.2
Total R&D expenditure	**1,373.4**	**100.0**	**1,916.7**	**100.0**	**2,643.9**	**100.0**	**3,135.9**	**100.0**	**3,284.0**	**100.0**

Table 5.3.4
Involvement in innovation activity in 1998-2000 in industries typical of the information society.
Source: Statistics Finland, Innovation Survey.

Industry	Number of enterprises	Product or service innovations	Process innovations	Innovation projects	Innovation activities
		%	%	%	%
Publishing and printing	412	24.7	28.1	23.1	41.2
Electro-technical industries	334	59.3	31.0	43.2	68.9
Post and telecommunications	97	45.9	31.0	24.2	48.3
Business services	779	49.0	22.8	33.3	54.3
Total	**1,622**	**44.7**	**26.3**	**32.2**	**53.6**
All industries	**7,381**	**35.1**	**23.5**	**24.8**	**44.2**

cent of total R&D expenditure on product groups typical of the information society. Since then the proportion has decreased somewhat, at the same time as the relative significance of the computer and related activities group has climbed back close to the level recorded in 1995. In recent years the total share of these two biggest groups has been around 95 per cent of the R&D expenditure on product groups typical of the information society. During 1995–2001 the share of other product groups has dropped from seven to three per cent. For example, spending on product development in computers and office machinery in 2001 was just one-fifth of the figure in 1995.

5.3.4 Innovation in enterprises

While R&D expenditure measures investment in development and patents describe the application of new technologies and methods, the main concern in innovation studies is to describe the whole innovation process from ideas via obstacles to new products launched on the market or to new processes introduced in production. The data here are based upon Statistics Finland's innovation survey 2000[10] which comprised enterprises with a staff of ten or more in selected industries.

In 1998–2000, 44 per cent of all enterprises were engaged in innovation activity, i.e. introduced in the marketplace a new innovative product or services or adopted a new or essentially improved production method. Among enterprises engaged in industries typical of the information society, more than one-half or 54 per cent had innovations. In the manufacture of electrical electronic and technical equipment the proportion of enterprises that had developed innovations

10 Statistics Finland (2002b).

was almost 70 per cent. The only category that remained below the average for the business sector was that of publishing and printing. Most typically, innovations consisted of new products or services: 45 per cent of enterprises in industries typical of the information society produced such innovations.

Sources

OECD (2002), Frascati Manual

OECD (2003), Main Science and Technology Indicators 2003/1

Statistics Finland (1993), Standard Industrial Classification 1995, Handbooks 4, Helsinki

Statistics Finland (2002a), Tutkimus- ja kehittämistoiminta 2001, Tiede, teknologia ja tutkimus 2002:3, Helsinki (in Finnish only)

Statistics Finland (2002b), Innovaatiotutkimus 2000, Tiede, teknologia ja tutkimus 2002:2, Helsinki (in Finnish only)

Statistics Finland (2003), Tutkimus- ja kehittämisrahoitus valtion talousarviossa vuonna 2003 (Government R&D funding in the State Budged for 2003), Tiede, teknologia ja tutkimus 2003:1, Helsinki (in Finnish only, Summary in English)

Appendix 5.1

Number of enterprises, personnel and turnover (EUR million) by industry in 1995–2001. Source: Statistics Finland, Business Register.

	1995	1996	1997	1998	1999	2000	2001	01/00 change, %	01/95 change, %
Production of goods									
Number of enterprises	604	661	688	705	689	687	703	2.3	16.4
Personnel	30,824	33,588	36,761	40,084	43,800	45,123	49,051	8.7	59.1
Turnover, EUR million	5,750.5	6,755.8	8,923.6	12,073.4	16,459.1	24,491.1	26,910.6	9.9	368.0
Production of services									
Number of enterprises	3,725	4,112	4,491	4,696	4,803	5,161	5,279	2.3	41.7
Personnel	40,508	42,678	46,476	52,230	56,539	62,704	67,694	8.0	67.1
Turnover, EUR million	6,158.8	7,532.9	8,975.7	11,145.8	12,174.5	14,079.1	14,985.3	6.4	143.3
Content production									
Number of enterprises	7,099	7,611	8,328	8,839	8,956	9,261	9,678	4.5	36.3
Personnel	35,410	37,537	36,767	40,212	41,091	42,223	42,742	1.2	20.7
Turnover, EUR million	3,374.3	3,716.1	4,034.7	4,600.3	5,629.0	6,007.3	6,162.1	2.6	82.6
Information sector total									
Number of enterprises	11,428	12,384	13,507	14,240	14,448	15,109	15,660	3.6	37.0
Personnel	106,742	113,803	120,004	132,526	141,430	150,050	159,487	6.3	49.4
Turnover, EUR million	15,283.5	18,004.9	21,934.0	27,819.5	34,262.5	44,577.5	48,058.0	7.8	214.4
Forest industry (SIC 20-21)									
Number of enterprises	3,010	3,148	3,257	3,244	3,140	3,124	3,048	–2.4	1.3
Personnel	68,849	68,953	69,939	70,098	70,079	69,605	67,902	–2.4	-1.4
Turnover, EUR million	15,442.4	15,199.1	18,124.4	18,842.4	18,970.6	21,562.2	19,684.0	–8.7	27.5
Metalworking industry (SIC DJ-DM)									
Number of enterprises	9,525	10,188	10,578	10,671	10,492	10,493	10,718	2.1	12.5
Personnel	164,124	172,991	181,381	187,819	192,008	196,567	204,944	4.3	24.9
Turnover, EUR million	23,408.4	26,500.7	30,222.8	34,124.3	37,586.1	50,267.9	54,704.9	8.8	133.7
Manufacturing total (SIC D)									
Number of enterprises	23,633	25,095	26,023	26,347	25,715	25,687	25,780	0.4	9.1
Personnel	391,280	397,392	409,938	417,721	419,889	423,491	426,309	0.7	9.0
Turnover, EUR million	63,904.4	66,857.1	75,499.4	79,058.9	83,483.6	102,232.7	105,209.5	2.9	64.6
Private sector services (SIC 50-74, 804, 85, 90,92,93)									
Number of enterprises	132,548	143,461	150,328	154,999	155,626	158,007	159,296	0.8	20.2
Personnel	582,771	601,254	630,973	665,396	692,509	714,258	722,470	1.1	24.0
Turnover, EUR million	86,384.7	93,543.9	103,500.0	112,962.2	120,508.5	134,958.6	132,698.2	–1.7	53.6
All branches total									
Number of enterprises	189,458	203,358	213,230	219,273	219,515	222,817	224,847	0.9	18.7
Personnel	1,095,799	1 127,235	1,181,134	1,235,054	1,268,658	1,301,418	1,318,654	1.3	20.3
Turnover, EUR million	165,882.9	177,668.1	197,771.6	212,381.2	225,797.3	261,995.8	271,662.6	3.7	63.8

Appendix 5.2
Turnover of enterprises by industry in 1995–2001, EUR million.
Source: Statistics Finland, Business Register.

		1995	1996	1997	1998	1999	2000	2001
Production of goods								
3001	Manufacture of office machinery	1.5	1.3	1.8	2.0	3.3	2.2	4.4
3002	Manufacture of computers etc.	937.1	807.3	1,157.0	1,160.2	1,146.9	388.8	68.4
3130	Manufacture of insulated wire and cable	298.4	390.5	360.3	363.1	369.4	452.5	480.8
3210	Manufacture of electronic valves etc.	385.9	473.6	426.8	493.6	473.2	548.2	606.1
3220	Manufacture of television and radio transmitters etc.	3,443.7	4,397.1	6,132.5	9,221.7	13,547.1	21,975.4	24,288.8
3230	Manufacture of television and radio receivers etc.	211.2	141.0	210.2	204.3	149.8	300.9	415.8
3320	Manufacture of instruments for measuring, checking etc.	293.2	328.2	377.1	394.2	450.7	505.6	549.4
3330	Manufacture of industrial process control equipment	179.5	216.8	257.9	234.1	318.7	317.5	496.9
Total		**5,750.5**	**6,755.8**	**8,923.6**	**12,073.4**	**16,459.1**	**24,491.1**	**26,910.6**
Production of services								
51432	Wholesale of radio and television goods	302.7	729.9	875.2	637.3	866.1	688.4	680.0
51641	Wholesale of computer hardware	1,903.4	2,416.9	2,977.9	3,302.0	3,570.0	3,820.7	3,905.7
51652	Wholesale of telecommunication equipment etc.	655.2	520.9	706.9	1,072.0	1,073.5	1,193.0	999.3
642	Telecommunications	1,776.6	2,139.1	2,610.0	3,439.1	3,678.4	4,824.3	5,396.3
7133	Renting of office machinery etc.	16.9	33.2	43.3	60.4	39.7	53.5	50.1
72	Computer and related activities	1,504.0	1,692.9	1,762.4	2,635.0	2,946.7	3,499.3	3,954.0
Total		**6,158.8**	**7,532.9**	**8,975.7**	**11,145.8**	**12,174.5**	**14,079.1**	**14,985.3**
Content production								
221	Publishing	1,805.2	1,878.7	1,955.1	2,099.8	2,266.8	2,304.0	2,447.9
7413	Market research and public opinion polling	43.6	55.9	68.7	66.3	89.9	98.7	103.4
7414	Business and management consultancy activities	477.7	629.8	731.1	924.2	934.0	1,152.1	1,106.7
744	Advertising	326.5	384.2	450.1	561.9	1,333.8	1,396.0	1,439.3
921	Motion picture and video activities	123.5	142.2	194.6	220.0	236.9	261.5	277.6
922	Radio and television activities	557.1	581.8	588.0	678.3	718.3	742.2	736.4
924	News agency activities	40.7	43.6	47.2	49.8	49.3	52.8	50.8
Total		**3,374.3**	**3,716.1**	**4,034.7**	**4,600.3**	**5,629.0**	**6,007.3**	**6,162.1**
Information sector total		**15,283.5**	**18,004.9**	**21,934.0**	**27,819.5**	**34,262.5**	**44,577.5**	**48,058.0**
20-21	Forestry	15,442.4	15,199.1	18,124.4	18,842.4	18,970.6	21,562.2	19,684.0
27-35	Metalworking industry	23,408.4	26,500.7	30,222.8	34,124.3	37,586.1	50,267.9	54,704.9
15-37	Manufacturing total	63,904.4	66,857.1	75,499.4	79,058.9	83,483.6	102,232.7	105,209.5
Private services (SIC 50-74, 804, 85, 90,92,93)		86,384.7	93,543.9	103,500.0	112,962.2	120,508.5	134,958.6	132,698.2
All branches total		**165,882.9**	**177,668.1**	**197,771.6**	**212,381.1**	**225,797.3**	**261,995.8**	**271,662.6**

Appendix 5.3
Establishments in the information sector, their personnel and turnover by region in 1997 and 2001 and percentage change.
Source: Statistics Finland, Business Register.

	Establishments			Personnel			Turnover EUR million		
	1997	2001	change %	1997	2001	change %	1997	2001	change %
Uusimaa	7,446	8,743	17	58,256	85,114	46	12,432	26,845	116
Itä-Uusimaa	169	223	32	591	583	–1	69	119	72
Varsinais-Suomi	1,012	1,234	22	10,302	13,052	27	4,054	8,225	103
Satakunta	362	437	21	1,703	2,098	23	162	269	66
Kanta-Häme	290	336	16	1,441	1,823	27	145	198	37
Pirkanmaa	1,200	1,381	15	8,320	14,033	69	941	3,896	314
Päijät-Häme	471	544	15	2,030	2,353	16	216	364	69
Kymenlaakso	255	316	24	1,107	1,240	12	155	207	34
South Karelia	242	278	15	955	1,353	42	109	214	96
Etelä-Savo	237	298	26	1,046	1,132	8	107	152	42
Pohjois-Savo	420	502	20	2,533	3,116	23	310	466	50
North Karelia	251	266	6	810	1,279	58	88	212	141
Central Finland	492	652	33	3,416	5,293	55	415	1,083	161
South Ostrobothinia	246	333	35	892	1,106	24	102	160	56
Ostrobothnia	382	465	22	1,933	2,378	23	239	393	64
Central Ostrobothnia	102	132	29	289	602	108	27	67	148
North Ostrobothnia	607	745	23	9,973	14,794	48	2,008	4,282	113
Kainuu	103	131	27	1,062	1,393	31	98	151	54
Lapland	249	318	28	1,117	1,418	27	132	198	49
Åland	67	86	28	281	380	35	25	90	258
Total	**14,603**	**17,420**	**19**	**108,057**	**154,537**	**43**	**21,836**	**47,591**	**118**

Appendix 5.4
Employment in the information sector[1] in the Nordic countries.
Source: Nordic Information Society Statistics 2002.

	Production of goods	Total manufacturing	Production of services			Information sector total	Private services total	Private sector total[2]
			Wholesale	Telecommunications	Consultancy services			
Iceland								
1997	104	27,356	973	2,366	868	4,207	51,253	84,687
1998	126	25,398	1,091	1,214	1,155	3,460	50,893	84,208
1999	108	25,223	1,106	1,405	1,587	4,098	50,822	84,449
2000	110	26,499	1,130	1,598	2,744	5,472	65,369	106,492
2001	104	24,568	1,094	1,563	2,646	5,303	60,816	93,899
Norway								
1995	9,641	299,700	24,251	10,271	15,375	49,897	774,100	1,187,800
1996	9,902	304,400	25,258	10,688	17,386	53,332	791,700	1,216,100
1997	10,597	317,400	23,457	10,996	23,060	57,513	820,500	1,267,200
1998	10,704	321,200	24,279	11,040	27,662	62,981	852,100	1,309,100
1999	11,569	308,500	25,913	11,300	32,071	69,284	869,700	1,314,100
2000	11,715	301,100	25,106	12,912	36,585	74,603	881,800	1,320,900
Sweden								
1995	55,122	662,920	26,823	31,265	37,311	95,399	898,933	1,743,409
1996	55,919	675,339	27,451	34,655	42,776	104,882	919,271	1,772,136
1997	59,160	702,648	31,095	36,296	48,470	115,861	1,013,582	1,889,337
1998	65,761	720,843	32,636	33,056	57,066	122,758	1,063,876	1,960,404
1999	69,187	708,715	32,611	31,274	68,283	132,168	1,062,953	1,949,795
2000	62,227	709,227	30,692	32,726	82,020	145,438	1,124,835	2,023,698
Finland								
1995	30,824	391,280	13,244	16,152	15,552	44,948	551,179	1,029,461
1996	33,588	397,392	14,437	16,489	16,623	47,549	567,455	1,060,494
1997	36,761	409,938	15,790	17,314	17,969	51,073	594,843	1,109,758
1998	40,084	417,721	16,105	18,639	22,292	57,036	623,317	1,159,352
1999	43,800	419,889	16,634	19,294	25,357	61,285	647,998	1,192,352
2000	45,123	423,491	16,703	18,775	32,376	67,854	666,562	1,222,549
2001	49,051	426,309	15,187	20,167	37,387	72,741	673,674	1,239,880
Denmark								
1995	19,104	415,283	23,617	14,567	17,332	55,516	482,060	1,028,023
1996	19,434	410,633	23,314	16,876	18,713	58,903	499,576	1,040,307
1997	19,358	407,589	25,092	15,242	20,280	60,614	511,475	1,055,983
1998	18,819	413,404	26,963	18,489	23,477	68,929	533,765	1,088,901
1999	21,087	407,636	27,478	19,306	28,370	75,154	554,120	1,106,741

1 The definition of personnel varies slightly by country
2 SIC 15-37, 45,50-74, 92,93

Appendix 5.5
Information technology products typical of information society[1].

1. Communications equipment

- Electrical apparatus for line telephony or line telegraphy
- Other instruments and apparatus, specially designed for telecommunications (e.g., cross-talk meters, gain measuring instruments)
- Transmission apparatus for radio-telephony, radio-telegraphy, and radio-broadcasting or television
- Television cameras
- Radar apparatus
- Reception apparatus for radiotelephony or radiotelegraphy

2. Consumer electronics

- Microphones, loudspeakers, and earphones
- Turntables and record-players, transcribing
- machines
- Sound recording apparatus
- Video recording or reproducing apparatus
- Magnetic tapes for sound recording or similar recording of other phenomena
- Radio-broadcast receivers
- Television receivers
- Photographic cameras, photographic flashlight apparatus and flashbulbs
- Cinematographic cameras and projectors

3. Computers

- Automatic data processing machines and units thereof

4. Office machines

- Sheet fed, office type
- Typewriters, word processing machines
- Calculating machines, accounting machines, cash registers, etc.
- Photo-copying apparatus incorporating an optical system or of the contact type and thermo-copying apparatus
- Other office machines (e.g., hectograph or stencil duplicating machines, automatic banknote dispensers, etc.

5. Industrial electronics

- Electrical signalling , safety or traffic control equipment
- Electric sound or visual signalling apparatus
- Particle accelerators
- Microfilm, microfiche or other microform readers, image projectors, photographic enlargers and reducers
- Apparatus and equipment for photographic and cinematographic laboratories
- Microscopes (other than optical microscopes)
- Compound optical microscopes (including those for microprojection)
- Lasers (other than laser diodes)
- Direction finding compasses, other navigational instruments and appliances
- Surveying, hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances
- Balances of a sensitivity of 5 cg or better
- Machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials
- Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases
- Instruments and apparatus for physical or chemical analysis
- Gas, liquid or electricity supply or production meters
- Revolution counters, production counters, taximeters, mileometers, pedometers and the like
- Oscilloscopes, spectrum analysers and other instruments and apparatus for measuring or checking electrical quantities
- Measuring or checking instruments, appliances and machines

6. Electronic components

- Electrical capacitors, fixed, variable, or adjustable
- Electrical resistors
- Printed circuits
- Television picture tubes, cathode ray tubes, and other electronic valves and tubes
- Diodes, transistors and similar semi-conductor devices
- Electronic integrated circuits and microassemblies
- Co-axial cable and other co-axial conductors
- Optical fibres and optical fibre bundles and cables

1 The list is based on the Standard International Trade Classification

6 Productivity and growth effects of ICTs in the national economy

6.1 Productivity effects of ICTs

When Finland was electrified, labour productivity in the electricity, gas and water supply sector began rapidly to increase. Similarly, as soon as manufacturing industries were able to rely to a significant extent upon electricity as a source of energy, productivity trends began to gather momentum. During the period from 1901 to 1920, labour productivity in manufacturing increased on average by 0.3 per cent a year; then, over the period from 1920 through to 1938, the figure rose to 4.2 per cent. In its studies of the productivity effects of new technology, productivity research makes a distinction between three phases. First, as a result of rapid technological advances, productivity increases significantly in the sectors producing the new technology; then, the industries applying the new technology show improved productivity as the old capital assets begin to give way to new ones; and finally, industries employing the new technology see an improvement in overall productivity as they introduce new ways of working and refine the new technology through continuous product and process innovations.[1]

Economic growth accelerated but productivity did not

Electricity is considered a generic technology that precedes information and communications technologies (ICTs). As in the case of early electricity production, industries producing ICTs are now showing rapid productivity growth (Table 6.1.1). Productivity trends in industries using ICTs remained unchanged throughout the 1990s (although

Table 6.1.1.
Average percentage growth of labour productivity in market production (excluding housing), per cent.
Source: Jalava (2003b)

	1975–1990	1990–1995	1995–2001
ICT producers	4.6	7.2	10.3
ICT users	3.3	1.7	1.8
Other	3.4	4.2	2.0
Total	**3.7**	**4.0**	**3.4**

1 Jalava (2003a).

they have slowed down compared to the pre-recession period), and in other industries too labour productivity (following a temporary acceleration caused by the recession) is growing more slowly than earlier in the whole period under review. In contrast to the world's leading New Economy, i.e. the United States, Finnish labour productivity showed no signs of accelerating in the late 1990s.[2]

Owing to the extremely rapid growth of ICTs production, a comparatively large proportion of the increase in the volume of gross value added in market production is attributable to ICT producers (Table 6.1.2). Market production showed strong and encouraging signs of growth in Finland during the latter half of the 1990s, even though labour productivity was unable to match this performance. Since prices in the ICTs sector have not moved as rapidly as in other industries on average, the nominal increase in value added is not quite as impressive as the contribution of volume growth. In fact in 1995–2001 the prices of ICT producers dropped on average by one per cent a year, while the prices of market production went up by just over one per cent a year. The nominal proportion also showed strong upward movement from 1995 to 2001, by which time the figure had risen to 15 per cent (Table 6.1.3).

Table 6.1.2.
Contribution of ICT production to the increase in the volume of gross value added in market production (excluding housing).
Source: Jalava (2003b).

	1975–1990	1990–1995	1995–2001*
Volume of gross value added in market production, %	3.2	–0.7	5.5
Contribution of ICT production, percentage point	0.3	0.5	2.0

Table 6.1.3.
ICT industries' nominal share of increase in gross value added in market production (excluding housing).
Source: Jalava (2003b).

	1975	1980	1985	1990	1995	2001*
Percentage share of ICT industries	3.7	4.2	5.3	5.8	8.0	15.3

ICTs use

The impact of ICT capital use upon economic growth can be determined by means of traditional growth accounting, i.e. by breaking down productivity growth between the contributions of labour input,

2 Jalava (2003b).

capital input and multi-factor productivity. To work out the contribution of ICT capital, fixed capital assets need to be further divided between other capital assets and ICT capital. A distinction can be made between ten different types of capital goods, three of which are ICT goods (computers, software and communication equipment). Labour input is measured on the basis of hours worked, which are quality adjusted by level of education. Multi-factor productivity is the residual, i.e. it is that part of productivity growth that is not explained by the increase in inputs. It is for this reason that the residual is sometimes called the 'measure of our ignorance'.

Since the recession that swept Finland in the early 1990s, other capital assets have seen a structural change from extensive to intensive growth. Extensive growth refers to growth that takes place through investment; intensive growth, on the other hand, means growth through productivity. The only category where the contribution to growth has increased is that of ICT capital. The figure for 1995–2001 was 0.8 percentage points. The contribution of labour to growth increased as well. As the positive contribution of other capital dwindled during the 1990s, growth became more intensive. This is explained by the ineffective use of capital in earlier decades and by the marked increase in

Table 6.1.4
Contributions to the increase in the volume of value added in market production 1975–2001.[1]

	1975–90	1990–95	1995–2001*
Volume of value added, per cent	3.2	–0.7	5.5
Contributions, percentage points			
ICT capital	0.2	0.3	0.8
Computers	0.1	0.2	0.5
Software	0.1	0.1	0.2
Communication equipment	0.0	0.1	0.1
Other capital	0.8	–0.7	–0.1
Hours worked	–0.4	–2.9	1.1
Quality of labour input (education)	0.2	0.2	0.2
Multi-factor productivity	2.2	2.3	3.7
Share of income, per cent			
ICT capital	1.7	5.0	6.3
Computers	0.5	1.5	2.1
Software	0.6	2.4	2.5
Communication equipment	0.5	1.1	1.7
Other capital	33.9	33.8	38.7
Labour	64.4	61.3	55.1
Growth rates, per cent			
ICT capital	16.5	7.2	12.9
Computers	29.7	15.1	25.9
Software	12.9	2.7	6.7
Communication equipment	9.9	9.1	9.3
Other capital	2.8	–2.1	–0.4
Hours worked	–0.7	–4.5	2.1

1 Sums do not necessarily add up due to means and rounding.

capital productivity since the recession. However multi-factor productivity has been the main engine of economic growth throughout the period under analysis, as we can see in Table 6.1.4.

Industries defined as ICT producers: DL Manufacture of electrical and optical equipment, 642 Telecommunications and 72 Computer and related activities.

Industries defined as ICT users: 21 Manufacture of pulp, paper and paper products, 22 Publishing and printing, 24 Manufacture of chemicals and chemical products, 51 Wholesale trade and commission trade, 641 Post and courier activities, J Financial intermediation and insurance, 71 Renting of machinery and equipment, 73 Research and development and 74 Miscellaneous business activities.

References

Jalava, J. (2003a): 'Electrifying and Digitalizing the Finnish Manufacturing Industry: Historical Notes on Diffusion and Productivity', *ETLA Discussion papers* No. 870

Jalava, J. (2003b): 'Den nya ekonomin i Finland: produktion och användning av IKT', *Ekonomiska Samfundets Tidskrift*, Vol. 56 (1), s. 17–24 (in Swedish only)

6.2 ICTs as sources of prosperity in the information society[3]

Labour productivity is the source of prosperity

In an economic analysis, our welfare is dependent upon GDP. This is the net effect of two factors: the amount of work done and the average productivity of labour. This can be represented as follows:

$$\frac{GDP}{population} = \frac{GDP}{L} \times \frac{L}{population}, \quad (1)$$

where GDP is gross domestic product and L is the number of people in active employment (or the number of hours worked). In the long term, welfare is mainly dependent on the first factor on the right hand side of the equation, or the average productivity of employees.

Labour productivity, for its part, is dependent on a number of factors, such as education, experience, motivation, etc. Another factor that has a bearing on productivity is the workplace that the employer has provided for the employee as well as the way that work has been organised in that workplace. Labour productivity is high when the employee has access to high-performance equipment and machinery. In the information society, information and communication equipment are key sources of productivity – and by the same token prosperity. These equipment include PCs, the Internet and other data networks. We use the abbreviation ICTs here to refer to these equipment.

On the theory of ICTs as a source of prosperity

ICTs help employees to do their job more efficiently, i.e. they make them more productive. Schematically, this can be represented as follows:

$$\left(\frac{GDP_{ICT}}{L_{ICT}}\right) \Big/ \left(\frac{GDP_0}{L_0}\right) = (1+\theta) \quad (2)$$

L_{ICT} indicates the number of employees using ICTs and L_0 the number of those who do not have access to ICTs. The total number of people

3 The text is based on a study commissioned by the Ministry of Trade and Industry on the productivity effects of ICTs in Finnish business and industry (see Maliranta and Rouvinen, 2003a and 2003b).

in active employment in the national economy is thus $L = L_0 + L_{ICT}$. GDP_{ICT} is the output of employees who use ICTs, GDP_0 that produced without ICTs. The national economy's total GDP is thus GDP $= GDP_0 + GDP_{ICT}$. Parameter θ indicates the extent to which ICTs increase the efficiency of the labour input.

Average labour productivity for the whole national economy can be represented as follows:

$$\frac{GDP}{L} = \frac{GDP_0 + GDP_{ICT}}{L}. \tag{3}$$

This can be further broken down as follows:

$$\frac{GDP_0 + GDP_{ICT}}{L} = \frac{L_0}{L}\frac{GDP_0}{L_0} + \frac{L_{ICT}}{L}\frac{GDP_{ICT}}{L_{ICT}}. \tag{4}$$

The equation tells us that overall labour productivity in the national economy is the average of the productivity of the labour input with ICT and labour input without ICT. The average is calculated by using person-shares as weights, or the terms L_0/L and L_{ICT}/L (the sum of the terms equals 1).

After minor manipulation the average labour productivity for the whole national economy can be represented as follows:

$$\frac{GDP}{L} = \frac{GDP_0}{L_0}\left[1 + \frac{L_{ICT}}{L} \times \theta\right] \tag{5}$$

This equation tells us that the national economy's labour productivity can be taken to derive from three factors:

1. What is the productivity of labour without ICT, i.e. what is GDP_0/L_0? This depends upon the education of employees, the volume of traditional capital, technological sophistication, etc.
2. How widespread is ICT use in the national economy, i.e. what is $\frac{L_{ICT}}{L}$?
3. To what extent does ICT use increase labour productivity, i.e. how large is the parameter θ?

Based upon research data collected from Finnish business and industry, our analysis here is focused on the impact of the two latter factors. The results reported in this text are drawn from the studies by

Maliranta and Rouvinen (2003a; 2003b). For the purposes of these studies we have compiled a company ICT panel, the data for which were collected in 1998–2001 through business surveys concerning ICT use. This dataset is currently held at Statistics Finland's Business Structures Unit.[4]

ICT use has been measured by three alternative indicators. The first alternative is to define ICT users as employees who use PCs or some other terminal in their job. In this case the indicator used in the analysis is a variable which describes the proportion of employees in the company who use a PC. The second option is to concentrate on the Internet and the third on the use of a local area network or LAN. A more detailed description of the methods of analysis is presented in the studies mentioned above.

ICT diffusion in Finland

Widespread ICT use in the workplace is one of the distinctive characteristics of an information society. It is a necessary but – as we can see from equation (5) – not a sufficient condition for prosperity. ICT use must of course still increase the productivity of employees; more on this below.

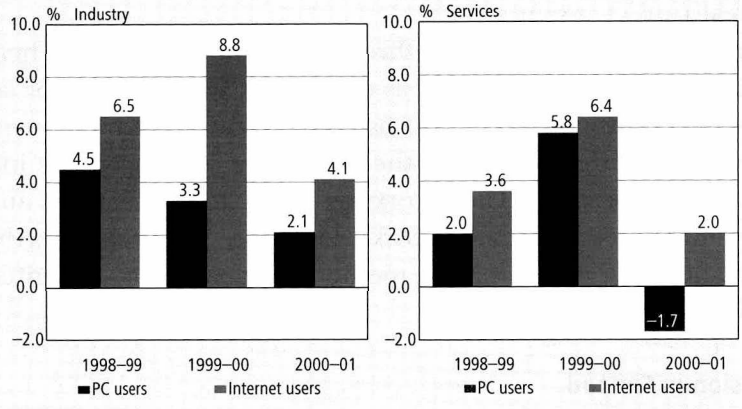
Figure 6.2.1 shows the annual increase in the number of ICT users. The number of PC users has continued to increase in industry in recent years, but the rate of growth has slowed down. In the three years under view, the number of PC users has increased by some 10 percentage points. Today, some 60 per cent of the industrial labour force use a PC in their job. The number of Internet users increased very sharply in 1999 and 2000, but by 2001 this trend began to wane. In three years the number of Internet users has increased by around 20 percentage points.

The fastest growth was recorded in 2000 when the number of PC users increased in services by around 6 percentage points. However during these three years overall growth was not as high as in industry. One possible explanation is that the proportion of PC users has traditionally been higher in services than in industry, at around 70 per cent. In recent years the proportion of Internet users has also shown slower growth in services than in industry.

The proportion of PC (or Internet) users in the national economy may increase in different ways. It may increase, first, as a result of business companies increasing the share of ICT users, i.e. ICT use has genuinely

4 The datasets and analyses are described in closer detail in Maliranta and Rouvinen (2003a and b).

Figure 6.2.1
Increase in PC and Internet users in Finnish industry and services, percentage points. Source: ICT panel.



Changes computed for those companies included in both datasets, i.e. at baseline and end year. Calculations include purchases and sales by all business units owned by the company.

increased in companies. On the other hand, the proportion of ICT users at the level of the national economy or economic sectors may increase because of structural changes at the company level. For instance, companies where only a relatively small proportion of the workforce used ICTs may have shrunk or disappeared altogether, at the same time as companies making extensive use of ICTs have grown up in their place. A closer analysis of the growth of ICT use in Finland showed that structural changes have had no major impact on the growth of ICT use described above (see Maliranta and Rouvinen, 2003a).

Positive impacts of ICTs on labour efficiency

In order to measure the positive impacts (2) on labour efficiency, we estimated (Maliranta and Rouvinen 2003a and 2003b) productivity equations in which the dependent variable is the productivity of labour in the company (in logarithmic form). Among the explanatory variables, we are mainly interested in the proportion of ICT using employees in the company. However, it is important that we also take account of other factors that have a bearing upon labour productivity, otherwise there is the risk that productivity effects are falsely attributed to ICT even though other background factors may be responsible. One such factor is the amount and field of education. The indus-

try as well as the amount of 'old economy' capital available per employee are other important background factors. The comprehensive and combinable microlevel materials that are available in Finland provide a unique opportunity to take into account these and many other factors that impact productivity.

Our calculations suggest that in Finnish business and industry, when a host of other factors are taken into account by statistical methods, the 'average' PC improves the productivity of the 'average' employee by 11.1 per cent. The analysis clearly highlights the importance of detailed and extensive micro-data in studying ICTs. If, for instance, the employees' level and field of education is ignored, the productivity effects of PCs would appear to be about twice as high.

When we turn our attention to PCs that are linked to a LAN, the productivity effect increases significantly. According to our calculations these kinds of PCs add productivity on average by 17.0 per cent. This is consistent with expectations: setting up and running a LAN involves various direct and indirect costs, so productivity needs to increase sufficiently in order to justify the investment.

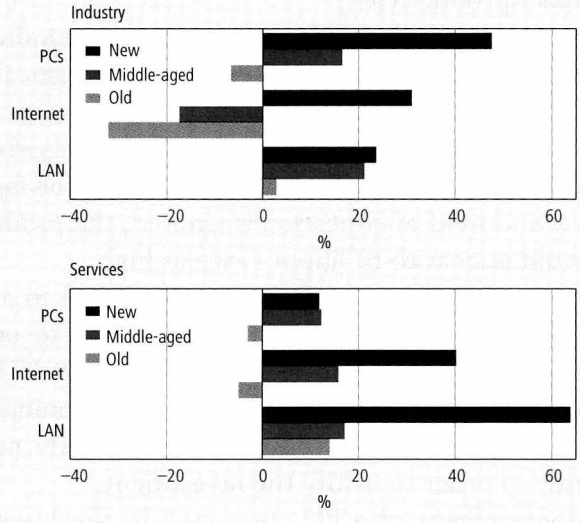
The productivity effects of a PC connected to the Internet would seem to be very different in industry and services. In services, the productivity effect is 15 per cent. In industry, by contrast, the effects are in fact sharply negative: –20 per cent!

It should be stressed that the results reported above describe average effects and the figures obviously conceal a great deal of variation between individuals and different kinds of companies. We have studied company differences by dividing companies into three groups: new companies operate business units whose mean age is 5 years or less; middle-aged companies operate units whose mean age is between 5 and 15 years; and old companies operate business units that are older than 15 years.

Figure 6.2.2 shows the estimates obtained from statistical models for the productivity effects of different ICTs in these three groups of industry and service sector companies. It should be noted that individual estimates may involve considerable measurement errors (especially in the case of the Internet) and therefore individual results must be interpreted with caution. However, the Figure does convey some general patterns very clearly indeed.

In general, young companies make more effective use of ICTs than old companies. The difference seems to be particularly clear in the case of Internet and PC use. The results for LAN use are not as pronounced. (According to the Figure service companies make highly productive use of LAN as well. However the measurement error for

Figure 6.2.2
ICT productivity effects by sector and company age, per cent.
Source: ICT panel (material for 1998–2000).



this estimate is considerable so we can draw no reliable conclusions). It appears that modern service companies make quite productive use of the Internet, whereas in old industrial companies the effect is clearly negative.

Discussing the results

Greenan and Mairesse (1996) use a similar approach to ours, but they have a very different kind of dataset. However, in so far as direct comparisons can be made, their findings are more or less in line with those reported here. The productivity effects of ICTs are usually expressed in terms of ICT output elasticity, and these figures are not directly comparable to the results reported here.

Translated into terms of output elasticity, our estimates put the effect of PCs at 5.3 per cent and that of LAN-connected PCs at 8.1 per cent. These figures come close to the values reported from other countries. Professor Matti Pohjola has noted that the results are usually in the range of 5–6 per cent[5] – although even these averages conceal considerable variation. Many studies have reported figures well above 10 per cent, in some they are clearly negative.

5 Press conference upon the publication of Maliranta and Rouvinen's ICT study.

The proportion of PC users has increased in three years by around 10 percentage points and, according to our cautious estimate, the productivity effect of PCs is around 10 per cent. On the basis of these estimates the annual contribution of PCs to productivity has been 0.33 percentage points (=10 % * 10 % / 3) a year; this is about half the figure suggested by Jalava in 2002 (at 0.6 percentage points). On the other hand, this latter estimate covers not just computers but other ICTs as well. In our own estimate a LAN-connected PC increases productivity on average by 17.0 per cent. Assuming that the number of LAN-connected PCs has increased at more or less the same rate as PCs, we arrive at the estimate of 0.57 percentage points (=17 % * 10 % / 3) a year, which comes quite close to Jalava's estimate.

Our estimate of the productivity effects of ICTs at the aggregate level of the economy is thus quite closely in line with earlier estimations from Finland. However, analyses based on micro-data shed interesting new light on the productivity effects of ICTs at company level. The extent of these effects varies among other things according to the age of the company and its sector. The productivity effects of different ICT equipment also vary.

The results reported here raise many further questions. What exactly is the reason why the productivity effects in new companies are so much greater than they are in old companies? Why do the productivity effects of the Internet seem to be sharply negative in old industrial companies? Further analyses are needed so that we can properly unravel these questions. Organisational changes offer one possible, but as yet an unexplored explanation as to why some companies have become successful users of the tools of the new economy and sources of prosperity in the national economy.

References

Greenan, Nathalie and Mairesse, Jacques (1996), 'Computers and Productivity in France: Some Evidence', *NBER Working Paper Series 5836*

Jalava, Jukka (2002), 'The production and use of ICT in Finland', ETLA Discussion papers, No. 827

Maliranta, Mika and Rouvinen, Petri (2003a), 'Productivity effects of ICT in Finnish Business,' ETLA Discussion papers, No. 852

Maliranta, Mika and Rouvinen, Petri (2003b), 'Tieto- ja viestintäteknologian tuottavuusvaikutukset Suomen liike-elämässä,' Kansataloudellinen aikakausikirja 2/2003, 164–180, (in Finnish only)

7 Employment

- In 2001, 165,000 persons were employed in the (narrowly defined) information sector: 46,900 of them were engaged in goods production, 71,600 in service production and 46,400 in content production.
- The information industries accounted for 7.3 per cent of all private and public sector jobs in 2001. The proportion of the total labour force engaged in the broadly defined information sector stood at 9.5 per cent.
- The broadly defined information sector (+ 62,600) accounted for 21 per cent of the total increase (+ 294,000) in the employed labour force in 1996-2001. Service production generated a large proportion of the new jobs in the information sector: 33,000 new jobs were created in service production.
- The production of goods in the information sector accounted for more than 40 per cent of the increase in manufacturing jobs in 1996-2000.
- Goods and service production in the information sector employ a higher-than-average proportion of young and well-educated people.
- The information sector recruits new employees directly from educational institutions, but increasingly from other industries as well. Movement between the information sector and other industries has increased markedly from the previous periods reviewed.
- Most information sector jobs are located on the Turku-Helsinki axis and in the Oulu, Tampere and Jyväskylä areas.

7.1 Changes in employment in the information sector

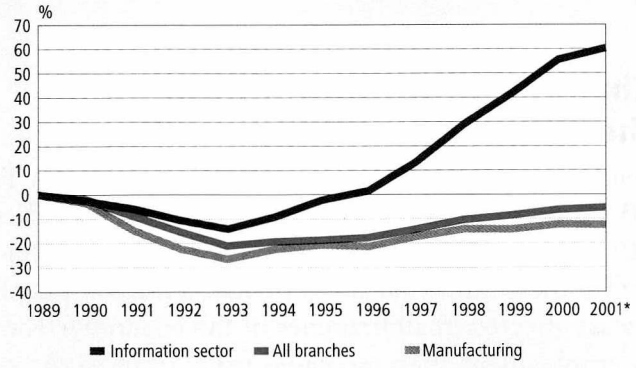
At year-end 1989 the total employed labour force in Finland was 2,374,000, but in 1991–1993 the figure dropped sharply to 1,878,000. Within the space of four years, the economically active population in the country declined by half a million people. This, inevitably, was reflected in all branches of the economy. The number of people in employment then increased from 1994 to the end of 2001 by 373,000, so that the active labour force stood at 2,251,000. Most of this growth (319,000 persons) was attributable to the increasing number of jobs in the service sector.

Table 7.1.1
Numbers employed in the information sector in 1989 (SIC-88) and 1995–2001 (SIC-95) as compared with all industries, manufacturing and services. Changes in numbers employed are also indicated (1989=100).*
Source: Statistics Finland, regional employment statistics.

	SIC-88 1989	SIC-95 1995	1996	1997	1998	1999	2000	2001*
All branches	**2,373,747**	**1,932,752**	**1,957,144**	**2,037,997**	**2,132,704**	**2,173,885**	**2,228,557**	**2,251,181**
	100.0	81.4	82.4	85.9	89.8	91.6	93.9	94.8
Manufacturing	520,959	412,950	409,648	430,736	446,818	446,628	457,043	455,613
	100.0	79.3	78.6	82.7	85.8	85.7	87.7	87.5
Services	1,392,052	1,240,491	1,273,423	1,327,241	1,403,103	1,483,680	1,483,396	1,515,603
	100.0	89.1	91.5	95.3	100.8	106.6	106.6	108.9
Information sector	**102,843**	**100,439**	**104,492**	**116,754**	**132,686**	**145,612**	**160,008**	**164,820**
Production of goods	22,998	28,835	31,914	36,656	40,035	44,377	46,814	46,876
Production of services	44,638	38,966	38,860	43,576	50,716	56,977	66,849	71,589
Content production	35,207	32,638	33,718	36,522	41,935	44,258	46,345	46,355
Information sector	**100.0**	**97.7**	**101.6**	**113.5**	**129.0**	**141.6**	**155.6**	**160.3**
Production of goods	100.0	125.4	138.8	159.4	174.1	193.0	203.6	203.8
Production of services	100.0	87.3	87.1	97.6	113.6	127.6	149.8	160.4
Content production	100.0	92.7	95.8	103.7	119.1	125.7	131.6	131.7

The changes in the industry classification have only limited impact during this period.

Figure 7.1.1
Change in the numbers employed in the information sector, all industries and manufacturing in 1989–2001 (1989=100).*
Source: Statistics Finland, regional employment statistics.



The information sector is an increasingly important source of employment

A total of 102,800 persons were employed in the information sector in 1989, but in the depths of the recession in 1993 the figure dropped to 88,300. Since then the number of jobs has been steadily increasing. In

1989 the information sector accounted for 4.3 per cent of all jobs, by 2001 the proportion had risen to 7.3 per cent. Some 20 per cent of the increase in the employed labour force in 1996-2001 was attributable to the information sector. Over 40 per cent of all new jobs created in manufacturing during 1996-2001 were in the production of goods in information sector.

A comparison of annual changes in the numbers employed with the situation in 1989 reveals that employment in the information sector has not dropped back to the levels recorded during the recession. In contrast to the situation in all industries and in manufacturing, the figures for the information sector started clearly to increase after 1993 and by year-end 1995 had reached the levels recorded six years previously.

Main increase in goods production

Looking separately at the categories of goods production, service production and content production within the information sector, it is clear that their roles and relative positions have changed somewhat since 1989.

The number of jobs in goods production as a proportion of all information sector jobs increased from 23 per cent in 1993 to around 30 per cent in the space of two-three years. At year-end 2001 a total of 46,900 persons were engaged in goods production, compared to 71,600 in service production and 46,400 in content production. However there have been no marked changes since 1996 in terms of the breakdown of information sector jobs between these three categories.

Figure 7.1.2
Numbers employed in the information sector in 1989–2001.*
Source: Statistics Finland, regional employment statistics.

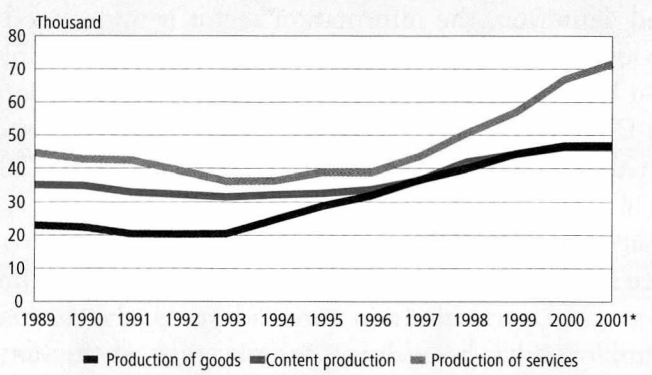
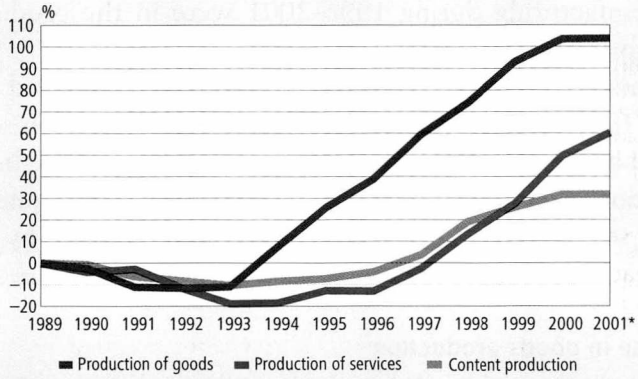


Figure 7.1.3
Change in numbers employed in the information sector in 1989–2001, 1989=100. Source: Statistics Finland, regional employment statistics.*



From 1993 through to the end of 1997, goods production in particular showed very rapid growth. Since 1997 the number of jobs in service and content production has increased equally rapidly, after 1999 most particularly in service production. From 1993 to the end of 2001, the number of people working in goods production has increased by more than 26,000, or by some 129 per cent. During the same period the increase in service production has been some 97 per cent or more than 35,000 persons, in content production some 47 per cent or close to 15,000 persons. In goods production the 1989 level of employment was exceeded as early as 1994. In content production that level was reached in 1997, and in service production in 1998.

Numbers employed in the information sector have grown rapidly

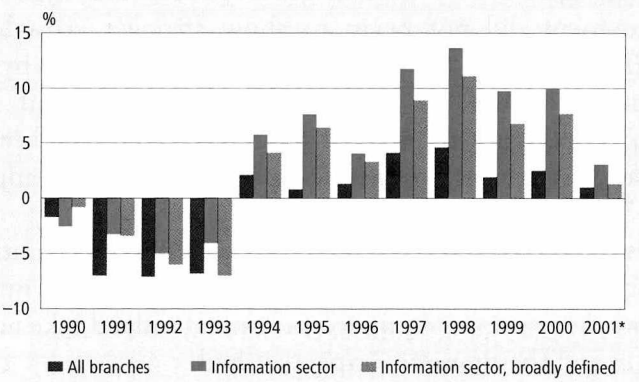
In its broad definition, the information sector is understood as referring to goods and service production as well as content production plus certain branches closely related to core areas of the information sector (see Chapter 1). At year-end 1989, the total number of people working in this broadly defined information sector was 159,000; 12 years later in 2001, the figure was some 56,000 more.

A comparison of the changes in the information sector with those taking place in all industries suggests that in the broadly defined information sector and particularly in core industries, the decrease in the numbers employed has been slower than average, at the same time as the increase in the number of new jobs has been much faster than in other industries on average.

Table 7.1.2
Numbers employed in the broadly defined information sector in 1989 (SIC-88) and 1995–2001 (SIC-95). Changes in numbers employed are also indicated (1989=100). Source: Statistics Finland, regional employment statistics.*

	SIC-88 1989	SIC-95 1995	1996	1997	1998	1999	2000	2001*
Information sector, broadly defined	**158,979**	**147,442**	**152,314**	**165,930**	**184,394**	**196,935**	**212,039**	**214,873**
Production of goods	22,998	28,835	31,914	36,656	40,035	44,377	46,814	46,876
Production of services	44,638	38,966	38,860	43,576	50,716	56,977	66,849	71,589
Content production, broadly defined	91,343	79,641	81,540	85,698	93,643	95,581	98,376	96,408
Information sector, broadly defined	**100.0**	**92.7**	**95.8**	**104.4**	**116.0**	**123.9**	**133.4**	**135.2**
Production of goods	100.0	125.4	138.8	159.4	174.1	193.0	203.6	203.8
Production of services	100.0	87.3	87.1	97.6	113.6	127.6	149.8	160.4
Content production, broadly defined	100.0	87.2	89.3	93.8	102.5	104.6	107.7	105.5

Figure 7.1.4
Annual change in the numbers employed in core branches of the information sector, in the broadly defined information sector and in all branches in 1990–2001, per cent. Source: Statistics Finland, regional employment statistics.*



In the information sector new jobs were created most particularly in goods production, where employment trends began to rise as early as 1993. The growth rate peaked at around 20 per cent, although in 2000 it slowed down to 5.5 per cent. By far the largest number of new employees was recruited in the manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy (including mobile phones), where the number of people employed more than tripled from 8,900 in 1993 to 30,900 in 2001.

Table 7.1.3
Annual change in the numbers employed in the information sector in 1990, 1995–2001 as compared with all branches, manufacturing and services, per cent.*
Source: Statistics Finland, regional employment statistics.

	SIC-88 1990 %	SIC-95 1995 %	1996 %	1997 %	1998 %	1999 %	2000 %	2001* %
All branches	**–1.7**	**0.8**	**1.3**	**4.1**	**4.6**	**1.9**	**2.5**	**1.0**
Manufacturing	–3.4	2.3	–0.8	5.1	3.7	0.0	2.3	–0.3
Services	0.9	2.3	2.7	4.2	5.7	5.7	0.0	2.2
Information sector	**–2.6**	**7.6**	**4.0**	**11.7**	**13.6**	**9.7**	**9.9**	**3.0**
Production of goods	–2.5	16.7	10.7	14.9	9.2	10.9	5.5	0.1
Production of services	–4.1	6.9	–0.3	12.1	16.4	12.4	17.3	7.1
Content production	–0.7	1.3	3.3	8.3	14.8	5.5	4.7	0.0
Information sector, broadly defined	**–0.8**	**6.4**	**3.3**	**8.9**	**11.1**	**6.8**	**7.7**	**1.3**
Production of goods	–2.5	16.7	10.7	14.9	9.2	10.9	5.5	0.1
Production of services	–4.1	6.9	–0.3	12.1	16.4	12.4	17.3	7.1
Content production, broadly defined	1.2	2.8	2.4	5.1	9.3	2.1	2.9	–2.0

In the early 1990s the number of jobs in service and content production declined more slowly than in goods production. In these industries employment did not begin to show stronger growth until 1997. In 2000, the figures for service production went up by more than 17 per cent, in content production by less than 5 per cent. In service production the largest number of new jobs was created in computer and related activities, where the number of people employed tripled from 13,600 in 1993 to 40,800 in 2001.

The changes in employment that followed with the recession in the early 1990s are equally evident in all industries, including the information sector. Any description of employment must indeed take account of this recession and the dramatic impacts it had.

The direction, magnitude and intensity of employment changes tend to vary in different industries. Measured in terms of the numbers employed, the annual rate of growth in the information sector has been at least twice that recorded in the economy as a whole since 1993. At the same time we should bear in mind, though, that many enterprises have outsourced their services (computer services, bookkeeping, cleaning, etc.), which means that these services are now classified in the service sector.

7.2 Employment structure in goods and service production in the information sector

Preliminary data from regional employment statistics indicate that over 118,000 persons were engaged in information sector goods and service production in 2001. In goods production men accounted for around 65 per cent and in service production for around 67 per cent of the workforce. In goods production the proportion of men is somewhat lower than in manufacturing overall, where the figure is just over 70 per cent. By contrast the proportion of men in information sector service production is higher than in the service sector on average: here the proportion of women is 47 per cent. In the information sector the proportion of men is highest in wholesale and in computer and related activities.

The proportion of employees under 35 is significantly higher in the information sector than in manufacturing and services on average. In information sector goods production the proportion of employees under 35 is as high as 54 per cent, whereas in manufacturing as a whole the figure is around 34 per cent. In information sector service production the proportion of young employees was 47 per cent in 2001, compared to 38 per cent in services in general. In service production the proportion of young people was highest in computer and related services.

In manufacturing the proportion of those with a tertiary degree was around 14 per cent and in information sector goods production 37 per

Table 7.2.1
Age, gender and educational structure of personnel in information sector goods and service production as compared with all manufacturing and services in 2001. Source: Statistics Finland, regional employment statistics.*

	Production of goods	Production of services	Wholesale	Telecommunicatons	Consultancy services	Production of goods and services, total	Manufacturing	Services
Total	46,876	71,589	11,581	19,069	40,939	118,465	437,147	805,543
Men, %	64.7	67.4	72.9	60.5	69.0	66.3	70.4	53.0
Women, %	35.3	32.6	27.1	39.5	31.0	33.7	29.6	47.0
Age, %								
15–35 years	53.9	47.2	47.7	40.6	50.1	49.9	34.4	37.9
35–44 years	28.1	29.0	31.6	27.7	28.9	28.6	26.8	25.9
45–54 years	14.7	18.7	16.5	23.9	16.8	17.1	28.1	25.3
55– years	3.3	5.1	4.2	7.8	4.1	4.4	10.7	10.9
Level of education, %								
Basic level	13.2	10.6	12.6	13.9	8.4	11.6	24.5	25.7
Upper secondary	35.2	35.6	36.3	38.1	34.2	35.4	49.3	42.6
Lowest tertiary	14.4	23.9	25.0	25.0	23.1	20.1	12.7	17.7
Tertiary level	37.1	30.0	26.1	23.0	34.3	32.8	13.6	14.0

cent. In services, the proportion of employees with a tertiary degree was 14 per cent and in information sector services 30 per cent. If tertiary degrees are defined as including those completed at the lowest tertiary level, the proportion of employees with such a degree in the information sector was 53 per cent, while the corresponding figure in manufacturing was 26 per cent and in services 32 per cent.

7.3 Changes in the information sector labour force in 1993–2001

During the recession from 1989 through to 1993, Finland lost almost half a million jobs. Most of this loss was recovered during the period from 1993 to 2001, when the number of jobs increased by 373,000. This net increase, however, conceals quite dramatic annual changes in the numbers employed. In 2001, for instance, a total of 218,600 persons left their jobs to continue their studies, to retire or for some other reason. At the same time 240,000 persons entered the labour market. The net increase in the number of jobs in 2001 thus amounted to 22,000. One year previously 6,000 of these 240,000 people had been out of work, 93,500 had been studying and 5,100 came from abroad.

The numbers exiting and entering the labour market to and from the ranks of the unemployed include people taking up jobs created for the long-term unemployed, for instance. Similarly, people who enter labour market training are not counted as unemployed for the duration of their training, but may return to these statistics upon completion of their training. These labour policy measures explain part of the movement between employment and unemployment.

During 1998–2000, the number of people employed in the broadly defined information sector increased by around 27,600 persons. Compared to the previous two-year period, the number of those newly employed in this sector increased considerably, i.e. by 66,900 persons. Almost one-third of the labour force had entered the sector in the previous two years. The background of the new entrants in the sector was quite different: the proportion of those who had been unemployed dropped to 11 per cent, while the proportion of those entering the sector from an educational institution increased to 29 per cent. The numbers moving to the sector from other industries was clearly higher than before, accounting for 46 per cent of the total. As for the structure of the 39,200 people leaving, the numbers moving to other industries and moving abroad increased in comparison with the 1995–1997 period.

Figure 7.3.1
Changes in employment in the broadly defined information sector 1998–2000.
Source: Statistics Finland, regional employment statistics.

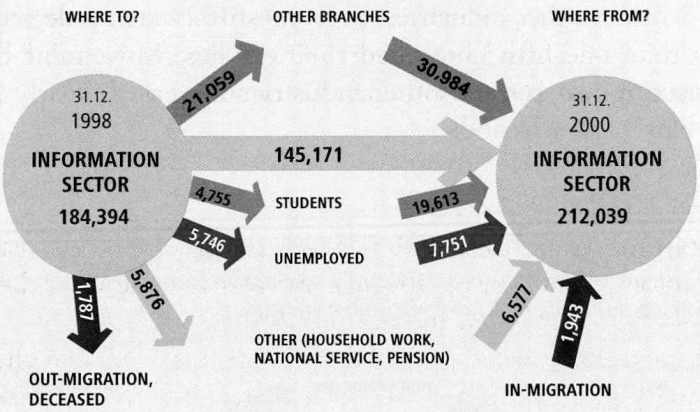
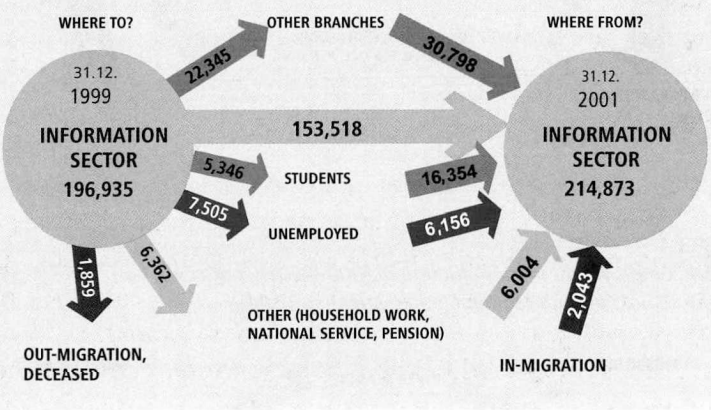


Figure 7.3.2
Changes in employment in the broadly defined information sector 1999–2001.*
Source: Statistics Finland, regional employment statistics.



In 2001 the growth of the information sector came to a virtual standstill: the numbers employed increased by no more than 2,800. The final figure may be somewhat higher because the preliminary data include a number of employed people whose industry is unknown; some of them will no doubt be ascribed to the information sector. The number of new entrants in 2001 was 35,500 (17%). Almost half of them or 17,200 had been employed in other industries before moving to the information sector. The proportion of those coming from edu-

cational institutions dropped to just over one-quarter, or 27 per cent. Some 11 per cent of the new entrants had been unemployed. The numbers leaving increased to 32,600 (15%), of whom 43 per cent went to work in other industries, over one-fifth were made redundant and less than one-fifth continued their studies. Movement between the information sector and other industries increased clearly in comparison with earlier periods.

Figure 7.3.3
Changes in employment in the broadly defined information sector 2000–2001, per cent. Source: Statistics Finland, regional employment statistics.*

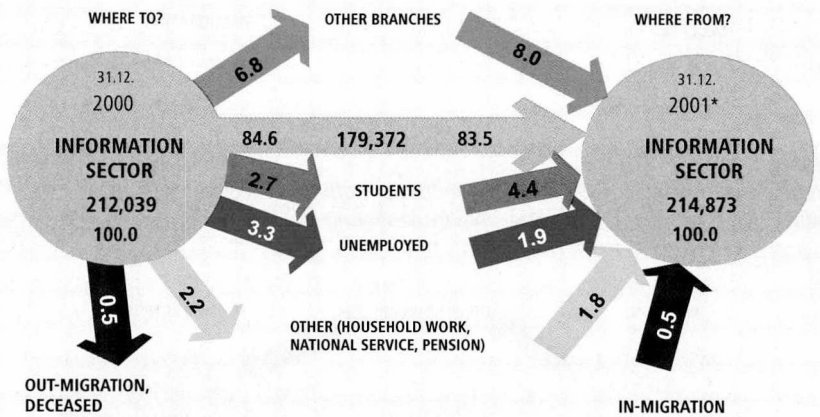
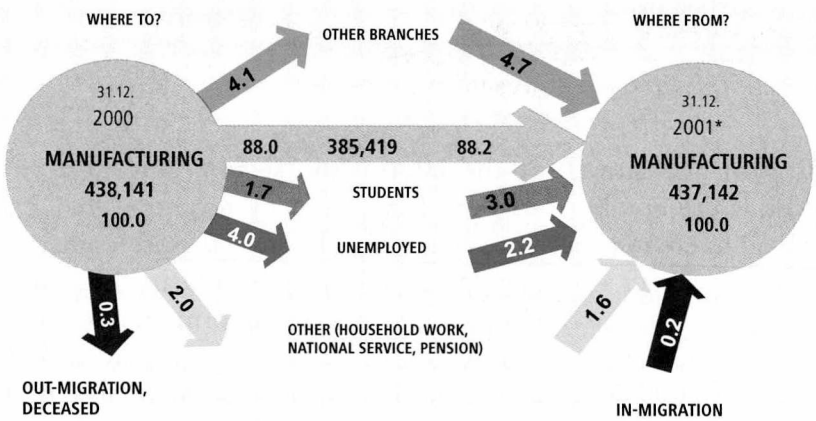


Figure 7.3.4
Changes in employment in manufacturing 2000–2001, per cent. Source: Statistics Finland, regional employment statistics.*

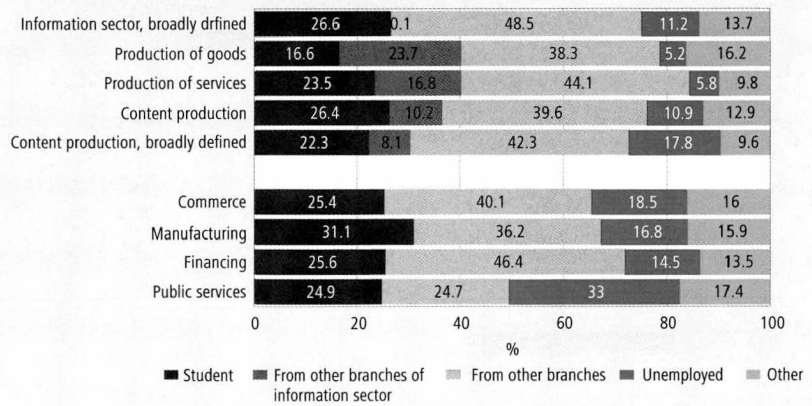


Labour turnover is at a much lower level in manufacturing than in the information sector. In 2001 no more than 52,700 persons or 12 per cent of the labour force left manufacturing, while 51,700 new employees were taken on, representing 12 per cent of the labour force at year-end 2001. In particular, movement between manufacturing and other industries increased in comparison with 1999. The number of students and unemployed people recruited was lower than in 1999. Growth in manufacturing, too, came to a halt, slowing down the recruitment of new employees.

The background of people starting in the information sector in 2001 was very different from the situation in 1999. The number of students as a proportion of new employees decreased by ten percentage points, and the figure for people formerly unemployed by six percentage points, but the numbers of those moving into the sector from other industries increased by 17 percentage points. The proportion of students decreased most in goods production and second most in service production. During the period of rapid growth ICT companies in particular had large numbers of students and graduates on their payroll.

The patterns of change in commerce, manufacturing, financing and public services are similar but less pronounced. They, too, were recruiting more people in 2001 from other industries and less people from educational institutions and from the ranks of the unemployed. Among new entrants in the public sector, the majority still come from an unemployment background. This is partly explained by the fact that job creation measures typically focus on the public sector. The in-

Figure 7.3.5
People newly employed in 2001 by previous activity, per cent.*
Source: Statistics Finland, regional employment statistics.



formation sector continues to employ less people with an unemployed background than manufacturing and services.

7.4 The information sector by geographical region

Regional employment data are here examined by sub-regional unit, using the broader concept of information sector (which includes printing, research and development, libraries, etc.). Indeed in many local municipalities library staff are the only group representing the information sector.

In 2001 the information sector accounted for between 1 per cent and 25 per cent of all jobs in sub-regional units; the average for the whole country was 9.5 per cent. Jobs in the information sector are so heavily concentrated in a few sub-regional units that just six units exceeded the national average. However these six sub-regional units are all very large: in 2001 they had a total of 982,700 jobs, which is 44 per cent of all jobs in the country. The number of information sector jobs in these sub-regional units totals 156,900, which is 73 per cent of the number of jobs in the information sector. In 2001 the growth of the information sector came to a virtual standstill even in these top regions; in some (such as Salo and Äänekoski) the figures actually began to decline. Indeed it seems that, at least for the time being, a period of sustained growth has now come to an end. This has also influenced regional population development. In the sub-regional units of Salo and

Figure 7.4.1
Jobs in the broadly defined information sector as a proportion of all jobs in the sub-regional unit in 2001, per cent.*
Source: Statistics Finland, regional employment statistics.

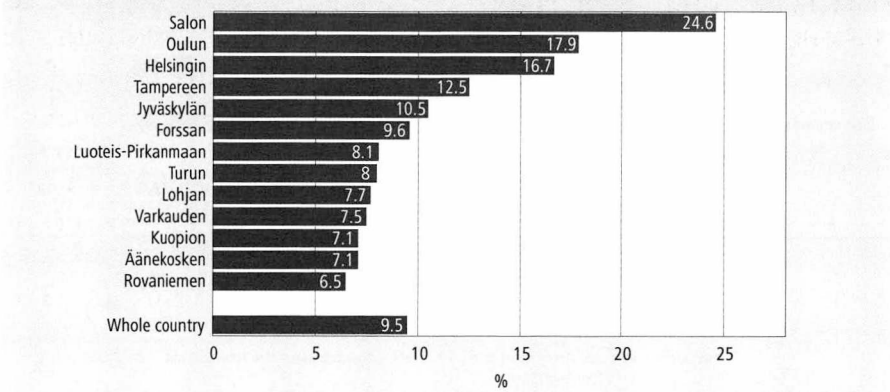
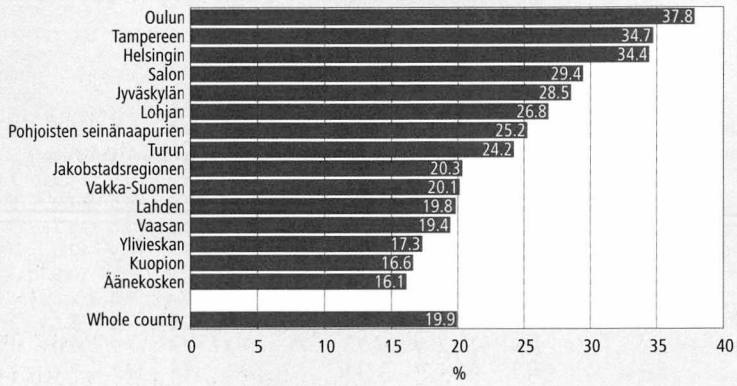


Figure 7.4.2
Change in total number of jobs in sub-regional units in 1993–2001, per cent.*
Source: Statistics Finland, regional employment statistics.



Äänekoski, previous trends of positive in-migration were immediately transformed into net emigration.

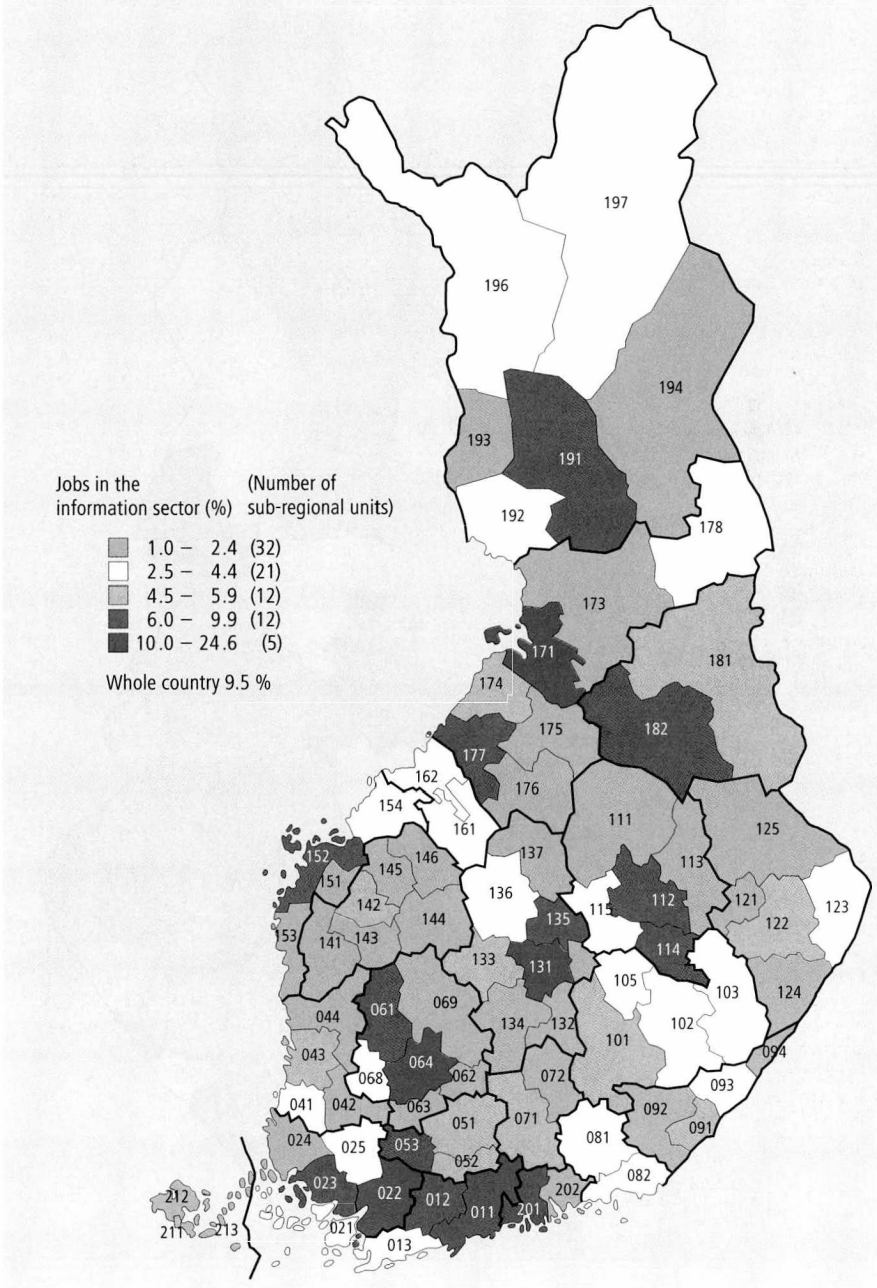
The same regions that have seen rapid growth in the information sector have also recorded the fastest increase in the overall number of jobs. An increasing number of jobs has also accelerated population growth. This association is not as clear in the other direction: there are regions where a small information sector has started rapidly to grow, but as yet this has not compensated for the decline in agriculture nor resulted in positive population growth. Now, with the increase in the overall number of jobs slowing down, population growth in the sub-regional units of Helsinki and Oulu, for instance, has also slowed down.

The number of jobs in the information sector as a proportion of all jobs in sub-regional units is continuing to grow in the sub-regional units of Oulu, Jyväskylä and Tampere as well as on the Helsinki-Turku axis. The proportion of information sector jobs increases most rapidly in areas with the largest number of jobs. The growth area has expanded from the Helsinki-Turku axis towards Häme, from Oulu down along the coastal regions of Ostrobothnia and around the city of Jyväskylä. From 1993 to 2001, the number of information sector jobs in the whole country increased by 61.5 per cent. Nineteen sub-regional units recorded an increase of more than 50 per cent, but there were 22 sub-regional units where the number of information sector jobs decreased at the same time. There are thus very pronounced regional differences in growth.

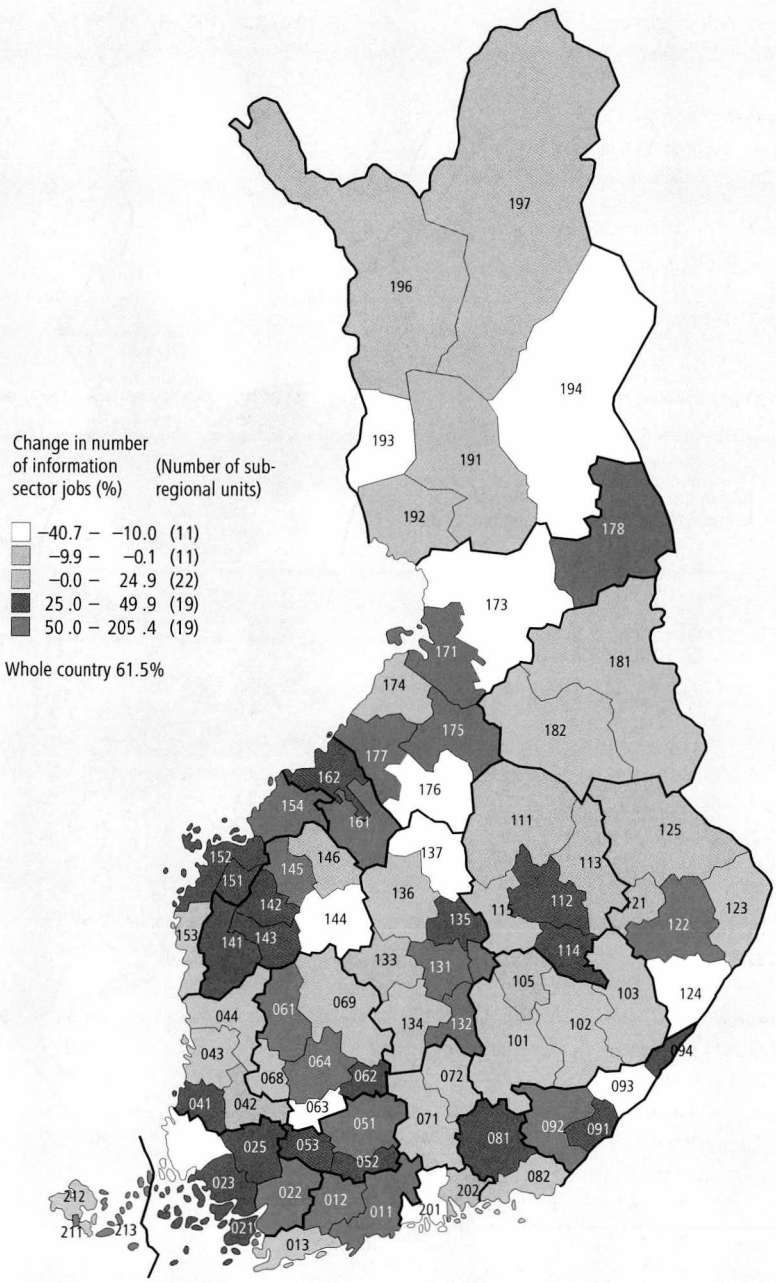
Table 7.4.1
Proportions employed in the broadly defined information sector in 1993–2001, per cent.*
Source: Statistics Finland, regional employment statistics.

	Information sector jobs as a proportion of all jobs in the sub-regional unit, %									Change 1993–2001* percentage points
	1993	1994	1995	1996	1997	1998	1999	2000	2001*	
Whole country	**7.1**	**7.2**	**7.6**	**7.8**	**8.1**	**8.6**	**9.1**	**9.5**	**9.5**	**2.5**
Sub-regional units with highest proportions of persons employed in information sector										
Salon	17.0	21.4	21.1	25.7	25.3	25.9	26.2	25.6	24.6	7.6
Oulun	11.5	12.6	14.6	15.2	15.6	16.0	17.2	18.5	17.9	6.4
Helsingin	12.9	12.9	13.5	13.9	14.6	15.4	15.9	16.6	16.7	3.8
Tampereen	8.5	8.6	9.2	9.2	10.1	10.8	11.5	12.4	12.5	4.0
Jyväskylän	7.4	7.4	7.3	7.8	8.0	9.1	9.8	10.5	10.5	3.1
Forssan	8.6	8.3	8.3	8.7	8.9	9.4	9.4	9.3	9.6	1.0
Luoteis-Pirkanmaan	4.9	8.7	8.4	6.6	6.5	7.9	10.8	7.5	8.1	3.3
Turun	6.8	7.0	7.2	7.1	7.2	7.3	7.4	7.9	8.0	1.3
Lohjan	5.9	6.8	7.1	7.0	7.7	8.1	7.7	8.2	7.7	1.8
Varkauden	6.1	6.0	6.2	6.0	6.4	6.8	7.2	7.4	7.5	1.4
Kuopion	6.4	6.0	6.4	6.2	6.4	6.7	6.7	7.3	7.1	0.7
Äänekosken	6.3	6.9	8.2	8.4	10.1	10.0	11.3	10.0	7.1	0.8
Rovaniemen	6.7	5.9	6.1	5.7	5.4	6.1	6.8	6.8	6.5	–0.1
Kajaanin	5.3	5.2	5.4	5.0	5.4	5.7	5.8	6.2	6.3	1.0
Ylivieskan	3.6	3.5	4.4	5.8	6.1	6.1	6.9	7.0	6.2	2.7
Porvoon	9.1	8.9	8.5	8.3	7.7	8.1	7.0	6.6	6.0	–3.1
Vaasan	5.1	5.1	5.4	5.1	5.3	5.5	6.1	6.2	6.0	0.9
Keuruun	6.6	6.6	6.5	5.9	6.2	6.2	5.5	5.8	5.9	–0.7
Joensuun	4.4	4.6	4.6	4.7	4.7	5.0	5.4	5.7	5.8	1.4
Mikkelin	5.9	5.3	5.4	5.2	5.0	5.1	5.3	5.5	5.6	–0.2
Sub-regional units with lowest proportions of persons employed in information sector										
Sydösterbottens kustregion	1.7	2.0	2.0	1.8	1.9	1.9	1.6	1.7	1.8	0.1
Ålands skärgård	0.8	1.6	1.8	1.1	1.8	1.6	1.1	1.6	1.7	0.8
Etelä-Pirkanmaan	2.2	2.4	2.4	2.0	1.8	1.9	1.5	1.7	1.6	–0.6
Iin	1.9	2.3	2.0	1.8	1.8	2.0	2.3	2.1	1.6	–0.3
Ålands landsbygd	1.5	1.5	1.3	1.4	1.9	1.6	1.3	1.7	1.6	0.1
Jämsän	1.4	1.7	1.7	1.7	1.6	1.8	1.8	1.7	1.5	0.1
Kaakkoisen Keski-Suomen	0.9	1.3	2.3	1.6	1.2	1.6	1.5	1.4	1.5	0.6
Viitasaaren	2.0	1.7	1.6	1.2	1.4	1.5	1.7	1.5	1.4	–0.5
Eteläisten seinänaapurien	1.0	1.0	1.0	0.9	1.0	0.9	1.2	1.2	1.4	0.4
Kyrönmaan	1.1	0.9	1.0	0.9	1.0	1.2	1.5	1.5	1.4	0.3
Kuusiokuntien	1.9	1.8	1.7	1.6	1.5	1.4	1.2	1.4	1.4	–0.5
Kärkikuntien	0.8	1.2	0.9	0.9	1.0	1.1	0.9	1.2	1.3	0.5
Järviseudun	1.5	1.6	1.6	1.4	1.4	1.4	1.5	1.5	1.3	–0.2
Keski-Karjalan	1.4	1.3	1.4	1.2	1.2	1.3	1.5	1.3	1.3	–0.1
Pohjois-Satakunnan	1.2	1.3	1.3	1.1	1.2	1.5	1.4	1.2	1.3	0.0
Nivala-Haapajärven	1.5	1.9	2.6	2.5	0.9	1.1	1.3	1.3	1.2	–0.3
Länsi-Saimaan	0.7	1.0	1.2	1.1	1.2	1.5	1.3	1.4	1.2	0.5
Siikalatvan	0.8	0.7	0.7	0.7	0.7	0.7	0.8	1.2	1.2	0.4
Torniolaakson	1.6	1.6	1.4	1.3	1.7	1.4	1.4	1.3	1.1	–0.6
Koillis-Savon	1.0	1.0	0.9	1.1	1.1	1.1	1.1	1.0	1.0	0.0

Map 7.4.1
Proportions of jobs in the broadly defined information sector by sub-regional unit in 2001, per cent.*
Source: Statistics Finland, regional employment statistics.



Map 7.4.2
Increase of jobs in the broadly defined information sector from 1993 to 2001.*
Source: Statistics Finland, regional employment statistics.



Appendix 7.1
Numbers employed in the information sector (SIC-88) in 1989–1992.
Source: Statistics Finland, regional employment statistics.

		1989	1990	1991	1992
Information sector		**102,843**	**100,170**	**96,891**	**92,069**
Information sector, broadly defined		**158,979**	**157,639**	**152,234**	**143,076**
Production of goods		**22,998**	**22,413**	**20,435**	**20,314**
261	Computing and office machinery manufacture	1,419	1,457	1,077	1,975
2621	Electronic circuits and components manufacture	2,739	2,700	2,544	2,862
2622	Telecommunications equipment manufacture	8,294	8,983	7,657	8,106
2623	Radio and television receivers manufacture	1,846	1,179	1,888	1,095
2634	Electric conductors manufacture	3,997	3,202	2,702	2,415
2642	Manufacture of instruments for measuring, checking etc.	4,703	4,892	4,567	3,861
Production of services		**44,638**	**42,793**	**43,458**	**39,456**
4152	Wholesale of telecommunication equipment	637	1,002	1,576	1,589
4154	Wholesale of entertainment electronics products	904	1,052	813	653
4173	Wholesale of office machinery and computers	8,386	8,289	7,604	6,788
58	Telecommunication services	19,748	17,578	18,718	16,303
674	Renting and leasing of office machinery and equipment	417	273	249	298
72	Data processing services	14,546	14,599	14,498	13,825
Content production		**35,207**	**34,964**	**32,998**	**32,299**
161	Publishing combined with printing	17,353	16,555	16,136	16,600
2624	Sound and image recordings manufacture	121	146	114	110
751	Management and administration services	3,776	3,800	3,467	3,151
7541	Advertising agencies	4,488	4,742	3,975	3,251
7542	Advertisement brokerage and distribution	546	483	407	515
762	News agencies	441	441	416	386
911	Cinema	1,203	1,185	999	976
912	Radio and television	6,981	7,341	7,214	7,055
9132	Recording studios	298	271	270	255
Content production, broadly defined		**91,343**	**92,433**	**88,341**	**83,306**
162	Printing independent of publishing	21,363	21,429	18,938	15,017
163	Services to printing	2,561	2,392	1,957	2,189
675	Renting of household articles	241	417	310	259
7642	Word processing and duplicating services	1,134	1,191	1,080	850
86	Research and development	11,410	11,610	12,091	12,385
913	Stage, concert and artistic activities	6,804	6,993	7,305	6,879
914	Library, museum and exhibition activities	9,324	9,564	9,914	9,632
919	Other entertainment and recreational services	3,299	3,873	3,748	3,796

Appendix 7.2
Numbers employed in the information sector (SIC-95) in 1993–2001.*
Source: Statistics Finland, regional employment statistics.

		1993	1994	1995	1996	1997	1998	1999	2000	2001*
Information sector		**88,316**	**93,347**	**100,439**	**104,492**	**116,754**	**132,686**	**145,612**	**160,008**	**164,820**
Information sector, broadly defined		**133,065**	**138,585**	**147,442**	**152,314**	**165,930**	**184,394**	**196,935**	**212,039**	**214,873**
Production of goods		**20,472**	**24,700**	**28,835**	**31,914**	**36,656**	**40,035**	**44,377**	**46,814**	**46,876**
3001	Manufacture of office machinery	68	43	21	19	21	20	32	27	27
3002	Manufacture of computers etc.	2,086	2,602	1,763	3,231	2,631	2,672	2,057	889	672
3130	Manufacture of insulated wire and cable	2,070	1,678	1,594	2,027	1,708	1,889	1,865	1,713	1,869
3210	Manufacture of electronic valves etc.	2,555	2,972	4,007	4,060	4,794	4,793	4,549	6,289	5,659
3220	Manufacture of television and radio transmitters etc.	8,878	12,416	16,095	17,282	21,366	24,049	28,749	30,358	30,900
3230	Manufacture of television and radio receivers etc.	1,139	1,292	1,359	1,105	1,235	1,341	1,656	1,871	1,378
3320	Manufacture of instruments for measuring, checking etc.	3,320	3,344	2,702	2,780	3,165	3,426	3,592	3,641	3,941
3330	Manufacture of industrial process control equipment	356	353	1,294	1,410	1,736	1,845	1,877	2,026	2,430
Production of services		**36,284**	**36,441**	**38,966**	**38,860**	**43,576**	**50,716**	**56,977**	**66,849**	**71,589**
51432	Wholesale of radio and television goods	626	761	766	754	862	862	777	790	836
51641	Wholesale of computer hardware	4,787	4,860	5,191	5,585	6,872	6,259	6,333	6,607	7,169
51652	Wholesale of telecommunication equipment etc.	1,822	2,086	2,475	2,467	2,972	3,322	3,640	3,517	3,576
642	Telecommunications	15,252	14,736	15,326	13,562	14,450	16,264	17,648	19,659	19,069
7133	Renting of office machinery etc.	219	42	58	64	68	68	126	86	105
72	Computer and related activities	13,578	13,956	15,150	16,428	18,352	23,941	28,453	36,190	40,834
Content production		**31,560**	**32,206**	**32,638**	**33,718**	**36,522**	**41,935**	**44,258**	**46,345**	**46,355**
221	Publishing	15,714	15,421	14,674	14,371	14,777	16,623	17,477	17,072	16,617
7413	Market research and public opinion polling	369	796	939	967	1,207	1,551	1,949	2,238	2,102
7414	Business and management consultancy activities	3,267	3,234	3,874	4,548	5,391	6,892	7,564	8,619	8,998
744	Advertising	4,032	4,377	4,768	5,138	5,706	7,024	7,507	8,472	8,910
921	Motion picture an video activities	975	1,057	1,121	1,211	1,535	1,836	1,874	1,903	2,047

Appendix 7.2 *continued*

		1993	1994	1995	1996	1997	1998	1999	2000	2001*
922	Radio and television activities	6,804	6,927	6,870	7,083	7,521	7,596	7,447	7,596	7,237
924	News agency activities	399	394	392	400	385	413	440	445	444
Content production broadly defined		**44,749**	**45,238**	**47,003**	**47,822**	**49,176**	**51,708**	**51,323**	**52,031**	**50,053**
222	Printing and service activities related to printing	15,572	15,498	15,329	14,860	15,464	15,557	14,925	14,660	14,278
223	Reproduction of recorded media	82	101	133	123	127	202	226	195	217
71401	Renting of videotapes	231	218	227	226	256	354	344	392	501
73	Research and development	11,524	12,155	12,959	13,712	14,552	15,610	15,462	15,801	14,213
7483	Secretarial and translation services	1,571	1,769	2,021	2,049	2,265	2,821	2,788	2,913	2,845
923	Other entertainment activities	6,747	6,541	6,741	6,896	7,060	7,711	8,127	8,270	8,488
925	Library, archives, museums and other cultural activities	9,022	8,956	9,593	9,956	9,452	9,453	9,451	9,800	9,511

Appendix 7.3

Percentage change in number of jobs in the broadly defined information sector and all jobs in the sub-regional units in 1993–2001, total number employed in the sub-regional unit and proportion of information sector jobs in 2001**

Source: Statistics Finland, regional employment statistics.

Number of sub-regional unit	Name of sub-regional unit	Change in jobs in information sector 1993–2001*	Change in all jobs in sub-regional unit 1993–2001*	Number of all jobs in sub-regional unit 2001*	Proportion of information sector 2001*
Whole country		**61.5**	**19.9**	**2,251,181**	**9.5**
011	Helsingin	74.1	34.4	657,038	16.7
012	Lohjan	64.4	26.8	28,067	7.7
013	Tammisaaren	4.4	4.9	17,443	2.8
021	Åboland-Turunmaan	38.8	3.8	8,311	2.7
022	Salon	87.4	29.4	28,561	24.6
023	Turun	47.4	24.2	130,031	8.0
024	Vakka-Suomen	–29.9	20.1	16,003	2.2
025	Loimaan	31.3	8.7	13,589	2.7
041	Rauman	41.3	14.8	24,950	4.1
042	Kaakkois-Satakunnan	–7.6	4.2	11,966	2.2
043	Porin	16.2	10.9	46,199	4.9
044	Pohjois-Satakunnan	0.8	–1.1	10,667	1.3
051	Hämeenlinnan	54.4	13.2	34,814	5.3
052	Riihimäen	42.7	15.2	14,944	4.9
053	Forssan	25.7	12.6	15,297	9.6
061	Luoteis-Pirkanmaan	84.7	10.6	11,149	8.1
062	Kaakkois-Pirkanmaan	32.8	11.9	3,666	2.1
063	Etelä-Pirkanmaan	–19.6	11.2	16,470	1.6
064	Tampereen	98.4	34.7	137,873	12.5
068	Lounais-Pirkanmaan	24.4	4.9	8,988	3.1
069	Ylä-Pirkanmaan	0.9	3.0	14,881	2.3
071	Lahden	19.1	19.8	69,715	4.8
072	Heinolan	1.8	0.4	11,367	2.0
081	Kouvolan	25.4	8.2	39,636	3.6
082	Kotkan-Haminan	12.8	6.5	34,185	2.6
091	Lappeenrannan	28.9	12.8	30,115	4.9
092	Länsi-Saimaan	64.1	–3.9	5,529	1.2
093	Imatran	–18.4	4.4	15,474	2.9
094	Kärkikuntien	35.0	–15.1	2,019	1.3
101	Mikkelin	9.1	13.2	27,680	5.6
102	Juvan	23.5	–3.5	8,208	3.4
103	Savonlinnan	15.7	2.2	16,386	4.4
105	Pieksämäen	–3.2	–3.3	8,508	2.5
111	Ylä-Savon	–1.1	2.3	22,003	2.4
112	Kuopion	29.9	16.6	47,451	7.1
113	Koillis-Savon	–2.8	–4.9	6,910	1.0
114	Varkauden	38.9	13.3	13,616	7.5
115	Sisä-Savon	20.3	–5.8	5,027	2.8
121	Outokummun	–8.6	–2.6	4,201	2.3
122	Joensuun	50.2	14.3	35,627	5.8
123	Ilomantsin	5.4	–6.2	2,839	3.5
124	Keski-Karjalan	–13.5	–5.4	7,540	1.3
125	Pielisen Karjalan	–6.0	–6.9	10,769	1.9
131	Jyväskylän	83.0	28.5	60,272	10.5
132	Kaakkoisen Keski-Suomen	57.5	–4.7	4,336	1.5
133	Keuruun	–5.8	4.8	5,780	5.9
134	Jämsän	13.8	6.6	11,522	1.5
135	Äänekosken	31.6	16.1	9,529	7.1
136	Saarijärven	19.1	4.3	7,195	2.9

Appendix 7.3 *continued*

Number of sub-regional unit	Name of sub-regional unit	Change in jobs in information sector 1993–2001*	Change in all jobs in sub-regional unit 1993–2001*	Number of all jobs in sub-regional unit 2001*	Proportion of information sector 2001*
137	Viitasaaren	–26.0	0.9	4,911	1.4
141	Suupohjan	32.2	6.2	10,511	2.2
142	Pohjoisten seinänaapurien	33.6	25.2	26,710	4.6
143	Eteläisten seinänaapurien	41.5	2.0	8,071	1.4
144	Kuusiokuntien	–22.7	5.7	10,566	1.4
145	Härmänmaan	50.0	14.8	11,902	2.0
146	Järviseudun	–4.6	10.2	7,842	1.3
151	Kyrönmaan	30.8	2.3	4,799	1.4
152	Vaasan	39.3	19.4	41,971	6.0
153	Sydösterbottens kustregion	8.6	2.8	8,330	1.8
154	Jakobstadsregionen	64.3	20.3	20,808	3.5
161	Kaustisen	205.4	8.1	6,766	2.5
162	Kokkolan	35.2	14.7	21,071	4.3
171	Oulun	114.6	37.8	83,694	17.9
173	Iin	–12.4	6.8	7,540	1.6
174	Raahen	11.5	8.4	14,170	5.3
175	Siikalatvan	56.8	3.5	5,976	1.2
176	Nivala-Haapajärven	–15.5	4.3	11,038	1.2
177	Ylivieskan	104.2	17.3	15,597	6.2
178	Koillismaan	135.3	9.8	7,636	4.1
181	Kehys-Kainuun	23.3	–9.3	8,332	5.0
182	Kajaanin	23.8	3.9	21,542	6.3
191	Rovaniemen	6.2	8.6	23,507	6.5
192	Kemi-Tornion	3.2	4.4	23,020	3.2
193	Torniolaakson	–40.7	–9.5	3,040	1.1
194	Itä-Lapin	–18.7	–12.2	6,953	2.2
196	Tunturi-Lapin	–0.6	4.4	5,154	3.2
197	Pohjois-Lapin	–1.2	–2.1	6,420	3.8
201	Porvoon	–25.9	12.1	26,643	6.0
202	Loviisan	–5.3	4.8	7,006	2.3
211	Mariehamns stad	54.9	13.9	10,473	4.6
212	Ålands landsbygd	20.4	12.1	4,118	1.6
213	Ålands skärgård	71.4	–14.8	718	1.7

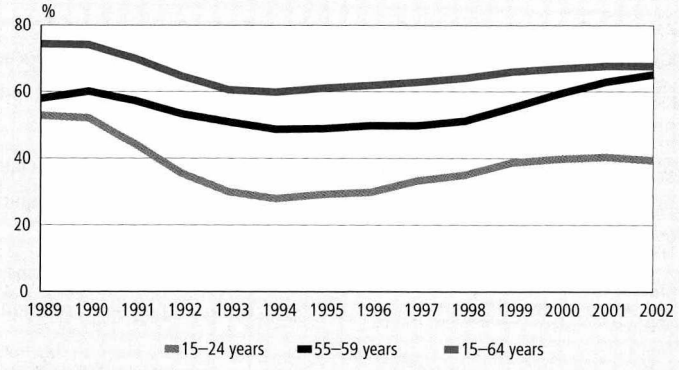
8 Changes in working life

- Finland's industrial structure has undergone a change during the past decade so that the share of services has grown increasingly dominant. At the same time ICT branches have expanded.
- Teleworking has not increased despite the possibilities information technology creates for it. In 2002, approximately 11 per cent of employees in Finland had teleworked at home.
- Approximately 25 per cent of employees, or roughly 500,000 persons, had so-called atypical, that is, part-time and/or fixed-term, employment relationships in 2002.
- The average number of people in fixed-term employment relationships, which are more common among women than men, was 331,000 in 2002. Fixed-term employment relationships were the commonest among employees of the State, of whom one in four works in a fixed-term job.
- Part-time employment has also grown more common. In 2002, approximately 13 per of the employed labour force, or 302,000 persons, worked part-time. In contrast to the situation with fixed-term employment, part-time employment is the commonest in the private sector.
- According to the 2002 Quality of Work Life Survey, one half of wage and salary earners felt that time pressure at work had increased and 60 per cent thought that the demands imposed by their tasks had grown over the past twelve months.

The labour market in Finland underwent intense changes in the 1990s. From 1992 to 1996 the country's economy was in the grip of a deep recession, which bottomed in 1994 when the rate of unemployment had soared to 16.6 per cent and the number of employed people had fallen by 450,000 in the space of five years. The economy has gradually recovered from the recession and over 300,000 new jobs have been created since the worst years. Nevertheless, unemployment has remained high at either side of 10 per cent and the rate of employment has also failed to rise anywhere near the situation of the late 1980s when over 74 per cent of the population aged 15 to 64 were employed. In 2002, the rate of employment was 67.7 per cent.

According to the Labour Force Survey, there were 2,372,000 employed people, 48 per cent of them women, in Finland in 2002. There were 237,000 unemployed people and the rate of unemployment stood at 9.1 per cent. Employment started to decline again in spring

Figure 8.1
Employment rate by age in 1989–2002, per cent.
Source: Statistics Finland, Labour Force Survey.



2003, after a long spell of growth. The rate of employment only went up among older age groups, while the rate of unemployment stayed at the previous year's level or even fell somewhat.

The structures of working life are shaped by many factors, such as technological progress, growing dominance of services, age structure of the population, economic fluctuations, globalisation, and so on. The overall characteristic is that the labour market has been acquiring ever more complex forms. This is manifested in types of employment relationships and in working hours. Services are accounting for an increasing proportion of the industrial structure. On the other hand, ICT branches and occupations have also been growing right up to recent years. Working life has become more demanding, partly because of increasing use of information technology and globalisation. The population's general level of education has risen considerably. Working conditions have not just changed in a positive direction. Employees are stressed by time pressure and stepped up pace of work.

Growth of service and technological branches

In the space of a decade the industrial structure of Finland has changed so that diverse public and private service branches have been growing while jobs in agriculture, forestry and construction have been declining. There has been no appreciable change in the number of jobs in manufacturing, trade, hotel and restaurant activities and transport. The development in the number of employees has been more favourable in technological branches than in others so that data processing

services, for example, today employ twice as many people than in the mid-1990s. Employment has also risen in telecommunications. Likewise, jobs in goods production in the information sector have increased by more than one third.

An examination of the occupational structure of the employed population shows that employment has gone up in technological and scientific work, and in teaching and other humanities, as well as in administrative and office work and in trade. The branches with declining employment have been agriculture and forestry, and transport. Despite these changes, the occupational structure of the employed population has in many respects remained unchanged. The shares of those employed in health care and social work, services, manufacturing, and in construction of the total employed population have barely changed.

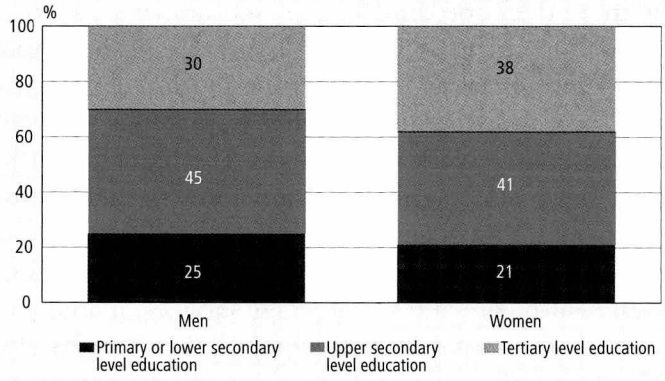
In 2002, the number of people working in occupations in the data processing branch was about 71,000, or 3 per cent of the employed population. At the beginning of the 1990s as well as in 1995 they numbered roughly 30,000. The sharpest increase in the number of people employed by this branch occurred in the late 1990s. At the same time, computer skills and computer use have also increased in many other occupations. According to the 1997 Quality of Work Life Survey, 66 per cent of wage and salary earners then used information technology in one way or another in their work, whereas in 1990 the corresponding proportion was 44 per cent.

The changed occupational structure is also depicted by the fact that there are over 100,000 more salaried employees today than at the end of the 1980s and the number of blue-collar workers has dropped by 150,000. The number of self-employed people has fallen, especially in agriculture.

Educational level has risen among the employed population

In 2001, the proportion of the employed population with some secondary educational qualification was 77 per cent. Upper secondary education had been completed by 43 per cent and tertiary education by one third of the employed population. The proportion of those having obtained secondary education has risen significantly since the early 1990s, when it was 64 per cent. Employed women are more highly educated that employed men, for close on 80 per cent of them had some secondary educational qualification in 2001, whereas the corresponding proportion among men was 75 per cent. Women also hold tertiary qualifications or degrees more often than men: 38 per cent of the employed women and 30 per cent of the men had an academic degree.

Figure 8.2
Educational structure of employed population in 2002, per cent.
Source: Statistics Finland, Labour Force Survey.



Personnel training sponsored by the employer has increased only slightly in the past decade. In 2001, just short of 45 per cent of wage and salary earners reported having participated in such training during the previous 12 months. Two thirds of those in managerial or professional occupations had taken part in personnel training, whereas the proportion among those in elementary occupations failed to reach 30 per cent.

According to the barometer of working conditions survey of autumn 2002, 60 per cent of wage and salary earners in Finland reckoned that their job tasks had grown more demanding in the past 12 months. Performance requirements have risen faster in the public sector than in the private sector.

The unemployed population is less educated than the employed population. Among the unemployed, 63 per cent held secondary and 17 per cent tertiary educational qualifications in 2001. The rate of unemployment among those without a secondary educational qualification was almost double that among the population with post-compulsory educational qualifications. The rate of unemployment declines clearly as the level of education rises.

Popularity of teleworking unchanged

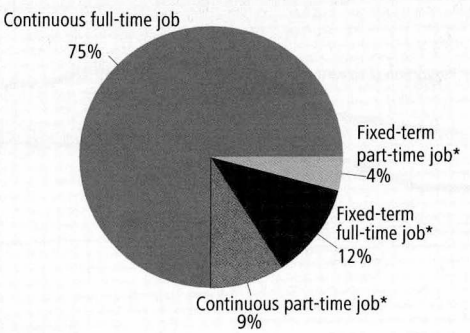
It would be reasonable to assume that the possibilities created by modern technology would increase the popularity of teleworking. If we examine the situation over a longer timespan, teleworking has increased, but this has come to a halt in the past few years. According to the 2002 Labour Force Survey, about 6 per cent, or 121,000, of all

wage and salary earners reported having worked at home regularly in the four weeks prior to the survey while those having worked at home only occasionally numbered 101,000, or under 5 per cent of all wage and salary earners. Altogether 10.7 per cent had worked at home. This proportion has remained unchanged for the past three years. There has been a structural change in it inasmuch that the number of regular teleworkers has gone down slightly while that of occasional teleworkers has risen correspondingly.

Fixed-term employment relationships common among women

In 2002, 75 per cent of all wage and salary earners were working in permanent, full-time jobs. The remaining 25 per cent, or around 500,000 employees, had so-called atypical, that is, either fixed-term and/or part-time employment relationships. Fixed-term employment contracts grew increasingly common in the mid-1990s and since then their proportion of all employment contracts has remained steady at 16 per cent. In 2002, the average number of employees with fixed-term contracts was 331,000. In the 1980s and early 1990s, the proportion of fixed-term employees fluctuated between 11 and 14 per cent, but it started to grow after the recessionary years when employers were wary from past experience when taking on new employees. Fixed-term employment relationships are particularly common in the public sector, for one person in four employed by the State and 23 per cent of local government employees, in other words almost as many as with the State, have fixed-term employment contracts. The propor-

Figure 8.3
Employment relationships of wage and salary earners in 2002, per cent.
Source: Statistics Finland, Labour Force Survey.



* Atypical employment contract

tion of fixed-term employees is much lower than this in the private sector, under 13 per cent of all of the sector's employees.

Fixed-term employment relationships are more common among women than among men. Almost one woman employee in five has a fixed-term job whereas the corresponding proportion among men is under 13 per cent. Fixed-term employment contracts are especially common among women employed by the State, of whom 30 per cent worked in fixed-term jobs in 2002. On person in four working in health care and social service occupations are employed for fixed term. Fixed-term employment contracts are also typical among young people, and 44 per cent of the wage and salary earners aged under 25 had them in 2002. The commonest reason reported for working fixed-term was that no permanent work was available, although nearly 25 per cent of the fixed-term employees also said that they had specifically wanted a fixed-term job.

Compared to other EU Countries, the proportion of fixed-term employees is the third highest in Finland after Spain and Portugal. In part-time employment the situation is the opposite, and Finland locates clearly below the average for the EU Countries. The relative proportions of part-time employees are the highest in the Netherlands, UK and Sweden and the lowest in Greece, Spain and Italy.

Along with fixed-term employment, part-time employment has also increased. In 2002, the number of people employed part-time was 302,000, or 12.5 per cent of all employees. By gender, the percentages were 17.5 for women and 8.3 for men. The proportion of part-time employees has grown by three percentage points since the

Figure 8.4
Proportions of fixed-term and part-time employees of all wage and salary earners in 1989–2002, per cent.
Source: Statistics Finland, Labour Force Survey.

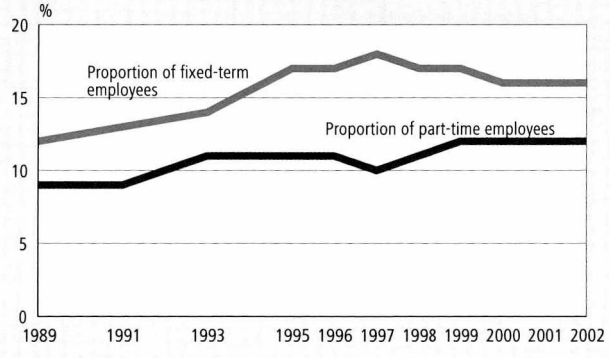
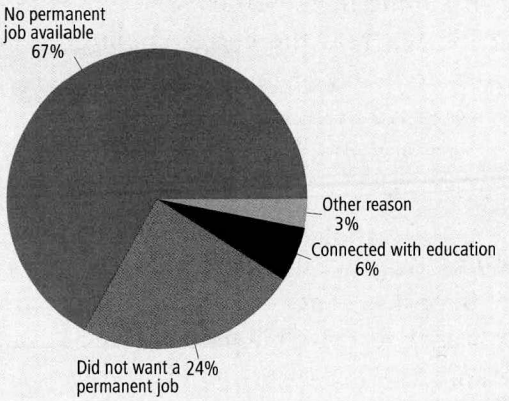


Figure 8.5
Reasons for fixed-term employment relationships in 2002, per cent.
Source: Statistics Finland, Labour Force Survey.



beginning of the 1990s and by one percentage point since the mid-1990s. Among the reasons for increased part-time working are the new possibilities for part-time retirement and for working shortened hours because of small children. On the other hand, part-time employment is also much used in industries where work piles up into certain time periods. Almost one quarter of the employees in trade and in hotel and restaurant activities, for example, work part-time.

Figure 8.6
Reasons for part-time employment relationships in 2002, per cent.
Source: Statistics Finland, Labour Force Survey.

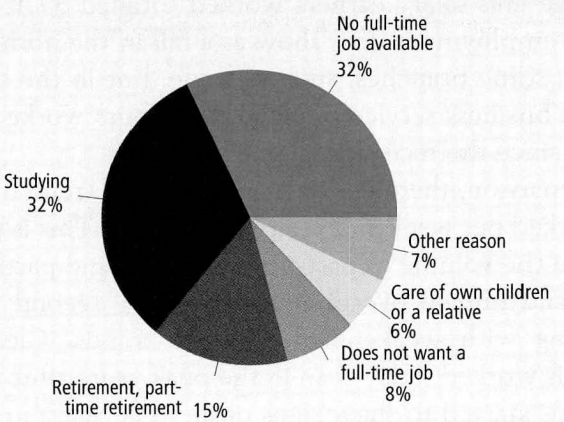
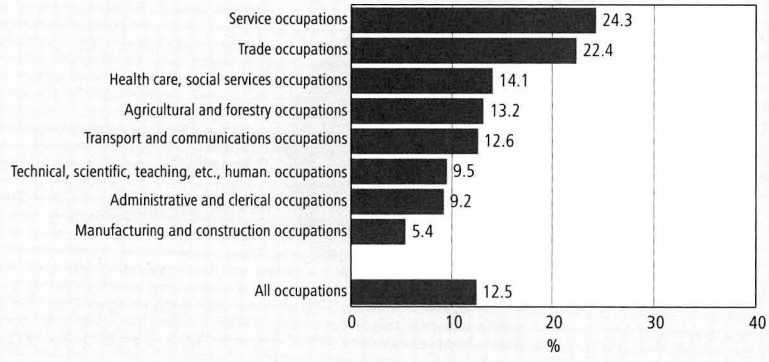


Figure 8.7
Proportion of part-time employees of all wage and salary earners by occupational group in 2002, per cent.
Source: Statistics Finland, Labour Force Survey.



Unlike with fixed-term employment, part-time working is commonest in the private sector.

In 2002, the most quoted reason for part-time working was unavailability of full-time work, which was given as the reason by 32.5 per cent of the surveyed part-time employees. Almost as many (32.1%) reported studying as the reason. Working while studying is quite common among students in Finland, particularly at the tertiary level.

Hours worked have grown shorter

If we examine the average, normal, weekly hours worked by wage and salary earners we see very little change from the 1990s despite the fact that part-time employment has increased. In 2002, the normal weekly hours wage and salary earners worked totalled 37.1. The increase in part-time employment does show as a fall in the normal weekly hours worked in some branches, such as trade, but in the technical consultancy and business service branches the hours worked per week have increased since the recession.

By comparison, there has been a downward trend in the numbers of hours worked per week and year in the 2000s. This is partly due to the increase in the volume of part-time working, and partly because working paid and unpaid overtime and having a second job have diminished along with weakening economic trends. Clearly less unpaid overtime is worked today than in the peak years after the recession, although this started to show signs of increase again in 2002, when 9.5 per cent of upper-level salaried employees reported having done un-

paid overtime during the survey week. In 2001, the corresponding proportion was 8.8 per cent. The average hours worked per week per employee totalled 36 in 2002. The calculated total annual hours worked per employee numbered 1,609.

Time pressure has increased at workplaces

It is descriptive of today's working life that especially women began to experience increasing time pressure at work towards the end of the 1990s. According to the 1997 Quality of Work Life Survey, 35 per cent of women reported that their work was hampered by time pressure, whereas in 1990 the corresponding proportion was 31 per cent. The situation has not changed. According to the 2002 working conditions barometer, physical and mental strains on employees have grown, and time pressure and pace of work have gone up most. One half of wage and salary earners reported that time pressure at work had increased in the course of the past twelve months. Increased time pressure was experienced especially in the public sector. One employee in five, women more often than men, also felt that work had become physically more straining. The aspects of working life where change had happened in the positive direction were experiences about own pay and position on the labour market.

Sources

European Social Statistics (2002), Labour force survey 2001, European Commission

Lehto, Anna-Maija – Sutela, Hanna (1999), Gender Equality in Working Life, OSF Labour Market 1999:22, Statistics Finland

Lehto, Anna-Maija – Sutela, Hanna: Efficient, More Efficient, Exhausted (1999), OSF Labour Market 1999:8, Statistics Finland

Statistics Finland (2002), In-service Training 2001, OSF Education 2002:7, Helsinki

Statistics Finland (2003), Labour force training and occupations 1995–2001, OSF Labour Market 2003:5, Helsinki

Statistics Finland (2003), Labour force Statistics 2002 Annual review, OSF Labour Market 2003:3, Helsinki

Statistics Finland, Labour Force Survey data from 1989–2002

Ylöstalo, Pekka (2003), Barometer of working conditions October 2002, Labour policy study no. 250, Helsinki

9 Information society in the workplace between 1996 and 2002

- The number of computer users will hardly rise much any more, but Internet and e-mail users probably will.
- In 1996, over 50 per cent of the labour force had access to a computer at their workplace; in 2002 this figure was 65 per cent.
- Under 50 per cent of employees at very small workplaces (fewer than 5 employees) had access to a computer.
- From 1996 to 2002, the number of women and men accessing the Internet at work increased ninefold and fivefold respectively.
- In 1996, only 10 per cent of the labour force had access to the Internet; in 2002, this figure was 50 per cent.
- Workplace use of the Internet is mainly for information retrieval.
- Although e-mail was increasingly used at the expense of the telephone, the telephone is still the most important means of communication in the workplace.
- The number of people using e-mail at work doubled between 1996 and 2002.
- 30–39-year-olds use e-mail the most.
- Use of a company mobile phone is much more common among men than among women.
- About one in every ten company mobile phone users also used text messages for business purposes.
- Teleworking was still uncommon in 2002.

The purpose of this chapter is to look at how the information society was manifested in the workplace from the mid-1990s to the early 2000s. We will describe the major changes in workplace use of information and communications technology and assess the extent and significance of these changes. Has workplace use of the Internet increased? Is e-mail surpassing the telephone as the primary means of communication in the workplace? And what about teleworking?

The results presented below are based on extensive interviews made in 1996, 1999 and 2002. In 1996 and 1999, information was collected concerning the last job of 15–74-year-olds (both employed and unemployed at the time) and of students. Since students were not included in the study in 2002, we will here only focus on the employed and un-

employed. In 1996 and 1999, information was collected through face-to-face interviews as part of the "Finns and the Future Information Society" project. In 2002, questions on the use of information and communications technology were included in a monthly employment survey conducted by telephone. In 1996, the number of employed people answering questions on the workplace use of the ICT was 1,303, while in 1999 it was 823. In 2002, the number of people answering the survey acceptably was 3,514.

9.1 The computer as a tool

The computer, Internet and e-mail have revolutionised the way work is done in many industries. Many employees, especially in the older age groups, have been introduced to information technology at work. So workplaces have held a key position in teaching people the skills needed in the information society. But not all work requires the use of computers. The following is an overview of how computers have become increasingly common in Finnish workplaces and how the transformation to the information society has progressed.

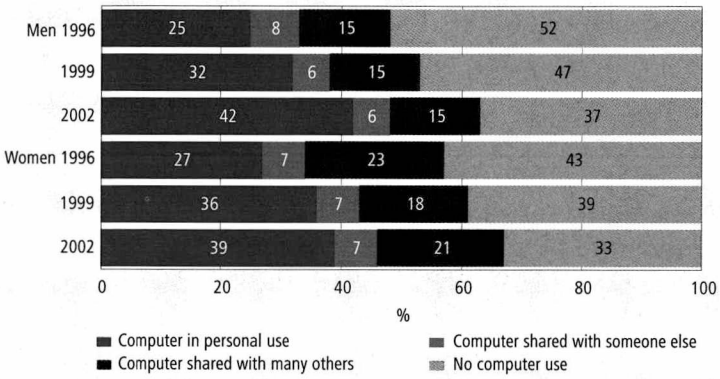
Computers were already widely used in 1996, when some 53 per cent of people in the labour force said that they either had their own computer at work or shared one. This translated to 1.2 million working-age Finns. The percentage of employed people using computers at work had increased to 57 per cent by 1999 and to 65 per cent (or 1.6 million people) by 2002. This percentage is already so high that the growth rate will surely slow down.

The percentage of employees not using a computer was lower among women than among men in each of the years under review. In 1996, about 43 per cent of women did not use a computer at work at all, while in 2002 this figure had fallen to about 33 per cent (see Figure 9.1.1). The decline among men was even clearer. Whereas in 1996 over 50 per cent of men did not use a computer at work, by 2002 this figure had fallen to about 37 per cent.

More and more people had their own PC or laptop at work. Whereas in 1996 about 25 per cent of working-age people had their own computer at work, by 2002 this figure had increased to 40 per cent. There were no major differences between men and women.

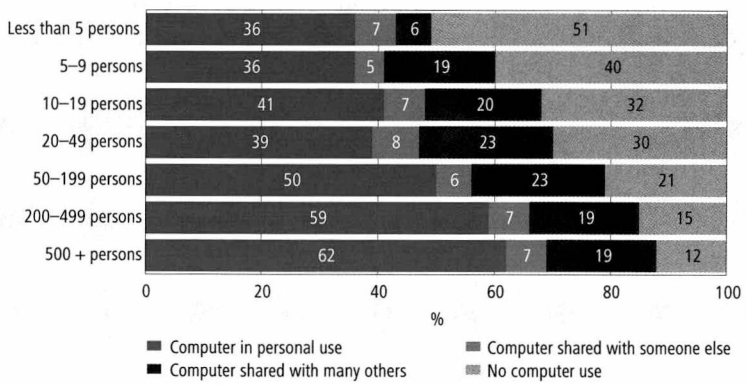
The 2002 survey results enabled us to analyse the use of information technology by workplace size. The larger was the organisation, the higher was the percentage of employees using a computer (Figure 9.1.2). In organisations of over 500 people, almost 90 per cent of the staff had access to a computer. Having your own computer at work was proportionally highest in larger organisations with some 62 per

Figure 9.1.1
PC use at workplace by gender in 1996, 1999 and 2002, per cent of employed persons. Source: Nurmela – Ylitalo 2003.



cent of the staff having one. At the other end of the scale, in organisations with fewer than five employees, most of the staff did not use a computer at all in 2002.

Figure 9.1.2
PC use by organisation size in 2002, per cent of employed persons. Source: Nurmela – Ylitalo 2003.



9.2 Internet use at work

Over half of the men and women in the labour force had access to the Internet at work in 2002. While the number of men with Internet access at work increased fivefold between 1996 and 2002, this increase was even higher among women – almost ninefold. Some 12 per cent of employed men had Internet access at work in 1996, and over 53 per cent in 2002. During the same time period, the percentage of employed women able to browse Internet pages at work increased from 6 per cent to 54 per cent. The number of men with Internet access increased in six years from 120,000 to 690,000, while the corresponding increase for women was from 50,000 to 665,000. The percentage of Internet users will probably continue to rise.

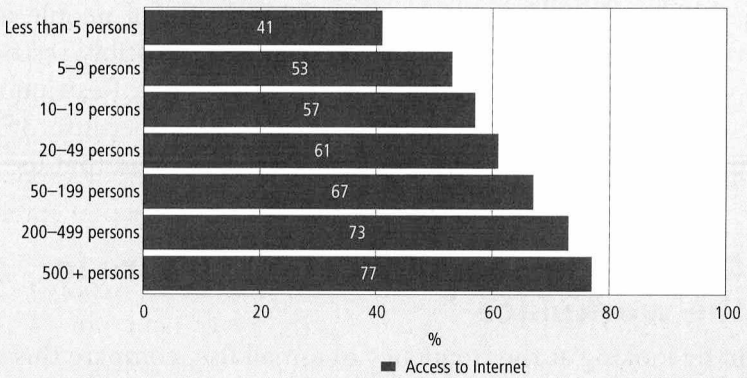
According to Table 9.2.1, accessing the Internet at work in 1996 was more common in all age groups among men than among women except in the oldest age group where it was more or less equally rare at about four per cent. In 2002, Internet access at work was commonest in the 30–39 age group, with women at 63 per cent and men at 58 per cent. The speed and scope of the change can be put in perspective when we consider that, in the over 50-year-old age group, Internet access at work grew twelvefold in six years. The lowest figure in 2002 for Internet access at work was among women under 30 years of age, at 40 per cent.

Figure 9.2.1 shows that, as with computer use, Internet access is more common in larger organisations. In organisations with a staff of over 500, 77 per cent had Internet access in 2002. In organisations with fewer than five employees, 41 per cent had Internet access.

Table 9.2.1
Percentage of men and women with Internet access at work in 1996, 1999 and 2002. Source: Nurmela – Ylitalo 2003.

Age group	1996		1999		2002	
	Men	Women	Men	Women	Men	Women
15–29	11	4	25	14	48	40
30–39	17	8	32	41	58	63
40–49	13	5	27	39	56	60
50–	4	4	33	21	49	50
Total	12	6	30	31	53	54
Users total	**122,000**	**53,000**	**347,000**	**314,000**	**691,000**	**666,000**

Figure 9.2.1
Percentage of employed people with Internet access at work by organisation size in 2002.
Source: Nurmela – Ylitalo 2003.



Uses of the Internet

Both men and women used the Internet at work mostly for information retrieval. The percentage of men using the Internet frequently to get information remained at 50 per cent between 1996 and 2002. In 2002, 40 per cent of women used the Internet frequently to get information, compared with 36 per cent in 1996 and 33 per cent in 1999. The workplace Internet connection was not used very often to access entertainment and recreational content, with the percentage among men falling from seven per cent in 1996 to three per cent in 2002. Only a few per cent of women use the Internet to read such pages. These figures may actually be higher in reality, because people tend to underestimate them. In 1999 and 2002, 25 per cent of employees with Internet access at work used it for online banking. Information retrieval and online banking were followed by visits to read the news, weather and newspapers. About 20 per cent of people with Internet access at work said they had read online newspapers in 2002. Men used the Internet at work more in almost all use categories than women did.

On the whole, it would seem that between 1996 and 1999, the percentage of men using the Internet rose or remained relatively stable in key use categories such as information retrieval and news reading, but fell in the following three years. The fascination of men with new technology may explain the growth between 1996 and 1999, because the percentages of frequent users in different use categories fell or remained stable in

the next three-year period. More and more people started using the Internet as it became more common in workplaces during the period under review. The proportions may have fallen in some use categories, but in absolute terms the numbers grew significantly.

Internet use is restricted in many workplaces, and increasingly so between 1999 and 2002. In 1999 some 14 per cent of people using the Internet at work said that use was restricted or possibly restricted in some way. By 2002 this figure was up to 22 per cent. Restriction of Internet use was commonest in large organisations, because 36 per cent of the staff in organisations employing over 500 said that use had been restricted or possibly restricted in some way.

9.3 Changes in communication culture in the workplace

We begin by looking at the frequency of e-mail use, compare this with telephone use, and conclude by assessing the changes in phone use in the workplace.

Proliferation of e-mail in the workplace

Between 1996 and 2002 e-mail became increasingly common in the workplace. In 1996 about 25 per cent of respondents said they had a company e-mail address, while in 1999 this percentage had increased to 41. In 2002, over 50 per cent of respondents could use e-mail at work. This means that the number of people with company e-mail accounts more than doubled in six years from 550,000 Finns in 1996 to 1,300,000 in 2002.

In 2002, use of e-mail was commonest in the 30–39 age group. According to Table 9.3.1, 62 per cent of women and 55 per cent of men were able to send and receive e-mail messages at their workplace. In almost all age groups in the years when information was collected,

Table 9.3.1
Percentage of men and women of the labour force using e-mail at work by age group in 1996, 1999 and 2002.
Source: Nurmela – Ylitalo 2003.

Age group	1996		1999		2002	
	Men	Women	Men	Women	Men	Women
15–29	22	23	27	26	42	36
30–39	28	29	38	51	55	62
40–49	23	28	35	52	52	59
50–	17	20	46	43	44	45
Total	23	26	37	45	49	52
Total users, thousands	**267**	**283**	**474**	**509**	**637**	**634**

e-mail use by women was more common than by men. This is probably because women work proportionally more than men in offices where e-mail is commonly used. The number of people using e-mail will probably continue to rise judging by the fact that growth in the 30–39 age group has been considerable also between 1999 and 2002.

The fact that e-mail has become an integral part of business communication has changed communication modes in the workplace. The benefits of e-mail are its speed, ease of use, low price and independence of time. E-mail has partly superseded old means of communication, because you can attach documents which were previously sent by post or fax. E-mail often saves time and trouble as the same message can be easily sent to a number of recipients at the same time.

Use of e-mail in internal communication increased at the expense of the telephone between 1996 and 2002 (Table 9.3.2). While in 1996 some 15 per cent of those with a company e-mail account said they were using e-mail more than the telephone in internal communication, by 1999 this figure had risen to 26 per cent and by 2002 to 35 per cent. This is a fivefold increase, from 76,000 to 420,000. E-mail substituted the telephone in internal communication more often for women than it did for men. Yet the telephone continues to be the primary means of communication in workplaces. We must also bear in mind that not everybody even needs a telephone to do his or her work. The percentage of such people did not change, being 14 per cent in both 1996 and 2002.

In 1996, the percentage of employed men using e-mail for connections outside their workplace was considerably higher than that of women (77 per cent, compared with 51 per cent), but by 1999 women had almost reached parity with men. In 1999, 81 per cent of women and 85 per cent of men with a company e-mail account used

Table 9.3.2
Comparison of e-mail and telephone use in internal communication by gender in percentages in 1996, 1999 and 2002 among employees with access to e-mail. Source: Nurmela – Ylitalo 2003.

Uses e-mail	Men			Women			Total		
	1996	1999	2002	1996	1999	2002	1996	1999	2002
More than the telephone	14	22	32	16	30	37	15	26	35
Less than the telephone (or not at all)	71	54	51	68	50	48	69	52	49
As much as the telephone	15	22	16	16	19	15	15	21	15
Total users, thousands	**255**	**455**	**619**	**252**	**488**	**612**	**507**	**943**	**1,231**

e-mail for connections outside their workplace. In 2002, the relative proportions remained almost the same.

We stated above that e-mail has increased in internal workplace communications at the expense of the telephone. E-mail has also gained a strong foothold in external communications, but not perhaps to quite the same extent. In 1999, about 17 per cent of women said they had used e-mail more than the telephone for communications outside the workplace. In 2002, the corresponding figure was approximately 28 per cent. With men, a similar increase took place between 1996 and 1999 but did not continue in the period up to 2002. About 25 per cent of men with access to e-mail said they were using e-mail more than the telephone for communication outside their workplace in 2002. This figure is calculated among those who used e-mail at all for external communications.

Now we will take a look at the volume of incoming and outgoing e-mail and how often people check their e-mail during the working day. We will first compare how much the number of incoming e-mail messages has changed between 1999 and 2002. The respondents were asked to provide a combined total of business and private messages. Those receiving over 200 messages a week were very few in 1999, as only one per cent of all company e-mail users said they used e-mail a lot. Although there were more such users by 2002, they only accounted for 3 per cent of all users. These people can be considered to suffer from some kind of information overflow.

According to Table 9.3.3, men belonged to the category of 'frequent e-mail receivers' a little more often than women. The 30–39 age group among men received proportionally the most messages, with 17 per cent saying that their received messages exceeded 100 per week in 2002. This is a 12 per cent increase on 1999. The increase in the case of women was greatest in the 15–29 and 40–49 age groups. At the

Table 9.3.3
Percentage share of employed e-mail users receiving more than 100 messages a week, by gender and age in 1999 and 2002. Source: Nurmela – Ylitalo 2003.
Source: Nurmela – Ylitalo 2003.

Age group	1999		2002	
	Men	Women	Men	Women
15–29	6	0	11	10
30–39	5	5	17	8
40–49	5	2	13	11
50–	6	4	9	8
Total	6	3	13	9
Receiving over 100 messages a week	**25,000**	**16,000**	**78,000**	**58,000**

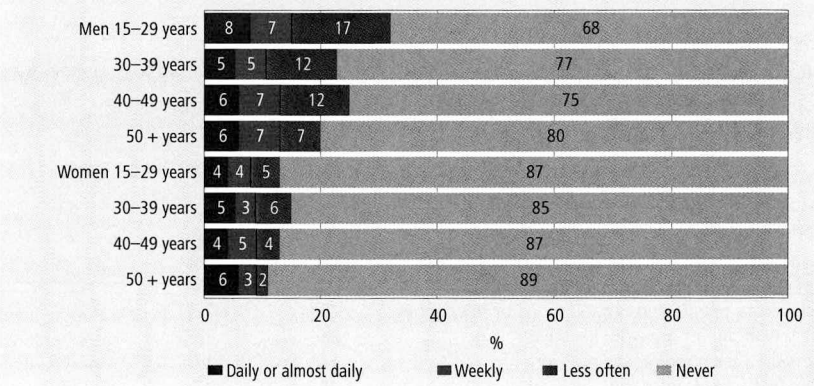
same time, the percentage of those receiving fewer than 10 messages a week decreased somewhat, indicating that the overall number of messages per week increased.

The trend in sent e-mail messages was similar to that of received messages, that is, upward. The percentage of those sending many messages (over 200) a week did not change much between 1999 and 2002, but the percentage of those sending over 100 messages increased from 2 per cent to 6 per cent. At the same time, the percentage of those sending fewer than 10 messages became smaller. The majority (80 per cent) of people sending e-mail messages sent fewer than 50 messages a week.

Messages sent through mailing lists may make the number of received messages many times greater. In 2002 some 16 per cent of e-mail users estimated that over half of their messages arrived through mailing lists. The efficiency of e-mail depends on how often people check their incoming mail. 80 per cent of employed people checked their e-mail at least once a day in 2002. The number of e-mail messages is likely to increase, as people become more accustomed to it and think of new practical applications.

Use of a wireless connection to read (or send) business e-mail was still rare in 2002, but slightly less uncommon among men than among women (Figure 9.3.1). Wireless connections were commonest among young men. 30 per cent of the 15–29 age group had tried or used a mobile phone or similar connection to read messages. A wireless connection represents the latest in electronic communications innova-

Figure 9.3.1
Percentage of employed people with an e-mail account using a wireless connection to read their e-mail, by gender and age in 2002.
Source: Nurmela – Ylitalo 2003.



tions. It is therefore no surprise that young men were the most eager to adopt this technology. The proliferation of wireless communications will in the near future be affected not only by technological advances but also by changes in the nature of work and work organisation. As the number of company laptops increases and mobile phones gain more features and more capacity, it is likely that the use of wireless network to send work-related e-mail messages and carry out other tasks will become more common.

Use of the telephone at work

Although e-mail has become more common, the telephone still remains the most important means of communication at work. The telephone is for some an integral part of their work, for others an important means of communication, but for many it is of no relevance in carrying out their work. The percentage of people using the telephone a lot in their work has not changed much between 1996 and 2002. More people identified themselves in the group "I contact various people and organisations by telephone" in 2002 than in 1999. The reason for this is probably because mobile phones have become more common, and many who need to move around in the course of their work can use a mobile phone.

The mobile phone is increasingly common among employed people (Table 9.3.5). In 1996, 50 per cent of men and 20 per cent of women used a mobile phone in their work. By 1999 these figures had increased to 60 per cent for men and 30 per cent for women. In 2002, men still used mobile phones in their work more than women did. Mobile phone use at work was proportionally commonest among men in the over 50 age group (73 per cent).

Table 9.3.4
Telephone use at work as per cent of persons employed in 1996, 1999 and 2002. Source: Nurmela – Ylitalo 2003.

	1996	1999	2002
My work mainly involves using the telephone	3	2	1
I am on the phone for half of my working time	2	2	2
The telephone is an important part of my work, although it does not take up most of my time	29	32	27
I contact various people and organisations by telephone	22	22	29
I use the telephone for my work irregularly	26	23	27
I do not need a telephone to do my work	14	17	14
Any other reason or cannot say	4	2	0

Table 9.3.5
Percentage of employed mobile phone users by gender and age in 1996, 1999 and 2002.
Source: Nurmela – Ylitalo 2003.

Age group	1996		1999		2002	
	Men	Women	Men	Women	Men	Women
15–29	39	18	51	29	52	28
30–39	56	24	59	37	70	38
40–49	56	18	52	33	70	39
50–	38	14	67	24	73	36
Total	50	19	57	31	67	36
Total users, thousands	**492**	**174**	**668**	**315**	**810**	**398**

Why do men have more company mobile phones than women do? This is partly explained by the fact that men have more jobs that require moving from place to place, which makes mobile phones a sensible choice for communication. Sixty-four per cent of women work primarily in one location, while the corresponding figure for men is 39 per cent. Table 9.3.6 shows that use of mobile phones is much more common in jobs that require more mobility than in jobs where employees work mainly in one and the same place.

The reason for differences in company mobile phone use may also be that more men work in the private sector, where mobile phone use can be considered more common than in the female-dominated public sector. The mobile phone may also be a sought-after company benefit, but it is hardly the kind of status symbol that it was in years gone by.

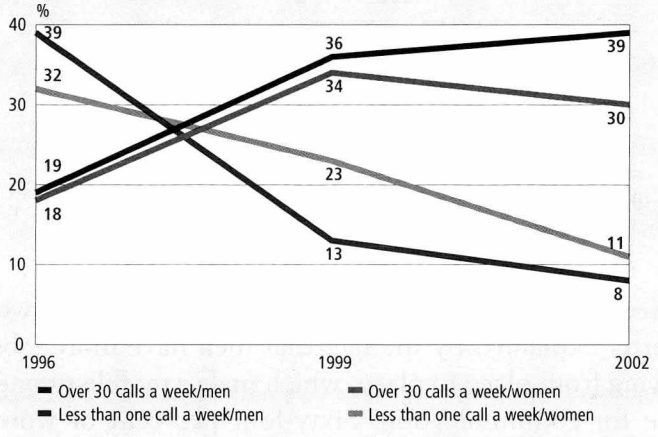
Table 9.3.6
Percentage of employed mobile phone users by gender and type of job in 2002.
Source: Nurmela – Ylitalo 2003. .

	Men	Women
Mainly in transportation jobs	91	69
Daily customer visits outside the workplace	89	85
Workplace changes according to building project etc.	78	50
In same workplace but in different locations	60	35
Mainly at one workstation all day	56	31
Other way of working	87	54

Number of phone calls is increasing

The number of business phone calls made and received rose considerably between 1996 and 1999 and slightly more moderately during the following three years. The number of men receiving over 30 calls a week doubled between 1996 and 2002 (Figure 9.3.2). The number of women receiving over 30 calls a week rose between 1996 and 1999,

Figure 9.3.2
Percentage of employed men and women receiving few (less than 1) and many (over 30) calls a week in 1996, 1999 and 2002.
Source: Nurmela – Ylitalo 2003.



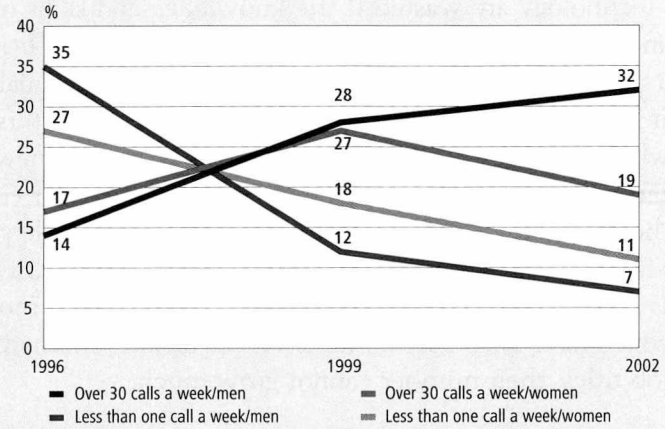
but was falling by 2002. On the other hand, the number of both men and women receiving an average of less than one phone call a week decreased dramatically.

The number of men making many phone calls (over 30 a week) rose between 1996 and 2002 (Figure 9.3.3). As was the case with received calls, the greatest change took place between 1996 and 1999 when mobile phones became more common in work use. The change was different among women who made many calls. With women, the number of calls rose between 1996 and 1999 the same way as with men, but fell clearly in the next three years. In 1999, over 20 per cent of employed women made over 30 phone calls a week, but in 2002 this figure had dropped to less than 20 per cent. As was the case with received calls, the percentage of both men and women who made less than one phone call a week on average fell clearly.

Telephone use in workplaces was assessed by asking people who had a telephone to estimate the number of calls they made. They were not asked to separate between business and personal calls.

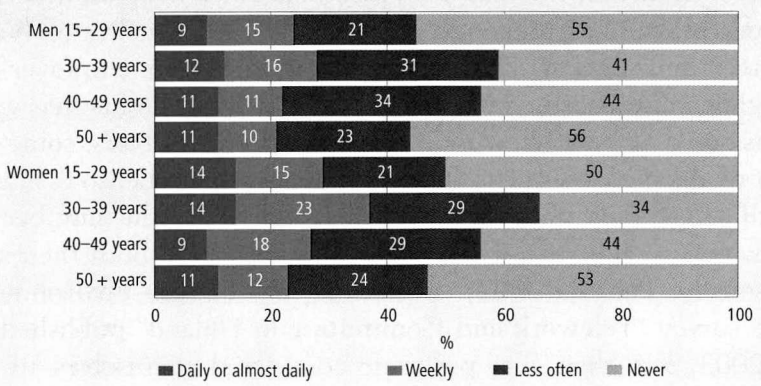
Text messages were also used for business purposes. 12 per cent of the women and 11 per cent of the men using a mobile phone in their work in 2002 sent work-related text messages daily or almost daily. There was no significant difference in terms of age or gender among this group, but if we look at those who sent text messages weekly, women made up a larger group. In 2002, some 12 per cent of those

Figure 9.3.3
Percentage of employed men and women making few (less than 1) and many (over 30) calls a week in 1996, 1999 and 2002.
Source: Nurmela – Ylitalo 2003.



who used a mobile phone in their work said they at least sometimes sent work-related group text messages. Although sending group text messages is relatively rare, on the whole, compared with the number of people sending any work-related text messages, they account for a relatively high percentage.

Figure 9.3.4
Sending text messages for business purposes by gender and age in 2002, per cent of persons using mobile phones at work
Source: Nurmela – Ylitalo 2003.



Significance of information and communications technology in work duties

As the majority of Finnish workers use both a computer and the Internet in their work, it is safe to say that work has entered the realm of the information society. But investments in information and communications technology are wasted if the knowledge and skills of the employees and the reorganisation of work are ignored. It is evident that computers, e-mail and Internet connections are already available everywhere where their benefits are obvious. Their spread to sectors and professions where their use is currently limited may require new kinds of applications and support and guidance in especially smaller companies. It would be interesting to analyse to what extent the mobile phone can replace e-mail and the Internet. According to surveys, only a small minority has work which requires many contacts and much mobility, attributes which have been used to describe the business nomads. Judging by their job titles, their number cannot grow much.

9.4 The potential and scope of teleworking

With the introduction of the latest information and communications technology, new interpretations of the concept of teleworking have arisen. Nowadays teleworking is not restricted to working from home; it is mobile and distributed and hence no longer limited to time or place. Teleworking can be done at a time which suits the employee – even on the move, or in libraries, satellite offices, customer companies or teleworking centres (Heinonen 2002). Most typically, teleworking is done once a week outside the workplace. Teleworking can also be done to complement regular working hours, i.e. by working part of the day at home, on the way to work or elsewhere outside the workplace.

Depending on the definition of teleworking, we get different kinds of results as to how many people work in this way. Sirkka Heinonen (1998) defines telework as work in which the employee does at least part of it outside the regular workplace and in which information technology plays a key role. According to the 1997 Quality of Work Life Survey, any person who had agreed with his/her employer on teleworking and was using information technology to do his/her work was considered to be a teleworker. Calculated on this basis, some 10 per cent of all employees (165,000) were teleworkers (Lehto & Sutela 1999). If teleworker status is established indirectly, the number of teleworkers is greater than if the employees are asked about their status personally (Pekkola 2002). According to a Finnish Environment Institute survey "Telework and Commuting in Finland" published in spring 2003, less than five per cent considered themselves to be teleworkers (Helminen, Ristimäki & Oinonen 2003). This translates to

102,000 employees. This report takes a look at the respondents' own assessment of how their work can be done as telework, seeks to establish the number of people working at home or elsewhere other than their regular workplace, and evaluates their interest in teleworking in the three years under review. The respondents have made a self-assessment of whether their work is suited for telework.

Possibilities and interest in teleworking

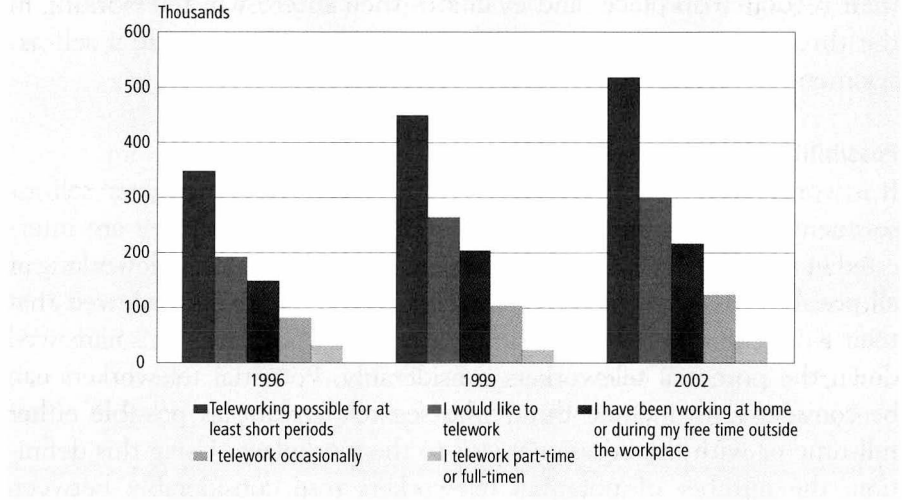
It is worth starting a review on teleworking with the employees' self-assessment of their chances for teleworking and whether they are interested in the first place. Only a small percentage considered teleworking at all possible. 70 per cent of respondents said in each year reviewed that their work could only be done in their regular workplace. This narrowed down the potential teleworkers considerably. Potential teleworkers can be considered to include those who see teleworking as possible either full-time or with the occasional visit to the workplace. Using this definition, the number of potential teleworkers rose considerably between 1996 and 1999, but rose very little between 1999 and 2002. In 1996, some 9 per cent of the employees reviewed considered teleworking possible, while in 1999 and 2002 the corresponding figures were 13 per cent and 12 per cent, respectively.

If we add to the above figures the employees who said they could telework at least for short periods, the number of potential teleworkers rose from approximately 15 per cent in 1996 to about 19 per cent in 1999. In 2002 the figure remained at about 20 per cent of the labour force. This corresponded to 350,000 people in 1996, 450,000 in 1999 and 520,000 in 2002 (Figure 9.4.1). The number of potential teleworkers and those interested in teleworking have been calculated from the entire labour force.

In each review period, those respondents who said their work is suited to teleworking at least for short periods were asked about their interest in teleworking. Those who were immediately prepared to telework or thought it may be a good solution accounted for 8 per cent of Finns (190,000) at the working age in 1996. Interest in teleworking had increased somewhat by 2002 when 12 per cent, or 300,000, displayed an interest in teleworking. There are no major differences between men and women in this respect.

Teleworking is still uncommon in Finland, but became somewhat more popular between 1996 and 2002. While in 1996 some 31,000 Finns considered themselves half- or full-time teleworkers, this figure was up to 39,000 by 2002. Two thirds of these were men. Moreover, in 1996 some 51,000 Finns considered themselves occasional

Figure 9.4.1
Different dimensions of teleworking in 1996, 1999 and 2002.
Source: Nurmela – Ylitalo 2003.



teleworkers. This figure had risen to 85,000 by 2002. Accordng to these figures 5 per cent of all employed people (124,000) considered themselves at least occasional teleworkers in 2002. This corresponds pretty well with the result of the Finnish Environment Institute survey. Figure 9.4.1 shows the number of potential teleworkers, those interested in teleworking, those who had worked outside their workplace and those who consider themselves as part- or full-time teleworkers in the different years reviewed.

The above figures are based on results in which the respondents have defined teleworking for themselves. If everyone performing work duties outside the regular workplace during normal working hours or outside working hours at evenings and weekends had been considered a teleworker, their number would have risen from 4 per cent in 1996 to 9 per cent in 2002. This would have corresponded to 148,000 employees in 1996 and 218,000 employees in 2002. These figures are approximately the same as those in the 1997 Quality of Work Life Survey (see Lehto & Sutela 1999). This shows that working overtime is getting more common and that the boundary between work and leisure time is becoming blurred. Information technology played a key role in such work, because 70 per cent of men and 60 per cent of women working outside their workplace had used the Internet or e-mail to do their work.

The potential for teleworking was proportionately highest among senior upper-level salaried employees. An examination of socioeco-

nomic status shows that some 60 per cent of upper-level salaried employees in design and research duties said that their work can, for at least short periods, be occasionally done outside the workplace. Half of those in managerial positions said they could telework. What is surprising is that only 22 per cent of upper-level salaried employees in educational work said they could occasionally telework for short periods. Yet almost all of them (97 per cent) said they had been working at home outside working hours. Apparently teachers do not regard work done at home as teleworking but as a traditional and integral part of the teacher's profession.

Lower-level salaried employees considered the potential for doing teleworking to be much less than did their upper-level salaried employees. An average of 25 per cent of Lower-level salaried employees said they could at least occasionally telework. Most said their work could only be done in the regular workplace. Most telework is done by upper-level salaried employees.

The typical work titles of what began to be called business nomads in 2002 included computer designers, systems engineers, marketing designers, sales directors, software designers, corporate sales representatives and different types of managers such as service, group and product managers. Those who considered themselves at least part-time teleworkers and who used a laptop and wireless connection to send and receive e-mail messages were classified as business nomads.

Sources

Heinonen, S. (1998), Suomalaisen etätyöpotentiaalin analyysi. [Analysis of the Finnish Telework Potential., (In Finnish with an English abstract)] ESF Publications 34. Ministry of Labour, Helsinki

Heinonen, S. (ed.) (2002), Ekoetätyön profiileja. [Profiles of Eco-managed Telework, (in Finnish with an English abstract)]. VTT Building and Transport, Research report RTE 2205/02, VTT Technical Research of Finland, Espoo

Helminen, V., Ristimäki, M. & Oinonen, K. (2003), Telework and Commuting in Finland. Ministry of the Environment, Helsinki

Lehto, A-M. and Sutela, H. (1999), Gender Equality in Working Life. Statistics Finland, Helsinki

Nurmela, J. and Ylitalo, M. (2003), The Evolution of the Information Society. How information society skills and attitudes have changed in Finland in 1996–2002. Reviews 2003:3. Statistics Finland, Helsinki

Pekkola, J. (2002), Telework in Finland; Physical, virtual, social and mental spaces as working environment for telework. Ekonomi och samhället nr 104. Helsinki

10 Information technology and e-commerce in enterprises

- In spring 2003, 94 per cent of Finnish enterprises had Internet access and some 58 per cent had a website.
- Over half of enterprises had broadband access in spring 2003.
- Data security is taken seriously: 85 per cent of enterprises had virus protection software and 59 per cent a firewall in place. Nonetheless more than one-third of all enterprises had suffered losses of data or working hours due to a computer virus during the preceding 12 months.
- In 2002 some 15 per cent of Finnish enterprises sold their products over the Internet.
- The value of Internet sales by Finnish enterprises increased clearly in 2002 compared to one year previously, with most of the growth coming from business-to-business trade.
- Almost 80 per cent of Internet sales went to the domestic market. Business-to-business trade accounted for 85 per cent of Internet sales.

10.1 Enterprises in the information society

In spite of its being in such widespread use today, it is very rarely that the concept of information society is actually defined. Generally the term is understood as referring to knowledge and know-how as an economic resource and to the diverse and extensive use of information and communications technologies (ICTs). Business enterprises are an important part of the information society. In enterprises knowledge and know-how become transformed into an economic resource, often precisely through the use of ICTs. In content production, too, enterprises play a major role.

The concern here is with enterprises in the information society from the point of view of IT use. In recent years there has been much interest in Internet use as well as in the services available via the Internet and e-commerce. In this context one frequently hears such concepts being used as the new economy and knowledge-based economy. Whatever the preference of terminology, the idea refers to new economic phenomena or systems within the information society. One of these new systems is e-commerce, which is usually understood as referring to trade over the Internet. In value terms, however, a far more

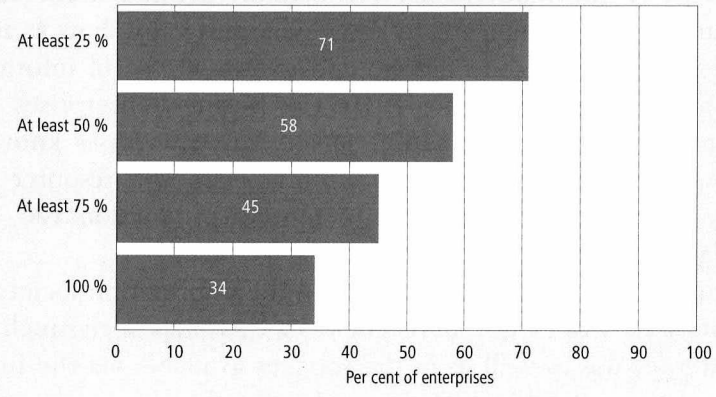
significant form of e-commerce is represented by EDI[1] trade among business enterprises. Nonetheless Internet trade does hold special importance in the information society because unlike EDI trade, it is (in principle at least) equally accessible to everyone. Furthermore, it is widely expected that Internet trade will rapidly gather momentum, although early forecasts have had to be drastically revised downwards. Statistics Finland's latest results on the volume of Internet sales by Finnish enterprises do however show that its value increased clearly in 2002.[2]

10.2 Computers used in almost all enterprises

computers are the basic tools of the information society; indeed without computers there would be no information society. Computer use is very widespread indeed in business enterprises today. In spring 2003, 97 per cent of enterprises with a staff of five or more used computers.[3] Computer use was at a slightly level only in smaller companies. In the category of enterprises with 5–9 employees, some 6 per cent did not use computers.

This analysis of computer use by enterprises only illustrates one side of the matter: it is also interesting to look at the proportion of personnel who use a computer in their own job. In spring 2003, one-third of

Figure 10.2.1
Use of computers by personnel in spring 2003. Proportion of enterprises with at least five employees where at least 25, 50, 75 or 100 per cent use computers at work.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



1 EDI (Electronic Data Interchange) is a technique used to communicate business transactions in a specified format directly between the computer systems of different companies and organisations.
2 Statistics Finland (2003), Internet use and e-commerce in enterprises 2003. The results are based on an enterprise survey in spring 2003.
3 Statistics Finland (2003).

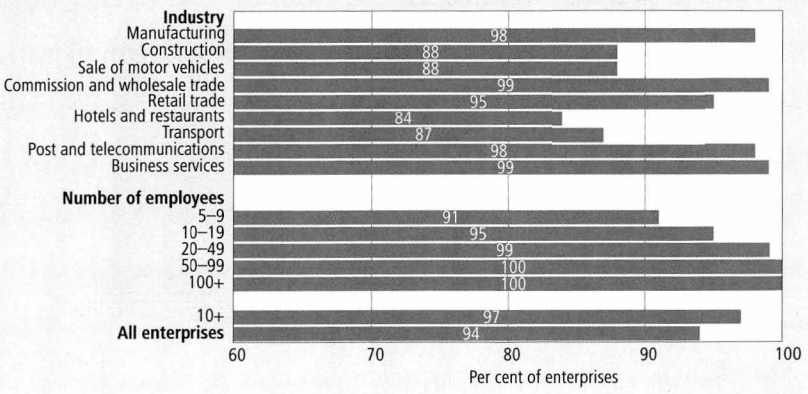
the enterprises with a staff of five or more reported that all their employees used a computer in their job. At least one-quarter of the staff used computers in around 70 per cent of Finnish enterprises.

10.3 The majority of enterprises have Internet access

If the computer is the basic tool of the information society, the Internet might be described as the symbol of the information society. Apart from its symbolic value, the Internet does of course also have a major practical role in the information society. The Internet supports the free transfer of information and makes vast quantities of data and information universally accessible. For business enterprises, the Internet is an important tool for both information retrieval and dissemination.

The Internet is by now in very widespread use indeed in Finnish enterprises. In spring 2003, 94 per cent of enterprises with a staff of five or more had Internet access. All enterprises with at least 50 employees had Internet access, among those with 20–49 employees the figure was 99 per cent. In the smallest category of enterprises with 5–9 employees, nine in ten had an Internet connection. The figures varied somewhat more across different industries, ranging from 99 per cent in business services and wholesale trade to 84 per cent in hotels and restaurants. It is important to note that some enterprises may genuinely consider many aspects of information technology unnecessary for their own operation. Lack of Internet access, for instance, does not automatically warrant the inference that the enterprise concerned is be-

Figure 10.3.1
The Internet in enterprises in spring 2003. Proportion of all enterprises in class. Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



hind the times or marginalised. Some enterprises do not need even computers, especially if they contract out certain services. The need for information technology clearly varies between different industries.

In the past few years data have become available that allow for international comparisons of Internet use in business enterprises. According to a Nordic comparison in 2001, Internet use in enterprises with at least ten employees was equally common in Sweden, Finland, Denmark and Iceland, where 92–95 per cent of enterprises had Internet access. Norway lagged some way behind the rest of the field, recording a result of 81 per cent. The prevalence of Internet connections has clearly increased over the past few years in all these countries.

Internet access is only part of the picture, though. Another interesting aspect is the number of employees in the enterprise who can actually use the Internet in their workplace. Among the enterprises with a staff of five or more and having Internet access, one-quarter indicated that all their employees used a computer in their job that was connected to the Internet. In 47 per cent of enterprises, at least half of the personnel worked on computers connected to the Internet, in almost two-thirds of the enterprises at least one-quarter had Internet access from the computer they use.

Given the importance of individuals having access to sources of information in the information society, it is useful to consider these figures from the opposite angle. In one-third of Finnish enterprises, at

Figure 10.3.2
Internet access in Nordic enterprises in 1999–2001, per cent of all enterprises with at least ten employees.
Source: Statistics Denmark, Statistics Finland, Statistics Iceland, Statistics Norway, Statistics Sweden, Nordic Information Society Statistics 2002.

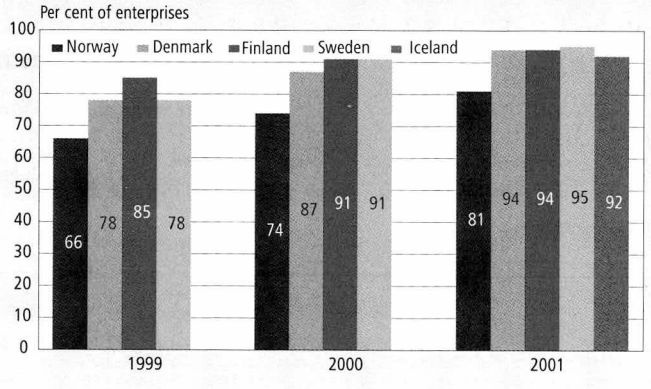
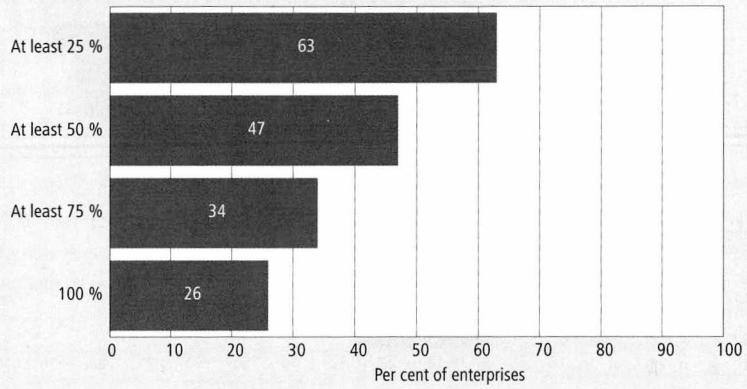


Figure 10.3.3
Use of the Internet by personnel in spring 2003. Proportion of enterprises with at least five employees where at least 25, 50, 75 or 100 per cent use computer with Internet access at work.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.

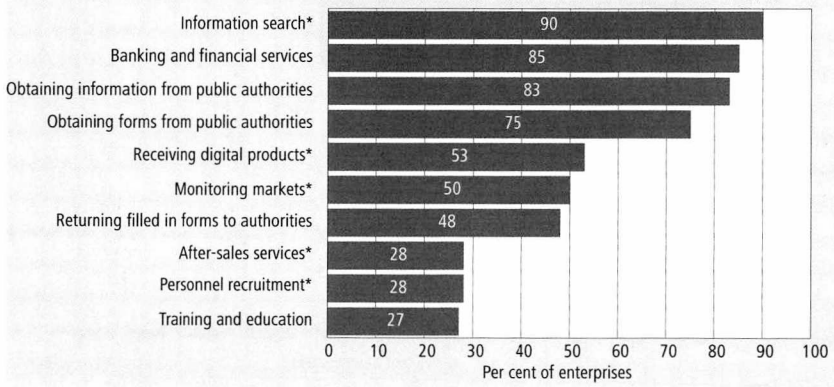


least 75 per cent of employees do not have access to the Internet in their place of work.

For what purposes, then, is the Internet used in enterprises? Surveys conducted at Statistics Finland suggest that the Internet is widely used for purpose of information search: nine out of ten enterprises with at least five employees say they used the Internet for this purpose. Other common uses included banking and financial services, information retrieval from the authorities and downloading official forms. Furthermore, the Internet is used quite often for receiving digital products, following the markets and returning forms to the authorities. Even though after-sales services, personnel recruitment and training did not feature among the most common uses in these surveys, more than one-quarter of all enterprises with Internet access identified these from the options listed. Far from being confined to ordinary information retrieval, Internet use in Finnish enterprises is thus quite varied. The use of the Internet for purposes of contacting the authorities has increased very rapidly in the business sector. In 2000, 45 per cent of all enterprises with Internet access[4] used the Internet for contacting the authorities, by 2001 the figure had risen to 59 per cent.[5] In spring 2003, 83 per cent said they used the Internet for retrieving informa-

4 Statistics Finland (2001).
5 Statistics Finland (2002).

Figure 10.3.4
Use of the Internet. Proportion of enterprises with at least five employees having Internet access.
Sources: Statistics Finland, Internet use and e-commerce in enterprises 2003 and Internet use and e-commerce in enterprises 2002.



* In 2001. Other data in spring 2003

tion from the authorities, 75 per cent downloaded forms and almost half returned forms to the authorities via the Internet.

Quite considerable numbers of enterprises have by now set up broadband connections. In spring 2003, more than half of Finnish enterprises had xDSL or some other broadband connection. Around

Figure 10.3.5
Internet access by type in spring 2003. Proportion of enterprises by size.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.

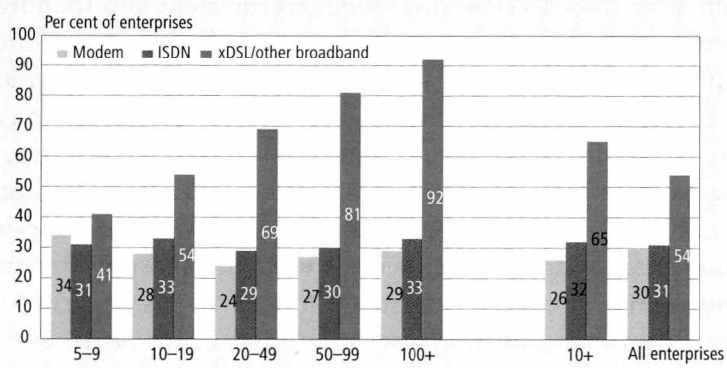
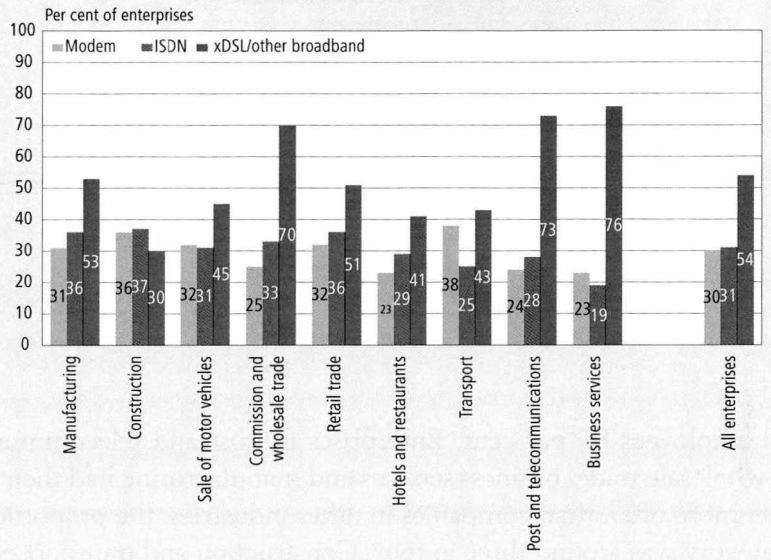


Figure 10.3.6
Internet access by type in spring 2003. Proportion of enterprises with at least five employees by economic activity.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



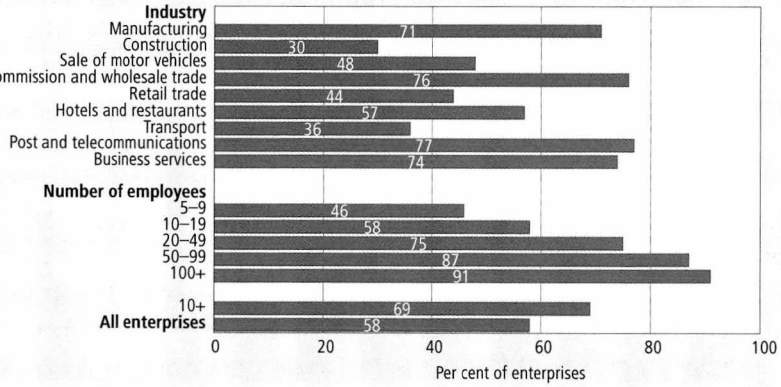
one-third had an ISDN connection, and less than one-third were still using modems.[6] xDSL and other broadband connections are more common in bigger enterprises. Broadband connections have been adopted by far more often in business activities, post and telecommunications and wholesale trade than in other industries.

10.4 Increasing online presence through websites

A website is the online platform through which enterprise can impart information as well as market and sell their products over the Internet. In spring 2003, over half of Finnish enterprises with at least five employees had their own homepages. The prevalence of homepages is closely dependent on the size of the company. While nine in ten enterprise employing 100 people or more had their own website on the Internet, the proportion among companies with 5–9 employees was less than one-half. In enterprises with 10–19 employees the figure was 58 per cent, in those with 20–49 employees around three-quarters and in enterprises with

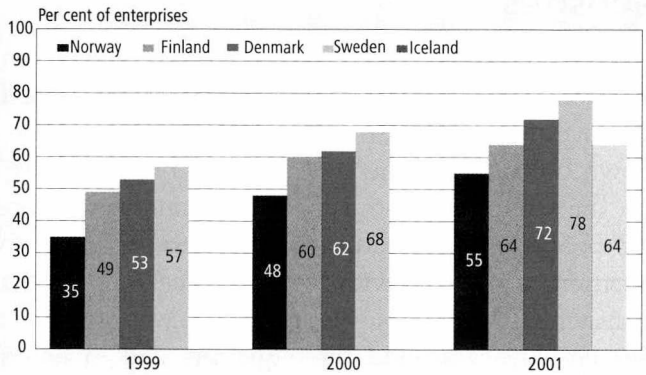
6 One enterprise may be using more than one technology.

Figure 10.4.1
Homepages in enterprises in spring 2003. Proportion of all enterprises in class.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



50–99 employees 87 per cent. Enterprises in post and telecommunications, wholesale trade, business services and manufacturing had their own website more often than companies in other industries: the proportion in this category was around three in four. Construction and transport enterprises had their own website much less often than enterprises in other industries. In smaller enterprises and in certain industries there is still scope for substantial growth with regard to online presence.

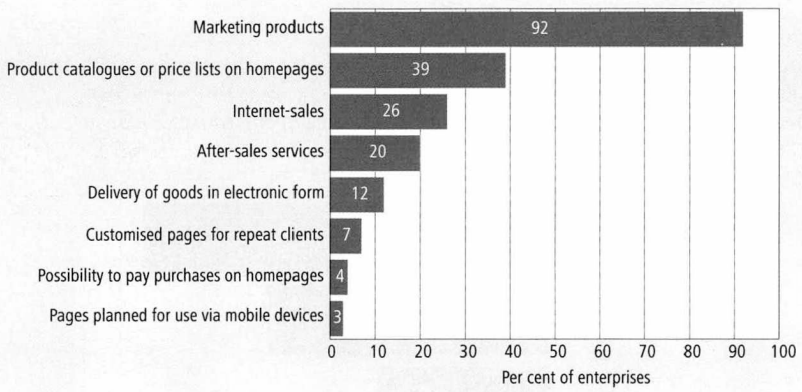
Figure 10.4.2
Proportion of Nordic enterprises with at least ten employees having homepages, 1999–2001.
Sources: Statistics Denmark, Statistics Finland, Statistics Iceland, Statistics Norway, Statistics Sweden, Nordic Information Society Statistics 2002.



Finnish enterprises do not rank quite as high in a Nordic comparison of the prevalence of websites as they do in Internet use. In 2003, the proportion of enterprises with their own homepages was highest in Sweden, whereas Finnish enterprises came third in this comparison together with Iceland. The number of websites has clearly increased over the past few years in all countries.

The most common use of homepages was for purposes of marketing: more than nine in ten enterprises with a staff of five or more and with their own homepages on the Internet, said they used the website for marketing. Two in five enterprises had their product catalogues and price lists available on the homepage. One-quarter of the enterprises with their own website sold their products over the Internet, and one in five offered after-sales services. Only very few companies – four per cent of those with a website – gave customers the option of online payment for their purchases. The proportion of enterprises delivering products in electronic form via homepage was 12 per cent. Three enterprises in a hundred of those with their own website had homepages supporting mobile access.

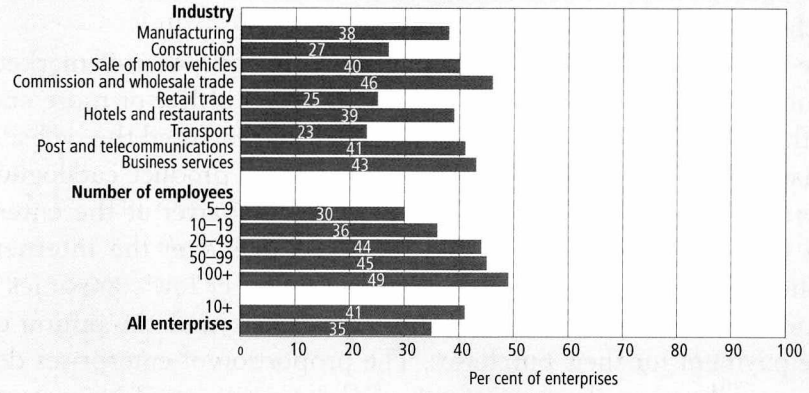
Figure 10.4.3
Use of homepages in enterprises in spring 2003. Proportion of enterprises with at least five employees having homepages.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



10.5 Data security taken seriously

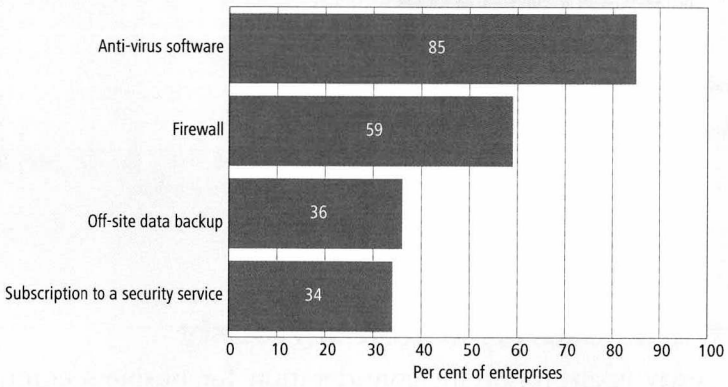
Data security is an important consideration for business enterprises, and also something that is often considered problematic in the case of Internet use. In 2000, one-third of enterprises employing a staff of five or more regarded data security and/or the threat of virus attacks a ma-

Figure 10.5.1
Computer virus having caused loss of information or working time during the last 12 months in spring 2003. Proportion of all enterprises in class.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



jor problem in Internet use.[7] In spring 2002, 29 per cent of Internet-using enterprises with five or more employees considered these to be a major problem.[8] In spring 2003 one-third of enterprises said they had suffered losses of data or working hours because of a computer virus during the preceding 12 months.

Figure 10.5.2
Data security tools in enterprises in spring 2003. Proportion of enterprises with at least five employees.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



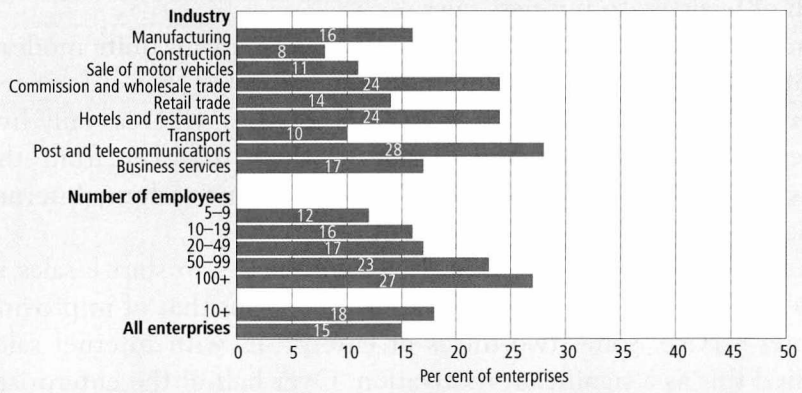
7 Statistics Finland (2001).
8 Statistics Finland (2002).

The concerns that Finnish enterprises have about data security are clearly reflected in their investments. No less than 85 per cent of companies had virus protection software in use, 59 per cent had a firewall in place and one-third used security services (e.g. virus protection or firewall services). More than one-third of the enterprises also took backup copies of data outside the place of use. Three in four companies had updated their data security during the past three months.[9]

10.6 Value of Internet trade[10] rising

Any enterprise that engages in Internet trading will need a separate online trading place or homepages where customers can place orders goods or services. While 58 per cent of enterprises with five or more employees had their own website, 15 per cent of all enterprises and one-quarter of those with their own website sold their products over the Internet. Internet trading increases clearly with increasing company size. Three industries stand out with higher than average proportions of enterprises engaged in Internet trading, viz. post and telecommunications, hotels and restaurants and wholesale trade, where around one-quarter of enterprises sell their products over the Internet.

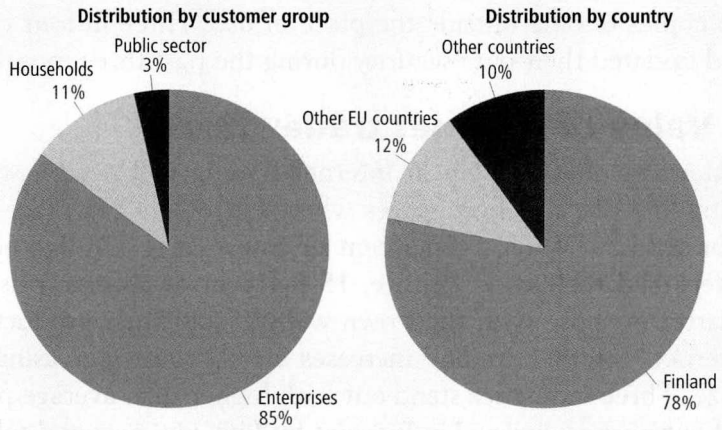
Figure 10.6.1
Enterprises having Internet sales in 2002. Proportion of all enterprises in class. Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



9 Statistics Finland (2003).

10 An order filled in and sent with a ready-made electronic form on the Internet, or orders in actual netshops are e-commerce as intended here. Orders made by ordinary e-mail messages are not e-commerce. Orders made on the Extranet by the same criteria are also included in Internet commerce.

Figure 10.6.2
Distribution of Internet sales by customer group and country in 2002. Proportion of all Internet sales.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



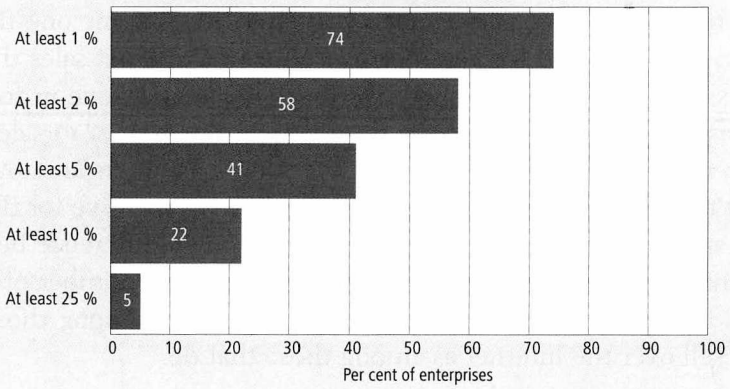
According to research by Statistics Finland, the value of Internet sales by Finnish enterprises with at least five employees stood in 2002 at around 3.4 billion euros.[11] Business-to-business sales accounts for 85 per cent of this total. Close to 80 per cent of the value of Internet sales comes from domestic markets. The value of Internet sales increased clearly from 2001, but increase is attributable almost entirely to the growth of business-to-business sales.

In most enterprises the value of Internet sales remains quite modest. One-fifth of enterprises with Internet sales reported that at least ten per cent of their turnover came from Internet sales, whereas only five per cent earned at least one-quarter of their turnover from the Internet sales. Nonetheless in three enterprises out of four, Internet sales accounted for at least one per cent of turnover.

What, then, is the motive that drives enterprises to start e-sales in Internet? The most common motivating factor was that of improving customer service: some two-thirds of enterprises with Internet sales identified this as a significant motivation. Over half of the enterprises consider company image and around half of them finding new customers and doing well in competition a significant motivation. On these four factors there was quite a broad consensus of opinion: no more than a few per cent of the enterprises took the view that improv-

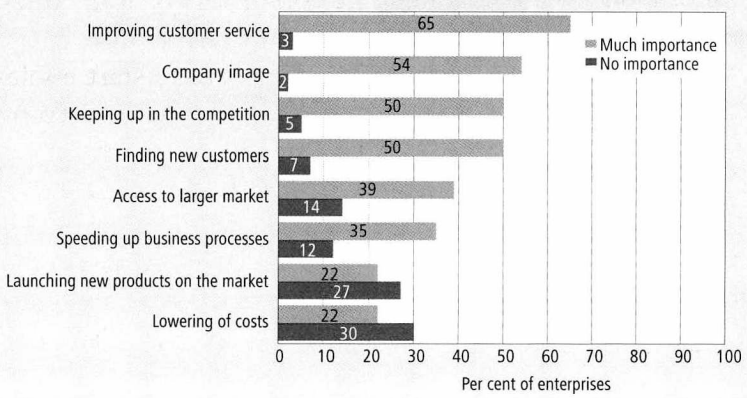
11 Statistics Finland (2003).

Figure 10.6.3
Distribution of the volume of Internet sales in enterprises in 2002. Enterprises receiving at least 1, 2, 5, 10, or 25 per cent of their turnover from Internet sales. Proportion of enterprises with at least five employees having Internet sales.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



ing customer service and company image was unimportant, and only a slightly larger proportion took this view with regard to getting new customers and doing well in competition. Opinions were more divided on the four other motivational factors queried. For some enterprises they are important, for others not. For less than one-third of the

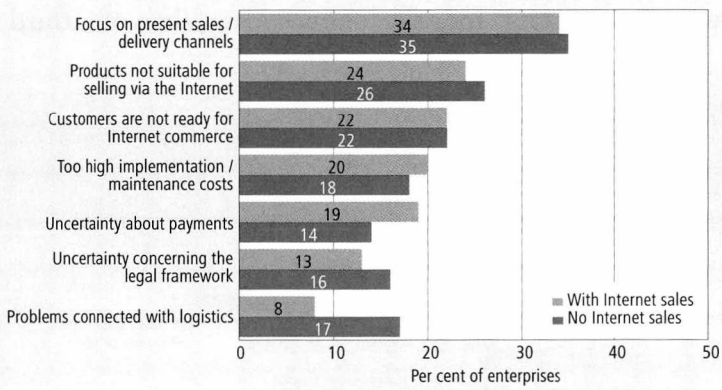
Figure 10.6.4
Motivations for Internet sales in spring 2002. Enterprises regarding the item as having much importance or no importance. Proportion of enterprises with at least five employees having Internet sales.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2002.



enterprises reducing costs and for just over one-quarter launching new products were insignificant motivations for Internet sales, but for around one-fifth of the enterprises both had much importance.

On the reverse side of the coin, it is interesting to examine the problems experienced by enterprises with Internet sales or the start-up of sales in Internet. For the time being it seems that for quite a number of enterprises, Internet sales is not a real alternative. Some one-third of enterprises considered it a significant problem of Internet sales that the emphasis remains on established distribution channels, one in four enterprises said that their products do not lend themselves to sales over the Internet. One in five pointed out that their customers are not ready to start trading over the Internet and that it is too expensive for them to set up and run and Internet sales system. The main difference between companies with and without Internet sales is that the number of enterprises identifying logistics problems is twice as high among those that do not sell over the Internet as among those that do.

Figure 10.6.5
Perceived problems in Internet sales in spring 2003. Comparison of enterprises having and not having Internet sales. Enterprises regarding the item as having much importance. Proportion of enterprises with at least five employees.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.



Sources

Statistics Finland (2001), Internet use and e-commerce in enterprises 2001. Science, Technology and Research 2001:3, Helsinki

Statistics Finland (2002), Internet use and e-commerce in enterprises 2002. Science, Technology and Research 2002:4, Helsinki

Statistics Finland (2003), Internet use and e-commerce in enterprises 2003. Science, Technology and Research 2003:3, Helsinki

Statistics Denmark, Statistics Finland, Statistics Iceland, Statistics Norway, Statistics Sweden (2002), Nordic Information Society Statistics 2002, Helsinki

Appendix 10.1
IT use by enterprise size in spring 2003.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.

	Enterprise size						
	All (at least 5 employees)	At least 10 employees	5–9 employees	10–19 employees	20–49 employees	50–99 employees	At least 100 employees
	%	%	%	%	%	%	%
Computer	97	99	94	98	100	100	100
Internet	94	97	91	95	99	100	100
Website	58	69	46	58	75	87	91
Broadband	54	65	41	54	69	81	92
Internet sales[1]	15	18	12	16	17	23	27

1 In 2002

Appendix 10.2
IT use by industry in spring 2003.
Source: Statistics Finland, Internet use and e-commerce in enterprises 2003.

	Industry									
	All (at least 5 employees)	Manufacturing	Construction	Sale of motor vehicles	Wholesale	Retail trade	Hotels and restaurants	Transport	Post and telecommunications	Business and other services
	%	%	%	%	%	%	%	%	%	%
Computer	97	99	92	95	99	99	90	93	99	99
Internet	94	98	88	88	99	95	84	87	98	99
Website	58	71	30	48	76	44	57	36	77	74
Broadband	54	53	30	45	70	51	41	43	73	76
Internet sales[1]	15	16	8	11	24	14	24	10	28	17

1 In 2002

For the purposes of this analysis industries have been grouped as follows: manufacturing 15-37, 40; construction 45; sale and repair of motor vehicles 50; wholesale trade 51, retail trade 52; hotels and restaurants 55; transport 60-63; post and telecommunications 64; business and other services 70-74, 92.1, 92.2, 92.4, 92.71, 93.

11 Electronic transactions in public administration, digital mass media and changes in bank transactions

- In Finland a wide variety of information about public services is already available online but thus far there are not many real interactive public transaction services on the Internet.
- The web services provided by libraries have increased in the last few years and the majority of libraries have Internet services for their customers' use. In 2002 the number of Internet visits to libraries increased by nearly one and a half times to 43.7 million.
- Digital technology has transformed the production and distribution of the conventional printing industry – for example, the printed press is already largely available on the web. The significance of DVD recordings and discs has grown and the use potential related to them is substantial.
- The banking sector in Finland has been quick to adopt information and communications technology. In 2002, as much as 92 per cent of the payment transactions between banks and their customers were made by machine-coded data transmission. Electronic banking agreements between banks and their customers have grown rapidly.

Digitisation of services has progressed at varying rates in Finland. Several services have been available online for years, while others are only now being taken to the web. In Finland electronic banking services are advanced and the majority of Finns use the net bank for their bank transactions. Likewise, the press is widely accessible via the Internet.

The net is generally used for publication of information, such as news and product presentation, and Finns are used to searching for information on the Internet. The development of the information society would, however, require that the web could be used not only for unidirectional purposes, such as publication of information, but also interactively, where service transactions could genuinely take place on the net. The net bank is an indication of this trend, and in the recent years libraries, for example, have expanded their facilities to use electronic services.

Stress is often laid on the role of public administration as an actor and enabler of the information society. One of the goals of the EU Commission's eEurope 2005 action plan is to develop public administration information and interaction services on the Internet; by 2005 Europe should have modern public network services, of which most emphasis is given to more advanced electronic administration, ICT utilising learning and electronic healthcare services.

11.1 Electronic transactions in public administration

In the last few years, electronic transactions[1] in public administration have become an ever more central theme in national and international discussion forums on the topic of the information society. A basic condition for electronic transactions and broader development of the information society is that the public sector can exploit information and communications technology adequately and that administrative data management and information systems function well and are compatible with each other. By international standards, Finland has fared well or at least adequately in comparisons of public net services. Even so, electronic transactions have not advanced according to the expectations and objectives set. Remodelling of operational processes to correspond to net services has been slow. It is estimated that construction of any significant interactive services will not be started within public administration until after at least another five to ten years. In practice, almost all authorities have informative net services but there are so far only a few real interactive public electronic transaction services.[2]

Government agencies and institutions are responsible for developing their own electronic services. The Ministry of Finance carries out an annual survey on the type and volume of each government agency's electronic services. In Finland plenty of information is already available on the Internet about government agencies, institutions and public services. For example, almost all central government organisations have their own web pages (90 per cent of the agencies responding to the survey). In addition to acquisition of information, it is also possible to print out forms from the authorities' web pages. The number of agencies with at least one electronic transaction service for citizens,

1 Electronic transactions or web transactions refer to production, distribution or use of public services or interaction connected with them based on utilisation of information networks that supplements, replaces or reforms conventional transactions.

2 Advisory Committee for Information Society (2002).

enterprises or other authorities doubled during 2002. Over one third of central government organisations already have an electronic transaction service and nearly one fifth are planning one. Thirteen per cent of the responding organisations had a mobile user interface and 11 per cent a facility for online payments.[3]

Suomi.fi, a portal for Finland's public sector services, became established during 2002. The portal was opened in April 2002, and the web services of different public administration organisations are linked to it. The service comprises information on all things important to people's everyday life. The service gives access to the websites of all central government agencies and institutions and municipalities. The most recently published part of the Suomi.fi service is Asiointiopas.fi, the user's guide to online services. During its first year, the Suomi.fi portal had 700,000 visitors.[4]

In spring 2001, almost all of Finland's 448 municipalities had their own websites, only 11 did not. Similarly as in central government, municipalities' web pages mainly provide information, and web forms are also available on the web pages.[5]

Electronic transactions also enable further development of public services. The objective is that people and enterprises can handle at home, work or joint service points many permission, application, notification and verification matters now requiring personal visits. Reliable electronic transactions require identification of customers. For this reason, Finland introduced the electronic ID card in December 1999. The certification authority for the electronic ID card is the Population Register Centre. The low popularity of the electronic ID card has, however, slowed the development of transaction services requiring electronic signature or solid identification.[6]

Use of public administration Internet services has been surveyed with Statistics Finland's inquiries. Of all people aged 15 years or over, 41 per cent had visited the website of their municipality of domicile, around every fifth had been to the tax authorities' pages and nearly one third to the websites of other central government agencies in 2002 (Table 11.1.1). Considerably fewer visits had been made to the web pages of the Parliament, the Government and the President of the Republic. One fifth of all aged 15 or over said they had filled in official forms online during 2002. The responses probably include both elec-

3 Ministry of Finance (2003).
4 www.vm.fi.
5 Ruusula M. (2001).
6 Ministry of Finance (2003), www.vm.fi.

Table 11.1.1
Visitors to public authorities' websites as per cent of total population over 15 and Internet users over 15 by region in 2002.
Source: Statistics Finland, The Evolution of the Information Society.

Visited website of	Metropolitan Helsinki area		Other towns		Rural areas near towns		Core rural area		Sparsely populated rural area		All	
	%	%	%	%	%	%	%	%	%	%	%	%
	All	Internet users	All	Internet users	All	Internet users	All	Internet users	All	Internet users	All	Internet users
Municipality	52	72	42	73	40	75	31	69	33	78	41	73
Tax authorities	28	39	17	30	18	32	10	22	10	30	18	31
Other government agency	45	63	31	54	31	57	22	49	20	49	31	55
Parliament or government	27	28	43	25	13	22	13	24	5	16	14	24
President	6	9	6	10	8	14	5	11	1	3	6	10
Filled in official form online	29	41	21	35	12	22	14	31	11	27	19	34

tronically filled and transmitted forms and online form templates sent by mail after filling in (it wasn't made any specifying questions about this in the survey).[7]

11.2 Public libraries

Public libraries are at the centre of people's information and cultural services. Libraries offer diverse book and other material services regardless of area of residence. They preserve national cultural heritage and organise and classify cultural contents in the net environment. They also support the educational system and advance self-study.

The library network covers the country well because there is a library in every municipality. Library services are also supplemented by mobile libraries especially in sparsely populated and remote areas. Regional co-operation over municipal boundaries has intensified in libraries. Combinations of libraries have been established since the 1980s, when joint acquisitions were rationalised in library materials and IT systems. Libraries nowadays have shared IT networks, databases and inter-library loans of collections.

The Internet services offered by libraries have grown in the last few years. For example, the Helsinki City Library (the central public li-

7 Nurmela J., Ylitalo M. (2003).

brary) has developed nationally centralised library services in the net environment. They provide access to libraries' collections and information retrieval tools, and instruct users in information search. Reservations and renewals of loans can also be made by means of the Helsinki region libraries' web services.

The public library collections comprised a total of 36.7 million books and 4.1 million other items in 2002. Libraries are significant distribution channels for literature. Fiction constitutes the major part of book collections. Libraries' material collections have become more diversified as a whole, because the proportion of other materials (audio and video recordings, etc.) has risen to about one tenth at present. As yet, CD-ROM or DVD recordings represent only a few percentages of the collections.

Loaning has been growing again from the late 1990s on. In 2002, altogether 106.9 million items were borrowed from libraries. In Finland loaning is on a high level by international standards. Nearly every second Finn borrows some item from library during the year (2.4 million borrowers in 2002). In 2000, the number of home loans was 20 per inhabitant, while in the other Nordic Countries this figure fell clearly short of this[8] .

According to the Time Use Survey (1999/2000), nearly 70 per cent of people aged 10 or over had been to the library within the year. Women had visited the library more often than men had. Library visits seem to concentrate mainly on young people's age groups. Almost all aged 10 to 14 and 93 per cent of the 15 to 24-year-olds had visited the library in the

Table 11.2.1
Number of borrowers and loans from public libraries in 1993–2002.
Source: Ministry of Education, Finnish Public Library Statistics Database

Year	Borrowers	Loans[1] of which					
	% of population	Books	Other material	Inter library loans[2]	Total	Per population	Per borrower
		1,000s	1,000s	1,000s	1,000s		
1993	48.8	82,228	16,693	155	99,075	19.6	40.1
1994	48.9	84,066	17,792	152	102,010	20.0	41.0
1995	49.1	81,634	20,264	166	102,064	20.0	40.7
1996	48.4	82,892	21,277	191	104,408	20.3	42.0
1997	48.9	81,011	21,128	188	102,327	19.9	40.7
1998	48.1	78,383	21,946	197	100,527	19.6	40.8
1999	47.1	75,895	23,158	215	99,268	19.3	41.1
2000	46.7	77,281	24,690	226	102,197	19.7	42.3
2001	46.5	76,352	26,793	258	103,403	19.9	42.8
2002	46.7	78,411	28,197	259	106,867	20.5	44.0

1 Excluding the Åland Islands
2 Including inter library loans and other material

8 Nordic Council of Ministers (2002).

year. Likewise, students and schoolchildren (96%) of socio-economic groups had been to the library relatively the most often.

In all, 66.0 million visits were made to the library in 2002, which is slightly more than the year before. At the same time, the number of Internet visits to libraries grew by almost one and a half to 43.7 million. This development is due to the increased provision of net services, because the majority of libraries offer Internet facilities for customer use.

11.3 Digital mass media

The trend of new home communications technology has been: 1) to expand the programme supply, 2) to enable more individual uses, and 3) to increase interactivity. At least the first two trends were already enhanced by such "conventional" equipment as videocassette recorders and CD players and naturally also by the fast growth of the supply of satellite and cable channels.

According to the international comparative data published by the EU, Finland rates at least averagely by European standards in access to computers and CD-ROM drives (at home, work or place of study). In Internet access Finland is one of the top countries, although among the EU countries the Netherlands, Sweden and Denmark are well ahead of Finland in this respect.

The total turnover of the so-called new media industry in Finland was estimated at EUR 230 to 240 million in 2001. The new media industry here refers to enterprises involved in the content production of digital media (e.g. multimedia and CD-ROM) and/or information networks and the respective technical solutions and related support. They have transcended conventional boundaries between industries.

It should be pointed out that only a limited part of the so-called new media industry is directly connected to the production of the digital mass media. First, a large proportion of content production can be mainly considered as organisational or marketing communication, comparable with advertising materials in the printing industry. Second, other significant sectors often included in the new media industry are logistics and customer management systems within and between enterprises, banking and investment services and solutions related to Internet commerce. Third, its major part is software production, which is at times confused with content production.

Within the actual mass media production, sales of online and Internet services at end user prices amounted to approximately EUR 56 million in Finland in 2002 and sales of CD-ROMs to around EUR 26 million in 2002.

The majority of sales of online service (Table 11.3.1) were business and news services commissioned mainly for professional use. The proportion of chargeable services and Internet advertising directed to consumer markets is still small.

Ownership arrangements between enterprises in the sector have been common in the recent years. Large and medium large conventional media enterprises have also bought smaller new media companies. For example, Talentum, publisher of economic and technological journals, expanded its operations to new media through its acquisitions. On the other hand, big media companies, such as Alma Media, have incorporated their own new media activities.

Table 11.3.1
Sales of online and Internet services in 1980–2002, EUR million.
Source: Statistics Finland, Mass media statistics.

	Current prices EUR million	Fixed (2001) prices EUR million
1980	0.2	0.4
1985	6	9
1990	19	23
1995	34	38
1996	37	41
1997	42	46
1998	46	50
1999	51	54
2000	60	61
2001	60	60
2002	56	55

The Internet

The use of the Internet has fast become general in Finland. In autumn 2002 over one half (57%) of Finns had used the Internet at home, work or place of study at least once a week[9]. The most common modes of using the Internet are email, search for factual information and banking services.

The traditional mass media have actively penetrated the Internet and live a sort of parallel life there. For example, Finland's most popular websites – excluding so-called general portals – are maintained by the conventional mass media, such as newspapers and TV channels.

9 Taloustutkimus Oy, Internet tracking, October-November 2002

The traditional printing industry has also been keen to develop products and services for integrated communication. This is the key competition strategy for the industry. When newspapers' classified advertisements are in danger of being transferred to information networks, newspapers offer net services to complement their printed advertisements. Through the links the readers can contact advertisers direct, make reservations and make final purchases online.

In spring 2002 Finland had some 300 Internet publications that can be classified as newspapers and magazines (Table 11.3.2). Most of these were net versions of customary papers. They usually comprise only part of the material of the printed paper. Some papers provide in their net version additional material not included in the printed version. Most papers offer their net versions free to all those browsing their pages. In some cases registration is required. Certain publications open their Internet version only to their subscribers, in which case it is an additional service comparable with supplements. Until now chargeable services have been offered mainly by business newspapers and magazines, but just recently some general newspapers (e.g. the Helsingin Sanomat and Keskisuomalainen) have changed major parts of their web pages into paid-for services.

The chargeability of net publications is still one of the most problematic issues related to the media economy. It is difficult to finance activities by advertising alone. The reader numbers of payable websites often remain low. Even if the fee for the services was small

Table 11.3.2
Number of Internet newspapers and magazines in 1997–2002. Source: http://www.sanomalehdet.fi/fi/linkit/index.shtml, http://www.journalistiliitto.fi/linkit/lehdet.html.

	1997 autumn	1998 autumn	2000 spring	2001 spring	2002 spring
Newspapers total	33	50	73	80	100
dailies	22	34	42	47	51
non-dailies	11	16	31	33	49
Magazines total	90	116	138	..	209
technology	6	..	11	..	17
business magazines	4	..	5	..	8
sports	3	..	12	..	19
culture and opinion journals	7	..	13	..	27
hobbies	16	..	9	..	15
scientific journals	3	..	7	..	12
student magazines	15	..	15	..	21
trade and organization magazines	20	..	28	..	35
other magazines	16	..	38	..	55

Note. Including homepages providing at least some news/editorial material.

and people were in principle willing to pay, chargeable services for consumers have not, at least so far, made any major breakthrough.

Adverting in net papers or other web pages is at least equally problematic. According to Suomen Gallup-Media, only about EUR 15 million was spent on web advertising in Finland in 2002, which is 1.4 per cent of the total volume of media advertising. The figure is modest compared with that of the traditional printing media, i.e. newspapers and magazines, i.e. over 70 per cent.

Thus the equation of the economy of web publications is still unsolved. Nevertheless, most of the largest publishers of newspapers and magazines are developing their own Internet versions in case the keys for profitability are discovered. The other reason has to do with defensive tactics – the idea is to fend off the possible new contenders in advance.

On the other hand, a major part of the mutual co-operation modes of the mass media that can be described by the buzzword, networking, have become possible only after the spread of the digital technology-based communications technology. It can well be said that the main impacts of digital technology have been visible in editorial production and organisation of marketing. The digital technology-based communications technology has thus far had only little effect on the consumer markets of the mass media.

Digital television and radio

Digital TV broadcasts were launched in August 2001. The Finnish Broadcasting Company YLE set up three new channels along with the digital parallel versions of the analogous TV channels. Commercial enterprises were granted licences for six new channels. It has been a difficult beginning. One half of the new commercial channels gave up their licences during the first year. In spring 2003 it was estimated that only around 100,000 households had purchased a digital TV set-top box to receive digital broadcasts either via ordinary antenna or cable. About 45,000 households had satellite digital set-top boxes.

The functionality of the Video On Demand (VOD) systems and interactive television services have been tested quite extensively in Finland from the mid-1990s. For example, the bidirectional cable network of the cable television company HTV in the Helsinki region in principle enables different Video On Demand services, interactive television programmes and other services requiring bidirectionality. Thus far, only a fraction of the digital set-top boxes bought by households are such that allow utilisation of interactive services.

The Finnish Broadcasting Company sends digital radio broadcasts on three DAB radio channels, but the number of digital receivers used by listeners is marginally small due to their limited selection and high price.

CD-ROM

In recent years, the development of CD-ROM recording markets appears to have stopped or even fallen despite the fact that multimedia PCs have quickly become more common in households (Table 11.3.3). Multimedia products accounted for around 35 per cent and games for about 65 per cent of the total CD-ROM markets in 2002. (Games do not here include console games that are nowadays sold clearly more than CD-ROM recordings in total.) Encyclopaedias and reference books are in principle perfectly suitable for CD-ROM format, where their search facilities can be put to full use. However, the competition is essentially hampered by the profusion of information available free on the Internet.

The overwhelming majority of the sold multimedia CD-ROMs are produced from start to finish in Finland, edited Finnish versions or at least Finnish translations. In the last few years most of the retail sales of multimedia CD-ROMs have been products of the members of the Finnish Book Publishers' Association. Their sales were around EUR four million on the wholesale level in 2002. The volume of sales fell by over 50 per cent compared with the previous year. Sales of domestic fiction and entertainment halted almost completely. (Table 11.3.4.)

Table 11.3.3
Sales of CD-ROMs in 1994–2002 and sales of console games in 2002.
Source: Finnish Games and Multimedia Association Figma, Finnish Book Publishers' Association, Statistics Finland.

	Current prices	Fixed (2001) prices	Of which Games	Multimedia products
	EUR million	EUR million	%	%
1994	3	4	–	–
1995	8	9	–	–
1996	25	28	75	25
1997	34	37	65	35
1998	37	40	65	35
1999	34	36	60	40
2000	36	37	55	45
2001	33	33	60	40
2002	26	25	65	35
Console games 2002	41			
CD-ROM and console games total 2002	67			

Table 11.3.4
Sales of Finnish CD-ROM publications and diskettes in 1995–2002, EUR million and percentage of total sales.
Source: Finnish Book Publishers' Association.

	1995	1996	1997	1998	1999	2000	2001	2002
	EUR million							
Education	0.1	0.6	1.1	0.2	0.3	0.4	0.2	0.0
Non-fiction	0.9	1.9	3.8	4.0	3.9	4.6	4.7	3.5
Fiction, entertainment	0.4	0.2	0.2	1.3	1.3	1.4	3.4	0.4
Total	**1.3**	**2.7**	**5.2**	**5.5**	**5.5**	**6.4**	**8.3**	**3.9**
	%							
Education	5	22	22	4	6	6	2	1
Non-fiction	64	70	74	73	71	72	57	90
Fiction, entertainment	31	7	4	23	24	22	41	10
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
No. of titles	**59**	**69**	**130**	**170**	**184**	**207**	**538**	**353**

DVDs

The markets of DVD films have grown fast in the last few years. Sales of separate DVD equipment started in Finland only in 1998. The new technology appears to have already become an alternative that will replace the VCRs of today in a few years. In five years the proportion of DVD recordings has risen to nearly one half of the sales and rentals of films and other recordings (Table 11.3.5).

The DVD is naturally suitable for the recording of all digital information. The storage capacity of DVDs is multifold compared with that of the CD-ROM system. It thus has a substantial use potential not only in pure consumer markets but also in professional use and generally in connection with PC equipment as substitutes for CD-ROM drives.

Table 11.3.5
Value of renting and sales of video and DVD recordings in 1997–2002[1], EUR million.
Source: Finnish Film Distributors' Association.

	DVDs		Videos		Total Current prices	Fixed (2001) prices
	EUR million	%	EUR million	%	EUR million	EUR million
1997	–	–	62	100	62	68
1998	0.4	1	70	99	70	76
1999	4	5	71	95	75	80
2000	12	15	70	86	82	84
2001	29	31	66	70	95	95
2002	50	43	65	57	115	113

1 Estimates

11.4 Consumption of mass media

The Intermedia Survey carried out by Gallup Media produces information about the media consumption of Finns. The survey examines the accessibility of different media groups, the time used at different media, the place and time of following the mass media and the motives for using the media.

The Intermedia 2002 Survey[10] was renewed from the previous survey rounds. The most essential change had to do with the survey methodology. Due to the methodological change the results of the Intermedia 2002 Survey are not comparable with the results of previously made surveys, for which reason the consumption of Finnish mass media is observed in the following only on the basis of the 2002 data. Examination of changes is here disregarded because of lack of comparable data.

In March 2002 Finns used an average of 9 hours 22 minutes per day for following different media. The most time was used on TV viewing, 3 hours 35 minutes, on average. Radio listening took an average of 3 hours 5 minutes. Finns read newspapers 48 minutes per day and magazines 25 minutes per day, on average. Finns were on the Internet about 21 minutes and listened to various audio recordings 18 minutes per day. Television was mainly watched at home (97%), but only 48 per cent of radio listening took place at home. Radio is listened to much at work (31%) and in the car and other means of transport on the way to work (19%). Of Internet use, 58 per cent occurs at home, 28 per cent at work and 12 per cent at place of study.

Of all mass media television has the best accessibility. In March 2002 as many as 96 per cent of Finns aged 12 to 69 watched TV during the day. Newspapers were read by 87 per cent and radio listened to by 83 per cent of those aged 12 to 69. Over 30 per cent of the respondents said they used the Internet daily (Figure 11.4.1).

Radio is clearly a background media that is followed while doing something else. In contrast, the Internet is naturally used very intently. Reading of newspapers and magazines and books and watching of TV is often intensive as well. The survey indicates that 73 per cent of newspaper readers and 62 per cent of TV viewers followed the media with concentration.

According to the Intermedia Survey, 39 per cent of PC owners use their computers at least once a day at home. The most common rea-

10 The reference time of Intermedia 2002 was March 2002 and the media use section of the survey was realised as a diary on one day. The reference group of the survey contained Finnish-speakers aged 12 to 69 (excl. people from Åland).

Figure 11.4.1
Proportion of 12 to 69-year-olds having followed the media during the media day in March 2002, per cent.
Source: Gallup Media.

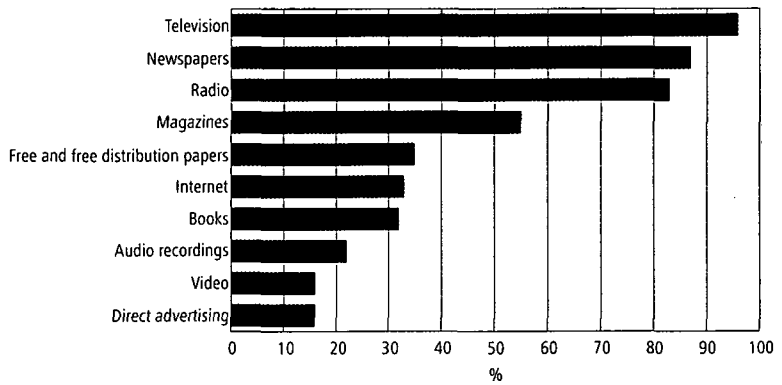
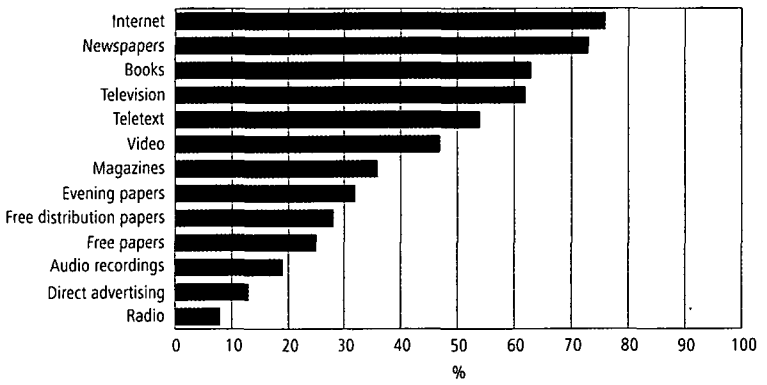


Figure 11.4.2
The proportion of those following the media intently among all followers of different media groups in March 2002, per cent.
Source: Gallup Media.



sons for using computers are word-processing and Internet use. In March 2002, the average time at computers by those having used PCs during the day was nearly one and a half hours.

11.5 Banking services and growing use of online banking

Electronic services in Finnish banks are nowadays highly developed. The bank crisis and the recession in the early 1990s forced banks to restructure their operations. One way of overcoming the crisis was investment in the new technology.

The banking sector in Finland has been quick to adopt information and communications technology applications. Payment systems are thus highly advanced, so that bills are rarely paid in cash nowadays and the number of electronic data connections is increasing. The use of instruments of payment varies greatly from one country to another, largely according to historical traditions, customary habits and general attitudes. Banking in Finland differs in several ways from the other European countries. In the EU area the bank office network is important because a significant part of payments are still made paper-based at banks. Finnish bank payment services extensively utilise the progress of information technology and data communications. Payment terminals at stores and data connections of enterprises and at homes have clearly diminished handling of payments at banks.

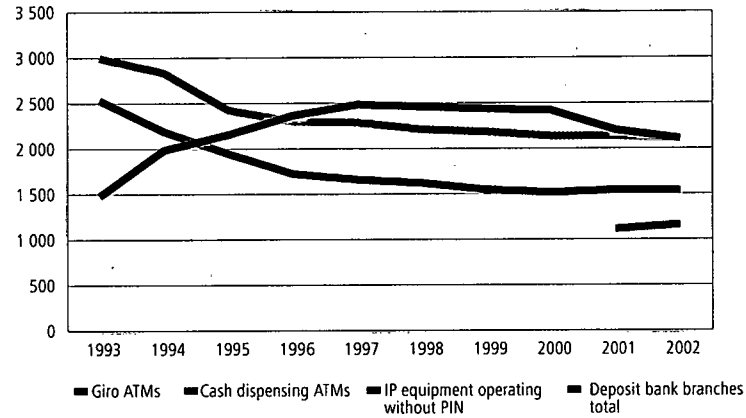
A total of 947 million domestic payments were processed in the payment systems of the Finnish banks in 2002, while the figure for 1993 was 552 million. In 1993 electronic payments accounted for a little over 60 per cent of all transmissions. In 2002 as much as 92 per cent of all transactions between banks and their customers took place by machine-coded data transmission.

The bank and cash distribution networks have undergone a rapid transformation. In 1993 the deposit banks operating in Finland had a little over 2,500 branch offices. By the end of the 1990s, the number of branch offices had fallen by one thousand. In the last few years this figure has remained at good 1,500. The number of banking terminals grew until 1997, but has fallen slightly after that as the use of the Internet has in-

Table 11.5.1
Number of banks' payment transfers in 1993–2002, in millions.
Source: Finnish Bankers' Association.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Electronic transfers	220	241	304	316	350	391	423	462	483	515
EFTPOS transactions	118	132	144	151	158	174	202	241	280	354
Sales slips and cheques	32	27	23	29	23	19	17	15	12	9
Paper-based transfers	183	172	140	132	120	105	96	79	71	69
Automation degree, %	61	65	73	75	79	82	85	88	90	92

Figure 11.5.1
Banking service networks in 1993–2002, numbers of ATMs and bank branches.
Source: Finnish Bankers' Association.



creased. The number of cashpoints has reduced in the recent years. Post offices have not functioned as banking service outlets since 1999.

The number of bank branch offices and cashpoints per capita is smaller in Finland then average for the EU. Against this, the number of usage times of cashpoints per population is the highest of all EU countries.

Table 11.5.2
Number of banks, post offices and ATMs per million population and usage times of ATMs per inhabitant in 1996 and 2001.
Source: European Central Bank.

	Number of bank branches per million inhabitans		Number of post office branches[1] per million inhabitans		Number of ATMs per million inhabitants		Number of transactions per capita	
	1996	2001	1996	2001	1996	2001	1996	2001
Netherlands	284	219	147	140	373	445	29	28
Belgium	748	600	168	131	414	669	15	22
Spain	935	961	..	..	775	1,167	15	17
Ireland	216	260	531	..	290	346	21	36
United Kingdom	205	245	328	292	376	612	27	37
Italy	425	503	254	237	422	593	6	10
Austria	582	559	288	282	479	814	9	13
Greece	183	269	12	0	185	400	6	15
Luxembourg	972	554	..	..	537	799	10	14
Portugal	428	530	108	76	541	1,022	18	35
France	436	428	291	186	420	606	18	19
Sweden	286	229	133	152	269	289	34	38
Germany	811	640	..	..	459	603	15	19
Finland	341	305	138	..	448	411	42	48
Denmark	457	427	235	202	239	516	..	..
EU[2]	525	502	248	217	448	654	17	22
Euro area[3]	..	561	..	194	..	676	..	19

1 If the post offices offer payment services
2 Average without countries where data are not available
3 Average without countries where data are not available, the 2001 figures include Greece

The banking services marketed for private persons in Finland rely very strongly on self-service and electronic data transmission. The number of off-line and telebanking agreements between banks and their customers has increased four-fold since 1995. The number of telebanking transactions has grown almost ten-fold in the same period.

The generalisation of electronic banking has influenced the reformulation of the bank network at the same time as it has enhanced the availability of bank services and thus also decreased regional differences in that respect.

In Finland banks and their customers have made over 2.5 million agreements on electronic banking. For example, 67 per cent of invoices were paid via information networks in 2002, while at the same time only five per cent of invoices were paid through branch offices. The development has been rapid, for as late as in 1993, 19 per cent of payments were made in branch offices. Most of the securities trading by private persons is now carried out over networks.[11]

In Finland online banking is one of the most important purposes for which the Internet is used. The number of online banking agreements relative to population is the highest in Finland among the Nordic countries.[12]

A few years ago one third of all payment cards were ATM cards, but now their proportion has gone down. In 2002 only around one fifth were ATM cards that can be used only for withdrawing cash. In contrast, bank and combination cards, credit and charge cards and retail cards have increased their popularity.

Compared with other European countries there are not particularly many cards per capita in Finland. However, cash withdrawal and bank cards are used much, more than average in the EU countries. Comparisons of the numbers of payment and other cards between countries are difficult, however, as the functions of different cards differ slightly

Table 11.5.3
Data connections between banks and their customers in 1995–2002, in thousands, and transactions between banks and their customers in 1995–2002, in millions.
Source: Finnish Bankers' Association.

	1995	1996	1997	1998	1999	2000	2001	2002
Off-line agreements, 1000s	149	173	192	219	233	232	212	210
Telebanking agreements, 1000s	583	682	1,057	1,274	1,639	2,199	2,576	2,791
Telebanking transactions, million	15.2	18.7	25.4	38.4	57.0	92.0	110.4	145.3

11 Finnish Bankers' Association (2003b).
12 Finnish Bankers' Association (2003c).

Table 11.5.4
Numbers of cards by function in 1995–2002, in thousands.
Source: Finnish Bankers' Association.

	ATM only cards	Bank and combination	Credit and charge	Retail cards	Online debit cards	Total
1995	2,453	1,962	1,233	1,749	..	7,397
1996	2,693	2,071	1,200	1,580	..	7,544
1997	2,934	2,211	1,350	1,582	..	8,077
1998	3,081	2,228	1,511	1,849	..	8,669
1999	2,848	2,360	1,796	2,155	284	9,443
2000	2,881	2,552	1,825	2,184	358	9,800
2001	2,426	2,818	2,029	2,322	566	10,161
2002	2,162	2,968	2,097	2,493	814	10,534

by country. Table 11.5.5 gives indication of the number of cards equipped with different functions in EU countries.

There are major differences between the countries with regard to cashless payment methods. In Finland, Sweden and Austria, most payment transactions involve direct credit transfers, while cheques are

Table 11.5.5
Number of cards equipped with different functions[1] per 1,000 population and usage times per card in 2001.
Source: European Central Bank.

	Number of cards per 1,000 inhabitants				Cash withdrawals per card with a cash function and payments per card with a debit function			
	Cards with a cash function 2001	Cards with a debit function 2001	Cards with a credit function 2001	Cards with an e-money function 2001	Cards with a cash function 2001	Cards with a debit function 2001	Cards with a credit function 2001	Cards with an e-money function 2001
Netherlands	1,608	1,315	312	1,309	17	45	10	2
Belgium	1,360	1,217	296	831	16	37	20	7
Spain	1,281	1,256	441	244	13	7	15	0
Ireland	835	234	453	..	44	48	42	..
United Kingdom	2,124	906	936	..	17	51	31	..
Italy	394	370	345	..	25	20	16	..
Austria	1,120	956	252	884	12	14	17	1
Greece	654	413	379	..	22	0	10	..
Luxembourg	1,619	795	824	795	8	38	41	4
Portugal	1,287	1,287	316	346	27	40	77	1
France	711	652	..	5	27	92	..	9
Sweden	536	542	303	63	70	68	9	3
Germany	1,480	1,405	228	818	13	11	20	0
Finland	1,186	652	662	141	40	81	20	1
Denmark	686	594	93	117	..	143	29	12
EU[2]	1,194	928	434	484	21	38	22	3
Euro area[3]	1,040	950	324	508	20	33	20	3

1 Card equipped with several functions is recorded in the statistics by its functions, which means that one card is included in different columns in the table
2 Average without countries where data are not available
3 Average without countries where data are not available, includes Greece

Table 11.5.6
Distribution of cashless modes of payment in EU countries in 1997 and 2001, per cent of all payments.
Source: European Central Bank.

	Cheques		Payments by credit/ debit cards		Credit transfers		Direct debits		Card-based e-money	
	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001
Netherlands	2.8	0.2	22.9	32.4	46.0	38.2	28.1	28.2	0.3	1.0
Belgium	8.0	3.8	23.4	33.3	58.0	47.8	9.8	11.2	0.8	3.8
Spain	13.9	7.3	22.4	26.3	15.2	15.6	48.4	50.7	0.1	0.1
Ireland	61.3	30.1	4.5	39.7	16.6	13.0	17.6	17.1	..	..
United Kingdom	34.5	23.5	29.4	39.0	18.5	17.7	17.7	19.7	..	..
Italy	30.0	20.3	12.1	24.6	44.6	34.7	13.3	20.4	..	..
Austria	3.4	1.0	6.5	14.6	61.3	55.5	28.8	28.4	0.1	0.5
Greece	..	3.4	..	77.8	..	8.5	..	10.2	..	..
Luxembourg	1.0	0.1	92.3	61.5	..	27.5	6.7	8.2	..	2.7
Portugal	42.8	27.1	39.5	56.4	6.1	4.4	10.7	11.8	0.9	0.3
France	46.6	35.4	21.9	30.0	17.7	17.8	13.6	16.8	..	0.0
Sweden	2.0	0.1	18.6	33.4	72.3	58.2	7.1	8.2	..	0.1
Germany	5.7	2.3	4.6	11.3	47.1	49.8	42.6	36.4	..	0.2
Finland	0.4	0.1	35.3	41.7	59.6	53.1	3.4	5.1	0.0	0.1
Denmark	11.2	5.5	46.9	53.7	25.7	24.1	15.4	15.8	0.8	0.9
EU[1]	23.1	15.1	18.3	28.8	33.4	30.4	25.0	25.5	0.3	0.4
Euro area[2]	21.7	14.0	15.6	26.3	35.4	32.1	27.2	27.3	0.3	0.4

1 Average without countries where data are not available
2 Average without countries where data are not available, the 2001 figures include Greece

Table 11.5.7
Total number of cashless payments per inhabitant in EU countries in 1997–2001.
Source: European Central Bank.

	Total number of cashless payments per inhabitant				
	1997	1998	1999	2000	2001
Netherlands	147	159	169	180	193
Belgium	118	122	136	137	153
Spain	40	43	50	56	57
Ireland	54	59	85	78	76
United Kingdom	152	159	167	173	182
Italy	38	40	46	48	52
Austria	94	97	100	110	118
Greece	..	..	..	6	6
Luxembourg	..	74	83	93	103
Portugal	63	71	82	92	98
France	175	182	185	196	201
Sweden	103	105	120	128	135
Germany	139	151	164	162	170
Finland	150	160	171	185	183
Denmark	130	140	148	156	163
EU[1]	115	122	131	132	138
Euro area[2]	108	115	123	128	134

1 Average without countries where data are not available
2 Average without countries where data are not available, the 2001 figures include Greece

still the predominant instruments of payment in Ireland and France, for instance. The number of cashless payment transactions per capita has grown in the EU countries in the last few years. France had the highest number of transactions per capita in 2001, and the figure for Finland is well over the EU average.

The proportion of cash in circulation relative to GDP has declined in most EU countries in the last few years. In 2001, the proportion was the smallest in Finland and Luxembourg, at 1.9 per cent, and the largest in Spain, 6.6 per cent.

Table 11.5.8
Amount of money in circulation as a proportion of GDP in EU countries in 1997–2001. Source: European Central Bank.

	1997	1998	1999	2000	2001
Netherlands	5.2	4.8	4.6	4.2	2.1
Belgium	5.1	4.8	5.1	4.8	2.8
Spain	10.2	9.6	9.7	8.9	6.6
Ireland	4.5	4.2	4.4	4.4	3.3
United Kingdom	3.0	3.0	3.1	3.2	3.3
Italy	5.4	5.5	5.9	6.0	4.7
Austria	5.8	5.5	5.7	5.9	3.9
Greece	6.6	6.1	7.0	6.4	5.5
Luxembourg	2.9	3.5	3.0	1.9	1.9
Portugal	4.1	4.5	5.2	4.7	3.6
France	3.3	3.2	3.3	3.1	2.0
Sweden	4.1	4.1	4.3	4.2	4.5
Germany	6.7	6.4	6.6	6.2	3.3
Finland	2.3	2.1	2.3	2.2	1.9
Denmark	3.0	3.0	3.0	2.9	2.9
EU[1]	5.2	5.0	5.2	4.9	3.5
Euro area[2]	5.7	5.5	5.7	5.4	3.5

1 Average without countries where data are not available
2 Average without countries where data are not available, the 2001 figures include Greece

Sources

Advisory Committee for Information Society (2002), Kohti hallittua murrosta – julkiset palvelut uudella vuosituhannella, Julkisen hallinnon sähköisen asioinnin toimintaohjelma 2002–2003 (Towards controlled transition – public services in the new millennium, Public administration e-transactions action plan 2002–2003; in Finnish only), Helsinki

European Central Bank (2003), Payment and securities settlement systems in the European Union, Addendum incorporating 2001 figures (Blue Book, September 2003)

Finnish Bankers' Association (2003a), Payment Systems Statistics 1993–2002, www.pankkiyhdistys.fi/english/index.html

Finnish Bankers' Association (2003b), Information technology enhances the availability of banking services, Banking year 2002, www.pankkiyhdistys.fi/english/index.html

Finnish Bankers' Association (2003c), Nordic Banking Review, www.pankkiyhdistys.fi/english/index.html

Gallup Media (2002), Intermedia Survey 2002

Ministry of Education, A wide range of culture and quality information retrieval in the library, Finnish Library Policy Programme 2001–2004, Committee's report, Helsinki, www.minedu.fi/minedu/publications/librarypolicyprogramme.pdf

Ministry of Education, Finnish Public Libraries Statistics Database, www.tilastot.kirjastot.fi

Ministry of Finance (2003), Review on ICT within the Government of Finland 2002, Studies and Reviews 3/2003, Helsinki

Nordic Council of Ministers (2002), Nordic Statistical Yearbook 2002, Copenhagen

Nurmela J., Ylitalo M. (2003), The Evolution of the Information Society, Reviews 2003/3, Statistics Finland, Helsinki

Ruusula M. (2001), Palveleeko verkko kuntalaisia? Suomen kuntien verkkosivustojen laadullinen vertailu 2001 (Does the net serve the local resident? Qualitative comparison of web pages of Finnish municipalities 2001; in Finnish only), The Development Project for e-Government (JUNA), Helsinki

Statistics Finland (2002), Mass media 2002. Culture and mass media 2002:3, Helsinki.

Taloustutkimus Oy, Internet tracking, October-November 2002

Central Organisation of Finnish Film Producers

Finnish Book Publishers' Association

Finnish Games and Multimedia Association Figma

www.journalistiliitto.fi

www.sanomalehdet.fi

www.vm.fi

12 Finns and information and communications devices

- In spring 2003 around 90 per cent, or 3.5 million, of Finns aged 15–74 used the mobile phone. Forty-five per cent of the women and 35 per cent of the men users were sending text messages daily.
- In spring 2003, 57 per cent of households had a home PC and 47 per cent of them were connected to the Internet. In spring 2001 the corresponding figures were 51 per cent and 37 per cent, respectively. The equipment stock of households has thus increased relatively little.
- In spring 2003 three in four people aged 15–74 had used a PC and two-thirds the Internet during the three months prior to the survey.
- For the time being email is the commonest purpose for which the Internet is used. In addition to email the Internet is used most for information search and electronic banking.
- Consumers still shop relatively little online. In spring 2003, around 14 per cent of people aged 15–74 had purchased something over the Internet, with books and magazines the most purchased items.

12.1 Introduction

This Chapter describes how the use of information and communications technologies, or ICTs, has changed in Finland from 1996 through to 2002. Those six years marked a period of intense growth both in the national economy and in the adoption of ICTs. Now that the pace of growth has slowed down somewhat, it is an opportune moment to take stock: What kind of an information society has unfolded in Finland during these years of rapid growth and expansion? Two related reports were published in 2003, one entitled "A Great Migration to the Information Society" in the early part of the year and another one called "The Evolution of the Information Society" in later summer, which study the changes from many perspectives. Some of the main findings from these two publications, among other things, have been gathered into this Chapter. The beginning of the Chapter analyses the angles from which the development of the information society, or more precisely the adoption and usage of ICTs, can be examined and interpreted.

12.1.1 Frame of reference and baseline situation

The general background or frame of reference is provided by a) the impacts of socio-demographic structures, b) innovation diffusion theory, c) the trickle down phenomenon, d) the perspective of marginalisation and e) the three basic factors of ICT use: access, skills and motivation. ICTs are approached and studied as means of social interaction. This has crucial implications for the interpretation of change, for most new technologies and new services are geared precisely to resolving the problem of human contact, i.e. to freeing interaction from the constraints of time and place and to moving it into a virtual space where contacts no longer are face to face.

Socio-demographic structures and stage of life cycle affect the use of ICTs in various different ways. At least in industrial countries household size and the age of children are clearly associated with whether or not households have a PC and Internet connection. In Finland, the main decision factor in one and two person households is whether the household members are of working age or retired. Young small households have been much keener to buy new technology than older small households.

The evolution of the information society depends in one crucial respect upon the rate of ICT adoption. Among people who have begun to use ICTs, age group differences at least in basic uses seem to have narrowed down quite rapidly. Differences in service use are explained by the nature of the services and their intentional segmentation. For instance, the needs for interaction are very different in the life situations of young people and pensioners. Young people are keen to establish new contacts; pensioners are more concerned to maintain existing ones.

In a country like Finland that is highly egalitarian both in terms of income distribution and ideology, neither the innovation diffusion theory nor the trickle down model, in their traditional form, provide very useful tools for monitoring the spread of new technologies. Here, technical innovations proliferate via multiple routes that are not dependent on income level, education or socio-economic group. However, when coupled with the concept of saturation, these theories do open up a useful perspective on future trends in development, or paths of change, if we compare the rate at which innovations are adopted in different population groups. The regional diffusion of innovations is examined in the urban-rural dimension or according to the division into EU support areas in the late 1990s.

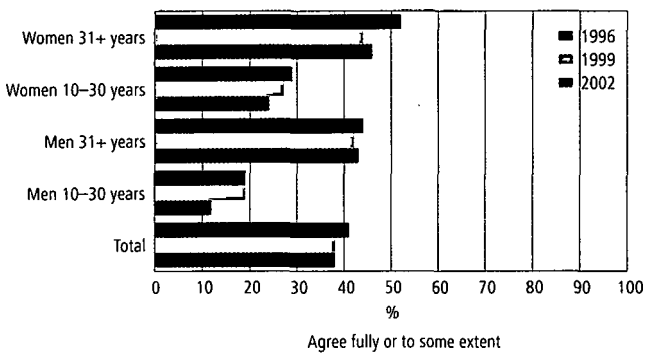
There has been much commentary about marginalisation or exclusion from the information society and the digital divide, but very little critical analysis. No one, it seems, is interested in asking the key question of exclusion from what? The same goes for the question as to

whose problem this really is, the individual citizen's or the multinational network operator's? It is clear that the more widespread ICT and Internet use become, the greater is the risk that producers of various social services begin to take it for granted that people have access to the Internet (and email). If they do that and ignore their other customers, then the standard of service provided over the phone or over the counter may well suffer.

The concepts of access, skills and motivation have provided a useful vantage-point for our empirical investigation into ICT use. The "measurement" of access and skills has succeeded reasonably well, whereas the study of motivation is clearly a somewhat more complex task. It is nonetheless important, for as well as involving aspects of the individual's motivation it also has a bearing on the motivation of other people to have interaction with that individual.

Attitudes towards the information society associate closely with the factors that motivate people to adopt and use new IC technologies. In the light of our results it seems clear that at least in Finland attitudes will not be presenting any obstacle to the increased use of ICTs. There is no widespread or profound sense of being overwhelmed by the advances in information technology; only among pensioners are there larger numbers of those who feel they are being left out. In the age group 35–59, there were quite a few who felt they had been left out. This is probably a group that would benefit from guidance and training, insofar as their sense of exclusion is due to their not having enough experience of information technology.

Figure 12.1.1
Percentage share of respondents under and over 30 who agree fully or to some extent with the statement "I feel completely overwhelmed by the advance of new information technology" by gender in 1996, 1999 and 2002.
Source: The Evolution of the Information Society.



Diverse media have expressed concern about the information overflow and the stress it causes. This is not experienced by a vast majority of the Finns, although the proportion of those disagreeing with the statement in Figure 12.1.2 has risen slightly (from 10 to 20 per cent) from 1996 to 2002. The picture conveyed by the media does not seem to agree with the Finns' own experiences.

Attitudes in Finland are clearly at variance with the direction in which people would like to see information technology develop because the vast majority still prefer to run their errands over the phone

Figure 12.1.2
Percentage share of respondents under and over 30 who agree fully or to some extent with the statement "I am not bothered by the information overflow" by gender in 1996, 1999 and 2002.
Source: The Evolution of the Information Society.

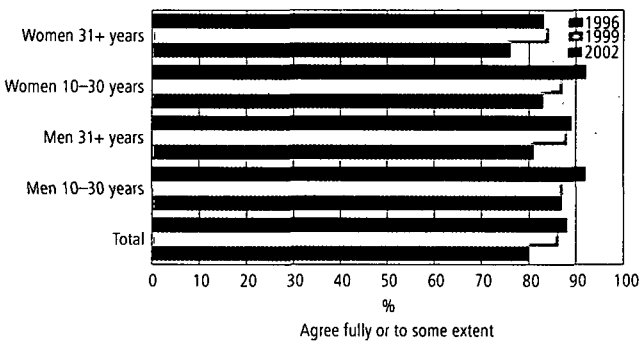
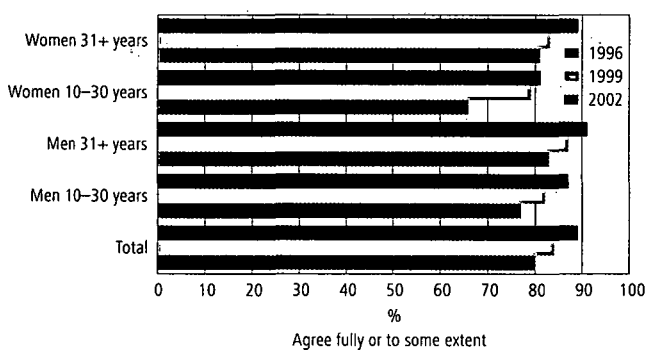


Figure 12.1.3
Percentage share of respondents under and over 30 who agree fully or to some extent with the statement "I prefer to run my errands by phone rather than by mail or computer" by gender in 1996, 1999 and 2002.
Source: The Evolution of the Information Society.



– yet at the same time product development seems to be moving in the opposite direction.

Overall, the attitude climate in Finland, as it has been measured here, provides a sound basis for the development and broader adoption of new ICTs. People are prepared to try out new innovations, but they have their feet firmly on the ground. As far as they are concerned, new technology is a servant, not a master.

12.1.2 Defining the information society

Although the direct translation of the Finnish term used for the change that is characterised by growing use of information and communication technology would be knowledge society, rather than information society, it nevertheless refers to the processing of information with the help of technology. A more fitting expression of what is analysed in both this and other reports on the "Finns and the Future Information Society" project would be information technology society.

In a very simplistic description, the development of ICTs has brought at least the following new opportunities for us who live in modern information societies: a) we can do more things today that used to be very difficult or time-consuming, such as classify, organise, describe; b) we can do things more efficiently than before, such as edit or do calculations; c) we can do things we have never done before, such as register www addresses or set up firewalls; d) we can do things that new equipment have made possible, such as use mobile phones and SMS messaging services; and e) we can do things in completely new ways, such as shop online and engage in new DIY activities.

It is important for us to follow and monitor how these phenomena change over time in order that we can provide an accurate assessment of the social impacts of new ICTs. Innovation diffusion theories are hardly very helpful in that they merely provide a description of how the various phenomena have proliferated. "Early adopters" and "stragglers" carry no real explanatory power if they are not logically connected to people's day-to-day activity and their socio-demographic characteristics. It remains for research and ultimately for politics to decide how much movement is needed before it is legitimate to conclude that the step into something new has been taken. How large a fraction of the Finnish population should be using and mastering new ICTs and for how large a share of the national economy should the information sector account in order that we can legitimately conclude that we have made the move to the information (technology) society?

12.1.3 What are the hallmarks of a good information society

In February 2003 the Finnish Ministry of Transport and Communications hosted an afternoon seminar under the title Information society – a life-buoy for the welfare state, where it released its latest future outlook "Challenges for Information Society Policy 2003–2007". A talk by Doctor Ilkka Tuomi, who has a job at the EU studying information society development, touched upon the unfolding of the information society in many ways. Some of the concepts and definitions drawn from his talk are very useful for anyone who is interested in the bigger picture: they help to see the wood from the trees in the debate about the information society.

An efficient and just information society

Doctor Tuomi was chiefly concerned in his talk with the question of how to define an efficient and just information society. He set out from a statement by Amertya Sen in Development of Freedom (1999): "When people get more freedom of choice with important life decisions, welfare moves forward." Indeed according to Tuomi, we ought to focus not on incomes and income differentials, but on opportunities and freedoms of choice and on differences along that axis.

The five freedoms of development

Doctor Tuomi identified five key freedoms of (economic) development: a) the freedom of political participation, b) access to economic resources, c) opportunities for social interaction (e.g. access to education and health care and a socially respected life), d) social transparency and e) basic security. According to Tuomi the changes unfolding in the information society should be judged and assessed in relation to these freedoms. It is for this reason that the development of the information society cannot be reduced simply to the growing number of Internet connections, PCs or mobile phones, or to growing GDP figures.

In an efficient and just information society, Tuomi maintains, information and communications technologies have an impact on all the five freedoms of development.

a) Changes in the processes of opinion formation and value harmonisation imply a political transformation in the information society because the Internet and new media are changing the forms of political participation and action. One example is provided by election simulator machines.
b) With the changes taking place in the economy and in resource allocation, the information society is globalised and the economy infor-

mationalised. All action becomes increasingly internationalised and information becomes an important production factor.

c) As opportunities for social interaction change, community and communication are transformed. This is neatly captured in the comment that in a sense, mobile phones create a telepathic community (Linturi 2003).

d) The conditions for social transparency are changing: We have more and more information about what is happening all around the world. The world is becoming ever more complex. Even though we can plan our actions in relation to what other people are doing and in relation to other events, the range of potentially significant issues is expanding faster than our ability to process the relevant information. Out of this grows a new balance between increasing transparency and growing complexity.

e) The production of basic security and access to services can be reorganised: for instance, information technology can be used to automate bureaucratic processes. New kinds of risks are also created in the information society that may threaten people's life and their scope of action. At the same time as opportunities for action expand in the information society, it is also necessary to define new responsibilities. A simple example is provided by responsibility for misleading information deliberately released through data networks (manipulation of stock prices, rights related to digital identity, etc.). Out of these changes grows a new balance of risks and responsibilities.

In this Chapter we describe different ways of approaching and defining the information society. We have quite consciously excluded definitions that are anchored to the meaning of knowledge itself, because that aspect is not covered in the empirical part of the report at all.

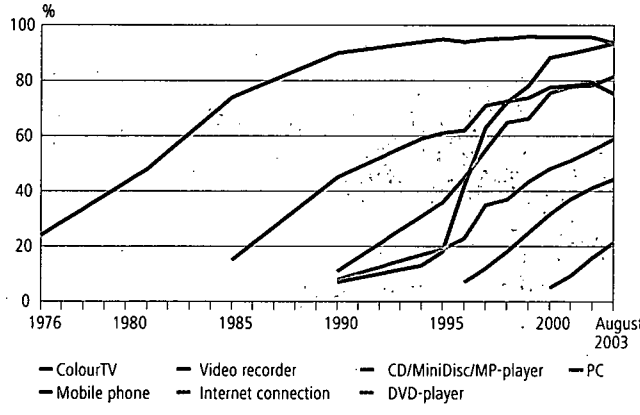
The following Sections assess the levels at which the use of ICTs has settled in different areas of life and how "ready" the Finnish information society is by comparing it with the development in other countries in respect of certain central aspects.

12.2 Increasing use of ICTs in households in 1996–2002

12.2.1 The long cycle of increasing ICT use in households

This Section starts with a general Figure depicting the long-term trends in ICT use and comparing these figures with those for other traditional household appliances. Figure 12.2.1 shows that the increase in the number of home PCs and Internet connections has not accelerated to

Figure 12.2.1
The penetration of certain household appliances until august 2003, per cent (at least one appliance).
Source: Statistics Finland, Consumer Survey.



any significant extent, although the proportion of home PCs with Internet access is growing slightly faster than the total number of home PCs. As far as mobile phones are concerned it seems that saturation point has more or less been reached. Less than 10 per cent of households have decided to make do with a land line telephone only. Today, virtually every household in Finland has some telephone. It is noteworthy that over 30 per cent of households only have a mobile phone.

12.2.2 Increasing use of ICTs in different types of households in 1996–2002

In spring 2003, 57 per cent of households in Finland had a home PC and 47 per cent of these were connected to the Internet. Over a year the proportion of such households had grown by 2 to 3 percentage points. The larger the household, the more likely it is to have a PC and an Internet access. Almost all, or 92 per cent, of households of five persons or more have a home PC. In 1996, at the early stage of the penetration of home PCs, there were still equal proportions of one person and 2–3 person households among the early adopters of home Internet use, but since 1999 household size has been correlating direct with the proportion of those having acquired home access to the Internet. Whereas 30 per cent of one person households are today connected to the Internet, the proportion among households of more than five persons is 81 per cent.

Figure 12.2.2
Households with a PC or Internet access, per cent by household size in autumn 1996, 1999 and 2001 and spring 2002 and 2003 (at least one appliance).
Source: Statistics Finland, The Finns and the Future Information Society reports 1996 and 1999, Consumer Survey 2001 and Internet Commerce Surveys in 2002 and 2003.

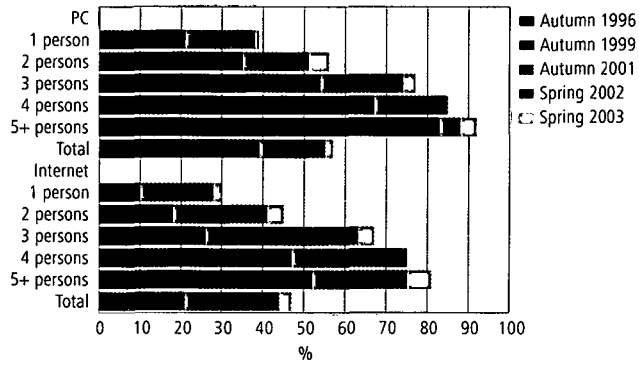
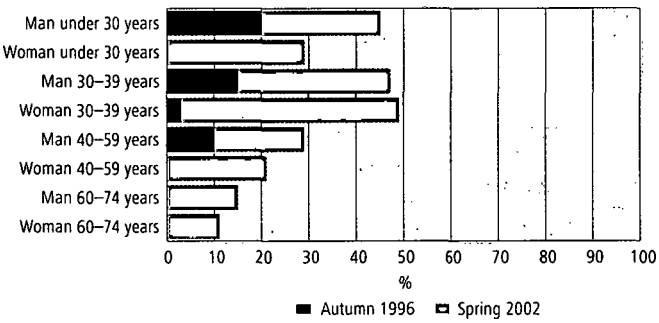


Figure 12.2.2 describes the increasing penetration rates over time from left to right. In all size categories the proportions of households that have acquired a PC and Internet connection has increased, but in most cases the growth rates have slowed down: during the past 12 months the figures are less than half those recorded for 1999–2001. In 2002, the share of two person households that acquired a PC and Internet connection grew somewhat faster than that for other households. The differences between family households of different sizes are less pronounced than previously: even in three person households the standard of equipment is catching up with the level of larger households. This is explained not only by purchases of new equipment, but also by children leaving many households that formerly had four or five members. In a way, a family will hold on to its PC and network connection until the last child is grown up and moves away from home, at which stage we get a new two person households with or without a PC.

CD-ROM drives are still more common than Internet connections in all households. In this light it might well be suggested that the public authorities should give serious consideration to using CDs for the purposes of information dissemination. Earlier reports have also discussed the penetration of printers: this PC peripheral provides a useful tool for the presentation and distribution of written and other products. In recent years the prices of (colour) bubblejet printers in particular have fallen dramatically, and older models can be obtained very cheaply. In

Figure 12.2.3
One person households with Internet access, per cent by age and gender in autumn 1996 and in spring 2002.
Source: Statistics Finland, A Great Migration to the Information Society.

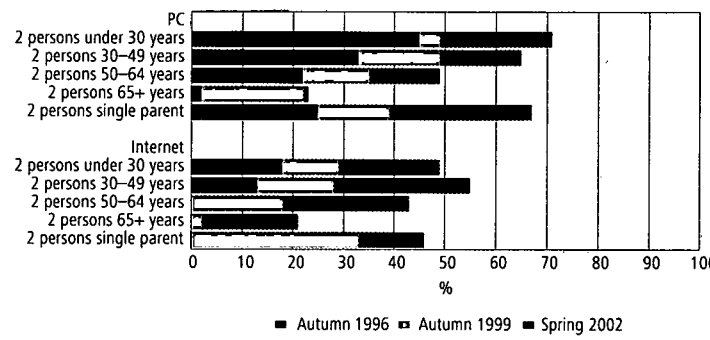


one person households 75 per cent have a printer connected to their PC, in three person or larger households the figure is around 85 per cent. As these figures have hardly grown since 1999, we might conclude that not all users have a real need for printers at home, but they are content with the other features of their PC and the Internet.

Let us next go on to examine one of the most important indicators of information society development, that is, Internet access from home. In this regard Figure 12.2.3, together with the previous Figure, produce some quite interesting findings. Even women aged 30–39 and living alone had access to the Internet more often than men under 30. All in all the increase in Internet connections was faster among female than male households. In spring 2002, the relative number of PCs not connected to the Internet was highest of all in households of young men, although in 1996 they recorded by far the highest frequency of connections. These results draw our attention to the motives for taking out an Internet subscription.

The Figures above have corroborated the results of earlier research that two person households differ markedly from one person households in terms of the ICT equipment they own, and also that they are beginning to approximate the standard of equipment seen in family households. Let us next study the growth rates of equipment acquisitions within this group (Figure 12.2.4). The number of PCs has increased in all the examined types of two person households, and especially in single parent households. Otherwise it seems that the group differences have remained, even though they have diminished to some extent. The youngest couples do not have the largest number of

Figure 12.2.4
Two person households with a PC and Internet access in autumn 1996 and 1999 and in spring 2002, per cent by type of household.
Source: Statistics Finland, A Great Migration to the Information Society.



Internet connections. The number of Internet connections was around 10 percentage points higher in two person households than in one person households. In single parent households Internet penetration is only slightly lower than in two person households in the age bracket of under 50, but is clearly lower than in family households.

Our above comparison of households of different sizes and at different stages of the family life-cycle has shown that PC ownership and Internet access has grown most particularly among women. It seems that right now, men and young consumers are in fact less interested in getting online than middle-aged women are. The differences between family households remain minor. Looking at how the number of households that have purchased a PC and subscribed to the Internet has increased over the past six years, there are good grounds to argue that the concerns voiced about digital marginalisation are probably unfounded, at least as far as hardware access is concerned.

12.2.3 Regional differences in household ICT equipment: changes 1996–2002

We conclude this Section on household ICT equipment with an examination of regional differences based upon EU target areas in the late 1990s. This provides a useful vantage-point for monitoring trends in development because it is reasonable to assume that it takes a few years for regional development efforts to begin to show results. The Figures below illustrate the diffusion of mobile phones, PCs and Internet access in EU target areas separately for 1–2 person households and households with at least three members.

Figure 12.2.5
Penetration of mobile phones by household size and EU target area in 1996, 1999 and 2002, per cent of households in area.
Source: Statistics Finland, A Great Migration to the Information Society.

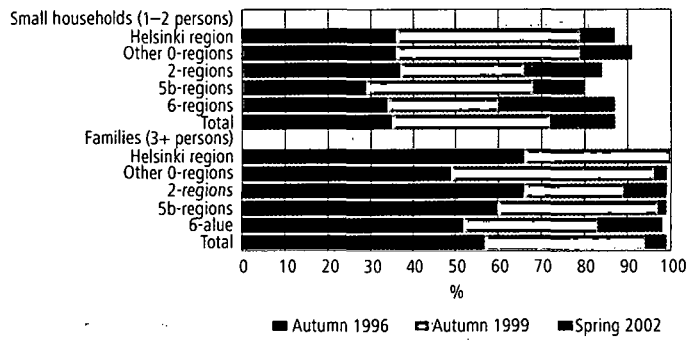
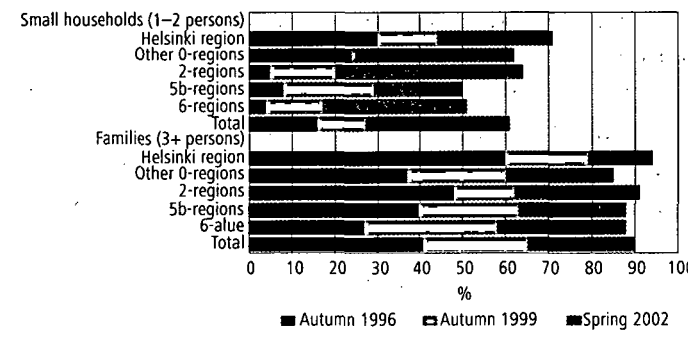
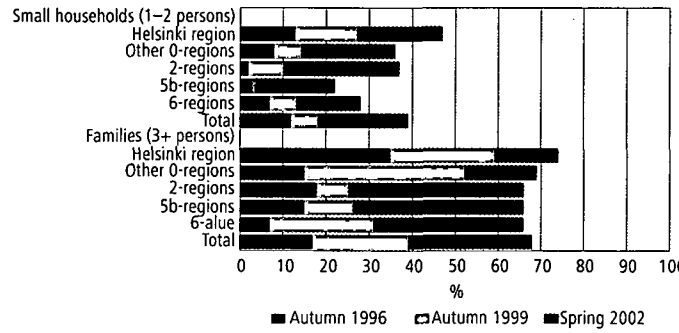


Figure 12.2.6
Penetration of PCs by household size and EU target area in 1996, 1999 and 2002, per cent of households in area.
Source: Statistics Finland, A Great Migration to the Information Society.



These Figures show, first of all, that regional differences have narrowed down. In households with at least three persons, there are hardly any differences at all. In one and two person households the diffusion of mobile phones has continued at the same rate in all regions. Given that even in the 5b regions as many as 80 per cent of all households have a mobile phone, there certainly are no grounds to talk about marginalisation. There are, by contrast, marked regional differences in the penetration of PCs and the Internet, although these differences are no doubt largely attributable to the high average age

Figure 12.2.7
Penetration of Internet access by household size and EU target area in 1996, 1999 and 2002, per cent of households in area.
Source: Statistics Finland, A Great Migration to the Information Society.



and lower income level of small households in remote regions. As we have shown earlier, elderly one and two person households had a PC and Internet access much less often than younger households. Viewed from the opposite angle, this means that in the metropolitan Helsinki region there are in relative terms more small households of younger people. When we further take into account the income differentials between different regions, it should be clear that the notion of "resistance to information society" hardly goes very far towards explaining the regional differences in the penetration of PCs and the Internet. Nonetheless there is cause for at least some concern about the development in 5b regions. Community centres are needed in these regions where older people can come and try out the services offered by the Internet.

12.3 The use of ICT innovations in Finland

This Secton describes the infiltration of new hardware and new services into people's everyday life in Finland. To what extent have various ICT innovations made their breakthrough in Finland, to what extent are they now in regular everyday use? Although the statistical reliability of our examination is to some extent affected by our decision to base the comparison upon five-year age groups, this does allow us to monitor more closely the progress of these innovations with advancing age.

12.3.1 The increasing use of mobile phones in Finland from 1996 to 2002

We start out at the individual level from the diffusion of mobile phones: the measure we use is that the respondent has a mobile phone in his or her own use, i.e. that the respondent is the principal user of the phone. First, though, a few words on the method of analysis, i.e. year of birth cohorts. Figure 12.3.1 shows how many people in the year of birth cohorts had a mobile phone in their own use in autumn 1996 and 1999 and in spring 2002. In other words, these are not the same people that were covered in the panel survey, but we have formed year of birth groups from the samples of each survey. The rationale behind this is the notion that people born in certain years face the changes and institutions of society at the same time, and largely in similar life situations. Secondly, this analysis provides added depth to our examination of innovation diffusion as it allows us to see how the adoption of the innovation progresses from the pioneering group (people born within a certain period) towards groups born earlier or later. The period of analysis that spans more than five years provides an excellent opportunity to monitor all the changes in the diffusion of the mobile phone innovation from early years through to the point of saturation.

Figure 12.3.1
Men with a mobile phone in their own use in 1996, 1999 and 2002, per cent of year of birth cohort.
Source: Statistics Finland; A Great Migration to the Information Society.

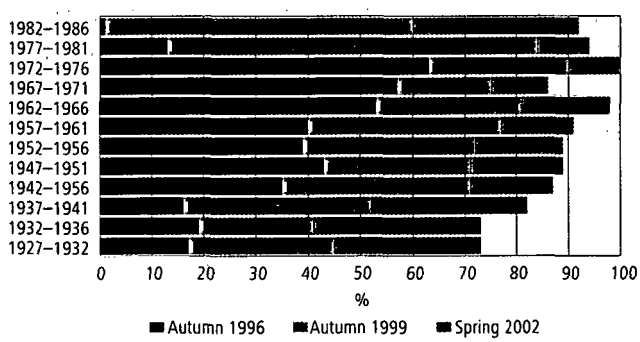
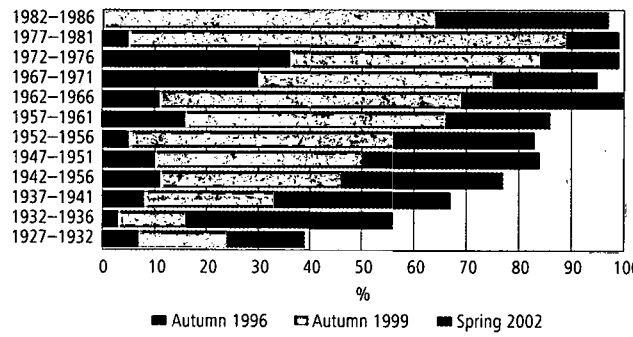


Figure 12.3.2
Women with a mobile phone in their own use in 1996, 1999 and 2002, per cent of year of birth cohort.
Source: Statistics Finland, A Great Migration to the Information Society.



In 1996 men in all age groups had a mobile phone in their own use much more often than women. People born in 1972–1976 were early adopters at the age of 20 to 24 years. Among men, over half had a mobile phone even in the two older five-year age groups. Among women the only groups where significant numbers had mobile phones of their own were those born in 1967–1976. At the time they were aged 20 to 29.

By 1999 the number of mobile phones had increased dramatically. In the age groups born in 1967–1986, women had by now at least as many mobile phones as men had. One particularly interesting observation is that over 80 per cent of women born in 1977–1981 had bought a mobile phone for their own use during these three years. Even among men, over 70 per cent in this age group got their own mobile phone during this same period. In 1999 ownership of mobile phones among women decreased steadily with advancing age, whereas among men there were marked differences between those born in 1952–1956 and those born in 1937–1941. These differences were visible even in 1996.

In 2002 almost all men and women in the five youngest year of birth cohorts had mobile phones in their own use. It remains unclear why a smaller proportion of those born in 1967–1971 (and this applies to men in particular) than in the age cohorts on either side had not got themselves a mobile phone by 2002, even though this group was in the vanguard of the mobile phone boom in 1996. In 2002 it seems that people born in 1942–1961 still have the same reasons and arguments for getting themselves a mobile phone as earlier. This means that the number of principal users is somewhat smaller than in youn-

ger age groups. In the oldest age groups ownership of a mobile phone was still higher among men than women. Given that the proportion of principal users of mobile phones has continued to show strong growth in older age groups from 1999 to 2002, it is safe to presume that the number of users will continue to grow in the future, reaching the 80 per cent mark possibly with the exception of women born before 1932.

As the mobile phone is now so extremely common, it might be justifiable to doubt whether everybody uses it actively. Table 12.3.1 shows mobile phone users by five-year age groups and the shares of those who use them daily for making calls or sending text messages, indicating the intensity of their use. The Table shows even more clearly the impact of age and gender indicated by the preceding Figures. The numbers of people who make calls and send text messages daily prove that the mobile phone is not an ornament or status symbol, but a very ordinary, everyday implement or tool. The fact that even in the 60–64 age group one person in two still make mobile calls daily indicates high motivation towards the use of the mobile phone. Fewer people send SMS messages daily, but their daily use is quite widespread among people under the age of 40. Women seem to have found more regular use for them than men. Men and women differ from each other in respect of their behaviour in social relationships. Women may be

Table 12.3.1
Mobile phone users, per cent of age group. Percentage shares of daily mobile phone users and people who send text messages daily by gender and age group in 2002. Source: Statistics Finland, The Evolution of the Information Society.

Age group	Mobile phone users %		Daily mobile phone users %		Mobile phone users who send text messages daily, %	
	Men	Women	Men	Women	Men	Women
10–14	74	75	74	76	47	62
15–19	97	99	89	91	54	79
20–24	97	100	91	89	62	77
25–29	97	99	92	92	63	66
30–34	95	96	89	88	55	58
35–39	94	93	87	86	31	55
40–44	87	88	88	87	21	45
45–49	88	87	84	78	28	36
50–54	89	78	83	66	20	20
55–59	89	74	78	47	27	11
60–64	85	70	52	50	6	13
65–69	70	66	45	42	0	0
70–74	57	47	21	29	0	0
75–80	62	22	43	42	0	0
81–93	27	6	17	0	0	0
Total	**86**	**78**	**79**	**75**	**35**	**45**

more regular users of text messages because they find them a more discreet or helpful medium for organising the everyday life.

In spring 2003 approximately 3.5 million people, or 90 per cent of the population aged 15–74 in Finland had a mobile phone in their own use and around 560,000 people, or 20 per cent of the age group concerned, and about 23 per cent of mobile phone users, reported that they were able to browse the www or WAP pages via their mobile phone. Men had twice as many (28%) mobile phones as women that could be used for accessing the Internet or WAP services.

In spring 2003, 93 per cent of men and 86 per cent of women in Finland had a mobile phone in their own use. In the age group of under 40, at the most only person in twenty did not own a mobile phone. After the age of forty men had slightly more mobile phones than women had. In the oldest age group this difference is already considerable: 80 per cent of men aged 60–74 but only 58 per cent of women of the same age own a mobile phone.

Interest in mobile phone services

The mobile phone is said to offer an extremely wide range of different uses, especially since the dawn of wireless Internet connections. Against this background it is useful to study Table 12.3.2, which describes people's interest in mobile phone services in 1999 and 2002.

The figures in the table above do not make for very inspiring reading for developers of new services: mobile phone users both under and over 30 are more dubious about all the new services listed in the table in 2002 than they were in 1999. The three services that might have the best chances of success are those that provide route directions out

Table 12.3.2
Percentage share of respondents indicating little or no interest in new mobile phone services by age group in 1999 and 2002.
Source: Statistics Finland, The Evolution of the Information Society.

Type of mobile phone service	10–30 years		+ 31 years	
	1999	2002	1999	2002
Browsing web pages	36	54	70	82
Banking by mobile phone	36	50	59	64
Shopping by mobile phone	74	75	88	91
Paying goods by mobile phone at the time of ordering	68	72	86	85
Opening e-mail by mobile phone	26	43	51	67
Receiving letters in electronic format by mobile phone	46	64	68	78
Notification of postal package arrival on mobile phone	22	31	46	51
Reminder of date due for library books	36	38	57	57
Route directions in home town	..	60	..	73
Route directions in a foreign town	..	33	..	44

of town; that remind users about the due return dates for their library books; and that provide notification of the arrival of a postal package. At the end of the day consumer demand will depend upon the pricing of these services. There might be some prospects for downloading email by mobile phone and for banking by mobile phone, whereas people are certainly not interested in using their mobiles for shopping.

Internet or WAP connections through mobile phones have not met with a very enthusiastic reception even among younger consumers. There are no regional differences in the numbers that have acquired such a phone. Only around 20 per cent own a mobile phone that can be used for accessing the Internet or WAP pages. Changing of mobile phones to newer models is likely to be relatively lively in the next two to three years, and we will then get an answer to the question of whether the usages of the mobile phone will also be extended to the accessing of the Internet. Our earlier panel survey showed that the routine of the mobile phone use is quickly established, and changes slowly. Admittedly, even those who did not use text messages before now use them routinely, but the motivation required in the adoption of services based on browsing is likely to be different from that needed in the adoption of text messaging.

When we study how different "mobile extras" have been accepted as part of everyday life and spending, the result is at variance with the theory of regional innovation diffusion. Against feasible assumption, the metropolitan Helsinki region does not have the highest figures for downloading ringing tones or logos, and the same applies to the use of charged SMS services. It may be that these fads will simply whither away once the novelty value wears off. The only group of mobile phone users where these extras have been taken into regular use is the age group of 15–29. In older age groups where income would probably be a less restrictive factor, these extras have not gained popularity beyond a small group of experimenters. Very few people pay for services or commodities by their mobile phone. This is of course largely explained by the fact that there are still very few goods that can be paid for via the mobile phone in the first place.

In spring 2003 only less than one-quarter of mobile phone users had used SMS services that would be charged direct on their telephone bill, such news, weather information, share prices or dictionaries. The share was almost unchanged from before. Roughly six per cent had used their mobile phone to order or purchase public transport tickets, parking fees, soft drinks, car wash services, golf balls or the like that are charged on the telephone bill. Their share was already at this level in spring 2002.

Motives for mobile phone use

The factors that might explain the phenomenally rapid penetration of the mobile phone can also be studied with attitudes to statements. In 2002 a total of five statements were presented to Leisure Survey respondents that were designed to measure the significance of the mobile phone in social interaction and other areas of life. There was a broad consensus of opinion on the statement that "The mobile phone increases safety": two-thirds of all respondents fully agreed with this statement in 2002. Women agreed with it more often than men, and older respondents agreed more often than younger respondents. Even half of the age group of 10–29 fully agreed with this statement. There were no marked regional variations in opinions on this item. It is also noteworthy that people living in the metropolitan Helsinki region did not stress the security argument more than people living elsewhere: it seems that the mobile phone increases people's sense of security regardless of where they live.

The statement that "The mobile phone is an indispensable means of communication for our family" met with almost the same level of agreement: 60 per cent of mobile phone users in households with two or more members said they fully agreed with this statement. Women aged 10–30 agreed fully more often than did men in this age bracket, there were no gender differences among middle-aged (30–54 years) men and women. In the age group of over 55 men regarded the mobile phone as a more important means of communication than did women. This is no doubt partly attributable to the fact that in this age group a larger proportion of men have their own mobile phone.

Almost half of the respondents fully agreed and 30 per cent agreed to some extent with the statement that "The mobile phone is an indispensable means of communication in the circle of my friends". As expected, young people widely agreed with this statement, but even in the age group of over 55 more than 60 per cent agreed fully or to some extent.

The next statement, "I learn about interesting events through the mobile phone", was designed to measure the significance of the mobile phone as a source of information about spontaneous events. In the youngest age group (10–29 years), around 60 per cent agreed with this statement fully or to some extent. In other age groups the mobile phone had clearly been less useful for these kinds of purposes.

It is not unusual to hear people complain that the mobile phone is a source of stress because it means one is always reachable. The statement that "I preserve and protect my leisure time by switching off my mobile" provides at least an indirect measure of how people in Finland

respect their privacy in relation to being reachable. The majority of the respondents disagreed with this statement. The proportions who disagreed were highest in the population aged 55 or over (46%) and lowest in the age group of 10–29 (35%).

Judging by the attitudes to the statements above, there seems to be a very strong perceived need for mobile phone use. The majority of people in Finland feel that the mobile phone answers their security needs as well as their needs for social interaction. It is no doubt for these reasons that it has become something of a ubiquitous appliance, not only in Finland but in many other countries as well. The same trend looks set to continue in the future as well, after all the mobile way of life is also becoming more and more common.

Over the past six years the mobile phone has become a virtually omnipresent means of communication and interaction in Finland; almost everyone has a mobile phone. The motives for mobile phone use lie clearly in such basic needs, as well as in the need for security, interaction, etc. No doubt people have different reasons for using their mobiles, but it seems the popularity of the mobile phone lies in the benefits it can offer to people in different life situations. It supports and facilitates social contact like no other means of communication we have had before. Perhaps the mobile phone has provided an answer to people's longing for human contact. The only way we can explain the rapid proliferation of the mobile phone (wherever it is financially possible), is by reference to social interaction. Whether we will eventually see other, charged services with mass appeal develop on top of these deeper motives, is too early to tell.

12.3.2 Use of PCs and the Internet by year of birth cohort

The data from different interview surveys on the use of PCs and the Internet are not equally comparable as those on the use of mobile phones. Nonetheless it is useful to try and trace the diffusion of these innovations by five year age groups formed on the basis of year of birth. The comparison is restricted to the period from 1996 to 2002.

We begin by looking at how the use of PCs has increased in these year of birth cohorts. The proportion of women who in 1996 used a PC was the same or slightly higher than the corresponding proportion of men up to the age cohort born in 1937–1941. By 2002, women's use of PCs had increased to a somewhat greater extent than men's. Among men, those born in 1972–1976 had begun using PCs very actively during the period under review. By the year 2002, the share of male PC users declines rather steadily with advancing age, but among women there are sudden jumps in the proportions of users. The first

occurs for the 1975 year of birth cohort, the second for the 1956 cohort and the third for the 1947 cohort. At least so far it seems that only a small proportion of the age group have found incentives for using a PC in retirement age. The increases in the proportions of PC users among those in retirement during the period under review has been quite marginal. With time the use of PCs by pensioners will obviously increase as people who are now in active employment reach retirement age.

Internet use has grown almost as rapidly as the use of mobile phones. In particular, the number of women Internet users has shown quite phenomenal growth. Although part of this is no doubt explained

Figure 12.3.3
Men who have used the Internet somewhere in 1996 and 2002, per cent of year of birth cohort.
Source: Statistics Finland, A Great Migration to the Information Society.

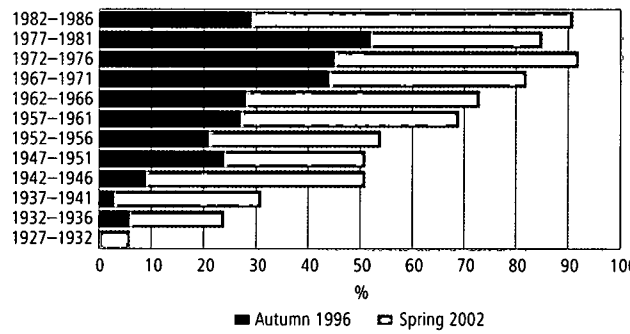
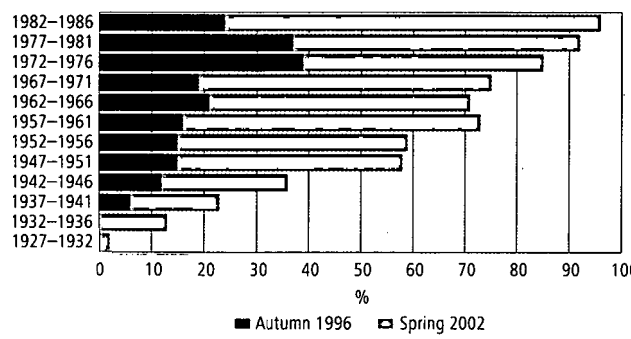


Figure 12.3.4
Women who have used the Internet somewhere in 1996 and 2002, per cent of year of birth cohort.
Source: Statistics Finland, A Great Migration to the Information Society.



by PC use at work, women's increased interest in home use is certainly a major factor here. In the youngest year of birth cohorts virtually all people used the Internet. As in other aspects of technology, men born before 1942 were clearly more active than women in terms of Internet use. In all other age groups women showed the same level of interest as men.

12.3.3 Use of PCs and the Internet in spring 2003

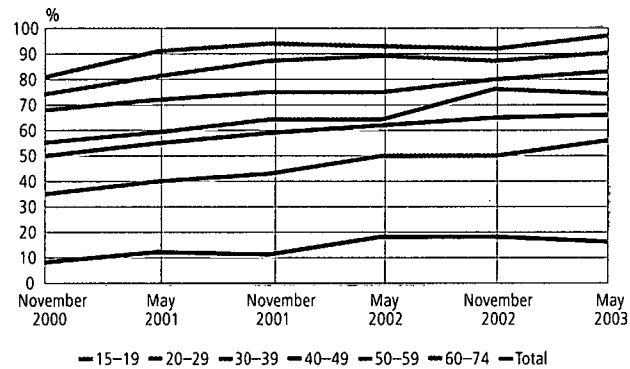
In early spring 2003 the proportion of those having used a PC recently was quite high, for three out of four people aged 15–74 had used a computer somewhere during the three months prior to the survey. Almost all young men and women had used the computer. The use declines with age. Men's proportion was only clearly higher than women's in the group of those aged over 60. As there has been hardly any change in the percentage shares since 2002 it may be that the use of ICTs is approaching its final level, although it will probably still go up slowly because many of the people who are now in active employment will continue using a PC even after retirement.

Approximately 2.6 million people, or 66 per cent of the population aged 15–74 in Finland had a PC at home. In twelve months their number has grown by 130,000 persons, or three percentage points. Among them, 55 per cent of men and 36 per cent of women were daily PC users. Given that four in five of them used their PC at least weekly, ICT has clearly become an established part of home life. Nevertheless there are still those among both women and men who never go near the PC, which has obviously been acquired for other members of the household (Table 12.3.3).

According to interviews conducted in spring 2003, over 2.6 million people, or 66 per cent of the population aged 15–74 in Finland had used the Internet in the past three months. Sixty-eight per cent of men and 64 per cent of women were Internet users. In twelve months their number had grown by almost 150,000 persons, or 4 percentage points and since November 2002 by 60,000 persons. Among the population aged 15–74, approximately 1,332,000 men and 1,255,000 women had used the Internet. When asked about Internet use in the twelve month prior to the interview the number of users went up by just 130,000 persons, or five percentage points. As with the PC, use of the Internet declines with age among both men and women. The age groups in which the proportions had grown most since 2002 were those of 30–39 and 40–49 years.

Since November 2000, the share of Internet users grew steadily for 12 months in all other age groups except that of people aged 60–74 (Figure 12.3.5). The interest in the Internet of people exiting or hav-

Figure 12.3.5
Internet use during the past three months by age groups, November 2000 – May 2003. Source: Statistics Finland, Internet Commerce Survey.



ing exited working life is not evident in the reporting of experience in its use and the total number of Internet users among women aged 60–74 had even declined.

Approximately 55 per cent of the people having used the Internet had spent no more than two hours per week of their free time doing it. Just under one-fifth, two-thirds of them men, said they had used the Internet for over five hours per week during their free time.

In spring 2003 more than half (56%) of those in the age group 15–74 had an Internet connection at home. Sixty per cent of men and 53 per cent of women were able to use the Internet at home. The Internet was accessed from home more frequently than in the year before. Whereas in 2002, this was done daily by one in five of those with a home connection, the share had now risen to 40 per cent, and with men to almost 50 per cent. The shares of those using the home connection weekly were 75 per cent among men and 63 per cent among women. Although the possibility for home use existed, one in five did not use it (Table 12.3.3). It seems that the free time use of the Internet is growing faster than the home use of the PC. The conclusion that could be drawn from this is that in the next few years the disparity between the shares of home users of PC and Internet will contract to less than half of what it is today.

In almost all age groups, Internet use is most common in the metropolitan Helsinki region and least common in rural municipalities. Almost all in the 15–19 age group use the Internet irrespective of where

Table 12.3.3
Use of PC and Internet at home in spring 2003, per cent.
Source: Statistics Finland, Internet Commerce Survey, spring 2003.

Use of PC	Per cent of those who have PC at home					15–74 years	
	Daily	Weekly	Monthly	Less often	Never	PC	Total
Men	55	25	5	3	11	1,323,909	1,958,000
Women	36	32	10	6	16	1,281,434	1,966,000
Total	46	28	8	5	13	2,605,343	3,924,000

Use of Internet	Per cent of those who have Internet at home					15–74 years	
	Daily	Weekly	Monthly	Less often	Never	Internet	Total
Men	49	26	5	3	17	1,166,000	1,958,000
Women	30	33	9	5	22	1,036,000	1,966,000
Total	40	29	7	4	20	2,202,000	3,924,000

they live, whereas there are considerable differences in this among people aged over 60 (Figure 12.3.6). People in the 20–29 age group and living in rural areas use the Internet clearly less than people in other areas, and the use among people aged 30–39 and living in towns of less than 100,000 population fails to rise above the level of use in rural areas. From the age of 50 onwards, there are differences between the metropolitan Helsinki region and other large cities in the use of the Internet, but this difference in the shares of Internet users has contracted from the year before. Over the year, the shares of users have also grown in other areas except the metropolitan Helsinki region[1]. It may be that the growth in the share of Internet users will come to a halt in a couple of years in other areas, too. Much depends on the attitudes of people aged over 60 to the PC and Internet.

In spring 2003, approximately 2.2 million people, or 56 per cent of the population aged 15–74 had their own email address. There was no change from the year before in either the number or the proportion of people in this age group who can be contacted by email. Sixty-one per cent of the people with an email address use it daily, whereas their share in the year before was 54 per cent. Weekly users of email make up 85 per cent of all those with an own email address, while in the previous year four out of five of them used their email at least once a week. Like PC and Internet use, communication by email looks set to become a regular everyday activity.

While 79 per cent of people in the 15–19 age group have their own personal email addresses, this is the case with 60 per cent in the 40–49

1 Nurmela J., Parjo L. and Ylitalo M. (2003).

Figure 12.3.6
Internet use by age and region in spring 2003.
Source: Statistics Finland, Internet Commerce Survey, spring 2003.

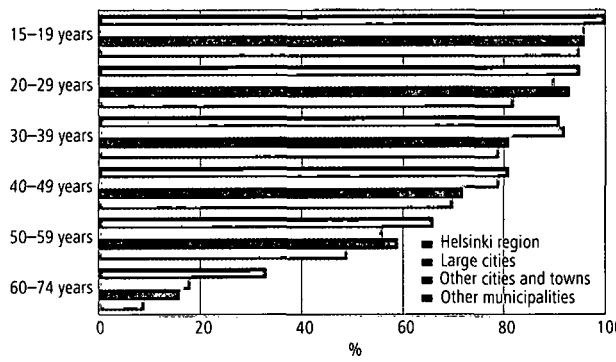


Table 12.3.4
Email address by gender and age in spring 2003, per cent.
Source: Statistics Finland, Internet Commerce Survey, spring 2003.

	Own email address, %						
	15–19	20–29	30–39	40–49	50–59	60–74	Total
Men	77	73	72	59	51	20	57
Women	81	81	68	62	49	10	55
Total	**79**	**77**	**70**	**60**	**50**	**15**	**56**

age group and with only 15 per cent in the 65–74 age group. Daily use of personal email is commonest among people aged 30–49 (68%), whereas only 40 per cent in the 15–19 age group used their email daily and even in the 60–74 age group more than one-third use their email every day.

Email the most common use of the Internet

The most common use of the Internet – whether personal or related to studying or work – was email. Other communication purposes, such as chatting, telephoning or video conferencing were much less common. Two million people in the 15–74 age group, or four out of five Internet users, browsed the Internet for product information or made actual purchases via it.

Banking services via the Internet were used by 1.7 million people in the 15–74 age bracket, or 66 per cent of the people in this age group who used the Internet. More than half of the respondents had communicated with public authorities, or at least browsed information about their services on the Internet. Travel-related use of web pages is

strikingly high. There has been a clear increase lately in the share of people who have made purchases connected with travel[2]. In addition to banking services, it seems that the self-service principle is increasingly being applied to travel services and products, as well. Reservations and purchases of tickets for diverse public events is also fast moving into the Internet. Use of ecommerce will probably also affect the organisation of work at mail order houses, because many respondents report that they today place their orders for mail order goods via the Internet instead of telephoning or sending them by post. About every fourth respondent said they had used the Internet to purchase or order goods or services and roughly eight per cent had sold something themselves via second hand goods or auction sites. However, considering the entire retail trade sector, browsing the Internet for product information has probably the greatest impact on product selections and purchase decisions. It is likely to become more and more difficult to make novelties into hit products without having www pages, as a good number of potential buyers are certain to search the Internet for more detailed information than they get from an advertisement. There are no published studies into this, but the need for them would seem obvious. It may be that the Internet will make consumers into "new generation kings" who first establish facts about products and services and only make acquisitions once they have done this. The ease of Internet use offers good possibilities for this. (Table 12.3.5).

Table 12.3.5
Use of the Internet for certain purposes by age group in spring 2003, per cent of Internet users.
Source: Statistics Finland, Internet Commerce Survey, spring 2003.

Internet uses	Age group						
	15–19	20–29	30–39	40–49	50–59	60–74	Total
Email	85	83	83	84	82	78	83
Searching for product information	73	85	86	82	74	66	81
Banking	22	68	78	72	67	79	66
Browsing government or municipality web pages	35	57	66	63	61	61	58
Travel-related services	38	53	60	61	66	61	57
Reading net magazines	37	58	53	48	41	39	49
Information search of disease, nutrition etc	43	54	54	49	40	34	49
Studying in school, university etc	80	46	20	13	7	6	29
Playing games	61	32	22	16	13	17	26
Purchasing goods and services	24	28	28	23	17	12	24
Chatting	54	31	17	12	13	6	22
IP calls	4	4	4	4	2	1	3
Video conferencing	3	3	4	1	3	0	3

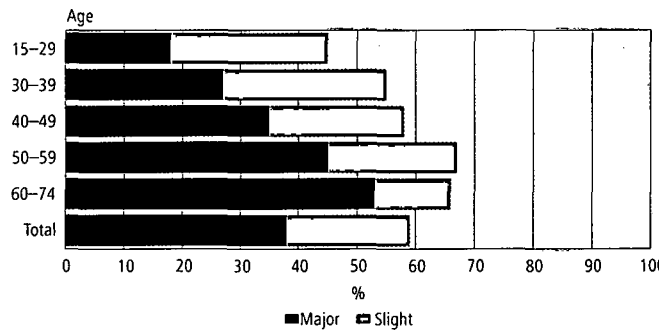
2 Statistics Finland, Tietoaika 8/2003.

No interest in getting online – no enthusiasm for ecommerce

The most frequently given reasons for not having gone online from home were that the Internet did not interest or its contents were regarded to be of no use. Even among respondents aged under 30 and without home access to the Internet nearly one in five and over half of those aged 60–74 quoted these reasons. High cost of equipment and use were regarded as major obstacles by a much smaller share of respondents. With people aged under 50, access to the Internet somewhere else was a major or considerable factor in the decision not to take out a subscription at home. Compared to the previous year's survey, the cost of equipment and use were this time a less important reason than the fact that the Internet just simply did not interest. In the oldest age group almost one in ten could not say whether these statements had had any bearing on their decision not to go online at home.

Those Internet users who had never bought or ordered anything online were asked six questions concerning the reasons why they had not done this. According to Table 12.3.6 people in Finland still want to see what they are buying although the weight of this reason on their decision not to buy anything on the Internet had lessened slightly. Four out of five Internet users feel no need to purchase anything online because there are also other trading places on offer. Opinions are very clear-cut in this respect and the share of don't know answers is very low. By contrast, decisions to refrain from buying anything online do not seem to be influenced by too high prices of the offered products, long delivery times or unavailability of products or services. With regard to these

Figure 12.3.7
Percentages of persons in certain age groups having decided against home access to the Internet in spring 2003 because of disinterest or viewing the Internet as needless, extent of influence on decision.
Source: Statistics Finland, Internet Commerce Survey, spring 2003.



reasons, the share of don't know answers went up to one-third. Of course, it is difficult for people to comment on prices or delivery times if they do not intent to make any purchases in the first place.

Nearly three out of four are hesitant about giving out their credit card details, but on the other hand one in five of those not having made online purchases do not think that it would have had any bearing on their decision. Out of the particular reasons inquired about in the survey, hesitancy about giving out credit card details was the only one showing slight growth. On the other hand, however, 46 per cent of those who had made purchases online had paid for them by credit card. In 2002 their share was 36 per cent. Giving out credit card details to pay for a purchase online has not been as widespread a custom in Finland as in some other countries. In Australia, for instance, two-thirds of online purchases are paid for by credit card at the time of ordering.

Table 12.3.6
Reasons for not having shopped online in spring 2002 and 2003, percentage of Internet users having made no online purchases.
Source: Statistics Finland, Internet Commerce Surveys, spring 2002 and 2003.

	2002 Yes	2003 Yes	2002 No	2003 No	2002 Don't know	2003 Don't know
Prefers to visit a shop to see the product	95	90	4	9	1	1
No need to make purchases via the Internet	81	79	17	20	2	1
Doubtful about giving credit card details	71	74	24	22	5	3
Delivery times too long	13	9	53	56	34	35
Required products or services are not offered	11	11	56	55	33	34
Products too expensive	9	6	54	57	37	37

The Internet changes the way we do things

This review about the use of ICTs would seem to indicate that we are approaching the culmination of equipment use. All people with a reason for using a PC, the Internet and email have already started to do it. Over the coming years, the shares of users will grow among retired people, as they will no doubt continue the ICT use that became routine while they were working, although maybe at lessened intensity. At the other end of the age scale, all children will become PC, Internet and email users at the latest by the time they reach lower secondary school age.

Although the culmination point has been reached in basic use, making the use regular and routine-like continues and will eventually result in new kinds of activities in many areas of life. Signs of this are already evident as changed behaviour in product information searching, mail order purchasing and ways of obtaining tickets or travel services.

12.3.4 Consumers' ecommerce in 2003

In spring 2003, approximately 27 per cent of people in the 15–74 age group had ordered something through conventional mail order in the past three months, 20 per cent had ordered products or services by telephone and 12 per cent had bought something from a telephone salesperson. These figures have remained almost unchanged since November 2000, with only a slight decrease in the share of those having placed mail orders.

Men and women use different channels for distance shopping: 37 per cent of women but only 17 per cent of men had ordered mail order goods by post. Men's share was slightly higher than this among those having placed mail orders by telephone, whereas two thirds of those having ordered something from a telephone salesperson were women. There has been next to no change in the situation in two years.

Around 16 per cent of men and 11 per cent of women had obtained something from an online store in the past three months. These percentages have been growing slightly from previous years. In 2002 the corresponding percentages were 15 and 13, and in 2001, 12 and 8, respectively.

Online shopping popular with young people

The age and gender structure of online shoppers differs somewhat from the breakdowns of both Internet users and the whole population. The age group of under 40 years accounted for 64 per cent of the people who had bought something online, whereas people of this age made up 57 per cent of Internet users and 43 per cent of the whole population.

The share of women among online shoppers has grown over two years, although a slight majority (51%) of the shopper were still men in spring 2003. In autumn 2000 women made up 40 per cent of those having shopped online.

The age of 50 seems to persevere as a clear watershed both with regard to Internet use and online shopping. People in the 50–74 age group made up good 16 per cent of all online shoppers and 21 per cent of those having used the Internet in the previous three months, although their proportion in the total population was 38 per cent.

Wage and salary earners accounted for 61 per cent of online shoppers and 58 per cent of Internet users, whereas their proportion in the total population is 50 per cent. Students represent around 14 per cent of the total population, but account for 18–22 per cent of online shoppers and Internet users. The discrepancy is quite considerable in respect of retired people, who make up almost one-fifth of the total population but only 3–5 per cent of Internet users and online shoppers.

Examined by level of education, Internet users and online shoppers differ from the distribution among the total population in that the proportion of those with basic level educational qualification is much smaller among them than in the total population. Correspondingly, the proportion of people with tertiary level educational qualification is about double that in the total population among Internet users and online shoppers.

In two years, the age distribution of online shoppers has evened out quite clearly; especially in the 30–39 and 40–49 age groups the share of people having made purchases on the Internet grew strongly. (Figure 12.3.8). A growing proportion of middle-aged people have become online shoppers, but making purchases on the Internet is still rare among people aged over 60.

People living in the metropolitan Helsinki region continue to be more active users of the Internet than people in other large towns (Turku, Tampere, Oulu, Kuopio, Jyväskylä, Lahti and Pori) or elsewhere in Finland. In 2002, 81 per cent of people in the 15–74 age group and living in the metropolitan Helsinki region had used the Internet in the three months prior to the interview – in 2003 their proportion was 77 per cent. (Figure 12.3.9) Searching for product in-

Figure 12.3.8
Share of online shoppers in spring 2001, 2002 and 2003, per cent of age group.
Source: Statistics Finland, Internet Commerce Surveys, spring 2001, 2002 and 2003.

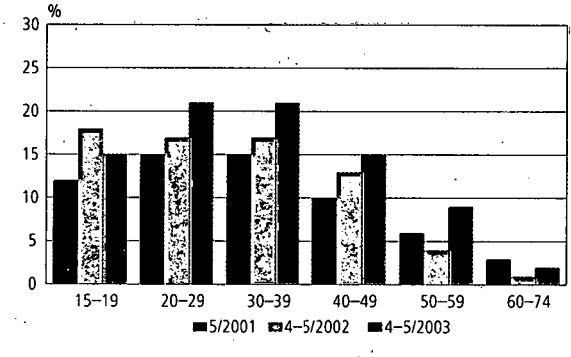
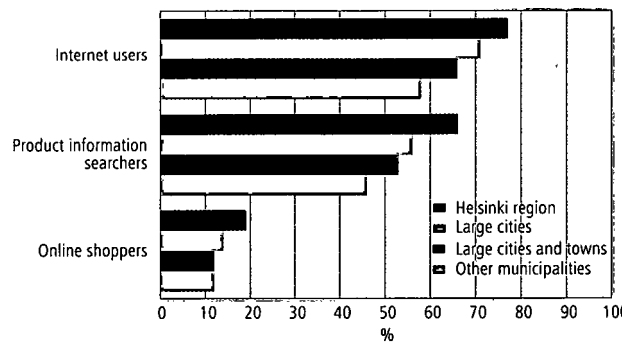


Figure 12.3.9
Shares of Internet users and online shoppers in spring 2003, per cent of 15–74 years. Source: Statistics Finland, Internet Commerce Survey, spring 2003.



formation is less common outside towns due to non-existence of Internet connections. If product information searchers are calculated from Internet users, the difference between the metropolitan Helsinki region and other areas does still remain, but is slightly reduced.

Value of ecommerce and volume of eshoppers

In spring 2003, the estimated total value of purchases made and orders placed online for private purposes was under EUR 210 million. In annual terms this would mean orders and purchases worth approximately EUR 830 million, assuming that online shopping has continued steady throughout the year. The value has not changed from the estimates of autumn 2002. The estimate calculated for the whole of the year 2002 with data for spring 2002 was approximately EUR 40 million up, so one could conclude from these figures that growth in Internet shopping has come to a halt – at least for the time being. Of course, the trend is still up when compared to previous years. The estimate concerning autumn 2001 was EUR 566 million and that concerning the year 2000 EUR 364 million.

When converted to annual terms the value of online orders and purchases from abroad was approximately EUR 170 million, in other words of the same magnitude as the estimate made in autumn 2002. The estimate for 2001 was around EUR 60 million and for 2000 under EUR 100 million.

Over two million people, or 53 per cent of the 15–74 age group and 81 per cent of Internet users, said they had searched the Internet for information on goods and products. These window shoppers can be

regarded as potential users of online shopping services, who have both the readiness and desire to shop online, even though they do most of their shopping elsewhere.

The total number of people who had made purchases on the Internet was 530,000, or approximately 14 per cent of all the people in the 15–74 age group and 22 per cent of Internet users. In addition, some 240,000 people had played gambling games online in the past three months. Some 430,000 people (11%) had ordered something via the Internet for their private use in the preceding three months. This number had not grown from the previous year. The number of people who had also paid for their purchases while online was even lower at around 230,000, or 6 or so per cent of the whole target population. Their number had not changed from the year 2002, either.

In addition, around one million people in the 15–74 age group had purchased something online for their private use at some earlier point in time.

In spring 2002, some 430,000 persons and in spring 2001 approximately 340,000 persons had been to online shops if those who engaged in gambling games are excluded. The number of people having gambled online had gone up by 100,000 over the year.

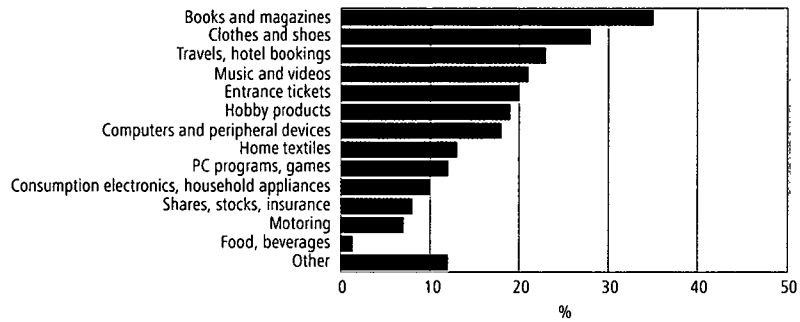
Product range in online shops

Products bought online can be divided into a few main categories. The most popular products are a) books and magazines and b) clothes and shoes; one online shopper in three had purchased these. The second main category consists of a) travel and hotel bookings, b) music and videos, c) tickets, d) hobby goods and e) computers and peripheral devices. Roughly one online shopper in five had ordered or bought goods in this category. Around one in ten had acquired consumer electronics and computer programs or households textiles online. Purchasing of food via the Internet is still incidental (Figure 12.3.10).

Nearly half of those who had bought something online had paid for the product at the same time as they placed their order, but this proportion had not grown from the year before. As purchasing online grows increasingly common, using bank connections via a PC terminal is perceived as safe. The nature of the goods and the alternative ways of paying for them offered by the shops naturally vary by product category.

In terms of volume, the greatest increases took place in the purchases of books and magazines, travel and hotel reservations, and tickets. However, the biggest growth in the value of trade was recorded for the purchases of computers and software, although the number of shoppers having purchased them was low. Although the number of

Figure 12.3.10
Online shopping by product category in spring 2003, per cent of users who had bought something.
Source: Statistics Finland, Internet Commerce Survey, spring 2003.



people having bought something online had not grown, they reported purchases extending to an increased number of product categories. It is noteworthy that as many as two-thirds of those who had shopped online had bought something via the Internet three or more times during the preceding three months. In spring 2002, this proportion still amounted to no more than one-third.

12.4 Evaluation

Did Finland evolve into an information society?

Mobile phones, PCs, the Internet and email have made everyday life in Finland today much easier for large numbers of people. Having said that, it is quite possible to manage without any of them. For reasons of equality and justice it is important that public services in society remain accessible even to those people who are unable to or who do not want to use online services. If and when the availability of traditional services is cut back, that should only be done once different user groups have moved en masse to use the electronic online version, not before. As far as the workplace use of ICTs is concerned it seems we have now reached some sort of ceiling at least within the context of current uses. These uses and applications will of course continue to develop and expand into new areas, so in the future they may also find their way into smaller companies.

New ICT applications are continuing to make such job tasks as the classification, organisation and recording of texts, images and sound less laborious and time-consuming than before, which inevitably is go-

ing to affect the availability of jobs. As unit sizes seem to be growing as well, for instance through company mergers, the combined effects on the job market may be dramatic indeed.

One strand of ICT applications development is aimed at producing new tools for purposes of control and surveillance. These new technical solutions are expected to have great efficiency benefits, most notably in caring jobs. Unfortunately, it seems that efficiency is considered only in terms of cost-effectiveness. Simple solutions that reduce human individuals to technical objects of observation are certainly not going to strengthen the freedoms of a "respected social life" and "basic security" identified by Tuomi. Great care is needed in applications development work to make sure that new information and communications technologies genuinely support the work done by care professionals rather than undermine it.

The development of new tools of control and distance monitoring involve other threats as well that will only receive the attention they deserve in the public debate if there is a high level of civic participation. Today, the ever-present fear of terrorist attacks seems to be taking us in the dubious direction of a Big Brother society of constant surveillance, even in this remote corner of the globe. We need to give serious thought now to the question of whether the development of ICTs is leading us into a social trap that, once it becomes embedded in the structures of society, is extremely hard to get rid of other than by a huge concerted effort.

Nevertheless, a more positive perspective on the future is also well justified, for mobile phones, email and Internet websites are developing into the kinds of infrastructure for social interaction that may pave the way, in one form or another, to the utopia envisaged by some scholars of a genuinely interactive society. At the same time, of course, the same new communication infrastructure is well suited to the needs of globalised content producers (see Rifkin 2001). Their goals probably represent the very antithesis of interactive society: the society of mass entertainment. To some extent the mobile phone also fulfils many people's dreams of just lying idle and having a host of services at their fingertips. The mobile is fast becoming our secretary-cum-butler that will send out orders, make appointments, tell us who's calling, pay bills, etc.

Within the space of less than a decade Finland has evolved into an information technology society, but at the same time we have also seen significant advances in terms of practices and structures. A new ICT infrastructure has evolved that opens up new opportunities and is also working to re-create society. There are many good sides and bad in that society, some of which are by now clearly visible. On this basis it is fair

to conclude that Finland has indeed evolved not only into an information technology society but also a knowledge society. Whether from here we will move on to the utopia of an interactive society or perhaps turn in some other direction, will depend among other things on the kind of choices that are made in the political decision-making process.

12.5 Information society expenditure in households

Information society consumption or expenditure here refers to how much households spend on what may broadly be described as information products and services. Information society expenditure comprises the following eight categories:

1. Telecommunications costs: postal and telephone expenses, telephone equipment.
2. Computing costs: computers, accessories and parts, software, typing, printing and calculating machines and pocket calculators.
3. Electronic entertainment: purchase and repair of TV sets, radios, video and tape recorders, CD players; purchase of films, cassettes and CDs; TV and other licences and fees; hire of videotapes.
4. Literature, newspapers and magazines.
5. Cultural events: admission fees and tickets and season tickets for arts and sports.
6. Studying: hobby courses and camps, private lessons, school and course fees (excluding physical exercise and sports).
7. Do-it-yourself: developing films, writing and drawing accessories, photography and film-making equipment.
8. Lotteries, betting and gambling.

In 2001 (2001/02[3]), total information society expenditure per household was EUR 2,328, which was around 17 per cent of the total voluntary consumption and approximately 9 per cent of the average total consumption expenditure per household. The voluntary consumption is determined by subtracting living, food and health costs from the total household expenditure. Table 12.5.1 shows that in 2001 the average total expenditure per household was EUR 25,760, of which voluntary consumption accounted for about 55 per cent.

Information society expenditure seems to be increasing when examined both as a proportion of households' voluntary consumption and of

3 Data collection went on until March 2002.

Table 12.5.1
Information society expenditure in households, voluntary consumption and total expenditure in 1990, 1998 and 2001/02.
Source: Statistics Finland, Household Expenditure Survey.

Expenditure per household		All households			Single-person households		
		1990	1998	2001/02	1990	1998	2001/02
Information society expenditure total	euro	1,359	1,874	2,328	872	1,198	1,435
Telecommunications costs	%	3	5	7	4	7	8
Computer costs	%	1	1	1	0	1	1
Electronic entertainment	%	3	3	3	5	5	4
Books and magazines	%	3	3	3	4	4	3
Cultural events	%	0	1	1	1	1	1
Studying	%	1	1	1	1	1	1
Do-it-yourself activities	%	1	1	1	1	1	1
Lotteries, betting and gambling	%	1	2	1	1	2	1
Information society expenditure total per cent of voluntary consumption	%	13	16	17	16	20	19
Voluntary consumption	euro	10,869	11,650	14,059	5,321	6,126	7,381
Expenditure, total	euro	18,869	21,496	25,760	10,091	12,573	14,749

total consumption. The amount of money spent on information society expenditure has also grown. The studies on the expenditure are, however, based on quite a broad specification and are, thus, only indicative.

The item of information society expenditure having grown most was telecommunications, which accounted for 7 per cent of voluntary consumption in 2001. The next largest expenditure items comprised those on electronic entertainment and on literature, newspapers and magazines, on both of which households spent three per cent of their voluntary consumption. The shares of these three expenditure items were

Figure 12.5.1
Real changes in consumption expenditure of households per consumption unit in 1994/96–1998 and 1998–2001/02, in percentages.
Source: Statistics Finland, Household Expenditure Survey.

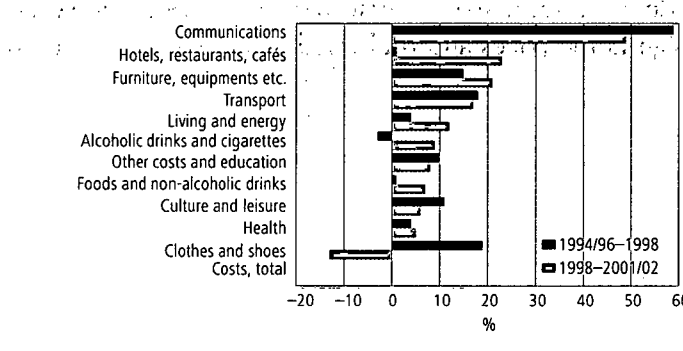
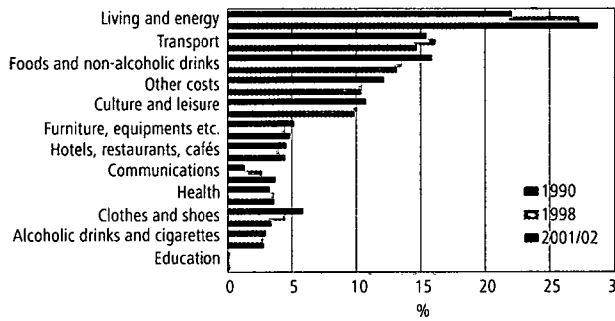


Figure 12.5.2
Structure of consumption expenditure in households in 1990, 1998 and 2001/02, percentages of consumption expenditure.
Source: Statistics Finland, Household Expenditure Survey.

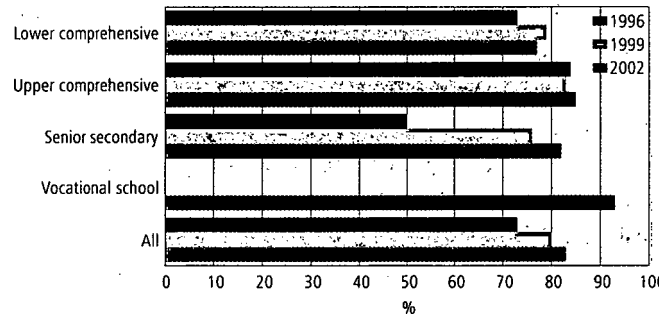


somewhat higher in one person households than in all households on the average. On the whole, information society expenditure accounts for a larger than average share of all household expenditure in one person households.

12.6 ICT use at school: trends in development

Taking all schoolchildren as a single group, around 60 per cent had studied the use of both word processors and Internet browsers during the past year. Vocational school students were the most active learners. The proportions of students who studied these skills were lower in 2002 than in 1999. In 2002 around 40 per cent had studied the use of database programs, operating systems and spreadsheet programs. The figures for those studying database programs had increased considerably, whereas for operating systems the numbers were clearly down on those recorded in 1999. Likewise, the numbers having learned how to use spreadsheet programs were also down to some extent. Just over 20 per cent had studied both how to design home pages and multimedia; for both these categories the figures were also down on 1999. Only some 10 per cent had taken courses on some programming language or pagemaking software. Bearing in mind the growing demand for content production, the figure for the latter in particular was very low. For all the categories mentioned the proportions studying the programs in spring or autumn 2002 were higher among vocational school students than among other schoolchildren. Not surprisingly, these skills had been studied least frequently by schoolchildren at the lower level of comprehensive school.

Figure 12.6.1
Percentage share of students using a PC at school during the autumn by type of school in 1996, 1999 and 2002.
Source: Statistics Finland, The Evolution of the Information Society.



It seems that PC use at schools has now reached saturation point: in comprehensive and secondary schools four in five students had used a PC at school during the autumn term. In vocational schools the proportion of non-users in autumn 2002 was less than 10 per cent. As long as all pupils do not have their own PC at school on their own desk, it is unlikely that the proportion of schoolchildren using PCs at school can rise any further, with the possible exception of lower level comprehensive school students aged 10–12.

Regardless of the level and type of education, schoolchildren used by far most frequently Internet connections and word processing programs. These categories were followed by practising language skills and playing games; among vocational school students 58 per cent reported doing the latter. Almost one-third had used computers for practising maths. This was most common among lower level comprehensive school students aged 10–12. One in four had processed pictures by computer, one in five had used computers to study natural science subjects. No more than one in ten had practised database use and creating music at school. It seems that schools devote only quite limited attention to online content production. If the idea is that schoolchildren should strengthen their skills and competencies in this area, then at the very least there needs to be closer co-operation and co-ordination between different subjects, and in their projects schoolchildren need to get more practice with image processing, pagemaking, etc., instead of working with paper and pencil or just word processing.

The main result of our analysis is that ICTs use has increased in schools quite rapidly from 1996 to 1999, but from 1999 to 2002 it has shown a tendency to decline. Our results are quite systematic. Apparently in the late 1990s when many schools got their first PCs and Internet connections, everyone was keen to try out the new equipment. In the longer run, however, they have not found an established niche for themselves in the context of everyday schoolwork.

It also emerges clearly from our findings that ICTs use in vocational schools is at a reasonably high level when compared to upper secondary schools. At least in the light of the results reported here it seems that the regular curriculum at post-compulsory vocational institutions caters reasonably well for students' needs in ICT skills.

It is widely expected that content production will have an increasingly prominent role as a source of future employment and GDP growth[4]. If the basic skills and competencies required by a high level of content production need to be learned at school, then the results reported above give strong reason to suggest that the learning of those skills be integrated into the work that students do and into the testing of their knowledge in various different subjects. For example, physical exercise could involve video recording, analysis of slow motions replays, foreign language studies could involve radio broadcasting, for history class students could produce newspapers, etc. This would make the media themselves and learning the necessary skills a sideline, turn them into tools just like paper and pencil; this of course is precisely what we do in working life (with the exception of artists). The experiences gained of mass media at school might well inspire young people to use them on a continuous basis for purposes of content production in other situations as well.

12.7 Use of ICTs in Finland in an international comparison

This Section describes how Finland compares internationally in the spread of use of information and communications technologies among households and ordinary people. The used comparison measures are the diffusions of mobile phones, PCs and Internet connections.

International comparisons are still hampered by a number of uncertainties, because data collected using commonly agreed harmonised methods are only available on a few topics. Sample definitions and data collection methods vary by country and the organisation collect-

4 See e.g. the Ministry of Education interim reports on content production 8/2002 and 9/2002.

ing the data. The youngest and oldest age groups of samples vary. The reported results may concern individual persons or households. It is an entirely different matter whether 50 per cent of households have access to the Internet or whether 50 per cent of individual persons aged 15–74 have Internet access from home. Except for the statistics produced by the OECD, interpretation of international data on the use of ICTs is still left down to the reader.

For years, Finland was regarded as some kind of IT wonderland with high mobile phone and Internet penetration rates. To an extent this was perhaps true, but the statistics available at the time also lent themselves to biased interpretations. The most widespread of the false images suggested that the number of Internet connections is extraordinarily high in Finland. Indeed, when we look at the per capita number of PCs connected to the Internet, this figure is still higher than in any other country in the world – but this says nothing about the actual use of the Internet because the statistics are based on registered addresses. Having said that, this indicator does provide a true reflection of the extent of Internet access.

Similar problems are encountered in comparisons of the penetration of telephone subscriptions. For land line subscriptions the accuracy of the figures collected is reasonably good, but statistics on the number of mobile phone subscriptions are unfortunately not entirely accurate, at least in all countries. In particular, statistics on prepaid subscriptions may include "dead subscriptions" as users switch to a different operator. In Finland prepaid subscriptions account for only a minor proportion of all mobile phone subscriptions, but for instance in Denmark they represent more than 30 per cent of the total. Even allowing for all the inaccuracies, the number of telephone subscriptions in Finland is relatively high in comparison with other OECD countries – not to mention non-industrial countries.

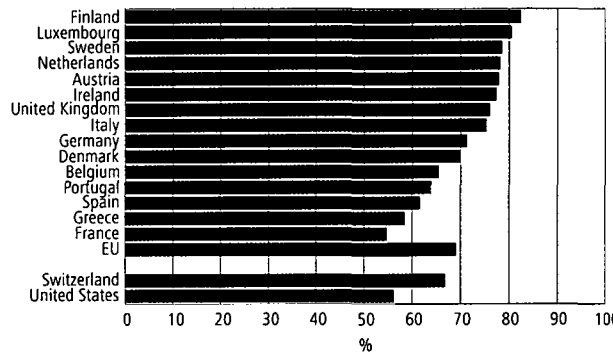
12.7.1 Use of mobile phones

National statistical institutes have not collected very much data on mobile phones; for some reason they have not been included in the EU's benchmarking indicators. Data on mobile phone subscriptions can be obtained from operators, but there are problems with reliability. The only way to obtain data on the use of mobile phones is through interview surveys. According to data collected in spring 2002[5], 70 per cent of all persons aged 15 or over in the EU countries had a mobile phone in their own personal use. In this comparison Eu-

5 SIBIS: General Population Survey

rope is way ahead of the United States, and the penetration of mobile phone subcriptions in Europe is highest in Finland. By contrast, Italy, for instance, remains around the average, even though the statistics on the number of subscriptions indicated (falsely) that it ranked high. In Figure 12.7.1 the number of mobile phone users in Finland comes quite close to the figures reported on the basis of the Consumer Survey at about the same time in the population aged 15-74 (86%).

Figure 12.7.1
Share of persons aged 15 or over who had a mobile phone in their own personal use in the EU countries, Switzerland and United States in spring 2002.
Source: SIBIS 2002.



12.7.2 Penetration of the Internet and PCs in private households

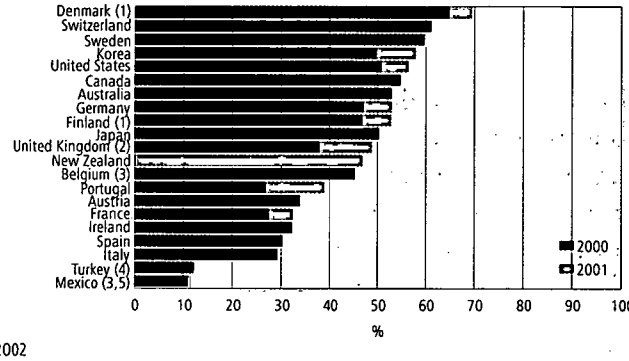
Recently many national statistical institutes have reported on the proportions of households that have a PC at home (Figure 12.7.2). However, figures are not available for all countries. In spring 2003, 58 per cent of Finnish households had at least one PC. Although in a Nordic comparison Finland has the smallest proportion of households with a home PC, in a broader comparison we rank among the countries at the top end of the table (as far as comparable data are available).

In many countries the majority of households have a PC, yet there are only a handful of countries where even half of all households have access to the Internet from home (Figure 12.7.3). In May 2003, no more than 45 per cent of all households in Finland had access to the Internet from home. The highest figure in 2001 was recorded for Denmark, but even there the figure was below 60 per cent. The United States and Canada lag some ten percentage points behind Denmark. Finland ranks in the middle, just ahead of New Zealand and Switzer-

land. However, it should be noted that the figures for Australia are based on the situation in 2000; in 2001 Australia would probably be ahead of Finland when measured in terms of number of Internet connections in private households.

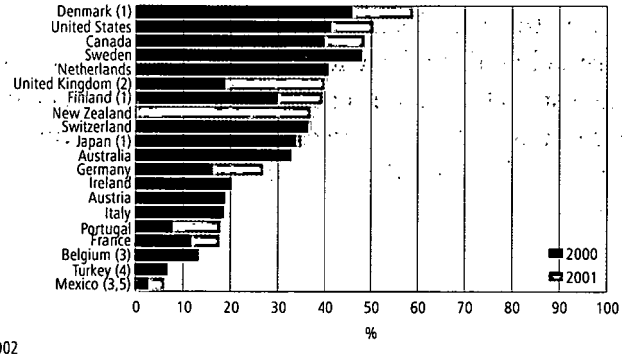
In the United States and Canada only one in ten PCs in private households are not connected to the Internet. In Finland the corre-

Figure 12.7.2
Households with access to a home computer in 2000 and 2001, percentage of all households.
Source: OECD, Measuring the Information Economy 2002.



1 Beginning of 2002
2 March 2001-April 2002 instead of 2001
3 1999 instead of 2000
4 Households in urban areas only
5 For 1999, households in urban areas with more than 15,000 inhabitants only

Figure 12.7.3
Households with access to the Internet in 2000 and 2001, percentage of all households.
Source: OECD, Measuring the Information Economy 2002.



1 Beginning of 2002
2 March 2001-April 2002 instead of 2001
3 1999 instead of 2000
4 Households in urban areas only
5 For 1999, households in urban areas with more than 15,000 inhabitants only

sponding proportion is one in four, in Germany one in two and in Belgium two in three.

It seems that household size has a bearing on having a PC at home in different parts of the industrialised world. In the United States 30 per cent of one person households had a PC at home in 2000, while in 2–4 person households the figure was 58 per cent and in 5+ person households 63 per cent.[6] The figures for Finland and France reveal a similar pattern: the bigger the household, the more likely it is they have a PC in the home. The result is the same when we look at households with and without children. In all countries a PC and Internet connection are more common in households that have children than they are in those where there are no children.

12.7.3 Broadband access

A major focus in recent discussions on the information society has been the question of broadband access: the argument is that broadband is a key precondition for the development of the real information society. There is even less reliable research data on broadband than there is on Internet access in general. According to the definition applied by the International Telecommunications Union, ITU, broadband refers to transfer speeds higher than those available via ISDN primary subscriber lines (i.e. in the range of 1.5 or 2 Mbps). In everyday usage broadband also refers to fast Internet connections. Without going to a detailed technical discussion, this in practice comprises ADSL and cable modems. It is believed that the growth of the broadband infrastructure will pave the way to the introduction and development of new services.

OECD statistics indicated that broadband access is still comparatively rare. There are some exceptions, though, such as Korea, where the population is concentrated in a few large cities and where major investments in the broadband infrastructure have boosted the introduction of broadband. In Finland the Ministry of Transport and Communications estimated in spring 2002 that the number of broadband connections in Finland was in excess of 100,000, ten times higher than one year previously.[7] The data in the table below describe the situation in June 2002; the figures refer to broadband subscribers per one hundred inhabitants.

6 U.S. Census Bureau.
7 Ministry of Transport and Communications (2002).

Table 12.7.1
Broadband access per 100 inhabitants in EU countries and other OECD countries in June 2002.
Source: OECD, Communications Outlook 2003.

Broadband access per 100 inhabitants, June 2002			
Sweden	7.0	Korea	19.1
Denmark	6.7	Canada	10.2
Belgium	6.3	United States	5.6
Austria	4.2	Iceland	4.7
Netherlands	3.9	Japan	3.9
Finland	3.3	Switzerland	3.9
Germany	3.1	Norway	2.7
Spain	2.1	Australia	1.3
France	1.6	New Zealand	1.1
Portugal	1.5	Hungary	0.4
United Kingdom	1.3	Mexico	0.1
Italy	1.2	Czech Republic	0.1
Luxembourg	0.6	Poland	0.0
Ireland	0.1	Turkey	0.0
Greece	0.0	Slovak Republic	0.0
EU	2.3	OECD	3.8

Household surveys do not yet have ways for measuring reliably broadband use; the number of users is still too small for an ordinary questionnaire survey to reach a sufficient number of respondents. However, there is technical equipment with which the use of broadband connections can be measured in different countries, although these do not yet allow us to say whether broadband users spend more time (measured in hours) on the Internet than people using slower connections do. When the connection is "always on", some definition is needed for "effective online time". The sporadic data that are available suggest that the use of the Internet increases with broadband access. Only time will tell to what extent this is down to novelty value and to what extent we will see a real increase in use levels.

12.7.4 Uses of the Internet

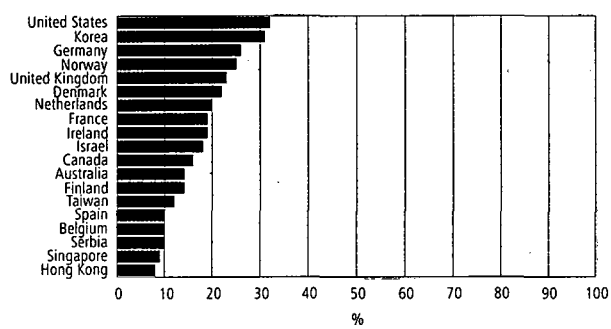
The most common use of the Internet is for emailing, but the figures for information search and general browsing and surfing are not far behind. In Italy, for instance, 63 per cent of Internet users indicated that they used it for sending and receiving email, while 60 per cent indicated they used the Internet for general information retrieval. Twenty per cent of users indicated that they used chat rooms, six per cent used the Internet for shopping purposes. In Britain a larger proportion of users said they used the Internet for information searches than for emailing.

The results from the Nordic countries point largely in the same direction. In spring 2002, 83 per cent of Internet users aged 15–74 in Sweden, 76 per cent in Finland and 84 per cent in Denmark used the Internet for communication purposes. One in four users in Finland do not use email, while in Denmark and Sweden only one in five do not use the Internet for communication purposes. Searching for information on goods and services is an equally common use in all countries, but in Sweden 67 per cent, in Finland 70 per cent and in Denmark 61 per cent used the Internet for shopping purposes or to pay bills. In relative terms the highest figures for the use of electronic banking services are recorded in Finland: almost two in three users in Finland use these services, while the figure in Denmark was around one-half.

12.7.5 eCommerce

The focus in the discussion here is on online shopping by private consumers, i.e. buying goods or placing orders over the Internet. Direct comparability would require the exact same reference periods and research designs, but national statistical institutes have not yet come that far in their efforts at harmonisation. Indeed the first harmonised European survey in spring 2002 opted to use different definitions in different countries; the results of this survey have not yet come out. One of the commercial research institutes that has recently published figures on online shoppers is Taylor Nelson Sofres Interactive: in Figure 12.7.4 those persons are classified as those having visited online shops who during the month preceding the interview had ordered or

Figure 12.7.4
Percentage of Internet users who have bought or ordered goods or services online in early 2002.
Lähde: Global eCommerce Report 2002, Taylor Nelson Sofres Interactive, 2002.



bought goods or services via the Internet. The figures indicate their proportions of Internet users in the respective countries (in which the reference period was the same month).

Consumers in Finland are not particularly keen online shoppers. Even in France and Germany, where Internet use is at a comparatively low level, almost one in five and one in four, respectively, made purchases over the Internet, whereas in Finland the rate was below the average of all these countries, i.e. 15 per cent.

12.7.6 Conclusions

As was pointed out at the beginning of this Section, Finland has long been portrayed as some kind of IT wonderland with extremely high penetration rates for mobile phones and the Internet. More recently this image has been fading somewhat, and perhaps for good reason. True, the number of mobile phones in the country is still very high, but in terms of Internet use relative to population many other countries are in fact way ahead of Finland. Overall, PCs and the Internet are in relatively active use in Finland when compared to the averages for the EU or OECD countries. In a comparison with the other Nordic countries, the figures for Finland are the lowest of all. Even when people do not have IT equipment at home they can of course make use of the facilities at their place of work or study, but all in all the use of the Internet, regardless of where it happens, is at a lower level in Finland than in any other Nordic country. With the exception of banking, people in Finland also use the Internet to a lesser extent than elsewhere for purposes of buying goods and services. As long as they can get along without it, it seems that Finnish people are content to rely on more traditional forms of shopping.

Sources

Linturi (2003), The Role of ICT-technology in Societal Change. HETKY 1/2003, pp. 22–27

Ministry of Education (2002), Interim reports on content production 8/2002 and 9/2002, Memoranda of the Ministry of Education's working groups 40:2002 and 41:2002

Ministry of Transport and Communications (2002), Telecommunications Statistics 2002, Helsinki

Nurmela, J.; Parjo, L. and Ylitalo, M. (2003), A Great Migration to the Information Society – Patterns of ICT diffusion in Finland in 1996–2002, Reviews 2003/1, Statistics Finland, Helsinki

Nurmela, J.; Ylitalo, M. (2003), The Evolution of the Information Society – How information society skills and attitudes have changed in Finland in 1996–2002. Reviews 2003/4, Statistics Finland, Helsinki

OECD (2003), Communications Outlook

OECD (2002), Measuring the Information Economy, Paris

Rifkin (2001), The Age of Access, The New Culture of Hypercapitalism Where all of Life Is a Paid-For Experience. Published by J.P. Tarcher

Sen A. (1999), Development as Freedom, Oxford University Press

SIBIS (2002), General Population Survey, www.sibis-eu.org

Statistics Finland, Consumer Survey

Statistics Finland, Household Budget Survey

Statistics Finland, Internet Commerce Surveys in 2000–2003

Statistics Finland, Tietoaika 8/2003

Taylor Nelson Sofres Interactive, Global eCommerce Report 2002, www.tnsofres.com

U.S. Census Bureau

Summary

Towards the end of the 1990s, the main driving force behind the strong growth of the Finnish economy was information and communications technology. At the same time Finland was seen as progressing fast towards an information society. To a large extent, the information society development of the time crystallised as an ever more important role of the information sector in industrial production and as rapid diffusion of information and communications devices, such as the mobile phone and the Internet. Since then, after the turn of the millennium, this progress, at times even described as unparalleled, has levelled off when examined from a number of perspectives.

The basic aim of the information society is utilisation of information to its full capacity and exploitation of information and communications technologies for the purposes of improving and maintaining competitiveness and, naturally, in a broader sense for increasing welfare. Finland has traditionally been a strong producer of information and communications technology. However, from the point of competitiveness and welfare it is also important that this technology can be used and exploited.

Information and communications technologies have been introduced quite broadly but the possibilities they afford cannot yet be utilised to the full

The Finns have been quick to adopt new information and communications technologies. Statistics show that the mobile phone, computer and Internet have become part of many people's everyday life in Finland. However, there are also signs that the penetrations of these devices have in many respects peaked for the time being. In spring 2003, nearly 60 per cent of households in Finland had a computer and almost half of them were connected to the Internet. However, the equipment stock of households has recently only been growing slowly in respect of these devices.

Utilisation of the possibilities afforded by information and communications technologies has also remained "superficial" in many ways. Consumers continue to do little of their shopping online and the volume of e-commerce has not grown as much as perhaps anticipated. Likewise, utilisation of interactive services via the web has not been successfully implemented, for example in many the public sector services. The transition to the building of interactive network services in administration to any significant extent is still estimated to take at least 5 to 10 years. At the moment, networks primarily function as

contact and information search channels. Having said that, there are some services in which online use has already been admirably realised. Banking technology, for instance, is highly advanced in Finland and online banking is one of the most important purposes for which the Internet is used.

Information and communications technologies are in extensive use in enterprises. In spring 2003, 97 per cent of all enterprises employing at least five persons used computers, 94 per cent used the Internet and 58 per cent had their own homepages.

In 2002, the value of the e-commerce of enterprises doubled from 2001. However, a significant proportion of this was inter-enterprise trade – consumers' online shopping is still relatively moderate, as already established. Enterprises regard as the most important reasons for starting e-commerce improvement of their service, impacts on their business image, maintenance of competitiveness and winning new customers. These in their part indicate clearly towards grown importance of information networks and confidence in their usefulness as a market place.

Over the past few years, working life has changed in Finland in many ways. The importance of the information and communications fields to the economy has grown and work has become more and more information technology-intensive in all industries. An increasing number of employees have a computer and an Internet connection in their use. In 2002, 65 per cent of the people in the labour force had the opportunity to use the computer and one in two were able to access the web. Nevertheless, the nature of different job tasks means that all employees do not need the computer in their work. It is, therefore, envisaged that the proportion of computer users is no longer likely to grow to any significant degree, whereas the proportions of those using the Internet and email will probably increase.

Although information technology is used as a tool and medium in an increasing number of job tasks in working life, there has been no appreciable increase in teleworking, which it would facilitate. Instead, there have been other rapid structural changes in working life. Increasing numbers of employees work part-time or in fixed-term employment relationships.

The information sector has an established position as an important sector of production and thereby also as an employer, but little knowledge is so far available on the economic impacts from the use of information and communications technologies

The growing importance of the information and communications technology branches in the 1990s became obvious from the way the

information sector started to provide jobs during the decade. The information sector accounted for 21 per cent of the total increase of the employed labour force between 1996 and 2001. The importance of the sector's service production as an employer was particularly striking. Goods and services production in the information sector employs more young and well-educated people than on the average. The information sector recruits labour force direct from educational institutes, but in recent years a lot of labour force has also moved to the information sector from other industries.

The information sector is quite an important employer today, but its significance in business has also grown rapidly by many other measures. The number of enterprises operating in the information sector has grown fast, and especially strongly in service production. Small, innovative enterprises have emerged in the field. The total turnover of the enterprises in the information sector developed favourably right up to the year 2001, when the general economic uncertainty, among other things, also started eat into the turnover of information sector enterprises. The turnover of especially goods production in the information sector went into a clear decline, which was still continuing in summer 2003.

Information and communications technology is of major importance to Finland's economy as regards output and foreign trade, and as an employer, etc. Enterprises also use information technology extensively but the essential question concerns the kinds of impacts the use of information and communications technology has on efficiency and productivity.

Studies conducted on the subject thus far prove indisputably the positive impacts of information and communications technology on productivity, but there is still a large number of open questions requiring verification. It is, therefore, obvious that the impacts from the use of these technologies need further analysing. In the light of research findings it would seem that modern service enterprises use the Internet productively – with a considerable impact on productivity – whereas in old industrial enterprises the use of the Internet may even have a negative influence on productivity. Findings of this kind prove that there is a clear need for further analysis and measurement. Because investments in information and communications technologies, and their maintenance and use require considerable resources, it is also reasonable to expect that their influence on productivity would be notable. ICT investments often also require investments in the development of organisational and operational models.

In the information society learning is continuous – besides studying for the qualifications offered by the school system, studying while working is widespread

Making use of existing knowledge, and the introduction, use and full exploitation of new technologies naturally require sufficient skills and abilities. In the information society learning is continuous, and this is also a prerequisite without which the information society cannot develop. The expansion of the information and communications fields has also necessitated changes to the education system. Appropriately educated employees must be provided for these growing fields. Maintenance of the skills and knowledge needed in working life means that employees also have to keep studying while working. Moreover, people outside the active labour force must be provided with the skills that are necessary in the information society.

Education in the information technology and media studies has increased considerably in Finland in recent years. The number of new students in information technology and media studies has been going up yearly since the mid-1990s. Degrees and qualifications obtained in information technology and media studies have also increased – in 2001 their number was almost double of that in 1997. Finding employment after graduation has also been easier for these students than for students having qualified in other fields.

In the light of statistics it would seem that enterprises in Finland offer more education for their employees than enterprises in the rest of the European Union do on the average. The information sector, again, provides more staff training than the rest of the enterprise sector. For example, most of the enterprises operating in the information sector have organised course format training for their employees, whereas the proportion of the enterprises having done so in the rest of the enterprise sector is distinctly smaller. All parameter figures concerning staff training have been clearly higher among enterprises in the information sector than among the rest of the enterprise sector.

Solid technological infrastructure is imperative to the realisation and development of the information society

Information technologies and information networks cannot be used unless the requisite basic infrastructure is in order. This demands adequate connections, that is, efficient data transmission networks, access connections, devices, and so on. The standard of the basic infrastructure needed for an information society is relatively good in Finland – for instance, information and communication networks cover the country exhaustively and connections to the networks are plentiful. It

must, however, be borne in mind that the infrastructure only creates the possibilities for the use of information and communications technologies – other factors, such as sufficiently important or interesting contents, determine the extent to which this infrastructure eventually gets utilised.

The density of mobile phone subscriptions is high in Finland and mobile services are being used more and more. The diffusion of broadband technology started quite slowly in Finland but broadband subscriptions by ordinary consumers have also been increasing recently. Despite the relatively good infrastructure, the whole population does not yet have at their disposal the connections and devices required in the information society.

Information society is formed by people – population development presents a number of challenges to the information society

To a large extent, social policy measures are determined by population development. Both the realised population development and the population projections show clearly that the population of Finland is ageing fast, and converging into large population centres. This development presents numerous challenges to society. Information technology can be of great help in the future development – at best, information and communications technologies can be used to moderate the effects on production from the ageing of the population of working age. Furthermore, information and communications technologies can be utilised for organising new services alongside the existing ones in e.g. the public sector so that they would be accessible to all citizens of all ages.

Development and advancement of the information society continue

Information and communications technology has played a major role in the recent development of Finland's economy. In addition, consumers and enterprises have already adopted the new technologies quite extensively. The potential for the exploitation of information and communications technologies is thus high in Finland. Finland has traditionally been a strong producer country of information and communications technology. However, from the information society development perspective it is vitally important that the introduction and use of information and communications technologies be supported and that special efforts be made to exploit fully the new possibilities offered by these technologies. It is equally important to ensure that the opportunity to utilise them and the services they facilitate are guaranteed equally to all citizens.

When the aim is to analyse the development of the information society it is not enough to just estimate the size of the information sector or the proportion of people in the total population who use the Internet, but the analysing also has to extend to the impacts from the use of information and communications technologies on society, such as how the use of ICT affects productivity, how the new technologies influence business patterns or people's social behaviour.

Information concerning the development of a phenomenon or on a given status quo can only be obtained through measurements, which may be based on research, statistics or administrative data. Statistics Finland produces continuously statistical data on the development of diverse topics with surveys on e.g. time use, consumption, labour force, enterprises, education, culture, mass media, etc. Information concerning important and essential issues pertaining to the development of the information society can also be obtained from these statistics.

Development of the information society is a globally important subject, which is monitored and scrutinised on a variety of fora. The information society extends to all areas of society and is therefore an important perspective to the advancement of all societies as well as to global development. The World Summit on the Information Society (WSIS), which will be held in two phases, will put forward an Action Plan containing proposals for actions for the realisation of the visions connected with the information society. The first phase of the Summit was held in Geneva, Switzerland, in December 2003 and the second phase will be held in Tunis in 2005.

It is to be hoped that this kind of global co-operation will produce an indicator system for the measurement of the development of the information society and thereby create better possibilities for achieving greater comparability between descriptions of this development with official statistics.

Tables

Appendexes

Figures

Maps

Tilastokeskus
Myyntipalvelu
PL 4C
00022 TILASTOKESKUS
puh. (09) 1734 2011
faksi (09) 1734 2500
myynti@tilastokeskus.fi
www.tilastokeskus.fi

Statistikcentralen
Försäljning
PB 4C
00022 STATISTIKCENTRALEN
tfn (09) 1734 2011
fax (09) 1734 2500
myynti@stat.fi
www.stat.fi

Statistics Finland
Sales Services
P.O.Box 4C
FIN-00022 STATISTICS FINLAND
Tel. +358-9-1734 2011
Fax +358-9-1734 2500
myynti@stat.fi
www.stat.fi

ISBN 952-467-265-0
Product number 9807
E0