Finland as an Information Society

The Report of the Information Society
Advisory Board to the Government

Contents

1 Purpose and nature of the report

The Government re-appointed the Information Society Advisory Board on 8 July 1999. Its task include monitoring and predicting Information Society development and reporting regularly to the Government.

This is the first report of the Information Society Advisory Board on Information Society development in Finland.

Information Society development may be evaluated from several different viewpoints. The concept of the Information Society is in itself complex although it is commonly used. **Manuel Castells**, considered to be one of the most notable information society theoreticians, prefers to use the term 'network society'. Also the concept knowledge society and other corresponding expressions have been used in different contexts when emphasising certain specific features of Information Society development.

The stage of Information Society development can be approached by evaluating how and to what extent various business sectors, government authorities and citizens have adopted modern information technology in their daily routines. Some indicators have often been used in public as the basis for placing the development stage of the Information Society of a certain country. However, as a phenomenon and goal, Information Society is much more complex than illustrated i.a. by the penetration of certain technical appliances.

This report aims at presenting an overall picture of Information Society development in Finland. The report is not scientific nor otherwise an exhaustive study of the different features of the Finnish Information Society although data and estimates from different research institutions have been utilised in its compilation. The report aims at outlining the present stage of Information Society development and at evaluating the social and economic effects of the Information Society. The report also includes a cross section of the measures and development programmes of public sector for the promotion of Information Society development.

International and domestic organisations and research institutions publish research and statistical data on the penetration of information and communications technology, the development of the information industry and other material relating to the Information Society. Due to the rate of change there are, however, very few profound analyses available on the Information Society.

Background material from different researchers and research institutions has been commissioned for the compilation of this report. Subheadings 3.1–3.5 of Chapter 3 'Use of new information and communications technology and network connections in Finland' are based on material compiled by Senior Researcher, Docent **Juha Nurmela** of Statistics Finland, Chapter 4 'The effect of Information Society development on the economy' on material compiled by Economist, Doctor **Heli Koski** of the Research Institute of Finnish Economy and that of Chapter 5 'Some of the social effects of Information Society development' on material compiled by Research Director, Docent **Antti Kasvio** of the Information Society Research Centre of the University of Tampere. The Ministries have provided material for the other parts of the report. The report has been edited by Counsellor **Juhani Korhonen** from the Ministry of Finance.

2 The Information Society as a national goal

The Information Society theme emerged in public discussion especially in the early 1990s together with, i.a., the OECD reports and the so-called Bangeman Report published by the European Commission in 1994 and the Green Paper 'Life and Work in the Information Society' published in 1996. In 1999 the European Commission launched the extensive *eEurope* Project with the goal of ensuring access to the benefits of the information society to all Europeans.

In the early 1990s, the information society issue was also seen in Finland as a central issue in the reform of the economy and public management. The Ministry of Finance appointed a broadly-based project to draft a national Information Society strategy. The publication 'Finland's way to the Information Society – the National Strategy and its Implementation' was published in December 1994 as a result of the project. On this basis, the Government formulated a policy standpoint in its Cabinet Evening Session in January 1995 on the measures required to develop the information society. The strategy drafted contained the following five different guidelines:

1) Information technology and information networks as tools in private and public sector renewal

2) Information industry to become an important future sector of economic activity in Finland

3) Professional expertise in information and communications technology to be maintained at a high overall level, with selected peaks

4) Everyone to have the opportunity and basic skills to use the services of the Information Society

5) Finnish information infrastructure to be competitive and capable of providing high-quality services.

SITRA, the Finnish National Fund for Research and Development, published a document in 1998 entitled "Elämänlaatu, osaaminen ja kilpailukyky" [Quality of Life, Skills and Competitiveness], which deals with the starting points and goals of strategic Information Society development. In the SITRA publication, the following is presented as the national vision:

> *"Finnish society will develop and apply the possibilities of the information society in an exemplary, diversified and sustainable manner in order to improve the quality of life, skills, international competitiveness and interaction."*

In the Government Programme of Prime Minister Lipponen's Second Government, Information Society development has central significance in the reform of the economy and the strengthening of the content industry and in increasing the efficiency of public services. The Government Programme approved in April 1999 states, i.a., the following on the Information Society and its general goals:

"Finland will be developed into an information society, in which knowledge and expertise form part of the culture and also the key factor in production. Finland, as a nation, will have to be in the forefront in terms of technological policy."

"Finland is seeking to play a pioneering role in implementing humane and sustainable information society. This implies, for example, the development of electronic services as well as cultural and information content that is easy-to-use and secure and at available to everyone with the help of personal computers, digital television and mobile telecommunications media."

3 Use of new information and communication technology and network connections in Finland

Significant from the point-of-view of the practical implementation of the Information Society is the frequency of computers, information networks and mobile telephones used and the differences between the various population groups.

The data presented are based on extensive interview data of Statistics Finland of 1996 and 1999, which studied the various aspects of the use of new information and communications technology in Finland and opinions regarding it. In 1996, 2,300 persons in 1,080 households and in 1999, 1,500 persons in 730 households were interviewed. Because the sample of Statistics Finland in 1999 was rather small, only significant differences were concentrated on when the results were examined.

3.1 The penetration of new information and communication technology in households

There are approximately 2.35 million households in Finland. The appliance reserve of the households has grown rapidly during the last few decades. Figure 1 shows how the increase in the frequency of mobile telephones differs from all other appliances. At least until now, the increase in the frequency of computers and network connections has followed the more 'peaceful' growth pattern of many other appliances.

FIGURE 1. The frequency of certain appliances in households up to the autumn of 1999 (at least one appliance), as percentage points
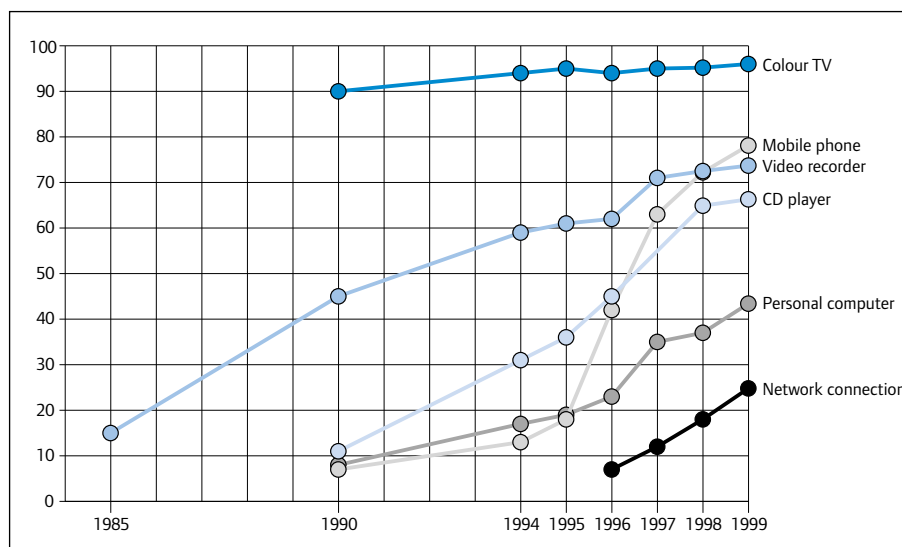
Source: Consumer research and Consumer Barometer, Statistics Finland

Figure 2 indicates the number of computers in households of different sizes and the number of their CD ROM stations and Internet connections at the end of 1999. According to the figure, their acquisition to homes was clearly connected to the size of the household, i.e., the number of children. Children have been a factor significantly speeding up the acquisition of new technology in households. On the other hand, in small households age has an essential effect on the willingness to acquire new information and communications technology.

FIGURE 2. The percentage of households with access to a computer, CD ROM station or Internet connection in the autumn of 1996 and 1999 according to the size of the household (at least one appliance)
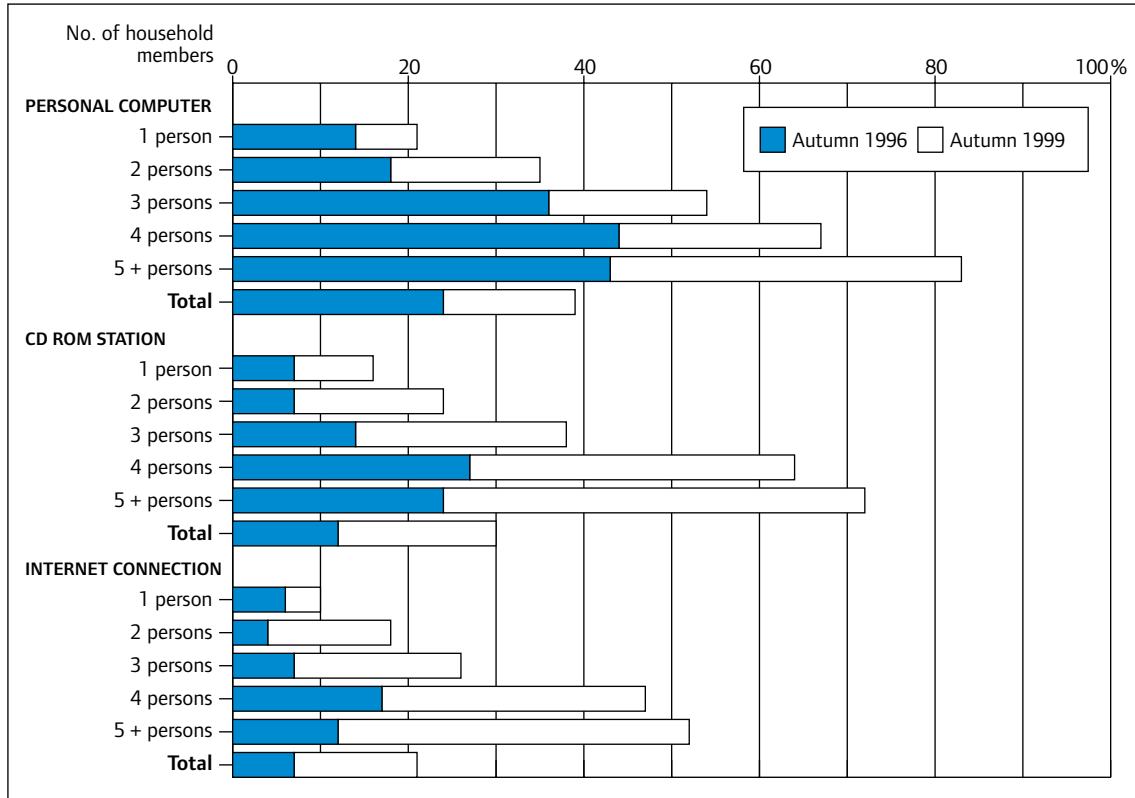
Source: Studies: The Finns and the future Information Society 1996 and 1999. Statistics Finland

Personal computers are significantly more frequent in larger families than in households of only one or two persons. Only about half of even households with four or more members had an Internet connection in their personal computer. There are still only a few computers and network connections in small households. In three years, Finland has acquired 350,000 new computer households. The number of Internet connections has increased slightly less, i.e. by 320,000. Only approximately 70,000 households had a fast ISDN connection. Personal computers had been replaced by better equipped computers, because there are now approximately 430,000 more computers with CD ROM stations than in 1996. CD ROMs were clearly more common than network connections.

The number of new households with mobile telephones had increased by more than 800,000 in three years. Altogether 78 percent of the 2.35 million Finnish households had at least one mobile telephone. Already 23 percent

of the households had no leased line and the number of these households has increased by 200,000. A quarter of the households did not subscribe to a newspaper and there were 100,000 more of such households than three years ago. The delivery of advertisements free of charge or telephone sales had been prohibited by 3–4 % of the households.

The following table examines the appliance reserves of households of different sizes.

TABLE 1. The information and communication technology reserves of households as percentages according to the type of household in 1999

CARS, TELETEXT, NEWSPAPERS AND TELEPHONE CONNECTIONS IN HOUSEHOLDS						
Type of household	Car available	Text TV	Subscribed newspaper	Some kind of telephone	No wired phone	No mobile phone
1 person under 30 yrs	51	57	32	100	72	7
1 person 30–39 yrs	59	72	65	94	62	17
1 person 40–59 yrs	55	62	60	96	26	36
1 person 60+ yrs	46	49	75	91	14	67
1-person households total	52	62	43	96	40	34
2 persons under 30 yrs	73	75	76	100	51	9
2 persons 30–49 yrs	84	84	73	100	32	3
2 persons 40–64 yrs	92	85	91	100	3	14
2 persons 65+ yrs	93	70	100	100	0	37
one-parent 2 persons	40	96	51	100	19	18
2-person households total	83	78	84	100	17	20
3-person households	91	85	92	100	7	10
4-person households	99	84	87	100	9	2
5+ person households	100	85	9	100	10	5
All households	75	74	75	98	23	22
PERSONAL COMPUTERS IN HOUSEHOLDS						
Type of household	Home PC	Network connection	ISDN connection	PC printer	CD ROM station	Scanner	Game station
1 person under 30 yrs	34	19	0	25	28	1	15
1 person 30–39 yrs	33	10	5	21	23	0	7
1 person 40–59 yrs	22	9	2	18	18	6	3
1 person 60+ yrs	3	0	0	3	0	0	0
1-person households total	21	10	2	16	16	3	6
2 persons under 30 yrs	49	29	2	36	45	9	18
2 persons 30–49 yrs	49	28	9	40	39	8	9
2 persons 40–64 yrs	35	27	3	33	27	7	5
2 persons 65+ yrs	22	2	0	22	1	0	0
one-parent 2 persons	39	18	9	25	35	9	38
2-person households total	35	18	3	30	24	5	9
3-person households	54	28	4	49	38	11	20
4-person households	69	47	8	61	64	10	53
5+ person households	83	52	12	64	71	13	61
All households	39	21	3	32	30	6	17

Some conclusions can be drawn from the table above:
- A mobile telephone is still rare in elderly one-person households,
- A significant number of small households does not have a leased telephone line. This has a considerable impact on the increase in

the frequency of network connections in the homes at least as long as the user fees of mobile telephones are essentially higher than those of leased lines.

- The number of ISDN connections is very low in family households and non-existent in small households.

- Teletext is a very common connection, and its potential may not have been discussed sufficiently. Although it is a simplex connection, it offers the information provider many possibilities and a large number of potential customer connections.

- The status of the newspaper as a mass medium in small households was clearly weaker than in other households.

The effect of income on new information and communications technology has not been examined in the table. On the basis of the analysis made of the interview data we can, however, conclude that low income has not been a central hindrance for the implementation of new information and communications technology. The income level seems to have an effect when the monthly gross income calculated for one member of the family is under FIM 4,000 (€ 673) or when the motivation for the new acquisition is not strong. However, when the gross income for one person increased to FIM 6,000–8,000 (€ 1,009–1,345) or more a month, its effect on the acquisition of new information technology was only minimal. In the case of mobile telephones, income does not seem to have any significance at all, at least as far as the acquisition of the first mobile telephone of the household is concerned.

> **Almost 80 % of the households have a mobile telephone, 40 % have a computer and so far only approximately a quarter has an Internet connection. Even a low income has not posed a significant hindrance for the implementation of information and communications technology.**

3.2 On regional differences

Regional differences in the frequency of mobile telephones increased from 1996 to 1999, particularly in the case of small households. When examining the regional differences according to the European Union Objective Regions[1], the development of the small and family households of Objective 6, i.e., the sparsely populated areas of Northern and Eastern Finland, and of Objective 2, i.e., the areas of industrial structural change has been slower than that of other regions. The regional differences of family households remained practically unchanged. The mobile telephone has clearly become more frequent in all the Objective Regions and in households of all sizes irrespective of the regional differences stated above.

According to the data compiled at the end of 1999, the frequency of computers still lags behind mobile phones. Particularly in small households, the increase in the frequency of computers seems to be relatively slow although more and more small households do nowadays have computers. The frequency of computers in small households in the different Objective

---

[1] The EU Objective-region classification is based on structural features or their changes: Objective 2 Regions, i.e., industrial regions of structural change (e.g. Hamina, Pori, Lahti, Jyväskylä), Objective 5b Regions, i.e., rural regions of structural change (e.g.. Raahe, Myrskylä, Somero, Virrat) and Objective 6 Regions, i.e., sparsely poluated regions of Northern and Eastern Finland (e.g. Rovaniemi, Kajaani and Mikkeli). The regions outside regional and structural aid, the so-called 0 Regions, or white regions, are divided into the capital region (Helsinki, Espoo, Kauniainen and Vantaa) and to Other 0 Regions (e.g.. Oulu, Tampere, Turku and Vaasa. Also the Åland Islands).

FIGURE 3. The percentage of households with access to a CD player, mobile telephone, computer and network connection in small households and family households in the autumn of 1996 and 1999 in the European Union Objective Regions (network connection in '96 = e-mail and in '99 = the Internet)
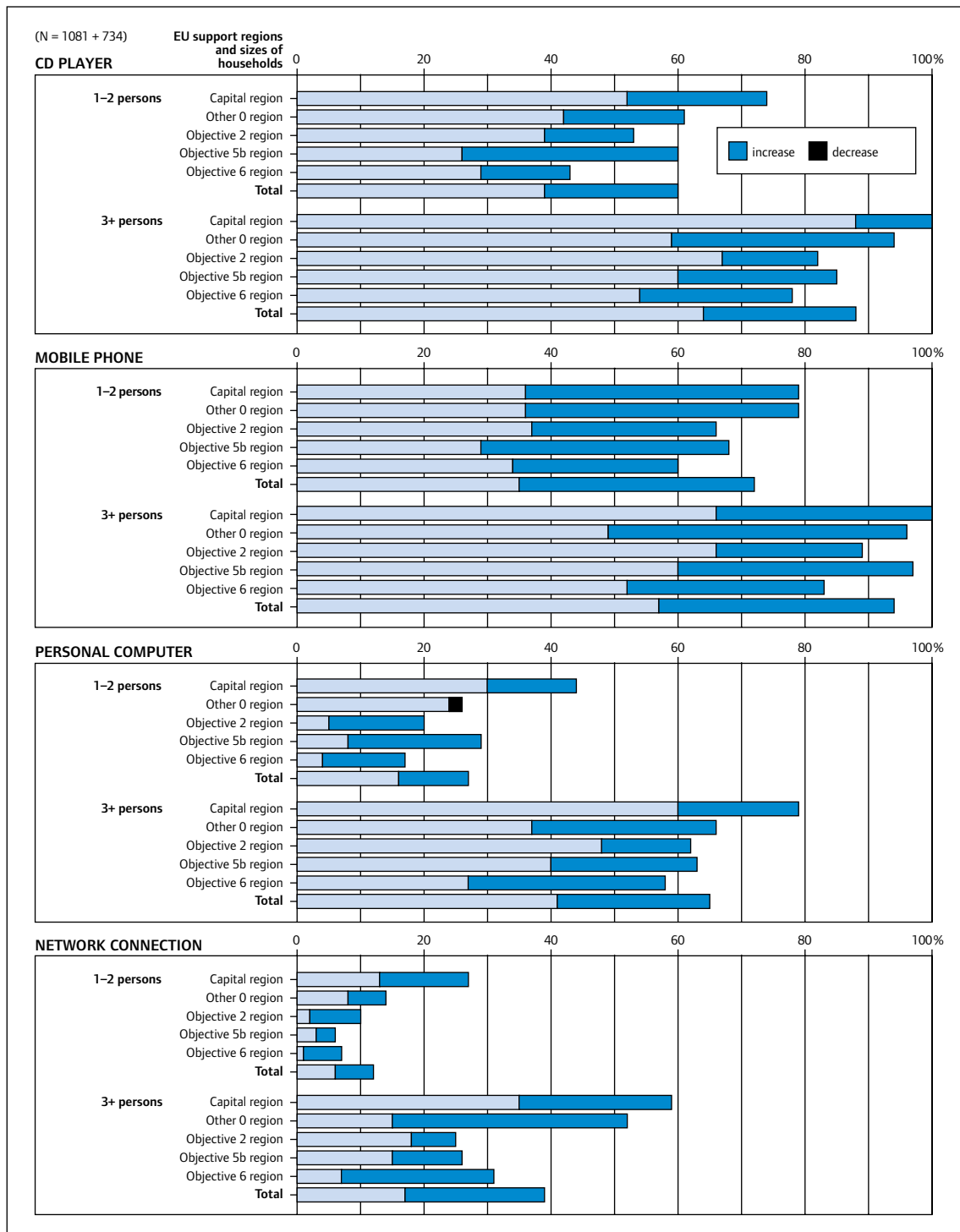
Regions varies between 17 % and 44 % and between 58 and 79 % in family households. The regional differences in the numbers of computers had remained unchanged in the case of small households and decreased in the case of family households. There is still a clear difference between the capital region and other regions, but the regional differences were reduced during the time period. With the exception of the capital region (44 %), a computer is still rare in small households.

The networking of households has started in Finland in the capital region and in the family households of the rest of the Objective 0 Regions. Small households in general and family households in the actual Objective (2, 5b and 6) Regions have usually not been connected to computer networks yet.

> **The mobile telephone has clearly become more frequent in the whole country in households of all sizes. Households are connected data networks mostly in the capital region and in other growth centres. The number of connections has increased strongly in the Objective Regions and regional differences have been reduced from 1996 to 1999.**

3.3　Connections of Finns to new information and communications technology

In the autumn of 1999, 60 % of both men and women had access to a computer. The computer was located in the home, in the workplace or in an educational establishment. The computer is used less by the older age groups than by the younger ones. Only a small proportion of those under 20 years has no access to a computer while those over 60 years have the least to do with computers. With the exception of the oldest group, a larger proportion of women than of men have access to a computer.

Approximately one-third of Finns had used an information network at home, at work, in an educational establishment or for example in the library. The group that most frequently had a network connection and e-mail was the 15–19-year-olds. On the other hand, the number of the network connections of the under 20-year-olds increased in particular by the possibility of accessing the net from school. Without this possibility, the percentage of those with access to the net would fall approximately 30

TABLE 2. Computer and network connections of the Finns and their command of Internet browsers and word processing according to sex and age at the end of 1999

MEN	AGE	< 15	15–19	20–29	30–39	40–49	55–59	60+	total
Access to a computer		97	87	64	66	61	57	15	60
Access to the network		66	61	43	38	29	32	7	35
At least one e-mail address		42	52	43	35	27	28	6	31
Moderate command of an Internet browser		72	84	55	50	34	31	6	43
Moderate command of word processing		75	83	56	50	37	46	9	46
WOMEN	AGE	< 15	15–19	20–29	30–39	40–49	50–59	60+	total
Access to a computer		97	90	67	74	76	52	8	60
Access to the network		57	55	38	43	43	18	1	32
At least one e-mail address		32	47	38	39	32	16	0	27
Moderate command of an Internet browser		66	82	55	48	44	23	1	40
Moderate command of word processing		86	84	63	64	60	30	7	50

percentage points in the two youngest age groups. The over 60-year-olds very rarely used information networks. Men has acquired or obtained an e-mail connection more often than women in all the age groups with the exception of the 30–49-year-olds. In the autumn of 1999 almost every third Finn on the average had an e-mail connection while only very few in all the age groups had their own web sites.

There were more men than women who had purchased something through the net, but the proportion of net shoppers was significant, approximately one-fifth, only in the group of 20–29-year-old men. The utilisation of services provided by the net still seems to interest only young men. There is also a group among them interested in net radio and in playing network games. Women utilised network connections provided by the libraries slightly more often than men.

When asked about their command of various software, those answering felt that their skills in using both the e-mail and an Internet browser were excellent while the number of people who felt their command of word processing was good, was clearly smaller. There were only few people skilled in computer graphics and especially in desk top publishing.

> One-third of Finns has access to the information network at home, at work or in an educational establishment. Similarly, almost one-third has an e-mail address. Young people and people of working age have network and e-mail connections more often.

3.4. Home users of computers and the net

In Finland, 51 % of all the 10–74-year-old men and 47 % of the women have access to a computer at home (Table 3). Compared to the previous figures this means that 9 % of the men only had access to a computer outside their

TABLE 3. The use of home computers and network connections as well as certain services and software among Finns in their spare time according to sex and age in the autumn of 1999, as percentages

Men	AGE	<15	15–19	20–29	30–39	40–49	50–59	60+	total
Access to a home computer		82	79	50	58	51	52	15	51
Uses a PC weekly at home		70	60	34	39	29	31	10	35
Access to the net at home		46	34	23	25	21	20	6	23
Uses the net weekly at home		29	28	23	24	17	17	4	19
Uses the e-mail often in spare time		21	32	20	21	11	16	3	16
Uses web sites often in spare time		32	36	22	21	11	11	2	17
Uses a chat line often in spare time		12	17	1	1	0	0	0	3
Uses word processing often in spare time		17	36	25	22	19	22	8	20
Uses graphics software often in spare time		11	20	12	11	3	6	3	9
Has used the CD ROM of a home PC in the past 2 weeks		50	47	31	27	17	11	5	23
Women	AGE	<15	15–19	20–29	30–39	40–49	50–59	60+	total
Access to a home computer		74	68	46	62	62	43	8	47
Uses a PC weekly at home		55	49	32	29	32	15	2	26
Access to the net at home		31	29	20	19	22	8	1	16
Uses the net weekly at home		17	24	18	14	13	2	1	12
Uses the e-mail often in spare time		20	28	16	12	12	8	1	12
Uses web sites often in spare time		18	30	14	11	6	3	0	9
Uses a chat line often in spare time		13	14	1	1	0	0	0	2
Uses word processing often in spare time		21	32	31	21	27	11	1	19
Uses graphics software often in spare time		10	7	9	1	6	1	0	4
Has used the CD ROM of a home PC in the past 2 weeks		25	27	11	12	15	1	1	10

home. In the case of women, the percentage was 13 % so the overwhelming majority of computer users also has access to a computer at home. The opportunities of pensioners to use a home computer were few. Another interesting feature was that slightly fewer of the 20–29-year-olds had a home computer compared to the younger and older age groups. Access to the net at home was more infrequent compared to access to a computer. Only in the two youngest age groups, a significant number had access to the net at home. Men had a network connection at home clearly more often than women.

If the limit of regular use is set at using the computer at least weekly, only half of the two youngest age groups used home computers regularly. A computer located at home is used at least once a week by 62 % (1.24 mil.), while three years ago the figure was 55 % (720,000). Even in the groups of young men, only just over one-fifth used the net weekly at home. Playing games on either a home computer or on a game machine was a significant pastime only for 10–19-year-old men. Last autumn www sites were visited often by approximately 30 % (540,000) and equally many had played computer games often. The percentage of those playing often had clearly decreased in three years. The home computer was used fairly often for word processing.

> **The use of home computers has increased but the use of the net is still relatively minor.**

3.5 Computers, telephone and network connections at the workplace

Most people of working age have access to a telephone at work and a growing number of Finns have access to a computer and the net. 14 % of men and 17 % of women did not need a telephone in their work. A considerable number of tasks performed by the under 30-year-old employed did not require the use of a telephone. Over half of the working time of approximately 5 % consisted of using the telephone. The work of as many as 44 % of men did not involve the use of a personal computer nor did 35 % of the tasks performed by women. Over half of the under 30-year-old employed did not use a personal computer in their work. Only one third of men and correspondingly 40 % of women had a computer of their own at work. However, in the higher age groups the proportion of men using their own personal computers increases. All in all, more people had access to their own personal computer at work than in 1996. The increase was 5 percentage points in three years.

Almost half of the women employed and approximately 40 % of the men used the e-mail system of their employer. Accessibility by e-mail had essentially improved in three years. Only approximately one third of those employed used the e-mail for contacts outside the work place. Approximately 30 % of both men and women had access to the Internet from work.

17 % of the men employed estimated that at least for short periods their own work could be performed as telework. The same estimate was reached by 21 % of the women. The willingness to telework was clearly lower than the possibility to do so but both had increased slightly in three years. The tasks of middle-aged employees seem to provide slightly more opportunities for teleworking as well as a higher willingness to do so. Only a very small

TABLE 4. The use of the telephone, computer and network connections of Finns at work as a percentage of those employed in the autumn of 1999

MEN AGE	20–29	30–39	40–49	50+	total
Does not need a telephone at work	22	17	12	6	14
Spends over half of working hours on the telephone	4	6	1	6	4
Work does not involve the use of a computer	54	45	41	36	44
Personal computer in one's own use	24	30	36	43	33
Uses the e-mail outside work	25	33	28	35	31
Access to www sites at work	25	32	27	33	30
Employer has a web site	27	26	24	27	26
Receives over 100 e-mail messages/week at work	2	2	2	3	2
WOMEN AGE	20–29	30–39	40–49	50+	total
Does not need a telephone at work	31	13	11	16	17
Spends over half of working hours on the telephone	7	11	8	2	6
Work does not involve the use of a computer	53	28	29	38	35
Personal computer in one's own use	22	42	47	38	39
Uses the e-mail outside work	14	43	42	27	33
Access to www sites at work	14	41	39	21	31
Employer has a web site	8	36	35	19	27
Receives over 100 e-mail messages/week at work	0	3	1	2	2

group thought of themselves as full or part time teleworkers, a total of under 30,000. Their number has not increased in three years. On the other hand, the willingness to telework seems to have increased slightly but still remains at a fairly low level, just over 10 % of all those employed.

Nowhere near everyone obtains a connection to information networks through their work. Particularly the jobs of the young people under 30-years of age often seem not to involve the use of a computer or the net.

While the number of those receiving over 50 telephone calls a week at work was 20–30 % in most groups, the number of people receiving over 100 e-mail messages was only a couple of percent of those employed. Thus the inconvenience caused by large quantities of e-mail at work is probably suffered by a relatively small number of Finns.

The number of those who had purchased something from the net at least once was approximately quarter of a million, i.e. 20 % of those with access to the net. In the way of a comparison it can be said that 1.8 mil. Finns had purchased something by mail order and 1.2 mil. through telesales at least once in 1999. 60 % of Finns with access to the net who had not yet purchased anything from the net had no intention of starting net purchasing and only 16 % estimate they will start purchasing this year (=160,000 new net buyers).

17 % of mobile telephone users had more text messages than calls and only 10 % had sent no text messages. Over 10 text messages during a week had been sent by 40 % of the 10–30-year-olds and by 10 % of the over 31-year-olds.

The concern of citizens that they will "be trampled underfoot" by the advance of information technology had decreased slightly (41 % ≻ 38 %). Presently every other person believes that the new information technology will increase the number of jobs whereas three years ago this opinion was held by only one quarter.

The flow of information still does not bother the large majority of Finns (88 % ≥ 86 %). Similarly, most Finns (89 % ≥ 84 %) fully or almost fully agreed with the statement "I prefer to handle my affairs by telephone rather than by letter or by means of computer connections".

> **The use of the computer, e-mail, and the net at work has increased during the last few years, although the jobs of the under 30-year-olds do not involve the use of computers or the net very often. The concern of citizens for their alienation as information technology advances has decreased slightly. The flow of information does not bother the large majority.**

3.6 Information technology and networks in banking services

The volume of payments and cash withdrawals transferred through banks in Finland is approximately one billion transactions annually. The mere extent of these transactions has steered towards the development of banking technology. Finland leads European statistics in the use of bank cards, automatic teller machines and shop payment terminals which has enabled the utilisation of technology in a different way than the use of cheques and cash. The number of cash withdrawals from automatic teller machines per inhabitant is the largest in the European Union (a total of 230 million automatic withdrawals).

Customers have started using information network-based banking services which is in part due to the decrease in the number of bank branch networks and automatic teller machines and bank transfer machines. The new technology has been utilised particularly in the development of telebanking services for enterprises, telebanking services and telephone banking services based on the use of the home terminals of private customers. The machine language level of the payment transmissions between a customer and a bank in Finland has increased from 44 % in 1990 to as high as 85 % in 1999. All transactions between banks are transmitted completely in machine language.[2]

> **Net banking services are used by approximately 1.5 million customers, which is the highest in the world in proportion to the population. The use of the Internet in stock exchange transactions is rapidly growing.**

3.7 National trunk networks and broadband connections

Information Society development increases the need of both enterprises and households for broadband connections. A broadband data transfer connection means a connection which transfers data at a speed enabling, i.a., the easy reception of a moving image. In practice this is possible at a speed of approximately 2 Mbit/second. Information Society development in Finland has been made possible by high-quality and comprehensive teleinfrastructure. The construction of broadband connections was started in Finland by the local telephone companies already in the 1980s and the networks were opened for data competition in 1988.

There are several trunk networks and operators who own and manage them in Finland. There are of over 100 operators carrying on registered telecommunications operations in Finland. At the moment there are three national and international broadband telecommunications networks: those of Sonera, Telia and the Finnet companies. In addition, several other telecommunications operators have already announced that they will build

---

[2] Source: Finnish Bankers' Association and its statistics on payment traffic.

international or national trunk networks. In addition, also for example programme transfer networks (for example television and digi-TV networks) may be used for data transfer. The data transfer capacity of all of these national trunk networks has increased considerably during the last few decades. In 2005 the capacity of the present national networks is estimated to be at least 125 times bigger than this year. The technical development of the national trunk networks is detailed in Table 5.

TABLE 5. Development of the transfer systems of national trunk networks 1950–2005

1950	60 channels in symmetrical wires
1960	900 channels in analogue coaxial cables (2–3 systems/cable)
1970	2,700 channels in coaxial cables or 1,800 channels in a radio link
1980	565 Mbit/s / fibre(or copper twin wire) (10,800 telephone channels) in a coaxial or optical cable (several fibres)
1990	2.5 Gbit/s / fibre = 4x565 Mbit/s (several fibres/optical cable)
2000	160 Gbit/s / fibre = 256x565 Mbit/s
2002	2.5 Tbit/s / fibre = 4,026x565 Mbit/s
2005	20…40 Tbit/s / fibre = 40,000–80,000x565 Mbit/s (estimate)

The connection of an individual user to the national networks can be arranged by means of several different technologies. Broadband data transfer can be implemented i.a. by means of copper cable networks (xDSL, *Digital Subscriber Line*), digital surface television networks, third generation mobile telephone networks, cable television networks, internal broadband networks of housing corporations, connection networks based on radio technology and the electricity supply network.
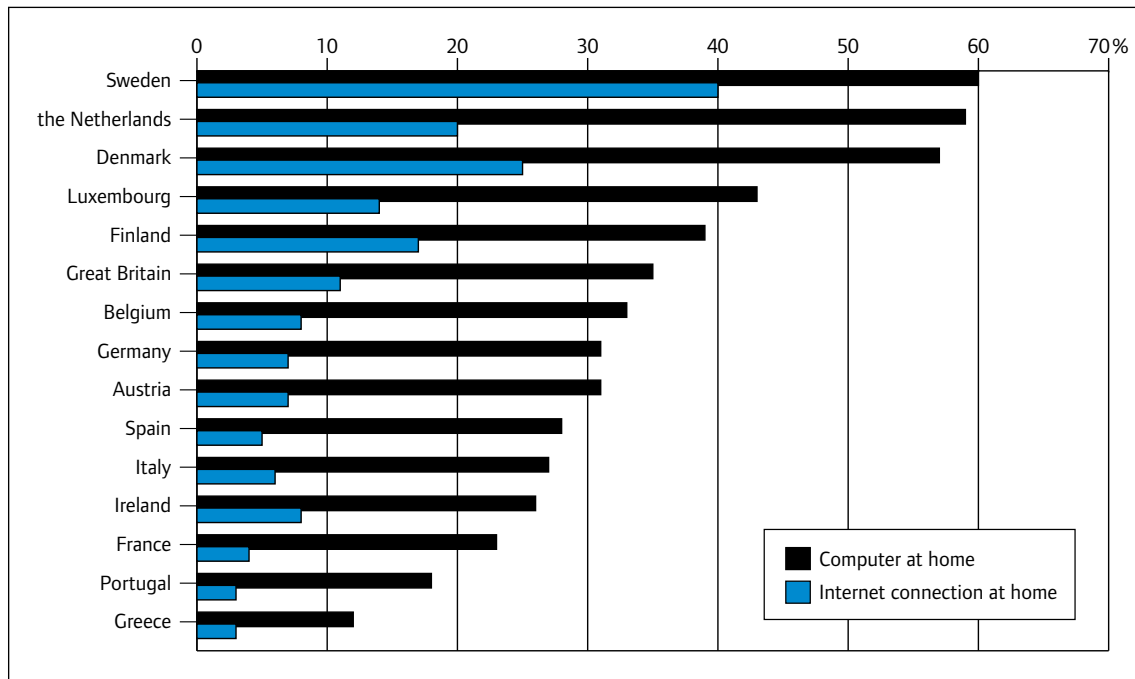
At the moment, the easiest way for an individual user to be connected to a national trunk network is usually to utilise the traditional telephone lines, which already at the moment provide every Finn with the connection required for data transfer. As the Information Society develops, we are faced with the question of whether a connection based on the traditional telephone lines will be sufficiently fast in the future to use the services of the Information Society. In addition to the connection, the use of the Internet at home requires terminal equipment, a modem and an Internet subscription. Although only few households in Finland have access to a broadband connection, there is already a broadband optical fibre connection to most telephone exchanges in Finland. Thus a broadband optical cable is located at an average distance of 5–6 kilometres from most telephone users. The question of how a sufficiently fast data transfer connection can be made accessible to the users (households, enterprises) can be solved in several ways, as indicated above.

> Technology is developing very fast and several alternative broadband networks based on different technologies are being established in the market and their increased penetration will be based on divergent market mechanisms.

3.8 International comparisons on the use of information and communications technology
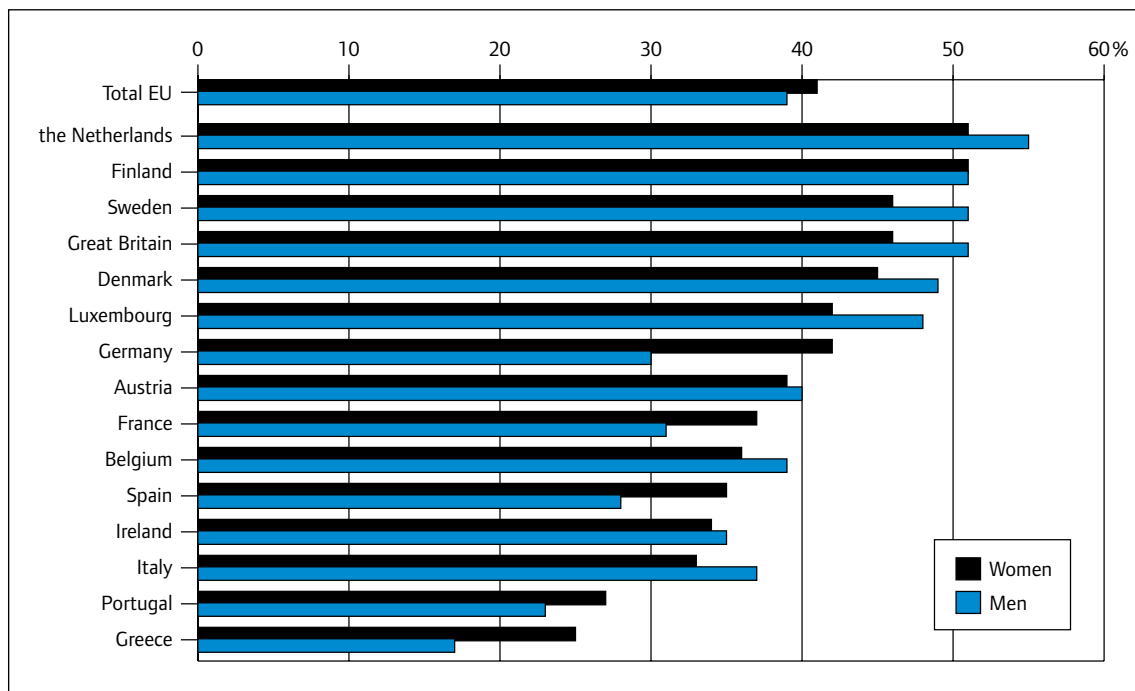
International figures on the penetration and use of information and communications technology are available from several sources. However, data acquired from different sources may vary considerably due to different

FIGURE 4. A computer and Internet connection at home, autumn 1998, % of over 15-year-olds

Legend:
- Computer at home
- Internet connection at home

Countries (top to bottom): Sweden, the Netherlands, Denmark, Luxembourg, Finland, Great Britain, Belgium, Germany, Austria, Spain, Italy, Ireland, France, Portugal, Greece

FIGURE 5. Use of the computer at work during at least 1/4 of working hours

Legend:
- Women
- Men

Countries (top to bottom): Total EU, the Netherlands, Finland, Sweden, Great Britain, Denmark, Luxembourg, Germany, Austria, France, Belgium, Spain, Ireland, Italy, Portugal, Greece

research and assessment methods. Also the time of the research and assessment effects the research results.

The prevalence of the use of *computers* and the Internet has been studied i.a. in the statistical data of the Eurobarometer published in the autumn of 1998. In the light of these results, Finland is in the top third with respect to the other European Union Member States but not quite at the top. For example, more households in the other Nordic countries than in Finland have computers and Internet connections.

There is not much data available on the use of computers at work. The latest data available are from 1996 so they should mainly be seen as indicative. However, it is possible to conclude from Figure 5 that in Finland, in addition to i.a. the Netherlands, Sweden, Denmark and Great Britain, almost half of the working-age population uses the computer in work during at least of working hours.

Network connections. When comparing the use of the Internet in the European Community and in the United States, it is evident that the United States is clearly ahead of the average European level. However, the penetration of the Internet both in Finland and in Sweden is nearly level with the United States (Figure 6[3].

FIGURE 6. The penetration of the Internet in the EU Member States and in the USA
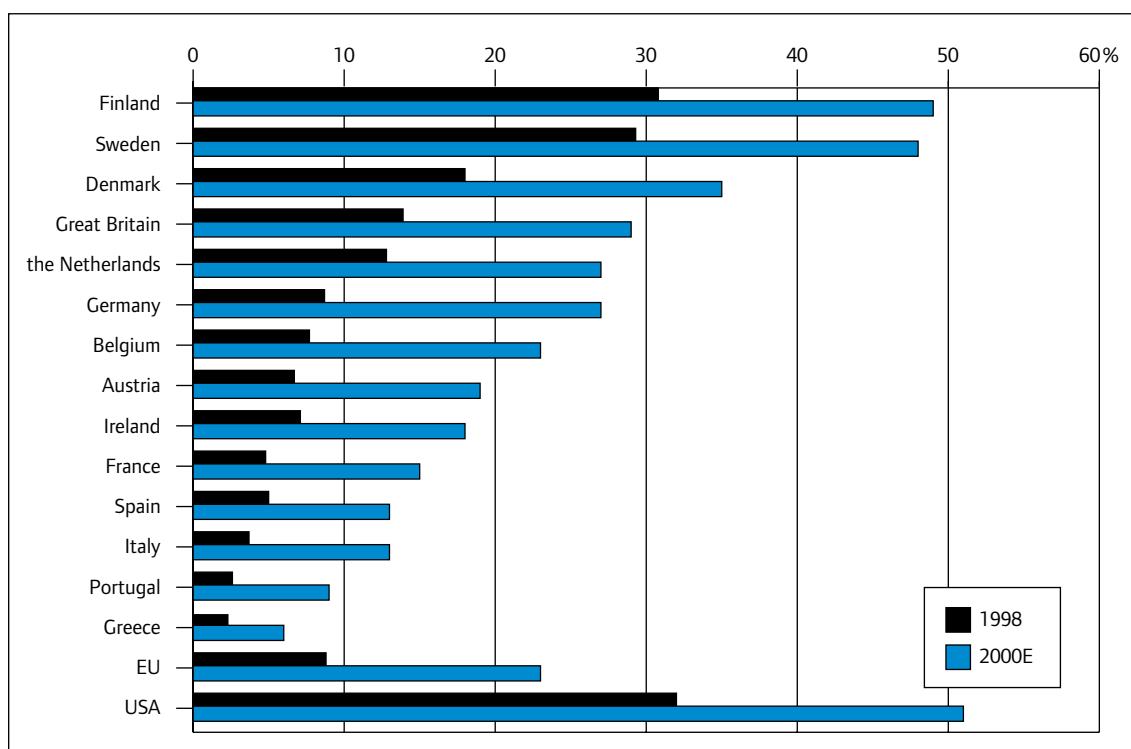
Source: Morgan, Stanley, Dean, Witter

---

3 When examining only households, Sweden has the most Internet connections with Denmark and the United States reaching the same level.

Prevalence of mobile stations. Finland is still the leading country in Europe in the number of mobile telephone connections (Figure 7). Proportioned to the whole population, already 68 % of Finns have a mobile telephone. (In subsection 3.1. above the ratio calculated on the basis of the number of *households* was ten percentage points higher). The prevalence of mobile stations in the United States does not reach the European level.

FIGURE 7. The penetration of mobile telephones in certain European countries on 1.3.2000, proportion of the whole population
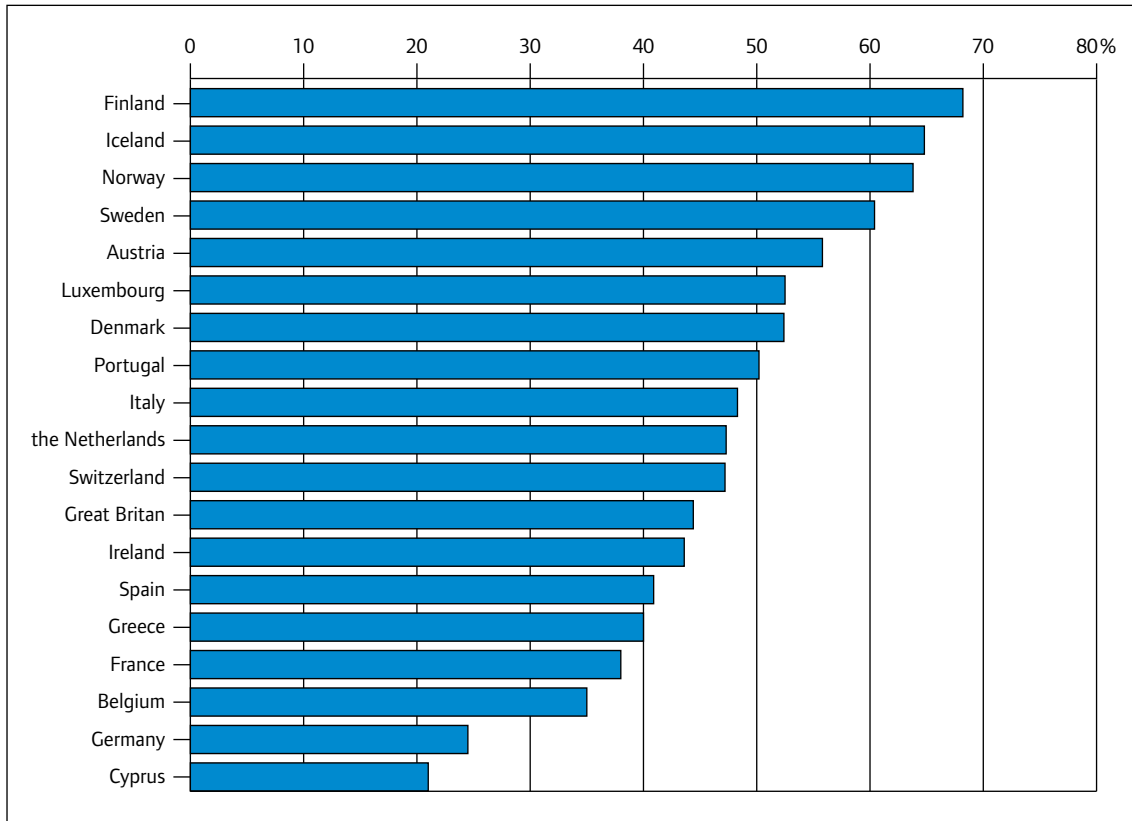
Source: Mobile Communications

4 The effect of Information Society development on the economy

This chapter will take a look at the situation and development of business sectors central from the point-of-view of Information Society development and the changes brought about in the structure of the economy by Information Society development. The utilisation of information and communications technology has significant effects on the competition situation and structure of almost all business sectors. When we move towards "digital economy", part of the present operations of practically all sectors will become information industrial. Information and communications technology investments have a significant effect on the organisation and efficiency of most operations. The development of demand for new products and services and their effects on the structure of consumption will form the third viewpoint in this Chapter.

Information and communications technology is the central force of change of the third industrial revolution now in progress. The first revolution was based on steam power and the second on the utilisation of electricity. Both previous revolutions brought about significant changes in the economy and in society. Little by little, the effects of the third revolution will become as radical as those of the two previous ones. Information Society development is still in its pioneer phase and in many ways unpredictable. Although there are many exaggerations in the discussion on the subject, it is clear that at least as far as the economy is concerned "everything" will really change though the time span may well prove to be quite long.

4.1 Development of the communications sector

Technical development

During the last few decades, the communications sector has been characterised by fast technological development and a continuous flow of new innovations. The most significant technical solutions include optical cables, digitalisation and wireless communications technology. The optical cable has increased the transfer speeds of fixed networks considerably. Thus distance has lost its importance as a cost factor in communications services. When using optical cables, information can be transmitted far with low marginal costs.

Digitalisation has been extremely important for the development of the communications sector. In addition to better quality and speed, it has enabled the provision of many new services (e.g. interactive multimedia) through the networks.

The digitalisation of the television networks is also under way. The term of the analogue television licenses will terminate at the end of 2006 when analogue transmissions will end. In addition to traditional television programme services, digitalisation will also enable the provision of interactive content services (e.g. Internet services) through the television network.

Perhaps the most significant result of digital technology and the related innovations has been the convergence of telecommunications, information

technology and the media (cf. Figure 8). Once recorded, sound, data and images can be provided in different networks. Due to digital recording, copying and making changes is easy and cheap and transmission is effortless.[4]

FIGURE 8. The convergence of media, information technology and telecommunications in the 1990s
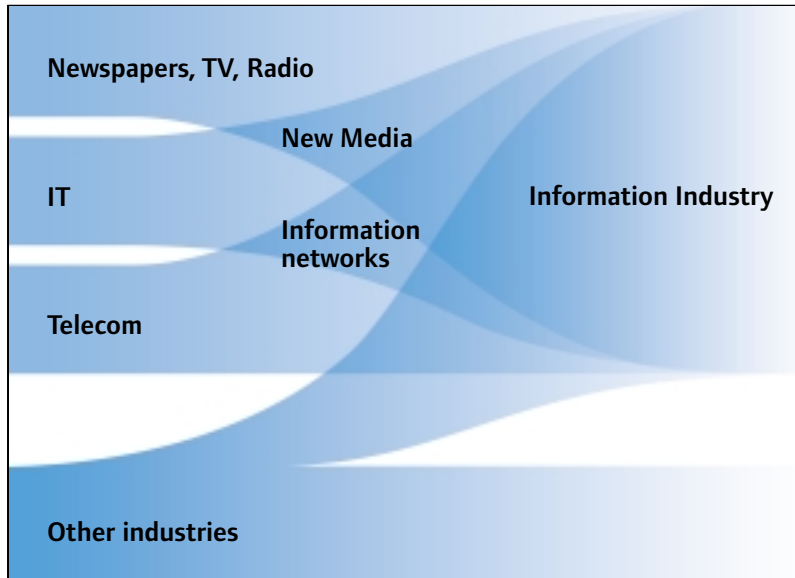
Source: Laura Paija and Petri Rouvinen, Etlatieto Oy (partially Mäenpää & Luukkainen, 1994).

As a result of the convergence, it is more and more difficult to separate the three sectors mentioned – often it is practical to refer to these three sectors together as the information industry. In the development phase presently in progress, part of practically all the industrial and service sectors will become information industrial. Electronic commerce is only the beginning of this trend; the final objective is some kind of a 'virtual' business model, parallel to which the traditional 'physical' operation will, however, be preserved. In the Information Society, an increasingly large section of the factor inputs and end products will be immaterial – know-how and information – and the competitiveness of enterprises will, to an ever increasing extent, be based on their ability to produce, control and utilise information.

As a result of technological development, the costs of constructing telenetworks, the switching and sending of calls, the transmission of data and images as well as data processing have fallen considerably. The result has been that also the prices of calls have fallen. In addition, technological development has enabled the provision of new communications products – e.g. Internet services and multimedia applications – at reasonable prices. Due to the universal usability of information and communications technology, the spectrum of potential application targets is practically limitless.

> **The most significant consequence of digitilisation has been the convergence of telecommunications, information technology and the media.**

---

[4] Practical examples of convergence include, i.a., Internet calls and Internet services in the mobile networks.

Communications markets

Telecommunications, information technology and the media are merging into one sector. Therefore the information and communications technology cluster (ICT[5] cluster), outlined in Figure 9, is well suited as the framework for studying the communications markets. In the centre of the figure is a theoretical chain of digital content and its packaging for distribution and final use. In practice this value chain is relatively chaotic. The group Local sectors contains some sectors which are deemed to have a significant effect on the development of the ICT cluster or where special potential can be seen in its information industrialisation. Through the appliers and users of information and communications technology, the development of the ICT cluster touches almost the whole of society (cf. Figure 9).

FIGURE 9. The information and communications cluster (ICT)
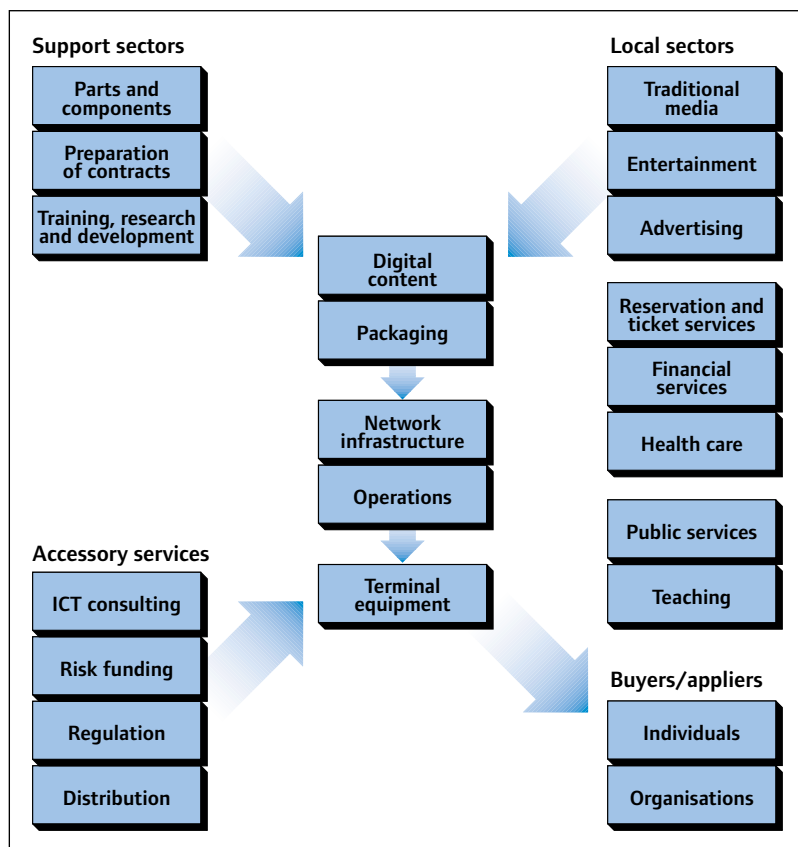
Lähde: Laura Paija ja Petri Rouvinen, Etlatieto Oy

As the result of the technological convergence i.a. 'the content production sector of the digital media', i.e., the 'new media', was established in the mid-1990s; it includes the planning, implementation and provision of information network and multimedia applications as well as packaging directly related to the applications (e.g. user connection software) and consultation. The sector is perhaps the fastest growing section in the ICT cluster. It has been estimated that its turnover in Finland will be in the range

---

[5] ICT=Information and communications technology.

of approximately FIM 1 billion (€ 168 million) in 2000, i.e., about four-fold compared to 1996 (Tekes, The New Finnish Media, 1999).

The Internet is the central marketing channel and trading place of digital content products. The Finnish Internet market is one of the most advanced in the world. The price level of Internet services is one of the lowest in the OECD countries. That is why the use of the Internet has increased rapidly during the last few years. The market value of Internet connection services in Finland rose from approximately FIM 7 million to FIM 350 million (€ 1.2 million to € 58.8 million) (estimate by the Ministry of Transport and Communications) in the years 1994–98. The Internet service markets are centralised: at the beginning of 1999 the market share of the three biggest service providers exceeded 80 % of private customers.

The convergence has also resulted in cooperation between enterprises, mergers and company acquisitions while content producers, operators and equipment suppliers search for synergy benefits; thus also corporate structures and organisations are changing as a result of technological development. In the international market this is illustrated for example by the merger of the Internet service company AOL and the media company Time-Warner and in Finland for example by the joint venture of the telecommunications operator Sonera and the publishing company Talentum providing Internet services. The total value of corporate mergers and takeovers in the telecommunications markets of the world exceeded 300 billion euros in 1999 (Talouselämä 40/99: p. 57). This trend is likely to continue also in the future.

The growth of the Finnish ICT sector[6] has been fast, although its proportion of the labour force still remains relatively low.[7] The turnover of these enterprises, however, is approximately ten percent of the turnover of all enterprises operating in Finland; as late as in 1993 the corresponding share was only five percent. The share of the GNP of the sector was approximately 4 % in 1997.

The importance of telecommunications operators for the economy has increased continually.[8] To a large extent this has been due to the growth of mobile communications. The return from mobile calls already covers well over half of the total return of telephone operations.

The growth has been even faster in the manufacture of telecommunications equipment. The gross value of the manufacture of telecommunications equipment was FIM 5.3 billion (€ 891.4 million) in 1990 where as in 1998 it already exceeded FIM 69 billion (€ 11.6 billion).

As a result of technological development and legislative amendments particularly competition in the telecommunications markets has become fiercer and the pressure for cost-based pricing has increased. Competition in Finland is fierce particularly in the case of long-distance calls and international calls.[9]

---

[6] In this evaluation the ICT sector includes office and data processing equipment (ISIC 3825), radio, TV and data communications equipment (ISIC 2832) as well as communications services (ISIC 72).

[7] According to OECD (2000, p. 223) 3.8 % in 1997. Also the other data of this paragraph are based on the same source.

[8] This is apparent i.a. in the share of the GNP of telecommunications operators: in 1990 telecommunications operators were responsible for approximately 1.6 % of the GNP, in 1998 the corresponding figure was already approximately 3 %. The total turnover of telecommunications operators in FIM terms has increased during the period in question by over 10 billion FIM, which means a growth of approximately 129 %.

[9] The market share of international calls of the new competitors was approximately 39 % in 1997.

The markets of fixed network connections and local calls have remained in the control of the Finnet companies and Sonera. It is likely that in the near future competition will increase in both the mobile communications and local call markets. The reason for this is the third company providing GSM-900 mobile station services entering the markets in addition to Radiolinja and Sonera, and especially the construction of the third generation mobile station networks i.e. the Universal Mobile Telecommunications System (UMTS) networks, offering an alternative Internet connection for fixed network connections.

UMTS networks enable sound, images and data to be transferred extremely fast. Before the construction of these communications networks, the local telecommunications operators who own the fixed telecommunications network leading to households have a monopoly in the last section of the communications network required for the provision of Internet connections. The constructors and service providers of UMTS networks may become significant competitors in the local call market. In addition, Internet calls may become a significant factor increasing competition. The increase in the use of Internet calls will, to a great extent. depend on the equipment acquisitions of households and the purchase of Internet connections in the future. It is also not yet clear to what extent the digital TV network will be used as a distribution channel for information network services and how strong a competitor it will become to the leased lines and mobile telephone networks. Also the electricity networks are being developed so that they will be suitable for fast data transfer but there are certain problems in their use in communications.

The ICT cluster is formed of several sectors. Most of the market sectors are changing and developing very fast. Businesses which operate only in the Internet (the so-called dotcoms) bring totally new content to the sector and compete in a completely new way not only with the enterprises of the ICT cluster but also with i.a. traditional commercial businesses; the mutual competition of the dotcoms is particularly fierce. The business operations of these enterprises – often still operating at a loss – are based on future expectations. In the next few years, the competition will significantly re-shape the ICT cluster and trim off some of the businesses presently in operation.

> **The information and communications cluster will continue to grow strongly in Finland. The Finnish areas of strength are the manufacture of equipment and mobile communications. The emphasis of international growth is moving towards content production.**

4.2   Electronic commerce[10]

The assessment and evaluation of electronic commerce is problematic, because there is no uniform, universally approved definition of electronic commerce or indicator describing its extent.[11] Assessment errors are also caused by the fact that several enterprises are engaged in both traditional and electronic business at the same time. In addition, it may be in the interests of the institutions studying electronic business to present a positive

---

[10] OECD defines network commerce as either a business operation taking place between enterprises or between enterprises and consumers in open networks such as the Internet. According to this definition electronic commerce in closed networks (EDI/OVT) is not network commerce.

[11] OECD is presently drawing up recommendations for the assessment of electronic commerce.

picture of the future of electronic commerce. Due to these assessment problems, the evaluations presented by different research institutions on the development of electronic commerce may not be comparable.

Although the evaluations of electronic commerce of the different sources differ from each other, their basic message is uniform: in proportion to the present volume of business its importance is still relatively minor, but the growth expectations are huge. Although network commerce between enterprises and consumers receives a lot of attention, the real volume is to be found in trade between enterprises, where also the biggest growth expectations are to be found.[12]

Use of information and communications technology in enterprises

The future of electronic commerce essentially depends on the use of information and communications technology in enterprises. Statistics Finland compiled a questionnaire at the beginning of 1999 called *'Use of ICT in enterprises'*, which indicates that the use of the Internet is growing fast. In 1995, only one-tenth of enterprises used the Internet; in 1999 almost 90 % of enterprises had access to an Internet connection. Thus the majority of Finnish enterprises have the equipment, software and services required for electronic commerce. The most enthusiastic use of the Internet is in the acquisition of information; the company's own products and services are provided in the Internet less frequently. Company service providers are more active in this respect than commercial and industrial enterprises.

Data security problems are the biggest hindrance to the utilisation of the Internet in enterprises. Approximately one-third of enterprises sees the small size of customer potential as a hindrance to electronic commerce. Over one-fifth of the enterprises that answered the questionnaire of Statistics Finland also stated that for them the uncertainty of payment traffic and logistics-related problems are major hindrances to electronic commerce.

Electronic commerce between businesses and consumers

The use of the Internet has increased in the world at an amazing rate.[13] A huge global clientele can be reached at present and especially in the future through the Internet, which is likely to promote the growth of electronic commerce. The domestic potential is naturally more limited but significant nonetheless.[14]

The amount of purchases made by consumers through the Internet has increased rapidly: *'In September-October 1998 the number of Finns who had purchased or ordered products through the Internet exceeded 200,000, in January-February 1999 300,000 and 400,000 in March-April of the same year'* (Finnish Information Technology Development Centre (Tieke), Sähköisen kaupankäynnin aapinen [The ABC of Electronic Commerce], 2000, hereinafter Tieke, 2000). According to a study made by Gallup Finland, approximately 13 % of 15–79-year-old Finns had made purchases through the Internet. The proportion of electronic commerce in the retail

---

[12] According to one estimate (cf. Kauppalehti Optio, 6.4.2000) network commerce between enterprises will increase for example in the USA from USD 43 billion in 1998 to USD 1,000 billion by 2003; at the same time the consumer markets will grow from USD 7.8 billion to USD 108 billion. Thus the aggregate volume of network commerce will increase twenty-fold. According to these figures, the relative proportion of consumer trade would decrease from over fifteen to under ten percent.

[13] According to Network Wizards Internet Domain Survey, the number of servers connected to the Internet increased by approximately 30 % between January and July 1999 (from 43.2 million computers to 56.2 million servers connected to the Internet).

[14] There were over 480,000 computers connected to the Internet in Finland in March 2000 (Tieke, 2000). According to the questionnaire made by Gallup Finland in May 2000, over 1.5 million over 15-year-olds used the Internet at least once a week.

trade remains small but in this respect the Nordic countries are at the top in Europe.[15]

The most common products purchased by Finns through the Internet are books, CDs and magazines. Buying perishable goods through the Internet is not very popular and no significant increase can be expected in the near future[16] while the Internet sales of such products as tickets to leisure events, travel tickets and travel and hotel reservations are expected to increase.

Finns are used to self-service. It is therefore no surprise that in proportion to the population Finland is the leading country in i.a. the use of online banking services.[17] At the moment approximately 1.5 million Finns have access to an online bank account. In 1997, banking services were the most significant telecommunications information service used by Finns (70 %). Other important services related to leisure time and entertainment (4.8 %) and communications (7.8 %).

Electronic commerce between enterprises

Finnish enterprises have been engaged in electronic commerce with other enterprises already for a long time by means of the EDI – Electronic Data Interchange i.e. electronic, special-format, standardised data transfer between computers across closed networks. Since the mid-1990s the open Internet has become more and more important as a means of electronic commerce between enterprises. By transmitting i.a. invoices and order confirmations and transport documents through the information networks, enterprises have tried to increase the efficiency of their business operations, achieve better customer service and savings in costs.

Most of electronic commerce takes place between enterprises: '*In electronic business, the volume of trade between enterprises is at least four times larger than the volume of consumer trade*.' (Tieke, 2000). According to an estimate of the OECD, business-to-business electronic commerce constitutes approximately 70–85 % of the total return of electronic commerce.

The future of electronic commerce

Electronic commerce is expected to increase sharply because information networks as trading places provide many advantages when compared to traditional trading for both the seller (for example low marketing costs for extensive geographical areas) and the buyer (for example shopping irrespective of time and place). According to an estimate of the OECD, savings of almost 90 % can be achieved i.a. in banking through the Internet compared to the traditional practice.

The volumes of network commerce between enterprises and consumers in Finland and in Europe are expected to increase considerably more slowly than in the USA with one of the reasons being that in the USA mail order sales have traditionally covered a considerably larger proportion of retail trade than in Europe. In other words, the buying habits of American consumers favour network commerce. In addition, the infrastructure required by electronic commerce (i.a. logistics and other services relating

---

[15] According to the Boston Consulting Group the online returns in the Nordic countries were 0.4 % of total sales; the corresponding figure in the USA is in the range of just over one percent.

[16] Less than one-tenth of those answering a questionnaire compiled by Gallup Finland at the beginning of 2000 stated that they could consider buying food or perishable goods through the Internet.

[17] One-fifth of the customers of for example MeritaNordbanken uses Internet banking services (Connectis (Financial Times), March 2000, p. 55). Compared to their foreign competitors, the numbers of online customers of the Finnish banks are large even in absolute terms.

to teleshopping) is more developed in the USA than in Europe. The growth of network commerce in Europe may also be slowed down by the fact that households using the Internet through the telephone network are invoiced according to the time used unlike in the USA, where local calls are included in the fixed monthly fee. Also the prices of the leased lines required by the service providers are higher in Europe than in the United States.

Some of the most significant factors effecting the growth of electronic commerce are data protection and data security as well as consumer and privacy protection relating to electronic commerce.[18] The aim of the European Union is to remove the legislative hindrances of electronic commerce, to improve security and protect personal data.[19]

On a political level, the future of electronic commerce is effected for example by how well one succeeds in creating the rules of the game of network commerce (e.g. taxation) and how closely the authorities will guide and regulate electronic commerce.

European companies have developed network commerce services more slowly than those in the United States, but they are predicted to follow the lead of American companies. We have learned from the experiences of the United States that being first is an important strategic advantage in network commerce: growth and market shares are more important than profits in the pioneer phase. According to EITO (European Information Technology Observatory 2000) the value of electronic commerce (i.e. the value of the goods and services which have been traded solely in electronic format) was approximately € 262 billion in 1998 and it is predicted to rise to € 717 billion by 2002. Germany and Great Britain are the biggest European electronic commerce markets. It is estimated that the Nordic countries will cover one-tenth of the electronic commerce of Europe in 2002. Although the USA has dominated the Internet markets up till now, EITO sees Western Europe as the biggest growth area in the near future.

The basic prerequisites for the development of electronic commerce in Finland are good: the communications network is comprehensive, the use of the Internet is extensive and the prices of communications services are low. The growth will be influenced by the spread of the infrastructure required (i.a. fast data transfer connections) and of the use of the Internet. The technical skills of consumers and enterprises, the speed and ease of using the services and confidence in electronic business will also have an effect.

The greatest volume of electronic commerce is formed by trade between enterprises. There are good basic prerequisites for electronic commerce in Finland. Central factors influencing the growth of electronic commerce are the skills of consumers and enterprises, confidence in network commerce as well as the speed and ease of using network services.

---

[18] According to the Boston Consulting Group payment systems and the security of payments form a significant hindrance to network commerce in Europe. In the USA over 90 % of net purchases are paid by credit cards; in the Nordic countries the figure is only 20 %.

[19] This is illustrated by the Directive adopted at the end of 1999 for providing uniform provisions for electronic signatures, which will make an electronic signature legally acceptable, and the Directive to be issued in June 2000 clarifying the legal issues relating to electronic commerce within the internal market of the European Union.

4.3　Effects on the operations of enterprises

Small and medium-sized enterprises

Small and medium-sized enterprises (i.e. enterprises employing 5–250 persons) still lag behind large enterprises in the use of ICT but their information technology investments are expected to increase quickly. Part of the reason for this is the technology, which is cheaper and easier to use than before, but the most important reasons are related to the market effects of the Internet and electronic commerce. Particularly for small and medium sized enterprises aiming at narrow markets, the Internet is an excellent aid because it provides the possibility of studying the buying behaviour of consumers and a marketing and sales channel to extensive geographical areas at reasonable costs. Especially in international trade the Internet enables lower transaction costs than before because transferring data is essentially cheaper and more efficient. For some of the small and medium-sized enterprises operating as subcontractors, the use of the Internet is essential if they want to continue material or goods deliveries to large enterprises.

There are also pioneers in the use of ICT among small and medium-sized enterprises. There is a group of new small and medium-sized enterprises in the market operating only in the Internet (the so-called dotcoms) and their economic importance is increasing.

Finnish small and medium-sized enterprises are progressive Internet users in European terms: the majority of Finnish small and medium-sized enterprises have an Internet connection – in Europe fewer than one-fourth have one.[20]

According to Tieke, over one-fifth of Finnish small and medium-sized enterprises offers their products or services for sale or to be ordered through www sites and 28 % order products through the Internet. According to the estimate of the enterprises themselves, approximately sixty percent will order and over fifty percent will offer their products through the Internet within two years. According to a study made by the Ministry of Trade and Industry and the Finnish Entrepreneurs' Association, the most typical uses of the Internet in Finnish small and medium-sized enterprises are the e-mail and the acquisition of information as well as banking services and data transfer.

According to a study made by the Philips Group, the electronic commerce operations of European small and medium-sized enterprises is still insignificant. The technological facilities exist in many enterprises but only one-tenth has an electronic commerce strategy of any kind. The ability to network and create new, flexible business operation models utilising network commerce or the Internet will be the crucial factor of the success of small and medium-sized enterprises in the near future.

Finnish small and medium-sized enterprises have better technical facilities for network commerce on an average than their European competitors. The success of the small and medium-sized enterprises will largely depend on their ability to create new, flexible business operation models utilising electronic commerce and the Internet.

---

[20] According to an estimate by EITO, fewer than one-fourth of the 15.7 million European small and middle-sized enterprises have an Internet connection and only approximately 10 % have their own web site. According to the study which the Ministry of Trade and Commerce and the Finnish Entrepreneurs' Association made at the beginning of 2000, over 70 % of Finnish small and medium-sized enterprises had access to an Internet connection and approximately every third had their own web site. Small and medium-sized enterprises engaged in export clearly had Internet connections more often (86 % of the enterprises) than small and medium-sized enterprises operating only in Finland (66 % of the enterprises).

Digital content production, i.e., the new media

Digital content production, i.e., the new media has only been discussed in Finland for a few years. However, the provision of content in a digital format is radically changing the media sector.

The new media sector includes (Tekes, 1999) the planning and implementation of www services, multimedia solutions and products as well as the provision of content relating to them, Internet advertising and marketing as well as training and consultation relating to the above. In 1999 there were approximately 330 new media enterprises in Finland. According to a study by LTT Research Ltd, another feature characterising the new media sector is the increasingly explicit specialisation of the enterprises to specific new media businesses. Competition in the sector is increased for example by the development of the new media skills of telecommunications operators. The majority of the new media sector enterprises are located in Southern Finland. Most of them are engaged in international cooperation.[21]

The new media is a young and quickly expanding sector. The development and success of its enterprises will largely depend on the strength of their financial basis and the availability of skilled labour.

> **The provision of content in a digital format has radically changed the media sector. The success of the new media enterprises will largely depend on the strength of their financial basis and the availability of skilled labour.**

4.4   Effects on the economy

Productivity, the operating policies and competitiveness of enterprises

There is a positive connection between information technology investments and the productivity of enterprises.[22] Technology can only be fully benefited from by amending business policies in ways made possible by information and communications technology.[23] When enterprises invest in information technology in all sectors, the effects can also be seen on the macro level. According to the estimates made at the Wider-Institute, the proportion of computer investments of the increase in the GNP of Finland has been about one-sixth in the period 1983–96. In other words, information technology investments generated 0.38 percentage points of the 2.4% average annual increase during the period in question. Correspondingly a study by the OECD estimated that the effect of information technology investments on the growth of the G-7 countries was on an average 18% in the years 1990–96.[24]

Enterprises benefit from ICT investments i.a. in the form of cost savings. According to EITO (2000), significant savings can be achieved especially in the initial costs of raw materials and intermediate products (as much as 80% in enterprises manufacturing medical products). Also the maintenance

---

[21] According to LLT approximately 70% of the enterprises of the sector operate in Southern Finland. Almost half of the enterprises of the new media sector participate in international cooperation and over 60% estimate they will expand their business abroad within the next two years.

[22] A few years ago the productivity effects of information technology were still being widely discussed (the so-called 'productivity paradox' literature). In the light of recent research the positive productivity effects of ICT investments are indisputable. Part of the reason for this 'doctrine dispute' may be the practical problems of assessing productivity, the organisational changes required by information technology investments, which typically take place at a much slower pace than the introduction of technology, and a statistical delay relating to empirical data.

[23] The topic was discussed e.g. in the publication Benchmarking Diffusion and Utilisation of Information and Communication Technologies (ICT) and New Organisational Arrangements published by the European Union (DG III) and the Ministry of Trade and Industry.

[24] Source: Regeringens proposition 1999/2000:86. Ett informationssamhälle för all. Stockholm den 28 mars 2000.

of smaller stores than previously has brought about significant savings (approximately 40–50 % for manufacturers in the aviation and automobile industries).

The Internet also provides enterprises with a new marketing and sales channel. In addition enterprises may acquire information through the Internet on the preferences and consumption habits of consumers and thus increase their competitiveness. Electronic commerce provides the producers of goods and services a possibility to sell their products directly to the end users. Therefore the roles of the market parties in some sectors (e.g. the retail trade) may change even radically. For example many enterprises at the distribution stage (e.g. automobile retailers) may find it necessary to plan new business models because part of their traditional tasks are being transferred to the manufacturers.

Products and services based on digital technology typically involve high research and development costs. On the other hand, the costs of manufacturing additional units (i.e. the marginal costs) are low. Additionally, they also often have so-called network effects, which can be either direct and/or indirect. In the first alternative, the benefit to the user increases 'directly' as the size of the network grows, because there are e.g. more potential e-mail contacts. In the latter alternative, the extensive prevalence of e.g. computer operating systems software will bring indirect benefits as it will attract providers of complementing technologies and compatible products and services. Because of the direct and indirect external effects, network markets have a tendency to favour technology which has originally been successful irrespective of its superiority. Therefore the first provider of an information product or service has the opportunity of taking over the market and making big profits.

The changes brought about by information technology are already so extensive that, at least in the United States, one talks of the so-called 'new economy'. The purpose of this is to emphasise that the conformities of the present economy deviate significantly from the earlier ones. Information and skills are the most important resources of the new economy. Networking effects, the external effects relating to skill and information as well as economies of scale are the most important variables of growth and competitive success.

Due to technological development (particularly the extensive use of ICT) and globalisation (particularly the internationalisation of enterprises), world economy has grown fast. The growth has also continued for an exceptionally long period; there is even talk of a permanent speeding up of growth. In the 'old economy' a fast growing economy also meant the acceleration of inflation; in the 'new economy' product and process innovations and global competition keep inflation in check. It is true that globally there have been so significant changes in the operations of enterprises and markets that we can justifiably talk of a new economy. Due to the lack of history information it is not clear how the changes will effect economic fluctuations and their duration.

There is a positive connection between information technology investments and productivity. The use of information and communications technology within enterprises requires new organisational arrangements. The adoption of information technology will bring about changes also in the relations between the market parties. The changes are so extensive that we can talk of a 'new economy'.

The structure of the economy

Information Society development has changed the structure of our economy significantly. Our domestic industry has traditionally been raw material, capital and energy intensive and has utilised economies of size. Nowadays the proportion of high technology goods exported is one of the highest in the industrialised countries (20%)[25] and the trade surplus (i.e. the import/export relation) the highest in the European Union (cf. Figure 10). Mainly due to the immense growth of the electronics industry, Finland has moved from the lower end of the European countries to the leading place in respect of the trade surplus of high technology products in less than ten years. The electricity and electronics industry is the most significant export sector in Finland already constituting almost 30% of the export of industrial products. It has superseded the paper industry, which at present represents less than one-fourth of exports. In spite of its size, Finland is a significant exporter of data communications equipment even in absolute terms: our share of the total exports in OECD in 1998 was 5.5%.

FIGURE 10. The relation of the import and export of high technology products in the EU Member States in 1990 and in 1997
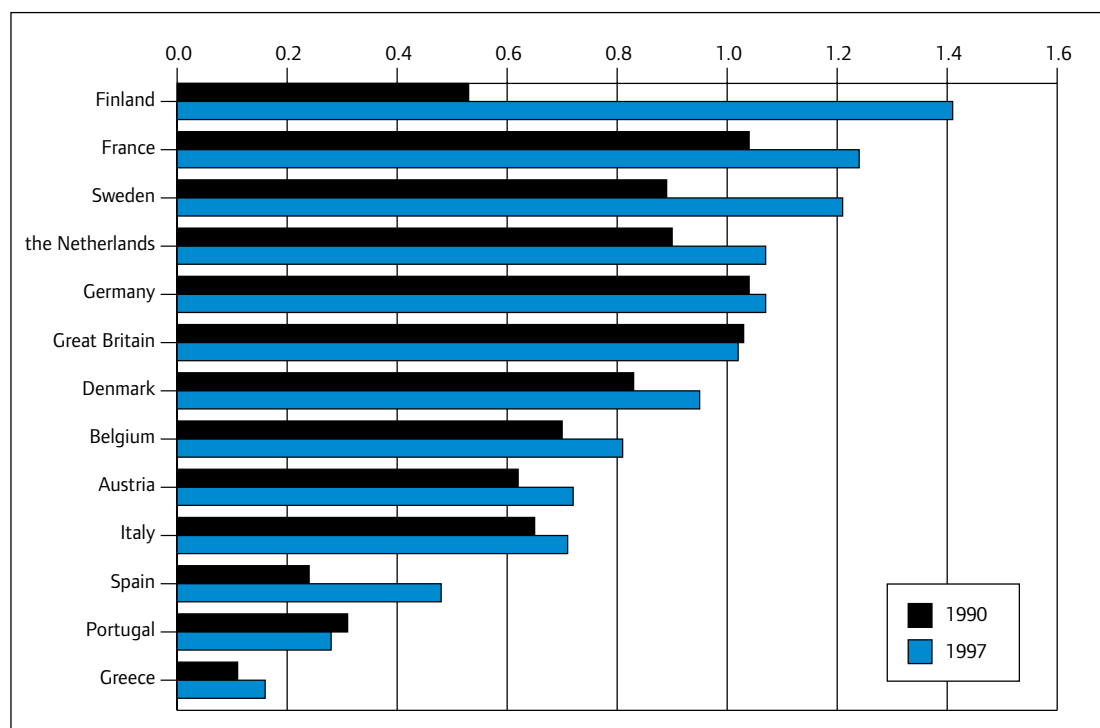
The success of the electronics industry, particularly Nokia, has had significant multiplier impacts. Nokia has also played an important role in the diversification of the production structure and especially as the engine of the ICT cluster.

The Information Society is also a service society; services already cover on an average two thirds of the GNP of the OECD countries. Electronic commerce will increase the importance of the role of the service sector even further; i.a. the equipment manufacturers are expected to increase the service content of their products.

---

[25] A list of the high technology sectors is available at: http://www.tilastokeskus.fi/tk/yr/tthuippuka.html#eka.

In addition to information intensive sectors, the utilisation of ICT has a strong influence also on sectors where technology can be utilised in the integration of systems. These sectors can be found i.a. in industries where the arrangement of subcontracting enables the implementation of new business models, in health care where services and operations require many information systems as well as in the financial sector. The effects of ICT are generally visible also in the whole logistic operation of an enterprises and in the networking cooperation.

The business effects of electronic commerce vary according to sectors. The biggest changes will probably occur in information intensive service sectors, i.a. in the financing and insurance sectors as well as in travel and entertainment services. In these sectors the effect of electronic commerce is particularly strong because a significant number of the services can be transferred into digital format. The changes will be slight in sectors where a tangible product is important. Considerable changes will take place also in sectors where the present distribution chains have multiple levels.

> **The Finnish information and communications technology cluster is one of the most competitive in the world. Information Society development involves extensive changes in the structure of the economy. Most changes will take place in sectors where products and services can be provided in digital format.**

Innovation activity

The fact that information and skills have become our most important resource is also visible in the strong increase in research and product development costs (R&D costs). In 1997, FIM 17.3 billion (€ 2.9 billion), 2.8 % of the GNP[26], was spent on R&D in Finland.

The communications sector is one of the most innovative ones in Finland when measured by both the number of patent applications and R&D costs. In 1996 almost 12 % of all the patents filed with the European Patent Office in Finland related to communications technology; the corresponding figure in 1990 was only approximately 4 % (EuroStat, 1998).

In 1997, over 60 % of the research and development of the private sector was performed in sectors which are important for the Information Society (Statistics Finland, On the Road to the Finnish Information Society II, 1999); at the beginning of the 1990s the share of these sectors was only approximately one-fourth. The R&D share of the ICT sector in Finland is clearly the largest in the OECD countries.

ICT also affects the innovative operations of other sectors. Networking and the use of new communications equipment has facilitated the mutual research cooperation of enterprises as well as that between enterprises and the scientific community. Also the spreading of information and innovations has become faster. In addition to these factors also the considerable increase in calculation efficiency has speeded up innovation processes (computer simulations are used in e.g. biochemistry to search for new pharmaceutical compounds).

> **Most of our product development is carried out sectors which are important for the Information Society. The R&D share of the ICT sector in Finland is the highest in the OECD.**

---

[26] Statistics Finland estimated that the share of R&D costs of the GNP exceeded 3.1 % in 1999; the figure is one of the highest in the world.

Structure of consumption

The share of data communications services[27] of the total demand for services has almost doubled in five years.[28] In the 1990s the demand for data communications services increased over threefold while the demand for all services increased by less than 40 % (cf. Figure 11).

FIGURE 11. Development of the demand for data communications services.
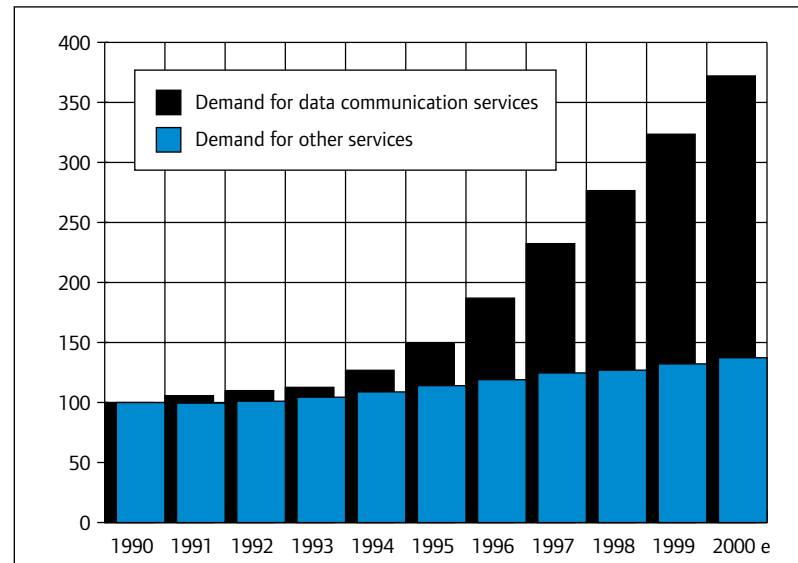
The most significant of the changes relating to the use of communications products and services have been the considerable increase in the cover and use of mobile networks and the increasing penetration of the use of the Internet. Finland has risen to the top of OECD countries in the use of both mobile stations and Internet services.[29]

Approximately 42 % of Finnish households had a personal computer and 22 % had an Internet connection. The active use of the Internet by the Finns is partly explained by the low operating costs. The continuous decrease in the prices of computers is an important factor increasing demand. There are clearly more home computers in Sweden than in Finland. The number of home computers has increased in Sweden especially since the amendment of 1998, which enables the use of a computer acquired by one's employer at home for private purposes without any tax consequences. In 1997, 48 % of Swedish households had a computer; in 1998 the figure rose as high as 67 %.

In the spring of 1999, approximately 60 % of Finnish households had a mobile telephone connection while the average in the OECD countries was under 25 %. In 1999 a mobile telephone was already more common in households than a leased line. We are in the front line also technologically: the first licences in Europe for third generation mobile networks were granted in our country.

---

[27] Data communications services include calls on leased lines, mobile calls and i.a. consumption costs incurred by Internet connections.

[28] According to the prediction of ETLA (Suhdanne 1/2000), the share of the total demand for services will be approximately six percent in 2000 (3.4% in 1995).

[29] At the beginning of 1999 there were approximately 107 computers connected to the Internet (host) in Finland per 1,000 inhabitants, which easily exceeded the OECD average, which in July 1999 was less than 50 computers per 1,000 inhabitants.

The Internet and network commerce have increased ways in which consumers can communicate and acquire information, products and services irrespective of time and place. The increase in the use of the Internet increases the demand for connections and terminal equipment required for local calls, fast data transfer connections and Internet connections. In the near future, the biggest increase in the number of Internet connections will take place through other terminal equipment than computes, e.g. through mobile telephones and interactive TV (EITO, 2000). However, a computer is still the most popular terminal equipment. According to EITO there will be over 350 million terminals providing Internet connections in West Europe in 2003, approximately 200 million of which will be computers.

> **The demand for data communications services is increasing. They are estimated to constitute almost 4 % of private consumption in 2004.**

Employment and education

The information sector employs over one hundred thousand people, which is over five percent of all those employed.[30] Of all the sub-sectors, the increase in employment has been the most notable in the production of ICT products: in the years 1994–97 employment increased by approximately 70 %.[31] Telecommunications operators employed just under 20,000 persons in 1997, which does not significantly deviate from the situation at the beginning of the 1990s. The importance of data processing services and the content industry as an employer has increased. In 1997, approximately 1,200 persons were employed in the production operations of the new media in Finland whereas at the end of 2000 the sector is expected to employ approximately 2,800 persons.

The need for skilled labour and especially for persons with IT skills is still growing. According to EITO, there were over half a million IT vacancies in Western Europe in 1998, which were not filled due to the shortage of skilled labour; in 2002 the deficit is predicted to be as high as 1.6 million. On the basis of the European Union growth and employment questionnaire, the need for skilled labour is grater in Finland than the average in the European Union Member States. According to the estimate of Confederation of Finnish Industry and Employers, the labour deficit in Finland will grow to 200,000 persons by 2010. The shortage of skilled labour can already be seen. According to a questionnaire compiled in Finland in the autumn of 1999, 42 % of enterprises in the metal and electronics industries had problems in finding skilled labour. The single occupational category with the biggest shortage was persons with information technology skills, e.g. electronics and data processing engineers and heads of adp departments and adp analysts.

The growing importance of the information sector as an employer and its special requirements regarding the labour force (e.g. a technical educational background) are putting pressure on the Finnish educational system.

---

[30] In 1997 the total employment of the sector was 112,000 persons, i.e., 5.5 % of all those employed; the sector was responsible for approximately 13 % of the growth in employment during that same year (On the Road to the Finnish Information Society II. Statistic Finland, 1999b). The calculation of Statistics Finland on the employment of the information sector also includes content production – unlike the OECD figure illustrating the employment of the ICT sector – and is thus bigger than the percentage indicated in footnote 7.

[31] The number of personnel in the electronics and electricity sectors increased by 18,000 persons in the years 1994–96. Especially the importance of the manufacture of telecommunications equipment as an employer in Finland increased in the 1990s: the number of personnel of this sector exceeded 21,600 in 1997 while the corresponding figure in 1990 was approximately 8,500 employees.

The effect of Information Society development on education can be seen i.a. in the fact that education in the information technology sector increased tenfold between 1971 and 1996. The number of starting places relating to information technology education in universities increased by 87% (to 2,800 places) and by 157% (to 4,900 places) in polytechnics in the years 1993–98.

Finland is investing in expanding the provision of education in sectors relating to the information industry (cf. The programme for measures of the Ministry of Education on Education Required by the Information Industry for the Years 1998–2002). In 1999, FIM 57 million (€ 9.6 million) was reserved for this purpose and it is estimated that FIM 438 million (€ 73.6 million) will be used for this purpose in 2006. The growth of the information industry will mean the increase of expert and research and development tasks and will also otherwise require a high level of education from the labour force. Information Society development also means that there will be less need for unskilled labour.

**The Information Society needs skilled and highly educated employees.
It is estimated that the labour deficit will grow to 200,000 persons in
Finland by 2010.**

---

5 Social effects of Information Society development

5.1 Discussion on the social effects of Information Society development

In sociological literature 'the information society' has already been discussed for more than two decades and during this time also many visions of the future have been presented which have later proved to be unfounded. The discussion on the progress of the Information Society has expanded lately but the issues relating to the social effects of Information Society development and of the distribution of these effects between the different population groups remain unsolved. The Governments and economies of different countries have usually taken an optimistic view of the growth and welfare prospects opened up by the development of information technology. However, at the same time it has been claimed that the increased implementation of information technology will displace human labour in more and more new areas and it has been assumed that this will cause the industrialised countries to be faced with growing unemployment problems. However, the most straightforward visions regarding the ending of work have lost their credibility as employment has continued to grow particularly in the United States, the leading country of the new economy.

It has also been asked how people and society will benefit from the progress of the Information Society. Will the prosperity brought by the growth of the new businesses turn out to benefit the whole of society or will the benefits be enjoyed mainly by a few privileged groups? Will the flow of entertainment and information flooding people's senses through more and more new channels really also increase their cultural or other understanding? How will interaction between people change? Will mobile telephones, other new technological equipment and their uninterrupted use in some essential way improve the quality of life of the people?

Many interpreters of development do not as such dispute the positive possibilities included in the development of the new information and communications technology and in its application in the different operations of society. In practice, however, it has become apparent that these possibilities have only been realised to a limited extent and partly in a very contradictory manner. For example *the new information and communications technology has only spread* to part of the population even in the most developed industrialised countries, and especially among the ethnic minorities, people in the lower income groups, those with only little education and the aged, there are many who do not have access to a computer or the skills required to use them or the possibility to access the Internet. The differences have become even bigger on a global scale, which is illustrated for example by the fact that over 90 percent of all the Internet connections are at present located in the industrialised countries (UNDP 1999, World Bank 1998).

The selective nature of development can also be seen in the *labour market*. The progress of the Information Society has increased the demand for young and well-educated labour especially in the fast growing sectors of the new

economy, and today those who succeed best within these sectors have the possibility of making large fortunes in short periods of time. However, at the same time many employees are experiencing the pressures of adjusting to this development as a threat to their own status and in many cases the risks are also realised in practice in the form of job losses or the weakening of the terms of employment. Thus the differences between the winners and losers of working life have increased and the differences are apparent within the industrialised countries as well as globally.

One central paradox is related to the *regional dimension* of Information Society development. In principle, the Information Society should promote regional equality by decreasing the significance of distances. However, this trend has not been apparent in reality; on the contrary, the global networking of businesses, which is characteristic of the Information Society, has in part lead in a completely opposite direction. The most demanding information tasks and the strategic operations of economy and society centre more and more on the junction points of the information economy both globally, nationally and regionally.

Nor have the effects of the Information Society on *the everyday lives of people, their possibilities to acquire information and the prerequisites of their participation in society* been only positive. It is true that some information technological equipment, applications and services are already relatively widespread in some of the pioneer countries and have had a concrete effect on the everyday lives of people. A good example of this is the breakthrough of the new mobile communications culture. The first services provided in the net have already shown us a view of society where more and more services are available to citizens 24 hours a day without physical communication or communication by telephone. But at the same time many of the promises that have been given during the different phases of Information Society development regarding the liberation of work from the restrictions of time and place, on various user-friendly applications which will make lives easier, the limitless possibilities for the acquisition of information and the possibilities for the implementation of a totally new kind of virtual democracy have not come true so far.

However, when outlining such paradoxes the information society researchers have emphasised that neither the positive nor the negative consequences *are the result of the development of information technology or the Information Society as such*. The crucial factor is the social terms and principles under which the Information Society is being built around the world. There is no 'Information Society as such'. The Information Society can only be built as a series of different concrete, historical projects. Their nature and the method of their implementation will decide what the social consequences of the Information Society will be at any given time.

Until today the Information Society has mainly been perceived as a society which has developed on the basis of networked computers. However, the development seems to be advancing towards the next phase of the Information Society based mainly on wireless communication. In that case, the social effects described above will to some extent be realised in many ways differing from the present ones and the positive promises previously associated with the development may become more clearly visible. On the other hand, the social and economic effects of the new solutions as well as the risks involved are bigger in scale than previously. In that case, linking

together technological and social innovations in a way that makes the new solutions implemented useful from the point of view of the users, will be even more important than before. Similarly it will be more and more important to pursue a general economic and social policy which will enable the new technological solutions to be implemented quickly and efficiently but at the same time in a socially fair manner.

> **The social effects of the advance of the Information Society are divergent and partially paradoxical. These are not due to the Information Society or information technology as such, rather they depend on the terms and principles under which the Information Society is being implemented.**

5.2 Observations on the social effects of Information Society development in Finland

The following discussion mainly considers the years after the economic recession in the first years of the 1990s, i.e., the actual break-through of faze of the Finnish Information Society.

a) Work and employment

The Communication of the European Commission on employment and the Information Society (Strategies for jobs in the Information Society. Communication from the Commission 4.2.2000 COM(2000) 48 Final) has recently drawn attention to the potential employment effects of the growth of the new information economy on Europe. Finland is a good example of how this potential can be implemented in practice. In Finland the employed labour force of the information sector has, after the recession, increased clearly more strongly than in other branches, and especially important has been the significance of goods production in the information sector.[32] The leading information sector enterprises have been of central significance for the increase of the whole national economy and the development of employment. We can thus say that it is especially due to the strong advances of the Information Society that, since 1994, employment has been increasing in Finland at an annual rate of almost two per cent, i.e., clearly faster than the average in the OECD countries or in Western-Europe. As a result also the employment level of our country has increased to about 67 per cent by the turn of the millennium.

In Finland, like elsewhere, the employment effects brought about by the Information Society development have been fairly selective. The information sector has been mainly employing young people, who are under 35 years of age and fairly well educated. The core areas of the increasing employment in this sector have been along the Turku-Helsinki axis as well as in the regions of Tampere, Jyväskylä and Oulu. The same development trend is visible also in the general employment development of our country, concentrating especially in the capital region.

In spite of the good economic growth supported by Information Society development, the development has also had its reverse side. In several areas of Northern and Eastern Finland, unemployment has still remained at a level of about 20 per cent. Likewise, some of the traditional industrial centres of Southern Finland, where no significant numbers of jobs in the new information sector have been created, still suffer from high unemployment.

---

[32] Statistics Finland 1999: On the Road to the Finnish Information Society II, 115–121

Irrespective of the region, return to working life has proved difficult for those with only little education and to the unemployed over 50 years old. The situation is also problematic for those without jobs who earlier worked in branches now strongly decreasing their labour force. For a variety of reasons it has not been easy for them to obtain re-training for tasks for which new labour is needed.

Also the increase of various atypical employment relationships has been considered to indicate new type of flexibility. Yet, the interpretations of different researchers vary: some consider traditional ordinary employment relationships to have irretrievably been replaced by new and more flexible forms of employment while others rather consider the changes cyclical and thus transient phenomena. As the general employment situation has improved in Finland, the number of permanent employment relationships has actually experienced a change upwards. At the same time, however, the expectations of the different parties have changed so that an employment relationship is no longer considered automatically to continue irrespective of possible changes in the circumstances or new opportunities opening.

In the initial stages of the debate concerning the Information Society, one of the central changes in working life was considered to be a liberalisation from the limits of time and place, which would e.g. be indicated by the increased favour of teleworking. However, in practice teleworking so that the employee would continuously or mainly work in his own home, has not increased in accordance with the initial expectations. On the other hand, what has been and most likely still will be increasing is mobile work – i.e., more and more working time is spent with the customer, travelling, at an airport or otherwise away from one's own desk. Part of this entity may the fact that people work some of their work time also at home or that, at some point of their carriers, they change their living circumstances so that it is no longer appropriate to go to the workplace every day. According to the newer research on working conditions, the amount of telework has increased somewhat in Finland in the 1990s, and, depending on the definition, in the autumn 1997 the share of teleworkers of all wage earners was about 4–8 per cent. This share is larger than in the other Western-European countries. In addition, in the same research, more than one-third of the wage earners expressed their interest in telework (Statistics Finland 1999, 168–170). Some other research has shown somewhat lower figures (Nurmela 2000).

A significant change relating to Information Society development has been the increased internationalisation of the operations of enterprises and the replacement of jobs depending on where the best possibilities exist for profitable business activities. International competition for jobs is today also clearly reflected in the possibilities of collective bargaining and the development of working conditions. In various branches and enterprises, it is necessary to set the goals relating to salaries and other working conditions as well as the means of pressure with an awareness of the fact that if the costs become too high it may result in a transfer of the activities elsewhere. What also has to be taken into consideration is the competition of foreign labour force in national employment markets especially when the differences between the salary levels and labour costs are significant in regions that are close to each other. In Finland the effect of these factors has already been clearly visible, and this has partly resulted in a certain degree of differentiation in employment conditions between stronger and

weaker branches. As a whole, the Finnish work life institutions can still, from the point-of-view of international job competition, be at present considered fairly developed and the competitive positions of Finnish work also fairly strong thanks to good productivity.

So far it has been possible to enjoy the benefits brought by good economic development in Finland without extreme efforts. However, the competition situation will become tighter in the future as other countries start closing the gap created by Finland in constructing the Information Society. That is when we will more clearly see the inputs needed from all those involved in the process to achieve success in the present global economy. For example in American enterprises of the new economy, the annual number of working hours is clearly higher than the ordinary Finnish level. In this respect, the differences are likely to even out to some extent. It also likely that the adaptive skills of the Finnish labour market system and educational institutions will face even other challenges in the future. Those involved in working life will be expected to be more mobile and more prepared to accept new challenges. As the large age groups approach the personable age, new means will have to be found to keep them in working life clearly longer than so far. In order to lower structural unemployment, we will most likely have to re-evaluate the functionality of the present income-oriented unemployment security system.

In the present circumstances it is not easy for the different parties to agree on the necessary changes. However, especially the defective adaptation ability of working life institutions and the insufficiency of human resources relating to it may become a bottleneck, which, in the next few years, will be the strongest obstacle for the further development of the Finnish Information Society and which may, at the same time, force some of the best companies to move some of their operations elsewhere.

> **The progress of the Information Society has increased employment even though it has been selective with regard to age groups and regions. The Information Society has brought along new kind of flexibility to employment relationships as well as international competition for jobs. These changes are a challenge to Finnish working life institutions.**

b) Income and property

Before the depression at the beginning of the 1990s and the later break-through of the Information Society, the differences in household income in Finland were among the smallest in the OECD countries in accordance with international income distribution comparisons. This was not so much due to salary differences, which were approximately of the same level in Finland as in the other OECD countries; instead thy were a result of a fairly extensive re-distribution of income effected through taxation and social income transfers.

During the post-depression growth, income differences have clearly started to increase in Finland. However, the real income of households in Finland has increased in all central earner groups whereas for example in the United States the real income of the lower income groups has decreased while the real income of the higher income groups has significantly increased. In Finland, the most significant factor affecting the increase of income differences during the break-through of the Information Society has been

the fact that in the highest income groups real income has increased faster than in the other income groups.

Compared to many other countries, the present income differences of Finnish households, can, however, not yet be considered very large. On the other hand, the pressures to lower the taxation rate decrease the possibilities of society to even out income differences by means of taxes and social income transfers. In the future, in addition to wage income, the property held by households – for example in the form of an investment portfolio or common-fund investments – will most likely increase its significance as a factor influencing the economic possibilities of the citizens.

> **The real income of households has increased in all income groups. At the same time also the differences in incomes have increased, but, compared to other countries, they can, however, not be considered very large.**

c) Education and skills

The Information Society is, above all, a society based on knowledge and skills. The skills resources available to the citizens and their distribution are the most significant factors affecting the social consequences of Information Society development in the different countries and globally. Education is still of decisive importance in creating skills resources even though learning is at present a life-long process.

In principle the Information Society offers good possibilities to promote the educational equality of the citizens. Modern information and communications technology makes it possible to extend high-quality and very advanced educational services also to remote and sparsely populated regions, where it would otherwise be impossible to offer similar education. In Finland the Ministry of Education has been using different Information Society strategies of teaching and research to ensure that the new possibilities offered by the Information Society are effectively utilised in all parts of the education system. What has also been of central importance in the implementation of equality goals has been the advanced library system of Finland as well as the extensive network of civic schools.

However, several factors have either slowed down or hindered the implementation of the above goals. For example the utilisation of information and communications technology has varied in different educational institutions even though a fairly considerable amount of social resources has been allocated to information technology acquisitions for schools. There have also been differences in commitment to the strategies adopted. Du to the restricted national markets, learning material producers have not been very eager to develop material meant for the new learning environments, nor have the positive experiences gained from individual pilot projects necessarily resulted in the reforms spreading fast throughout the educational field. Many municipalities have been forced to cut down the resources allocated to education, and this means that the possibilities for the development have been partly dependent on the general economic situation of the municipality and the region. This, in turn, may have influenced the distribution of the best teaching resources among the different parts of the country.

In the present Information Society, an education obtained in one's youth can only create a general basis for the skills of people and their development.

However, present-day Finnish working life does not offer all those involved equal opportunities to develop their skills and thus to improve their future employability for example workers belonging to different age groups and having different basic education do not have nearly the same possibilities to become familiar with the secrets of the new information technology as the representatives of the younger generations. In spite of all the projects and programmes to develop working life, many of the performance-level tasks are still such that they do not offer very good prerequisites for the continuous development of the skills of the workers. Also the status of the workers has a significant effect on their possibilities to obtain training arranged by the employer.

At present people can develop themselves and learn new things also in their free time by utilising computers and the data resources of electronic networks. For example in the United States positive development has been noticed in this area lately so that the use of information technology has been increasing fairly quickly among some ethnic minority groups. However, the danger lies in the social differences between the different population groups remaining fairly permanent so that when certain basic solutions become more common among the whole population, the elite groups have already moved to the next stage of development. Also the routines in the use of new information technology may differentiate so that, for some people, information technology may become an efficient and flexible channel for handling networking work, information retrieval and everyday routines without friction while among others its use will be more dominated by games, entertainment and other leisure-time use.

> **The Information Society offers an opportunity to increase educational equality. By means of the Information Strategy of Education and Research, the aim is to utilise the possibilities offered by the Information Society in the whole educational system. However, several factors have slowed down the implementation of the goals. Working life offers a possibility to develop skills but only for some of the employees.**

d) Regional development

Already when discussing the development of employment, we have been able to note that the most central region benefiting from the increase of the new economy in Finland during the last few years has been the capital Helsinki and its surroundings. In addition to the capital area, the growth of the new economy has benefited i.a. the Salo, Oulu and Tampere regions more clearly than other regions. Positive development has also been seen in some other areas of tertiary education. Especially Jyväskylä has lately made a conscious effort to promote the creation of new jobs in the information sector. However, the growth rate of these regions has not reached the same scale as the capital region.

The other regional centres in Finland form the next circle of regional differentiation. They also include traditional industrial towns like Lahti and Pori, whose economy has been receding with a decrease of jobs in the heavy industry and which today face very difficult unemployment problems. A relatively large number of the unemployed in these areas have a fairly weak education, they are often somewhat older and their main work experiences relate to tasks hardly in demand today. It is therefore difficult to re-train them for jobs opening in the information sector or other increasing fields.

The sparsely populated areas of Eastern and Northern Finland form a different problem area, where unemployment has been high for decades already and which have again suffered from an increasing number of people moving away. It is a threat of these areas that, as the population ages, the welfare ratio will become very disadvantageous. A considerable share of the present jobs in these regions is jobs in the public sector or in activities strongly supported by society. Therefore it is difficult to find a credible foundation for launching market-oriented growth in these fields.

> **The economic growth and positive development has been at its strongest in the capital region, in other growth centres and certain towns of tertiary education. On the other hand, the other regional centres and the sparsely populated regions in Eastern and Northern Finland still have considerable numbers of unemployed people whose training for the information sector or for other growth branches presents a challenge.**

e) Democracy and the possibilities of citizens to participate

When discussion the Information Society was first discussed, even very optimistic thoughts were presented on the effects of the electronic networks promoting democracy. After all, the Internet forms a free global forum for discussion and communication where everyone can act equally as the senders and recipients of messages and which is thus not as easily controlled by the authorities or economic powers as many of the traditional media. Similarly it was thought that the electronic networks could provide new kinds of possibilities for 'teledemocracy' i.e. for discussions on social topics and for carrying out referendums though the net. The idea was that in addition to the national level, the operations of local communities and those of the citizens society would spring to new life through virtual networks formed by people and communities.

Actual research data on the effects of Information Society development on the development of political democracy and the possibilities of citizens to have an influence has been rather limited until recently. However, especially the Internet has been regarded as having promoted the possibilities of citizens to make a social input. The fact that it has been possible to mobilise through the Internet global social movements which have achieved significant results, is regarded as the best example of this. It has been claimed said that the Internet has had a significant influence on the fall of certain authoritarian regimes. On the other hand, the Internet represents only one of the dimensions of the development of the political cultures of our time. At the same time the increased market control of social processes, for example, has been seen as a factor limiting the possibilities of political influence.

In Finland, the issues concerning the relation between the Information Society development and democracy have been extensively considered for example in the 'Politics and the Internet' seminar arranged by Sitra and the Parliamentary Committee for the Future in the beginning of 1999 as well as in the Report of the Parliamentary Committee for the Future on the future account of the Council of State of 1998. The government has in practice aimed to utilise electronic networks to increase the possibilities of citizens to have an influence by i.a. increasing the availability of various documents and information and by providing citizens feed-back channels

and discussion forums on topical subjects. Corresponding work has been done also in the different sectors of administration and at district and local government level. In some localities also interesting experiments have been implemented in order to create new types of formats for discussion and participation in the net. The most famous examples of this have been the Kuorevesitori project which was implemented relatively early on and the NetParliament of Espoo representing a slightly later development phase as well as the Mansetori of Tampere.

For the present the projects described above have, however, not been very extensive and have thus not been very significant as far as the development of the general political culture and democratic institutions of our country are concerned. Still there are no very clear signs to be seen in Finland of the kind of commercialisation of politics or of the crises of democracy which have been written about in the most pessimistic interpretations of Information Society development. Rather on the contrary, on the basis of more recent attitude studies and the actual political conduct of citizens it is possible to deduce that some of the negative development trends which have been apparent in previous years, such as the increasing alienation of citizens from politics and the weakening of confidence in central political institutions, have not continued as strongly (EVA 1999). For example the interest shown by citizens in the last presidential elections and in the main candidates was extensive and obviously genuine although perhaps 'unpolitical' from a traditional point of view.

> **It is generally though that the Internet has increased the possibilities of citizens to participate. The authorities have tried to utilise the information networks to increase the possibilities for influencing (e.g. in the form of feed-back channels) and to provide electronic communication services. The weakening of the confidence of citizens in political institutions does not seem to be continuing.**

f) Quality of life

So far only limited research data has been compiled in Finland on the effects of the new information and communications technology on the everyday lives of people and on the quality of their life. On the basis of the experience available it is apparent, however, that the best results from the point of view of the quality of life of the people are not necessarily achieved in the building of the Information Society when the processes are steered too exclusively by the interests of technology. Many technology based projects and pilot experiments have been implemented in Finland and elsewhere in the developed industrialised countries which have never lead to any notable practical results. Advanced data communications connections have perhaps been built in a residential area only to find out later that they were in actual fact never used very much. Digital television broadcasts have perhaps been launched with large investments without getting the consumers interested in the acquisition of the accessory equipment required to watch them.

Sometimes an effort has been made to promote the Information Society as a kind of an enlightenment project. Citizens have been instructed from above how they should behave and what they should want in order to be good citizens of the Information Society. Also the results of such normative change projects have often been relatively modest. Much more

efficient results have been achieved when the aim has been to search for new solutions together with the people who are the potential users. It is particularly important to understand what kind of social innovations the people themselves produce when they are incorporating different new technical solutions as a part of their everyday lives. In this way the aim can be to achieve a fruitful interaction between technical and social innovations so that they both strengthen each other and the new solutions to be developed also have actual commercial importance.

Attention should be paid to such viewpoints also when moving into the next stage of the Information Society. It is obvious that the effects of the Information Society on the everyday lives of Finns will be seen more clearly for example when digital television broadcasts begin than they are at present. At the same time services provided through wireless networks – first wap telephones, next third-generation equipment – will become more common, electronic commerce will develop, more and more homes will be joined to the net through broadband cable connections, people will be presented with the opportunity of controlling different processes of their daily lives by means of electronic information networks, and also communication with different authorities through the networks will become possible in a more and more extensive and diversified way. All these solutions will require major investments from those implementing them and when making choices, also great financial risks will be taken. It is possible to minimise the risks significantly if the users are included in the development of the new solutions sufficiently early. If these development efforts are realised successfully, we might perhaps speak of the final breakthrough in Finland of the 'networked lifestyle' visualised recently in his book by Bill Gates, founder of Microsoft. At that time it will also be possible to evaluate the effects of the change on the quality of life of different population groups more specifically.

In the future it will be especially important to pay attention to how new information and communications technology could be utilised as an aid to special groups such as the elderly and the handicapped. The increased possibilities for communication and the acquisition of information through the electronic networks, the arranging of continuos surveillance in the case of different emergencies, and concrete assistance in the handling of various routines of everyday life may become issues of particular significance especially in the case of these groups. Similarly, we must consider how the new information and communications technology can be utilised to improve the situation of different population groups living under the threat of alienation – e.g. young people who have been excluded from working life and who have received no education – and their possibilities to participate.

How the progress of the Information Society effects the status of children is a whole chapter in itself. Children and young people have been the ones who have been the least prejudiced in testing the possibilities provided by the new information and communications technology in Finland. However, at the same time many experts and citizens have been worried about the effects of computer games, the Internet and the increasing amount of mass entertainment on the development of children and young people and the chances of the growing generation to receive protection and care from the adults bound by their own busy lives. This presents a challenge to the parents as responsible parents.

> **If technological innovations or projects relating to the Information Society touching on the everyday lives of people are not implemented together with their potential users, they may never be used. We will see the effects of the Information Society on everyday lives more clearly when the new communications technologies are introduced and the use of information networks increases in trading and communication.**

5.3   Summary

All in all Finland is at present in a situation where the Information Society is no longer a vision of the future but a process of change which is beginning to have a more and more concrete effect also on the everyday lives of ordinary people. On the other hand, we are aware of how the growth of the new economy and the advance of the Information Society development based on it is threatening to increase economic and social inequality. Although a certain degree of social differentiation can even be expedient for the efficient operation of society, we should remember that a relatively homogenous social structure has clearly assisted Finland and the Nordic countries in advancing in the building of the Information Society. Social equality has made it possible also for talented young people from modest backgrounds to receive and education. In addition it has provided the prerequisites for spreading different information technology equipment and applications quickly through the whole of society. At the same time the stability of the social structure has provided a basis for a feeling of solidarity, which has made it possible to unify resources effectively to build the Information Society. The strengthening of the present development trends may bring about a situation where the legitimacy of the strategies aiming at the advancement of Information Society development will start to weaken among those population groups that have become the losers.

6   Regulatory framework

Technological changes have occupied a central position in the development of the Information Society. However, the realisation of several features and elements belonging to the Information Society require numerous legislative amendments as well as whole new regulation extending to new areas. As examples of the later, we can mention legislative measures relating to electronic commerce and electronic signature. The development of the Information Society is both national and international. Therefore many Finnish legislative measures are based on legislative initiatives of the European Union or another international actor.

6.1   International regulatory development

From the point-of-view of Finland, the most important transnational regulator of the Information Society is the European Union. The Organisation of Economic Cooperation and Development OECD, the World International Property Organisation WIPO and the United Nations Commission on International Trade Law UNCITRAL are significant international convention fora and issuers of recommendations. The World Trade Organisation WTO has a work programme on electronic commerce. The WTO also attends to the International Telecommunications Service Agreement. Global Business Dialogue is a significant discussion forum on Information Society issues.

The legislative measures of these international actors relating to the Information Society deal with electronic commerce and communication, data protection and issues of intellectual property. The most central projects are the following:

Project	Preparatory status (9 June 2000)
THE EUROPEAN UNION	
Review of the telecommunications sector. Commission Communication 'Towards a New Framework fort Electronic Commerce Infrastructure and Associated Services – The 1999 Communications Review, COM(1999) 539	The matter was handled by the Telecommunications Ministerial Council on 2.5.2000. The Commission proposals for new Directives are expected to be submitted to the Council working groups in summer 2000.
Directive on electronic signature	Directive 1999/93/EC entered into force on 13.1.2000.
Directive on certain legal aspect of Information Society services, particularly electronic commerce (Directive on **electronic commerce**)	Directive adopted on 8.6.2000 and will enter into force at the end of the year 2001.
Proposal for a Directive on **distance marketing of consumer financial services**	Political consensus on common position not yet reached; matter returned to the Commission, which has been clarifying provisions on duty to notify in different Member States. Further schedule open.
Proposal for a Directive on the taking up, the pursuit and the prudential supervision of the business of **electronic money** institutions (Directive on e-money)	Common position of the Council adopted under Finnish Presidency. European Parliament accepted the proposal in spring 2000.
Proposal for a Directive on **value-added taxation of electronic products**	Proposal for a Directive expected in summer 2000.
Proposal for a Directive on the harmonisation of certain features of copyright and related rights in the Information Society (provisions required by WIPO Treaties)	Preliminary consensus in several individual matters reached under Finnish Presidency. However, Internal Market Council failed to reach political consensus on the proposal on 25.5.2000. Portugal will seek to solution to still open issues and to find a consensus during her Presidency.
Reform on Community legislation on **public procurement** (introduction of electronic procedures)	The Commission adopted the proposal on 10.5.2000 and has announced that it will be published on 15.6.2000 after completion of all language versions.

OTHER ORGANISATIONS OF INTERNATIONAL TRADE	
OECD Recommendations on the taxation system of electronic commerce **(global principles of taxation of electronic commerce)**	Draft summary of all recommendations to be completed during the year 2000.
OECD Recommendation on **Guidelines for Consumer Protection in the Context of Electronic Commerce**, (C(99)184 Final)	Preparation completed. The OECD Council adopted the recommendation on 9.12.1999.
Model Act on electronic signatures prepared by UN Commission on International Trade Law (UNCITRAL).	Preparation of the model act to be completed in the next session of the working group in November-December 2000.
Reform and global harmonisation of the WIPO **International framework on copyright**	The new WIPO Treaties have not yet entered into force. Negotiations continue. Diplomatic meeting possibly in December 2000.
The WTO **Work programme on electronic commerce**, reviewing i.a. issues relating to electronic deliveries and duties thereon	

6.2   Domestic legislation and regulation

Finland has been strongly reforming legislation dealing directly or indirectly with the Information Society. The reforms primarily relate to electronic commerce and electronic communication with the authorities and with private service providers. The amendments of the Personal Data File Act and openness legislation also support the development of the Information Society.

The most central amendments and projects are listed in the following table.

Project (Relation to international regulation)	**Preparatory status** (9 June 2000)
MINISTRY OF JUSTICE	
Personal Data Act (EU Directive 95/46/EC on the protection of individuals in the processing of personal data and on the free movement of this data)	Personal Data File Act (523/1999) entered into force on 1.6.1999.
Total reform of openness and secrecy legislation (the so-called EC Data protection Directive 95/46/EC; EU Green Paper Public sector information in the Information Society COM, 1998, 585)	Legislation on openness and secrecy (621–699/1999 and 1030/1999) entered into force on 1.12.1999.
Act on Electronic Communication in Litigation Issues (594/1993)	Act entered into force in 1993 amended by an Act that entered into force on 20.3.1998 (199/1998).
Act on Electronic Service in the Administration (EU Directive on the electronic signature)	Act on Electronic Service in the Administration (1318/1999) entered into force on 1.1.2000
Consumer protection in distance contracts (Implementation of the so-called distance-contract Directive)	GP for amendment of the Consumer Protection Act to be submitted in June 2000.
MINISTRY OF THE INTERIOR	
Identification Card Act (829/1999) Identification of an individual in networks and production of an electronic signature (EU Directive on electronic signature)	Act entered into force on 1.12.1999. Relates to Act on Electronic Communication in Administration and to legislation on the PRC in charge of Card Certification Services.
Population Information Act: Legislation on the Population Register Centre (PRC) in charge of the certification services of the State electronic identity card	Amendment of the Population Information Act (527/1999) and of section 23 of the Act (830/1999) entered into force on 1.12.1999.
Amendment of the Act on Registration Administration Certification services of the PRC (EU Directive on electronic signature)	Amendment entered into force on 1.12.1999.
MINISTRY OF EDUCATION	
Amendment of copyright legislation (EU Directive on copyright and WIPO Treaties)	Preparation of the necessary legislative amendments to be started in 2000.
MINISTRY OF AGRICULTURE AND FORESTRY	
Act on the Data System of Real Estate and Amendment of the Act on Real Estate registers. The Acts will implement a national information service on real estate and other land and water-area unit information by means of data technology	GP to be submitted to Parliament toward the end of the year 2000.

MINISTRY OF TRANSPORT AND COMMUNICATIONS	
Total reform of the Radio Act Particularly standards on frequency planning and usage permits on frequencies (EU Directive 1999/5/EC on radio and telecommunications terminal equipment and the mutual recognition of their requirements)	GP to be submitted to Parliament in the autumn of 2000. Act to enter into force as soon after its adoption as possible.
Act on Electronic Signatures (EU Directive 1999/93/EC on a Community framework on electronic signatures)	GP to be submitted to Parliament in the autumn of 2000.
Amendment of the Telecommunications Markets Act Use of new technologies in fixed telecommunications networks and the spreading of third-generation mobile communications networks	GP submitted to Parliament on 9.6.2000
Act on the Protection of Information Society Services (EU Directive 98/84/EC on legal protection of conditional access services)	GP to be submitted to Parliament in the spring session of 2000. Act to enter into force as soon as possible after its adoption.
Act on Domain Names ional domain names in the Internet	GP to be submitted to Parliament in the autumn session of 2000.
Communications Markets Act Harmonisation of the regulation of digital telecommunications networks used for electronic communication (European Commission Communication The 1999 Communications Review, COM (1999) 539)	Preparation started. Legislation to enter into force at the beginning of 2002.
MINISTRY OF SOCIAL AFFAIRS AND HEALTH	
Reform of social insurance legislation Requirements of Openness and Personal Data File Acts as well as supervisory aspect in exchange of information	GP will be submitted to Parliament in September 2000.
Specification of data protection provisions of insurance legislation. Taking into account the amendment of the Constitution, the new Personal Data File Act and the Openness Act (so-called EU data protection Directive (95/46/EC)	Part of legislative amendments entered into force on 1.1. and 1.4.2000 and part (GP 34/2000 session) submitted to Parliament in May 2000 and pending in Parliament.
Act on Testing the Seamless Service Chain of Social and Health Care and the Social Security Card. The provisions would make it possible to test the seamless service chain action model in trial municipalities in Satakunta	GP submitted to Parliament on 5.5.2000.

6.3 Measures of the public sector to increase fast network connections

Some European countries (Great-Britain, Finland) have, ever since the middle of the 1980s, aimed at improving the telecommunications markets, at increasing services and at lowering prices by increasing competition. This development has been supported also by the legislation of the European Communities since the 1990s. The approach chosen has been successful, because i.a. in accordance with the latest statistics of the OECD (http://www.oecd.org/dsti/sti/it/cm/), Finland is among the five most advantageous countries with regard to the pricing of Internet connections. European telecommunications operators have also become internationally competitive and numerous new services have been introduced in the markets because the operators have been able to make a strong input in product development.

The promotion of competition in the subscriber connections of the telephone network, i.e., in the connection from the telephone exchange to the household, is a prerequisite for the development of even better and reasonably priced connection technologies. This is the aim i.a. of the Government Proposal on the parallel use of subscriber lines, which will most likely be given to Parliament in the spring session 2000. The purpose of the proposal is to increase competition in the provision of the fast twisted pair connection (the so-called ADSL technology, *Asymmetric Digital Subscriber Line*). It is believed that this will increase both the use and provision of the

services of the Information Society and to lower the prices of the services. Legislative measures are used to increase competition also in the provision of fast mobile communications networks and in the use of digital television for fast data transfer.

The ever-increasing competition for market shares may, however, result in the provision being centralised only to the most profitable areas and in a situation, in which part of the population is, at least for the beginning, left outside the provision of the latest and most developed technology. More and more services are being transferred to the network and better and better connections are needed for access to these services. A discussion has started in Europe and also in Finland on how to ensure high-quality network connections and services in a regionally balanced manner.

The community legislation of the EU requires that the operators offer certain universal services through the telecommunications network equally for everyone and at reasonable prices. So far the concept of universal service is fairly narrow, but pressures to extend its scope may emerge e.g. in the future review of EU telecommunications legislation. The issues to be evaluated include i.a. the data transfer speed and capacity that is sufficient and necessary for everyone to use the services of the Information Society as well as the technology used to provide universal service. In Finland even at the moment the provision of the universal service is not tied to fixed networks only. A telecommunications company may provide these services also through its mobile networks. However, in this case the services will have to be provided to the end-user in accordance with charges based on fixed-line tariffs.

The Telecommunications Markets Act imposes telecommunications companies a so-called service obligation in their own operating areas, which means that the company may primarily not refuse to provide the service even to an end-user. The legislation makes no difference between owners of the telecommunications company or network. On the other hand, a telecommunications company is not obliged to offer its services at a loss. If it would seem that the user prices became unreasonable and it were not possible for telecommunications companies to offer them in an economically sensible way, measures defined in EU legislation should be introduced to finance the provision of the services. The measures allow the covering of the burden for the provision of the universal service from a universal service fund collected and authorising the burdened telecommunications company to collect its costs from other telecommunications companies through interconnection traffic charges.

The Ministry of Transport and Communications is at present preparing an account of the provision of fast data transfer connections and the effect of the measures of the public sector on the overall development of the Information Society. The study concentrates especially on the optimum construction and cost of optic fibre networks and other fast data-transfer technologies as well as the need to promote their provision by measures of the public sector in Finland. The study will be completed in autumn 2000.

Lately public debate has proposed a stronger involvement of the public sector in the construction and development of broad-band data communication infrastructure. In Finland, however, it is the public sector that is responsible for the construction, development and maintenance of the communication infrastructure. The public sector has different possibilities in guiding the

development of broad-band communications. Its most important role is that of a regulator. The interests of all parties can be equally taken into consideration in legislation. The public sector can also function as developer of electronic services. The public debate has i.a. proposed that part of the broad-band network be differentiated into a separate network supervised by the State or that the State would otherwise support the construction of, or access to, the broadband network. This would mean that the public sector would, in a way, become an actor of business life, in which case it would i.a. have to have an opinion on the data-transfer technology that would be used as the basis of the network. In Finland this has not been considered a task of the public sector.

So far it cannot yet be fully seen to what extent commercial or even public services will be offered, on the one hand, through fixed telecommunications networks and, on the other, for example through the digital television network or the third-generation mobile network. Therefore the operation of the public sector in the markets, especially in the prevailing sensitive competition situation, would most likely distort competition, stop the investments of the private sector in the infrastructure and thus endanger the provision of commercial services and the development of alternative data-transfer channels. Therefore the Committee considers that the role of the State in guiding the development is best implemented through regulatory measures characteristic of the State.

The competition in the telecommunications markets has resulted in Finland having some of the cheapest Internet connections in the world. An increase in the competition for subscriber connections is expected further to lower consumer prices.

---

7 Development programmes – measures appending

7.1 The Project Portfolio of the Government – the projects of the Ministries

The Project Portfolio confirmed by Prime Minister Lipponen's Second Government on 10 June 1999, Point *7.1. The Information Society,* contains three extensive project entities relating to the development of the Information Society. These are the promotion of content production and electronic commerce as well as the development of electronic communication within administration and the development of public-sector service processes.

7.1.1 Content production

According to the Project Portfolio of the Government, the purpose of the content production project is *to create the prerequisites for Finland to become a significant content-industry country in addition to data communications technology. The aim of the development of the operating prerequisites of the content and culture industry is for Finnish culture to have as large a share of the domestic markets as possible and a significant and growth-oriented role in the international markets.*

The Working Group on Content Production appointed by the Ministry of Education guides and coordinates the activities of the different Ministries in the implementation of the Content Production Project and evaluates the progress of the implementation. Several different thematic sub-groups have been established to support the Working Group.

Content Production as a term

Content Production mainly refers to the production of documentary, cultural, educational, research, entertainment or marketing contents for electronic media and related business activities. In the project, Content Production has, however, been defined as content mainly in digital form and using digital channels even if the primary production is analogue. Excluded is also all of network commerce, the information industry with regard to programme production, the support of art through grants as well as non-digital areas of culture.

The development programme of the Content Production business

The aim is, on the one hand, to promote the interaction of culture and digital forms of production and distribution channels and the diversified utilisation of the national cultural capital and, on the other hand, to develop the content-industry business and to increase its international competitiveness. Content production ponders the needs and problems relating to the transfer of culture and services to the network. The aim is to create economically productive content markets based on business principles: to remove obstacles and to improve operating conditions. The Working Group has divided its activities into eight task areas.

Development of know-how (education, research, entrepreneurship)

The most central know-how of a content producer relates to audio-visual skills and creative know-how as well as to know-how relating to the

business of the field. Re-training and sufficient training places help to avoid employment bottlenecks. The development of the field channels the success of Finnish information technology on the one hand, to the benefit of different occupational groups and, on the other hand, to the reform of the concept, methods and materials of both vocational and general education. Different learning materials in different educational institutions are made available to the students also in the networks.

Copyright

The economic success of content enterprises is based on the buying and selling of rights. The know-how of enterprises in these issues has to be ensured. Both national and international measures are taken to amend the legislation so as to ensure both copyright and the business possibilities of the enterprise. Contract-related checklists and Best Practice models and other information material on copyright is drafted in the area of digital content production, multimedia and data networks. Cooperation, accounts and comparison material is also needed on the solutions of corresponding issues in other countries.

Availability of the national data reserve and materials

What is essential for the availability of the national cultural heritage is access to it in digital form. The group creates the prerequisites for the availability and usability of the collections of different memory organisations – libraries, archives and museums.

The development of contents markets (demand, public procurement)

What is important for the enterprises operating in the field is to create commercial markets for cultural products and long-term quality thinking. It is also important to make an input in the operating conditions of the enterprises. Central to the cooperation of the public and private sectors is the creation of genuine partnership activities. The Communications Markets Act under preparation is necessary to open competition.

Strengthening of regional content production

More and more often strong regional and local culture is included in the characteristics of a successful, self-aware region with the potential to become international. Supporting the development of versatile cultural entrepreneurship requires the cooperation of both this project and regional organisations. The regional development of content production will have to be based on the needs of the population of the region and, on the other hand, networking will have to promote the creation of more extensive production models. They will i.a. make it possible for the field to become international. The demand for content production has increased and with convergence, the fields using and applying content production and the development of these fields will result in a significant increase in business.

Internationalisation

Internationalisation is both a cultural and an economic process. The purpose of internationalisation is not only to increase the export of culture but to create genuine international business. The purpose of the content-industry project is, in practice, to help enterprises to become international business experts. The development of content production is being coordinated with the goals of the *eEurope* Programme of the EU.

*A favourable operating environment and support of
product development*

A significant factor in the content industry and production is the product development of content creation, and therefore the skills of the entrepreneurs are promoted. Product development in the content industry means promoting know-how so that content-product enterprises are financially so strong that they can maintain continuous product development. The enterprises should be able to make a sufficient input in the initial stages of the value chain. This way the content industry will produce sufficient material for the other industry utilising content production.

Financing and capital inputs

The development of the content industry will be made possible by the creation of versatile financing instruments adapted to the life-cycle of the enterprises. Existing financial institutions will have to be made aware of the content industry as a significant growth area. The emphasis of public financing will have to be in the initial and significant development stages of enterprise activity. It is important for the development of the whole industry that the investment activities in the field are primarily private.

7.1.2 Electronic commerce

The purpose of the development project of electronic commerce of the Ministry of Transport and Communications is to use the means of the public sector to promote the business activities of electronic communication in the networks and the introduction of new technologies. The measures are directed at the development of the communication infrastructure and in increasing the trust of users and actors. The development of electronic commerce in the field of the Ministry of Transport and Communications covers the regulation of electronic commerce activities as well as research and development activities.

The topical regulatory initiatives in the Communications Management Department promoting electronic commerce relate to the promotion of the use of new technologies and the trust of the users as well as to the regulation of physical distribution channels. The aim of the development activities is to create tangible development projects and programmes to promote electronic commerce.

**FIGURE 12. Sub-projects relating to the development project
of electronic commerce**
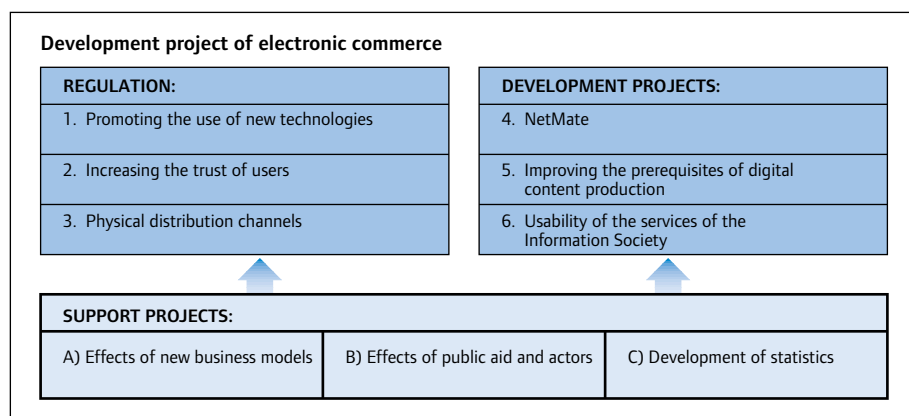
The Electronic Commerce Project contains six different subprojects, three of which relate to regulation and three to development. In addition, a project entity supporting the regulatory and development projects (support projects) will be launched, comprising primarily research and accounts to support the regulation and development projects and supporting not only electronic commerce but also the development of the Information Society and communication society in a more extensive way.

Development projects:

4) NetMate

The NetMate Project has been functioning since 1998. The aim is to promote electronic commerce in SMEs as well as the networking of enterprises. The NetMate has been cooperating i.a. with the Technology Development Centre Tekes, the Chamber of Commerce organisation and the Regional Employment and Economic Development Centres. The NetMate Project will end this year, but the operating models and the networks produced by it will be utilised in new development projects.

5) Improving the prerequisites of digital service production:

The project aims at promoting electronic commerce with a multi-annual programme concentrating on extensive promotion of content and service production. The aim is to map the bottlenecks of digital service production from the point-of-view of new media and new technologies covering all the new technologies (the web, mobile, digi-TV). A separate subproject in the improvement of the prerequisites of digital service production is an evaluation of the development of physical distribution in electronic commerce and logistics.

6) Usability of the services of the Information Society

The services of the Information Society are distributed to different user groups at different times and unevenly. The aim of the project is to study and evaluate the readiness of different population groups to use the services of the Information Society as well as to identify obstacles of this usability and to create new models to support and encourage people in the use of network services. The project also aims at affecting the demand of the services of the Information Society by increasing the trust of consumers in electronic communications and by promoting the creation of products that are easy to use i.a. by influencing standardisation.

7.1.3 eGovernment

The project on electronic access to public administration implements the Policy Decision of the Council of State of 5 February 1998 on Electronic communication, the development of services and decrease in the collection of information (MF 9/00/98). The aim of the project is to improve the availability, quality and customer-orientation of the services of public administration as well as the ability of administration to serve and its efficiency. Electronic communication is developed by utilising the possibilities offered by information and communications technology.

Projects and measures implemented

The points of the Council of State Policy Decision on electronic communication dealing with infrastructure and legislation were implemented in 1999.

The Act on Electronic Service in the Administration (1318/1999) entered into force at the beginning of the year 2000. The Act makes it possible

to initiate, handle and serve notice on administrative issues electronically and gives an electronic signature the same legal effects in administration as those of a traditional signature. The Act contains provisions on the rights, duties and responsibilities of the authority and administration in electronic communication.

The electronic identity card of the citizen was introduced by the Identity Card Act (829/1999), which entered into force in December 1999. The introduction of the electronic identity card also involved enacting an amendment relating to certification services (Population Information Act 527/1999). The Population Register Centre started the provision of certification services in December 1999. The electronic identity card can be used in communication with the authorities and also for some services in private-sector electronic commerce.

The contact-information directory of public administration Julha (http://www.julha.fi) was started at the beginning of 1999 and the arrangements for production use have been established at the beginning of the year 2000.

Projects and plans to develop electronic access

Nearly all administrative fields have been and are still making preparations for measures to develop electronic communication services. According to an inquiry conducted by the Ministry of Finance, 90 per cent of all offices and agencies use a www service of the Internet. Altogether 63 offices are offering their own forms through the Internet and 26 offices have an interactive communication service through the Internet.

As examples of the electronic communication services offered we can mention the filing of a notice to move and an application for a television viewing permit. The Citizen Handbook and the Citizen Network Form Service are joint services making it easier to find the service or form. Significant in decreasing the managerial costs of enterprises is the TYVI system (Tietovirrat yrityksiltä viranomaisille [Data flows from enterprises to the authorities]) introduced in 1997, which enterprises can use to notify the authorities of their taxation information, statistical information and work pension information.

According to the results of an inquiry published by the Ministry of Finance in March 2000, 36 offices are conducting or planning development projects relating to electronic services and the total number of projects is 76. The size and nature of the projects vary considerably: the costs of the projects vary from less than one million marks to tens of millions of marks. The projects to increase the efficiency of the use of the services relate to customer service, inter-authority contacts and electronic commerce. Also various research projects are pending.

Clearly the most extensive individual development projects is the *Macro Pilot Project* of the Ministry of Social Affairs and Health. The aim of the Macro Pilot Project is to develop the service system of social and health care into a seamless and efficient service entity, where the customer does not have to worry about the different organisations. The Pilot Project also includes testing of the customer card (the service card of KELA, the Social Insurance Institution) supporting the service chain of social and health care as well as the improvement of data protection and data security. The reference data base helps to locate the operating unit of social and health care with information on the customer. The Macro Pilot implemented in the

Satakunta Province will, at its largest, involve services to 10,000 citizens and the work methods of 1,000 workers.

The development project of public network communication (JUNA) is a coordination and support project included in the Government Project Portfolio. The project supports the authorities of both the State, the municipalities and indirect State administration in the development of network communication. The aim is extensively and in a sufficiently uniform way to make public administration into an active producer and user of network services. Another aim is to create cooperation, exchange of information, evaluation criteria, norms and rules as well as strategic guidelines to support decision-making. The project will end at the end of 2002. Administratively the project is subordinate to the Ministry of the Interior.

Also the following separate project can be mentioned:

- The Administration Service Network Project develops the data network necessary for the production of administrative services. It will provide administration with basic services for electronic communication so that different administrative fields can implement their own electronic communication services. The aim is also to create a service centre providing network, system and application products suitable for joint use.

- The aim of he Citizen Network Form Service is to make it possible to fill in, sign and send forms through the network.

- The Citizen Handbook is made into a more extensive service portal bringing together different public services.

- The Support Project of Network Services VETURI plans and tests public services in six regions in Eastern Finland. The main partners of the project are Kela, the National Board of Taxes, the Ministry of Employment, District State Offices and municipalities. The project terminated on 31 May 2000.

- The Working Group on the Communication Card of Civil Servants and Employees. The working group is planning alternative solutions and recommendations relating to the introduction of the electronic communication card (certificate) necessary in the electronic communication and identification of State and municipal authorities. The project terminated on 30 April 2000.

- Electronic Collection of Financial Statement Information. The purpose of the project is for the taxation authorities and Statistics Finland to introduce joint data collection in 2002. According to the proposal of the working group, the Trade Register will also join the system after experiences have been gained from the cooperation between the taxation authorities and Statistics Finland.

Development plans relating to electronic communications have been or are being drafted in the Ministry of the Interior, the Ministry of Transport and Communications, the Ministry of Agriculture and Forestry, the Ministry of Employment, the Ministry of the Environment, Foreign Affairs Administration, the National Board of Forestry, the State Treasury, the National Board of Taxes, the Vehicle Administration and the Immigration

Office as well as in several authorities subordinate to the Ministry of Trade and Industry. The scope of the services subject to planning differs by the authorities.

7.2 Other programmes or measures pending

The following is a discussion of other central Information Society projects than those mentioned in the previous chapter. This is not an exhaustive list of Information Society projects of the various parties.

Information Strategy of Education and Research

The first Information Strategy of Education and Research completed in 1995 created the guidelines of the information and communication policy of education and research until the turn of the millennium. The strategy contained a view and proposals on ways to improve the level of education and research by utilising data technology, on ways simultaneously to improve national competitiveness and employment, on ways to promote the possibilities of citizens to acquire and use information as well as on ways for the citizens to acquire basic skills for the use of information and data technology. The strategy also proposed measures to safeguard the capacity of high-capacity calculation, to improve the prerequisites of the production and use of network-based multimedia as well as to develop the data networks of education and research.

The goals of the strategy were implemented through the Information Society Programme of the Ministry of Education (1995–1999), with special earmarked funds of close to FIM 1 billion (€ 168 million). The majority of these funds were allocated to the acquisition of equipment and the construction of networks in different educational institutions, universities, libraries, archives and museums. Funds were also allocated to strengthening education and research relating to the Information Society by increasing the number of study places and the number of teachers and research workers. Content production was supported by allocating appropriations for the development of new types of learning materials and the network-based dissemination of scientific information. The goals of the Information Society Programme were promoted not only through these specifically allocated appropriations but also through the basic funding of the different institutions and by means of a supplementary programme of research financing and different programmes of the European Union. Universities, polytechnics and other educational institutions as well as libraries, archives and museums have utilised the document and, for their part, promoted the positive development to implement the strategy. Also municipalities, business life and associations have strongly promoted the goals of the strategy.

The strategy document drafted in 1999 contains the guidelines on the goals of the development of the Information Society with regard to education and research for the years 2000–2004.

The strategy presents the following vision:

> *By the year 2004 Finland will be among the top countries in the world as a knowledge-based interactive society. The success will be based on equal opportunities for citizens to study and develop their own skills and extensively to use the data reserves and educational services. The operating method of network-based education and research, which is of a high quality and ethically and economically sustainable, will be established.*

To attain the vision the strategy outlines numerous activities to be implemented as part of the ordinary development work of education and research both in different organisations in the administrative field of Ministry of Education and in administration. The Action Programme contains four areas of emphasis needing special appropriations. Their aim is to make all citizens ready for the Information Society, to develop the versatile utilisation of networks in learning and education, to increase the digital data capital and to strengthen the structures of the Information Society in the area of education and research.

The project plan of the Action Programme notes that in order to achieve the goals of an equal Citizen Information Society, an extensive programme will be launched aiming inter alia at giving all citizens data and communication technology skills and media literacy skills. The programme is a central means in the prevention of the alienation of the citizens from the Information Society.

According to the goals of the information strategy, more than half of the educational staff will need good pedagogical skills in information and communications technology by the year 2004 and all the teaching staff will need the relating basic skills. Special experts in information and communications technology will also have to be trained for the field of education. With regard to the basic skills, the attainment of the goal requires training 7,500 persons, with regard to good skills, that of 35,000 persons and with regard to special experts, supplementary training of 9,000 people. Information and communications technology applications will also be developed strongly in the training aiming at the basic degree in education.

The development of a national virtual university and polytechnic involves safeguarding Finnish top know-how. At the same time, tertiary education will respond to the increased international competition in the market of education. The aim is to establish a high-quality and internationally recognised virtual university and polytechnic and to extend the utilisation of network studies in universities. This will involve the cooperation of universities, polytechnics, enterprises and research institutions producing flexible tertiary-level training services based on network studies and allowing life-long studies.

The Virtual University Project will promote possibilities for studying irrespective of one's place on residence or studying. Information and communications technology will be used to increase the flexibility and versatility of teaching. This is especially important in order to promote regional equality and to safeguard the possibilities to offer versatile teaching in small schools and municipalities. It will also facilitate the possibilities of working individuals to supplement their studies. The activities will also change the operating cultures of schools so that they will better correspond to the needs of working life.

The promotion of the virtual university, polytechnic and school will require a fast increase in digital data material available through the networks, which will be implemented, on the one hand, through domestic production and, on the other, by making foreign material in electronic form available through the networks.

The Information Industry Programme has been prepared in cooperation with the industry of the field and the Ministerial Committee on Economic Policy accepted the programme in December 1997. The programme contains

once-only measures that will affect the employment markets quickly, such as professional upgrading as well as an increase in specialist studies and research training. The programme will also permanently increase the courses available in the universities in the fields of the information industry. The Information Industry Programme will gradually increase the number of new university students by 1,000 students compared to the level of 1998. In 1998–2002, professional upgrading will be given to 5,150 new students in the fields of the information industry.

SITRA

SITRA, the Finnish National Fund for Research and Development, has collected a list of Spearhead Projects complying with the Finnish National Information Society drafted by it. This list of Information Society projects contains altogether 142 pending Information Society projects grouped into spearhead categories. The categories of the projects are the following

> 1) Culture and Information Products and Services (9 projects)
>
> 2) Electronic Transaction Services (15 projects)
>
> 3) Personal Navigation (1 project)
>
> 4) Electronic Learning (35 projects)
>
> 5) Knowledge-Intensive Work (2 projects)
>
> 6) Business Networking and Teleworking (39 projects)
>
> 7) The Local Information Society (27 projects)
>
> 8) Projects of Social and Health Care (27 projects).

One of the Spearhead Projects implemented was the 2-year Learning Upper Karelia Project, which ended in March 2000. A central goal of the local Information Society project implemented in the region of Nurmes, Juuka and Valtimo was to create a regional survival strategy for a retarding and remote area like Upper Karelia to respond to the new challenges of the Information Society. The positive results gained from the project have resulted in the launching of a new project utilising the model of the project elsewhere in Finland. The aim is also to export the project model.

Further information on the projects collected by SITRA is available in http://karkiverkosto.sitra.fi/netcomm .

The research programmes of TEKES

The National Technology Centre of Finland TEKES finances several research projects supporting the development of the Information Society. The following is a short description of the projects with the financing by Tekes during the whole programme period in brackets.

New User-Oriented Information Technology (USIX) – technology programme 1999–2002 (FIM 150 million / € 25.2 million)

USIX is a new multi-discipline technology programme set up to increase Finnish know-how in the development of products, applications, services and contents based on information and communications technologies. The key programme areas are active environments, electronic services and participation, persona navigation, natural language applications, teaching and learning environments as well as retrieving, compiling and processing information.

Business concepts for industries (UTT) technology programme
2000–2004 (FIM 79 million / € 13.3 million)

The programme will provide companies with new information technology tools needed for an on-line mode of business, new consortia of different experts for new types of business as well as to enhance the use of existing and new information technology infrastructure to enhance their operation. The programme will create new operating models, methods and tools for an on-line mode of business, and with the new services, service products and superior customer relation management that this will bring, companies will benefit from greater efficiency, better competitiveness and higher profitability.

Software Products – SPIN 2000–2003 – technology programme
(FIM 200 million / € 33.6 million)

The aim of the SPIN (Software Products INdustry) programme is to boost the software products business in Finland. The core areas of the programme are

- Spearhead Projects to develop new products and technology in selected core areas

- The launching of measures relating to the operating environment and support infrastructure of the software industry

- Strengthening of clustering and networking between companies

- Support for internationalisation activities of enterprises.

The Spearhead project areas of new products and technology are

- Software products and innovations for mobile telecommunications

- Applications for Internet service infrastructure, e.g. www, component and agent technologies and service systems

- New enterprise management software for companies and organisations of the future.

TESLA – Information Technology and Electric Power Systems
1998–2002 (FIM 44 million / € 7.4 million)

The objective of the TESLA programme is to adapt information technology extensively to power distribution and thus to develop the potential for Finland's electricity industry to succeed in world markets. The programme subject areas are distribution network automation, management of electrical systems in industry, data systems for power sales, demand side management and new data communication technology.

Telecommunications – creating a global village – TLX technology programme
1997–2000 (FIM 250 million / € 42 million)

The objective of the programme is the creation of new profitable businesses and new jobs, increased capacity for product development and increased exports for new telecommunications industry products in Finland, increased capacity for domestic and international cooperation as well as greater diversity in Finnish telecommunications industries and services in particular.

iWELL – turning well-being technology into a success story
(3 years, FIM 110 million / € 18.5 million)

The programme develops services and technology products for the health, well-being and independent living of individuals. The programme focuses on innovations relating to technology and service products improving the well-being of the population, enhancing rehabilitation after illness and compensating for permanent ailments and damage as well as giving the ageing population a better change of living independently in their homes. The aim is to make the products suited for export.

Information Networking in the Construction Process,
the VERA Technology Programme (FIM 100 million / € 16.8 million)

Construction processes and information systems are being developed simultaneously in the programme. The goal is to make the information concerning a building available throughout its entire life cycle.

The Academy of Finland

At the end of 1996 the Academy of Finland launched a 5-year Information Research Programme. At the first stage of the programme, 24 research projects were funded with slightly over FIM 50 million (€ 8.4 million) until the end of 1999. The core of the programme was formed by four themes: non-linear phenomena, data visualisation and medialisation, efficient retrieval and transfer of information, man as processor of information and Information Society. The main emphasis of the research programme was on so-called strategic basic research.

Stage II of the Information Research Programme was launched at the beginning of 2000. The programme consists of three consortia (joint ventures of several separate research teams) and nine separate projects, the majority of which were financed also in stage I. The themes of stage II are the growing demands of knowledge and skills, the changing structures of work life and interaction between man and technology. The second stage will last for two years and its budget is FIM 15 million (€ 2.5 million).

Further information on stage II of the research programme is available at the web site of the programme http://www.info.uta.fi/ttutk

The Ministry of Transport and Communications

Research and Development Programme of Transport Telematics Structures
TETRA (FIM 70 million / € 11.7 million)

Transport telematics is the most important single factor changing and developing transport operations in Finland in the near future. Development has been especially slowed down by the lack of information infrastructure despite the high-quality telecommunications infrastructure in Finland. The programme aims at promoting the production of interoperable intelligent transport systems covering all transport modes by developing the required basic ITS infrastructure and basic information systems and by promoting national expertise and industrial competitiveness.

Personal Navigation NAVI
(FIM 100 million / € 16.8 million)

The aim of the programme is, within the limits of consumer needs and the possibilities of technology, to develop and test location services of the mobile telephone network, mobile location devices and different guide

services. The programme also includes research as well as product and service development projects supporting the aims, legislative reform, further education and user training.

Transport Chain Development Programme KETJU
(FIM 100 million / € 16.8 million)

The purpose of the development programme is to promote the product development of the Finnish transport vehicle, cargo handling, logistics-related and telematics industry. The project aims at high-technology products with international markets. In addition to the manufacturing industry, the new products and modes of operation will, in the long term, promote the competitiveness of Finnish logistics services and thus improve the operating conditions of Finnish industry and trade.

The Association of Finnish Local Authorities

The primary aim of the Association of Finnish Local Authorities in the promotion of Information Society development is to support local authorities in their own Information Society projects. Finnish municipalities also have hundreds of Information Society projects. The association of Finnish Local Authorities also has its own Information Society projects, the most significant of which include the so-called *LOGREGIS, Local And Regional Information Society,* cooperation project, launched at the initiative of the European Commission, the Local Information Society Project and the Videophone Project.

The Local Information Society Project has been launched on the basis of experiences gained form the LOGREGIS project. The aim is to collect and develop Best Practices for the implementation of local and regional Information Society and to increase regional cooperation and interaction in order to improve services and to strengthen democracy. The project is also one of SITRA's Spearhead Projects.

The purpose of the *Videophone Project,* launched in 1999, is to speed up the introduction of videophone technology in the service production of public administration. The aim of the project is, by utilising new technology, in the local community to safeguard expert services threatened by termination, to increase the range of services offered in a local community both to citizens and to enterprises and organisations.

7.3 EU Information Society projects

eEurope – An Information Society for All -Initiative

On 8 December 1999 the European Commission published the Initiative *e*Europe – An Information Society for All. The projects aims at ensuring that the future generations in the European Union will benefit from changes brought by the Information Society. The target is to bring the benefits of the Information Society within reach of all Europeans. The initiative of the Commission was supplemented by the Communication from the Commission 'Strategies for jobs in the Information Society'. (COM(2000)48 Final) in February 2000.

The key objectives of the *e*Europe Initiative are:

- Bringing every citizen, home and school, every business and administration into the network environment and into the digital age.

- Creating a digitally literate Europe, supported by an entrepreneurial culture ready to finance and develop new ideas.
- Ensuring that the whole process is socially inclusive, adds to consumer trust and strengthens social cohesion.

The *e*Europe Initiative was handled by the Lisbon European Council in March 2000. The Summit supported the initiative and emphasised inter alia the development of European communications infrastructure, electronic commerce, training, public services, research activities and content production as means for promoting economic growth and well-being. According to the conclusions of the Summit, all citizens will have to possess the skills necessary to live and work in the Information Society. According to the conclusions, information technology will have to be used so as to renew regional development, the use of environmentally-friendly technology will have to be enhanced and the cultural diversity of Europe will have to be supported in content production.

The European Council invited the Commission to draft an Action Plan to support the initiative; it was published by the Commission on 24 May 2000. On the basis on the results of the Summit, the Commission reviewed the contents of the original initiative in the Action Plan. The plan has three objectives comprising 11 priority areas for action.

1) A cheaper, faster and secure Internet

The aim is to bring cheaper and faster connections to the Internet available to all Europeans. Fast connections are needed especially for researchers and students in order to increase real-time research cooperation. A further aim is to improve the data security of data networks.

2) Investing in people and skills

Bringing the European youth into the digital age requires i.a. that all schools have access to the Internet and multi-media resources and that teachers are given further training in the use of information and communications technology. Working in the new knowledge-based economy presents challenges to an enhancement of the educational system. Inputs will also have to be made for all citizens to become digitally literate. The benefits of the Information Society will have to be made accessible also to the disabled and to those left outside the labour markets and educational systems.

3) Stimulating the use of the Internet

The aim is to accelerate e-commerce and especially the trust of the consumers in network commerce e.g. by legislative measures. The availability of public services in data networks will be increased in order to enhance the services, to improve their quality and to lower costs. With regard to health services, the aim is to develop a user-friendly infrastructure able to offer interactive health ducation, disease prevention and medical care.

The development of European digital content will be accelerated and cultural and linguistic diversity will be promoted.

The Action Plan contains individual measures for the years 2000–2002. Responsibility for their implementation is divided between EU institutions, Member States and the private sector. According to the Action Plan, the aim is to achieve the targets by the year 2002. The Action Plan also includes indicators relating to each target.

The purpose is to approve the Action Plan in the Feira European Council in June 2000.

User-friendly Information Society

The purpose of the user-friendly Information Society project, *Information Society Technologies*, IST, is to make user-friendly information technology products and services meeting the needs available to all. This will improve the quality of citizens´ life and the competitiveness of the industry. The different parts of the research programme relate to both basic and applied research.

The IST is part of the Fifth Framework Programme of the EU. The EU mainly finances half of the costs. In the years 1999–2002, the EU will contribute to the project by € 3,600 million. The programme is implemented by the Commission and the actor responsible in Finland is Tekes. The IST Committee has representatives from the Ministry of Education and Tekes.

8   Conclusions

8.1   On the development of the Information Society in Finland

The development of the Information Society has been very strong in Finland during the last ten years. Finland is generally considered a country that already has many of the elements of the Information Society. However, Finland is still making its way into the Information Society. The emergence of the Information Society means a new way of handling matters. This requires a new kind of administrative culture and organisation. Changes are taking place within enterprises and public administration as well as in the division of work between them.

The citizens, enterprises and public administration have extensively adopted the use of new information and communications technology. A mobile phone has become commonplace in nearly all population groups. The information and communications sector as a field has continued its strong growth. Even though electronic commerce has so far been modest, for example Finnish small and medium-sized enterprises have, on the average, better technical readiness for network commerce that their European competitors. The increase in the demand for the products and services of the information and communications branches has contributed towards making the increase in employment in Finland one of the fastest in the OECD countries.

Several background factors can be outlined for the strong Information Society development in Finland. On the global level, the starting point of the development of the Information Society has largely been the strong technological development (the 'digital revolution'). The development in Finland was also influenced by the recession in the first half of the 1990s, after which the trade structure has strongly changed. The electric and electronic industries have replaced the paper industry as the most important export sector. Extensive inputs have been made in education as well as in research and product development in the last decades. The foundation of knowledge has been strengthened and new models of a networked economy have been created.

In addition to the development and efforts of the private sector, also the public sector has made an input in the promotion of the Information Society. The liberalisation of the regulation of the telecommunications field has promoted a strengthening of the competitive ability of the telecommunications field and its reform. A nationally unifying Information Society strategy has supported and helped to direct the development. The educational policy of the public sector offering equal opportunities for all citizens has created mental prerequisites for the development of the Information Society.

Several factors may slow down the development of the Information Society in Finland. A visible example is the discrepancy between the supply and demand of manpower in the information industry. Information Society development poses challenges both to business life, the public sector and to employees. Especially the fast development of electronic commerce is changing business activities and the structures of business life. The institutions of work life are facing new challenges. Continuous attention

will have to be paid to the training of employees and to the maintenance and renewal of professional skills. Networking is creating pressures to the structures of the public sector and to the division of work between the different administrative levels. In spite of the strong development and economic growth there are social groups and areas which are not sufficiently benefiting from the Information Society.

A central challenge is to maintain Finland among the leading Information Societies. Maintaining the present head start requires a speeding-up of the development of the Information Society and a strengthening of the weaknesses. Both the private and the public sectors will continuously have to evaluate and, where necessary, flexibly adapt their strategies. It is only the next few years that will show the real place of Finland in the global Information Society development.

8.2 The strong points, problems and challenges of Finnish Information Society development

Finnish Information Society development contains several strong points and positive expectations. On the other hand, several problems have emerged and Information Society development contains significant challenges. The most central of these strong points, problems and challenges will be discussed in the following in the form of a list.

Strengths

- Cooperation between the public and private sectors

   In Finland both public and private sectors have made an input in Information Society development. It is a significant benefit to Finland that it has been possible for the public and the private sectors in cooperation to create joint visions and goals for the development of the Information Society.

- A strengthening of the information economy

   Economic development and especially the development of the so-called information sector has been strong after the middle of the 1990s. In 1997, the information sector employed about 5.5 % of the labour force. In 1990, the share of the exports of information technology products was 7.5 % of total exports and in 1995 it was 13.5% and in 1999, about 23 %.

   Also the resources of research and development activities have increased quickly in the last twenty years. The share of the expenditure in research activities is at present three per cent of the gross national product. Among the OECD countries, only the input of Sweden is higher. United States and Japan are at about the same level as Finland. In 1997, the research expenditure of product groups typical of the Information Society covered almost half of the research expenditure of the enterprise sector.

- High educational level

   The educational level of the Finns is strong. Especially information technology and media training has been strongly increased – the number of students starting in these fields has become almost 4-fold in ten years.

- Telecommunications networks and services

  Telecommunications networks form the technical foundation for the development of the Information Society. In Finland, the telecommunications infrastructure is, for both historical reasons and due to public-sector measures supporting competition, one of the most developed. In 1999 Finland was the first country in the world to grant the licenses for the so-called third-generation mobile telephone networks. The diversity of service provision and low prices have made an extensive use of new services possible.

- Information technology is extensively utilised in both the private and the public sectors

  The majority of Finnish enterprises is already utilising the new information technology. As early as in 1998, about 90 per cent of enterprises utilising information technology and employing more than 20 persons were using the email and Internet connections.

  Finnish banking technology is among the most advanced in the world. Over 80 per cent of payment transactions between the bank and the customer are handled through telecommunications connections. Finnish private and corporate customers use the Internet in their banking relatively more than anywhere else. The network banks have made Finns used to using the Internet for other than entertainment and they show a good example for attending to other processes in the network.

  In Finland it is possible both technically and from the point-of-view of legislation to attend to the book-keeping of an enterprise without paper receipts. This gives an opportunity for a full utilisation of electronic commerce.

  Public administration is applying information technology in many ways. So-called basic registers (the Population Information System, real-estate registers, road traffic data system and company registers) form a reliable data base for efficient operations of the public sector, which the citizens can experience in the facilitation of administrative processes (e.g. the tax proposal procedure).

- Comprehensive library network

  Libraries are an important channel for the growing information resources and services. In Finland public libraries form a well-functioning national network with connections to other national and international library and information service networks. In an international comparison, Finland is among the top countries in the use of public libraries per inhabitant. What is typical of the Finnish library system is that the users have parallel access to general, scientific, special and educational-institute libraries. The libraries commonly offer an opportunity to use the Internet free of charge.

- Mobile communications

  The early start in mobile telecommunications and its high penetration have created numerous new innovations and businesses.

The high level of know-how in the production of mobile communications equipment and services as well as consumers fond of trying the new equipment and service provision bring also foreign product development into the country.

- Location information covering the whole country

Finland has extensive nationwide location information in numerical form describing the terrain, natural resources and the environment in a versatile way. The majority of the material is located in the location directory of the National Land Survey of Finland accessible through public data networks. The national location information infrastructure and the arrangement of central location information services are still being developed.

Problems and weaknesses

In spite of many positive features and strong points, the development of the Information Society in Finland also contains 'bottlenecks' or features that require attention. The following can be mentioned among the most significant:

- Scarcity of resources

Although Finland has made a strong input in research and product development, the resources of our national economy are still more restricted than in many other OECD countries.

- Application software industry and content production still under development

The software industry is still relatively young in Finland. Finnish enterprises have made progress only in a few areas (so-called imbedded software, data security). In the case of content production, the inputs and development projects have not yet had time to produce significant visible results.

- The dependency of economic growth on one branch

In the last few years, the economic growth of Finland has been largely dependent on the electronics industry and its exports. The cumulative effects of the electronics industry and especially the mobile communications branch in the Finnish economy are significant. Eventual difficulties in these branches would affect the economy extensively.

- Recruitment problems of trained personnel in the information sector

In 1997, the information sector employed a total of 112,000 persons in Finland, i.e., about 5.5 % of all those employed (Statistics Finland: On the Road to the Finnish Information Society II). The development has been especially fast in the goods production of the information sector: between 1994 and 1997, their employment increased by about 70 %.

The scarcity of information and telecommunications technology professionals is a reality in individual enterprises. This is restricting the growth of the enterprises.

- The regional imbalance of the information sector

The growth of the information and communications sector has been the strongest in the capital region as well as in the regions of Salo, Oulu and Tampere. The share of the information sector of the jobs in different areas varied from one per cent to 25 per cent in 1997.

■ Low level of entrepreneurship

Entrepreneur activity is low in Finland in international comparison. The share of those participating in new enterprises of the Finnish adult population is one of the lowest in Europe and only one-fourth of what it is in the United States[33].

■ The position of small and medium-sized enterprises

The internationalisation of the markets and the progress of electronic commerce are changing the operating environment and operating conditions of enterprises. Many small and medium-sized enterprises will have to develop and internationalise their operations quickly. They will need new know-how for this.

Challenges

■ The flexibility and social dimension of the Information Society

The Information Society as such is neither a positive nor a negative matter. What is essential is the mental and physical well-being or problems and challenges that it will bring to Finnish society. One of the most significant challenges is finding a balance between the requirement of flexibility in both work life and more extensively in the development of society brought along by Information Society development (and the international competition that it entails) and, on the other hand, the maintenance of the social cohesion, equality and justice of Finnish society.

■ The capacity of the educational system and the direction of education

Education in information and communications technology and the media has doubled several times in the last ten years. Yet, the capacity of the educational system has proved insufficient, because the need for manpower in the information industry has increased and is increasing strongly. The increasing importance of the information sector as an employer and the special requirements it sets on the workforce bring pressure to the Finnish educational system to adapt to the manpower requirements of enterprises.

The need to increase the labour force and the limited capacity of the educational system also bring challenges to the direction of education. Education should be directed to people already in work life. Enterprises are responsible for the development of their personnel. Information and communications technology training has not been able to attract sufficient numbers of female students, which weakens the recruitment basis.

The development of the Information Society cannot, in the

[33] Cf. e.g. 'Creativity and Innovations to be Boosted in Europe. UNICE, Benchmarking report 2000.'
Confederation of Finnish Industry and Employers 2000. p. 15.

long term, be based solely on information and communications technology training. More and more information and communications technology skills are needed also in professions with a different education.

- Network commerce forms a challenge to enterprises and business life

  So far electronic commerce has been growing faster in the United States than in Europe. Although electronic commerce still involves issues of data security, consumer protection and taxation, it is estimated that especially inter-company commerce will almost triple even in Europe in a few years. It is estimated that the share of the Nordic countries will exceed 10 % of the European network markets in 2002. In an international comparison, Finland has good prerequisites for the development of network commerce.

  Electronic commerce brings enterprises both possibilities and challenges. Network commerce can i.a. lower marketing and distribution costs. To the buyer network commerce offers a possibility to shop irrespective of time and place.

  Network commerce affects the structure of the markets, opens up new markets, influences the competitive position of enterprises and brings along new cooperation needs and relations. In an individual enterprise electronic commerce may affect the business idea, the operating methods, production, logistics and marketing. The enterprise faces the challenge of evaluating and adapting its business idea and all its operations (its production, logistics and marketing) to the new operating and marketing environment.

- Regional development

  Information and communications technology and its development open up new possibilities for work and life in different parts of Finland. The new technologies also give a possibility for a free regional placement of various functions (such as telephone service centres). These possibilities have not been utilised and regional development is uneven.

- Information management and the change in the operating environment from the viewpoint of the employee

  The use of information and communications technology has changed the physical and mental operating environment of human beings[34]. The increase in the amount of information and its easier availability poses a special challenge to executives and experts. The Information Society has, indeed, created a surprising paradox: those with the greatest possibility to use information and communications technology are busier and busier and work longer and longer hours.

---

[34] For further information, see Rantanen – Lehtinen: Tietoyhteiskunta, terveys ja työ [The Information Society, health and work]. SITRA 164. Helsinki 1998.

Information and communications technology has offered many possibilities to improve the health and safety of work. For example it has been possible to transfer dangerous or monotonous work to automation. The use of information and communications technology involves new and even unforeseen health effects (e.g. the ergonomic problems of computer display work or the sense problems in a virtual environment). A clarification of these problems, looking for solutions and adaptation to the new environment is a challenge both to research institutions, those developing new technology and to employers.

9   Proposals for further measures

In Finland the public and private sectors have been cooperating successfully in the development of the Information Society. Central measures have been an increase in research and development activities, the fast and efficient opening of telecommunications competition, the development of training in information and communications technology as well as the development of legislation and other regulation to meet the new needs. The National Committee considers the Information Society policy selected in Finland and the projects implemented and decisions made in compliance with it to be correct. These measures have created a good starting point, but in many ways the actual work still lies ahead. In the future, the measures will have to be enhanced, strengthened and adapted to new needs.

On 8 December 1999 the European Commission published its initiative *e*Europe – An Information Society for All, which was handled in the Lisbon meeting of the European Council in March 2000. The Summit supported the initiative and invited the Commission to draft an Action Plan. Inter alia the European Council emphasised the development of the European communications infrastructure, electronic commerce, training, public services, research activities and the content industry as means for promoting economic growth and well-being. According to the conclusions of the Summit, all citizens will have to posses the skills necessary to live and work in the Information Society. According to the conclusions, information technology will have to be used so as to renew regional development, the use of environmentally-friendly technology will have to be enhanced and the cultural diversity of Europe will have to be supported in content production.

On 24 May 2000 the European Commission published an Action Plan in support of the project and it will be handled at the European Council meeting in Feira on 19–20 June 2000. The measures listed in the Action Plan will take place in 2000–2002.

The Information Society Advisory Board considers the goals of the *e*Europe Programme important for Finland and considers that Finland should commit herself to implementing the goals. Some of the measures proposed in the *e*Europe Project have already been implemented or launched in Finland. The National Committee considers that Finland should aim at implementing the measures under national responsibility, such as improving the information-technology skills of teachers and the development of electronic services of administration, faster than the schedule proposed in the Action Plan.

In the opinion of the Information Society Advisory Board, training, know-how and research, communications infrastructure, the operating and environmental environment, the prevention of the development of alienation, and public sector services are the core areas that will have to paid attention to in order to strengthen Information Society development. The proposals for measures listed in the following and relating to these fields supplement the Information-Society projects of the Government Project Portfolio and support the goals of the *e*Europe Project.

1. **Strengthening education, know-how and research**
   - Training in the fields of information and communications

technology will have to be strengthened in order to increase the availability of skilled labour. Training will have to be directed also at age groups already in working life. The training offered will have to be made attractive to as many as possible. Special emphasis will have to be paid to the quality of training, the resources of tertiary education and increasing the training of research workers and teachers in the field.

- A knowledge of and skills relating to information and communications technology are needed in all sectors of society in the Information Society. Education and training in information and communications technology skills will have to be included in the training programmes of all fields.

- Already the comprehensive school will have to give sufficient "digital reading and writing skills" so that the use of information technology and networks will be a basic skill possessed by every citizen.

- Training in information and communications technology to those in working life and other adult population will have to be increased.

- In order to safeguard the growth potential of information and communications branches and research in the field, also foreign professional workers will be needed in Finland. It will have to be ascertained how the possibilities of Finland to compete for skilled professionals can be improved.

- Public-sector funding for research and development will have to be increased in balance with the inputs of the private sector. The inputs of the public sector will have to be continuously evaluated and directed especially at larger research projects with long-term market potential.

2. **Communications infrastructure**
   - Liberalisation of the provision of the services of information and communications technology infrastructure will have to be increased (for example with regard to subscriber connections of the fixed telephone networks). Regulation and, where necessary, participation in development activities will have to ensure that alternative technologies have a possibility to develop in the markets. The entry of new entrepreneurs into the field will have to be facilitated. These aims will be pursued also internationally both in the European Community and in the global markets.

   - The availability and utilisation of information and communications services will have to be monitored in different fields and user groups. Special attention will have to be paid to the regional distribution and bottlenecks of broadband data-transfer services.

   - In order to ensure the availability of communications services, their high level and advantageous price, the permit policy will also in the future have to based on the guidelines chosen, according to which the licenses are granted based on an

evaluation of the operating prerequisites and reliability of the applicants. No auctions will be arranged to grant the licenses.

3. **The operating and legislative environment**

- The Information Society Advisory Board considers that the starting point for the regulation of electronic commerce will have to be self-regulation, supplemented, where necessary, by public-sector regulation. Public-sector regulation will, inter alia, be needed in issues relating to consumer protection, the protection of personal data, data security and copyright.

- The development of the legislative environment of electronic commerce will have to continue as part of the measures of the European Communities and other international actors when taking into account the global nature of electronic commerce. Special attention will have to be paid to measures increasing the trust of consumers and other parties to the electronic commerce in this business.

4. **Prevention of alienation in the Information Society**

The use of new information and communications services in Finland does not indicate an increasing development of alienation even though there are differences in the use of these services between population groups and different regions. In spite of this, the Information Society Advisory Board considers it necessary to monitor the eventual alienation development. If necessary, preventive action will have to be taken. Several of the measures referred to above – especially those relating to training and the communications infrastructure – promote the prevention of alienation. We can say that the most central of these means is the fact that, already in comprehensive school, children obtain a sufficient readiness to use information and communications technology. The development of alienation can also be prevented by the following measures.

- The possibilities of public libraries to offer citizens network connections in library facilities will be strengthened.

- The development of sufficient hardware, software and network connections in educational institutions will be continued. A better utilisation of these resources in the evenings, weekends and during school holiday periods would make network services available to citizens not having their own equipment and connections. In this way, educational institutions would supplement libraries.

- Research and development work will have to be directed so that also the disabled and other special groups can utilise the possibilities offered by information and communications technology. Attention will have to be paid to special groups in all development projects of the Information Society.

- The development of regional differences will be monitored and projects of the Structural Funds and the Social Funds for the promotion of Information Society development will have to be emphasised.

- Counselling and support measures will emphasise the readiness of small and medium-sized enterprises to utilise information and

Sources

Alasoini, T. (1998): Ryhmätyön uusi aalto Suomen teollisuudessa – havaintoja Kansallisen työelämän kehittämisohjelman hakemusten valossa (The new wave of teamwork in Finnish industry – observations in the light of applications for The National Development Programme of Working Life). Kansallisen työelämän kehittämisohjelman työraportteja 7 [Reports of the National Development Programme of Working Life 7]. Helsinki: Ministry of Employment.

Ali-Yrkkö, J., Paija, L., Reilly, C. ja Ylä-Anttila, P. (2000). Nokia – A big company in a small country. ETLA.

Anttiroiko, A.-V. (1999): The Informational Region. Promoting Regional Development in the Information Age. University of Tampere, Department of Local Government Studies, Publication Series 3/1999

Aro, J. (2000): Teknologian ja yhteiskunnan muutoksen suhde [Relationship of technology and change of society]. In: Vuorensyrjä, M., Savolainen, R. (ed.): Tieto ja yhteiskunta [Knowledge and society]. Helsinki: Gaudeamus (forthcoming)

Barber, B. (1998): A Place for Us: How to Make Society Civil and Democracy Strong. New York: Hill & Wang Pub.

Blom, R. (ed.) (1999): Mikä Suomessa muuttui? Sosiologinen kuva 1990-luvusta [What changed in Finland? A sociological picture of Finland]. Tampere: Gaudeamus Oy

Cairncross, F. (1997): The Death of Distance: How the Communications Revolution Will Change Our Lives. Boston: Harvard Business School Press

Castells, M. (1996): The Rise of the Network Society. The Information Age: Economy, Society and Culture Vol. I. Oxford: Blackwell

Castells, M. (1997): The Power of Identity. The Information Age: Economy, Society and Culture Vol. II. Oxford: Blackwell

Coyle, D. (1998): The Weightless World: Strategies for Managing the Digital Economy. Boston: MIT Press

Cronberg, T. (1985): Työ, aika ja asuminen tietoyhteiskunnassa [Work, time and housing in the Information Society]. Helsinki: State Printing Office & National Board of Housing.

Drucker, P. (1993): The Post-Capitalist Society. New York: HarperBusiness

Dyson, E., Gilder, G., Keyworth, G., Toffler, A.(1994): Cyberspace and the American Dream: A Magna Charta for the Knowledge Age. Release 1.2, August 22, 1994

EITO (2000). European Information Technology Observatory 2000.

Etla, The Research Institute of the Finnish Economy. Suhdanne 1/2000 [The Finnish Economy 1/2000: Forecast for 2000–2001].

EU Commission (1996): Green Paper – Living and Working in the Information Society – People First. COM(96)389 final adopted on 24 July. Brussels: European Commission

EU Commission (1997): Cohesion and the Information Society. Commission Communication to European Parliament, the Council, the Committee of Regions and the Economic and Social Committee. COM(97)7. Brussels: EU Commission

EU Commission (1999): The Information Society. http://europa.eu.int/en/comm/dgiii/infosoc.htm (1999a)

EU Commission (1999): eEurope. An Information Society For All. Communication on a Commission Initiative for the Special European Council of Lisbon, 23 and 24 March 2000. Brussels: EU Commission (1999b)

EU Commission (2000): Strategies for Jobs in the Information Society. Communication from the Commission. February 4. Brussels: COM(2000) 48 Final

Eurostat (1998).

EVA, Centre for Finnish Business and Policy Studies (1999): EVA-raportti: Suomalaisten asenteet 1999 [EVA Report: Attitudes of Finns 1999] Helsinki: The Centre for Finnish Business and Policy Studies EVA

Forsman, P. (2000). Elektroniikkateollisuus – Vakauttava tekijä Suomen taloudessa? [The electronics industry – A stabilising factor in Finnish economy?] Unpublished working paper.

Frank, R.H., Cook, Ph.J. (1995): The Winner-Take-All Society. The Free Press, New York

Freeman, C., Soete, L. (1994): Work for All or Mass Unemployment?: Computerised Technical Change into the Twenty-First Century. London: Pinter Publications

Gates, B. (together with C. Hemingwayn) (1999): Bisnestä ajan hermolla [Business in the forefront of development]. Porvoo-Helsinki-Juva: WSOY

Government (1997): Reilu ja rohkea -vastuun ja osaamisen Suomi. Valtioneuvoston tulevaisuusselonteko eduskunnalle osa II [Fair and brave –A Finland of responsibility and skills. Council of State Account on the Future to Parliament, Part II] Helsinki: Publications of the Office of the Council of State 1997/2

Government (1999): Paavo Lipposen II hallituksen ohjelma 15.4 [Programme of Prime Minister Paavo Lipponen's Second Government, 15 April]. Helsinki: Council of State

Government (2000): Pääministeri Paavo Lipposen hallituksen hankkeet: päivitys talvella 2000. 2.2. [Projects of Prime Minister Paavo Lipponen's Government: Update in winter 2000, 2 Feb] Helsinki: Office of the Council of State

Hanhike, T. (1999): Etätyö muutoksen välineenä: kokemuksia yritysten ja työntekijöiden sopeutumisesta ympäristön muutokseen etätyön ja hajautetun työn avulla [Distance working as a means for change:

Experiences of the adaptation of companies and workers to changes in the environment by means of distance working and decentralised work]. Helsinki: ESR-julkaisut 29

Heikkilä, M., Uusitalo, H. (ed.) (1997): Leikkausten hinta. Tutkimuksia sosiaaliturvan leikkauksista ja niiden vaikutuksista 1990-luvun Suomessa [The Cost of Cuts. Studies on cut-backs in social security and their effects in Finland in the 1990s]. Helsinki: Stakes

Hienonen, R. (1997). Elektroniikka- ja sähköalan kehitysnäkymät 1997–2000 [Development prospects in the fields of electronics and electricity 1997–2000. VTT Automation.

Heinonen, R., Hannula, R. (2000): Valvonta tietoyhteiskunnassa [Control in the Information Society]. Helsinki: Edita

Helsingin Sanomat (2000): Castells tietää mistä tässä kaikessa on kysymys. Saska Snellmanin laatima prof. Manuel Castellsin haastattelu [Castells knows what it is all about. Interview of Prof. Manuel Castells by Saska Snellman] Helsingin Sanomat 2.1.

High-Level Expert Group (1997): Building the European Information Society for Us All. Final Policy Report, April. Brussels: European Commission, Directorate-General for Employment, Industrial Relations and Social Affairs

Hintikka, K.A.(1998): Puheenvuorojen kirjasto. Keskustelua suomalaisesta tietoyhteiskunnasta [Library of discussion. Discussion on the Finnish Information Society]. Helsinki: Sitra 163

Hintikka, K.A. (1999): Puheenvuorojen kirjasto 2. Keskustelua tietoyhteiskuntastrategiasta [Library of discussion 2. Discussion on Information Society Strategy]. Helsinki: Sitra 219

Inkinen, S. (1999): Teknokokemus ja Zeitgeist. Digitaalisen mediakulttuurin yhteisöjä, utopioita ja avantgarde-virtauksia [The techno experience and Zeitgeist. Communities, utopias and avantgarde trends of the digital media culture]. Rovaniemi: Acta Universitatis Lappoensis 28

Jarva, V., Köppä, A. (ed.) (1998): Maan tiet. Maaseudun tiet tietoyhteiskuntaan [Country Roads. The roads of the countryside to the Information Society]. Helsingin yliopiston osuustoimintainstituutti, julkaisuja 19 [Institute for Cooperative Studies, Helsinki University, Publications 19]. Helsinki: University Press

Johnson, R. (2000): Professori Manuel Castellsin haastattelu, esitetty TV1:n a-studiossa 7.1. [Interview of Prof. Manuel Castells, presented in TV1 of the Finnish Broadcasting Company on 7 Jan.]

Kaivo-oja, J., Kuusi, O. (1999): Arvioita ja analyyseja tietoyhteiskunnan työmarkkinoiden kehityspiirteistä Suomessa. Työelämän kehitystrendit ja osaamisklusteriajattelun kehittäminen ennakointitoiminnassa [Evaluations and analyses of development trends of the labour markets of the Information Society in Finland. Development of thinking about development trends and the know-how cluster of working life for forecasting] . ESR-julkaisut 42/99. Helsinki: Oy Edita Ab

Karjula, K. (2000): Tietoyhteiskunta kaikkien ulottuville [Bringing the Information Society within everybody's reach]. Suomen Kuvalehti 11, 80-81

Karvonen, E. (1999): Elämää mielikuvayhteiskunnassa: imago ja maine menestystekijöinä myöhäismodernissa maailmassa [Life in an image society: image and reputation as success factors in the post-modernistic world]. Helsinki Gaudeamus

Karvonen, E. (2000): Elämmekö tieto- vai informaatioyhteiskunnassa? Tiedon ja informaation käsitteiden syväanalyysia [Are we living in a knowledge or an information society? Profound analysis of the concepts of knowledge and information]. In: Vuorensyrjä, M., Savolainen, R. (ed.): Tieto ja yhteiskunta [Information and society]. Helsinki: Gaudeamus (forthcoming)

Kasvio, A. Nieminen, A. (1999): Kilpailu työstä [The competition for work]. Tampere: Tampere University Press

Keskinen, A. (ed.) (1995): Teledemokratia, tietoverkot ja yhteiskunta [Teledemocracy, data networks and society]. Helsinki: Printing Office Oy

Kevätsalo, K. (1999): Jäykät joustot ja tuhlatut resurssit [Inflexible flexibilities and wasted resources]. Tampere: Vastapaino

Klee, K., Bensko, J. (1999): 'The Future Is Finnish'. Newsweek International May 24

Koski, J.T. (1998): Infoähky ja muita kirjoituksia oppimisesta, organisaatioista ja tietoyhteiskunnasta [Information overdose and other writings on learning, organisations and the Information Society]. Saarijärvi: Gummerus kirjapaino Oy

Krugman, P.: Is Capitalism too Productive? Foreign Affairs, Sept./Oct. 1997

Lash, S. (1999): InformationCritique. Paper Prepared for the UK-Nordic Meeting on Information and Communication Technologies, Copenhagen 16–17 September. At: http://www.brunel.ac.uk/research/virtsoc/nordic/cbslash.htm

Lehtinen, J., Luotola, T. (1986): Matka informaatioyhteiskuntaan [A trip to the Information Society]. Tampere: Tampereen yliopiston tiedotusopin laitos, julkaisuja sarja A; 53 [Publications of the Tampere University Department of Communications, Series A, 53]

Lehto, A.-M. (1998): Tehokas, tehokkaampi, uupunut: työolotutkimusten tuloksia 1977–1997 [Efficient, more efficient, burnt-out: Results of research into the conditions of working]. Helsinki: Statistics Finland

Lehto, A.-M., Sutela, H. (1999): Tasa-arvo työoloissa [Equality of working conditions]. Helsinki: Statistics Finland

Ministry of Education (1995): Koulutuksen ja tutkimuksen tietostrategia [Information strategy of education and research]. Helsinki: Ministry of Education

Ministry of Education (1995): Koulutuksen ja tutkimuksen tietostrategia [Information strategy of education and research 2000–2004] . Helsinki: Ministry of Education

Ministry of Finance (1995): Suomi tietoyhteiskunnaksi – kansalliset linjaukset. Tikas-ohjausryhmän loppuraportti [Finland's Road to the Information Society – National Guidelines. Final Report of the Tikas Guidance Group]. Vantaa: Ministry of Finance

Ministry of Finance (1998): Suomi taloudellisena toimintaympäristönä. Arvio Suomen kilpailukyvyn vahvuuksista ja heikkouksista [Finland as an Economic Operating Environment. Estimation of the Strengths and Weaknesses of Finnish Competitiveness]. Helsinki: Ministry of Finance 1998

Ministry of Labour (1999): Tiedon valtateiltä luovuuden lähteille. Inhimillinen näkökulma tietoyhteiskunnan työpolitiikkaan [From Information Highways to fountains of creativity. A human viewpoint to the employment politics of the Information Society]. Knowledge Society Team 12.1. Helsinki: Ministry of Labour

Ministry of Social Affairs and Health, (2000): Kansallinen ikäohjelma 1998–2002 [National Programme on Ageing Workers 1998–2000]. Project description at: http://www.vn.fi/vn/stm/suomi/ajankoht/ikaohjel.htm

Ministry of Transport and Communications (1997). Suomalaisen tiedon valtatien tekninen kehitys [Technological development of the Finnish Information Highway]. Publication of the Ministry of Transport and Communications 16/97.

Ministry of Transport and Communications (1999). Televiestintätilasto 1999 [Telecommunications statistics]. Oy Edita Ab.

Mannermaa, M., Ahlqvist, T. (1998): Varsinainen tietoyhteiskunta. Varsinaissuomalaisen kommunikaatioklusterin pk-yritysten kilpailukyky, kehitysnäkymät ja työllistävyys tulevaisuudessa [The actual Information Society. The competitive ability, development prospects and employment capability of the SMEs of the communications cluster of the Varsinais-Suomi Province in the future]. ESR -julkaisut 36. Helsinki: Oy Edita Ab

McGuire, S. (2000): Shining Stockholm. Newsweek International February 7th

Morais, R.C. (1999): Smoked Reindeer and Web Phones. Forbes Global December 27, 92–95

Mäenpää, P. (2000): Digitaalisen arjen ituja. Kännykkä ja urbaani elämäntapa [Sprouts of digital everyday life. Mobile phone and the urban way of living]. In: Hoikkala, T., Roos, J.-P. (ed.): 2000-luvun elämä. Sosiologisia teorioita vuosituhannen vaihteesta [Life in the 2000s. Sociological theories on the turn of the millennium]. Tampere: Gaudeamus, 132–152

Nurmela, J. (1997): Suomalaiset ja uusi tietotekniikka [The Finns and the new information technology]. Helsinki: Statistics Finland, Reviews 1997/7

Nurmela, J. (1998): Valikoiko uusi tieto- ja viestintätekniikka käyttäjänsä? [Does the new information and communications technology select its users?] Helsinki: Statistics Finland, Reviews 1998/1

Nurmela, J., Heinonen, R., Ollila, P., Virtanen, V. (2000): Mobile Phones and Computer as Parts of Everyday Life in Finland. Phase II of the project "The Finns and the Future Information Society", Report 1. Helsinki: Statistics Finland, Reviews 2000/5.

Nätti, J. 1998. Työn muutos: vakaudesta epävakauteen [The change in work: from Stability to instability]. In: Saksala, E. (ed.): Muutoksen sosiologia [Sociology of change]. Jyväskylä: Gummeruksen Kirjapaino Oy, 44–54

OECD (1997 ja 1999). Committee for Information, Computer and Communications Policy. Unpublished meeting material, OECD, Paris.

OECD: Knowledge-Based Economy. OECD, Paris 1996

OECD (2000). OECD Information Technology Outlook. ICTs, E-commerce and the Information Economy. OECD, Paris.

Okko, P., Miettilä, A., Hyvärinen, J. (1998): Globalisaatio ja aluerakenteen muutos [Globalisation and the changing regional structure]. Helsinki: Sitra 177

Pantzar, M. (1996): Kuinka teknologia kesytetään. Kulutuksen tieteestä kulutuksen taiteeseen [How to tame technology. From the science of consumption to the art of consumption]. Hämeenlinna: Hanki ja jää

Parjanne, M.-L. (1998): Työmarkkinat murroksessa [The labour markets in a change]. ETLA publications B 135. Helsinki: Taloustieto Oy

Parliament, Committee for the Future (1998): Eduskunnan tulevaisuusvaliokunnan mietintö valtioneuvoston selonteosta osa 2 "Reilu ja rohkea – vastuun ja osaamisen Suomi" [Report of the Committee for the Future of Parliament on the Council of State Account, Part 2 "Fair and brave –A Finland of responsibility and skills". TuVM 1/1998 session – VNS 3/1997 session. Helsinki: Parliament

Pekkola, J., Ylöstalo, P. (1996): Tietotyö ja työmarkkina-asema : tietotyön yhteyksiä työmarkkina-asemaan Suomessa vuoden 1993 työolobarometrin perusteella [Information work and labour-market status: Connections of information work to labour-market status in Finland based on the 1993 work conditions barometer] Ministry of Labour, Employment Policy Research 158. Helsinki : Ministry of Labour

Penttilä, S. (1998): Verotus tietoyhteiskunnassa [Taxation in the Information Society]. Helsinki: Sitra 181

Pohjola, M. (1998): Information Technology and Economic Development: An Introduction to the Research Issues. Helsinki: UNU/Wider, Working Papers No. 153, November

Pohjola, M. (1999). Nollan ja ykkösen vallankumous [The revolution of zero and one]. Unitas 3, 15–20.

Rantanen, J. et al. (2000): Tietointensiivinen työ -kärkihanke. Suunnitteluvaiheen loppuraportti [Information-intensive work – Spearhead Project. Final report of the planning stage. Institute of Occupational Health, Sitra (forthcoming)

Rauhala-Hayes, M., Topo, P., Salminen, A.-L. (1998): Kohti esteetöntä tietoyhteiskuntaa [Towards an unhindered Information Society]. Helsinki: Sitra 172

Rifkin, J. (1997): Työn loppu [The end of work]. Helsinki: WSOY 1997

Salin, V. (ed.) (1998): Hiiriä ja ihmisiä. Kolmetoista kirjoitusta satunnaisesta maailmasta [Mice and men. Thirteen writings on a random world]. Helsinki: Viherjuuri-ryhmä

Savolainen, R. (1998): Tietoverkot kansalaisten käytössä. Internet ja suomalaisen tietoyhteiskunnan arki [Information networks in the use of the citizens. The Internet and everyday Finnish Information Society] Tampere–Åbo–Oulu: Finnish Information Studies 12

Science and Technology Policy Council of Finland(1993): Tiedon ja osaamisen Suomi: kehittämisstrategia [Towards an Innovative Society: A Development Strategy for Finland]. Helsinki: Edita

Sennett, R. (1998): The Corrosion of Character. The Personal Consequences of Work in the New Capitalism. New York: Norton

Seppänen, R. (ed.) (1998): Tietoyhteiskunnan harha [The delusion of the Information Society]. Kuopio: Kustannusosakeyhtiö Puijo

Silberman, S. (1999): 'How Nokia Will Wireless the World / Just Say Nokia'. Wired 7.09 –Sep 1999

Sinko,M., Lehtinen, E. (1998): Bitit ja pedagogiikka. Tieto- ja viestintätekniikka opetuksessa ja oppimisessa [Bits and pedagogy. Information and communications technology in teaching and learning]. Jyväskylä: Atena-Kustannus

Sitra, Finnish National Fund for Research and Development (1998): Elämänlaatu, osaaminen ja kilpailukyky. Tietoyhteiskunnnan strategisen kehittämisen lähtökohdat ja päämäärät [Quality of life, skills and competitiveness. The starting points and goals of the strategic development of the Information Society]. Helsinki: Sitra 206

Spiegel, Der (2000): 'Voll auf Draht. Sonderteil Cebit',. Der Spiegel 8, 119–203

Statistics Finland (1998). Koulutus Suomessa [Education in Finland]. Ed. Heikki Haven. Koulutus 1998:1.

Statistics Finland (1999). Use of Information and Communication Technology in Enterprises 1999 . Science and Technology 1999:3.

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

Suikkanen, A., Linnakangas, R. (1998): Uusi työmarkkinajärjestys? [A new labour-market order?] Helsinki: Sitra 182

Swedish Government, IT-Kommissionen (2000): IT-Kommissionen rekommenderar: Fem megabit till alla i hela Sverige. Version 22.2. At: http://www.itkommissionen.se/bredband/index.html

Tekes, The National Technology Agency (1999). Suomalainen uusmedia [The new media in Finland]. Technology Programme Report 3/99 (English abstract)

Tieke, Finnish Information Technology Development Centre (2000). Sähköisen kaupankäynnin aapinen [The ABC of electronic commerce].

Tiihonen, P. (ed.) (1999): Report on Politics & Internet Congress. Helsinki: Committee for the Future, National Fund for Research and Development (Sitra)

Turkle, S. (1997): Life on the Screen : Identity in the Age of the Internet. New York: Touchstone Books

Törmälehto, V.-M. (1998): Tuloerot kasvussa – "vihdoinkin" [Increase of income gaps – "at last"]. Hyvinvointikatsaus 2,

UNDP (1999): Globalisation with a Human Face. Human Development Report 1999. UNDP, New York

University of Tampere, Information Society Research Centre (1999): Lasten ja nuorten mobiilikulttuuri Suomessa 1998 – 2000 [The mobile culture of children and the young in Finland 1998–2000]. Project description at: http://www.info.uta.fi/winsoc/projekti/proj8.htm

U.S. Department of Commerce, National Telecommunications and Information Administration (1999): Falling Through the Net: Defining the Digital Divide. A Report on the Telecommunications and Information Technology Gap in America. NTIA & U.S. Dept. of Commerce, Washington D.C., July

U.S. Department of Labor (1999): 20 Million Jobs: January 1993-November 1999. A Report by the Council of Economic Advisers and the Office of the Chief Economist, U.S. Department of Labor. Washington D.C.: Department of Labor

Uusitalo, A. (2000): Sanomalehtien tietoyhteiskunta vuonna 1998 [The Information Society of newspapers in 1998]. Tampere: University of Tampere, Information Society Research Centre, Work Reports 9

Uusitalo, H. (1998): Muuttuva tulonjako. Hyvinvointivaltion ja yhteiskunnan rakennemuutosten vaikutukset tulonjakoon 1966-1985 [The changing distribution of income. Effects of the welfare state and structural changes in society on income distribution 1996–1985]. Helsinki: Statistics Finland Research 148

Vartia, P., Ylä-Anttila, P. (ed.) (1999): Teknologia ja työ [Technology and work]. Helsinki: Taloustieto Oy

Viherä, M.-L. (1999): Ihminen tietoyhteiskunnassa: kansalaisten viestintävalmiudet kansalaisyhteiskunnan mahdollistajana [Man in the Information Society: Communications skills of citizens in making the Information Society possible]. Turku: Publications of the Turku Schools of Economics and Business Administration A 1:1999

Virola, H. et al. (1999): Internet suomalaisten arjessa [The Internet in everyday Finnish life]. Kansallisen multimediaohjelman kuluttajatutkimukset -hanke. Digitaalisen median raportti 3/99 [Consumer Research Project of the Finnish Multimedia Programme. Report of the Digital Media 3/99]. Helsinki: Tekes (English summary)

Vuorensyrjä, M. et al. (2000): Tietoyhteiskuntaprofetia ja tietoyhteiskuntatutkimus [Information Society Prophesy and Information Society Research]. In: Vuorensyrjä, M., Savolainen, R. (ed.): Tieto ja yhteiskunta [Knowledge and society]. Helsinki: Gaudeamus (forthcoming)

World Bank (1998): Knowledge for Development. World Development Report 1998/99. Washington D.C.: The World Bank Group

World Times (2000): Fourth annual Information Society Index (ISI). The WorldPaper February 2000. Cf. also http://www.worldpaper.com/Feb2000/isihili.html