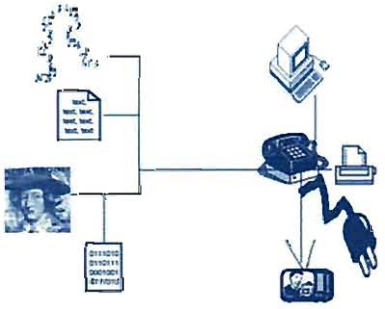
TELDOK report 116

The TELDOK Yearbook 1997

Telecommunications and Information Technology in Sweden as Seen from a User's Perspective



Gull-May Holst (editor & main author)

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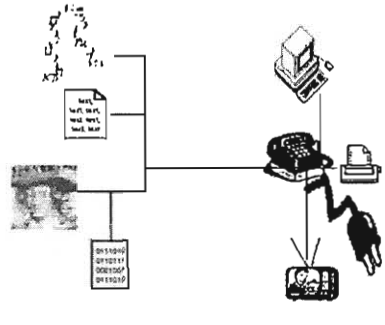

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TELDOK

TELDOK was initiated in 1980 by the Board of Telia, Sweden's largest telecommunications operator, to facilitate early and easy-to-read documentation on the use of telecommunications-based information systems.

TELDOK aims at documenting, as early as possible, working applications of new information systems and arranging study trips and seminars directly related to this task.

TELDOK activities are coordinated by an Editorial Board with wide representation from the IT corporate user community, academia, trade unions, government authorities, suppliers, and Telia AB.

The TELDOK Editorial Board welcomes new ideas concerning the study and documentation of working applications of new communications technology systems. The Editorial Board can best be reached by sending email to PG Holmlov, Telia, pg.x.holmlov@telia.se.

TELDOK has issued more than 160 publications, mostly in Swedish, that are distributed regularly and at no cost to 5,000 professionals in Sweden and abroad.

Recent TELDOK publications in *English* include...

TELDOK Report **116:** *The TELDOK Yearbook 1997.* December 1997.

TELDOK Report **111E:** *IT—Visions at work.* December 1997.

TELDOK Report **101E**: *20 seconds to work. Home-based telework.* October 1995.

TELDOK Report **94E**: *IT Myths.* November 1996.

TELDOK Report **90E**: *Telecottages, telework and telelearning.* June 1994.

Via TELDOK **28E:** *The building of a World Industry—The Impact of Entrepreneurship on Swedish Mobile Telephony.* February 1997.

These and other publications from TELDOK may be ordered, free of charge in single copies, from an independent grocery store, "Linde Livs", in northern Sweden, e-mail order_teldok@fr.se. Reports are stored in Ture's barn. You are also encouraged to "Open Location" www.teldok.framfab.se.

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The TELDOK Yearbook 1997

Telecommunications and Information Technology in Sweden as Seen from a User's Perspective

by Gull-May Holst
editor and main author

Editorial Committee: Thomas Hilstad
Rickard Lindhé
Jill Melançon
Bengt-Arne Vedin

TELDOK mentor: PG Holmlöv

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Preface TDY 97

Gull-May Holst and her virtual staff have done it again! TELDOK -- and our readers -- thoroughly appreciate the hard work and great devotion Gull-May Holst and her co-authors have put into the making of The TELDOK Yearbook 1997. For the sixth time they have successfully managed to present a great blend of graphs and tables, lists and articles, spanning the entire IT area, in Sweden as well as internationally.

If TELDOK is "a national resource" (as has been kindly suggested by the staff of Open Systems at the Swedish Agency for Administrative Development), then surely the TELDOK Yearbook more than most of our publications embodies this usefulness and resourcefulness. Paradoxically, the 1,599 pages of the six Yearbooks differ from typical TELDOK Reports: where the Reports aim at documenting in case stories the early experiences of today's most advanced IT use, the Yearbook is an "exciting book on telecommunication" (as a former Swedish Prime Minister puts it) with "dazzling amounts of statistics and facts" (as another senior Cabinet member has added). Data need interpretation as well as analysis needs facts; the Yearbook provides it all and also furnishes a baseline for viewing other reports from TELDOK.

The 1997 Yearbook is even more dazzling, even more fact-filled, even more exciting this year. The Yearbook attempts to: define the IT area; look at current IT users; refer to exemplary research; highlight trends of the Web and the business of intranets; sample exciting new IT applications; offer methods for generating your own visions of the future; and provide the links to operators, suppliers, and reference resources of various sorts.

Will there be a TELDOK Yearbook yet another year? To compile a Yearbook such as this is no mean feat; in fact, it is impossible! We have said it before: nobody could "intelligibly capture the global state of information technology use" because the IT area is changing at a rate we would all like -- or maybe, dislike -- to describe as "hectic", "frantic" or just plain crazy. Even as we feed the printer with this Preface, we learn about proposed megamergers, visions that will put the world on its head, happenings that are likely to permeate all of our lives.

We wish you a pleasant reading.

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1. Introduction to the *"TELDOK Yearbook 1997"*

1.1. What is the "TELDOK Yearbook"?

Is a yearbook really possible in a world of technological development moving "faster than its own shade"? Is it possible to achieve? The aswer is "no" in one sense, "yes" in another. Thus, we have adapted to some extent to the Internet world of fast facts by first introducing the "TELDOK Yearbook 1997" in a version for the World Wide Web, providing facts up to May 15, 1997. A printed version will follow, with last data entry by June 30, and early this autumn a second, updated Web-version is planned to follow.

First of all, more than a regular yearbook, this, the sixth issue of the *"TELDOK Yearbook"* is becomming a permanent expriment of catching up with several highly differentiated and rapidly moving developments, and of trying to draw a still picture of these changes while they occur, in such a way that the reader/ user of the *"TELDOK Yearbook"* at least gets a feeling that there are some stable gound to stand on, after all. Can this be achieved? Only the user of the book can respond to the question.

The developments covered in this document are the results of ever expanding human imagination and creativity, i.e. the imagination and creativity of the users, always creating the unpredicted, the unpredictable, and the unexpected. How does any editorial team cope with such challenges? The news services providing viewers/listeners/users with information about the presidential elections in the US on the Internet experienced something of the same: There were ten times as many visitors to the home pages of the networks during the count of the votes, than on any normal day. And many users were pretty upset by the fact that the home pages were not up to date — to the minute! Slow, sometimes static, facts have to be adapted to a newvery fast medium, changing by the minute. How?

Should one choose to be provocative in this context, one would, of course, choose to provoke the politicians. Politicians in their function as decision makers on subjects affecting all of us seem to be about the only human beings who do not understand that telecom and IT changes not once every 10 years, not even once every 5 years, or once a year, but several times a day. Technologies change: the geographical dissemination of information and communication technology is changing — the numbers of telecom users, Internet users, satellite TV users, mobile phone users, etc. — are changing, i.e. increasing from day to day. Terminologies change: Ten years ago, in 1987, "telematics" was the buzz word of the industry; then followed "information

technology", IT; last year, we were on to "information and communications technology, ICT; now, we are discussing "information society technology", IST.

The effects of the masses are neither easily understood nor explained. Neither is human creativity and the imaginative use of the information and communications technologies.

Tounge in cheek, the best description of what the *"TELDOK Yearbook"* really is, is to compare it to a dish that starts out by your looking into the pantry to find out what kind of ingredients you have and then decide what kind of dish you will make.

1.2. The Objective of the *"TELDOK Yearbook"*

The objective of this sixth issue of the *"TELDOK Yearbook"* is to try to define Sweden's place in an ever more complex telecommunications and information technology world, in the information society, and to put our country firmly on the international IST map. In order to do so, we have to look at the global situation as it is presented by some of our most important national and international institutions, such as Statistics Sweden, the OECD, the EITO Task Force, and the British DTI among many others. These organisations have presented the most interesting and best covering overviews so far over international, historical facts as well as future trends. Local Swedish material has been collected from a number of sources. *Statistics Sweden, SCB*, has served as our main source for the Swedish input. But many, many other sources are quoted, so we ask the reader to pay attention to the source of each single diagram, table, and statement.

Even the experts of our institutions, such as SCB are having some difficulties in describing the situation of one single country and its telecom and IT users. They state that, *"however important, it is practically impossible to get satisfactory facts and statistics about IT and its usage for various reasons. One of these reasons is the — for Europe — new and open competitive market."*
Source: SCB: Data om informationstekniken i Sverige 1996

Thus, the reader needing exact information is asked to go directly to the sources in order to understand how the facts presented are collected and selected. The alternative is, for the one who is in a hurry, to interpret the facts in this document as approximations, and the relations of these approximations as relative to each other rather than as a true picture of reality.

By now, there are several academic studies available on all kinds of aspects of the information society. Reference have been made to some of these in the various chapters of this yearbook, reports that we have decided may be of particular interest to our readers.

1.3. Facts About Facts

One of the important fact about the facts, serving as a basis for this yearbook, is that Sweden did not become a full member of the European Union until 1995. Thus, in international telecommunications and information technology statistics, Sweden still is most commonly included in the EFTA region, as in the previous years. It is difficult to say how long it will be until international statistics will cover the EU after the latest expansion. In any case, the new regional borders in Europe contributes to the difficulties in making comparisons over a longer period of time, without considerable reevaluation of existing facts.

A second important set of data is, that there seem to be different ideas about where the technological development is going among our source materials. So, for instance, the OECD is treating telecommunications and computers as two parallel but different worlds, issuing two different publications, *"Communications Outlook"* and *"Information Technology Outlook"*. *"Information Technology Outlook"* covers IT, which is defined as *"computer hardware, components, software, and services"*, while *"Communications Outlook "* covers *"telecommunications equipment and services, as well as initiatives to upgrade and extend telecommunications infrastructure or transmission or networks or their operation"*.

EITO, on the other hand, is looking at *"ICT, information and communications technology"*, and is treating the two technologies as well on their way towards integration, although it has not yet happened: *"Telecommunications, computers and information content are converging into a single medium at stunning speed"*.

The pilot report *"Development of the Information Society. An International Analysis"* from the British Department of Trade and Industry, DTI, is looking upon the *"converging information society"*, where *"the telecommunications industry, multimedia network equipment, interactive multimedia, and online multimedia"* merge to the benefit of the user.

Those who read and use the contents of the TELDOK Yearbook should be aware of these facts, since they influence the interpretation of the facts given. It must also be borne in mind that some of the sources give contradictory facts. This makes it all the more relevant for the reader to make her/his own decisions about the possible interpretations.

Anyone being the least unclear about the meaning of whatever is presented, is recommended to go directly to the sources, as already pointed out above. All of them contain interesting additional information and analyses, at the same time bringing a clear understanding and adding to the confusion. In this way we are

all brought forward by the ever increasing knowledge of the information society technology, which started out as a humble technology to assist deaf persons and rapidly has developed to a world spanning social and economical phenomenon.

1.4. The Settings –The Information Society and Cyberspace

The Global Information Society, GIS, needs the Global Information Infrastructure. The Cyberspace needs the Internet. The Internet is the first backbone in the Global Information Society... such is our IST global context.

Two of the predominating present telecommunications and IT industry buzz words are "Information society" and "Cyberspace". These words are particularly used — and misused — by anyone, wanting to appear "in" as we used to say some years ago — today's equivalent is "cool". In any language. "Information society" and "Cyberspace" are so frequently used that they may well have turned into "memes" as defined by the British biologist Richard Dawkins[1].

But, what are the contents of these words, once we start thinking about them? What do they stand for? In the process of putting this document together, we have been scouring our sources for definitions of these and other concepts, relevant to our communications prone era. Here we will stay with two definitions, one for each concept — or, maybe, meme:

The Information Society:

"The term "Information Society" cannot be precisely defined. It conveys a great deal — a society that uses information intensively and in a way that is not constrained by time or space, a society where transactions of all sorts can be processed electronically, a society whose working and living practices have been modified fundamentally by technology. However, what the Information Society consists of precisely is elusive for two good reasons. First, the Information Society has not yet been achieved and there is considerable debate about the services and technologies that will create it. And second, the term, the "Information Society", is used by many different people (in Europe and elsewhere) in many different ways."

Source: Department of Trade and Industry: Development of the Information Society. An International Analysis, Norwich U.K., 1996

[1] Richard Dawkins defines a meme as a "cultural reproducer", a culture based equivalent to the biology based genes. See his book *"The Selfish Gene"*, Oxford University Press, 1976.

The Cyberspace:

"Cyberspace is the total mass of electronic communication networks, databases, and whatever else is needed for global communication via the Internet. It is the environment — or biotop — of the Cyberpunks."
Source: NUTEK, Närings- och teknikutvecklingsverket: Datorndt och telekommunikationer. Infrastruktur för informationssamhället, R 1993:66 (Translation by the editor)

Much can — and should — be said about these definitions. We shall however confine ourselves to the following reflections:

* each definition is trying to combine the easily quantified — technology and economics — with aspects not so easily quantified: the cognitive human being and her society. Or to be a bit more precise for the context: users and their habits, lifestyles, fancies, actions, and emotions;

* each definition is more orientated towards the user than towards the technology and the technological systems and the market place, although the economical aspects, for obvious reasons, are even more in focus in this sixth issue of the *"TELDOK Yearbook"* than in preceeding editions.

It is impossible to say if these reflections mirror proper trends here to stay, trends that can be measured by traditional quantitative methods, or merely are the dragon flies of a sunny summer afternoon. Whatever, let it here be stated that in every single current source on the telecommunications and information technology industries, the user is working her way more and more into focus. Thus the subtitle of this sixth issue of the TELDOK Yearbook: *"Telecommunications and Information Technology in Sweden From a User's Perspective"*.

The Information Society and the Cyberspace are, of course, not the only terms that can be discussed. In spite of the evident merger between telecommunications and computers, the most common statistical sources of information insist on defining "information technology, IT" as covering "computer hardware, components, software, and service" (EITO, OECD), while "telecommunications" belong to a category of its own, concerned with "telecommunications equipment and services, and initiatives to upgrade and extend telecommunications infrastructure or transmission networks or the operation" (OECD). When facts about the two industries are merged it is sometimes called "ICT, Information and Communications Technology" (EITO) or "IST, Information Society Technology" (EU). Is the user of the TELDOK Yearbook less confused by these explanations? More confused? Still confused, but at a higher level? We would love to know!

1.5. The 1997 Yearbook

There are some striking differences in the background materials for the 1997 issue of the *"TELDOK Yearbook"* as compared to that of its predecessors. One is the present predominance of facts about the IT industry, i.e. the industry occupying itself with computers and related products and services, while facts about telecommunications are much more scarce and harder to come by. Earlier it was the other way round — an abundance of facts about telecommunications, issued by PTTs, and a few scraps of rather obscure facts about the IT industry. The reason for it is obvious : The liberalisation/ privatisation of the telecom sector has resulted in very few facts available — even the OECD is having difficulties obtaining information from their member countries. We are not yet accustomed to the idea that the formerly so open information flow from the telecom industry now is hemmed — by the very liberalisation processes and competition. At the same time we have grown used to interpreting the sometimes cryptic data from the computer industry.

Another difference is that by now, in April 1997, every single aspect of society is involved in or with information technology, telecommunications, and new media. Before, in the good old days of yesteryear, there were the pioneers, those who braved a large number of technical, financial, and social obstacles in order to use the wonders of information technology. Today, it is impossible **not** to use it. Which means that almost all aspects of society have to be covered, which in turn is impossible...

A third difference is that there is so much more qualitative data available. Some of the qualitative data is collected and analysed by benchmarking methods (DTi, Mason, etal). In some cases it is rather unclear how it should be interpreted, but it is there. In the early days of the first four issues of the yearbook, we had to make do with rather crude qualitative data.

Two of the reasons for the recent mass of qualitative data are:

* the users are in focus
* our information habits are changing

and we have to understand what drives it all in order make sensible decisions.

No longer do we merely rely on conventional media like books, newspapers, broadcast programs, and television for our data. Those of us equipped with a reasonably powerful PC, a modem, and some pieces of software, are searching the entire world for relevant — and irrelevant — information, assisted by search motors like NetScape, AltaVista, Lycos, WebCrawler, just to mention a few, via the Internet. In the future, it will be much more interesting to study information habits than counting numbers of PCs and mobile telephones installed. Statistics Sweden is giving this a thought in order to develop new methods for measuring such habits.

The members of the editorial committee of the TELDOK Yearbook 1997 have spent considerable time, suffered a lot of headache, survived a number of excruciating discussions about materials, that should be included and materials that should not be included. In the process, we have in turn caused headache to the TELDOK Editorial Committee, and a great number of other persons actually waiting for the manuscript to be finished. We want to say thank you to all of you, not only for a lot of patience, but also for very valuable advice and support in every possible way.

We also want to say thank you to every single source utilised to build this book (because a construction it is) — thank you for permitting us to reproduce your material.

Special thanks go to the TELDOK Editorial Committee and to Bertil Thorngren, without whose support we would have drowned in the background material. Most of all, we want to thank our gentle "TELDOK mentor" PG Holmlöv, without whose prodding we would still be floundering in a sea of contradictory information.

The editorial committee of the TELDOK Yearbook 1997

Currency	931231	940630	941231	950630	951231	960630	961231	970630
US$	8.3125	7.6325	7.4325	7.2350	6.6375	6.6100	6.8250	7.7325
£	12.3300	11.7750	11.6250	11.5400	10.2950	10.2475	11.5650	12.8575
ECU	9.3275	9.1950	9.1300	9.6450	8.5200	8.2350	8.5500	8.7300
100 Ffr	141.7500	140.2500	139.1000	149.2000	135.6500	128.5500	130.7500	132.1000
100 DM	481.2000	480.6500	480.6500	523.5000	462.9500	434.8000	440.5500	495.0000
100 yen	7.4400	7.7250	7.4700	8.5525	6.4580	6.0260	5.9500	6.7650

Fig 1: The Swedish crown rate compared to some currencies relevant to IST statistics for the period during which the manuscript of the TELDOK Yearbook 1997 has been put together. Values given in diagrams and tables throughout this book are in local currencies, unless otherwise stated, and related to the currency rates current at the time indicated by each source.
Source: SE-Banken/The Scandinavian Bank

To access the TELDOK Yearbook on the Internet, type: http://www.teldok.framfab.se

Last data entry: June 30, 1997

2. The Frameworks and The Structures

The majority of all communication is still local, but the scope of the future users may be growing.
Source: Anon

This chapter of "The TELDOK Yearbook 1997" gives general information about the global frameworks and structures that govern the information society, of which Sweden is part. Sweden is one of the countries under scrutiny in a report made by the British Department of Trade and Industry, DTI, in 1996, *"The Development of the Information Society – An International Analysis"*, cited below. According to this report, *"the adoptation of new products and services is growing quickly — some relatively long established services such as mobile telecommunications are growing at rates of between 50% and 100% each year, while new services such as the Internet are growing in some markets at even higher rates."*

Following chapters give detailed information about telecommunications and information technology developments in Sweden. The reader is encouraged to cross connect as she sees benificiary.

2.1. The Frameworks

"In 1996, the slow-down of the European economic growth was reflected in the performance of the Information and Communication Technologies Market. However, the 7 per cent growth rate experienced by the European ICT market, despite being lower than that of 1995, is nevertheless higher than most sectors of the economy. This is an impressive result for a broad and diversified industry, whose market in Euroep in 1996 exceeded 300 billion ECU."
Stefano Micossi, Director General Industry, EC, in "European Information Technology Observatory 1997"

*** 100 Million New Public Lines per Year**

The Public Network is not dead, far from it. 10% of the world's inhabitants have a telephone by now, and 50% of the global population have used a telephone. The need for public networks will grow by 100 million new lines per year. 50 million will be new lines, 50 million will be repair of existing ones. The global infrastructures are being prepared for multimedia communication and real-time interactive communication.By October 1996, some 800 million persons worldwide hold a telecommunications subscription.
Source: Anders Igel, Ericsson Infocom Systems, in Kontakten # 8 1997

Internet Tariffs Put Pressure on Global Telecom Tariffs

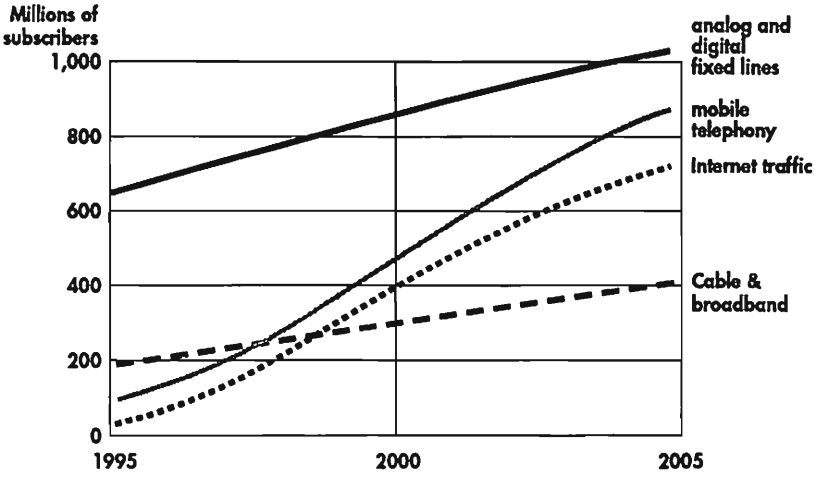


Fig. 2: By 2005, 1 billion inhabitants of our globe will be subscribers to fixed telephone connections. Early 1997, the equivalent figure was some 700 million subscribers. According to this diagram, the usage of fixed telephone lines as well as the usage of mobile telephones and the Internet are expected to grow at rather important rates until 2005. One interesting fact is that old, fixed lines will be replaced by digital ISDN lines.
Sources: Ericsson/Dagens IT, June 3, 1997, diagram after Airi Iliste

Internet Causes Fast Expansion of the Global IT Market

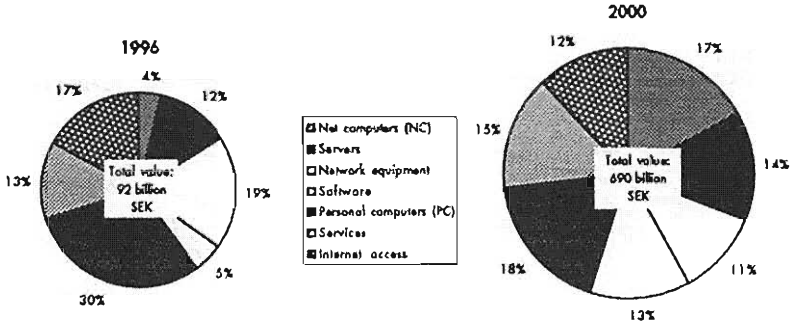


Fig. 3: The rapid expansion of the Internet is behind the increase in the markets for Internet-related products and services, according to the research firm IDC. In 1996, the global Internet-related market had a total value equivalent to 92 billion SEK. In 2000, the value is forecasted to 690 billion SEK. NCs, net computers, and software, are the fastest growing sectors. The NC segment is expected to grow by 116% from 1996 to 2000, while software will increase with 91% over the same period.
Source: Computer Sweden # 39, May 30 1997

* *The World Trade Organisation's, WTO's, agreement to deregulate world trade in information and communications technologies was signed by 68 countries — among them Sweden — in December 1996 in Singapore, representing 90% of the world telecommunications and information technology markets. In short, the agreement allows free competition in each one of the 68 national markets as off January 1, 1998. Some countries, like Japan and France, have included limitations of foreign ownership of some services. China is not among the signatory countries.*

In the short run, the agreement will give the average consumer lower cost international telecommunications, at least according to some analysts. In the long run, the agreement will make communications technology available to a large part of the world population, at affordable price.

The Stockholm based morning paper Svenska Dagbladet reported on 15 December 1996, that "*five days of negotiations had resulted in a new agreement on information technology. 68 countries have accepted an agreement to abandon custom charges on computers, software, semiconductors, and telecommunications equipment, starting in July 1997, and having to be completed by January 2000. Once implemented, more people worldwide will have cheaper and better access to the Internet,*

according to one delegate. The WTO estimated the world IT trade in 1995 to a total value of 600 billion US $. Negotiations are to continue during 1997. WTO has ambitions to attract more countries to sign the agreement."
(Translation by the author)
Source: Svenska Dagbladet, December 15 1996

The WTO agreement may be regarded as an important step towards the Global Information Infrastructure, GII, (see chapter 8), and the Global Information Society, GSI. In a report made by the British Department of Trade and Industry, DTI, in 1996, *"Development of the Information Society — An International Analysis"*, it is stated, among other things:

"Information and communication pervade all aspects of society. While no-one knows what eventual form the Information Society will take, the benefits of its emerging products and services are manifest."

Technology, investment, and mass distribution are three of the driving forces behind the Global Information Society. Improved productivity was one of the major incitaments promised early on by suppliers of information and communication technology. However, to what extent this promise was fulfilled, turned out difficult to prove by traditional academic research, until recently, when studies carried out at, for instance The Sloane School of Management at Massachusetts Institute of Technology by researchers Brynjolfsson and Hut, have proven substantial productivity gains over a long period of implementation of information and communication technology. These researchers demonstrate that over a period of four years capital investment in information and communication technology contributes more to productivity gains than any other form of capital investment. Research in the banking sector has shown that this kind of investment rendered 100% return on investment.

The British magazine *"The Economist"* sums up the importance of the WTO agreement as follows:

"It is increasingly the case that service businesses, such as telecoms, transport, and financial services such as banking and insurance, are the industries that make a modern economy go round. For that very reason, a remarkable number of governments in the developing world, and some in the rich world too, argue that these industries are too vital to be exposed to international competition. Actually they are too important not to be. If a country's telephones can be made to work properly, or its financial sector becomes better able to allocate capital where it is most needed, the benefits for the economy at large can hardly be exaggerated."
Source: The Economist February 22 1997

*** In 1996, The West European IST Market Reached 2 693.25 Billion SEK**

According to the international market research firm IDC, the West European IST market had a total value of 2 639.25 billion SEK (equivalent to 315 billion ECU) by the end of November 1996. Western Europe is identified as the 15 EU member countries and Norway and Switzerland.

Telecommunications answered for 1 427.85 billion SEK (167 billion ECU), while information technology answered for 1 265.4 billion SEK (148 billion ECU). This represents a growth of 7.9% for the telecommunications sector, and an overall growth of 6.5% for the IT sector.
Source: IDC

* In 1997, all the inhabitants of the world will spend approximately **US$ 683 billion**, buying information and communication technology (ICT) equipment and services. USA and Japan will be the biggest spenders, all according to the research firm IDC.

*** OECD Information Technology Investment is Increasing**

Since 1987, the OECD countries have increased their investments in information technology between 4 and 12% annually. See the following diagrams.
Source: SCB: Data om informationstekniken i Sverige 1996

Public Telecommunication Investment Per Capita In OECD 1985 and 1995

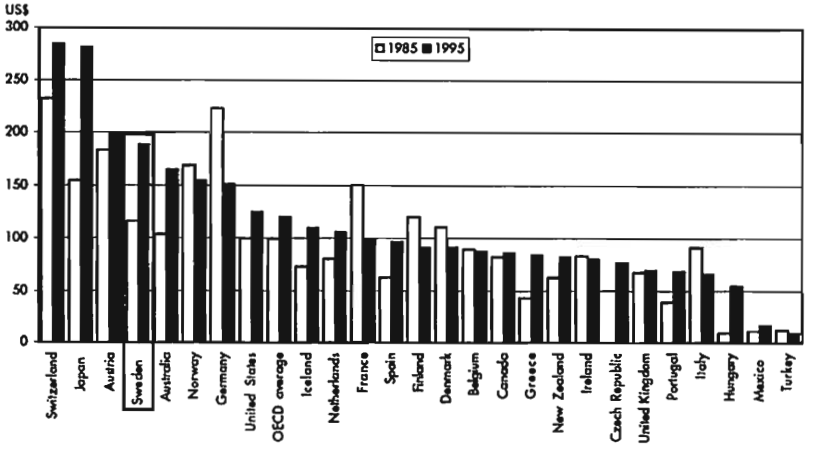
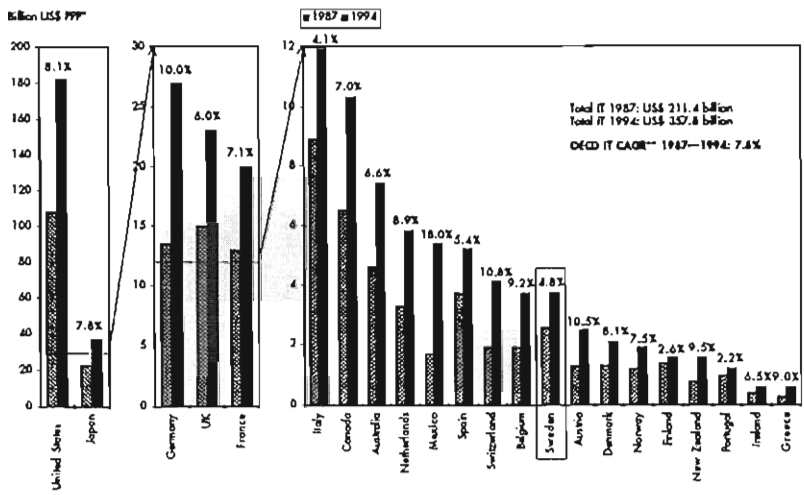


Fig. 4: The diagram shows the public telecommunications investments per capita in 1985 compared to 1995 in the OECD countries. It is evident that some of the heavy investors of 1985, invested considerably less in 1995, Germany, France, and Italy being the best examples of this. Other countries, Switzerland, Japan, Australia, and Sweden, invested considerably more in 1995 than in 1985. Switzerland and Japan invested most, almost US$ 300 per inhabitant, while Sweden invested not quite US$ 200 per capita, in 1995. The OECD average in 1995 was US$ 98.04.

Source: Communications Outlook 1997, vol.1, © OECD, Reproduced with the permission of the OECD

IT Spending in Selected OECD Countries 1987 — 1994
CAGR 1987 — 1994 in percentages



* PPP = Purchasing Power Parities
** CAGR = Compound Annual Growth Rate

Fig. 5: In 1994, the total spending on information technology by the 22 OECD member countries amounted to US$ 357.8 billion. 81% of the total were spent in five countries — USA, Japan, Germany, UK, and France. In general, IT spending outplaced GDP growth between 1987 and 1994 in the OECD countries, with the exception of Spain, Italy, Finland, Ireland, and Portugal. The United States, Switzerland, New Zealand, and Sweden, while already having some of the highest OECD shares of IT consumption related to GDP, nonetheless increased those shares over the period.

Sources: IDC/OECD Secretariat/OECD: Information Technology Outlook 1995, © OECD, Reproduced with the permission of the OECD

IT Spending/GDP Versus Per Capita GDP 1994

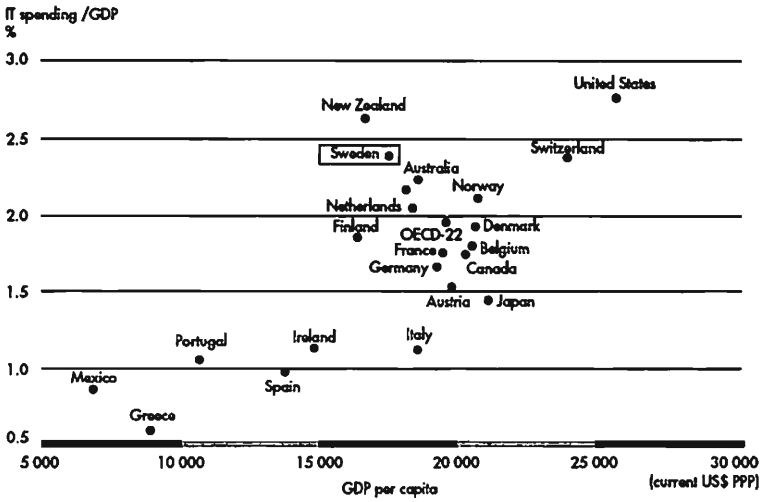


Fig. 6: United States has the highest IT spending/GDP in relation to the per capita GDP. Average growth in IT spending in the OECD area was three times faster between 1987 and 1990 than between 1990 and 1993, while 1994 seems to have brought an upswing. Note, that this fact is not made clear in this diagram. Also see previous diagrams.

Sources: IDC/OECD Secretariat/OECD: Information Technology Outlook 1995, © OECD, Reproduced with the permission of the OECD

*** IT Investment in USA Third Quarter 1996**

The US economy is booming not least in comparison to the European one. Million new jobs are created, almost no unemployment. The currency is strong and the country has almost no inflation. The annual growth rate is 2 – 3%, and USA is the world leader in a number of industries, information technology among others. During 1996, US companies increased their investment in information technology to almost 6% of GNP – see diagram below.

US Information Technology Investment as Part of GDP Third Quarter 1996

In percent

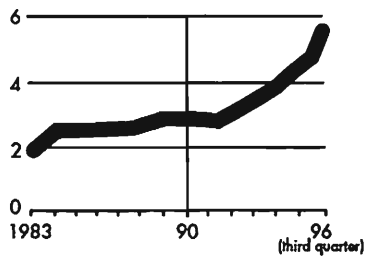


Fig. 7: In September 1993, US vice president Al Gore launched the National Information Infrastructure, NII. Its aims at bringing the new developments in information and communication technology to all Americans. The project has grown into a Global Information Infrastructure, GII, and a number of countries have followed suit and launched their own versions of NIIs and GIIs. One important backbone structure in the GII is the Internet. Since the Net has become available also for commercial activities, US corporations in particular, are looking into new ways to increase business in the global structures. This is one of the reasons behind the increasing investment in IT in the US. Another reason is, that a number of studies recently have shown that increased efficiency is a result of using IT. Also see chapters 6 and 8.
Sources: OECD/Business Week/The New York Times/The Washington Post/The Washington Times/Svenska Dagbladet, 22 February 1997.

Investment and Job Creation in Selected Countries
1980 — 1990

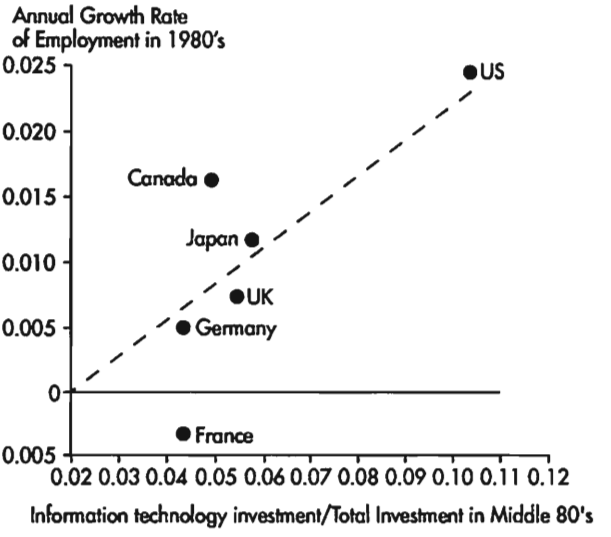


Fig. 8: The DTI report mentioned at the beginning of this chapter is confirming that analysis of macro-economic data from OECD tends to support a positive correlation between growth in information technology investment and overall productivity growth, as well as a posivite correlation between information and communication technology investment and employment growth, as shown above. See also Fig. 6 and Fig. 7 above.

Sources: OECD 1996 ITC Standardisation in the New Global Context/Department of Trade and Industry & Spectrum Strategy Consultants: Development of the Information Society — An International Analysis , 1996

Information Technology Investments in Sweden 1990 — 1995
In billion of SEK

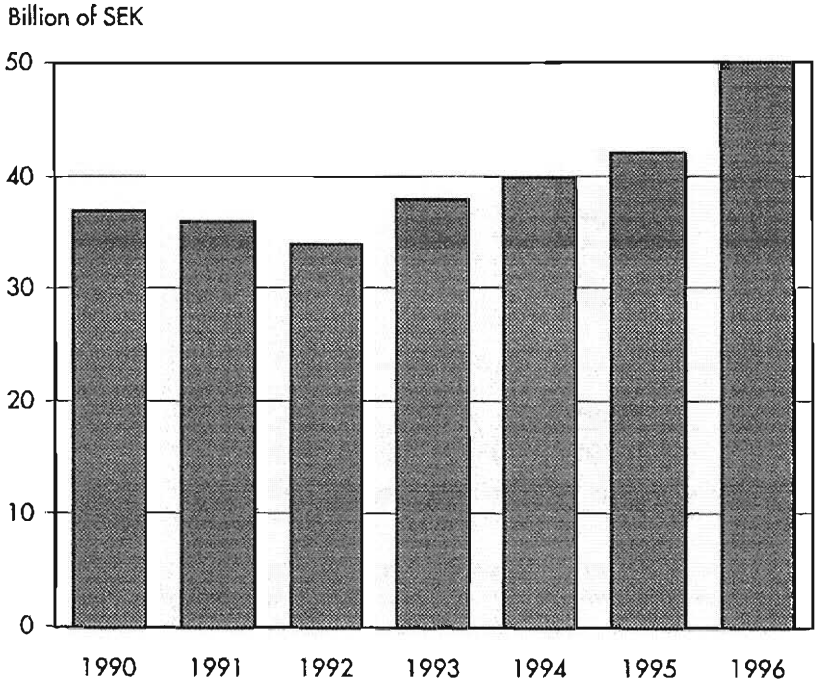


Fig. 9: This diagram shows investment in Sweden in information technology, which includes computer hardware, software, and services, but excludes telecommunications and fax.
Source: IDC/SITO

The Global Information Industry Market in the 1990s

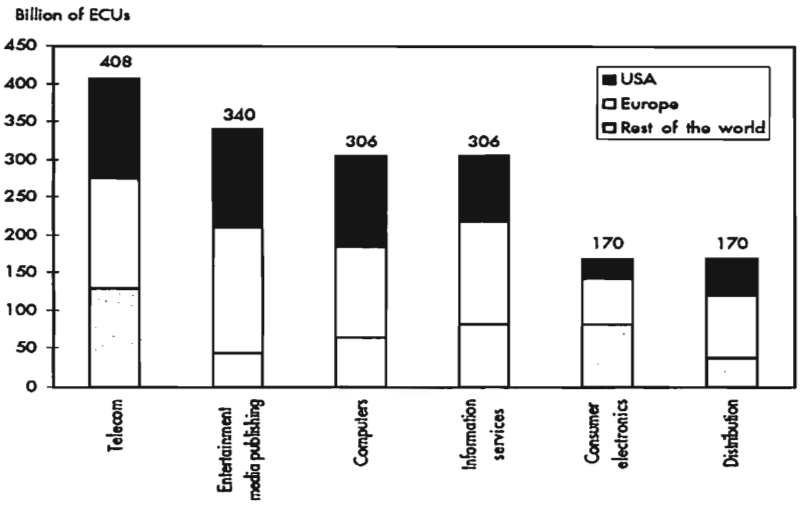


Fig. 10: In the early 1990s, the global information industry had an appreciated total value of 1.7 trillion ECUs. This diagram shows the relative size of each market segment, as it can be related to the information society. The telecom industry is still the largest one, but the so called content industry, i.e. information, entertainment, media, publishing, film and video making, games, data bases, and maybe education, sometimes related to as edutainmant, etc. is the one industry with the largest prospects of growth. According to a study by Veronis, Suhler & Associates Inc. in 1995, the US content market is growing by some 5% annually. Of these 5%, interactive digital media answers for more than 30%, and recorded music for almost 13%. Subcription video services represents almost 9%, while newspaper publishing not quite 2% of the total.
Sources: Telia/SMG

* According to the OECD (see *Communications Outlook 1997*, vol. 1), the public telecommunication services market produced estimated revenues of US$ 519 billion in 1995, which should be compared to US$ 458 billion in 1994. Between 1985 and 1995, the telecommunications services market grew by 3 — 4% per year, the pace accelerating in the latter half of the decade. **The global ICT market had a total value of US$ 1 399.5 billion in 1996,** according to IDC. Telecommunications services generated 43% of the total value, computer hardware 20%, IT services 17%, telecommunications equipment and programs 8% each, networking hardware, and office equipment 2% each.

OECD Member Countries as a Share of the World IT Market, in Percent 1993

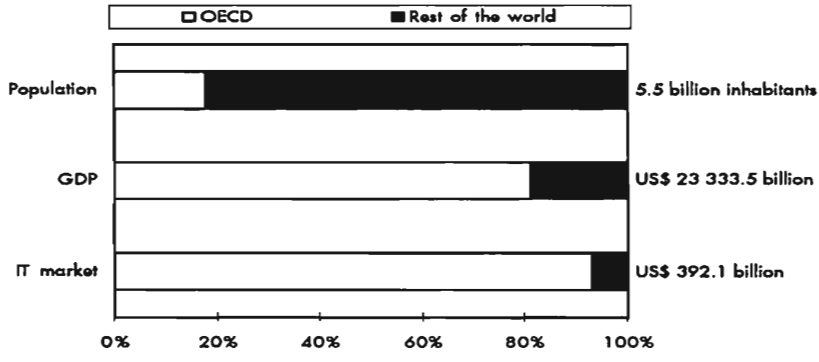


Fig. 11: The world IT market, (IT defined as computer hardware, software, and services) as measured by the revenues of primary vendors in 1994, has been estimated to US$ 432 billion by the OECD. The figure in this diagram, US$ 392.1 billion, is based on an estimate made before the 1994 spending count, but the percentages remain unchanged. As can be seen from this global comparison between the percentages of the population related to the percentages of GDP and IT market, the OECD member countries correspond to 17.4% of the global population, to 81.1% of the global GDP, and to 92.9% of the IT market. For 1996, the discrete figures in this diagram have changed, but the relations expressed by the percentages of the global figures remain the same. The 68 signatory nations of the WTO agreement in December 1996 represent 90% of the global IST market.

Sources: Information Technology Outlook 1995/OECD Secretariat, based on IDC, IMF and OECD data, © OECD, Reproduced with the permission of the OECD

The Global Information and Communication Technology Market by Region in 1993 and 1996

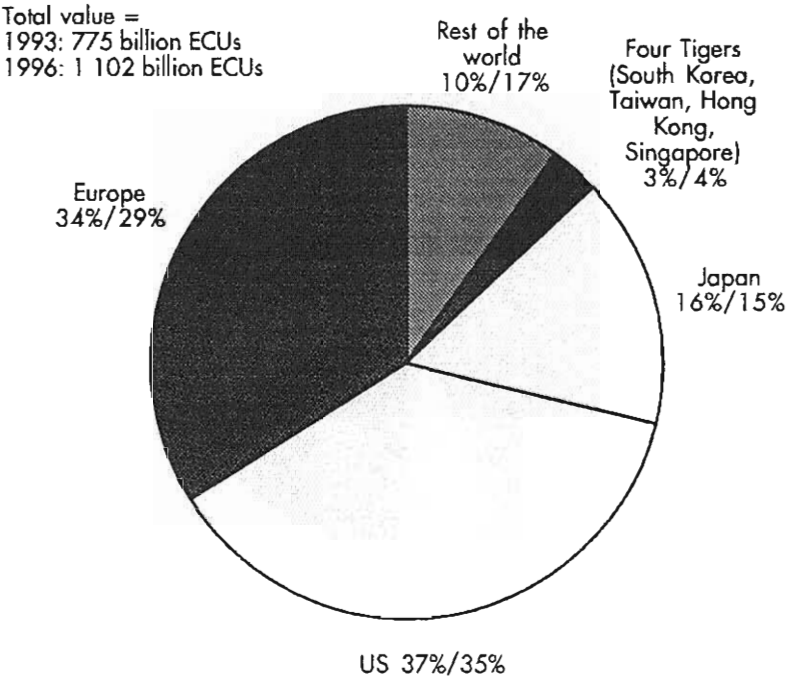


Fig. 12:The dominant regions were the US, the EU, and Japan, making up 82%, or 635.5 billion ECUs, of the global value, 775 billion ECUs, of the information and communication technology market. In 1993, Sweden did not belong to the EU, and thus is included in the EFTA region. The exchange rate used for this diagram is from December 1992. 1 ECU = US$ 1.29; ¥ 163.87; SEK 7.56. In 1992, IDC appreciated the global value of IT to 351 billion ECUs, however without providing a definition of IT. In 1996, the dominant regions were still the US, Europe, and Japan, responsible for 80% of the total market, as compared to 82% in 1993. By now, Europe is made up of the EU members and the non-EU members Norway and Switzerland. The rest of the world, including the growing economies of China and India, the Pacific Rim, and Australia, is the region marking the largest change from 1993 to 1996. The market shares of the US as well as of Japan are decreasing.
Sources: IDC/EITO/EU

Technology Market in 1996 compared to 1993 in Percent per Industry Sector

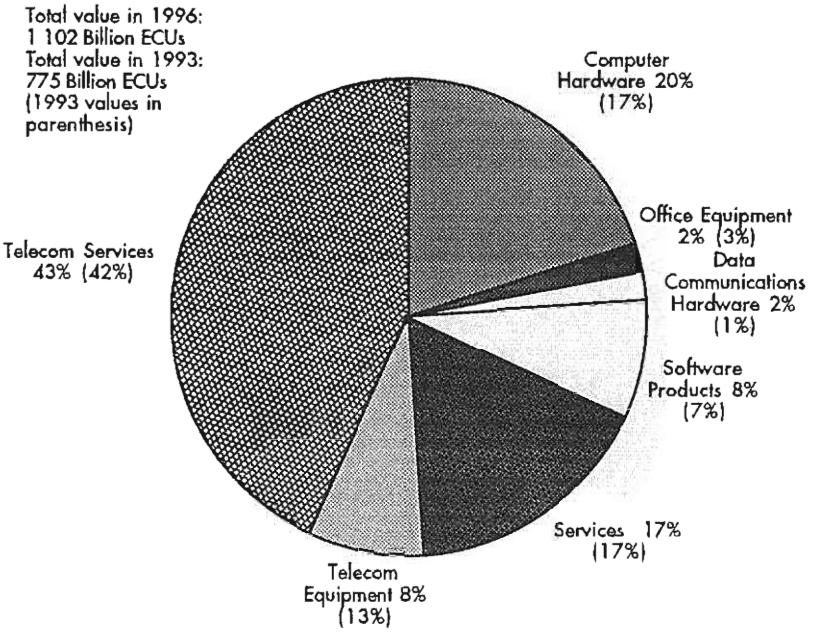


Fig. 13: In 1996, the global market for information and communications technologies as defined by EITO had a total value of 1 102 billion ECUs, which should be compared to 775 billion ECUs in 1993. This represents a compound growth of more than 42% over a period of three years. The percentual relationships between the industry sectors do not differ significantly, although the telecommunications sectors answered for 55% of the total value in 1993, compared to 51% in 1996. Within telecommunications, the majority of the revenue is generated by voice network services.
Sources: IDC/EITO: European Information Technology Observatory 94/ European Information Technology Observatory 97

The European Information Industry 1994 and 1995
Relative Size

Total value 1994: 743 billion ECUs
Total value 1995: 812 billion ECUs (1995 values after /)

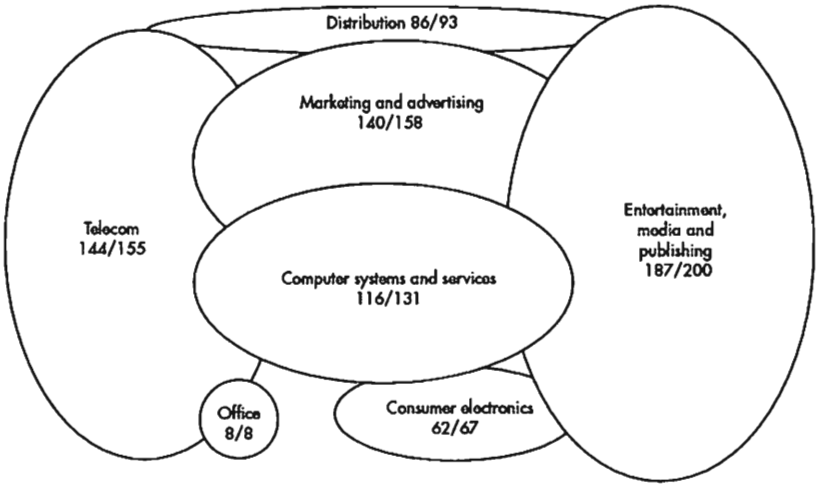


Fig. 14: In 1994, the total value of the European information industry was 743 billion ECUs as compared to 812 billion ECUs for 1995. The value of the US information industry at the same time was US$ 635 billion, which is equivalent to approximately 819 billion ECUs (in the exchange rate of 1992, 1 ECU = US$ 1.29, OECD). The global information technology market had a total value of 1.7 trillion ECUs. The two fastest growing areas are telecommunications and entertainment.

Source: EITO: European Information Technology Observatory 1995

The Western European Telecommunications Market by Country 1991 — 1995 In Million ECUs

Country	1991	1992	1993	1994	1995	CAGR 91—93 %	CAGR 93—95 %
Austria	2 753	3 023	3 288	3 543	3 809	9.3	7.6
Belgium & Luxemburg	2 952	3 200	3 449	3 691	3 941	8.1	6.9
Denmark	2 166	2 345	2 552	2 764	2 974	8.5	8.0
Finland	1 228	1 325	1 404	1 477	1 536	6.9	4.6
France	19 317	20 545	21 856	23 339	24 728	6.4	6.4
Germany	29 802	33 639	36 335	39 275	42 621	10.4	8.3
Greece	1 113	1 153	1 188	1 219	1 248	3.3	2.5
Ireland	1 093	1 127	1 148	1 157	1 163	2.5	0.7
Italy	15 380	16 556	17 715	18 950	20 230	7.3	6.9
Netherlands	5 385	5 696	6 047	6 421	6 827	6.0	6.2
Norway	1 951	2 151	2 322	2 516	2 667	9.1	7.2
Portugal	830	933	1 029	1 113	1 172	11.4	6.7
Spain	9 268	9 415	9 825	10 411	11 006	3.0	5.8
Sweden	**5 374**	**5 648**	**5 867**	**6 095**	**6 388**	**4.5**	**4.3**
Switzerland	5 495	5 767	6 052	6 348	6 638	4.9	4.7
UK	19 910	20 311	20 932	21 631	22 299	2.5	3.2

Fig. 15: The table shows the telecommunications market per country in Western Europe in million of ECUs for 1991 to 1995, and the CAGRs for 91—93 and 93—95 per country in percent. More detailed information is available in "Communications Outlook 1997", vol 1, by the OECD, and in "The European Information Technology Observatory 97" by EITO. According to the latter, the total Western European telecommunications market that had a value of 166.7 billion ECUs by 1996, is estimated to 178.9 billion ECUs for 1997, and to 191.3 billion ECUs in 1998. The total Western European ICT market as defined by EITO will be worth 337.6 billion ECUs in 1997, and 361.3 billion ECUs in 1998.

Source: EITO: European Information Technology Observatory 1995

The Worldwide IT Market by Segment 1987 — 1994

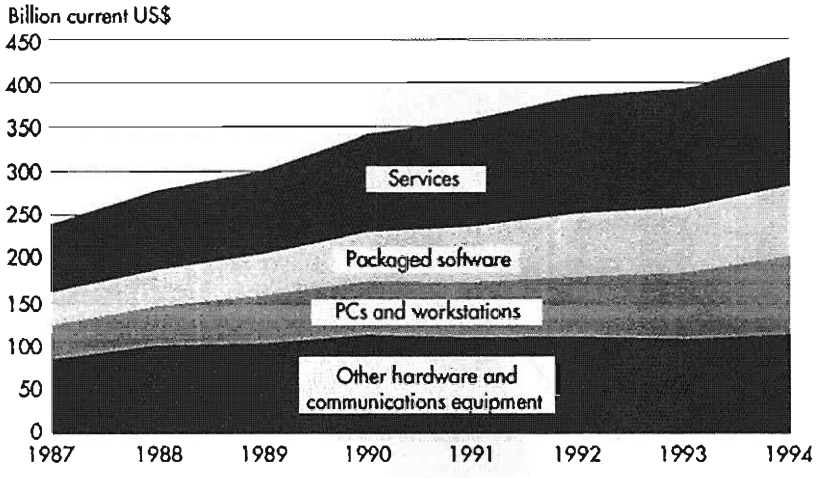


Fig. 16: The OECD defines IT as hardware, software, and services related to computer processing. Since 1987, there has been a gradual shift in spending in the world IT markets, from hardware to software and services. These equalled the hardware spending in 1991, and by 1994, spending for software and services represented 52.2% of the total spending, or US$ 224.6 billion.
Sources: Information Technology Outlook 1995/OECD Secretariat and IDC, © OECD, Reproduced with the permission of the OECD

* In October 1996, the **international telecom traffic market** was estimated to an annual value of 10 billion US dollars. Some 800 million persons worldwide subscribed to telephone lines and telecom services.
Source: Ovum and IMF

The Western European IST Market by Product Group in 1993 (EU & EFTA) and in 1996 for Europe

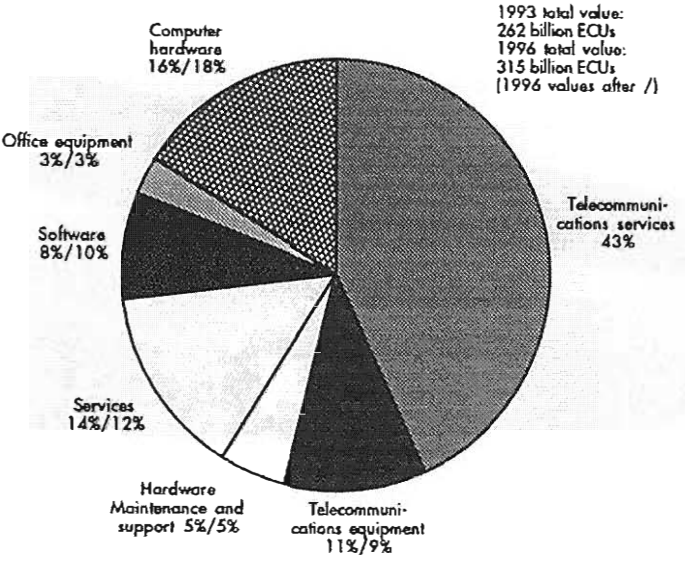


Fig. 17: In 1993 the Western European (EU & EFTA) Information and Communications Technology market had a total value of 262 billion ECUs. 141 billion ECUs represented telecommunications equipment and services, while 121 billion ECUs worth came from traditional information technology categories such as office equipment, computer hardware and software, hardware maintenance and support, and services. The total 1996 values was 315 billion ECUs. The percental relations changed only marginally over the three year period.

Sources: EITO: European Information Technology Observatory 94/European Information Technology Observatory 97

* According to world population statistics, **more than half of the world's population lives more than two hours' travel time from the nearest telephone.** Vast regions are completely without telephone services. India, for instance, has 860 million people and about seven million telephone lines, all of them in the largest cities. At present, the cost for bringing modern communication facilities to poor and remote areas is so high that many of the world's citizens cannot participate in the global electronic community. However, the technology is there — satellites and "fixed wireless" can provide the technical solutions. It is now a matter of political decision making. So far, little is known about the developments of telecommunications – and its impact – in China.
Source: IMF

* Well functioning telecommunications are one of the prerequisites for global development and expansion, according to a study, carried out by Gallup on behalf of BT and MCI during the first half of 1996. According to this report, the global telecom market will have a turnover of more than 650 billion US dollars by the year 2000, and make up almost 2.5% of the global GNP;
Source: "Natvärlden" # 6, 1996

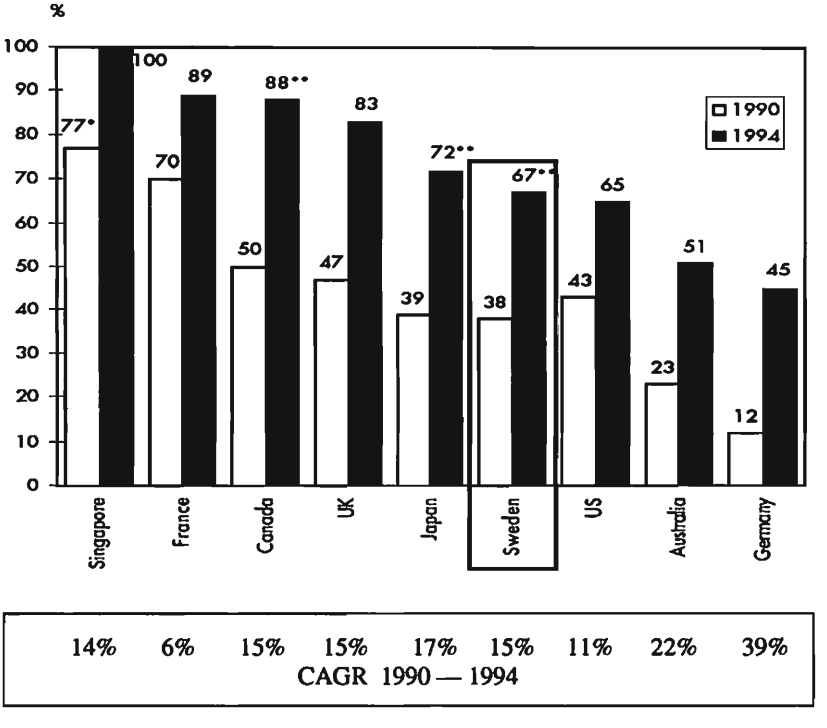
Communications Penetration by Country in Western Europe in 1993

	Communications Investment/GDP %	PSTN lines per 100 inhabitants	Mobile Connections per 1,000 inhabitants	% Digitalisation	Leased lines per 100 screen
Europe	0.7	45	12	58	7
Germany	0.8	41	7	85	4
France	0.4	51	7	80	7
UK	0.4	45	21	48	12
Italy	0.7	46	10	41	9
Spain	1.1	34	3	34	5
Austria	0.9	43	15	30	5
Belgium/Luxemburg	0.4	41	5	40	13
Denmark	0.3	58	31	34	7
Finland	0.6	54	63	90	10
Greece	0.8	41	1	6	2
Ireland	0.3	29	9	69	4
Netherlands	0.5	48	8	79	5
Norway	0.4	51	55	45	4
Portugal	1.0	27	1	25	4
Sweden	**0.5**	**69**	**66**	**47**	**7**
Switzerland	0.9	60	26	40	8

Fig. 18: According to this comparison among Western European countries, based on input from 1993, Sweden has most telephone lines per capita, and the highest mobile telephone penetration. When it came to digitalisation, Finland was leading, and Belgium/Luxemburg were leading the "leased lines per 100 screens", i.e. cable television. The latter is considered important, because it will give access to advanced network services. In 1995, Sweden still had the most mainlines per 100 inhabitants, 68.1, and were among the leaders in mobile telephone penetration, with 2 008 000 mobile telephone subscribers to a population of 8.5 million.
Sources: EITO: European Information Technology Observatory 94/OECD: Communications Outlook 97 © OECD – reproduced with the permission of the OECD

Digitalisation of National Telecommunications Infrastructures, 1990 & 1994

In countries studied by DTI, in percent of total infrastructure



* = 1992 data and growth rate

** = 1994 estimates

Fig 19: According to the DTI researchers, network digitalisation is a significant indicator of the advancement towards the Information Society. The diagram shows the digitalisation in percent of total of the telecommunications infrastructure in the countries, studied by DTI, for 1990 and 1994. By 2000, all these countries plan to be 100% digital. In 1995, the OECD average digitalisation index was 82.84%.

Sources: © OECD 1995 Communications Outlook/ITU/ Spectrum analysis/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

Cellular Mobile Subscribers per 100 Inhabitants by 1995 in the OECD Countries

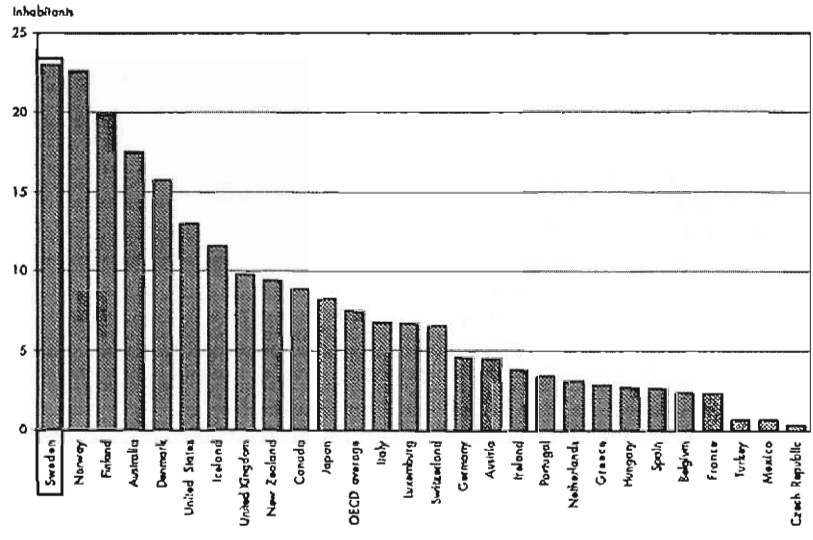


Fig. 20: The diagram shows the number of cellular mobile subscribers per 100 inhabitants by the end of 1995 in the OECD countries. The market is growing very rapidly, by more than 50% in some countries.
Source: Communications Outlook 1997, vol.1, © OECD, reproduced by permission of the OECD

* **Global Mobile Telephones**

From 1990 to 1994, the number of mobile telephone subscriptions has increased globally from 11.2 million to 54.8 million. According to Dataquest, there were 85 million subscribers to mobile telephones globally by the end of 1995. The growth rate in some regions is approximately 50%. The fastest growth is taking place in Asia. By 2000, some 350 million persons will be subscribers to mobile phone connections.
Source: SCB: Data om informationstekniken i Sverige 1996/Dataquest/Computer Sweden, April 30, 1996

* **Mobile vs. Fixed Telecom Growth in the World**

In 1995, the global number of mobile telephone subscribers increased by more than 30 million to totally 85 million. By the end of the year, there were 88 331 970 subscribers to mobile telephones in the world. 83.9% of these lived in the OECD area. In Asia, the number of subscribers more than doubled, to 22 million subscribers. In Europe, the number of subscribers increased by 9 million to 23 million.

The largest market for mobile telephony is the U.S., having more than 40% of all subscribers in the world. During 1995, the number of mobile telephone users increased by 9 million to totally 33 million subscribers.

Norway and Sweden are competing about having the highest penetration rate, i.e. the largest percentage of mobile telephones related to the number of inhabitants. Early April 1996 some 23% of all Norwegians and Swedes were subscribers to mobile telephones. The per capita penetration rate in the U.S. was 13%, in the U.K. 10% and in Germany 5%.
Source: OECD

GSM Available in 94 Countries to 4.34 Billion Persons

Fig. 21. The GSM standard for mobile telephony is the most widely distributed one in the world. 4.34 billion persons in 94 countries subscribed to the GSM services in early 1995. Mexico and Central America, the majority of Latin America, large parts of Africa, and central Asia are the (only) areas, where the standard had no coverage by early 1995.
Sources: Telia: Tele # 3/1995, Telia, Ericsson, and Motorola

* **GSM for Mobile Data Communications**

According to the Swedish magazine "*Ny teknik*" # 1996:41, some of the GSM operators, among these Ericsson and Nokia, along with some computer manufacturers, such as Intel, Microsoft, and Compaq have started a collaborative effort to connect the system for mobile telephony to modems and portable computers. The objective is to make GSM more available to mobile data communication. Some telecom operators, like Telia, Mannesmann and Vodata, have joined the group.

Source: Ny teknik-Teknisk tidskrift, # 1996:41

AMPS Available in 73 Countries to 3.01 Billion Persons

Fig. 22. The American AMPS standard for mobile telephony was available to 3.01 billion persons in 73 countries worldwide early 1995. Europe, parts of Africa, the Middle East, India, and central Asia, is not covered by AMPS. The interesting question to the user is, of course, to what extent the two networks do collaborate. Note, that the GSM and AMPS systems availability in the world is overlapping, in particular so in North America, Asia, and Australia — also see previous figure 21.

Sources: Telia: Tele # 3/1995, Telia, Ericsson, and Motorola

* **European Mobile Growth Slows Down**

According to "*Mobile Communications*", the number of mobile telephone subscribers in Western Europe increased by 904 703 during September 1996. The total number of western European subscribers were 30.89 million. The net increase was 3.02% compared to 3.19% during August 1996, and 4.30% during July 1996.

Source: Svenska Dagbladet, Oct. 22, 1996

The Cellular Market in Europe, Forecast Subscribers 1991 — 1997

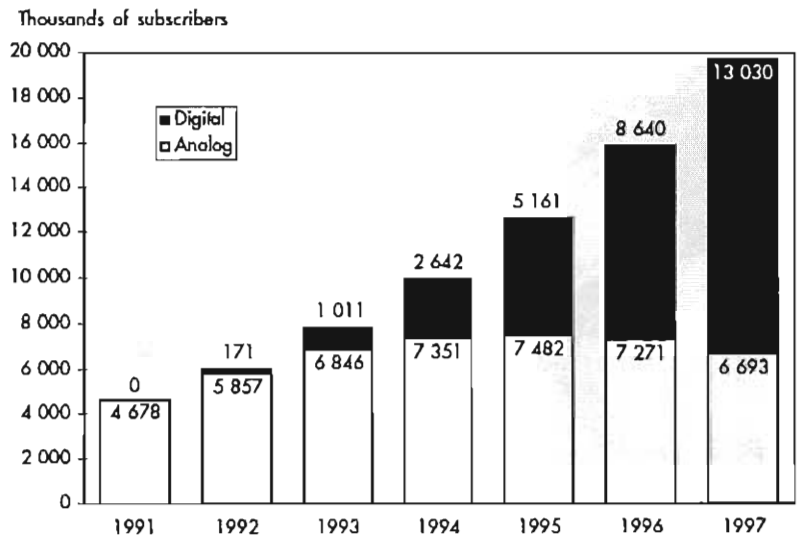


Fig. 23: The Western European cellular market as seen in 1994 by EITO. The number of subscribers are forecast for analog and digital systems users. By the end of 1995, 5.16% of Europe's 447 525 000 inhabitants were mobile subscribers, i.e. 23 092 290 Europeans.

Source: EITO: European Information Technology Observatory 94

* **Global Computer Density**

In 1994, there was one computer per 350 inhabitants in all the world. This should be compared to the situation in 1965 — then there was one computer per 10 000 inhabitants.

Source: SCB: Data om informationstekniken i Sverige 1996

Computer Penetration by Country in 1992 In percentage of GDP, and in ECUs

	IT/GDP %	IT per Capita ECUs	White collar per screen
Europe	1.93	313	1.8
EU	1.88	295	1.8
EFTA	2.35	501	1.8
Germany	1.94	361	1.6
France	2.00	362	1.8
UK	2.41	340	1.9
Italy	1.35	227	2.1
Spain	1.25	143	2.1
Austria	1.61	293	1.7
Belgium/Luxemburg	2.20	353	1.7
Denmark	2.60	554	1.4
Finland	2.02	352	1.6
Greece	0.73	43	2.5
Ireland	1.71	181	1.7
Netherlands	2.36	387	1.8
Norway	2.71	547	1.5
Portugal	1.20	79	2.5
Sweden	2.59	574	1.8
Switzerland	2.65	730	2.3
USA	2.83	501	1.2
Japan	2.04	229	4.3

Fig. 24.: The table shows the computer penetration in Europe, the EU, the EFTA, the Western European countries, the US and Japan. The penetration is given in percentage of GDP, in ECUs spent per capita on data processing equipment, and in number of white collar employees per computer screen in offices. Between 1982 and 1992, the Scandinavian countries led the European IT adaptation. In 1992, IT penetration suffered a general setback in all of Europe. The figures also show that the European IT market consists of several segements in different stages of development, depending on the national economic growth.

Source: EITO: European Information Technology Observatory 94

*** The Global Market for CAM = 250 000 Software Packages**

The global market for computeraided manufacturing, CAM, is appreciated to grow by 12% annually. The total market is made up of approximately 250 000 software packages. This is according to the American analyst firm CIMdata.
Sources: CIMdata/CAD Special, May, 1997/Ny Teknik # 22, 1997

Global Notebook and PDA Market 1991 — 1997

Year	1991	1992	1993	1994	1995	1996	1997
Notebook & Subnotebook							
Shipments (1000)	607.0	1 145.0	1 742.4	2 380.4	3 251.7	4 098.3	5 110.5
Revenues (Million ECUs)	2 171.9	3 971.6	4 809.5	5 666.1	6 484.3	6 950.3	7 679.0
PDA							
Shipments (1000)	0.0	0.0	9.0	30.0	65.0	125.0	195.0
Revenues(Million ECUs)	0.0	0.0	7.3	20.3	35.1	64.1	79.0

Fig. 25 Mobile computing and mobile communications are moving closer and the two markets are merging. However, the majority of existing notebook computers have little communication ability away from the office. The diagram shows the total estimated notebook and PDA market from 1991 to 1997.
Source: EITO: European Information Technology Observatory 94

The Global Market for Data Mining 1997 & 2000

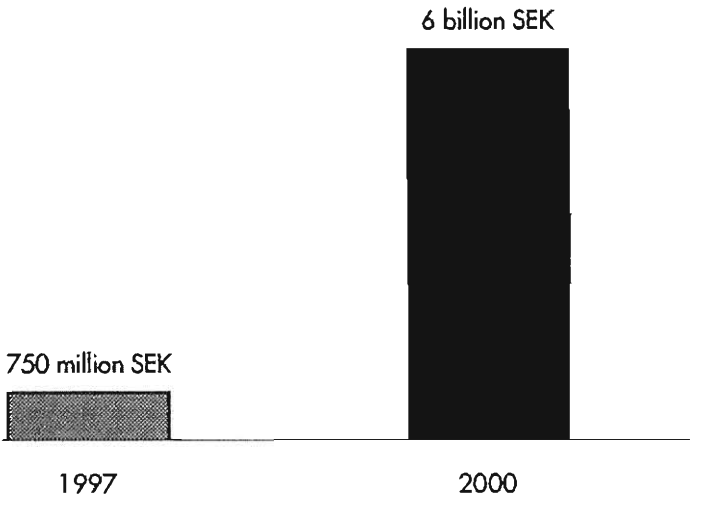


Fig. 26: Data mining is a software tool to be used in a data warehouse to search for hidden relations and patterns in large masses of data. According to the analyst firms the Meta Group and the Gartner Group, there is a rapidly increasing global demand for this kind of tools. In 1997, the global market will have a total value of 750 million SEK, to be compared to 6 billion SEK in 2000.
Sources: Meta Group/Computer Sweden, # 39, May 30 1997

* The major barriers to the progress of the full **merger of communications and computing technologies** are many. Miniaturisation of the electronic and mechanical components is one, maybe the one most easily overcome. Others are:
  + lack of international standards
  + questions related to frequency allocations
  + infrastructure — who is responsible?
  + cost versus performance
  + user acceptance.

  Mobile communications, which are the heart of the products of the future, have to have global standards for
  + computer hardware
  + operating system software
  + communications hardware
  + communications infrastructure.

  Also compare diagrams 1.1 and 1.2 of GSM and AMPS global availability.
  Sources: EITO, Telia, Ericsson

European Potential Market Development Versus Rest of the World

Technology	Europe	Japan	USA
Analog Cellular	—	+ —	+ —
Digital Cellular	+	+ —	—
Telepoint	+ —	+ —	—
International Paging	—	+	+
Packet Radio	+ —	—	+ —
Wireless LANs	+ —	—	+
Personal Computing	+ —	+ —	+ —

— = below average position
+ — = average position
+ = above average position

Fig. 27: In 1994, EITO made the above comparison between Europe's market potential in some of the fastest growing information and communication technology areas, and that of Japan and the United States. Each region has one single area, in which its potential is superior to that of the others — for Europe, in digital cellular technology, for Japan, in international paging, and for the US, in wireless LANs.
Source: EITO: European Information Technology Observatory 94

* New Customer Challenges and Demands

International telecom customers are challenging their international telecom operators by constantly increasing their demands for services, according to Ovum.

Any company with global operations are at least expecting
— that all telecom services are available globally
— that all services are the same and function in the same way anywhere in the world
— that IVPN services are available everywhere, i.e. a company wants to be able to connect their local switches to one corporate "internal" network
— 100% compatibility and seamless transgressions between all members in an alliance
— favourable pricing for operator loyalty
— flexible invoicing
— one single contact and service person.
Source: Ovum

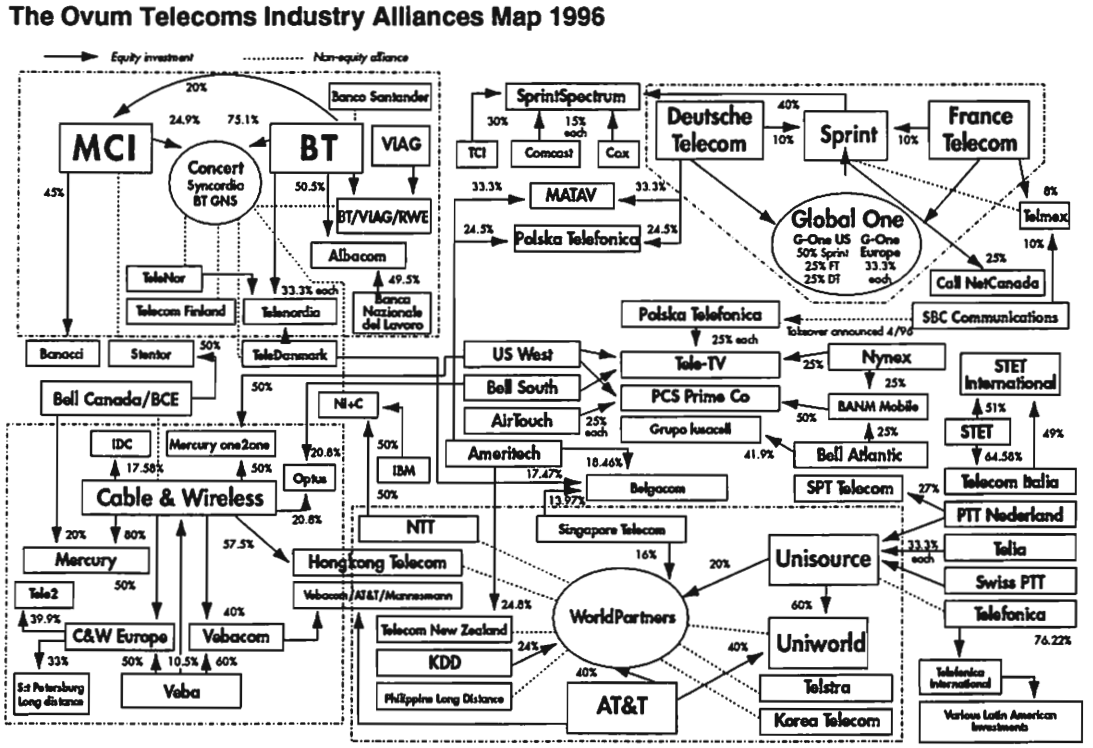


Fig. 28: The British telecom intelligence company Ovum has mapped the major telecom operators of the world and their strategic alliances. The most interesting fact is that not one single telecom operator is large enough to cope with global telecommunications on its own.

Source: Ovum

* **You Have to be BIG, Real BIG, to Take on the WORLD...**

Today, not one single telecommunications operator, or any other organisation involved in ICT, is large enough to act as a single, global player, and actually being able to provide services worldwide.
Sources: Several

* **Globalisation — Alliances**

So far, international telecommunications have been based on collaboration between national and international operators. Only few operators, AT&T, BT, and Cable & Wireless, have built their own global networks for telephony. Specialists in data transmission, like Infonet, MFS, and GEIS, having their own international networks, are expected to enter the competition for the telecom users as soon as deregulation is permitting;
Source: Ovum

* **Globalisation — Three Leading Telecom Groups**

Three groups, formed through strategic alliances, are presently competing for global telecom dominance. The groups are: Concert, Global One, and World-partners.

Concert was formed in 1994 and is owned by BT (75.1%) and MCI (24.9%). BT also owns 20% of MCI.

Concert has formed strategic alliances and signed agreements for collaboration with local operators, making it possible for the group to cover Canada, USA, Mexico, UK, Norway, Denmark, Sweden, Finland, Spain, Italy, Germany, South Africa, Indonesia, Taiwan, Japan, and Australia.

In April 1997, it was announced that Spanish Telefónica leaves Unisource in order to join the BT and MCI alliance Concert.

Global One is owned by France Télécom, Deutsche Telekom, and Sprint. Sales are expected to exceed 800 million US dollars annually, and the overall growth is predicted to some 15 — 20%. The group has to have a permission to operate from the EU Commission, and the American FCC, due to the deregulation of the French and German local markets. Are they not deregulated by January 1, 1998, the group will lose their permission to operate.

Worldpartners was created in 1993 by AT&T, KDD, and Singapore Telecom. Later on, Unisource joined the group. The ownership is distributed as follows: AT&T — 40%, KDD — 24%, Unisource — 20%, Singapore Telecom — 16%. Worldpartners, a partnership based on non-exclusive agreements, has so far attracted a number of local operators, for instance Telstra in Australia, Telecom New Zealand International, Hongkong Telecom, Korea Telecom, Unitel in Canada, The Philippine Long Distance Telephone Company, Bezeq Israel Telecom, International Telecommunications Authority of Taiwan, Telkom South Africa, and NTT, Japan.
Sources: Ovum and "Nätvärlden" # 6, 1996

* **KPN of the Netherlands + Swiss Telecom + Telia from Sweden = Unisource**

Unisource was founded in 1992 by Dutch KPN, Swiss Telecom, and Swedish Telia, and describes itself as "the first truly pan-European telecom company, providing telecommunication services to European corporations and individuals at work, on the move, or at home". The company has its headquarters in the Netherlands. **Spanish Telefónica belonged to Unisource from early 1996, when it got an OK from the European Commission to become a full member of the group, but in late April 1997, it announced that it is leaving in order to join the Concert group.**

In 1995, Unisource reported revenues of NGL 1.3 billion, had made investments of NGL 326 million, and had 2 229 employees. Unisource has a close collaboration agreement with AT&T, manifested by the formation of the company AT&T-Unisource Communication Services, having 450 employees, also based in the Netherlands. The group is one of the partners in the global alliance WorldPartners, jointly owned by American AT&T, Japanese KDD, Singapore Telecom, and Unisource. For more detailed information, see chapter 10.

* **Unisource + AT&T = Uniworld**

Unisource and AT&T, in turn, have agreed to form a global company, Uniworld, owned to 60% by Unisource and to 40% by AT&T. The objective of Uniworld is to create a European operator for business customers. Uniworld is planning to invest about 1 billion Swedish Crowns over the next five years. Uniworld will offer their customers the present business networks services, satellite and voice services of Unisource and the AT&T Business Communications Services Europe plus AT&T Easy Link Service.
Source: "Nätvärlden" # 6, 1996

2.3. The Market Structures

The Information Society — A Result of Converging Technologies?

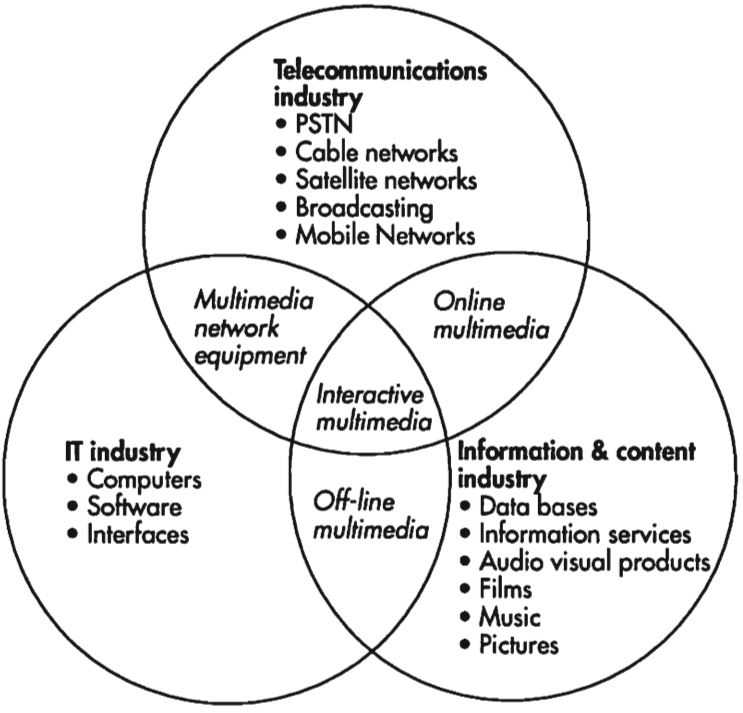
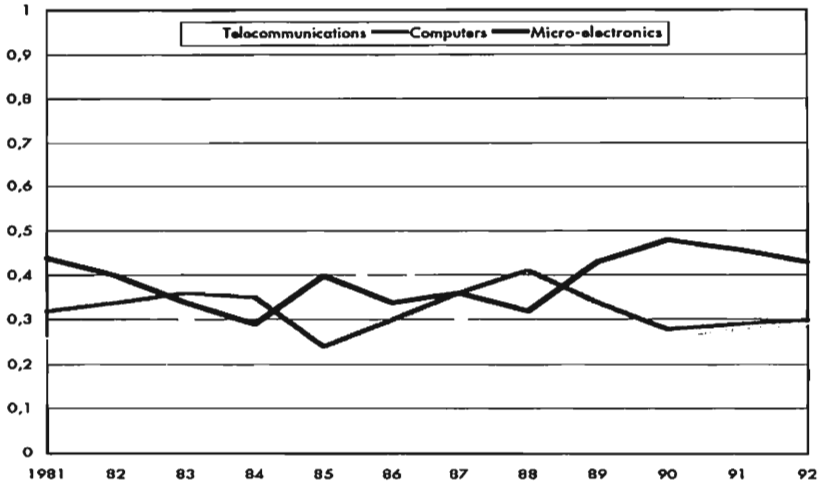


Fig. 29: This is a current model of how the convergence of the telecommunications and information technologies will result in the information society and in one single Information Society Technology market, IST.
Sources: DTI: Development of the Information Society, An International Analysis/OECD: 1996 Information Infrastructure Convergence and Pricing/Devotech: "Developpement d'un environnement multimedia en Europe"

Proportion of Strategic Alliances of Computer Companies with Partners From Telecommunications and Microelectronics 1981–1992

As proportion, 1 = 100% of alliances



Three year moving averages. The data is based on a sample of leading IT manufacturers in computers, semiconductors, and telecommunications sectors.

Fig. 30: Over the past 15 years, strategic alliances between companies in the information society technologies have become even more important to survival and success. There are several factors pushing this development, a few of them being related to the merger of technologies like microelectronics, computer science, media development, and telecommunications, and others being related to the development of new markets as a result of the merging technologies. The demand for new products and services in the media area is likely to see an even faster tendency to alliances in the years to come.
Mergers are considered especially important to industries under pressure to get new products and services to market swiftly. The diagram shows the development of strategic alliances for telecommunications, computers, and microelectronics during the period 1981 — 1992. The reader is adviced to use the diagram as an indication of relations only, the data going back some time.
Sources: Duysters, 1995/OECD: Information Technology Outlook 1995 © OECD, reproduced with the permission of the OECD

The Information Business Area

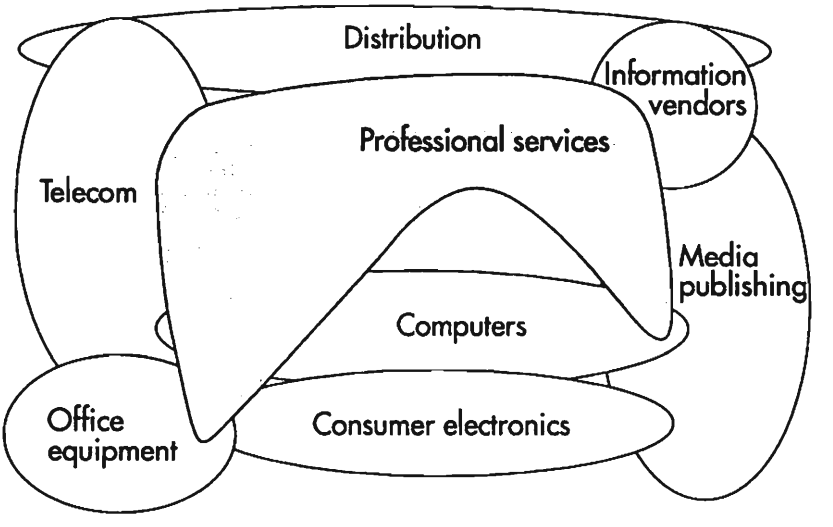


Fig. 31: These are the current information business areas, as seen by specialists at the Harvard University. The area of professional services is integrating into all of the other areas. Implicit is the rapid development in the microelectronics field, chips manufactured in VLSI design containing more than three million transistors and integration of many different technologies continuing. Also see chapter 9.2. The New Technologies. Moreover, this figure provides some of the backgrounds to the strategic alliances and the consortia, formed by the various players in the IST industries.
Sources: EITO/Harvard University

2.4. The IST Business

The Global Trade Flow of Information and Communication Technology Equipment in 1992

In million of ECUs

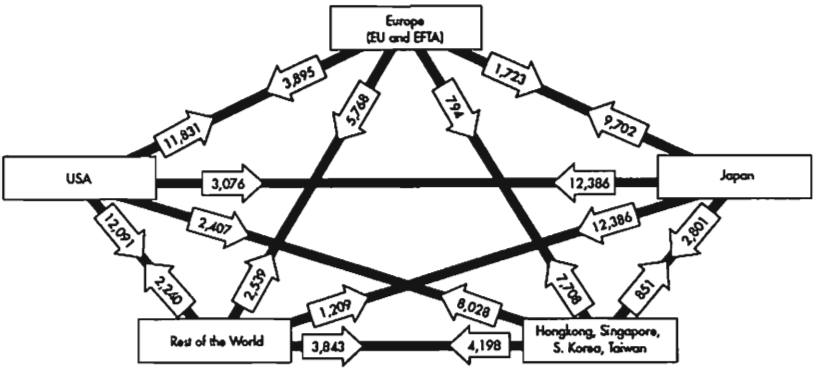


Fig. 32: In 1992, the trade balance between Europe and USA for information and communication technology equipment differed by a factor three — the US exported goods to Europe for a total value of 11 831 million ECUs, while the Europeans exported goods valued at 3 895 million ECUs. For the same period, exports between Japan and USA differed by a factor four — Japan exported for 12 386 million ECUs to the US, which in turn had an export equivalent to 3 076 million ECUs. The difference in exports between Japan and Europe is at a factor 5.6 — the Japanese exported goods at a value of 9 702 million ECUs to the Europeans, who in turn sold goods at a value of 1 723 million ECUs to the Japanese. The trade deficit for Europe between imports from and exports to non-European countries was 23 billion ECUs in 1992. The intra-European trade is dominating both imports and exports — 54% for imports, and 72% for exports. Specifically interesting is to note, that Europeans seem to prefer to trade with their neighbours rather than with the US, Japan, and the rest of the world.

Sources: Eurostat/EITO: European Information Technology Observatory 94

* In 1995, the European Union member countries spent £5.1 billion on public sector procurement of hardware, and £10.5 billion on software and services.

Sources: European Information Technology Office/Financial Times 7/2/96/DTI

* The driving forces for changes in the information and communication technology markets are basically socio-economical. Europe is going through a period of economic instability, which, in combination with technology and competition and liberalisation developments, and evolving and ever more sophisticated user needs, are shaping and changing the future markets. Looking at the imports and exports of equipment for 1992, the diagram above points to several interesting facts. Two of these are:
  - intra-European exports dominate the European trade;
  - Europe had a total trade deficit of 23 billion ECUs.

  Not shown in the diagram are the following facts:
  - in the computer and office machinery segment, Europe had a trade deficit of some 19 billion ECUs;
  - in the telecom equipment segment the trade balance was positive, by 252 million ECUs.

  Source: EITO: European Information Technology Observatory 94

Government Expenditure on Goods and Services as % of GDP in 1992
In countries studied by DTI

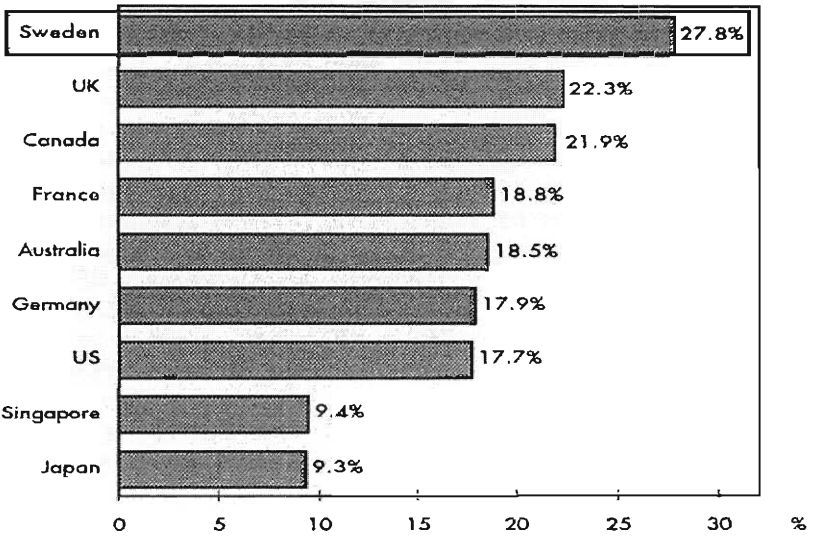


Fig. 33: According to the researchers of the DTI, government represents a major element in the ICT economy. The government has double roles — as a user of ICT as well as a promoter. The Swedish government was the largest buyer of goods and services among the countries studied by the DTI.
Source: Department of Trade and Industry & Spectrum: Development of the Information Society. An International Analysis, 1996

* New distribution channels are regarded as essential to market share. The reasons are many. One is that the whole telecommunications and information technology market is moving from a so called professional market to a mass market. The suppliers follow these trends. Thus, it is possible to buy a telephone subscription along with your telephone in a specialised shop. In Sweden, anyone can buy a mobile telephone subscription along with a mobile pocket phone in numerous shops all over the country. And when you buy a modem for your PC in a PC shop, you can buy an Internet connection and a yearlong subscription along with it.
  But so far, the distribution channels seem to change rather slowly. In 1993, PC shipment in Western Europe at a total value of 18.4 billion ECUs, was distributed to 88% by what can be called traditional distribution channels — see diagram Feb. D below.
  The hype about Internet marketing has not quite lived up to expectations as yet, although software, CD-ROM-based music, and books have shown some signs of taking off. For Europeans, there are several problems to cope with for tranborder electronic shopping. One is to quickly translate the price you will have to pay from one currency to another. A second one is related to local VAT and customs — in reality, trade is nowhere as free as in theory. And, of course, there is the ever present security problem — I cannot be certain that my business card numbers are not misused. For more information about Internet shopping, see chapter 7.

PC Sales in Europe in 1996 — Private and Professional Market Segments by Manufacturer

In million of units

Company	Million of units	Growth in percent 96/95	Market share in percent
1. Compaq	2 026	7	12.6
2. IBM	1 548	12	9.6
3. Hewlett-Packard	842	22	5.2
4. Packard-Bell NEC	812	8	5.1
5. Dell	745	39	4.6
6. SNI	739	8	4.6
7. Apple	716	- 23	4.5
8. Fujitsu/ICL	642	31	4.0
9. Olivetti	551	- 4	3.4
10. Toshiba	548	56	3.4

Fig. 34: Packard-Bell NEC has taken the fourth position in the European PC market in five years only. This is an increase of 8 percent over 1995. The American-French-Japanese conglomerate looks very promising, indeed.
Sources: IDC, February 1997/Les Echos, April 1, 1997

PC Shipment per Distribution Channel in Western Europe in 1993 and 1995

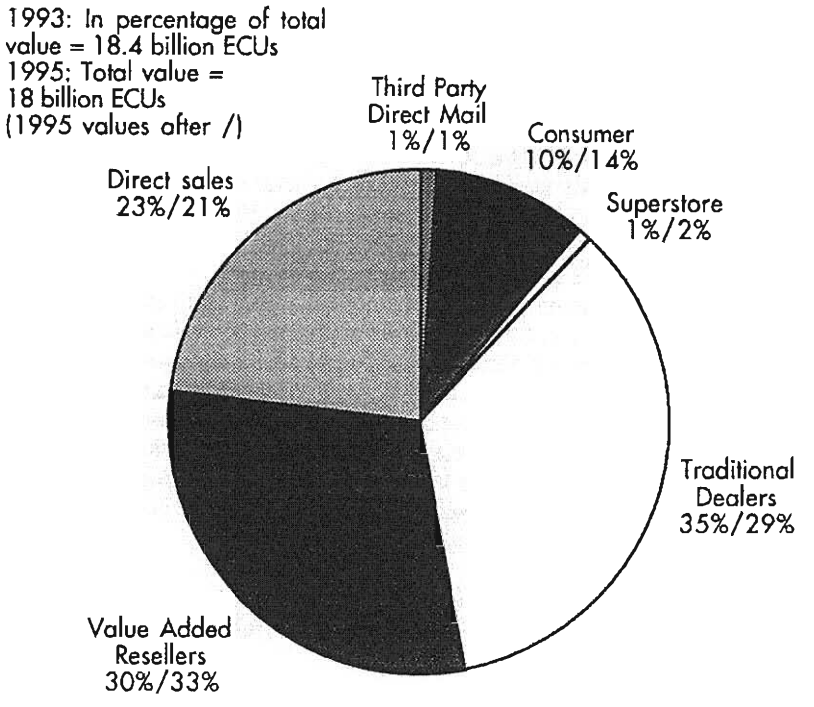


Fig. 35: In 1993, PC distribution in Western Europe still followed the traditional pattern. The diagram shows the value per channel in percent of the total value, which amounted to 18.4 billion ECUs. The picture of 1995 has not changed much. The total value of PCs distributed had decreased to 18 billion ECUs; the traditional dealers lost out to value added resellers, and direct sales.
Sources: EITO: European Information Technology Observatory 94/European Information Technology Observatory 97

* **"Fixed Wireless" Networks**

"Fixed wireless" networks geared for access rather than mobility are solving telecommunication problems all over the world, and fast. So, for instance as one example of bringing communications to many, Argentina announced in February 1994, that it was awarding licenses for the entire country to CTI, a GTE-led consortium. By May an 800-cell fixed wireless network that AT&T built for CTI was up an running, serving 160 000 subscribers.
Souce: Scientific American, September 1995

* **Semiconductors — The New Global Basic Industry?**

The global microelectronics industry grew by 40% during 1995. About 30 new semiconductor factories are planned worldwide, each year. This is the direct result of the development of the ICT society, the semiconductur being its very heart. Or rather, brain. By the year 2000, the semiconductor industry will have an annual turnover of some 400 billion US dollars. Industry analysts with SGS-Thomson are projecting a doubling to 800 billion US dollars by 2010.

The distribution of semiconductors per application area were as follows by the end of 1995:

• computers	54%
• communication	17%
• consumer goods	18%
• industry	9%
• automobiles	4%
• military equipment	< 1%

The Leaders in Semiconductors in 1996

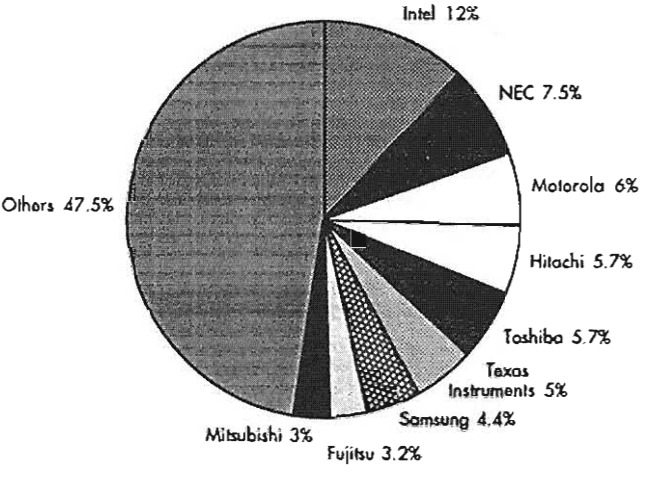


Fig. 36: According to the research firm Dataquest, the leading semiconductor manufacturers in 1996 were Intel, having 12% of the market; NEC 7.5%; Motorola 6%; Hitachi 5.7%; Toshiba 5.7%; Texas Instruments 5%; Samsung 4.4%; Fujitsu 3.2%, and Mitsubishi 3%. 47.5% of the market were provided by other companies, of which some are European. The world market for DRAMs is down, causing the whole semiconductor segment to decrease by 7% over 1995. The total turnover for 1996 was 945 billion SEK.
Sources: Dataquest/Computer Sweden, 28 February 1997

The Semiconductor Market Place: DRAM Generations Sold 1990—2000

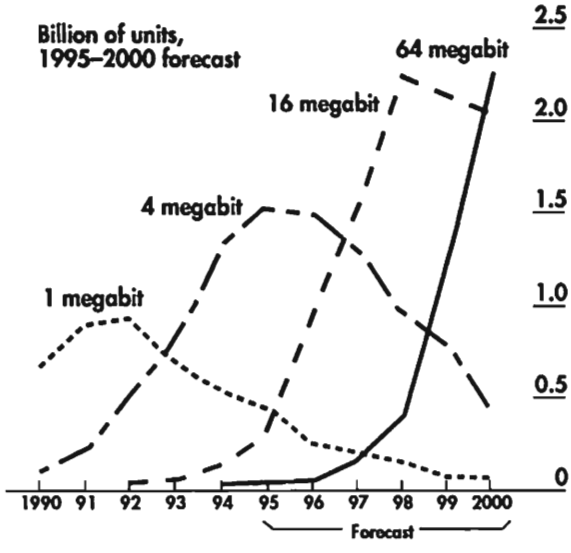


Fig. 37: The diagram shows a projection of the number of units sold per DRAM (Dynamic Random Access Memory) generation — 1 megabit to 64 megabit — by semiconductor firms from 1990 to 2000.
Sources: VLSI Research/The Economist, August 26, 1995

Semiconductor Factories in the World 1995

Fig. 38: Semiconductors are likely to be the new global basic industry. Today, 54% of all semiconductors are used by the computer industry, but the distribution of intelligence into all kinds of equipment, from home electronics to cars, along with increasing intelligence built into telecommunications networks and equipment will increase demand for semiconductors. The Japanese have seen this development early on, and the Americans have learnt from them, while the Europeans are the laggards, when it comes to investing in and building semiconductor factories. Sweden has three semiconductor factories .

Sources: Ny teknik 1996:41/SGS-Thomson

Annual Turnover for the Global Semiconductor Industry 1960 — 2010

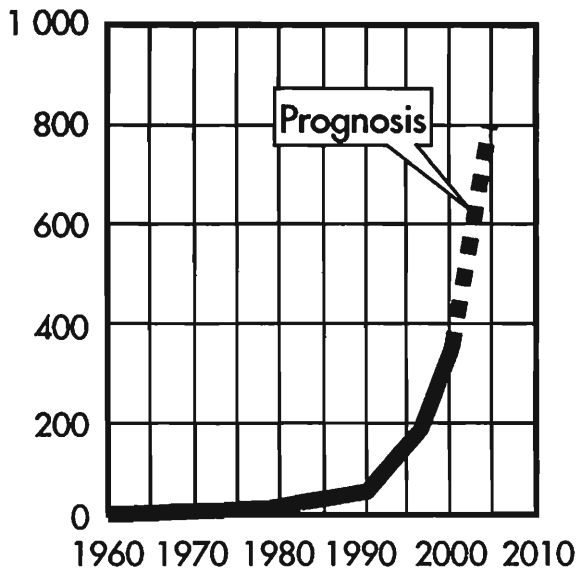


Fig. 39: In the year 2005, the annual turnover for the global semiconductor industry is projected to some 800 billion US dollars. For 2000, the projection is 325 billion US dollars. In 1995, the global turnover was 144 billion US dollars. The microelectronics industry is rapidly becoming the new basic industry of this world, thanks to the development of the IST – the Global Information Society and its technologies.
Sources: Ny teknik 1996:41/SGS-Thomson

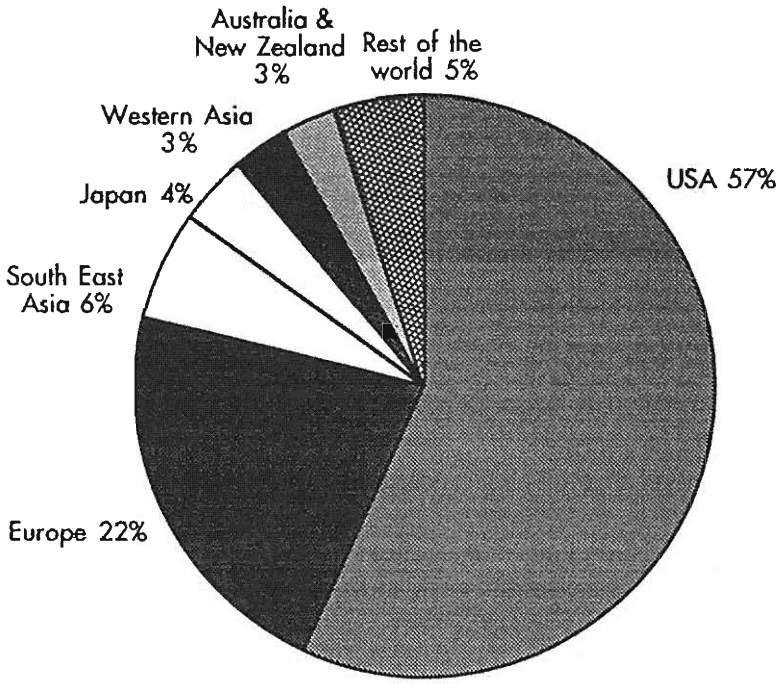


Fig. 40: India is rapidly becoming the most important supplier of software to the large US and European software manufacturers. In 1985, India had less than 7 000 software specialists turning over the equivalent of 70 million SEK. In 1996, 140 000 persons were working in the software industry, exporting software code to a value equivalent to 8 billion SEK.
Sources: Ny teknik, 1996:46/Nasscom

2.5. The European Union and IST

Information technology and the Information Society being one of the prioritised areas for research, development and policy making, of the European Union, there is a wast amount of information and data about EU IST projects, developments, and policies. This chapter only gives the reader a small piece of the wide variety of initiatives taken by the EU and its agencies. Anyone with a specific interest in the EU area is asked either to contact the Information Society Project Office of the EU, and/or, if in Sweden, Uppdragsenhet 3, at Statskontoret, or to type into the following URLs on the Internet (*N.B. there are many more, the ones below provide overviews and further site addresses*):

* **http://europa.eu.int/**
  gives access to the EU Europa-server, providing background information about the EU nd its institutions;

* **http://www.ispo.be/**
  connects to the Information Society Project Office, ISPO, Web-sites, and its news letter *"Information Society News"* (http://www.ispo.cec.be)

* **http://www2.echo.lu/**
  is the address of the Information Market EUROPE, providing a sea of information;

* **http://www.cordis.lu/cordis/home.html**
  accesses the "Community Research and Development Information Service" program and related information;

* **http://www2.echo.lu/ict/en/ICTHOME.HTML**
  are Web-sites for contacts between organisations and individuals involved in a program controlled by DG XIII, "Information and Communication Technologies Partnership" in order to promote IST collaboration in Europe. Some 40 organisations belong;

* **http://www2.echo.lu/tentelecom96/en/tthome.html**
  is the site of "Trans-European Telecommunications Networks" (TEN-Telecom) program, to some extent concentrating on ISDN;

* **http://www.ispo.cec.be/infosec/eleccom/**
  is a good place to start for anybody interested in electronic commerce in Europe;

* **http://www.ispo.cec.be/infosoc.randd.html**
  gives an overview over R&D programs within the EU in the IST area;

* **http://www.cordis.lu/esprit/home.html**
  is the starting point for the R&D program ESPRIT.

As mentioned above, information about Swedish EU-activities in the IST area can be asked for at Statskontoret. In 1995, Statskontoret published an analysis of the European Union regarding IT, telecommunications and new media. The analysis is available in Swedish only, and called: *"Europeiska Unionen — IT, telekommunikation och nya medier"*, 1995-12-01.

*** The European IT Industry Needs Help**

According to the European Commission, the European IT industry needs immediate help, if it is ever to participate in the global IST top list. Since 1990, the European market share of the global IST industry has dropped to 28% from 35%. In Europe, IST expenditure represents 2% of GDP, compared to 3.7% for the USA. The IST expenditure per capita in Europe during 1996 was 365 ECU, while the Americans spent the equivalent of 763 ECU per capita. Part of the problem is the high labour costs and the inflexible labour market conditions in Europe.

Sources: EITO/EU/Computer Sweden, April 18, 1997

*** EU and IPR, Intellectual Property Rights**

Several of the directorates of the European Commission are involved in projects related to intellectual property rights, IPR, an issue which rapidly has grown into focus. Within DG III (Industry) and DG XIII (Telecommunication and IT), the following projects are current (N.B. the list is not necessarily complete!):

* Cited — Copyright in Transmitted Electronic Documents, was a pilot project, finished in 1992, which defined a general architecture for IPR. Cited serves as the basis for several ongoing development projects;
* CopeArms — Co-ordinating Project for Electronic Authors Rights Management System — supports the implementation of ECMS, Electronic Copyright Management System;
* CopiCat — Copyright Ownership Protection in Computer-Assisted Training — is based on the Cited-model and implemented when IPR-related problems are complex;
* CopySmart — Cited Based Multi-media IPR Management on Cost-Effective Smart Device — is a system of smart card readers and copyright protected material is loaded down on PC cards;
* ECUP — European Copyright User Platform — is helping to disseminate information and knowledge about IPR, with special address to libraries;
* Imprimatur — Intellectual Multimedia Property Rights Model and Terminology for Universal Reference — is a system for marking pictures. The pictures are available via a www-server, and can be apid for by e-cash. Telia Infomedia participates in this project;

* MUSE — Digital Media Management in the European Music Sector — is developing standards for secure transmission of music via the networks;
* Talisman — Tracting Authors' Rights by Labelling Image Services and Monitoring Access Network — is focusing on technology for videofilm marking.

Source: Datateknik, # 10, May 29 1997

*** EU's Anti-dumping Measures on D-RAM Chips**

Minimum prices are reimposed on European imports of D-RAM seminconductors from Japan and Korea. Since 1990, the EU has taken the following steps:

- January 1990: The European Commission finds evidence of dumping by Japan. Imposes minimum selling prices on 11 manufacturers;
- March 1993: Minimum prices imposed on three Korean producers;
- June 1995: After global price rises, the European Commission suspends measures against Japan and Korea for 12 months;
- June 1996: The EU extends suspension for maximum nine months. D-RAM chip prices fall 80 percent;
- March 1997: The Comission is legally obliged to reintroduce minimum prices but delays the decision in order to avoid market disruption;
- June/July 1997: EU completes review of measures.

The semiconductor market is expected to grow globally by 16% for the period 1996 — 2001. The growth per region is forecast as follows for the period:

* Asia/Pacific	+ 20%
* America	+ 16%
* Europe	+ 14%
* Japan	+ 12%
* Rest of the world	+ 38%

Sources: Siemens/The Financial Times, April 1, 1997

*** The EU Schoolnet to Swedish Kalmar**

The European Union Schoolnet, EUN, is to be based in the Swedish city of Kalmar on the Swedish eastcoast. The objective of EUN is to facilitate contacts between schools in Europe, and to assist in the implementation of new technology. The EUN center will also function as an information hub and a contact focus.

Source: Computer Sweden, #38, May 27 1997

*** EU Supports Program Development**

SPIRE, Software Process Improvement in Regions of Europe, is a EU supported research program for small companies wanting to become better at program development.
Source: Datateknik, # 10, May 29 1997

*** EU's ISPO to Map European IST Usage**

Early 1997, the European Commission started a project named the Information Society Project Office together with the research firm IDC. The objective is to map the European IT usage, ongoing projects, rules applied in the different countries, and what actors are active in the national markets. The Commission wants to be able to make better decisions regarding a European Information Society.
Source: Computer Sweden, # 16, March 7, 1997

*** The Bangemann Challenge Goes Global**

A new Bangemann Challenge, a global one this time, was launched when the first awards were being handed out in Stockholm early 1997. The new Challenge will last from January 1997 to June 1999, and some 150 major cities in the world are expected to participate, according to the coordination team in the Mayor's office of Stockholm. Projects can be submitted in the following 11 categories:

1. New business structures
2. IT services for small and medium-sized enterprises
3. Electronic commerce
4. Public service and democracy
5. Health care
6. Culture and media
7. IT in all areas of education
8. Lifelong learning
9. Environment
10. Traffic
11. Universal connectivity

For more information, type: www.stockholm.se/bm
Source: Information Society News, # 12, April 1997

*** The European Commission to Spend on CAT Modems**

According to some sources, the European Commission is considering to spend extra money on the development of modems for cable television networks. Such modems have considerably larger capacity than those used for ordinary tele and data communications. In the US, some 400 000 CAT modems are sold annually. In Europe, tests are being carried out in Nice, Le Mans, and Manchester.

Source: Dagens IT, April 29, 1997

*** EU Studies Mobile Phones and Health**

Early on in 1997, the European Commission launched an action plan for comprehensive research into the effects on health of mobile telephones. So far, nothing proves that there is a health risk involved in using mobile telephones, but the industry has an interest to find a clear answer that the use of mobile phones is safe. About 17 000 mobile telephone users in Norway and Sweden are taking part in this study on the harmful effects of mobile telephones.
Source: Mobile Europe, January 1997

*** EU Internet Users Pay As Much As 300 Times The US Fees**

The DG III ESPRIT program is publishing two new cross-sectoral research themes for the EU IT program, "IT for mobility", and "Electronic commerce". One reason for the latter is, that Europe is lagging behind in the US$ 100 billion market for electronic commerce, due to its still largely regulated telecom markets. The costs to access Internet is 300 times higher for some European users than they are for the Americans, for instance. Only Finland has more Internet hosts per 1 000 inhabitants than the US. See
the following diagram.

Internet Hosts Per 1 000 Inhabitants for EU and USA in March 1997

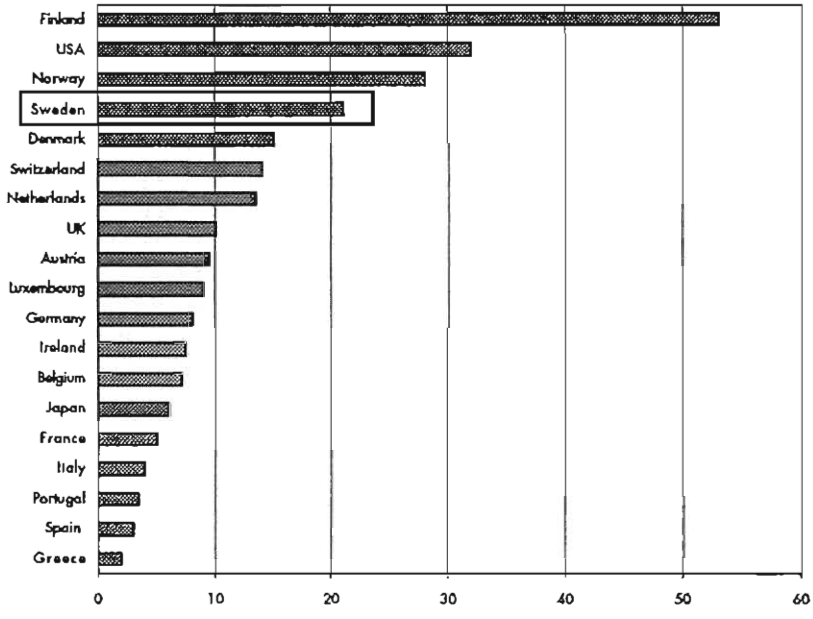


Fig. 41: Some European countries are lagging behind when it comes to Internet commerce, a US$ 100 billion market, due to high Internet access fees and tariffs via telecommunications networks. In spite of this, Internet based electronic commerce offers considerable opportunities, not least for SMEs. Europe's mail order industry, which turned over ECU 37 billion in 1994, is actively incorporating the Internet. But the consumers are not there, in spite of excellent technical conditions — to most, telecommunications are too expensive.

Source: Information Society News, # 11, March 1997, http://www.ispo.cec.be

*** The IS Survey — A Eurobarometer on IST Users**

The Information Society Activity Centre has released the results of its recent survey called "Measuring Information Society". The survey covers the state of awareness and use of modern information and communication technologies in Europe. Information from 15 000 European citizens are available in the survey. Type http://www.ispo.cec.be for the full results.

Source: Information Society News, # 12, April 1997

2.6. Current Standardisation Issues

"The standardisation process in the information and communications technology area has become increasingly visible in recent policy discussions, as witnessed by the conclusions of the G-7/ Ministerial Conference on the Information Society, held in Brussels on February 1995..."
Source: OECD: Information Technology Outlook 1995

Within the European Union, standards are also debated, particularly in the wake of the "Bangemann Report" on the Information Society. At the OECD, a special group, the Ad Hoc Group of High-Level Industrial Experts on IT Standardisation, has brough forward a number of conclusions and recommendations, presented in **"ICT Standardisation in the Global Context"**, published by OECD in 1996. OECD has dedicated itself to gaining a better understanding of the economic dimensions and processes of IT standardisation.

A number of joint efforts to tackle new and ever more complex standardisation questions are made by several international and national bodies. One example is the attention to new multimedia requirements given by the **Joint Technical Committee, JTC1**, of the **International Organisation for Standardisation, ISO,** and the **International Electrotechnical Commission, IEC**. They are looking at questions as diverse as coding of audio, picture, multimedia and hypermedia information, security questions at all levels, open electronic data interchange, image processing, interconnection of information technology equipment, just to mention a few.

In several OECD member countries informal standard fora have been established. In USA, the **Information Infrastructure Standards Panel**, is working under the aegis of the **American National Standards Institute, ANSI**, to facilitate consensus among all partners involved.

Compound Evolution in Number of the International Standards Published in 1988 — 1994

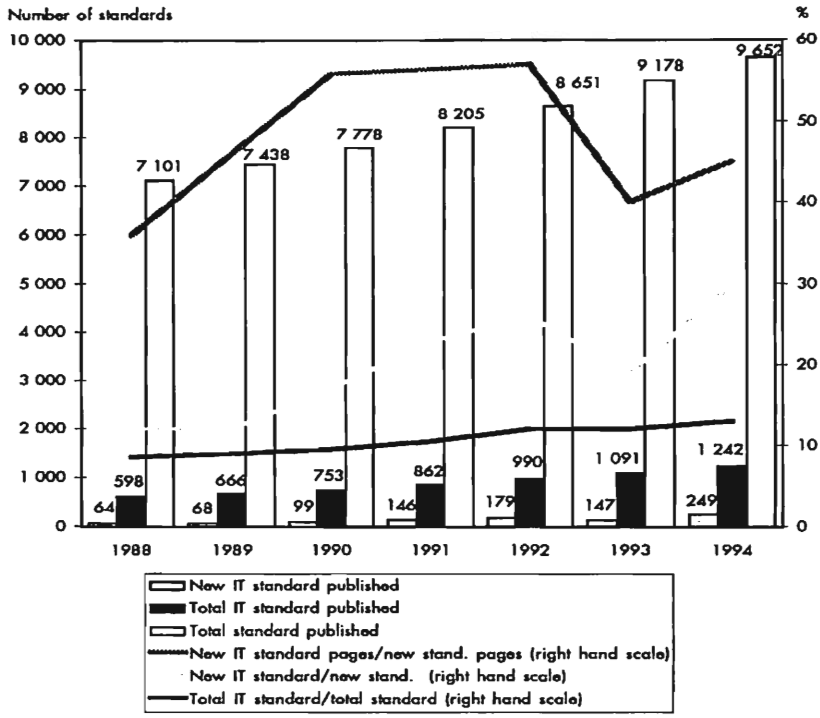


Fig. 42: The number of international standards published from 1988 to 1994, and the number of pages of technical text, is given in this diagram. This data reflect a quantitative slowdown in the development of standardisation activities in some IT areas. This may reflect the impact of economic difficulties in many firms. The total number of standards is growing, however, because IT applications have become increasingly essential to all industry sectors.
Sources: International Organisation for Standardisation/OECD: Information Technology Outlook 1995, © OECD, Reproduced with the permission of the OECD

2.7. Do You Know This About Telecommunications and ICT Standards?

* Nine of the largest electronics companies in the world have agreed upon a common technical standard for the new CD-ROM video disc, the **Digital Video Disc, DVD**. The companies will launch the new standardised discs as the "ideal digital storage medium for the multimedia era". The agreement will cover development and production of DVD players for video, and DVD-ROM readers for personal computers. DVD players will also play regular audio CD-ROMs. A standard for music is under development. DVD stores information on both sides and can contain 4.7 gigabyte per side, i.e. 133 minutes of pictures and sound. A conventional CD-ROM can store 650 megabyte. Toshiba, Sony, and Philips are three of the partners.
  Source: Svenska Dagbladet, 9 december, 1995

* The American standard for digital mobile telephony will be introduced as the **Japanese standard** during 1998. The number of subscribers is increasing so rapidly that broadband transmission is needed for the network to function without friction. According to the MITI, there will be some 45 million subscribers in Japan by 2000.
  Source: Ny teknik, 1997:9

2.8. Do You Know This About Information and Communications Technology in the World?

*** Digital Infrastructures Open Markets for Works of the Mind — New Roles for Old Rules**

In December 1996, The World Intellectual Property Organization, WIPO, discussed one of the hottest issues in the cyberworld, the protection of works of the mind. The diplomatic conference met to update the international system of copyright established by the 1886 Berne Convention for the Protection of Literary and Artistic Works. Delegates from 128 governments and representatives of 100 international organisations adopted the results of preparatory work by the WIPO Expert Committees. One specifically hot issue is the right of reproduction.

The right of communication, which is another cornerstone of the global copyright system, is getting a new role. Anyone who wants to participate in the discussion of the issues raised by the WIPO Policy Forum can do so by visiting the following URL: http://www.sciencemag.org./feature/data/forum.shl
Source: Science, vol. 279, April 11, 1997

* Some Facts About Telecommunications and ICT in the Former Eastern Block

The majority of the former east block countries launched telecommunications modernisation programs during the years immediately after the fall of the Berlin wall, i.e. in 1991 to 1993. The PTTs have concentrated on quick solutions to some of the most urgent problems, directing investment towards overlay networks, cellular communications, and international gateways for majors business centres. The following diagrams describe the telecommunications situation per country.

Telephone Lines Per 1 000 Inhabitants in 1991

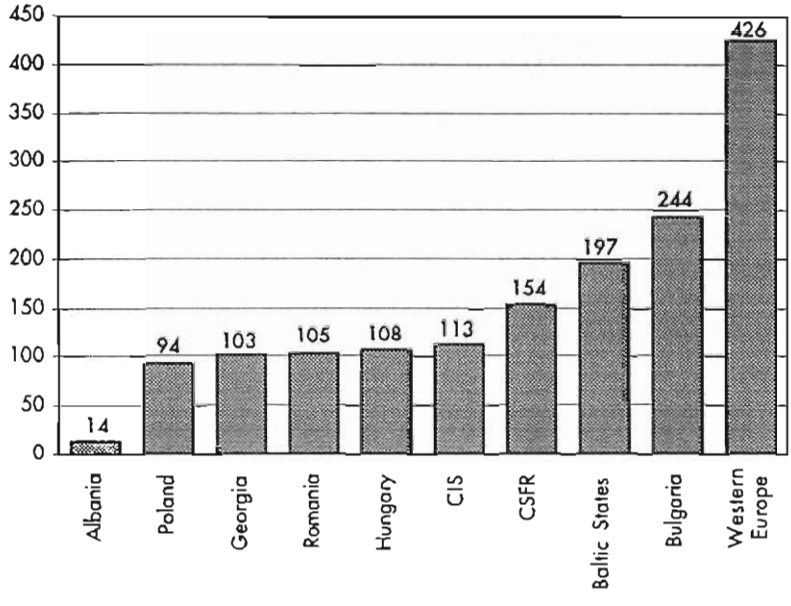


Fig. 43: The diagram shows the number of telecommunications lines per 1 000 inhabitants in the former eastern block countries in comparison to western Europe. The modernisation of the telecommunications infrastructure is a must for economic reform. Approximately 200 billion ECUs of infrastructural investment will be needed for the eastern countries to reach the same penetration level as western Europe.
Sources: ITU, OECD, EITO

Telecommunications Revenue in Percentage of GDP in Former Eastern Block Countries for 1991

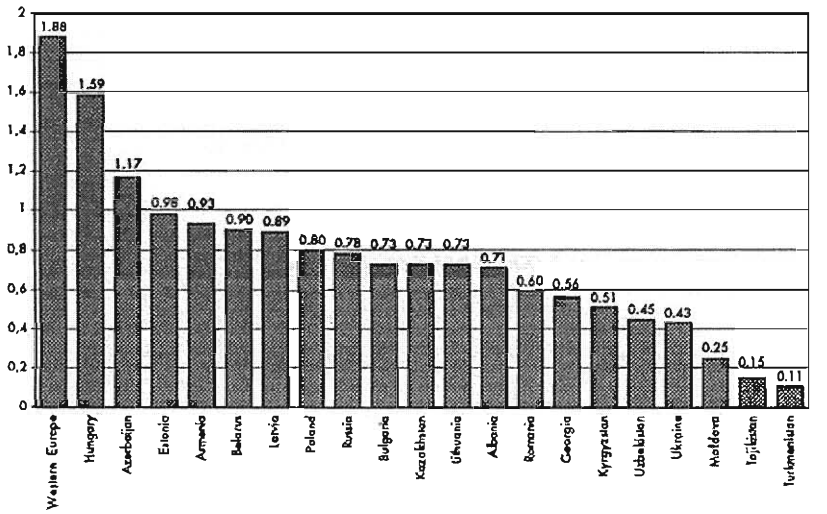


Fig. 44: The compounded average western European telecommunications revenues in percentage of GDP amounts to 1.88%, which is compared to the percentage of GDP per country in the former eastern block in this diagram.
Sources: ITU, OECD, EITO

Telecommunications Network Development Plans for Eastern Europe in 1993

Country	Gateway	Cellular	Overlay
Armenia	E	N	P
Azerbaijan	P	N	P
Belarus	E	N	N
Georgia	P	N	N
Kazakhstan	E	N	P
Kyrgyzstan	P	N	N
Moldova	P	P	N
Russia	E	E	P
Tajikistan	P	N	N
Turkmenistan	P	N	N
Ukrainie	E	P	E
Uzbekistan	P	N	N
Estonia	E	E	P
Latvia	E	E	E
Lithuania	E	E	P
Czech Republic	E	E	E
Slovak Republic	P	E	E
Hungary	E	E	P
Poland	E	E	E

Fig. 45: The keys to this table are as follows: E = established; P = planned; N = none. The availability of financing and investment are the major keys to the modernisation of the telecommunications networks of the eastern countries.
Sources: Business Central Europe, 1993/EITO

Germany Dominates European Multimedia Market

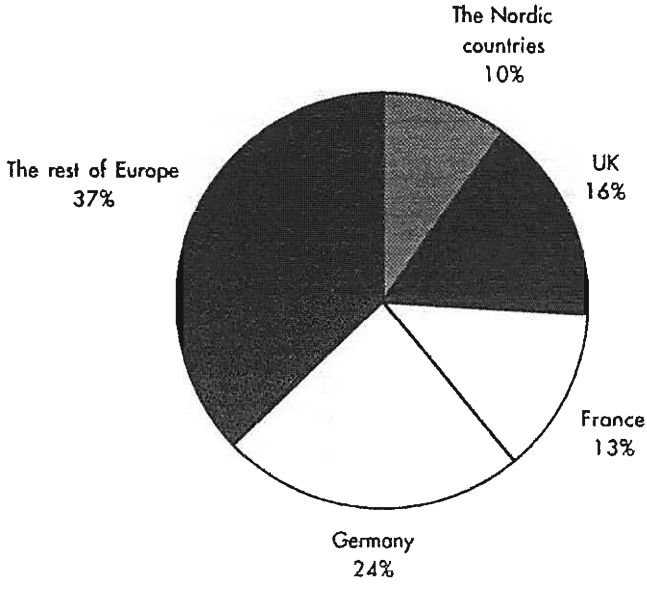


Fig. 46: Germany (24%), UK (16%), and France (13%), dominate the European multimedia market by far. The Nordic countries — Denmark, Finland, Iceland, Norway, and Sweden — have 10% of the total market, in 1996 having a total value of 100 billion SEK. In 2003, the same market is forecast to have a total value of 300 billion SEK, all according to Frost & Sullivan. Hardware answers for the largest part of the turnover.
Sources: Frost & Sullivan/Computer Sweden # 39, May 30, 1997

* The **German telecom market** will be deregulated by January 1, 1998. Before that, Deutsche Telecom will be privatised. A number of pilot projects are being carried out by various new consortia and alliances in order to find out what services users are willing to pay for. The diagram below shows the top ten fastest growing services and their estimated growth rates in Germany.

Top 10 Growth Areas for Deutsche Telekom
Change in turnover in percent compared to previous year

ISDN	+ 79%
Networks	+ 43%
Text TV	+ 24%
Information & brookerage services	+ 23%
Picture communication	+ 22%
Fixed lines	+ 21%
Cable connections	+ 17%
Telephony, business switches	+ 10%
Audiovision	+ 8%
Analog telephony services	+ 4%

Fig. 47: ISDN is the top growth area for Deutsche Telekom. The reason for this is that the majority of the Germans see multimedia services as a great opportunity for development. See following diagram.
Source: Computer Sweden, 21 February 1997

Multimedia is one of the techniques that are looked at and seemingly received with a positive interest by the Germans. About half of the German working population is employed in areas dependent on information technology. In 2000, two thirds of all working Germans will be involved in IT. Thus training and learning are big future markets, and in these multimedia will serve well. This is according to the report "*IT- och multimedietjänster*" (IT and Multimedia Services) compiled by STATT, The Swedish Office of Science and Technology.

Multimedia the Future for Deregulated Germany?

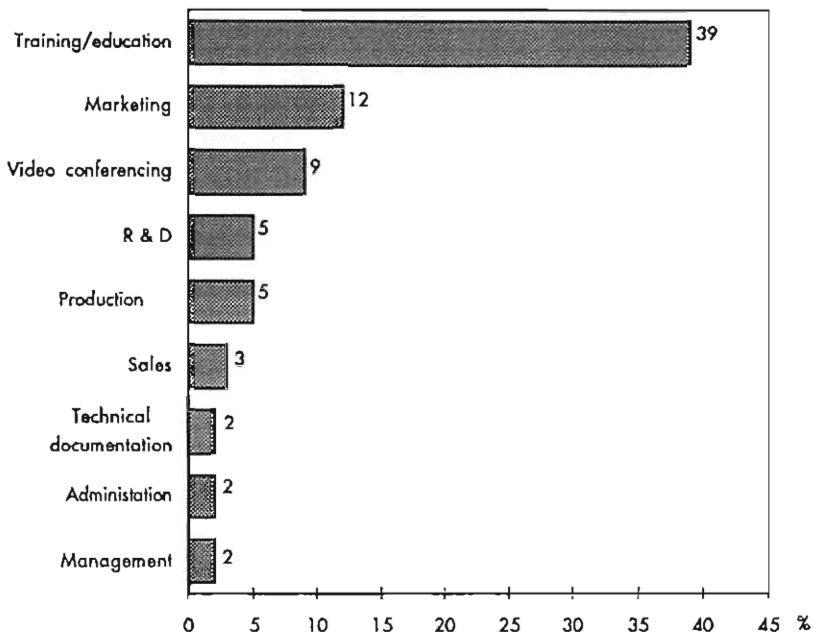


Fig. 48: Predicted distribution of multimedia services in Germany after deregulation in January 1998. The diagram is based on the responses of interviewed Germans in 1996.
Sources: STATT: http://www.swetech.se/Dagens IT, February 18, 1997

* One of the many myths created by politicians and related to telecom is that this industry should create a number of new jobs. Facts from real life do not support this particular myth, to the contrary: The number of employees of telecom operators has decreased by 30% from 1990 to 1993.
Source: SCB: Data om informationstekniken i Sverige 1996

* The Internet will be the death of print publishing. So far, however, the major effect has been to inspire the release of hundreds of books for the computer shelves. A myth as effective as the one about the paper less office?
Sources: Several

* **The Y2K Problem and Some Myths**

Many electronic systems, including computers, store information about the current year as two digits in stead of four. So, at the turn of the millenium, year 00, i.e. 2000, may well be interpreted by such a two-digit system as being less than year 99, i.e. 1999. This can cause havoc for systems comparing information based on date comparisons, for instance economic transactions carried out on a certain date. The awareness of the problem among users is rather high, although it can be difficult to understand the full consequences, due to the fact that each individual owns several devices with electronic chips that may be programmed in this way.

Among media people, politicians, and many other groups, the Y2K problem has generated a series of myths. One of these myths is that "'most' old computers cannot cope with dates after 1999, so they will 'crash' as the clock chimes midnight for the year 2000." One source of this urban myth, likely to gather momentum over the next four years, is the English Member of Parliament, Mr David Atkinson, MP for Bournemouth East, who has written to the British Prime Minister to ask if he is aware of the problems which now face the Britsh industry. When asked to name any make or model that will crash, Mr Atkinson responds: "I am no IT expert, but I have been advised that the vast majority will crash". The Prime Minister has referred the question to a government committee, which will report and give 'guidance'.

Sources: Informatik # 2, May 1997/New Scientist, 13 January 1996

* **A Personal Computer Is a MUST for Americans**

The personal computer, the PC, is being regarded as an absolute must by 90% of all Americans, according to a study made by the Yankelovich Partners for Intel. Nine out of ten Americans said that the PC is a must at work as well as at home. This means that IT is number three on the American list of absolute "musts" for an acceptable life, medical care, and agriculture being number one and two. And IT is regarded as more important than a strong defence and transportation systems.

Sources: Yankelovich Partners/Computer Sweden 28 February 1997

* **GSM 1800 to One Million Chinese Subscribers**

Ericsson has been appointed to deliver a GSM 1800 system for mobile telecommunications to one million subscribers in the North Eastern part of China.

Source: Computer Sweden 22 April, 1997

* **New Broadband Services to All — Future Universal Service for France**

In France, the public debate regarding the future information society often concentrates on the consequences of leaving part of the population behind, outside the information society. Thus, a policy decision has been taken to enlarge the concept of universal service to include not only fixed telephony to all, but also new broadband services.

Source: Magnus Härviden: "Fransk esprit — Informationsteknologi mitt i Europa", STATT report Frankrike 9601, November 1995

* **Big Corporations Change Minds on Teleworking**

The analyst firm Forrester Research has interviewed the Fortune 500 companies about their attitude to and plans for teleworking. So far, small and medium sized companies have been the most frequent users of teleworking. 24% of the companies with 1—50 employees had teleworking employees early in 1997, while 18% of the companies with 1001 — 10 000 employees had teleworkers. By 1999, the large corporations will have some 30% of their employees teleworking — there are, after all, several advantages. Note that only 50 corporations were interviewed and serve as basis for the following table! Also see chapter 4, p. 143, *"Flex-place Working"*, where there is a description of teleworking in Sweden.

Number of employees	Percentage of teleworkers 1997	Percentage of teleworkers 1999
1 — 50	24%	16%
51 — 100	18%	8%
101 — 500	30%	22%
501 — 1 000	10%	22%
1 001 — 10 000	18%	30%

Sources: Forrester Research/Computer Sweden, # 14, February 28, 1997

3. IST in Sweden

"Statistics are the triumph of the quantitative method, and the quantitative method is the victory of sterility and death."
Source: Hilaire Belloc

* **Statistics Sweden on the Internet**

  Anyone looking for statistical information about Sweden, should type http://www.scb.se/index.htm for the home page of Statistics Sweden. A very large amount of the official statistics about Sweden is available, not least so recent data about the economic developments of the country. Information in English is available.
  Source: Statistics Sweden

* In 1995, Swedish companies invested 150 billion SEK in IT. 100 billion SEK went into software and 50 billion SEK were spent on hardware and equipment. About 70% of all IT projects fail. How to evaluate IT projects? Three development companies in SoftCenter in Ronneby are collaborating with the university of Karlskrona/Ronneby to develop models, methods, techniques, and tools for — IT evalutation. The project is called Janus.
  Source: IT Nyheterna # 8, 1996

* A description of the transformation of the Swedish telecom market was made in June 1995 by three researchers at the Stockholm School of Economics. Michael Kaplan, Bertil Thorngren and Mats Vilgon presented the essence of the transformation in a paper presented to COTIM 95, a conference on telecommunications and information markets, in Newport, Rhode Island, USA. It may serve as a complement to this chapter about Sweden.

* **Amendments to the Swedish Telecommunications Law of 1993:**
  - **Telecommunications Service to All on the Same Conditions, at Reasonable Pricing**
  - **Regulations Adapted to EU Liberalisation**
  - **All Operators Must Register**

On March 12, 1997, the Swedish Government handed its proposition for amendments to the Telecommunications Law of 1993 to the Swedish parliament, Regeringens proposition 1996/97:61 (The Government's proposition # 1996/97:61).Some of the contents of the proposition are:

— The basic telecommunications objectives are confirmed and reinforced by it being explicitly expressed in the law that telecommunications services shall be made available to all inhabitants on similar conditions and at reasonable pricing
— Current rules about operating licenses are reinforced by new rules about obligatory registration of all operators, even the very small ones

— Current rules about joint traffic are sharpened
— Dominant operators are enforced to provide open information on for instance costs and tariffs

The objectives of the proposed changes are to facilitate for the fulfillment of the telepolitical objectives, and to adapt the local Swedish law to the emerging EU regulation.

Source: Regeringens proposition 1996/97:61

* **Telia's Agreement with the State to Provide Telecom to All is not Prolonged — General Rules for All Operators**

Telia has had an agreement with the Swedish state to provide telecommunications services also to the very distant parts of Sweden on the same conditions and at the same tariffs as for the rest of the country. This includes availablilty of public telephones in little frequented areas, as well as access to the telecommunications network. The agreement will not be prolonged for the period after July 1, 1997, but be replaced by general rules, common to all operators.

Source: Regeringens proposition 1996/97:61

* **PTS, the Regulatory Authority, to Have Overall Responsibilty for the Swedish Telecommunications Market**

According to the March 12, 1997, government proposition to the parliament, the Swedish regulatory authority, Post och Telestyrelsen, PTS, will have an overall responsibility for the function of the Swedish telecommunications market from the user's perspective as well as from a competitive one. The PTS is to be given increased empowerment in order to supervise the adherence of the operators to the laws and regulations.

Source: Regeringens proposition 1996/97:61

3.1. Basic Facts

The DTI & Spectrum report *"Development of the Information Society"* (1996) is comparing facts on information and communication technology usage and perfomance collected from Australia, Canada, France, Germany, Japan, Singapore, UK, USA, and Sweden. The objective is to understand the factors underlying the development towards the information society. The summarising analysis on Sweden states:

"Despite its relatively low GDP in comparison with the other countries..., Sweden scores very well on a large number of benchmarks considered. It leads in terms of penetration of cellular and personal computers penetration of the European workforce and its baskets of international telephone charges and mobile tariffs are the lowest of the countries considered."

The report goes on mentioning a number of factors which have facilitated the progress of the information society in Sweden:

* the size and the geographical situation, which have made it possible to lay a fibre optic backbone;
* the Swedes being competent English speakers;
* the geographical distances of some communities have forced their inhabitants to depend on communication technologies and their early applications — Telemedicine is mentioned as one example;
* government support by, for instance, using electronic procurement for 90% of frequently purchased goods has encouraged businesses to develop EDI and e-mail systems.

Sweden's Way Towards the Information Society in 1996, as Seen by DTI & Spectrum

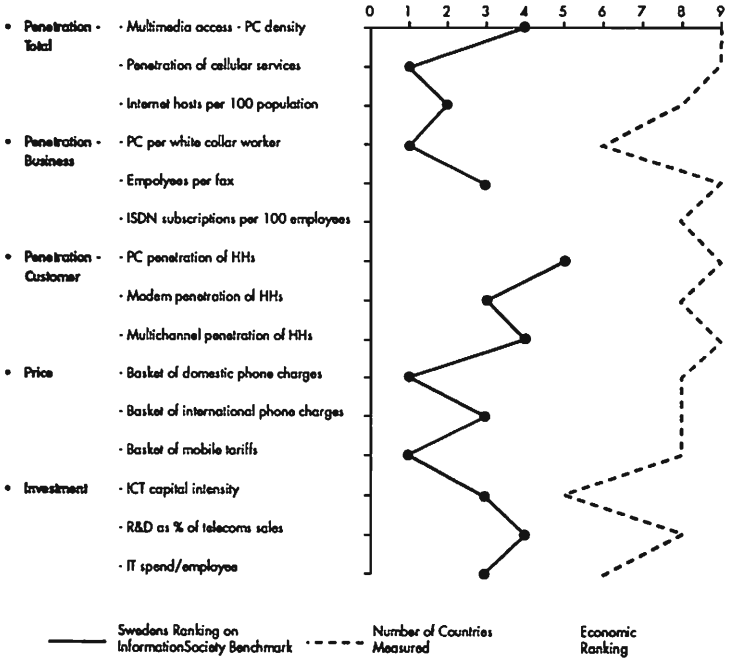


Fig. 49: The British researchers have developed a number of benchmarks, against which they have measured nine countries in order to decide to what extent the particular countries are making progress toward the Information Society. The diagram shows how Sweden positions itself against these benchmarks. Of course, the report contains compound comparisons for all the other countries as well.

Source: Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

Influences on Relative Performance of Sweden Towards the Information Society as Reported by DTI & Spectrum 1966

Factor	Impact	Commentary
Macroeconomic environment	○	• High levels of public debt • Emerging from recession
Geography and demographics	●	• Small population (simplifies electronic registers) • Remote communities
Education	●	• Active encouragement of use of computers in schools
Government/Private sector relationship	◑	• Supportive with considerable government investment • Government registers provide companies with access to useful data
Competitive regime	●	• Strong competition in telecommunications early but not pioneering
Culture of innovation	◑	• Fairly strong
Culture of communication	●	• Competent English speakers facilitates access to content • Remote communities

● Very positive ○ Neutral or negative

Fig. 50: The conclusion the DTI is making of these benchmarks is that Sweden has a sound foundation and a good performance in its development towards the information society. But the small size of its market cannot serve as a model for larger and more complex markets.
Source: Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

Investment in Information Technology per Employee for Countries in DTI Report

Estimation for 1996 in £

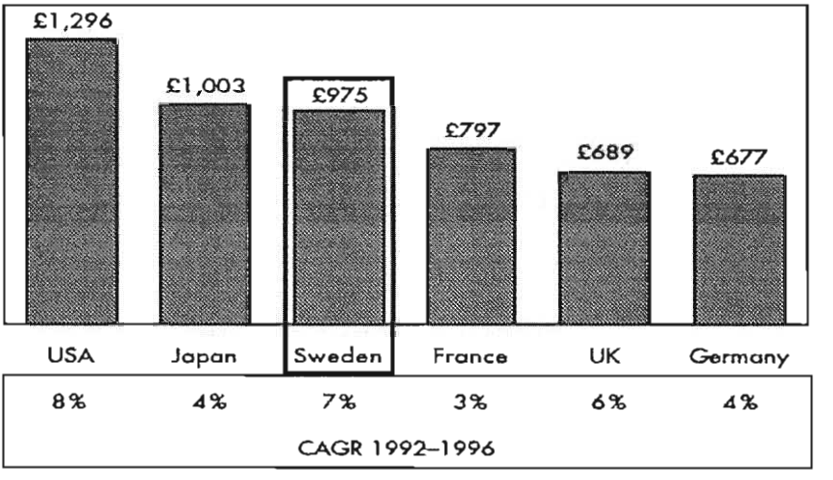


Fig. 51: The diagram shows the variation in investment in information technology per employee for the countries analysed by DTI and Spectrum.
Sources: EITO 1995/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

The Market Value of the Swedish Telecommunications and Information Technology Market 1991 — 1995 in million ECUs

	1991	1992	1993	1994	1995	CAGR 91-93 %	CAGR 93-95 %
Large computers	226	112	173	149	128	- 12.4	-14.1
Medium computers	169	120	146	132	122	- 7.1	- 8.8
Small computers	149	149	166	175	181	5.3	4.5
Workstations	90	80	82	86	92	- 4.9	6.4
PCs - portable	145	122	144	151	167	- 0.1	7.5
PCs - desktop	609	516	467	453	459	- 12.4	- 0.9
PC printers	148	141	139	140	139	- 3.0	0.1
Computer Hardware	**1 536**	**1 239**	**1 317**	**1 285**	**1 288**	**- 7.4**	**- 1.1**
Typewriters	21	19	17	15	14	- 10.0	- 8.0
Calculators	22	21	20	20	19	- 4.0	- 4.5
Copiers	110	112	113	117	120	1.4	2.9
Other Office Equipment	80	82	83	84	86	2.1	1.7
Office Equipment	**233**	**235**	**234**	**236**	**239**	**0.1**	**1.1**
LAN Hardware	76	97	114	123	128	22.8	5.9
Other Data Communications	56	64	69	70	68	11.5	- 1.2
Data Communications Hardware	**131**	**161**	**184**	**193**	**196**	**18.2**	**3.3**
IT Hardware	**1 901**	**1 635**	**1 735**	**1 714**	**1 723**	**- 4.5**	**- 0.3**
Systems Software	343	362	388	410	434	6.3	5.8
Application Software	331	356	386	419	452	8.4	7.8
Software Products	**675**	**718**	**777**	**829**	**886**	**7.3**	**6.8**
Professional Services	1 649	1 588	1 771	1 950	2 088	3.6	8.6
Processing Services	534	545	563	586	606	2.7	3.8
Network Services	55	59	72	77	86	13.7	9.7
Hardware Maintenance & Support Services	449	433	411	391	379	- 4.4	- 3.9
Services	**2 687**	**2 625**	**2 816**	**3 004**	**3 159**	**2.4**	**5.9**
Total IT Market	**5 263**	**4 977**	**5 328**	**5 546**	**5 768**	**0.6**	**4.1**
Service Providing Equipment	673	586	539	509	471	- 10.5	- 6.5
Customer Premises Equipment	770	753	730	708	763	- 2.6	2.2
Data Network Services	260	295	324	358	386	11.6	9.2
Voice Network Services	3 478	3 817	4 075	4 319	4 566	8.2	5.8
Installation & Maintenance	193	197	199	202	203	1.7	0.9
Total Telecom	**5 374**	**5 648**	**5 867**	**6 095**	**6 388**	**4.5**	**4.3**
Total Telecom and Computer Industries	**10 637**	**10 625**	**11 195**	**11 642**	**12 157**	**2.6**	**4.2**

Fig. 52: This table shows the size of the Swedish computer and telecommunications industries per product area and their developments from 1991 to 1995. Each figure is based on a value given in Swedish Crowns, SEK, and then converted to constant 1992 ECU. The exchange rate was 7.56 SEK to 1 ECU.

Sources: SITO/EITO: European Information Technology Observatory 94

Key Figures of the IST Market Value in Sweden 1994 — 1998, According to EITO 1997

All values are in million ECUs

Industry sector	1994	1995	1996	1997	1998
Computer hardware	1 497	1 837	1 996	2 067	2 161
Office equipment	208	208	204	202	201
Data communications hardware	208	244	277	300	308
IT hardware total	**1 913**	**2 290**	**2 478**	**2 569**	**2 669**
Software products	718	781	839	915	992
Services	2 327	2 475	2 621	2 769	2 941
Software and services (subtotal)	3 044	3 256	3 461	3 684	3 934
Total IT market	**4 957**	**5 545**	**5 938**	**6 253**	**6 603**
Public network equipment	432	422	422	432	447
Private network equipment	606	686	728	725	755
Telecom equipment total	**1 038**	**1 107**	**1 150**	**1 157**	**1 202**
Telecom services	3 622	4 033	4 346	4 667	5 013
Total telecom	**4 661**	**5 140**	**5 496**	**5 824**	**6 125**
Total IST	**9 618**	**10 685**	**11 435**	**12 077**	**12 818**

Fig. 53: This table, after data from EITO, shows the market values of the major ICT industry sectors in Sweden 1994 to 1998, 1997 and 1998 values being estimates.
Source: EITO

* **Telecommunications Largest IST Market Segment in Sweden in 1996**

In 1996, telecommunications equipment was sold for 103.3 billion SEK, in Sweden. It was followed by telecom services, turning over 45.5 billion SEK. Foreign hardware was sold for a value of 36.6 billion SEK, and IT services turned over 22.7 billion SEK. The global value of elecommunications equipment sold in 1996, was equivalent to 4 500 billion SEK. Also compare the following diagram to the diagram 9, p.26.
Sources: Executive Report/Dagens IT, June 3, 1997

The Swedish Computer Market Worth 50 Billion SEK in 1996

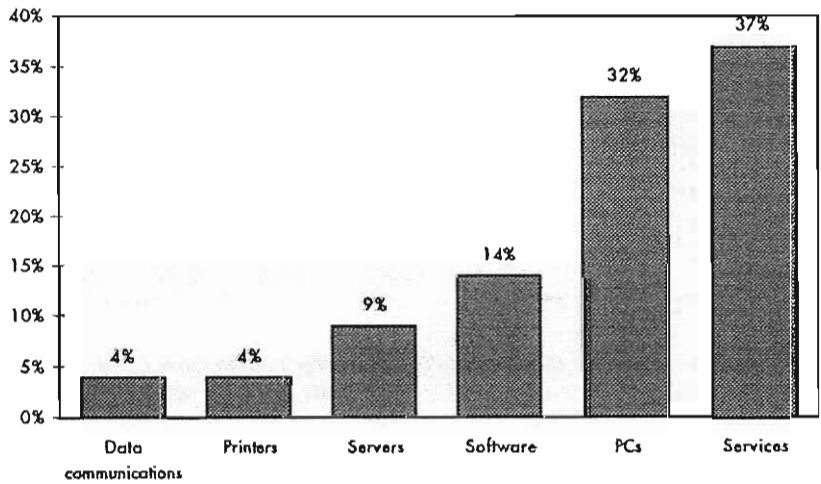


Fig. 54: The Swedish computer service market has grown into a giant industry in its own right, turning over 18.5 billion SEK in 1996, which is equivalent to 37% of the total computer market, worth 50 billion SEK in 1996. The second largest market segment is PC sales, equivalent to 32%. Software generated 7 billion SEK — or 14% of the total, servers 9%, printers, and data communication equipment 4% each.
Source: IDC/Computer Sweden, # 33, May 9, 1997 (diagram after Jörgen Johansson)

CTI Growth Forecasted for Sweden by 2002

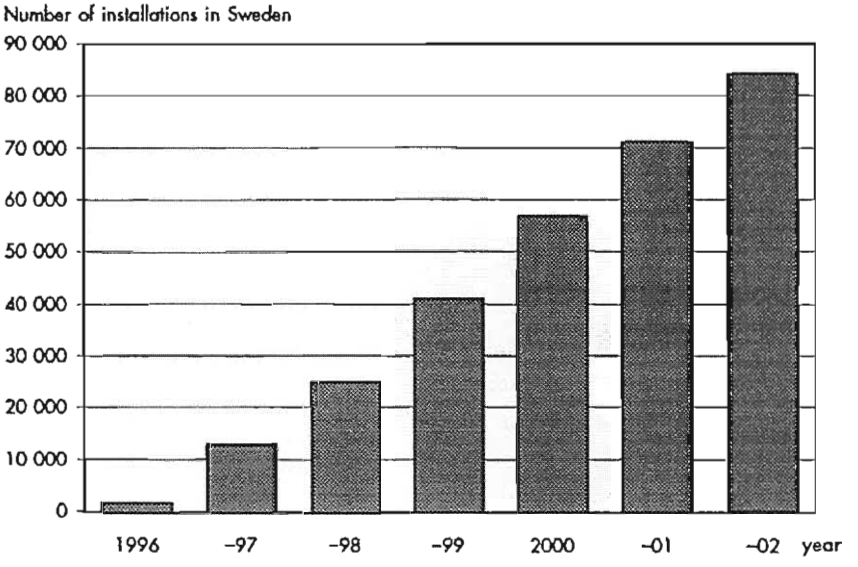


Fig. 55: CTI, Computer Telephony Integration, is forecasted to grow to 90 000 installations in Sweden at a total value of almost 600 million SEK by 2002, according to an analysis made by the British telecom research and analysts Ovum. The global number of installations was 530 000 for 1996, and is forecasted to some nine million by 2002. The global value of the CTI business will then be equivalent to 50 billion SEK.
Sources: Ovum/Computer Sweden # 35, May 16, 1997

* Total Swedish ICT Industry Turnover in 1995

For 1995, the ICT industry in Sweden, including telecommunications, reported a total turnover of 248 billion SEK (Swedish Crowns).
Source: Datavärlden, June 7 1996

* Electronic Production in Sweden in 1993

In the context of production and trade, it should be noted that telecom and IT falls under the terminology "electronics", which also includes areas like medical electronics and industrial electronics. This applies to all of the following diagrams.

Electronic Products in Sweden in 1993

Trading value in current prices in million SEK
Percentage per product group

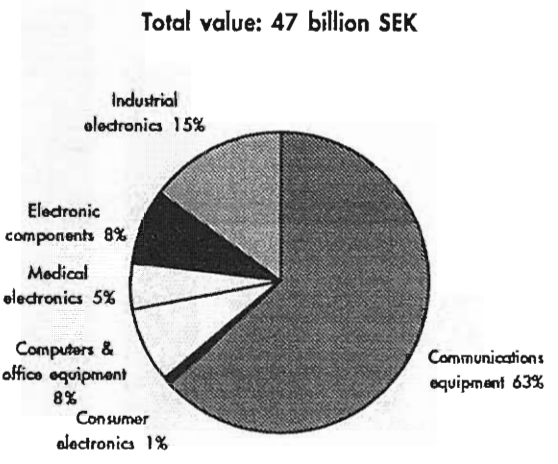


Fig 56: The total value of the production of electronic products in Sweden in 1993 was almost 47 billion SEK. The largest group of goods is the one called communications equipment, making up 63% of the total. In this group is included any equipment for radio communication and mobile telephony, representing 38% of the total, while telecommunications represent 25% of the total.

Source: SCBs industristatistik/SCB: Data om informationstekniken i Sverige 1996

Total Electronic Production in Sweden 1975 — 1993

In current prices (CP) and in fixed prices (FP)

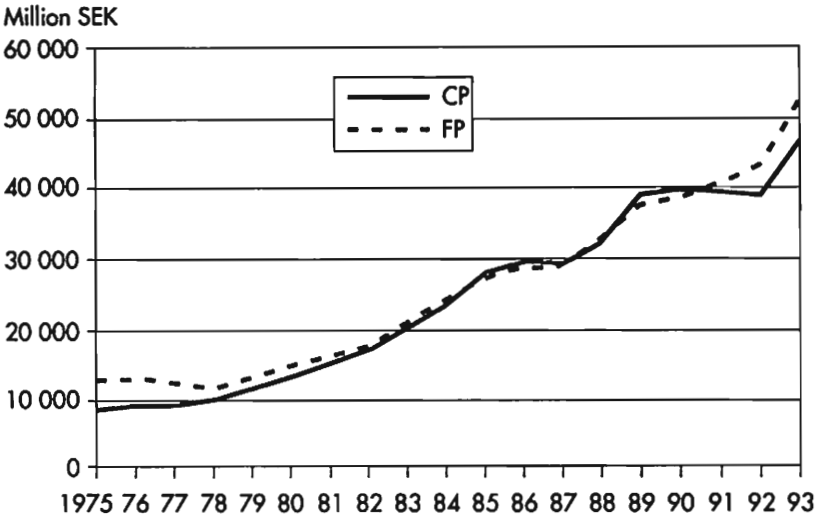


Fig 57: During 1988 to 1993, the electronic production in Sweden expanded by 43% in current prices and by 58% in fixed prices. This expansion should be compared to the general environment of slow economic progress in the country. Total industrial production decreased during this period by 5% in real figures, and GNP decreased by 1.5%. Since 1975, electronic production has grown four times in size, measured in fixed prices.
Source: SCBs industristatistik/SCB: Data om informationstekniken i Sverige 1996

Sweden's Export Partners in Electronics in 1994

Electronic products export in percentage of total by country

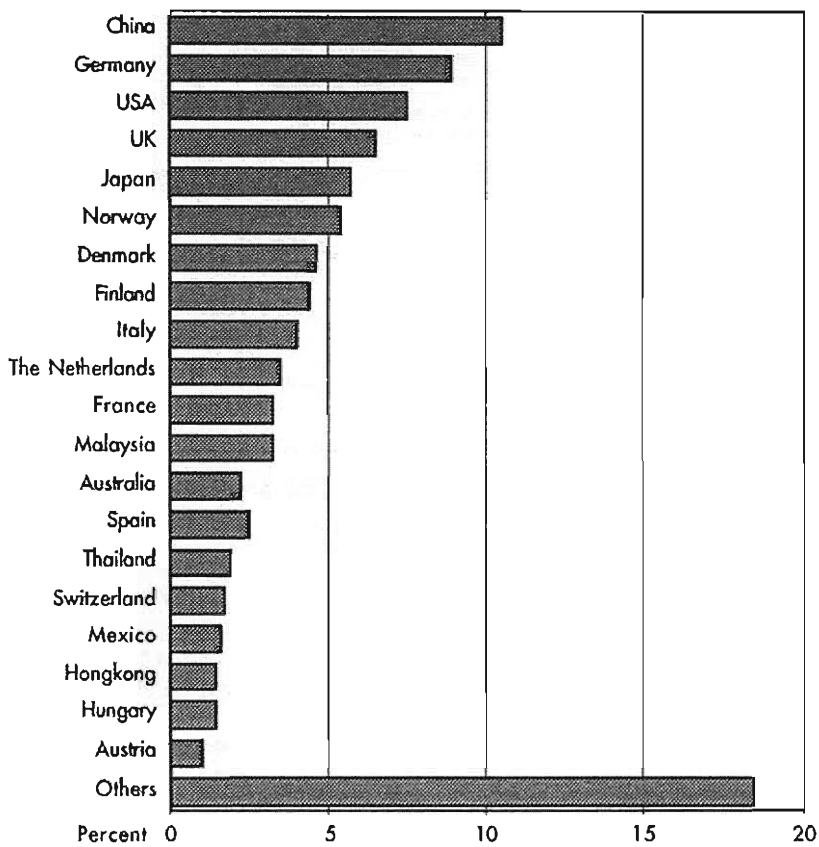


Fig 58: Germany, USA, UK, Japan, and Norway are traditionally Sweden's most important trading partners for products and services in general. This goes for export of electronic products as well. However, in 1994, China was the most important export partner. 10.4% of the total export value in communications equipment was bought by China.

Source: SCBs industristatistik/SCB: Data om informationstekniken i Sverige 1996

Sweden's Import Partners in Electronics in 1994

Electronic products import in percentage of total by country

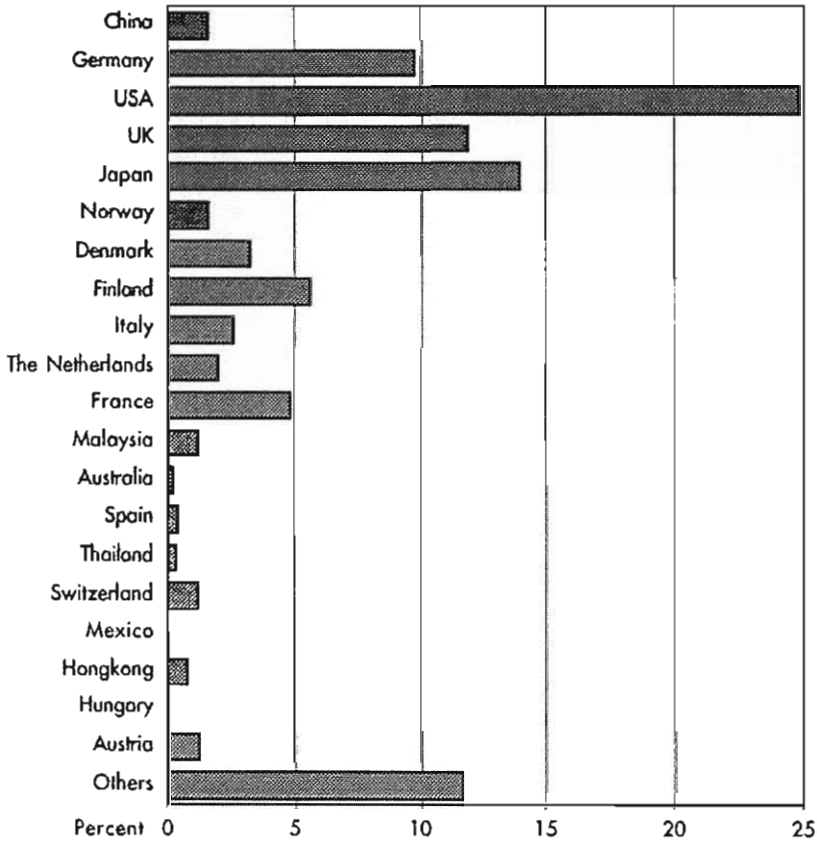


Fig 59: USA, Japan, UK, Germany, and Finland are Sweden's dominating import partners. Of late, Taiwan, South Korea, and Singapore have become important partners, but so far they are reported among "others" in the trade statistics. In rough terms, it can be stated that Sweden buys computers from the US, consumer electronics from Japan, and medical electronics from Germany.
Source: SCBs industristatistik/SCB: Data om informationstekniken i Sverige 1996

Trade Balance for Electronic Products per Country in 1994

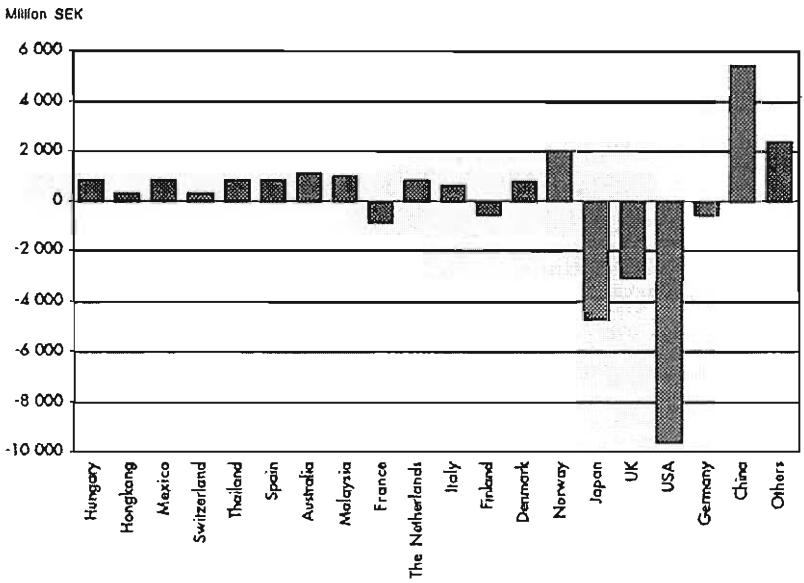


Fig 60: The Swedish trade balance for electronic products in 1994, in million SEK per country.
Source: SCBs industristatistik/SCB; Data om informationstekniken i Sverige 1996

Number of Swedes Employed in the Electronic Industry 1990 — 1993

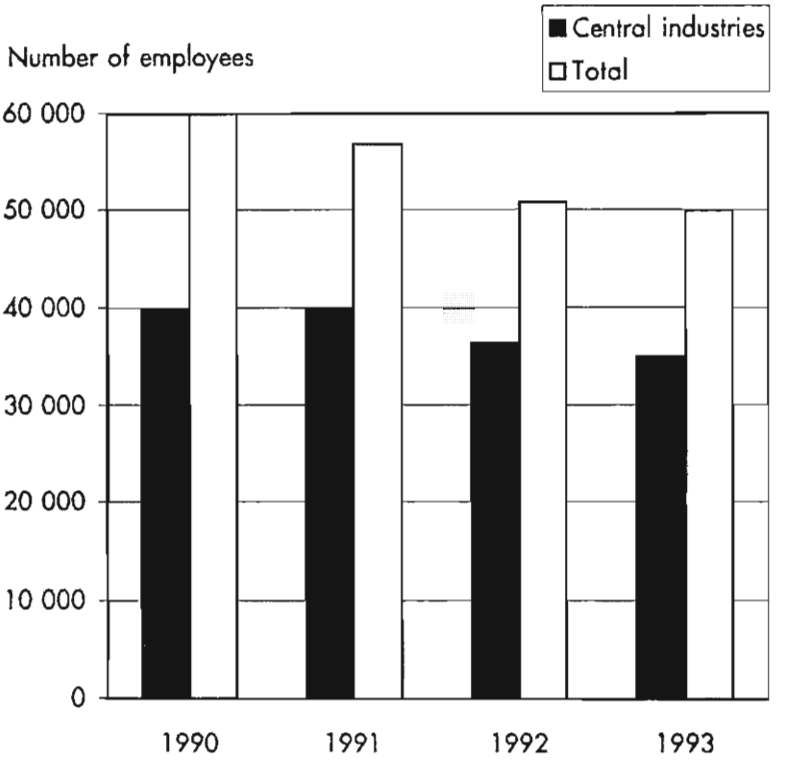


Fig 61: From 1993, the number of persons employed by the electronic industry has decreased. So has the number of employees in most industries. In relative terms, compared to the proportion of the total number of employed persons in Sweden, the electronic industries have increased their part.
Source: SCB: Data om informationstekniken i Sverige 1996

Number of Swedes Employed by the Process Industry, Using Computerised Tools in 1989, 1991, and 1993

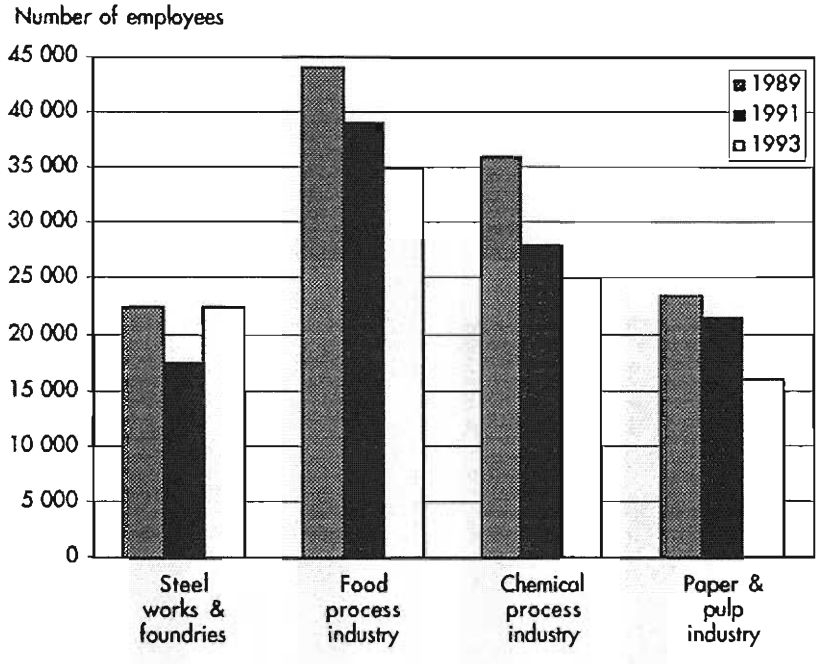


Fig 62: Two tendencies are made evident by this diagram. The first is that the level of computerisation and automation is increasing in these process industry areas. The second one is that the number of employees in all process industries in Sweden is decreasing and productivity gains are made by investment in ITC rather than in people.

Source: SCB: Data om informationstekniken i Sverige 1996

3.2. Sweden's Telecom Tariffs Among the Cheapest in the World

Telecom Tariffs Described as Deviations from the OECD Average Tariff

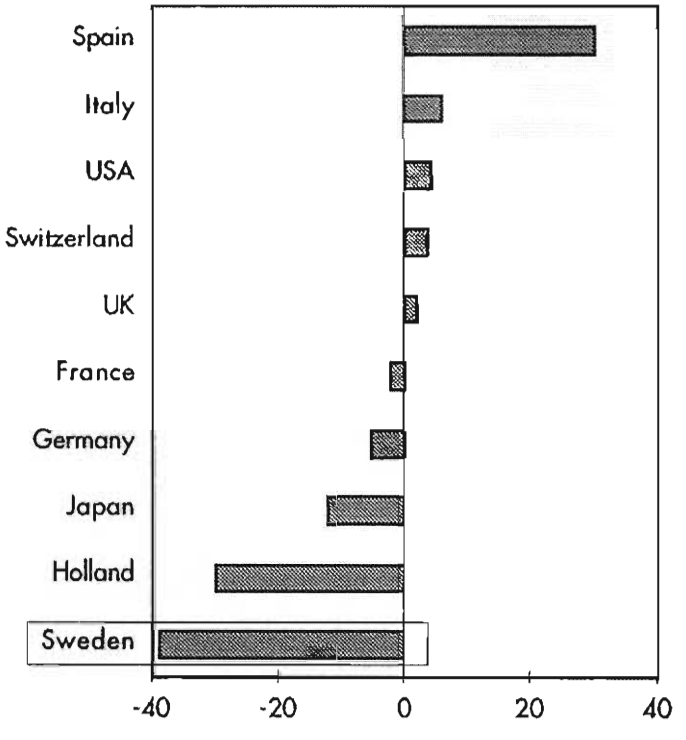


Fig. 63: Swedish telecom operators are offering their subscribers among the lowest tariffs in the world, according to the OECD. The diagram shows the deviation from the OECD average tariff for some major countries. Also see the OECD "Communications Outlook 1997", vol. 1.
Sources: OECD/Computer Sweden, 21 February 1997 (After Fredrik Persson)

Basket for National PSTN Tariffs for Residential Subscribers

Including VAT, February 1997

US$/PPP (Parity Purchasing Power)

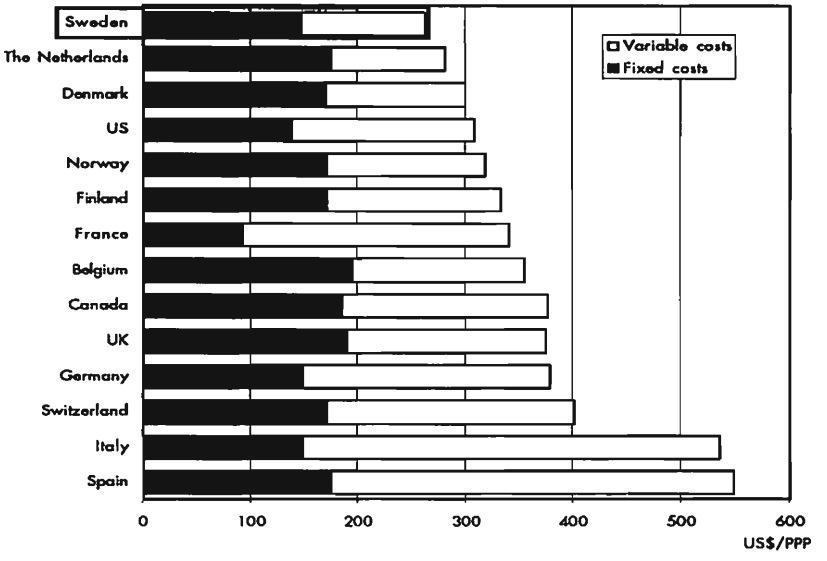


Fig. 64: According to these data from Eurodata and the OECD, Sweden, the Netherlands, Denmark, the United States, and Norway are offering their residential subscribers the lowest telecommunications tariffs in the industrialised world. It is interesting to note, that the southern European countries Italy and Spain have tariffs for their residential subscribers that are more than twice as high as those of the northern European countries.
Sources: Eurodata/OECD

Basket of National PSTN Tariffs for Business Subscribers

Excluding VAT, February 1997

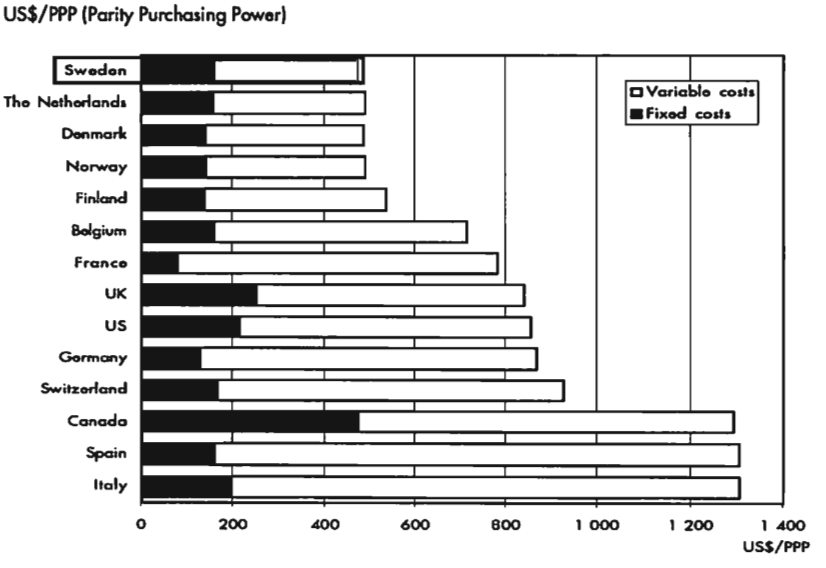


Fig. 65: Sweden, along with the Netherlands, Denmark, Norway, and Finland, are the countries offering business subscribers the lowest telecommunications tariffs in the western world. Spain and Italy are charging their business subscribers three times the tariffs of the northern countries, and the price level in the US is 84% higher than the one in Sweden.
Sources: Eurodata/OECD

Basket of International Tariffs for Business

Excluding VAT, February 1997
presented as % of OECD-average

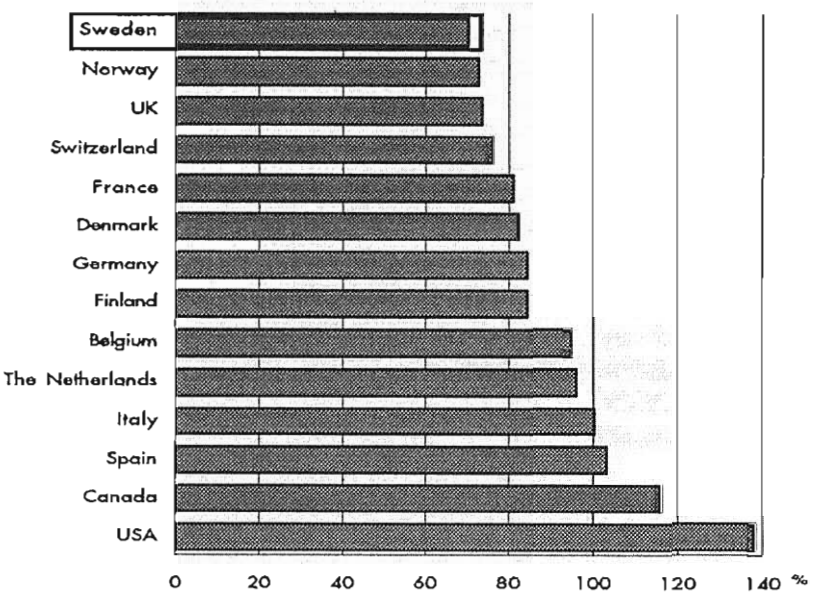


Fig. 66: Sweden, Norway, and BT of Great Britain offer their business subscribers tariffs that are approximately 25% below the OECD average, in this diagram = 100%.
Sources: Eurodata Foundation/OECD

Basket of International Tariffs for Residential Users

Including VAT, February 1997
Percent of OECD Average

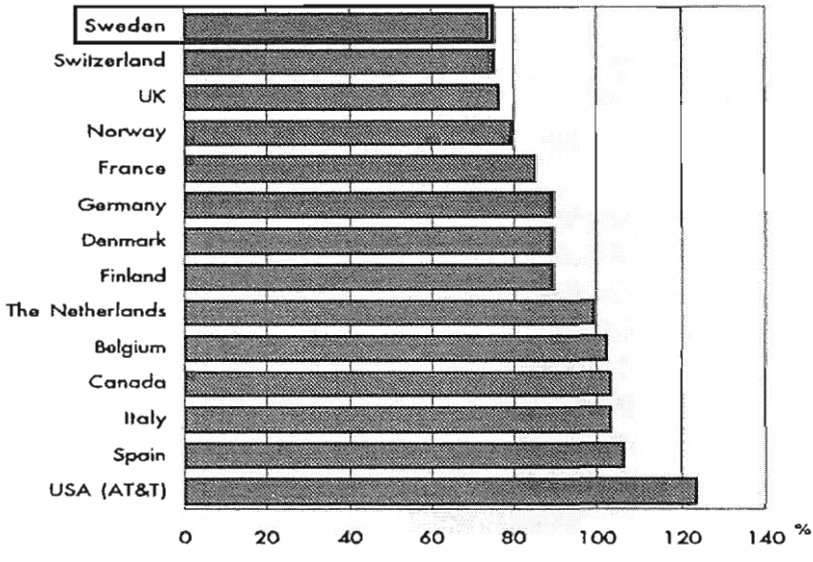


Fig. 67: This diagram shows the percentual relationship to the OECD average of international telecom tariffs for residential — or domestic —users. Three operators offer their users tariffs that are about 25% lower than the OECD average: BT in the UK, Swiss PTT in Switzerland, and Telia in Sweden.
Sources: Eurodata Foundation/OECD

Basket of National Mobile Tariffs

Excluding VAT, February 1997
In US$ PPP (= purchasing power parities)

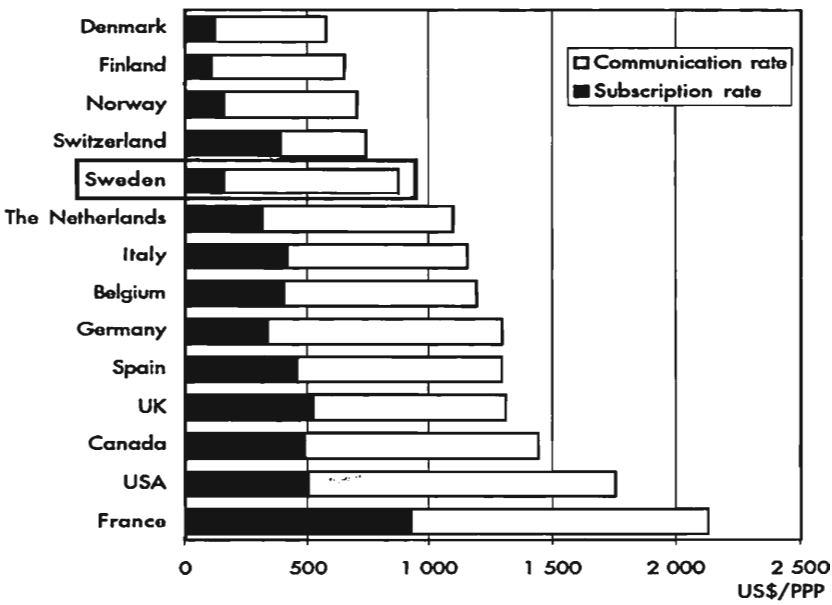


Fig. 68: Mobile tariffs, expressed in US$ PPP, are low in five countries, Denmark, Finland, Norway, Switzerland, and Sweden. Denmark, Finland, Norway, and Sweden offer their users low subscription rates, and higher communication rates, while Swizerland charges higher subscription rates and lower communication rates. In Canada, USA, and France, subscription rates as well as communication rates are high, France being the most expensive country of the ones compared.
Sources: Eurodata Foundation/OECD

Price Development of Telecommunications as Compared to Other Services and Goods in Sweden 1975 — 1995

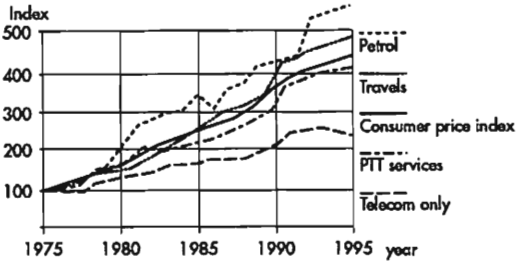


Figure 69: comparison of price development in Sweden for communication related goods — petrol — and services from 1975 to 1995, compared to the comsumer price index. Telecommunications have a unique position, showing a modest increase in relation to other compared goods and services. It should be noted that after 1991, the price development for telecommunications is even slower. This is a direct effect of the opening to competition of the telecom market in Sweden.

Source: Telia: Tele 3/1995, Peter Liedberg

Price Development for Long Distance Communications Sweden — Germany 1975 — 1995

A call of 5 minutes during peak hours, Monday — Sunday, 08:00 — 22:00 hours

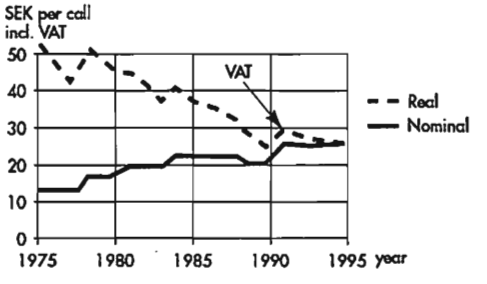


Figure 70: Price development for long distance calls between Sweden and Germany for the period 1975 to 1995, in nominal and real terms. The model call has a duration of 5 minutes and is placed during peak business hours, which in early 1995 were applicable Monday to Sunday, from 08:00 to 22:00 hours. It should be noted that VAT was added to telepcommunication services in Sweden in 1991.

Source: Telia: Tele 3/1995, Peter Liedberg

Price Development for Long Distance Communications Sweden — USA 1975 — 1995

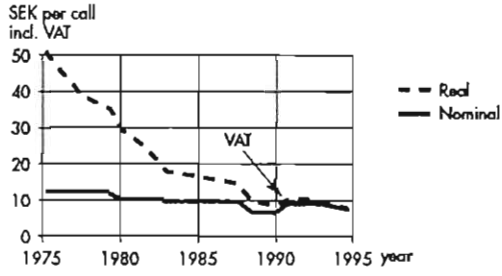


Figure 71: The price development of long distance telephone calls from Sweden to USA during the period 1975 — 1995 in nominal and real terms. A private subscriber calling the US in 1995 paid only 14% of what he paid in 1975, in real terms. In some cases, even the nominal prices were lower in 1995 than they were in 1975 for traffice between Sweden and the US and Canada. It shpuld be noted that VAT was added to telephone calls i Sweden in 1991.
Source: Telia: Tele 3/1995, Peter Liedberg

Basket of National Tariffs for 64 Kb/s Leased Lines

Excluding VAT, February 1997
In US $ PPP (= purchasing power parities)

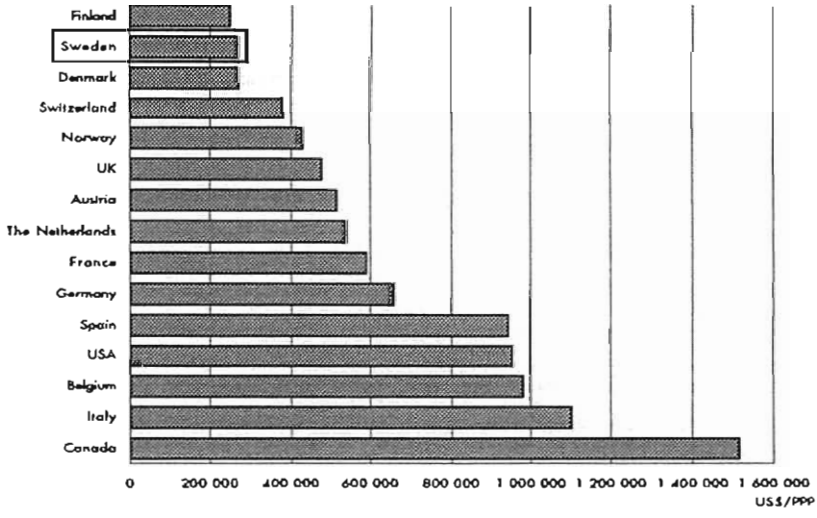


Fig. 72: National tariffs, expressed in US$ PPP, for 64 Kb/s leased lines are the lowest in Finland, Sweden, and Denmark, and the highest in Belgium, Italy, and Canada, among the nations compared in this diagram.
Sources: Eurodata foundation/OECD

Basket of National Tariffs for 2 Mb/s Leased Lines

Excluding VAT, February 1997
In US $ PPP (= purchasing power parities)

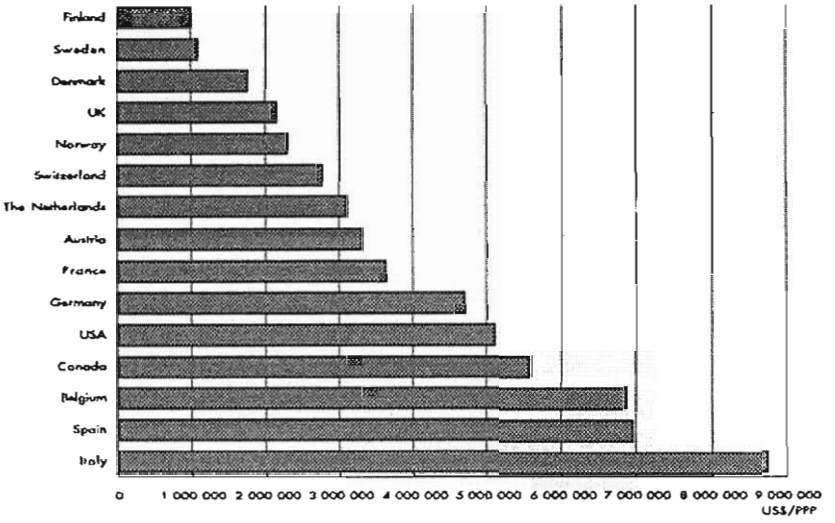


Fig. 73: National tariffs, expressed in US$ PPP, for 2 Mb/s leased lines. Finland and Sweden are the low cost countries, while Belgium, Spain, and Italy belong to the high cost countries among the nations compared in this diagram.
Sources: Eurodata Foundation/OECD

* **Competition Lowers International Tariffs**

Telecommunications operators in Sweden have contributed to lowering the tariffs for international calls by more than 50% during the last two years. The result is that Sweden is offering subscribers among the lowest long distance tariffs in the world. The major contenders in what is sometimes described as a price war are Telia and Tele2.
Source: Computer Sweden, 17 January 1997

Basket of National Tariffs for X25-lines

Excluding VAT, February 1997
In US $ PPP (=purchasing power parities)

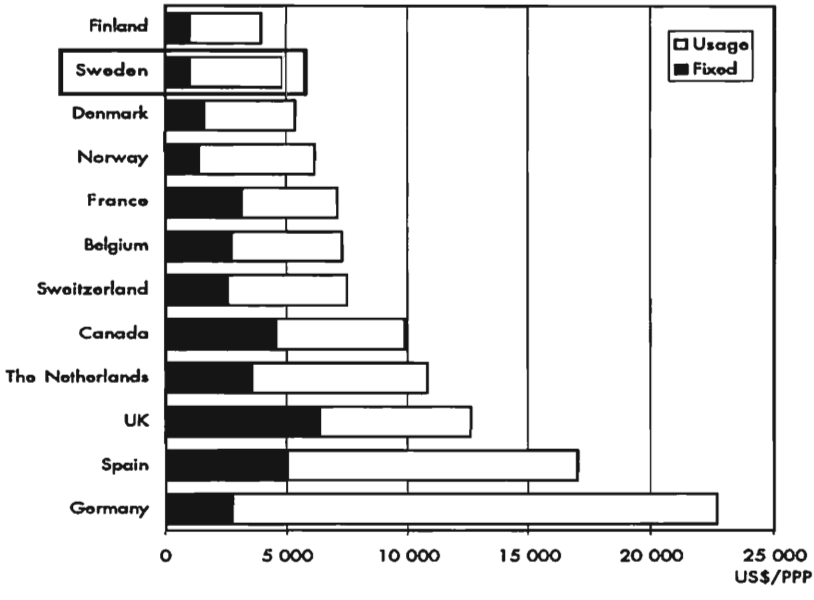


Fig. 74: National tariffs, expressed in US$ PPP, for X25-lines. Finland Sweden, Denmark, and Norway are the low cost countries, while UK, to a certain extent, Spain, and Germany, are the high cost countries among the ones compared in this diagram.
Sources: Eurodata Foundation/OECD

* **Sweden "Best in Class" According to OFTEL Benchmarking Study**

"Benchmarking is one of the mechanisms by which (the British) OFTEL tests the extent to which it has achieved its goals of ensuring the best deal for UK consumers", according to a comparison of UK telecoms with other leading countries, carried out by the British research firm Mason Communications, relased in the spring of 1997.
According to the executive summary, "the report presents the findings of a benchmarking study to deteremine a ranking for the UK, in world terms, with regard to the availability, scope, quality, and value for money of telecommunications services for business customers, and to investigate the underlying reasons."
The countries studied are the UK, USA, Sweden, France, and Australia for all services (see following table), Germany for ISDN and mobile communications, and Japan for Virtual Private Networks (VPNs) and high speed data transmission.

OFTEL PPP Price Ranking as a Result of Benchmarking Study

Service	UK	USA	Sweden	France	Australia	Germany
Business telephony	3	2	1	5*	4*	
ISDN	2*	3*	1	5	6	4*
Analog mobile	4	5	1	6	2	3
Digital mobile	3	5	1	4	2	6
Private circuits	3	2	1	5*	4*	
Calling cards	2	4	1	3	5	
Freephone services	3	1	2	5	4	

* Shows where rankings differed between small, medium, and large firms

Fig. 75: The OFTEL report by Mason makes the following conclusions:
a) Sweden is cheapest for almost all services;
b) USA has lower telephony and private circuit prices than Sweden when measured in currency (with actual discounts applied);
c) UK is generally third in the price ranking, but close to Sweden in the currency comparison (except private circuits);
d) Australia ranks second in price for mobile, but otherwise trails the UK by a significant margin;
e) France has the highest overall prices.
Another study carried out by Mason Communications in collaboration with Nucleus Consulting for OFTEL is called "Customers views of telecoms: case studies of UK and USA businesses".
Source: OFTEL: Benchmarking Studies for OFTEL: Comparison of UK Telecoms with Other Leading Countries, by Mason Communications in collaboration with Nucleus Consulting, spring, 1997

3.3. Telecommunication Operators in Sweden

Sweden got its first telecommunications regulation in July 1993. By October 1996, the following operators were established in the country:

Permissions Granted to Operators in Sweden in October 1996

(in alphabetic order)

Fixed networks
AB STOKAB
Banverket
Dotcom Data & Tele Communication AB
France Telecom Network Services Nordic AB (FTNS Nordic AB)
MFS Communications AB
Tele2 AB
Telecom Finland AB
Telenordia AB
Telia AB
Telephony Services
Cyberlink Sweden AB
Dotcom Data & Tele Communication AB
First Telecom Europe AB
France Telecom Network Services Nordic AB (FTNS Nordic AB)
FT Nordphone AB
MFS Communications AB
NETnet International S.A.
Nordiska Tele8 AB
Singapore Telecom International Svenska AB
Telenordia AB
Tele 1 Europe AB
Tele2 AB
Telecom Finland AB
Telia AB
TELiT-Galesi TeleCom International AB
Mobile Services
Cable and Wireless FlightNet Limited (TFTS)
Comviq GSM AB
Europolitan AB
Europolitan PCN AB (DCS 1800)
Netcom Systems AB (DCS 1800)
Tele8 Kontakt AB (DCS 1800)
Tele Danmark International (ERMES)
Telia AB
Telia AB (DCS 1800)
Telia AB (ERMES)
Telia AB (TFTS)

Fig. 76: The list above gives the names of operators and their operating licenses per service area (in alphabetic order): fixed lines, telephony services, and mobile services, as granted by the National Post & Telecom Agency by October 1996. See chapter 10 for further details.
Sources: The National Post & Telecom Agency/Telia AB

3.4. The Networks in Sweden

The Telia Network is the oldest network for telecommunications in Sweden and still the most extensive one. From a technical point of view, it is one of the most modern networks in the world in the sense that new technologies like Synchronous Digital Hierarchy, SDH, and Asynchronous Transfer Mode, ATM, are built into the structure of the network, making it suitable for all kinds of now foreseeable applications. The Telia Network is open to all standardised interfaces and to all operators.

* **Facts about the Telia Network**
  (Data from 1997, source: Telia AB)
* So far, some 86 billion SEK has been invested in building a modern network;
* The total length of the Telia Network would take us 15 times around the Equator;
* 1997 is a key year for the Telia network. By then, the number of stations will be reduced from an original 4 300 to 250;
* By the end of 1996, 96.1 % of all Telia customers were connected to a modern AXE-station, making available PLUS services such as call forwarding, completion of call to busy subscriber, call waiting, three party call, call waiting tone, etc. By 1997, all subscribers to the Telia Network will have AXE connections and PLUS services;
* In 1996, there were more than 6 million fixed line subscriptions, and 1.8 million subscribers to mobile connections in the Telia networks;
* Each day, on an average 20 million telephone calls are carried out in Sweden, each Swede spending about 42 minutes a day on the phone;
* Swedes make 250 000 international calls each day of the year;
* In 1994, 65% of the Telia network was digital; in 1997, 99% of the network is digital;
* In 1996, Telia cut tariff income by 1 billion SEK by lowering prices to their subscribers. In spite of this, the comany made a handsome profit;
* Telia is the first telecommunications operator in the world to transmit highresolution television pictures over the television network. A technology called VDSL - Very High Speed Digital Subscriber Line - makes it possible to transmit 52 million bits/sek via ordinary copper wire. Eight different digital channels can be accessed simultaneously, television programs, video conferencing, Internet, or video-on-demand. The next step is to develop a high speed, low cost modem for the home.
  Sources: Svenska Dagbladet 5 April, 1997/Ny teknik, 10 April 1997

Telia's National Optical Fiber Network

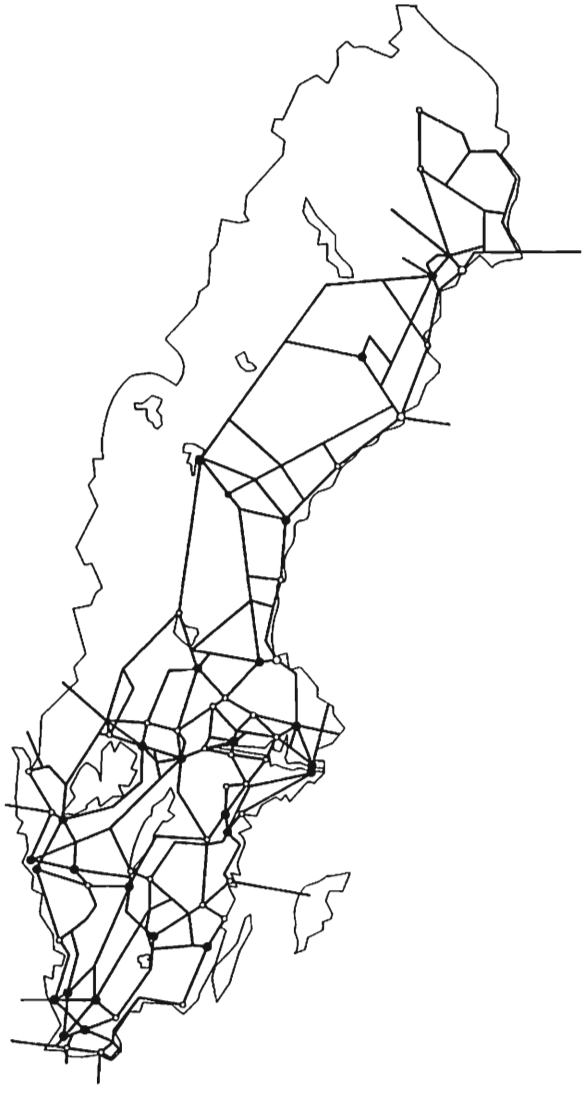


Fig. 77: Telia's national optical fiber network. In addition, there are regional fiber networks.
1994 = 29 000 km of optical cable
1997 = 45 000 km of optical cable

International Traffic on the Telia Network

Destination	Traffic volume %	Earth stations #	Satellites #
The Nordic countries	41	100	0
Rest of Europe	43	90	10
North America	8	86	14
Rest of the world	8	10	90

Fig. 78: It is evident from this table that the great majority of all telephone calls Swedes make abroad are to their Nordic neighbours and to their European counterparts. As the slogan says: "Business is local" — 16% of the total traffic volume go outside Europe, 8% to North America, and 8% to the rest of the world.
Source: Telia AB

ISDN — Telia Compared to Other Major Operators December 1995

Country	Operator	Basic Access Subscribers
Denmark	Tele Denmark	4 700
Finland	Telecom Finland	550
	Finnet Group	5 200
France	France Télécom	250 000
Germany	Deutsche Telekom	850 000
Italy	Telecom Italia	6 000
Japan	NTT	520 000
	KDD	1 400
UK	BT	120 000
Sweden	Telia	30 000

Fig. 79: Basic access ISDN services have been very successful in Germany. In Sweden, users have been less interested so far. This should be compared to fig s. p. 93.
Sources: OECD/Computer Sweden 21 February 1997 (After Fredrik Olsson)

* Tariff Agreement Between Telia and Tele2

The Swedish operators Telia and Tele2 have signed a new agreement, regulating the technical and financial conditions for the utilisation of the networks in Sweden. The basic principle for the agreement on common traffic is that "sender keeps all". Both operators have about the same level. of tranmission.
Source: Nätvärlden # 1 1997

* **Telia Goes Public in 1999?**

Swedish media are discussing a probable timing for the sell out of the Telia shares by the Swedish government. According to the business daily *"Dagens Industri"*, a sell out will be possible at the very earliest by 1999. According to *"Dagens IT"* of 29 April, 1997, there were some signs that Spanish Telefónica leaving Unisource, of which Telia is one of the owners together with Swiss Telecom and Dutch KPN, would make the government more positive to selling out the Telia shares.
Source: Dagens IT, April 29, 1997

* **Telia to Test New Technologies for Mobile Network Expansion**

Users of mobile telephones now and again become aware of the limitations of the mobile networks technology when trying to use their phones from popular and thus congested areas like shopping centers, train stations, and airports. Network operators are trying various ways of coping with the congestion problem. One way is to offer dual-band handsets, capable of coping with 900 MHz as well as with 1800 MHz. Another is to offer mobile users DECT (Digital Enhanced Cordless Telecommunications). Telia has chosen to run with the two — it is offering a commercial service in some city centers by using the Ericsson dual-mode handsets.

According to *"Mobile Europe"*, January 1997, the dual-mode handsets offer big benefits — the subscriber can use the same handset to make calls at fixed line prices when at home, because the dual-mode phone will also log on to a domestic DECT cordless terminal. According to the same source, Telia believes in there being room in the market for a DCS1800 network as well as for a DECT one — this operator is already well on its way installing them.
Source: Mobile Europe, January 1997

3.5. Swedish Operators in the International Markets

* Telia AB is strengthening its international position and looking for new markets, focusing on the Nordic countries, the Baltic area, and Europe. The operator has formed an alliance, Unisource, offering international services, in collaboration with Dutch PTT Telecom Netherlands, KPN, Swiss PTT Telecom, and Spanish Telefónica. In april 1997, Telefónica announced that it is leaving Unisource.
* Unisource has formed a strategic alliance with American AT&T, which makes the operator the third largest supplier of international communications in the world.

* By the end of 1996, Swedish Telia and Dutch KPN bought about a third of the shares in Irish Telecom Eireann from the Irish state. The Irish wanted partners to help them face EU deregulation.
  Source: Telia

* Telia and Norwegian Statnett have agreed to contruct a new, nationwide telecommunications network in Norway, in order to compete with Telenor. Some 800 million SEK will be invested in the network for a start.
  Source: TT-NTB, May 1997

3.6. Mobile Communications

"What purpose does a mobile telephone serve? Basically, that you can say that everything is O.K. and that you will arrive soon. Motorola has spent 50 million dollars in order to make it possible for everyone to communicate this to everyone else. Now, this is real progress."
Jean-Luc Godard

Mobile Telephone Users in Sweden by the End of 1996
Subscribers in Thousands

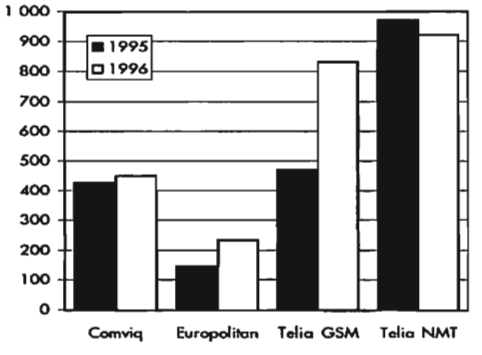


Fig. 80: There are in total some 2.5 mobile telephone subscribers in Sweden. During 1996, 1.1 million mobile phones were sold in the country, compared to 0.8 million in 1995. The number of NMT subscribers decreased from 975 000 to 921 000. Less than five percent of the mobile phones sold in December 1996 were to be used in the old NMT system, the rest, 95%, were digital telephones. 924 000 GSM telephones were sold in 1996. The number of new subscribers amounted to estimated 550 000. Only Telia is willing to reveal real figures — they had 361 000 new GSM subscribers during 1996, making Telia's GSM takers total 824 000. The figures for the other two GSM operators, Comviq and Europolitan are extrapolations made by Svenska Dagbladet, based on the number of subscribers in September 1996. Also see the following diagrams.
Sources: Mobiltelefonleverantörerna/Svenska Dagbladet 17 January, 1997

Total Sales of Mobile Telephones in Sweden 1982 — 1997
In thousands of telephones

Year	NMT	GSM	Total
1982	13		13
1987	49		49
1992	122	3	125
1994	293	367	660
1996	140	925	1 065
1997 *	75	1 100	1 175

* = estimate

Fig. 81: In five years' time, some 5 million of Sweden's 8.4 million inhabitants will be subscribers to mobile telephones, should the present trend of 500 000 to 600 000 new users per year keep up. By now, GSM telephones totally dominate the market over the original NMT systems.
Sources: Mobiltelefonleverantörerna/Telecom idag, #2 1997

Number of Sold Mobile Telephones in Sweden in 1995 and 1996

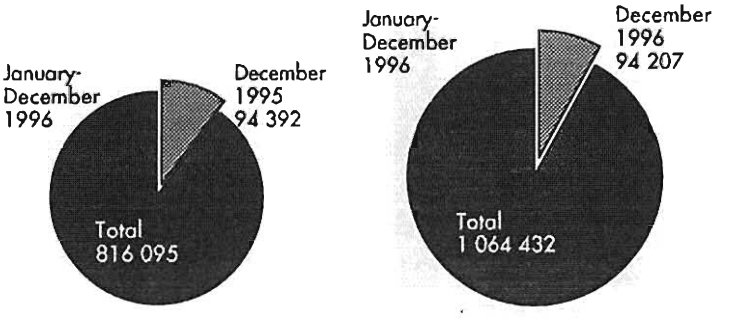


Fig. 82: In total, approximately 3.5 million mobile telephones were sold in swedenduring past ten years. The diagram shows the sales in number of telephones in 1995 and 1996, with the peak month, December, separated from the rest of the year.
Sources: Mobiltelefonleverantörerna/Svenska Dagbladet 17 January, 1997

Penetration of Cellular Services by Year End 1994 and 1995

Penetration of the total population, in countries studied by DTI

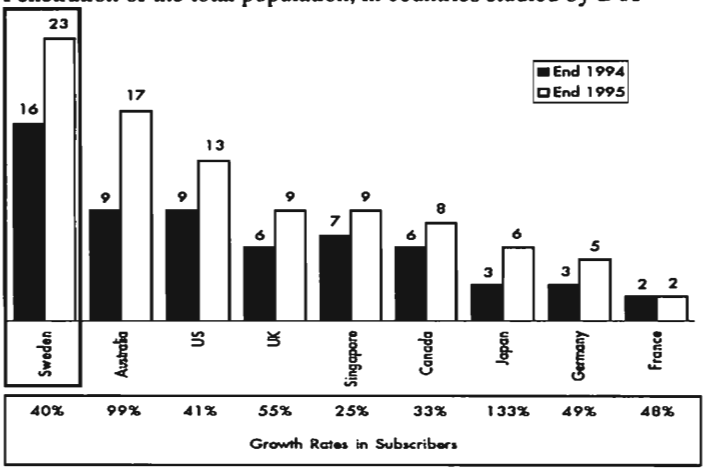


Fig. 83: Cellular services show rather impressive growth rates in the countries studied by the DTI. According to this diagram, Japan has the highest growth rate of 133%, while Singapore is expected to grow by 25% "only". Sweden, which already has a mobile phone penetration of almost 30% of the population, can look forward to a growth rate of 40%.
Sources: Global Mobile/Spectrum analysis/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

* Every Fourth Swede Has a Mobile Phone

In total, about 2.5 million mobile telephones are used in Sweden, which means that about every fourth Swede has one, according to Mobiltelefon-leverantörerna, MTL.
In 1996, 1 064 000 mobile telephones were sold in Sweden. This should be compared to 816 000 mobile phones sold during 1995. Of the ones sold in 1996, 924 000 were GSM compatible, while 140 000 were NMT compatible.
In January 1997, 388 891 mobile telephones were sold in the country, 36 678 GSM phones, and 2 213 NMT phones. This should be compared to 51 715 mobile telephones sold in January 1996.
For 1997, another million of mobile telephones are estimated to be sold in Sweden.
Sources: Mobiltelefonleverantörerna/Ny Teknik - Teknisk Tidskrift 1996:6Dagens Nyheter 19 februari 1997

* **Mobile Subscriptions in Sweden**

In 1995, 18.8% of all telephone subscriptions in Sweden were mobile, compared to 5.6% for Europe.
Source: SCB: Data om informationstekniken i Sverige 1996

* **DSC Operators in Sweden**

Swedish telecom operators Telia, Comviq, Europolitan and Tele8 have been granted permission by the Post and Telecom Commission to operate nationalwide mobile telephony systems based on the new DCS 1800 system. DCS stands for Digital Cellular System and offers digital telephony over a different band of frequencies than for instance the earlier NMT and GSM systems.
Source: Ny Teknik - Teknisk Tidskrift 1996:6

3.7. IT Equipment

PCs Sold in Sweden 1996

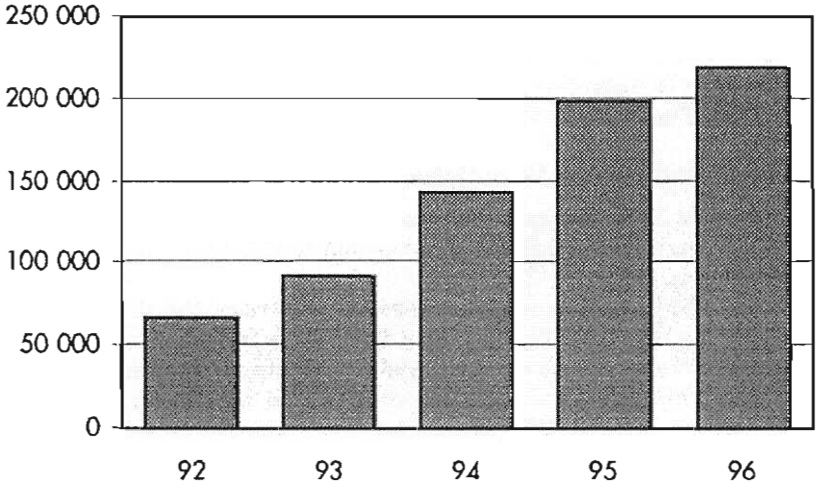


Fig. 84: In 1996, 219 200 PCs were sold in Sweden, which is an increase by 7% over 1995. In the same period of time, the number of complaints regarding malfuctioning PCs increased by 155%!
Sources: IT Research/Ny teknik, 6 March 1997

Penetration of Personal Computers per 100 Inhabitants in 1994

In Countries Studied by DTI

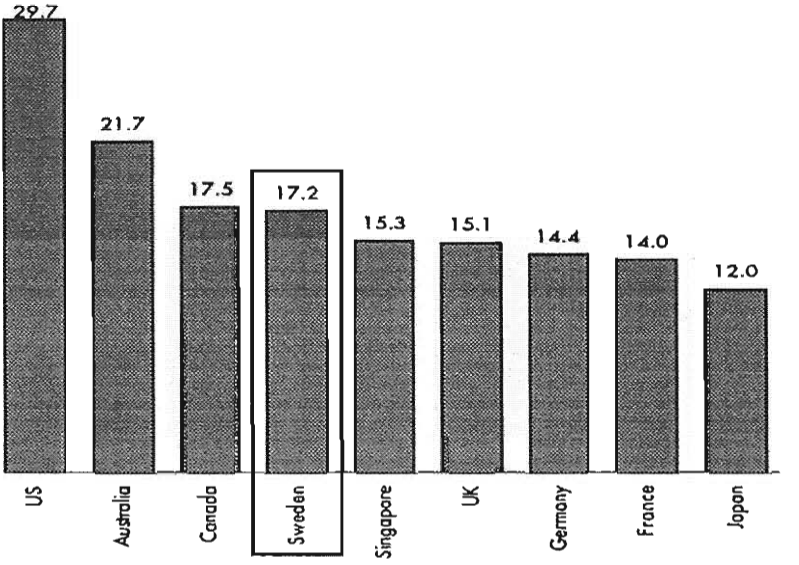


Fig. 85: Personal computer utilisation is seen as one of the major development paths to the Information Society by the DTI researchers. The diagram shows the 1994 penetration per 100 inhabitants of personal computers in the countries studied by DTI.
Sources: ITU World Telecommunications Indicator Database/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

Penetration of Personal Computers Among White Collar Workers 1994

In Countries Studied by DTI

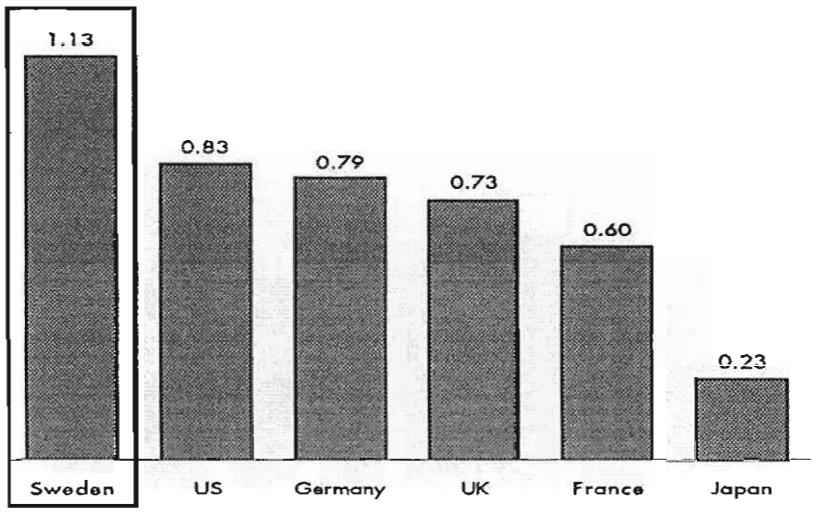


Fig. 86: Swedish white collar workers are among the most frequent users of personal computers in the world in their professional roles. This diagram is closely related to the one above, and shows the professional usage of PCs in some of the countries studied by DTI. See also chapter 4 for further comments on the utilisation of PCs by Swedes, etc. in the professional world.
Sources: EITO/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

Fax Machine Penetration in Work Environments in 1994

In countries studied by DTI; Number of employees per fax
(Total fax machines divided by working population)

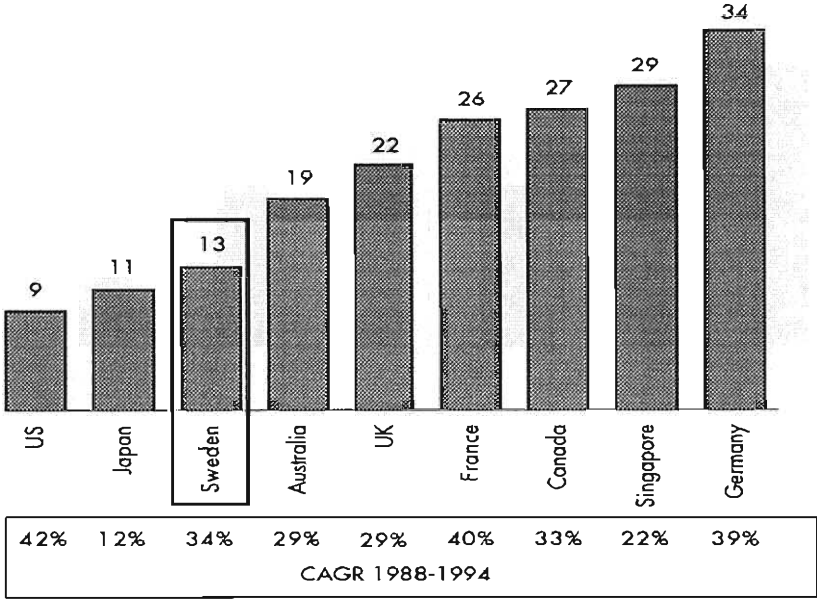


Fig. 87: Data transmission is an important indicator when it comes to decide the extent to which a country is becoming an information society. But data transmission is difficult to measure, because there are so many means of doing it. One method the DTI reseachers have chosen, is to measure the penetration of fax machines in professional environments. This is a rather uncertain measurement, however, since almost any PC with a modem most likely has a fax program as well, a program used to send and receive fax messages from a PC to another terminal, a fax machine, a PC, a personal digital assistant, and even a mobile telephone. According to the diagram above, US, Japan, and Sweden are the heavy fax users among the countries studied.
Sources: ITU World Telecommunications Development Report, 1995/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

Software Spending per Capita 1994 & 1996 (est.)

Countries Studied by DTI, in UK Sterling

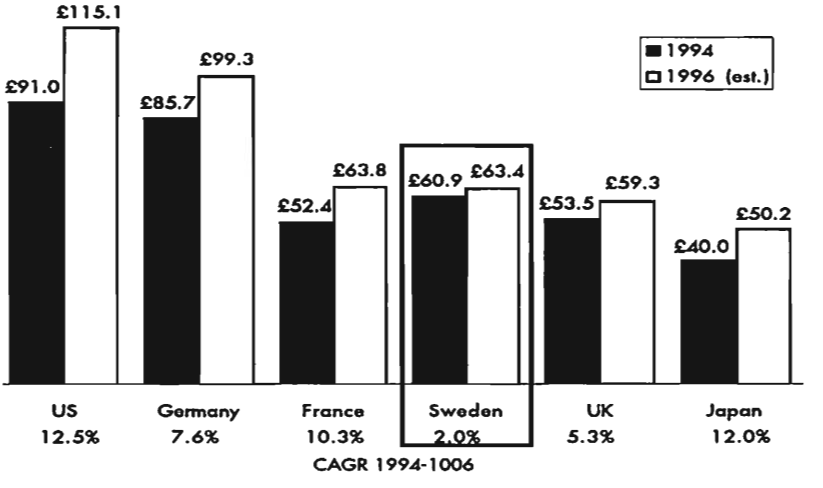


Fig. 88: According to the DTI study, the Swedes are less generous spenders when it comes to computer and communications software. One reason for this may be, that relatively little of the software available to the general public is translated into Swedish. Swedish software production for the home market is still an emerging industry.

Sources: EITO1995/Spectrum analysis/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

3.8. Special Solutions for Less Populated Areas

Sweden being a large country with several less densely populated areas, and also subject to political decisions that all telecom services should be available at the same costs for every citizen, has resulted in a number of special technical solutions for these areas. The solutions are often based on a combination of several technologies, optical fibers being the common backbone, combined with radio links. Thus, point-to-point (P-P) or point-to-multi-point (P-MP) radio communications make high speed communications available to the end users. Depending on the local environment, the telecommunications solutions offered to Swedes living in the outback, are varying but always very reliable, with extra security built in.

* **The Community of Pajala — The Highest Computer Density in the Least Densely Populated Area**

8 000 persons live in 80 villages within the borders of the community of Pajala, north of the Polar Circle, close to the border between Finland and Sweden. This vast but not so densely populated area of Sweden has the highest computer density in the country. So, for instance, are there four students to one computer in the local schools, compared to anything from 5 to 19 students per computer in the schools in the rest of Sweden — also compare table 1.11.
In Pajala, computer training starts early, before primary school. This in order to prepare for life as a college student, which means spending a lot of interactive education hours. Since a few years back, the local authorities have invested in computer and IT training and education in order to create new jobs to replace those disappearing in the traditional industries, mainly forestry.
It looks as if they are succeeding. So far, local electronic industries are employing 160 persons, which is more than the forest industry ever employed. Now, ambitions are growing among the bilingual — Finnish and Swedish — inhabitants and their representatives. Thus, the authorities are creating their own, local university, concentrating on computer and electronics related subjects, and a "House of Knowledge", where a number of databases containing qualified knowledge about Russia, and development of design and computer production will be available to the inhabitants.
The distance to the big urban areas is not seen as a problem — the inhabitants of Pajala know how to build high quality, high precision electronic instruments in niche areas, and that is what their customers care about.
Source: Dagens Nyheter, Oct. 24, 1996

3.9. Do You Know This About IST in Sweden?

* **"Toppledarforum" — IT Coordination of Public Services**

"Toppledarforum" (the Top Leader Forum) is made up of ten directors-general from different state organisations, and the directors of the Federation of county Councils and the Association of Local Authorities, under the leadership of the Minister of Finance. The Forum is the venture of the public administration to develop new ways of collaboration, based on IST. The goal is to create an open electronic infrastructure for information provision for the Swedish public sector. A number of seminars, work shops, and project groups on various aspects of IT and the public sector have been and are carried out, involving a good number of specialists in public service all over the country. Among the projects, initiated and carried out are:

* PROSIT, concentrating on solving problems related to different definitions implemented by different organisations, shifting standards, pricing policies etc. PROSIT is there to create one standard for all services involved;
* PILOTGIS, based on GIS, is developing the correct maps needed for future planning of the society, and the tools for reading and interpreting these maps correctly. It contains a number of sub-projects;
* Y2K, problems related to computers' inability to handle the millenium shift, and its implications to the public sector, are the subject of one group of problems solvers;
* "WWW for public information" has as its objective to create a national public information service of high quality, available on the Internet;
* The EDI project has generated frame agreements for electronic trade and commerce in the public sector. EDI took off during 1996. The project group is now working in three subgroups, covering the dissemination of EDI; the technical requirements related to the frame agreements; and the legal aspects of electronic trade and eventual adjustments of existing laws.

Sources: Nyhetsblad från Toppledarforum/ Statskortoret: Staten i omvandling 1996:15

* **Swedish Public Administration Is A Leader in Investment in Information Society Technology**

The Swedish public administration is made up of advanced users of information society technology. More then 80% of all employees in the public administration are computer users. 75% of all public authorities are using E-mail. So far, no fully covering statistics about state IST usage is available, but it is obvious from various sources that the public administration is well on its way towards electronic handling. Most of the work is carried out assisted by electronic instruments like computers, fax machines, telecommunications services, databases, and networks like the Internet and World Wide Web. All is used to provide better service to the general public. "Electronic government" is part of Swedish daily life.

Source: Statskontoret: Staten i omvandling (English summary available), 1996:15

* Young IST Advisers to the Swedish Government

In 1995, the Swedish Government created the Information Technology Advisory Board of the Youth, Ungdomens IT-råd, consisting of five members between 14 and 28 years. Their task is to find out and to communicate to the government what young people think about information society technology, and to stimulate all youngsters to learn about and use the new and emerging technologies. By now, the young advisers are looking for more vision in the Swedish IST public debate.

Source: Computer Sweden, # 27, April 18 1997

* Bangemann Award to STELHA

STELHA, Stockholms ELektroniska HAndel, (Stockholm's Electronic Trade) started in March 1966. In January 1997, the project leader received the Bangemann Award for electronic trade. The City of Stockholm annually handles one million invoices in payment of goods and services purchased for more than six billion SEK. Administration costs can be drastically cut thanks to EDI. STELHA is an EDI project developed for testing the electronic purchasing process, from order to payment, in the City of Stockholm.

Source: Nyhetsblad från Toppledarforum

* IT Award for Schools

The Royal Academy of Engineering Sciences has founded an award for information technology at school. In 1996, six science and mathematics teachers and their schools shared the prize sum for their introduction of IT as a tool for information search, data processing, and interactive learning.

Source: IVA Aktuellt 1997:1, homepage: http://www.iva.se

* Stockholm Arts and IT Lab

In 1998, Stockholm will act as the official European cultural capital. From the preliminary program, it is evident that IT will be an important tool in many of the planned activities. Several projects are under development, for instance:

— An international meeting place in the shape of an IT lab is planned at Skeppsholmen, a traditional "museum island" in the center of Stockholm. The objective is that all kinds of artists and masters of the plastic arts should be able to meet those specialising in electronic, IT and IT artwork in order to find new working methods, develop ideas, collaborate with artists all over the world... you name it. The anchor theme is "In the steps of Lionardo";
— A specific web-site is being developed for those who want to walk through the historic Stockholm;

— "Interact" is an Internet based project for young people all over the country. Basically oriented towards creativity and artistic creation, but also including film making, broadcasting, literature, etc.
Source: Stockholm 98, E-mail address: info@98.stockholm.se; Internet: www.kultur98.Stockholm.se

*** Electronic Cash Under Government Scrutiny**

The Department of Finance is looking into how electronic cash is handled via smart cards and Internet-based pay systems. A recommendation for who may issue e-cash will be proposed, what kind of illegal problems are to be expected will be mapped, and what the legal status of e-cash is, are further areas for the scrutiny.
Source: TT/Computer Sweden, 17 January 1997

*** Recycling Your Old Computer**

What do you do with your old computer (and any other electronic equipment) when it has served its time? Give it to the nearest school? Not too many schools would know what to do with it. Pass it on to your kids? Most likely, they already have their own computer, quite a number of generations ahead of the one you want to scrap. If you live in Stockholm, Sweden, you may place a telephone call to GRE, a company specialised in recycling electronic equipment. They will pick up whatever you want to get rid of, and break down the old equipment into its basic components, which will be recycled. The only thing not quite settled yet — in March 1996 — is "who pays".
Source: Ny Teknik - Teknisk Tidskrift 1996:6

*** Recycling Metal in Mobile Telephones**

Sweden is participating in a EU operation called "Operation Return Telephony" dedicated to the recycling of used mobile telephones. The project has two objectives; to find out if mobile phone users are interested in getting rid of their old telephones, and to find the best methods for recycling the materials used in the phones. Alacatel, Ericsson, Motorola, Nokia, and Panasonic are the participating companies. The project was initiated by Ectel, the European mobile telephone suppliers' organisation. Some 500 Swedish retailers have said, so far, (February 18, 1997) that they are interested in collecting used telephones. So far, it is estimated that 800 000 mobile telephones have been taken out of service.
Source: Dagens IT, February 18, 1997

*** Swedes as IT Users**

* When it comes to buying and using multifunction machines, for instance fax + printer, or fax+printer+copier, the Swedes are more similar to the Japanese than to the Americans — Swedes don't buy multifunction machines, they want the best of everything and are still buying more according to technical specifications than to actual needs and usage. Thus, the manufacturers who sell multifunction machines do not even introduce them to the Swedish market — it is nonexistant for this type of equipment!
Source: Nya Datamarketing, # 2/96

*** The Telia Network Is Digital**

* By the end of June 1997, Telia's network was digital to 99.8%. That means, among other things, that almost all subscribers to Telia's telecommunications services have access to the AXE services, including call transfer, and call waiting, among others. By the end of 1996, Telia had installed 100 000 ISDN connections.
Source: Telia and the Telia annual report 1996

4. Sweden, the IST Industry and the Users

An Analysis by Rickard Lindhé
(Translation by Gull-May Holst)

Swedes as IST Users in 1996
In percent of the age groups 16 — 79 years

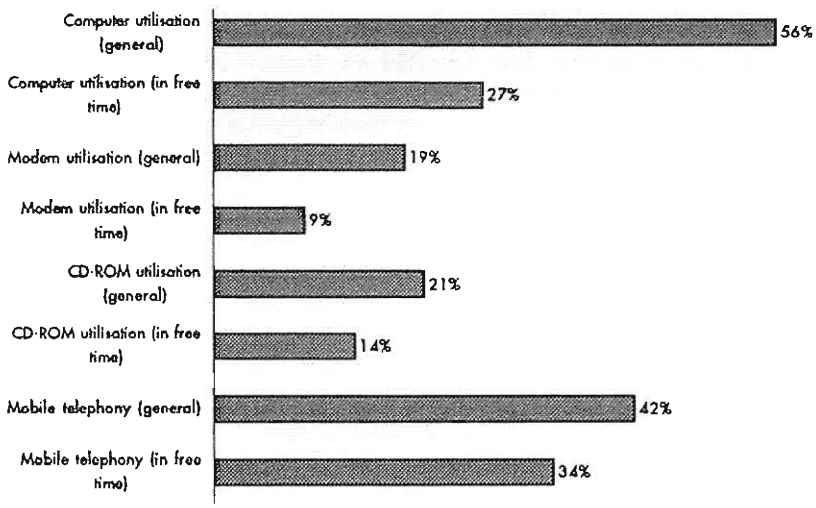


Fig. 89: The diagram shows the average precentage of the Swedish population, aged 16 to 79 years, regularly utilising IST technology in general as compared to the utilisation of the same technologies during their free time.
Source: Österman, Torsten & Timander, Joachim, FSI: "Modern teknik i allmänhet och Internet i synnerhet", report April 1997

Swedes Want to Use IST for Banking

In percent of the age groups 16 — 79 years

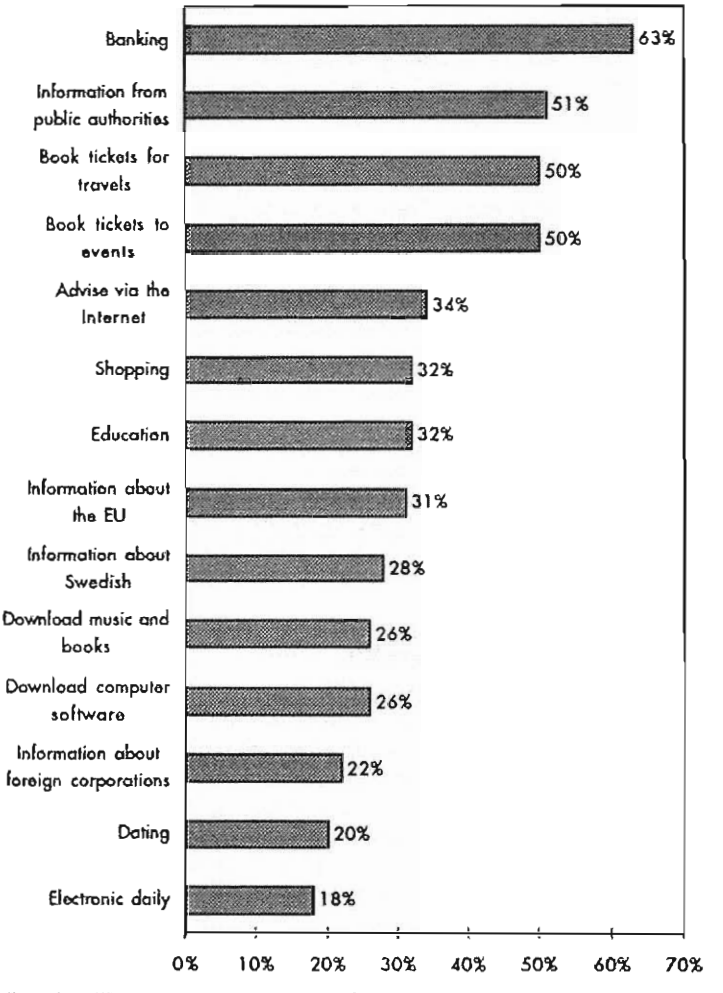


Fig. 90: This diagram, from a study carried out by the Swedish analyst firm FSI, Forskningsgruppen för Samhälls- och Informationsstudier early 1997, shows that 63% of all Swedes in the age groups 16 to 79 years want to use IST in order to carry out their banking business. Only 18% want to download their daily newspaper via the Internet. Searching for information from the public administration and from the EU also get high scores, while dating is of interest to 20%. So far, there is little knowledge of why the Swedes prioritise like this.
Source: Österman, Torsten & Timander, Joachim, FSI: "Modern teknik i allmänhet och Internet i synnerhet", report April 1997

Statistics Sweden, the publicly owned Swedish statistics office, defines information technology, IT, as a generic term for those different technologies that are being used to create, store, use, and transmit sound, text, and pictures. This definition appears in the publication *"Data om informationstekniken i Sverige 1996"* (*Data about Information Technology in Sweden 1996*, published in Swedish in May 1996. Since June 1997, an abstract in English is available via Statistics Sweden.) The report was sponsored by the IT Commission of the Swedish government.

Evidently, IT as defined by Statistics Sweden is a rather wide concept, including a number of technologies, such as computing, computers, data, telecommunications, radio communication, and entertainment media like television and digital radio. As a consequence, it is difficult to draw a sharp borderline between what is and what is not included in IT. According to the Statistics Sweden's publication, 268 different IT products, from computers and modems, via radios, and TV-sets, to numerical machine tools for production are included in their definition.

In addition to this wide definition, it is important to note that information technology sometimes is used about media as well, even including those who are the movers in the IT market. Just to add to the IT confusion.

4.1. The IST Industry in Sweden

According to the Statistics Sweden's publication, there are 60 industries in the country, wholly or partially involved in the development, manufacturing, and distribution of IST products. In addition to the manufacturing companies, several other industries are closely related to and/or dependent on IST, for instance telecommunication operators, software developers, detailers, retailers, and various consulting services businesses. So far, the content industries, i.e. media, are not included in the figures from Statistics Sweden.

4.1.1. Growth Industries

Generally speaking, all the IST sub-industries are growth industries. But the growth is somewhat unevenly distributed, which can be read from the following tables and diagrams, most of which have their origin in the 1997 annual industry analyses made by two of the leading Swedish computer magazines,"Datateknik" , (# 11, June 12, 1997), and"Datavärlden", (# 6-7, June, 1997). The reader of this chapter should be aware that there are some basic differences in the analyses presented by the two magazines, making direct comparisons difficult, at least without access to the original data.

Thus,"Datateknik", is basing its 1997 analysis on facts resulting from interviews with 354 companies having an annual turnover of more than 15 million SEK in 1996, and being active in the information society technology business. The basic criterium for selection is the size of the turnover, i.e. 15 million SEK. The definition of IST is approximative. In the 1996 survey, the number of qualified companies was 265, according to more or less the same criteria, which makes comparisons between the results of the interviews from year to year a rather shaky business. The analysis by "Datateknik" is based on figures from the business magazine "Affärsvärlden", belonging to the same media conglomerate.

"Datavärlden" in turn, having carried out its questionnaire-based analysis for the fifth consecutive year, has identified the 500 largest IST companies, based on turnover, and gathered facts about them from various sources, including questionnaires, mailed to the companies. Data for these companies are available via several media, among others via the Internet, type: www.datavarlden.bonnier.se should you need more facts. Anyone wanting to understand the fine details of the Swedish IST industry, should compare the analyses of the two magazines and their basic data. This chapter provides an overview only

Total Swedish IST Industry Growth 1993 — 1996

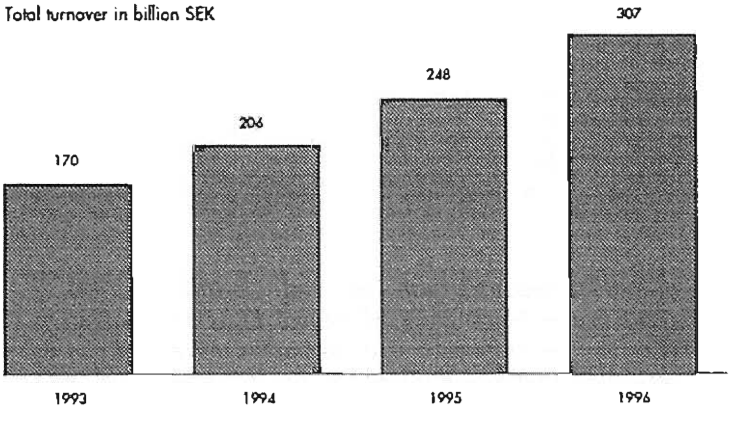


Fig 91: In 1994 and 1995, the Swedish IST industry had an overall growth in turnover of 20%, while in 1996, the growth was 16.5%. Only the forestry related industries can compete with this kind of growth. By and large, the Swedish IST industry is made up of Ericsson and Telia, genrerally answering for more than 50% of the total industry turnover, in 1995 answering for 56% of the total, and in 1996 55%, equivalent to 168 billion SEK of the industry total of 305 billion SEK (= 500 largest companies).
Sources: Datavärlden, June 7, 1996/Datavärlden, # 6-7, June, 1997

IST Industries Growth in Sweden from 1995 to 1996

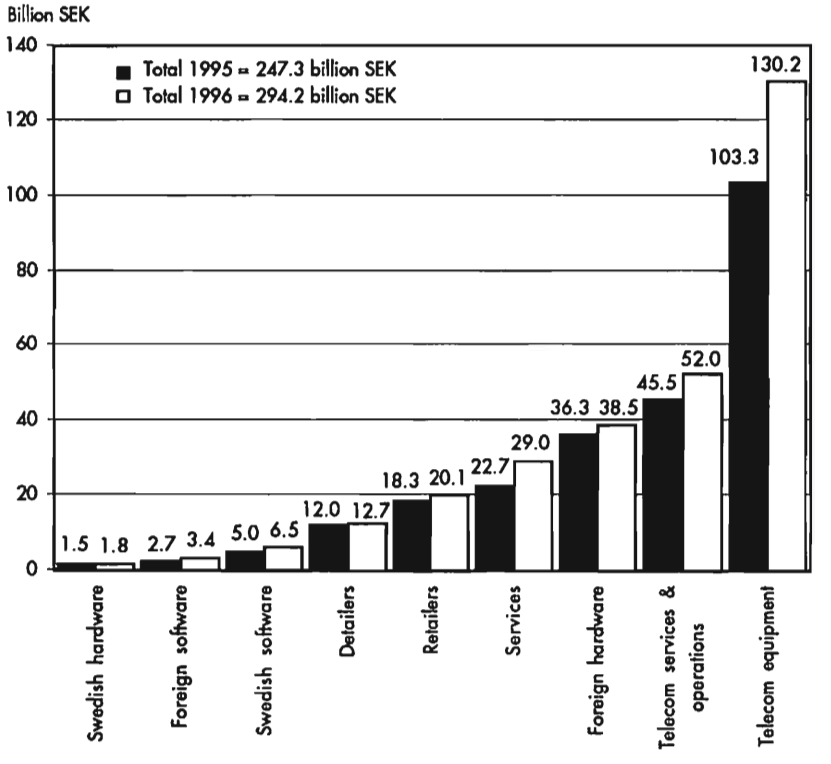


Fig. 92: The overall IST industry growth was reported to 16.5% for 1996, which would result in a total turnover of 307 billion SEK. The breakdown in the various IST sub-industries in this diagram according to reported growth figures per industry results in a total of 294.2 billion SEK, which means that 12.8 billion SEK of the total are missing. This may be due to the fact that new IST areas, for instance outsourcing and multimedia, are included in the total turnover, but have not been accounted for as separate industries. According to "Datateknik", the total turnover was some 280 billion SEK, counting 354 companies.

Sources: Based on data from Datavärlden, June 7, 1996/ Datavärlden # 6-7, June, 1997

As can be seen from the diagrams above, the Swedish information society technology industry is made up mainly by Ericsson and Telia, contributing 55% of the total industry turnover (56% in 1995). The total industry profit for the top 500 companies in 1996 was 20 billion SEK. 11 billion SEK was generated by Ericsson alone. Ericsson has spun off a number of consultancies and specialist hardware manufacturers, which makes the influence of the company even larger than the figures above suggests.

A specially interesting fact is, according to "Datavärlden", that Sweden has the most telecom operators per capita in the world. Telia, the former de facto monopoly, has 15 competitors, offering the Swedes telecom services. Ten are non-Swedish companies. The competition in the field is due to Sweden offering one of the most liberalised markets in the world. (Also see chapter 3.3, p. 94, "Telecommunication Operators in Sweden"). The magazine expects that the focus of the telecom operators will move from Sweden to the larger European countries as off 1 January 1998, when all the EU markets should be open.

Considered as a new sub-industry in the 1996 industry rankings by both magazines, "Datateknik" and"Datavärlden", are telecommunications operators. This may seem surprising, but the reader should not forget that Sweden, now having the most telecommunications operators per capita in the world and the most open market, has had an open market also "de facto" since 1993. Since then, fifteen operators have established themselves, some rather successfully, in the Swedish market, now considered among the most open ones in the world.

The listings made by the two magazines differ to a certain degree. Thus, both are included in the following tables.

Telecommunications Operators in Sweden in 1996
(Datateknik)

Company	Ranking	Turnover, million SEK
Telia	1	44 100
NetCom Systems	2	2 958
Unisource Business Network	3	1 474
Europolitan Holding	4	1 431
Teracom Svensk Rundradio	5	1 177
Global One	6	220
MFS Communications	7	44
Stokab	8	42

Fig. 93: The "Datateknik" ranking of the eight largest telecommunications operators in Sweden in 1996. To be compared to the following listing.
Source: Datateknik, # 11, June 12, 1997

It should be borne in mind that telecommunications operations are a heavy investment industry, which means that it may be several years before profits are generated. Patient capital is a must. During a number of years, Telia has been the largest investor in Sweden. The company has invested some 47 164 million SEK during the last few years. In 1996, Telia invested 11 949 million SEK.

Telecommunications Operators in Sweden in 1996
(Datavärlden)

Company	Ranking	Turnover, million SEK
Telia	1	44 100
NetCom Systems	2	2 958
Comviq	3	1 584
Unisource	4	1 474
Europolitan	5	1 431
Tele2	6	1 383
Teracom Svensk Rundradio	7	235
Global One	8	200
Telenordia	9	134
MFS Communications	10	44

Fig. 94: The ten largest telecommunications operators in Sweden in 1996, according to "Datavärlden".
Source: Datavärlden, # 6 — 7, June 1997

According to"Datavärlden" , counting 354 companies, the total turnover for the Swedish IST companies was 280 billion SEK for 1996.

The growth figures for the IST industry in Sweden can be compared to equivalent figures for the total western European IST market in the following diagram (fig. 95).

Annual Growth of the IT Market in Western Europe 1988 — 1995

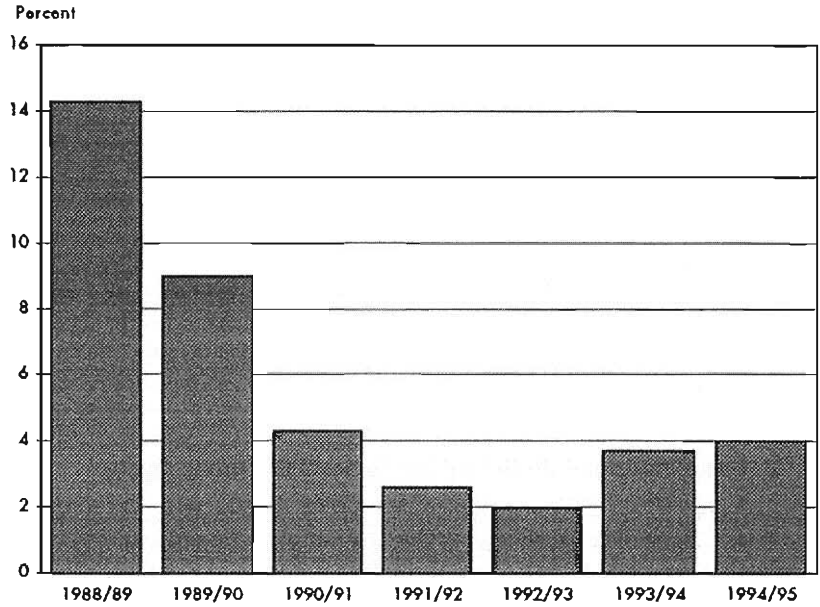


Fig. 95: The overall annual growth of the IT market in Western Europe has been 4% for the period of 1993 — 1995, while the growth rate was more than 14% in 1988/89. This according to statistics from The World Engineering Industries and Automation.
Source: Statistics Sweden/International Statistics

4.1.2. Increased Foreign Interest

For 1996,"Datavärlden" stated, that ever more foreign IST companies are restructuring their Swedish companies by turning them into pure sales offices, while important strategic decision making takes place outside Sweden. So, for instance, market planning for IBM and Apple is made from Paris, France. So far, during the 90ies, Swedish management of foreign subsidiaries have seen their scope of responsibility curtailed. Even logistics have moved out of the country. Most hardware manufacturers have no or very insignificant storing capacity in Sweden. The products are distributed to the Swedish retailers directly from central warehouses in Europe.

"Datavärlden" also tells of increasing foreign ownership of IST companies in Sweden. Excluding the two industry giants, Ericsson and Telia, from the top 500, the remaining 498 companies in 1996 represented an annual turnover of 108 billion SEK. 350 of these companies, representing 45% of the total turnover, were Swedish owned. In 1994, the relationship between Swedish and foreign ownership was 50 — 50, in 1995, 51 — 49 in non-Swedish favour, and in 1996, 54 — 46 in favour of foreign owners.

Among the 100 largest companies, the foreign based companies generated 54% of the total turnover, excluding Ericsson and Telia, in spite of the fact that 51 of the companies (+ Ericsson and Telia) are Swedish. However, if all of the 1997 500 companies are considered, the Swedish ones show a small domination. 360 Swedish companies had a total turnover of 71 billion SEK (again, Ericsson and Telia are excluded), while 99 foreign companies generated 68 billion SEK. Conclusion: The Swedish companies are considerably smaller that the foreign ones.

4.1.3. Little Influence on IST by the General Business Cycle

"Datateknik", in its industry analysis, states that the general recession in the Swedish economy has not marked IST. While private consumtion increased by dismal 0.3% in 1995, PC sales were up by 50% for the same year, according to the international research group IDC. PC sales are often seen as an indicator for the IST industry overall. IDC also predicted that PC sales would continue to increase during 1996, and then slow down as we get closer to the millenium turn. This was true for 1995, with an overall IST growth of some 20%, while 1996 shows some slowdown, with an overall growth of 16.5%. In particular, PC sales in 1996 — some 750 000 PCs were sold in Sweden, an increase by 5% over 1995 — came next to a full stop. Moreover, the competition in the Swedish market is such that profit per sale is decreasing. Rapidly. So retailers and distributers are hit as well by the PC slowdown.

PC Sales in Sweden 1990 — 2000

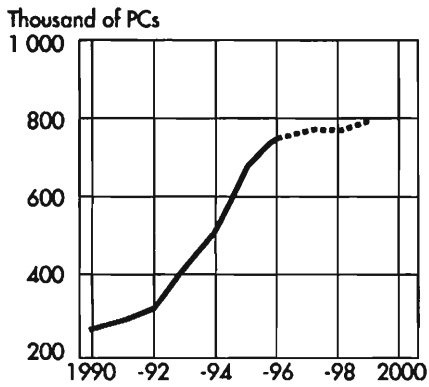


Fig 96: The Swedish PC sales are slowing down. The professional market is saturated, while there is room for growth in the private market segment, so far having a penetration of only 27% — i.e. 27% of all households have a PC. In 1996, 750 000 PCs were sold.
Sources: Datateknik # 11, June 13, 1996/IDC/Datavärlden June 1997)

The PC market is becoming saturated, not least so in the professional market segments, where penetration is almost 100% — see Statistic Sweden's diagrams in the following chapters. The private PC market still has room for growth, but one prerequisite is a more optimistic general outlook for Sweden's economic growth. Another one, that more software, interesting and useful software, is available in Swedish.

In 1995, the overall increase in PC sales was 30%, meaning that 710 000 personal computers were sold. The sales to the private segment showed an increase of 50%. But in spite of this annual increase, the PC penetration of the private market was only 27%.

The IST sub-industries, in 1996 identified by"Datateknik" as follows: data communication, Swedish software, distributors, foreign software, retailers, services, peripherals, telecom, and hardware, all showed growth for 1995. The magazine identified IST — then IT — as the "high growth industry no. 1" — see following diagram.

IT — High Growth Industry No. 1 in 1995
In percent

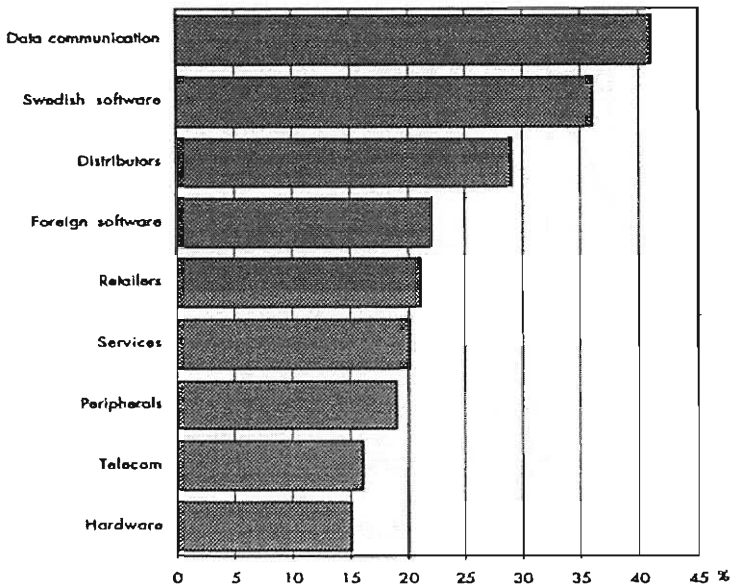
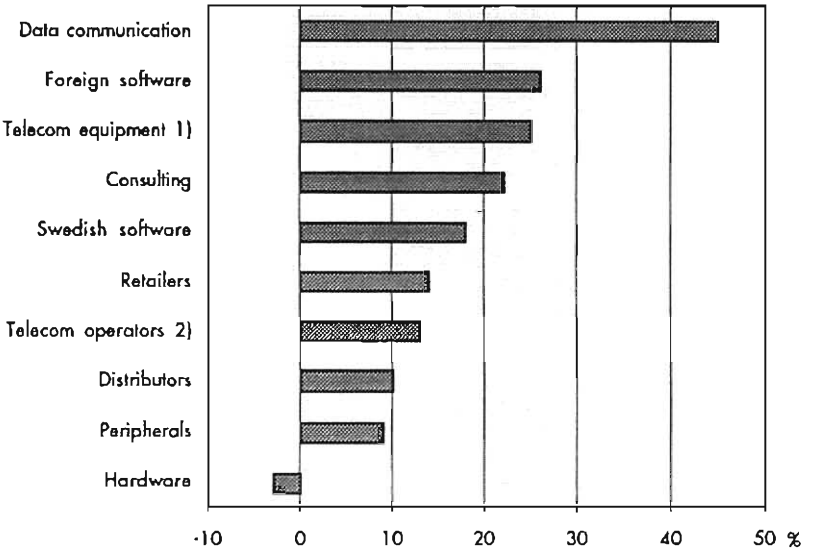


Fig. 97: According to "Datateknik" the information technology industry was the high growth industry no. 1 in turnover in percent from 1994 to 1995. The total industry was then divided into the following sub-industries: data communication, Swedish software, distributors, foreign software, retailers, services, peripherals, telecom, and hardware. Data communications showed the largest growth in 1995, as it did in 1996 — see following diagrams.
Source: Datateknik, # 11, June 13, 1996

In 1996, the IST sub-industries were made up by: data communication, foreign software, telecom equipment, consulting, Swedish software, retailers, telecom operators, distributors, peripherals, and hardware, according to the same magazine. What was general "telecom" in 1995, was represented by "telecom equipment" and "telecom operators" in 1996 — for "operators", see listings above.

In 1995 as well as in 1996, data communication was the fastest growing sub-industry, measured by turnover growth in percent. In 1996, Swedish software had to yield to foreign software, and telecommunications equipment, a "new" sub-industry, ended up third. Hardware continued to have a rough time in 1996 as well.

IST Industries Turnover Growth 1995 - 1996
In percent



1) = excluding Ericsson, + 5.3%
2) = excluding Telia, 34.2%

Fig. 98: In 1996, PC sales came almost to a full stop, growing by 5% only over the year. The hardware industry had a difficult year, showing a decrease in turnover by -4%. Data communications, including routers and switches, continued to grow, in 1996 by 40%, as did telecommunications equipment. The demand for networking equipment has also resulted in a heavy demand for consultants to build the networks. One important factor behind the growth of data communication demand is the fact that the Internet is coming of age— see chapter 6 for detailed information about the Internet.
Sources: Affärsvärlden/Datateknik # 11, June 12, 1997

Regarding changes, increase as well as decrease, in net results, 1994 to 1995, and 1995 to 1996, show some interesting differences, as demonstrated in the two following diagrams.

Changes in Results for the IT Industries from 1994 to 1995

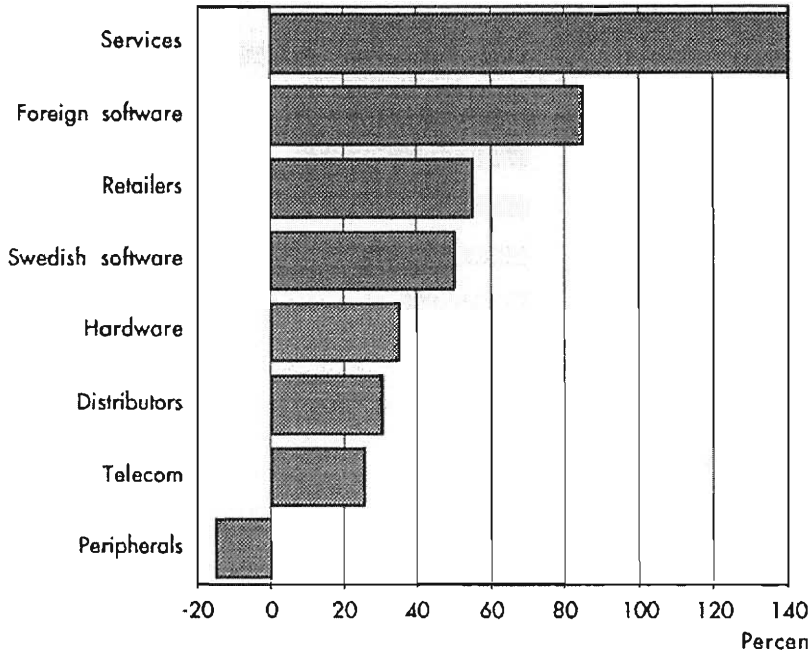


Fig. 99: The diagram shows the change in percent in results for the major IT sub-industries for 1995 as compared to 1994. Data services are representing the sub-industry most in demand.
Source: Datateknik, no. 11, June 13, 1996

Now, the figures for foreign software sales in the diagram above should be regarded with a sceptic eye, since it is not clear from the data to what extent development costs are balanced against sales, while in the case of software developed in Sweden, they most definately are. Regarding peripherals, the net results were negative. The sub-industry called "data services" is not included in the diagram, simply because there were no reliable figures available.

Net Result Growth for the IST Industries from 1995 to 1996
(Excluding data communication) In percent

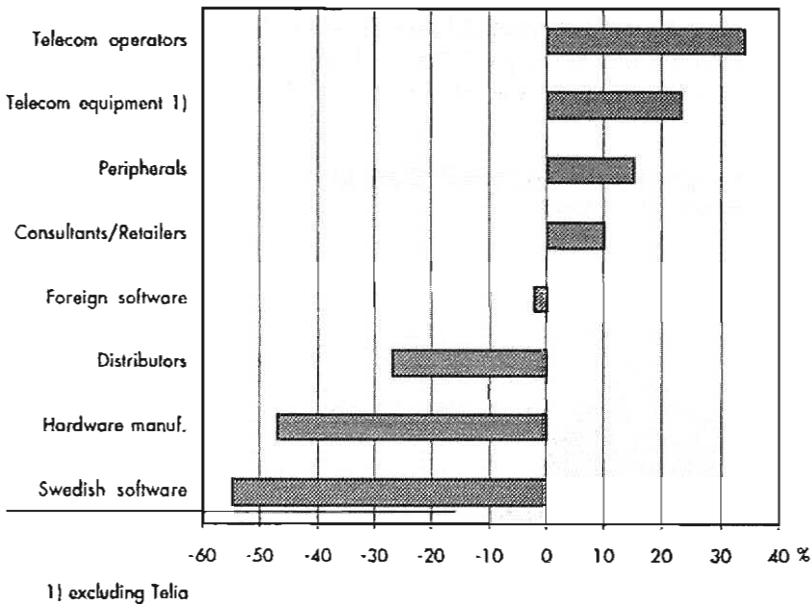


Fig. 100: The telecommunications operators showed the largest growth in net results among the IST industries from 1995 to 1996. Problem areas when it comes to profits are software developers, the foreign ones less so than the Swedish ones, who are the big losers, distributors, and hardware manufacturers. Reliable facts for data communication are not available.
Sources: Affärsvärlden/Datateknik # 11, June 12, 1997

In 1995, peripherals was the problem sub-industry, the only one in the red. In 1996, four sub-industries had profit problems, software developers, foreign ones as well as Swedish ones, distributors, and hardware manufacturers. The big losers in 1996 were the Swedish software developers. Peripherals were the third most profitable sub-industry in 1996, compared to being the big loser in 1995.

4.1.4. Increased Margins

According to"Datateknik" of June 1996, profit margins for the IT companies increased for the third consecutive year in 1995. The increase among the 265 analysed companies from 1994 to 1995 was some 2%. For 1995, the increase came close to the top years 1986 and 1988. However, during the period from 1988 to 1992, the increase dropped sharply, but turned to an up-beat for 1992 to 1994. In 1995, the upturn was even more remarkable — see diagrams below.

Profit Margins for the Top 265 IT Companies in Sweden 1986 — 1995

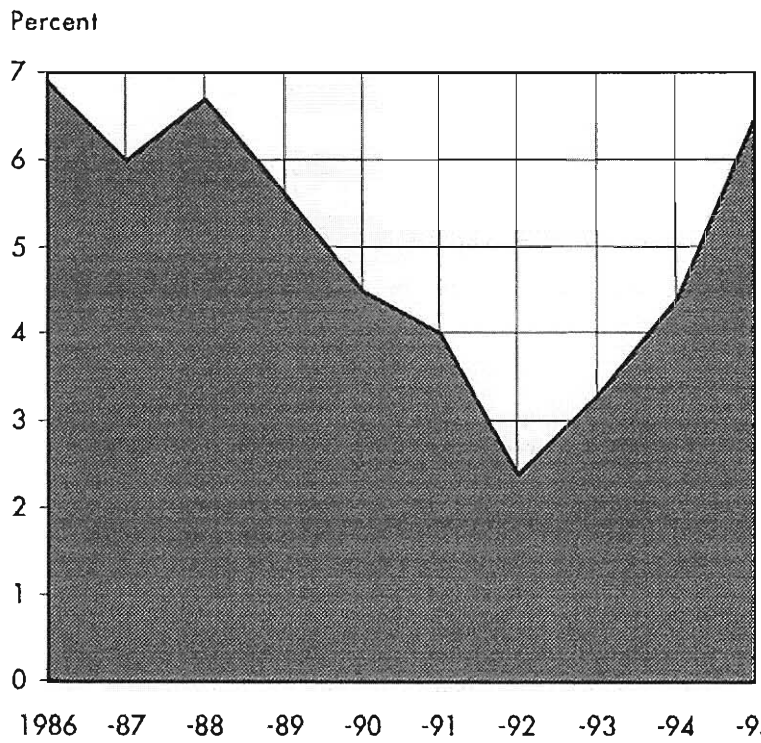


Fig. 101: The profit margins for the 265 largest IT companies in Sweden in percent for the period 1986 to 1995. Profits took a steep dive in 1992, but have increased steadily over the last three years.
Source: Datateknik, no. 11, June 13, 1996

Profit Margins for the Top 354 IST Companies in Sweden 1986 — 1996

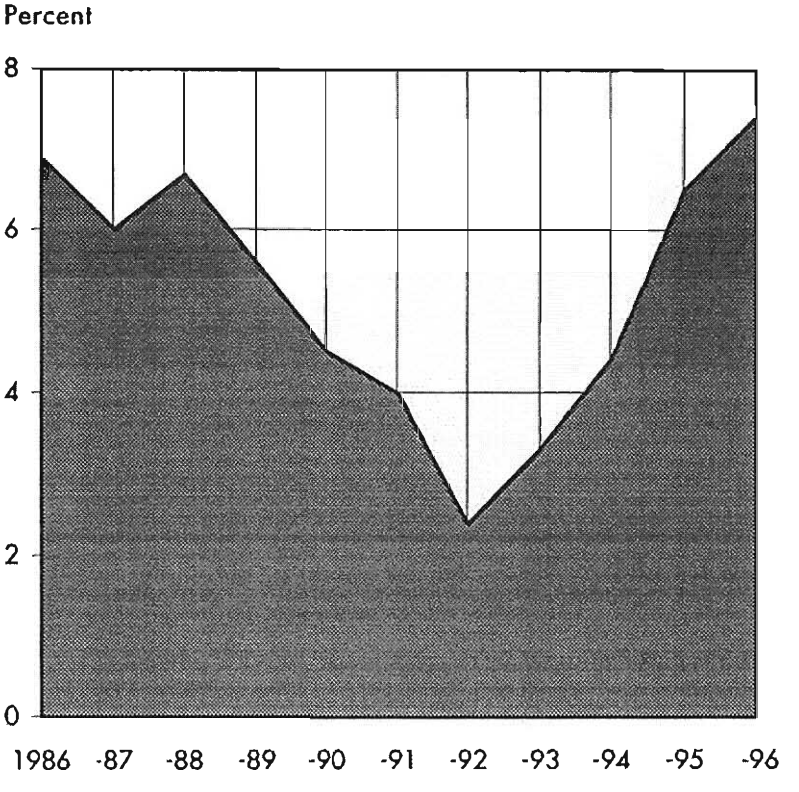


Fig. 102: Profit margins for the top 354 IST companies from 1986 to 1996 in percent show an increase for the fourth consecutive year. For 1996, the compound figure is more than 7%. Excluding Ericsson and Telia, the remaining 354 companies generated a compound profit margin of 4.9%.
Sources: Affärsvärlden/Datateknik # 11, June 12, 1997

Also from a profit margin point of view, 1996 was a good year for the majority of the Swedish IST industry, which is shown in the diagram above. The reader is asked to note that comparisons between the two profit margin diagrams are made difficult by the fact that for 1995, 265 companies are covered, while for 1996 354 companies are included.

Return on Investment for the Top 265 IT Companies In Sweden 1986 — 1995

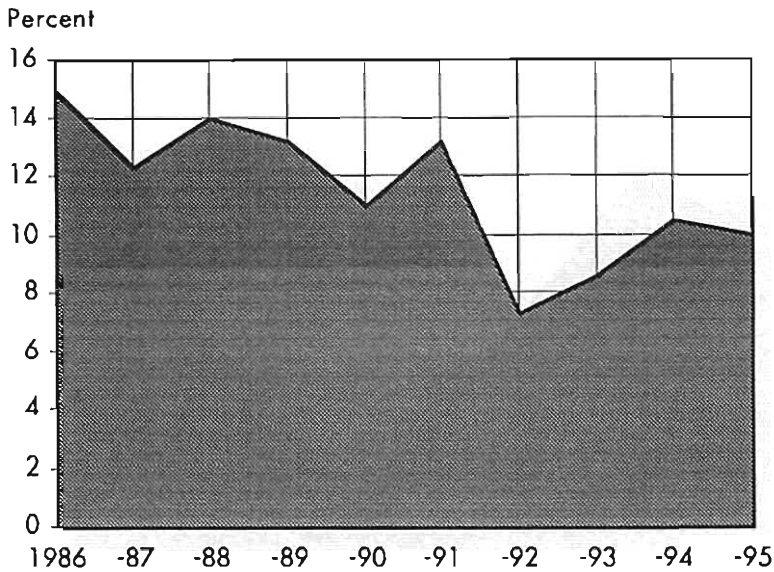


Fig 103: Return on investment of the total investment in 265 Swedish IT companies, in percent of capital invested, for the period of 1986 to 1995. In 1986, the return was 15%, in 1992 half of that, some 7%, and in 1995 just above 10%, which is slightly down from 1994, when it was 11%.
Source: Datateknik, no. 11, June 13, 1996

The diagram showing the return on investment for 1995 for the top 265 IT companies resembles the ones for profit margins above, with one important exception. The line for profit margins turns upwards from 1994 to 1995, while the line for return on investment turns downwards, i.e. less return per SEK invested. One conclusion drawn from this, was that the companies had more capital than before, and that investors evidently had confidence in IT. The messages from the Stockholm Stock Exchange and the other institutions trading in IST companies strengthen this impression. More IST companies than ever are being offered to the public, on the stock exchanges or by brokers, and they have no difficulties in finding capital. The diagram for 1996, covering the return on investment for the top 354 companies confirm this.

Return on Investment for the Top 354 IST Companies in Sweden 1986 — 1996

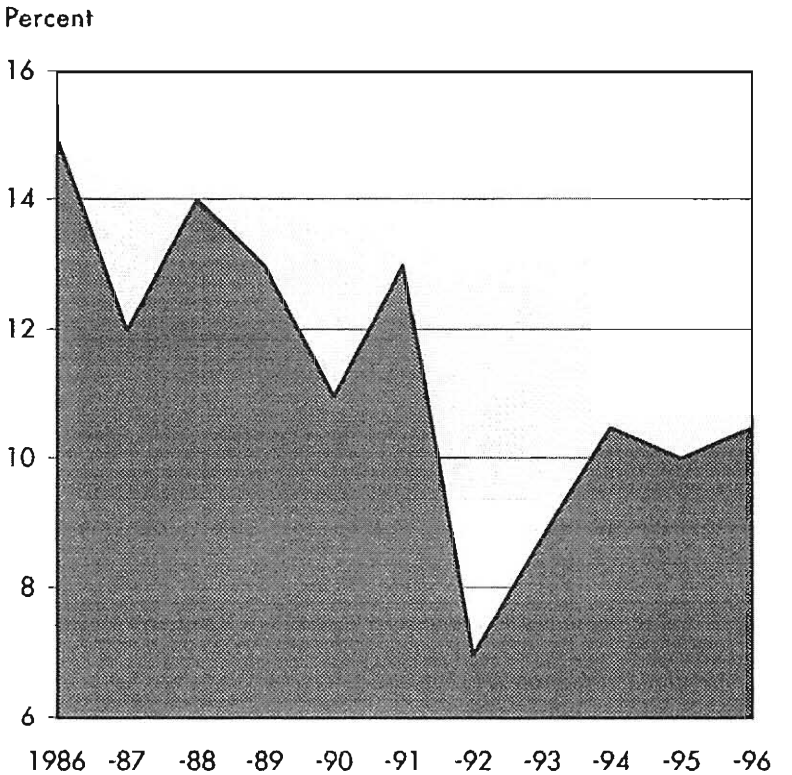


Fig. 104: In 1996, the return on total investment of the 354 IST companies studied by "Datateknik" was more than 10%, which is up from 1995 — see previous diagram, but note that only 265 companies are included for 1995.
Sources: Affärsvärlden/Datateknik # 11, June 12, 1996

One more fact worth noting regarding the Swedish IST industry, is the solvency development as indicated by the following diagrams.

Solvency Development for the Top 265 Swedish IT Companies 1986 — 1995

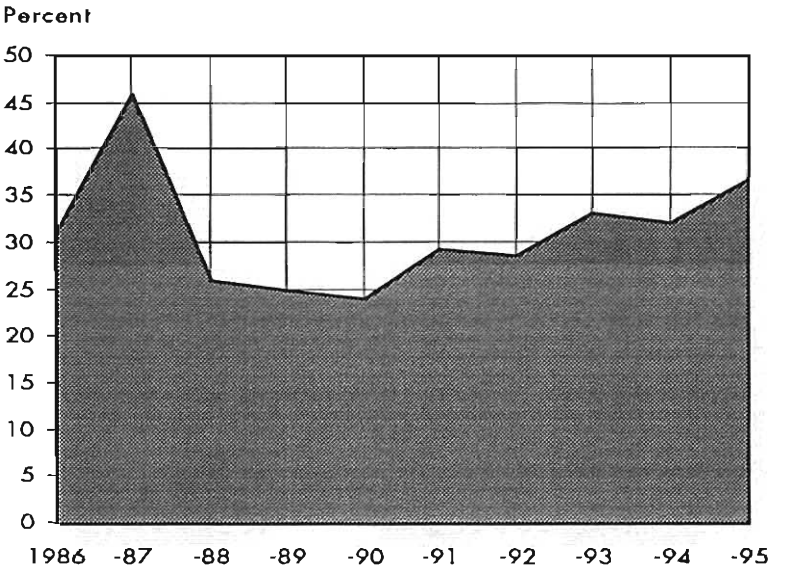


Fig. 105: The diagram shows how total solvency has developed over the period 1986 — 1995 for the 265 Swedish IT companies in the "Datateknik" survey. It could be compared to diagram DT:5 above.
Source: Datateknik, no. 11, June 13, 1996

Solvency Development for the Top 354 Swedish IST Companies 1986 — 1996. In percent

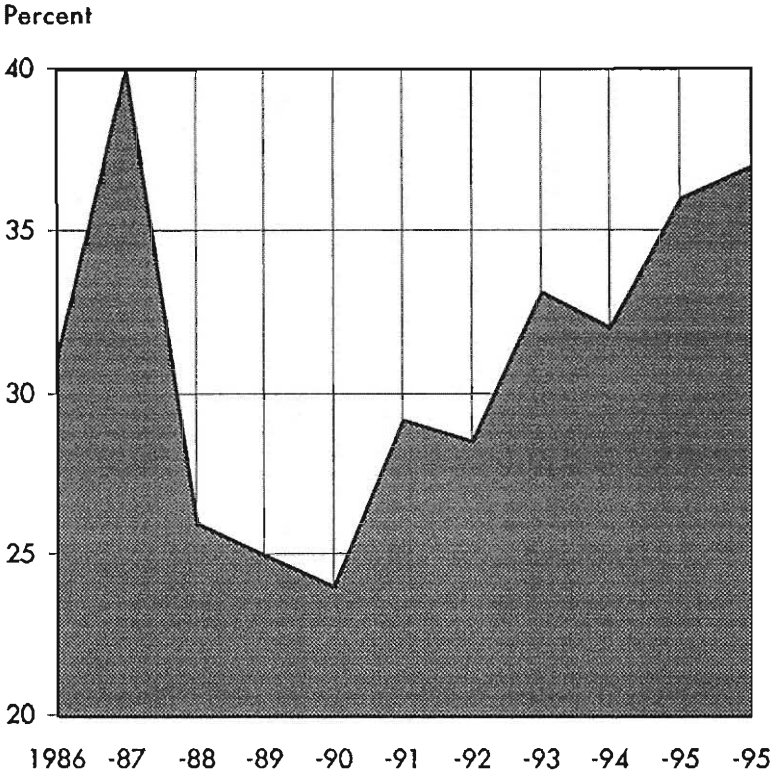


Fig. 106: The solvency development for the top 354 Swedish IST companies from 1986 to 1996 in percent, tells about a rather stable group of companies.
Sources: Affärsvärlden/Datateknik # 11, June 12 1997

According to what has been stated by the previous facts, and is stated in the following tables, the three largest IST companies in Sweden in 1995 as well as in 1996 were Ericsson, Telia, and IBM. Scribona followed as number four, while the consultancies WM-Data and Enator changed places for 1996, WM-Data overtaking Enator, which was number 6. Number 7 in 1996 was number 15 in 1995, Netcom Systems. This change is a result of the strong growth for data communications, among other things.

The Largest IST Companies in Sweden in 1996

Company name	Ranking		IST related turnover million SEK		No. of employees	
	1996	1995	1996	1995	1996	1995
Ericsson	1	1	124 266	98 780	93 949	84 513
Telia	2	2	44 100	41 060	34 192	32 825
IBM	3	3	6 192	6 685	2 312	2 185
Scribona	4	4	5 869	5 025	2 061	1 801
WM-Data	5	6	5 703	3 260	4 200	1 058
Enator	6	5	4 178	3 904	5 004	4 690
Netcom Systems	7	15	2 958	1 995	771	n.a.
Ingram Micro	8	14	2 900	2 200	n.a.	n.a.
Bure IT	9	new	2 659	new	2 553	new
Hewlett-Packard	10	9	2 600	2 511	410	446
Telia Data	Te	Te	2 564	1 980	1 518	1 437
ICL Holding	11	11	2 377	2 375	1 034	800
Compaq	12	12	2 355	2 360	75	65
Philips	13	8	2 253	2 720	637	662
Nokia	14	7	2 200	3 228	n.a.	1 058
Santech Micro Gr.	15	21	2 053	1 366	120	80
Ericsson Data	Er	Er	1 896	1 633	1 404	1 132
Digital Equipment	16	17	1 830	1 821	n.a.	913
Microsoft	17	22	1 714	1 286	320	n.a.
WM-Data Owell	WM	WM	1 700	2 314	n.a.	646
Scribona Office	18	18	1 700	1 700	700	700
Intel	19	10	1 690	2 424	26	n.a.
Comviq	Ne	Ne	1 548	n.a.	400	n.a.
Sema Group Sweden	20	19	1 574	1 518	1 353	1 444
Unisource	21	33	1 474	1 050	408	n.a.
Volvo Data	22	26	1 451	1 217	n.a.	n.a.
Europolitan	23	38	1 431	752	590	66
Computer 2000	24	29	1 409	1 161	n.a.	84
Cisco Systems	25	new	1 400	new	20	new
CMA	26	20	1 396	1 496	245	238
Tele 2	Ne	Ne	1 383	937	287	n.a.
Allgon	27	28	1 369	1 175	714	615
AST	28	24	1 357	1 269	83	90
Sun Microsystem	29	34	1 280	987	276	195
Motorola	30	16	1 158	1 987	133	139
Merkantildata	31	41	1 119	722	404	232
Alfa Laval Aut.	32	31	1 100	1 080	1 250	1 200
Intentia	33	35	1 080	877	998	815
Fujitsu ICL Comp.	34	new	1 032	new	100	new
Canon	35	30	1 012	1 104	405	371
IBS	36	42	997	717	1 176	1 041
Kontorslandslaget	37	25	948	1 249	n.a.	n.a.
EDS	38	36	937	866	790	842
Apple	39	23	936	1 274	100	103
Dell	40	39	828	729	59	75
Responsor	IBM	IBM	773	690	583	550
Alfaskop	41	51	745	-	400	-
QD System	42	45	682	-	321	-
Siemens Nixdorf	43	40	674	724	270	286
IMS Data	44	60	659	-	520	-

n.a. = data not available

The letter combinations in the table indicate that a company is owned by another one. Thus, Te = Telia; WM = WM-Data; Er = Ericsson; Ne = Netcom systems; IBM = IBM.

Fig. 107: The table lists the 44 largest IST companies in Sweden in 1996, along with their ranking in 1995, based on turnover in million SEK. The data were compiled and published by the computer magazine "Datavärlden" # 6 — 7,

June 1996, and # 6 — 67, June 1997. The tables in the magazine contains considerably more data, that may be of interest to anyone analysing the Swedish IST market and its players.
The most striking fact about this condensed list is, of course, the absolute dominance of the two Swedish giants, Ericsson and Telia. They make up more than 50% of the total IST turnover in Sweden. A telling difference when comparing the 1996 performance to that of 1995, is the obvious difficulties companies involved in distribution are having.
Sources: Datavärlden # 6 — 7, June 1996/Datavärlden # 6 — 7, June 1997

4.1.5. IST Sub-Industry by Sub-Industry

What kind of picture of the IST world do we get, should we choose to regard the separate IST sub-industries as industries in their own right? Below are listed the major companies belonging to some of the IST sub-industries. There are considerable differences in the listings of the"Datavärlden" sub-industries for 1995 and 1996, so the reader is asked to pay attention to what year is related to by carefully reading the headlines. The reader is also asked to keep in mind the fact that, so far, there is no definate definition of exactly what an IST sub-industry group should consist of. Thus, the classfication of a company to a specific sub-industry is rather arbitrary.

A budding IST sub-industry is multimedia based products, introduced to the "Datavärlden"-readers in the 1996 industry survey for the very first time. So far, business related to multimedia, the Internet, and www, is more of a test laboratory than real cash cow business. The Swedish multimedia industry is not only a newcomer in the IST context, it is made up of a mix of new companies, created by young enthusiasts, of since long existing consultancies and media companies, having started a new business line, and a group of "also-rans". Below follows a list of the 1996 leaders in multimedia in Sweden in 1996, according to"Datavärlden".

Multimedia Providers in Sweden in 1996

Company	Position	Multimedia turnover, million SEK	% of total	Total turnover 1996, million SEK
WM-Data	1	228	4	5 703
Enator	2	87	2	4 352
Multimedia Softt. Scand.	3	35	70	50
Levande Böcker	4	29	95	30
Tetre	5	25	100	25
PIR-New World Media	6	18	90	20
Spray	7	18	100	18
Clockwork	8	16	100	16
AdEra	9	15	25	61
Icon Media Lab	10	15	100	15
Linné Data	11	14	9.1	150
Modul 1	12	13	10	134
Lexivisionföret. Projector	13	13	40	33
New Media	14	13	60	21
Almén Direkt	15	12	100	12

Fig. 108: The table lists the 15 largest multimedia providers in Sweden in 1996. The turnover generated by multimedia is given in million of SEK and as percent of the total turnover, also given in million of SEK.
Source: Datavärlden # 6 — 7, June 1997

Outsourcing also belongs to what "Datavärlden" sees as a new IST sub-industry. In 1996, the magazine compiled for the first time the largest outsourcing specialists in Sweden. For expected growth of this particular sub-industry, see fig. Feb. 18.8 below. A list covering the ten largest outsourcing specialists in Sweden looks as follows:

Major Outsourcing Companies in Sweden in 1996

Company	Ranking	Outsourcing turnover in million SEK	% of total	Total 1996 turnover, million SEK
Telia Data	1	1 026	40	2 564
EDS	2	937	100	937
Sema Group Sw.	3	850	54	1 574
Volvo Data	4	813	56	1 451
WM-Data	5	684	12	5 703
Responsor	6	657	85	773
Cap Gemini	7	646	24	2 691
Enator	8	609	14	4 352
Ericsson Data	9	569	30	1 896
Capella	10	271	98	277

Fig. 109: Telia, Volvo, and Ericsson, are among the ten leading companies, offering outsourcing services in Sweden. In total, "Datavärlden" lists 20 companies in the outsourcing business. Since outsourcing is expected to show a spectacular growth in Europe, including Sweden, over the next few years, it can be assumed that a similar list for the following years will represent an important part of the total IST industry. Also see fig. Feb. 18.8, below.
Source: Datavärlden # 6—7, June 1997

Outscourcing in Sweden Trebles in Five Years
1996 — 2001

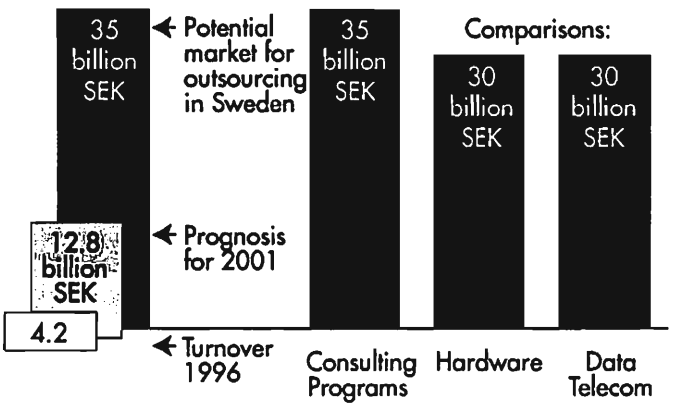


Fig. 110: The consulting companies make up the hottest part of the Swedish IT-market at present. One of the fastest growing services is outsourcing, which according to the consulting firm Input, will grow tenfold to 35 billion SEK by 2001. This means that outsourcing will pass hardware sales as well as data and telecommunications services.
Sources: Input/Executive Report/WM-Data/Dagens IT, February 18, 1997

Outsourcing in Sweden Trebles 1996 — 2001

Regarding computer hardware, all the providers to the Swedish market are foreign companies. 1996 was a difficult year for the hardware manufacturers, and in total, hardware showed a decrease for 1996 as compared to 1995. The table below lists the major hardware suppliers in 1995 and 1996. Mind, that it is compiled from data from the two magazines,"Datavärlden" and"Datateknik". This may mean that the comparisons are not 100% adequate since different methods have been used in the data collection. But the table gives an idea of the relations between the companies."Datavärlden" also gives the percentual breakdown of a particular segment as part of the total turnover.

Computer Hardware Suppliers in Sweden 1995 and 1996

Company	Ranking		Hardware turnover in million SEK	% of total	Total turnover million SEK	
	96	95	1996	1996	96	95
IBM	1	1	3 139	50	6 384	6 766
Compaq	2	5	2 355	100	2 355	2 360
Philips	3	-	2 253	41	5 495	-
HP	4	2	1 835	60	3 059	2 954
Intel	5	3	1 690	100	1 690	2 424
ICL	6	4	1 520	64	2 377	2 375
Cisco	7	-	1 400	100	1 400	-
AST		8	10	1 357	100	1 357
1 269						
Fujitsu ICL	9	new	1 032	100	1 032	new
Sun	10	11	947	74	1 280	1 039
Apple	11	9	928	99	936	1 274
Dell	12	-	828	100	828	-
Digital Eq.	13	7	805	44	1 830	1 821
Motorola	14	6	695	60	1 158	1 987
Nokia	15	-	638	29	2 200	3 228

Fig. 111: First of all, there is not one single Swedish-owned computer hardware manufacturer among the fifteen largest in 1995 and 1996. Second, by comparing the total results for 1996 to those of 1995, it becomes obvious that this sub-industry has some problems in the Swedish market-place, which by now is old and saturated, at least when it comes to the professional segment.
Sources: The table is based on data from Datavärlden, # 6—7, June 1997 and Datateknik, # 11, June 13, 1996

The ranking list of foreign software manufacturers — see following table — is headed by Microsoft, which is almost four times as large as number 2 on the same list. There are no big differences in the ranking between 1995 and 1996."Datateknik" is the provider of the data for both years. The magazine contains an interesting analysis of the global software industry and the obvious warfare between the "softlords", seemingly suffering from oversized egos. The"Datavärlden" ranking list differs from this one.

Foreign Software Manufacturers in Sweden 1995 and 1996

Company	Ranking		Turnover, million SEK	
	1996	1995	1996	1995
Microsoft	1	1	1 750	1 286
Oracle Svenska	2	2	465	325
Computer Associates	3	5	174	134
Adobe Systems Nordic	4	4	165	150
Autodesk	5	3	158	178
SAP Svenska	6	6	148	123
Sybase Sverige	7	7	121	100
Informix Software Scand.	8	8	100	79
SAS Institute	9	9	81	68
Lotus Development Nord.	10	14	59	43

Fig. 112: Microsoft is almost four times as large as number two, Oracle, among the foreign software manufacturers, represented in the Swedish market. There are no dramatic differences in the ranking between 1995 and 1996.
Sources: Data from Datateknik, # 11, June 13, 1996/Datateknik, # 11, June 12, 1997

"Datateknik" is also the source of the following listing of Swedish software manufacturers. The top three are the same as the top 2 — 5 in 1995. The 1995 number 1, Saab-Combitech, is no longer on the list.

Swedish Software Manufacturers in 1995 and 1996

Company	Ranking		Turnover, million SEK	
	1996	1995	1996	1995
Intentia	1	2	1 081	877
IBS	2	3	997	826
Frontec	3	4	635	572
Industri-Matematik	4	5	447	330
IFS Data	5	-	359	-
Essnet	6	-	251	-
Hogia-gruppen	7	-	189	-
Entra Data	8	-	157	-
Scala International	9	-	137	-
Verimation	10	-	131	-

Fig. 113: The ten largest Swedish software manufacturers had a total turnover of 4 384 million Swedish crowns (SEK) in 1996. The ten largest foreign software manufacturers in the Swedish market had a 1996 turnover of 3 111 million SEK. In 1995, the five largest Swedish companies had a total turnover of 3 780 million SEK, while the foreign ones reported a total turnover of 2 073 million SEK for the same year. One conclusion could be, that the Swedish software industry is doing quite well from a longterm stand-point, even if 1996 was a year of profit problems.
Sources: Based on data from Datateknik, # 11, June 13, 1996/Datateknik, # 11, June 12, 1997

The ten largest Swedish software manufacturers had a total turnover of 4 384 million SEK in 1996. For the same period, the ten largest foreign software companies reported a total turnover of 3 111 million SEK for their Swedish operations. Maybe the Swedish computer journalist, Lars Dahmén, editor in chief of"Computer Sweden", was right back in October 1995, when he stated:

— The Swedish computer industry is alive and well. It is time to stop crying over a lost Swedish computer industry. A new, and highly vital, Swedish computer industry has started and grown up quietly, beyond the media spotlights. This time it is not about the manufacturing of hardware. The new and successful companies are making their living in the software field. Some suppliers of software for business administration may serve as good examples: Intentia, IFS, and IBS are the leaders.

In 1995, the manufacturers of peripherals, in particular printers, had a difficult year. In 1996, the peripheral manufacturers increased their turnover by 25%, on an average. The group of companies belonging to this IST sub-industry is mixed, manufacturing anything from envelopes to digital radiology. Thus, it is indeed difficult to make meaningful comparisons. Anyway, below is a list of the ten most successful manufacturers of peripherals and their performance in 1995 and 1996. The list is based on data from "Datateknik". "Datavärlden" has integrated some of these companies — Strålfors and Axis, for instance — into a sub-industry they call "Swedish hardware manufacturers".

Peripheral Manufacturers in the Sweden in 1995 and 1996

Company	Ranking		Turnover, million SEK	
	1996	1995	1996	1995
Strålfors	1	1	2 015	1 737
Canon Svenska	2	2	1 137	1 241
UBI	3	3	646	635
Olivetti Lexikon Nordic	4	4	496	425
Rank Xerox	5	-	461	-
Axis	6	5	394	328
NEC Scandinavia	7	-	315	-
Fujitsu Nordic	8	10	273	164
EIZO Sweden	9	12	232	144
Storage Tek	10	8	193	174

Fig. 114: Strålfors and Axis represent Sweden on this list. UBI was once a Swedish company, but has been sold out. Axis, constructing, manufacturing, and selling servers for printers and CD-ROMs, has attracted a lot of interest since it was started by two young students and entrepreneurs in Lund some ten years ago. It is one of the fastest growing and most profitable companies in the IST business in Sweden.

Sources: After data from Datateknik, # 11, June 13, 1996/Datateknik, # 11, June 12, 1997

For their 1996 analysis, both magazines have made separate listings of what is called "telecommunications equipment". The listings are not identical, which may be due to a lack of convergent definitions."Datavärlden" makes one qualification, that the equipment is a result of in-house development. However, none of the magazines are explicit about their particular definitions, why the readers should go to the sources for further explanations.

Telecommunications Equipment Manufacturers in Sweden in 1996 (Datateknik)

Company	Ranking	Turnover, million SEK
Ericsson	1	125 883
Nokia	2	3 268
Allgon	3	1 369
Doro Telefoni	4	328
Alcatel Telecom	5	79
U.S. Robotics Nordic	6	71
Picture Tel Scandinavia	7	45
Teligent	8	31
Objecta Elektronik & Data	9	28
Viking Telecom	10	22
Polystar Instruments	11	21

Fig. 115: The eleven largest telecommunications equipment manufacturers in Sweden in 1996, according to "Datateknik".
Source: Datateknik, # 11, June 12, 1997

Telecommunications Equipment Manufacturers in Sweden in 1996 (Datavärlden)

Company	Ranking million SEK	Telco.eq. turnover million SEK	Total turnover
Ericsson	1	120 538	124 266
Nokia	2	1 540	2 200
Allgon	3	1 369	1 369
Motorola	4	347	1 158
Siemens	5	301	2 509
Alcatel Telecom	6	71	79
Saab Combitech	7	70	1 399
Brother	8	52	149
Picturetel Scand.	9	45	45
Panasonic	10	39	796

Fig. 116: The top ten telecommunications equipment manufacturers in Sweden in 1996, according to "Datavärlden", which has qualified the generic "telecom equipment manufacturer" by adding "developed in-house".
Source: Datavärlden, # 6 — 7, June, 1997

In the 1995 analysis by"Datateknik", this industry along with the telecommunications operators, were classified under one heading, "the telecommunications industry". The listing looked like this:

The Telecommunications Industry in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	Ericsson	99 681
2	Telia	41 060
3	Nokia	3 228
4	Netcom Systems	1 995
5	Allgon	1 175
6	Unisource	1 156
7	NordicTel Holdings	752
8	Doro Telefoni	318
9	Global One	98
10	Alcatel Business Systems	87
11	Telenordia	39
12	Stokab	33
13	Objecta Elekt. och Data	27

Fig. 117: The telecom industry is the one among the IT-industries investing the largest part of its income in installations. The four largest of the companies on this list invested in total almost 23 billion SEK during 1995. This is equivalent to one eighth of their total income.Telia is the largest investor in networks and other communications installations in the country.
Source: Datateknik, no. 11, June 13, 1996

An interesting fact in the 1996 analyses is, that both magazines state that data communications is representing the one industry showing the heaviest growth."Datateknik" has ranked these companies as follows:

Data Communication Providers in Sweden in 1995 and 1996 (Datateknik)

Company	Ranking		Total turnover million SEK	
	1996	1995	1996	1995
Cisco Systems	1	-	1 410	-
3Com Nordic	2	1	587	442
Bay Networks Nordic	3	2	507	353
AU-System	4	-	263	-
Heath Comm Nordic	5	-	171	-
NCR (Sverige)	6	3	166	239
Alca Comm. Group	7	-	165	-
Cabletron Systems	8	8	69	54
UB Networks	9	5	63	112
Dafix	10	9	55	53
Westermo Teleind.	11	10	38	32

Fig. 118: In 1996, the 11 largest companies in the business of data communications reported a total turnover of 3 494 million SEK. In 1995, the ten largest companies in the business had a total turnover of 1 551 million SEK. Out of the 11 companies in the 1996 ranking list, 4 were not on the 1995 list.
Sources: Datateknik # 11, June 13, 1996/Datateknik # 11, June 12, 1997

In 1996, the top 11 data communications providers to the Swedish market more than doubled the total turnover as compared to the top 10 leaders in 1995, 3 494 million SEK compared to 1 551 million in 1995. The Internet and its derivatives intranets and extranets, are part of the explanation to this growth.

As already stated, the distributors and the retailers had a difficult year in 1996. The rankings for 1995 and 1996 according to "Datateknik" follow below. The "Datavärlden" rankings differ, why the reader is adviced to go the the sources for further and more detailed information. In 1995, the distributors made up the most successful industry of all sub-industries. The change from 1995 to 1996 is dramatic.

Distributors in Sweden in 1995 and 1996

Company	Ranking		Total turnover million SEK	
	1996	1995	1996	1995
Scribona	1	1	6 594	6 054
Santech Sverige	2	2	2 053	1 366
Computer 2000	3	3	1 409	1 161
OEM International	4	-	834	-
Nordic Datadistr.	5	4	659	786
Avnet Nortec	6	-	610	-
Facit	7	5	436	541
Dennis Bergström	8	-	370	-
Gandalf Data	9	8	342	331
Metric	10	9	320	324

Fig. 119: Although the total turnover has grown from 1995 to 1996 for most companies, the profits of 1995 turned into losses for many in 1996. Over the last few years, logistics have become a crucial competitive advantage for the distributors — good products and low prices are no longer sufficient.
Sources: Datateknik # 11, June 13, 1996/Datateknik # 11, June 12, 1997

Retailers are facing the same type of difficulties as the distributors. In 1996, the total growth was somewhere between 5 — 10% compared to more than 30% during the period of 1993 — 1995. The competition is tougher than ever before, and the margins are smaller. 1996 has been a year of many mergers and changes."Datateknik" has an interesting analysis of the industry as such, its difficulties and its structure.

Retailers in Sweden in 1995 and 1996

Company	Ranking		Total turnover million SEK	
	1996	1995	1996	1995
CMA Computer Marketing	1	2	1 395	1 496
Kontorslandslaget	2	3	1 200	1 100
Konfac	3	-	900	-
QD System	4	5	682	620
IMS Data	5	10	659	392
Alfaskop	6	6	564	529
Pulsen	7	8	555	460
TCM	8	-	522	-
Lap Power Hold.	9	-	488	-
Min Dator	10	-	450	-

Fig. 120: The top 10 retailers in Sweden in 1995 and 1996, as ranked by "Datateknik". The magazine has an interesting analysis of the whole business in its June 1997 issue, pointing out that a number of traditional TV- and radio-retailers now are competing by offering PCs, lap tops, and software directly to the general public, at comparatively low prices. Since these companies — ON-OFF and City Stormarknad being the most typical ones — are not included in the IST survey, since their main business is — TV, radio, and hi-fi retailing.
Sources: Datateknik # 11, June 13, 1996/Datateknik # 11, June 12, 1997

According to"Datavärlden", the IST and computer consultancies are so loaded with business, that they are having difficulties accepting new projects and customers. Moreover, they are recruiting more people than ever before, frequently advertising for IT-specialists and persons with network competence. Below are two listings of Swedish and foreign consultancies and their ranking in 1996.

Swedish IST and Computer Consultancies in 1996

Company	Ranking	Consulting turnover million SEK	Percentage consulting	Total turnover million SEK
VM-Data	1	1 882	33	5 703
Enator	2	1 871	43	4 352
Ericsson Data	3	910	48	1 896
Telia Data	4	897	35	2 564
IBS	5	548	55	977
Intentia	6	508	47	1 080
Volvo Data	7	377	26	1 451
Frontec	8	355	56	634
Telia Swedtel	9	288	90	320
Mandator	10	250	100	250

Fig. 121: The top 10 among Swedish IST and computer consultants had a total turnover of 19 227 million SEK in 1996. 7 886 million SEK were generated by consulting. Now, these are only the top 10 of the several hundred consultancies in the country. Some 90 000 people are employed in this area, and at least 10 000 more will be needed in 1997.
Source: Datavärlden # 6—7, June 1997

Foreign IST and Computer Consultancies in Sweden 1996

Company	Ranking	Consulting turnover million SEK	Percentage consulting	Total turnover million SEK
Cap Gemini	1	2 019	75	2 691
IBM	2	575	9	6 384
Sema Group Sweden	3	331	21	1 574
Merkantildata	4	236	20	1 178
Digital Equipment	5	165	9	1 830
Andersen Consulting	6	155	40	387
Cambridge Technology Partners	7	138	100	138
Bull	8	128	30	425
ICL Holding	9	119	5	2 377
Motorola	10	116	10	1 158

Fig. 122: The top 10 foreign IST and computer consultancies represented in Sweden reported a total turnover of 18 142 million SEK in 1996. 3 982 million SEK were generated by consultancy business. These figures should be compared to those generated by the Swedish consultancies, presented in the previous table.
Source: Datavärlden # 6—7, June 1997

Hardware service continues to grow. But during the past few years, many of the small, independent start-ups have been acquired by large, more traditional groups, once they decided to get involved in third-party-service."Datavärlden" contains a detailed and interesting analysis of the Swedish hardware market segment. In this context it will have to suffice to state that among the top 10 hardware service providers in the Swedish market, not one company has "hardware service" as their one and only business. Most of the companies are in hardware sales, one is a distributor, one a retailer, and one a consulting conglomerate.

Hardware Service in Sweden in 1996

Company	Ranking	Hardware service turnover million SEK	Percentage hardware service	Total turnover million SEK
Digital Eq.	1	824	45	1 830
IBM	2	511	8	6 384
ICL	3	475	20	2 377
Sun Microsyst.	4	256	20	1 280
Unisys	5	164	35	472
Kontorslandlaget	6	162	14	1 200
Siemens Nixdorf	7	155	23	674
Scribona	8	132	2	6 594
Enator	9	131	3	4 352
Océ	10	120	41	294

Fig. 123: The hardware service market is dominated by the old players, Digital, IBM, ICL, etc. all of them having adopted the idea of third party service. This is a market segment staggering under tough price competition and thus corroding margins. Retailers are part of the competition, offering more and more of traditional hardware service to their customers. According to one analyst, the retailers increased their part of hardware service by 17% in 1996, and turned over 1 550 million SEK.
Source: Datavärlden # 6 — 7, June 1997

4.2. The IST Users in Sweden

Evidently, one prerequisite for growth of the IT industries, is demand, demand caused by individual human beings and their organisations, wanting to buy the products and the services offered in the market place. Statistics Sweden, which during spring 1996, published a survey called *"Data om informationstekniken i Sverige 1996"(Facts about Information Technology in Sweden 1996 – not available in English)*, provides an almost complete picture of computer usage in the country.

Individual Usage

The number of persons living in Sweden and using computers is more than 3.1 million, according to the Statistics Sweden's survey. Some 60% of all inhabitants in the age groups from 16 years to 64 years are at present or have been computer users.

Computer Users in Sweden in 1995:
60% of the Population

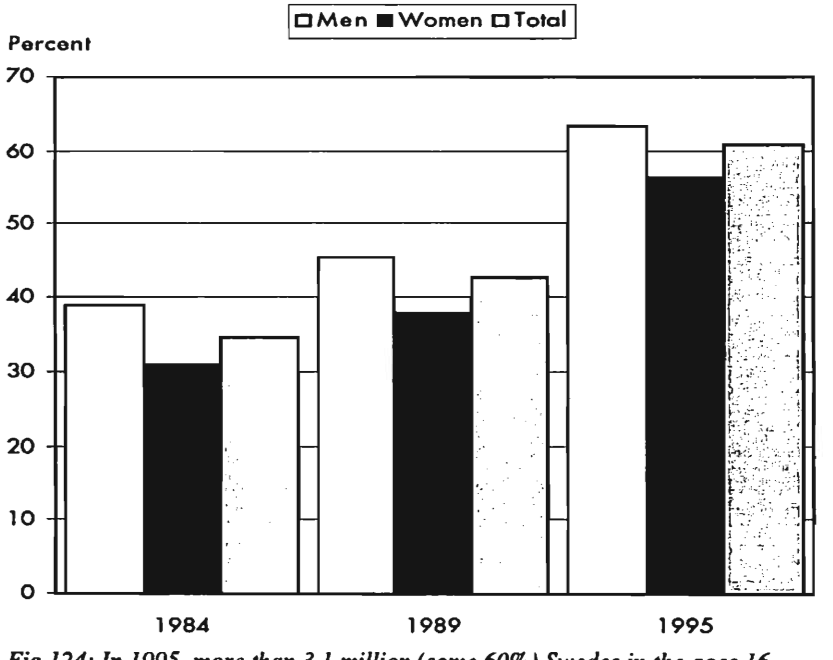


Fig 124: In 1995, more than 3.1 million (some 60%) Swedes in the ages 16 — 64 years were computer users. In 1989, the equivalent percentage was 42%, and in 1984, 35%.

Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Among users in Sweden, users defined as individuals using or having used computers, about 1.7 million were men, and 1.45 million were women. The Statistics Sweden's survey shows, among other things, that there are rather important differences between users groups regarding gender, age, socio-economic status, and education.

Statistics Sweden defines computer usage as usage of any kind of computer, computer terminal, cash register, or any other kind of computerised equipment when working outside the home, for instance in an office, or at home. Not included in "computerised equipment" are computerised kitchen machinery, telephones and fax machines.

The data in the following chapter is based on the latest survey of computer habits among Swedish users, carried out during 1995 by Statistic Sweden on commission of the Swedish government's IT Committee. Similar surveys were made in 1984 and in 1989. These are referred to in the results presented. For more details, see also earlier issues of the *"TELDOK Yearbook"* — 1989/90, 1992 and 1994.

General Computer Usage

The distribution of computer usage as regards socio-economic status and gender shows that less than half of the blue collar workers, 42%, in comparison to the Swedish white collar workers, 92%, are using or have used computers. It should be noted, that white collar workers in Sweden are divided into two categories, called lower white collar workers and higher white collar workers. Among the former are clerks, cashiers, and similar professionals, having no managerial responsibility. Among the later are professionals having managerial responsibilities.

Computer Users in Sweden Related to Socio-economic Status in 1995

Fig 125: The diagram shows the socio-economic distribution in percent of Swedish computer users among blue collar workers, lower white collar workers, higher white collar workers, and managers. Figures are given for each category in total as well as the distribution per category among men and women.

Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Among Swedish corporate leaders and managers, only 52% are using computers, which should be compared to the equivalent figures for white collar workers.

Computer usage is also related to education. People holding degrees from universities and polytechnical schools are using computers to a larger extent than those not holding any degrees. The exception to this rule is found among those having only nine years of basic education — there are more computer users in this group than among those having a post college education of one year. 54% among the former group are computer users, while 47% of the latter group use computers.

Computer Usage Related to Education Level in Sweden 1995

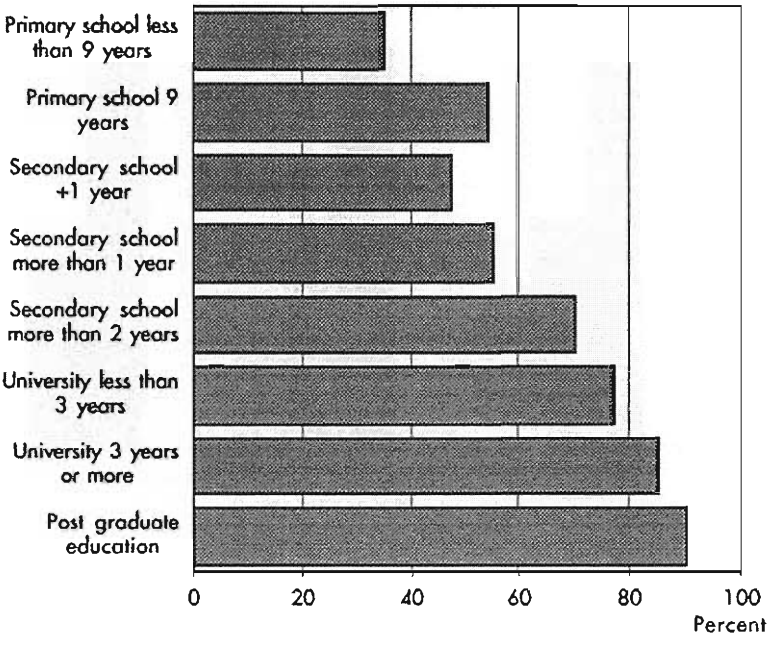


Fig 126: The best educated Swedes are the most frequent computer users. Interestingly enough, Swedes having left primary school after 9 years, are more frequent users than those having spent some time in secondary school.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Among persons holding doctorates, 90% are computer users, and among those holding other academic degrees of more than three years, 85% are using computers at work and/or at home.

Relating computer usage to age and gender, results in some not unexpected results. People being 55 years and older, use computers less that the younger ones. 47% of the population group aged 55 to 64 years, are computer users.

Computer Users in Sweden:
Gender and Age Distribution in 1995

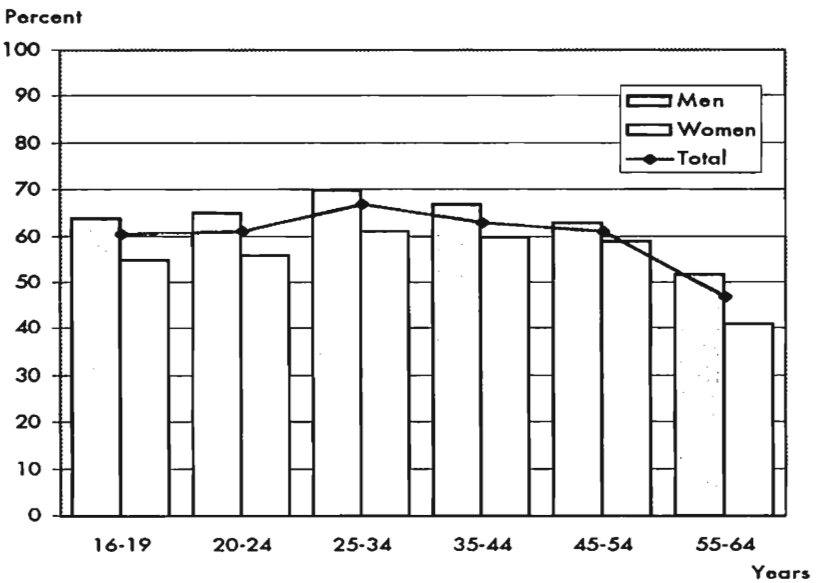


Fig 127: Swedes are no exception to the general rule for the western world that the most frequent computer users are men in the age groups of 25 to 35 years. Overall, men are more frequent computer users than women. Among the reasons for this are that women find the technology as such much less interesting than men, and women tend to prefer communicating directly with other people over so called mediated communication. This is shown by various user research programs.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Among the individuals in the younger age groups, between 60 to 66% are users. The largest user category, 70%, is found among men of the age group from 25 years to 43. Generally speaking, women use computers less than men. This difference is most remarkable for those in the oldest age category, and less so for those in the second oldest one.

Computer usage related to geographical distribution across the country also seems to be significant, the densely populated urban areas having a larger percentage of users than the less inhabited areas. In the urban area of Stockholm, 70% of the inhabitants are computer users; 66% of the inhabitants of Gothenburg, and 66% in Malmö in the south.

Geographical Distribution of Computer Users in Sweden 1995

Computer users in percent of total population in the Swedish counties in 1995

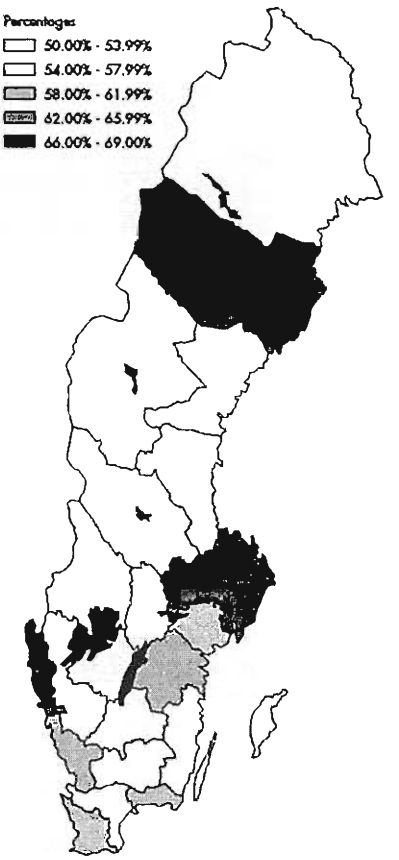


Fig 128: That people living in the urban areas of Stockholm, Gothenburg, and Malmö are the most frequent computer users, fits with prevailing ideas. But the map also shows some interesting phenomena — some less densely populated areas are using IT to cope with distance and to create new job opportunities. In the north, the council of Västerbotten is the outstanding example. In the south, the council of Blekinge, which traditionally has had the most elevated unemployment figures in the country, has implemented IT as a countermeasure. And along the westcoast, most counties are actively implementing IT to help the local industry, by tradition small family companies.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

The council of Västerbotten in the north is one of the most user intense areas — 67% of its inhabitants are computer users, while their immediate neighbours all belong to the less user intense computer user areas of Sweden.

Computers at Work

Nowadays, it is more common than not to use computers at work. About 2.1 million, or more than 50% of all persons employed in Sweden are using computers in their daily professional tasks. In 1989, 32% — or 1.4 million employed Swedes — were computer users, and five years earlier the equivalent figures were 24%, or 1 million.

Men have been computer users at work to a larger extent than women, according to all surveys carried out. In 1995, 54% of the men employed and 31% of the women used computers. In 1989, the figures were 35% to 31%, and in 1984, they were 25% to 22.

Computer Users at Work in Sweden 1984, 1989, and 1995 In percent of the total employed population, according to gender

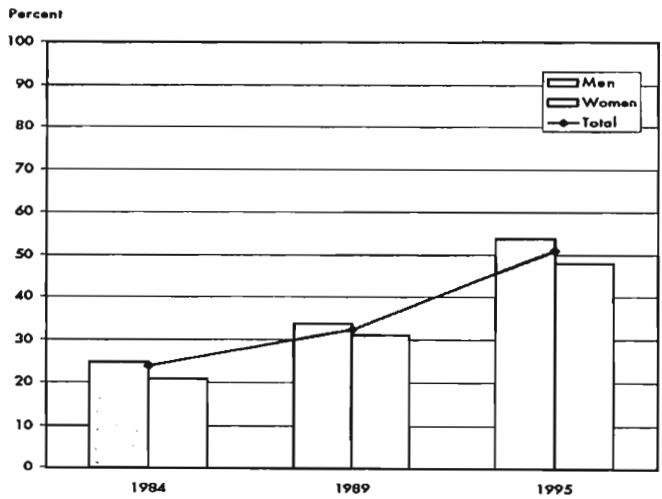


Fig 129: Statistics Sweden has so far made three surveys of computer usage among the Swedish working force, in 1984, 1989, and 1995. At the first two occasions, Sweden had one of the most computerised working forces in the world. This is no longer so, countries like Denmark and Switzerland have overtaken Sweden. Interesting to note, however, is that men still are more frequent computer users at work than women. But other surveys indicate that this may be changing.

Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

The category of the Swedish population having been the the most frequent computer user as shown by all surveys made is men belonging to the age groups 25 to 34 years and 35 years to 44 years. Some 60% of these groups are using computers.

Computer Users at Work in Sweden in 1995
In percent of total employed population, according to gender and age group for 1995

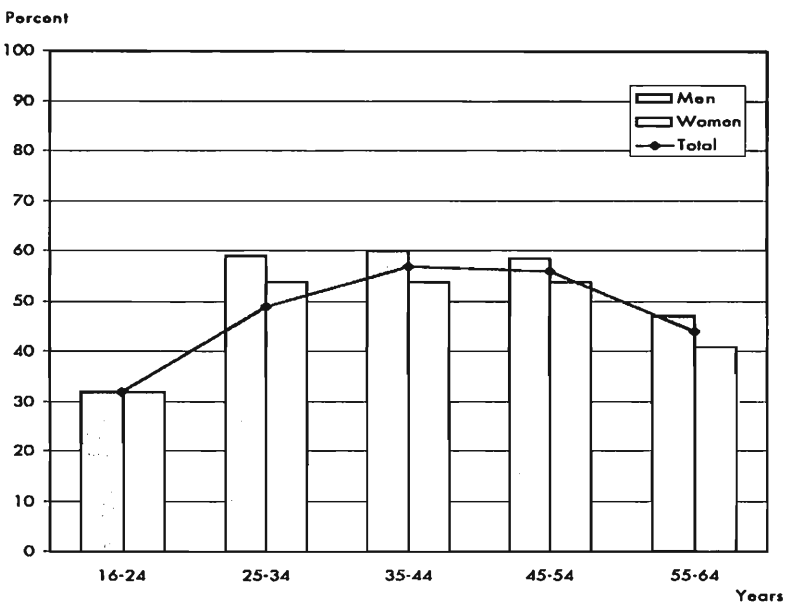


Fig 130: Again it is confirmed that men aged 25 to 44 are the most frequent computer users at work. The percentage of women using computers at work increase by age — more than 50% of working women aged 45 to 54 are computer users, while not quite 50% of their younger sisters aged 25 to 34 are computer users at work.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

The least frequent users are found in the age group 16 to 24 years, among which about 32% are computer users. The fact that these young people have not been employed yet, may contribute to the low figure. On the other hand, the survey also shows that this group are frequent users of computers at home.

Regarding computer usage at work, there are also significant differences shown by geographical distribution.

Geographical Distribution of Computer Users at Work in Sweden 1995

Computer users at work in percent of the total working force in the Swedish counties in 1995

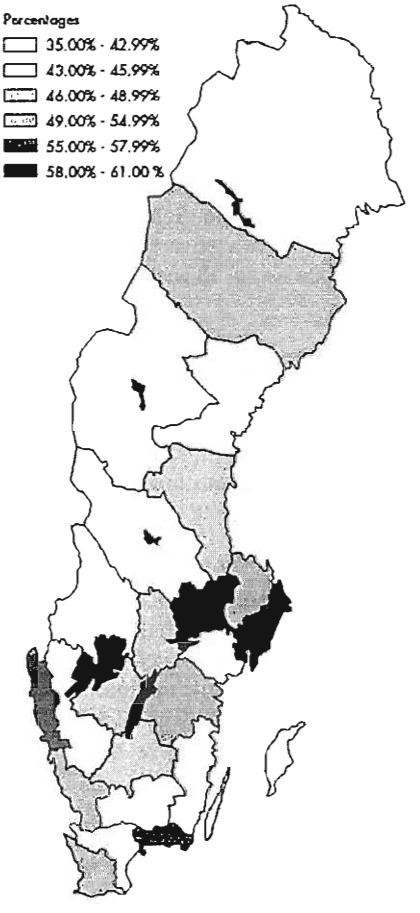


Fig 131: Also at work, computers are more frequently used in the urban areas than in the country side. As evident from this map, there are some important exceptions to this — the council of Västerbotten, the coastal area north of Stockholm, including the archipelago, and the council of Västmanland, where ASEA Brown Boveri is the dominating industry.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

In the district of Stockholm, the users at work amount to 60%. The districts of Västmanland, 59%, and Blekinge, 57%, show a larger percentage of computer users at work, than does the urban area of Gothenburg, having 56%. The map also shows that there is a considerably larger number of computer users at work in the county of Västerbotten than in the surrounding counties of Norrland.

Equipment and Usage at Work

Personal computers are the most common type of equipment used at work. 1.65 million — 69% — of computer users are using personal computers for their professional work, in this context defined as PCs or Macintoshes. As PCs are regarded any computers running under the operating systems DOS, Windows NT or OS/2. 1.35 million, or 80%, of all users of personal computers, are utilising PCs according to this definition. Some 8% are Macintosh users, while 5% among the rest are using a PC as well as a Macintosh. 6% do not know what kind of computer they are using, all according to Statistics Sweden's survey.

Some 763 000 employed persons are using computer equipment other than personal computers. Almost two thirds are hooked up to central computer systems via monitors. Not quite one fourth is working with computers for process control, while one fifth of all employees is using cash registers. About 15% are working with programmable machine tools, robots, or similar. The remaining third of the work force is using the computer equipment for "other purposes".

Among those using personal computers, 70% are connected to networks. 57% of all users of personal computers, some 930 000 persons, are using networks in order to share information. Sharing is related to the sharing of data such as electronic documents and databases, while the sharing of operating systems and other software is infrequent. Only 20% of all professional users of personal computers are sending faxes via their networks.

The most frequently used computer applications are word processing and the creation of uncomplicated diagrams. 64%, or 1.34 million of all users, say they utilise their computers for these applications. 44% have word processing as their major computerised task. 47% work at changing and updating existing databases and registers. 54% are busy at adminstrative routines. The fourth most frequent application — according to Statistics Sweden — is analysis of figures — 11% of all users are employed to do this. For 70% of the 210 000 persons utilising cash registers, this is the most common — or only — work task performed by computer equipment.

Computer Usage at Home

Not quite 1.4 million persons living in Sweden of the age groups between 16 to 64 years are using computers at home.

Computer Users at Home in Sweden 1995
In percentage of the total population, aged 16 to 64, also according to gender

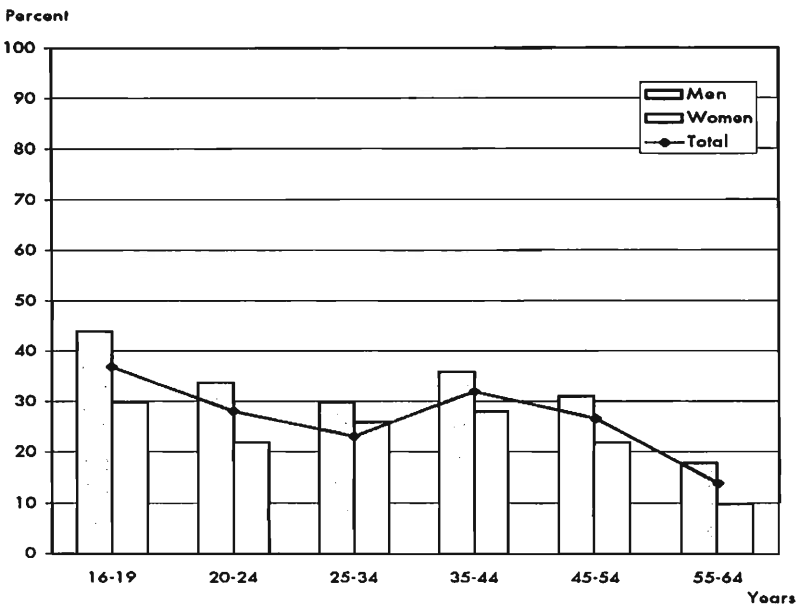


Fig 132: At home, the most frequent computer users are the young ones, those aged 16 to 19 years. Again, the men are dominating, more than 40% are computer users, while less than 30% of the young women use computers at home.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

The most frequent users are found among the young people, aged 16 to 19 years. 30% of all men and 22% of all women use computers at home. Men are more frequent users than women in all age groups.

The educational level turns out to be an important factor to computer usage at homeas well as professionally. Most frequent is computer usage at home among the highly educated, among those having post graduate education. Least frequent is computer usage at home among those having spent less than nine years at primary school.

Computer Usage at Home Related to Education Level in Sweden 1995
In percentage of the population aged 16 to 64 years

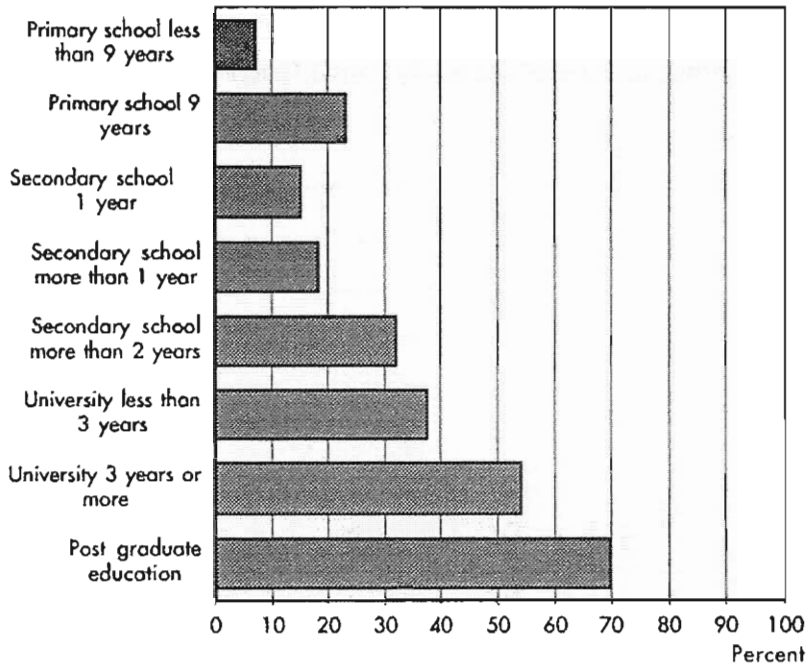


Fig 133: The correlation between computer usage at home and level of education is a strong one. Almost 70% of those holding post graduate degrees are using computers at home, in comparison to less than 10% among those having spent less than 9 years at primary school.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

It turns out that those who have spent two years at college but never finished their studies, are less frequent users than those who spent nine years at basic education, i.e. primary school.

Moreover, there are important differences in computer usage at home between different socio-economic groups (see diagram 1.11 below).

Persons Using Computers at Home in Sweden 1995
In percentage of the total population in the age groups 16 — 64 years, distributed per gender and socio-economic status

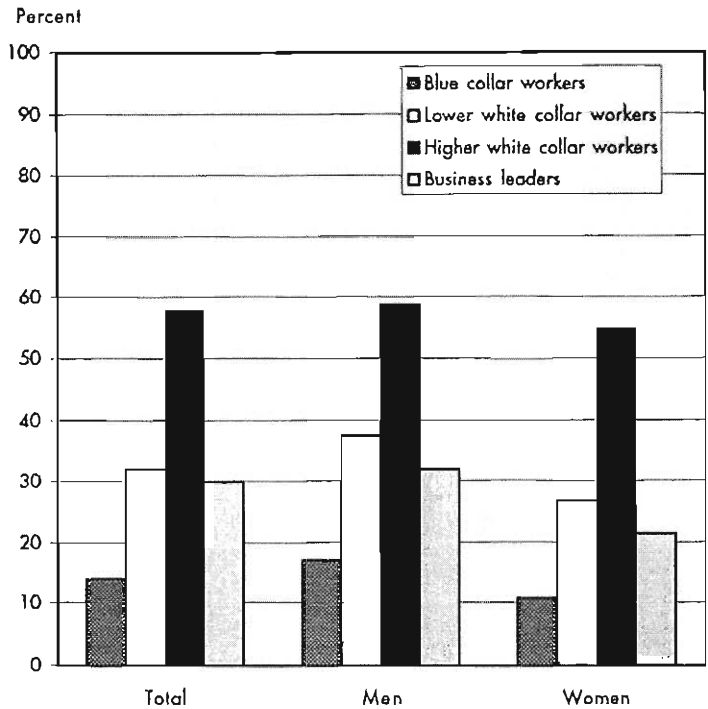


Fig 134: People belonging to the category "managers", i.e. white collar workers with managerial and business resposibilities, employed by organisations, are the most frequent computer users at home. The distribution is almost even between men and women. The least frequent users are blue collar female workers.

Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Only 14% of blue collar workers use computers at home, while some 58% of white collar workers do so. Men are more frequent users than women in all groups.

The most frequent applications for the almost 1.4 million persons using computers at home, including all socio-economic groups, are word processing, processing of private finances, processing for all kinds of volontary associations, and similar activities. Almost 80% use their home computers for these kinds of applications. 55% use their home computers for games and other hobbies. Among those employed outside the home, 42% use their computers for training and educational purposes, and 12% find other usages for their home computers.

Geographical Distribution of Computer Users at Home in Sweden 1995

Computer users at home in percent of the population aged 16 to 64 years in the Swedish counties in 1995

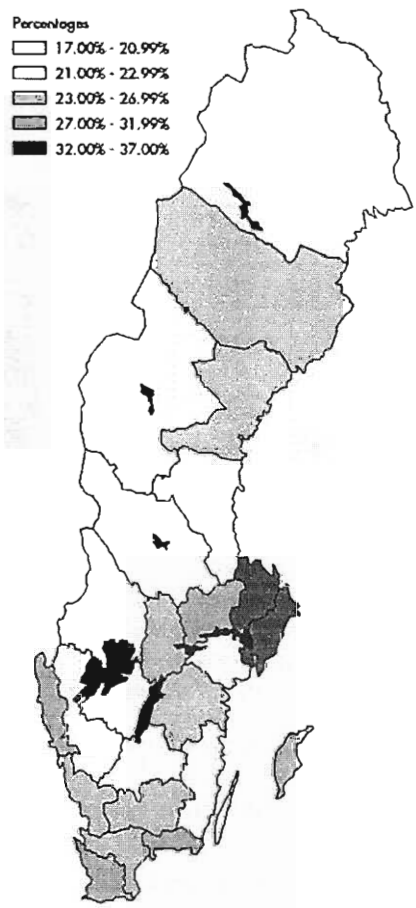


Fig 135: The most frequent home computer users live in the counties of Stockholm and Uppsala. This can be compared to the geographical distribution of computer usage at work, diagram 1.8 above.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

A map of the geographical distribution of home computer usage shows that the counties of Stockholm and Uppsala are the areas most densely populated by home computer users — some 35% of the total population.

Two other urban areas, Gothenburg and Malmö, follow, having 30% of their populations using home computers. The counties of Kalmar, Värmland, Kopparberg, Gävleborg and Norrbotten have the fewest home computer users.

Are people using the same types of computers at home as at work? Today, the answer to that question seems to be yes, to a large extent.

Computers Used at Home in Sweden in 1995

Percentage of types of computers used at home

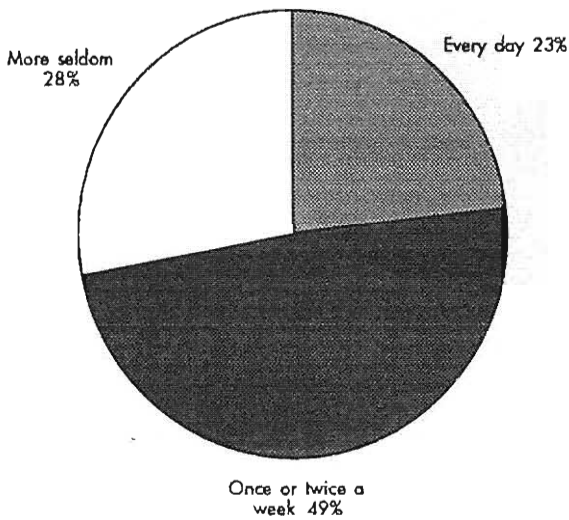


Fig 136: A PC is defined as a computer running under one of the operating systems DOS/Windows, OS/2 or NT. PCs are dominating at home, as well as at work. 15% are Macintosh-users, which is equivalent to 210 000 persons.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

The notable difference is that Macintosh is represented twice as frequently at home as at work. 78% of all users are using PCs, i.e. computers running under the operating systems DOS, Windows, Windows NT, or OS/2. Almost 15%, or some 210 000 persons, are Macintosh users. The equivalent figures for other types of computers are 5%. In this is included computers not regarded as PCs or Macintosh, for instance Amiga. 2% of all home computer users do not know what type of computer they use.

The computers installed at home are used frequently (see diagram 1.14). The once popular hypothesis that home computers mostly function as dust collectors, simply does not hold.

Computer Usage at Home among Swedes Aged 16 to 64 Years in 1995

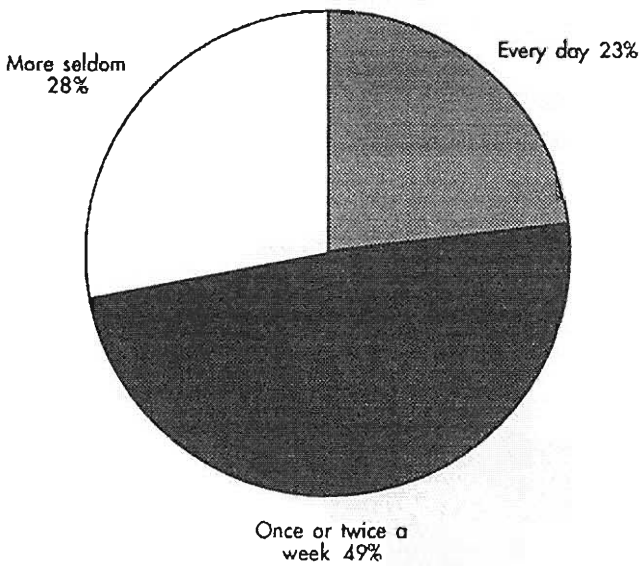


Fig 137: About half of the home computer users in Sweden, among those aged 16 to 64 years, switch on their computers at least once a week. 23% are using their computers every day.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

23%, or some 300 000 persons, use their home computers every day. 49%, almost 1 million users, utilise them a few times a week. Among those, 670 000 are men. 28% of the male users and 14% of the female users switch on their home computers every day. About 53% of the male users and 45% of the female users say they utilise their computers a few times a week. 20% among the men, and 40% among the women use their computers less frequently.

240 000 home computer users, or 17%, of the 1.4 million home computer users in Sweden are connected to computers outside their homes via modems or other types of network connections.

Why Are Swedish Computer Users at Home Connected to Networks in 1995?

Reason	Thousands of persons	Percentage of home computer users
To communicate with others by electronic mail	116	8.4
To send faxes	119	8.5
To work from home	99	7.1
To retrieve information from external data bases, BBSs, Internet, etc.	124	8.9
Banking services	18	1.3
To play games	94	6.8
To communicate with other computers for other reasons	75	5.4

Fig. 138: Among the networking services most frequently used are communications functions, E-mail and fax. But most frequently of all, the Swedes are using their network connections for downloading information from data bases. It will be interesting to follow the development of on-line banking services — the Swedish banks are slowly reacting to the opportunities offered in this field.
Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Flex-place Working

Thanks to the fact that information technology has moved into the homes of many people, they are experiencing new opportunities to work from their homes, carrying out tasks that traditionally have been closely tied to offices and similar work places.

From a societal point of view these (new) opportunities are interesting for many reasons. first of all, tasks can more easily be given to those having the best competence, in stead of vice versa. Secondly, people can live whereever they want to, which for a scarcely populated country like Sweden means that the country side can be populated, in spite of the fact that most new jobs are created in the urban areas.

One direct consequence of flex-place working is less commuting, which should have positive long term effects on environment. This is, of course, of special interest for urban areas. In Stockholm, some 440 000 people commute every day. In Tokyo, 25 million. Each Stockholm commuter spends on average 1.25 hours commuting, while the average Tokyo commuter spends 2.20 hours commuting each day. The drawbacks of flex-place working is that people working from their homes are thought to have fewer social contacts. So far, however, no statistics are available proving or disproving this.

The Nordic Institute for Urban Planning, Nordplan, has defined flex-place working as follows:
— Flex-place working is applied to every person working part of his/her time from home. Those having their employers at a distance are called tele commuters.
People working in their own firms, from their homes, are not included in this definition.

Persons Working from Home vs. Persons Not Working from Home in Sweden 1995

In total 3 466 000 persons

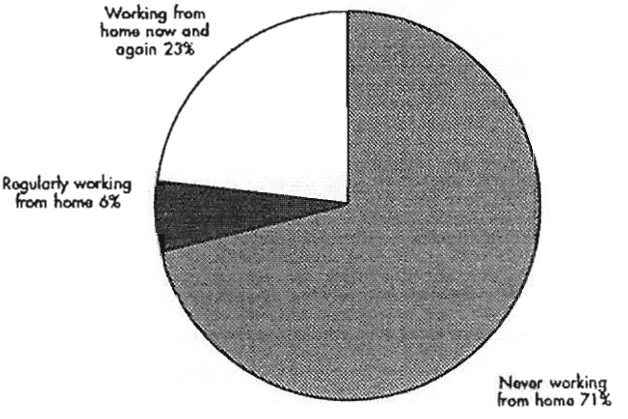


Fig 139: The total Swedish working force consisted of 3 466 000 persons by the end of 1995. 23% of these were working from home now and again, 6% said they were working from home regularly, while the great majority, 71%, said they never worked from home. In total, some 800 000 people are working from home in Sweden.
Source: The TCO survey 1994/"Data om informationstekniken i Sverige 1996". SCB/Statistics Sweden

According to a survey made by the Swedish white collar workers' association of trade unions, TCO, in collaboration with Statistics Sweden in December 1994, 71% of all people employed never work at home. 6% work regularly from their homes after agreement with their employers. 23% work from their homes now and again, at least an hour per month. The latter group has made no agreement with their employers about working from home.

A more detailed study of the category of people working from their homes now and again without agreement from their employers, in total some 800 000 persons, shows that 59% work from their homes one hour per month. 18% work from their homes at least one day per month, and 23% at least one day per week. Of special interest is, that as many are working from their homes at least one day per week without formal agreement with their employers.

Frequency of Work at Home in Sweden 1995
Total population: 800 000 persons

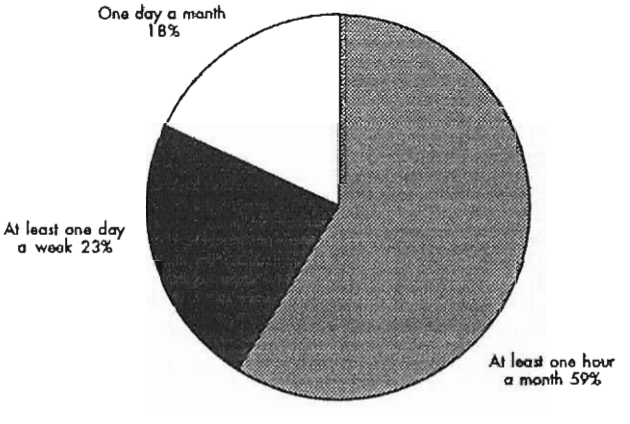


Fig 140: Some 800 000 Swedes are working from home some of their regular working hours. 23% say that they work from home at least one day a week, while the great majority are infrequent workers from home — 59% spend at least one hour a month working from home.
Source: The TCO survey 1994/"Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Almost without exceptions, it is the white collar workers being able to work from their homes now and again, specifically so people engaged as teachers or educators. Tasks in the areas of administration, finance, research, statistics, and public journalism are also frequently carried out from home.

Temporary time pressure or too heavy work loads are the reasons given by almost 58% of those working from home now and again. The need for peace and quiet and concentration is the reason given by 44%. Almost 13% say that personal needs including baby sitting are the reasons for working at home, while 9% want to avoid commuting.

Reasons for which Swedes Work at Home Given in 1995

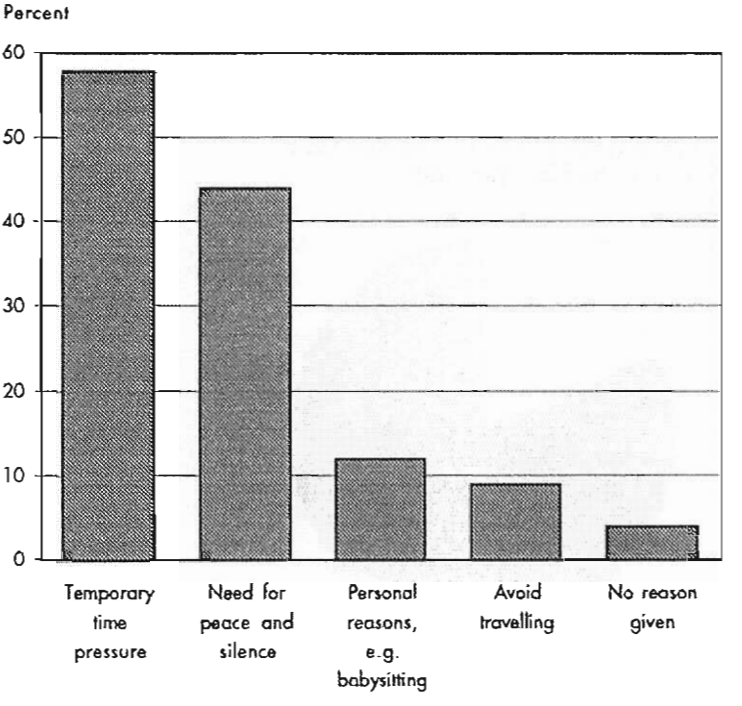


Fig 141: The dominant reasons given for working at home are temporary time pressure and a need for peace and quiet when solving problems. In this survey, less than 10% have said they "want to avoid travelling time" as a reason for working at home.

Source: The TCO survey 1994/"Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

Flexible working hours provides 63% with the possibility to work from home now and again. Private investment in equipment provides 18% with the possibility, and in 13% of the cases, investment by the employers offers the opportunity to flex-place working.

Prerequisites for Working at Home in Sweden 1995

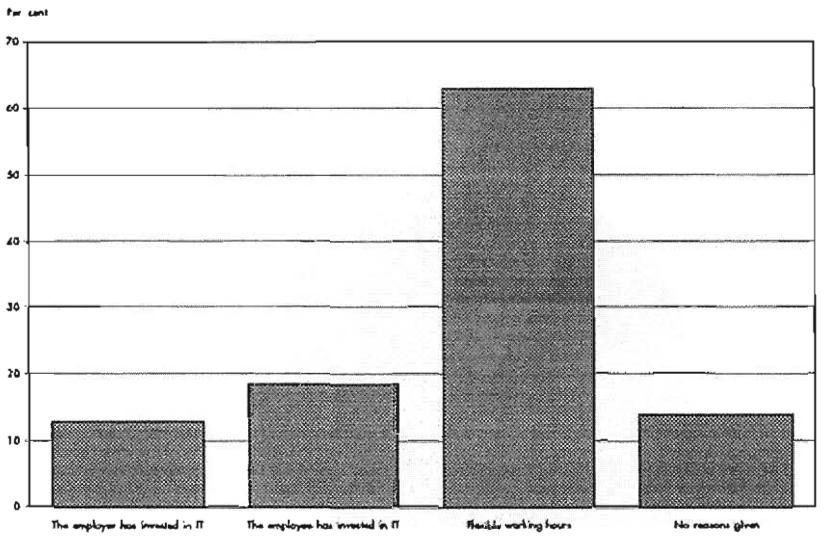


Fig 142: The above diagram gives major reasons for which people in Sweden work at home now and again. The most important factor is the flexible working hours, while it is of less importance that the employer has invested in IT equipment stationed at the employee's home.
Source: The TCO survey 1994/"Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden

According to the computer users' habits survey by Statistics Sweden in 1995, some 42% among the 1.1 million persons using computers at home, are utilising their computers for paid work. That means that almost half a million persons in the age groups from 16 years to 64 years are using their computers parttime or fulltime to earn a living from their homes. However, 81% of these are only working 25% of their total working hours from home. 9% are spending more than 25 but less than 50% at work from home, while 10% are working 50% or more from their homes. 19% of all persons working from their homes are using modems or other modes of communication.

Computer Assisted Work from Home as Part of Total Working Hours Population: Less than 500 000 persons.

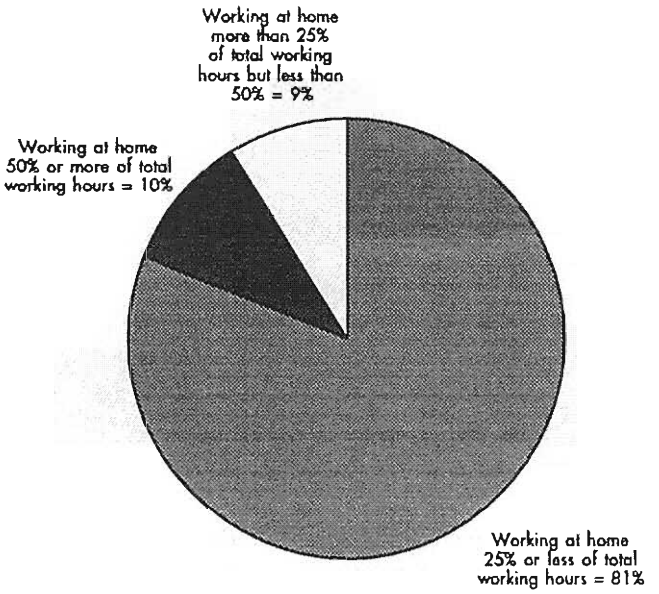


Fig 143: Some 50 000 Swedes, or 10% of the population working at home, a total of less than 500 000 persons, spend at least 50% or more of their total working hours at their IT equipment at home. 45 000 persons, or 9%, spend at least 25% of their working hours at home, while the rest, about 405 000 persons, equivalent to 81%, spend less than 25% of their working time in their home offices.

Sources: "Datorvanor 1995" in "Data om informationstekniken i Sverige 1996", SCB/ Statistics Sweden

4.3. Computers, Education, and Training

Since 1985, the number of individuals having formal IT degrees from educational institutions as their top education has increased by 30 000.

According to the regular surveys on finished educations, carried out by Statistics Sweden, the following number of IT diplomas and academic degrees have been awarded during the period 1985 — 1994 in Sweden:

* *In 1985, 14 786 persons left schools and universities holding IT degrees*
* *In 1990, 21 985 persons left schools and universities holding IT degrees*
* *In 1994, 48 595 persons left schools and universities holding IT degrees*

During the same period, there has been a development towards a larger degree of integrated educations, which cannot be concluded from the statistics of finished diplomas and degrees.

Still, the majority of those holding IT degrees of some sorts belong to the age groups being 25 years to 34 years, but according to the statistics over formal educations kept by Statistics Sweden, there has been some changes in the age groups over the last few years.

Number of IT Educated Persons of the Swedish Population 1985 — 1994 According to Age Group Belonging

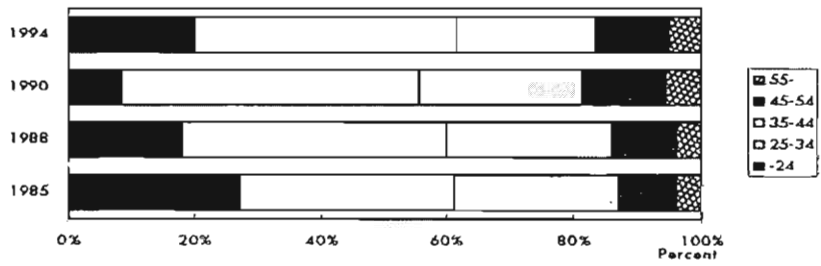


Fig 144: The largest percentage of persons having some kind of IT education and/or training still is found in the age groups 25—34 years.
Source: SCBs utbildningsregister/(The Education Register), Statistics Sweden

At all levels of the primary and secondary schools, IT education and training are integrated with other teaching subjects. At secondary school, some special courses in IT are available, but since 1986, when students' interest was at top level, fewer pupils are choosing these courses.

Participants in Special IT Courses at Secondary Schools in Sweden 1980 — 1994.
Totals and Distribution According to Gender.

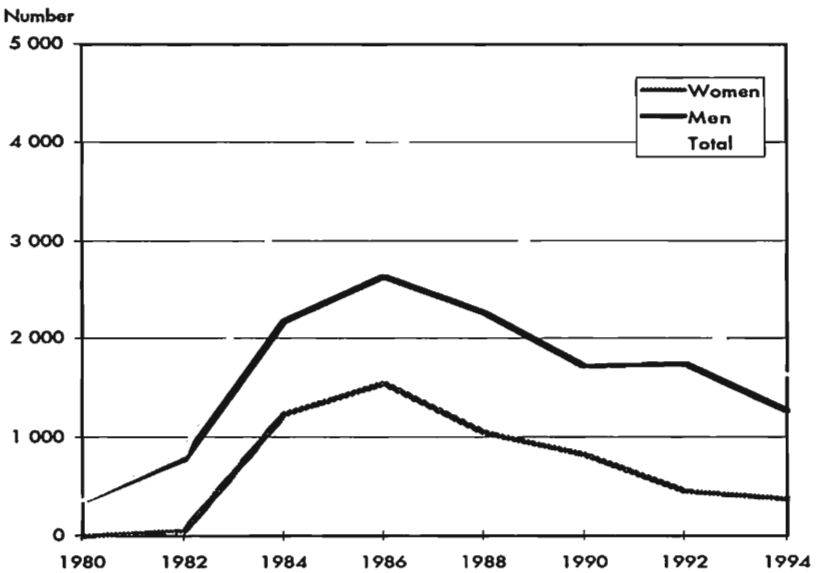


Fig 145: There were fewer students taking the specialised IT courses in 1994 than in 1986. During the same period, fewer female students participated in these courses. One reason for the decreased student interest in the specialised courses is, that there were more integrated IT courses offered in 1994 than in 1986.
Source: SCBs utbildningsregister/(The Education Register), Statistics Sweden

At university level, the number of students graduating from IT basic level courses have been increasing rather steadily from the academic year of 1980/81 until 1988/89. After that, the number of students decreased and since then it has stabilised just below the top year.

IT Diplomas from Universities and High Schools in Sweden 1980 — 1993 Totals and Distribution According to Gender.

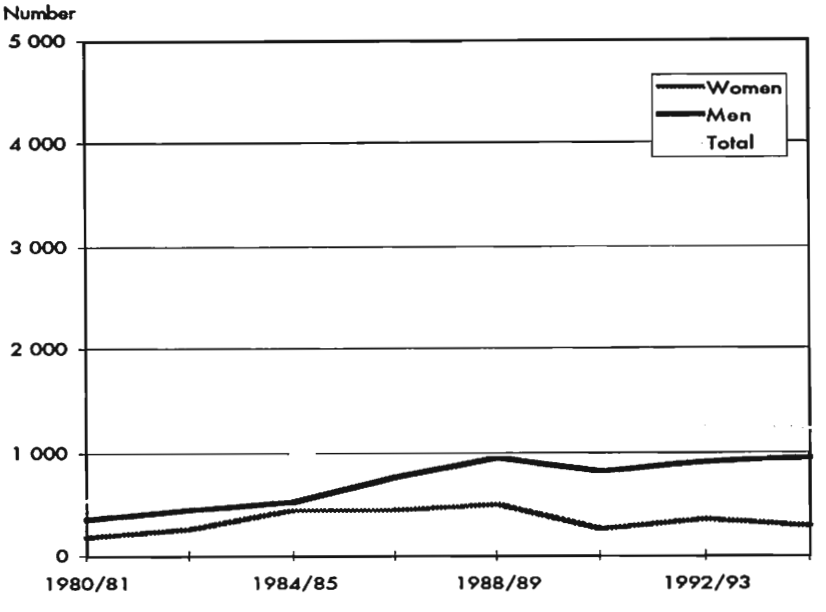


Fig 146: According to these statistics, the number of female students has decreased. But these changes are partly due to changes in curricula structures at the universities — large number of students are participating in what are called "free courses", i.e. courses not being part of a formal education programme.

Source: SCBs utbildningsregister/(The Education Register), Statistics Sweden

The number of women following the specialised courses have decreased. The statistical decrease of students is basically due to structural changes at the universities. In reality, large numbers of students are taking so called "free courses", i.e. one or two term courses instead of the more traditional bound courses being part of formal educational programmes and lasting three to four years. "Free courses" are not represented in the statistics in the same way as the formal courses. Post graduate curricula have not been changed during the period, however.

Students Active in Scientific IT Research Training in Sweden 1980 — 1994 Totals and Distribution According to Gender.

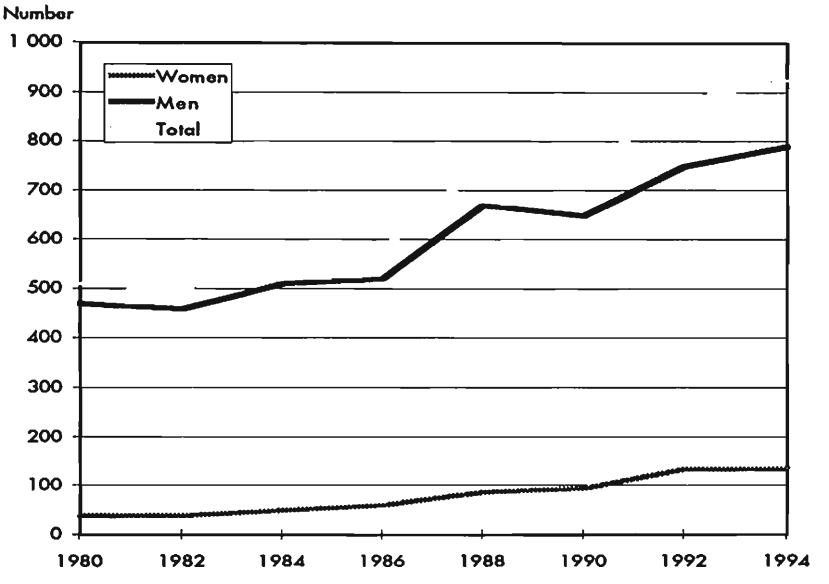


Fig 147: While students' curricula at high schools and universities have undergone considerable structural changes, making statistical comparisons over a period of time difficult, the scientific IT research programmes have not changed. It should be noted, that relatively seen fewer women are participating in the research programmes.
Source: SCBs utbildningsregister/(The Education Register), Statistics Sweden

An ever larger number of students are chosing to follow university courses at distance. During the academic year 1994/95, 25 800 students were following distance courses, which represented an increase of 60% from two years earlier. In real figures, the largest number of students following courses at distance are enrolled at universities having post graduate curricula, but the small and medium sized universities have the largest number of "distant" students in percentage of the total number of students.

Number of Students Following University Courses at Distance During the 1994/1995 Academic Year
Types of Universities

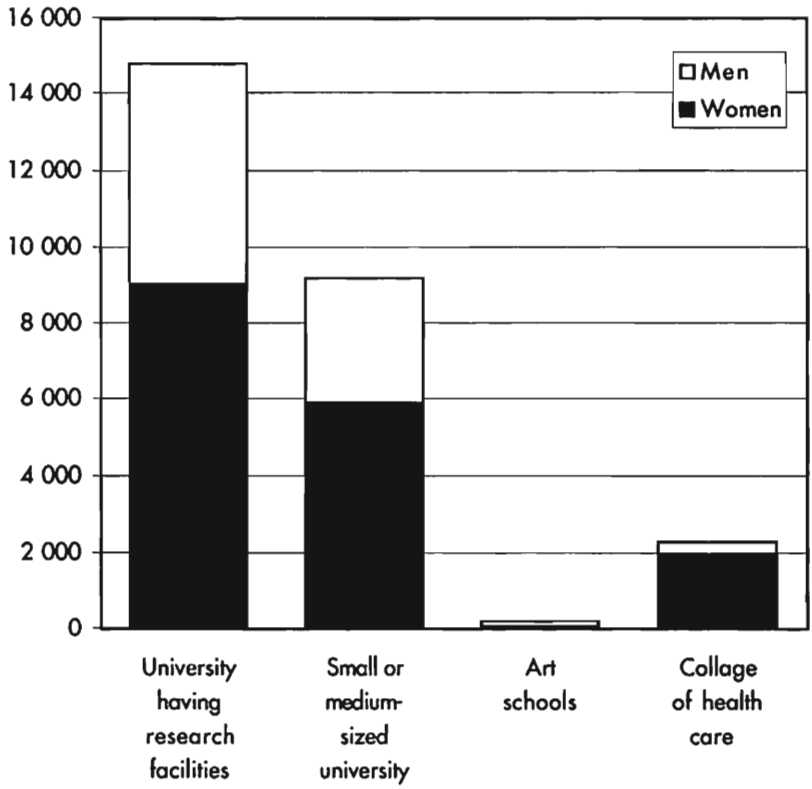


Fig 148: Generally speaking, female students are more frequently represented than male students in the university programmes offered as courses to be followed at distance. This goes for all types of programmes offered. Women totally dominate the social care programmes. 65% of all students following courses at distance are women. This should be compared to 57% of all students at high schools and universities being female.
In Sweden, the small and medium sized universities usually do not have research facilities and thus no post graduate programmes. Specialized universities like the art schools and the social care schools have their own research facilities, however.
Source: SCBs högskolestatistik (Statistics Sweden: Statistics for universities and highschools)

Basic college education for grown ups — KOMVUX — offer IT courses for beginners as well as for advanced users. Moreover, a large number of people in Sweden are taking IT courses offered by various more or less private evening schools, run by the trade unions and volontary organisations. The number of students has increased considerably during the last few years.

Persons Participating in Evening Class IT Courses Offered by Private Organisations 1991 — 1995

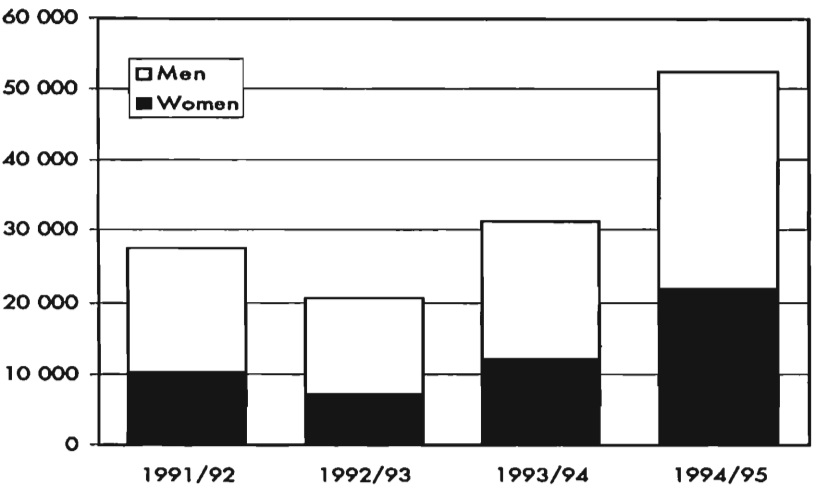


Fig 149: 54 000 persons participated in IT courses offered by evening schools in Sweden during the academic year of 1994/95. This should be compared to some 28 000 students in the academic year of 1991/92. 40% of all students in 1994/95 were women.

Source: SCBs kulturstatistik/Statistics Sweden: Cultural statistics

In addition to this, the past few years of an unusually high level of unemployed persons — for Sweden — have contributed to a large number of people participating in special state sponsored IT training programs for unemployed persons, so called "arbetsmarknadsutbildning, AMU". The table shows only IT training courses in the administrative field. Specialised courses in for instance CAD/CAM and programming languages are not included.

Persons Participating in AMU IT Training Programmes 1981 — 1994

Year	1981	1986	1991	1994
Men	17	235	1 380	9 450
Women	108	238	1 669	10 110
Both sexes	125	473	3 049	19 560

Fig. 150: There are more females out of jobs than males, which is evident also from this table, showing the number of people who have successfully finished the government sponsored AMU IT training programmes for unemployed during the period 1981 to 1994.
Sources: SCB: Datoranvändning/AMS. Statistik över avslutad AMU-utbildning/SCB: Data om informationstekniken i Sverige 1996

Internal Training Programs

Internal training programs are defined as courses lasting at least four hours, and which are paid for by the employer. This means that only those already employed can participate in internal training programs. The figures below make up part of a special survey made by Statistics Sweden regarding employment in Sweden. The survey was made in June 1995 and covers the first six months of 1995.

During these six months 416 000 persons participated in computer training programs, paid for by the employers. That represents 19% – or 451 000 – of the total 2 397 000 places offered at such internal training courses during the period. 60% of these courses were related to computer usage. 27% had general computer knowledge as their subject. 11% were specialised courses in programming and system development. The last 2% were courses in computer installation and maintenance.

The number of employees having received computer training shows important variations between the various industries.

The Number of Employees Having Participated in Internal Computer Training During the First Six Months of 1995. Per industry

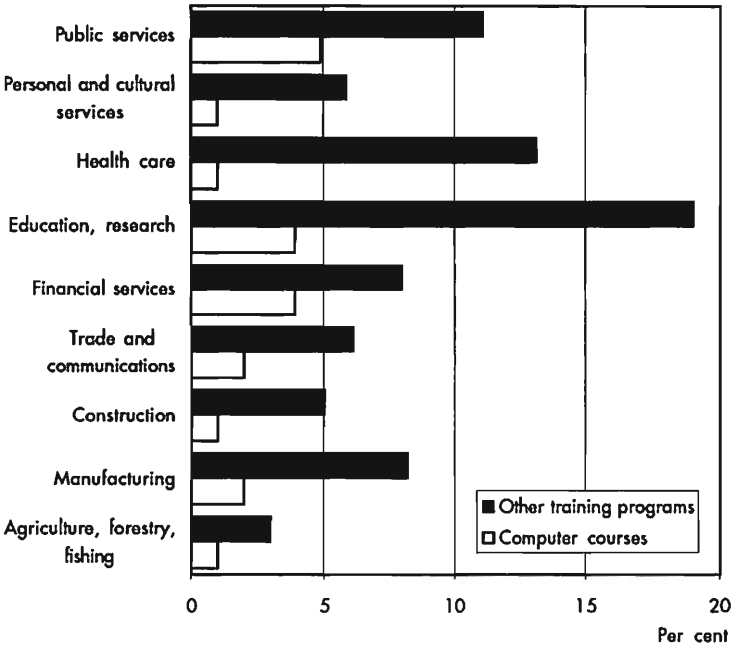


Fig 151: In 1995, 416 000 persons in Sweden participated in computer training programmes paid for by the employers. The majority of the training porgrammes concentrated on computer usage. 27% of all students were trained in general computer knowledge, while 11% received training in programming and system construction. 2% were trained in computer installation and maintenance.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

The employers arranged 65% of the total number of course places used for internal IT training during the first six months of 1995.

Numbers of Employees Having Participated in IT Training and Other Courses During the First Half of 1995

Distribution per Trade Union Membership and Type of Course

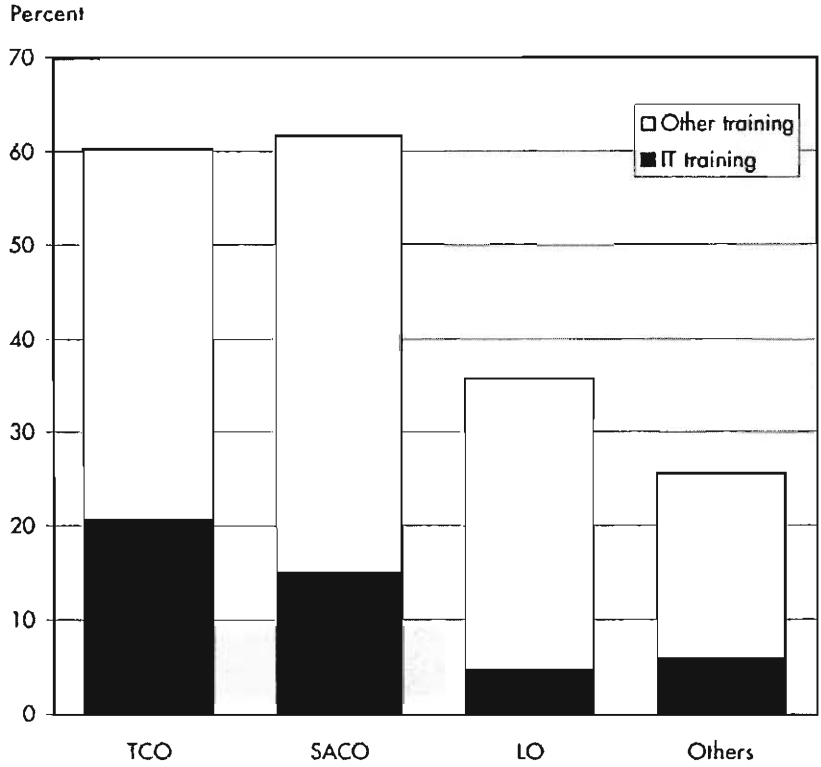


Fig 152: TCO, Tjänstemännens Centralorganisation, is a white collar trade unions' association; SACO, Svenska Akademikers Centralorganisation, is a trade union for people holding academic degrees; LO, Landsorganisationen, is a blue collar trade unions' association. Persons belonging to the white collar workers' trade unions are attending to more computer training courses than members of any other trade union.

Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

It is interesting to note that there are important differences between trade unions, trade union membership, and availability of internal training programs. 20% of the white collar union members, 14% of the academic trade unions' members, and 5% of the blue collar unions' members participated in internal IT training programs. For those belonging to other unions, or not belonging to any union, the equivalent figure was 6%.

There are also important differences between the different sectors of the labour market. Among those working for the public sector, almost every fourth employee, 23%, participated in IT training during spring 1995. This is more than twice as many as for the other sectors.

Number of Employees Having Participated in Computer Training or Other Internal Training During the First Half of 1995

Distribution according to labour market sector and type of course

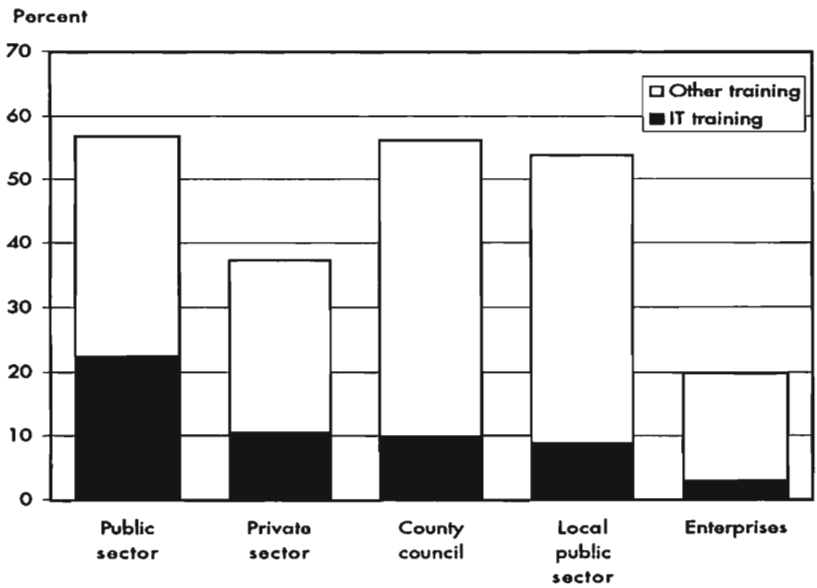


Fig 153: Persons employed by the public state sector are the most frequent participants in any type of internal training courses, as well as in computer training programmes. People employed in private enterprises within the public sector are the less frequent participants.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

Apparently, there is a close relationship between the number of employees participating in internal training programs and earlier educational level. Among those holding academic degrees, 17% participated in IT training some time during the first six months in 1995. This is twice as many as those holding a college certificate only, and three times as many as those having finished primary education.

Basic Education of Persons Participating in Internal IT Training During the First Half of 1995

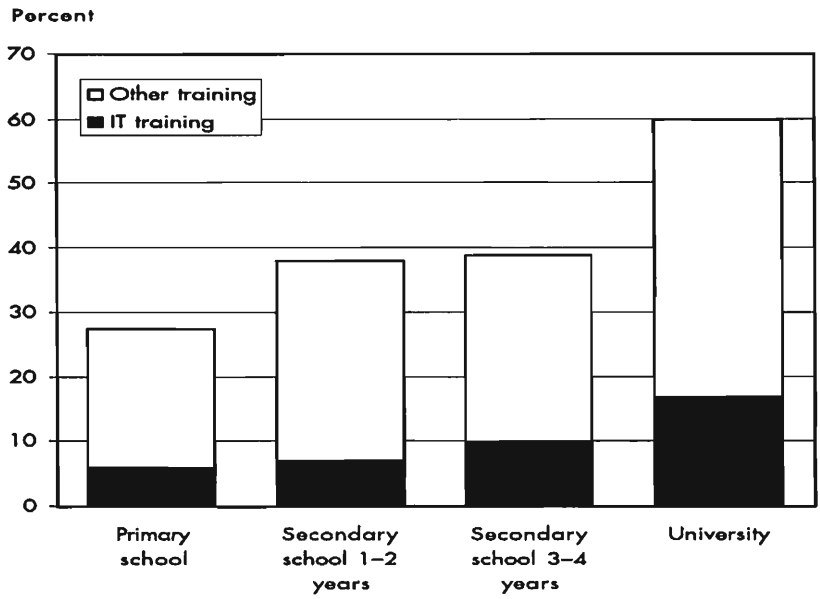


Fig 154: About three times as many persons holding an academic degree as people having primary education only, participated in internal computer training programmes during the first six months of 1995. Participation in internal training programmes shows a general pattern: 60% of those employees holding an academic degree participated in internal training programmes, while 27% of those having primary education and not quite 40% of those having secondary education participated.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

Moreover, age is an important factor in the context. Only 3% of the employed persons belonging to the age group 16 to 24 years participated in IT training during the period. For all other age groups the equivalent percentage were 11 to 12%.

Age Group Belonging and Participation in Internal IT Training During the First Half of 1995

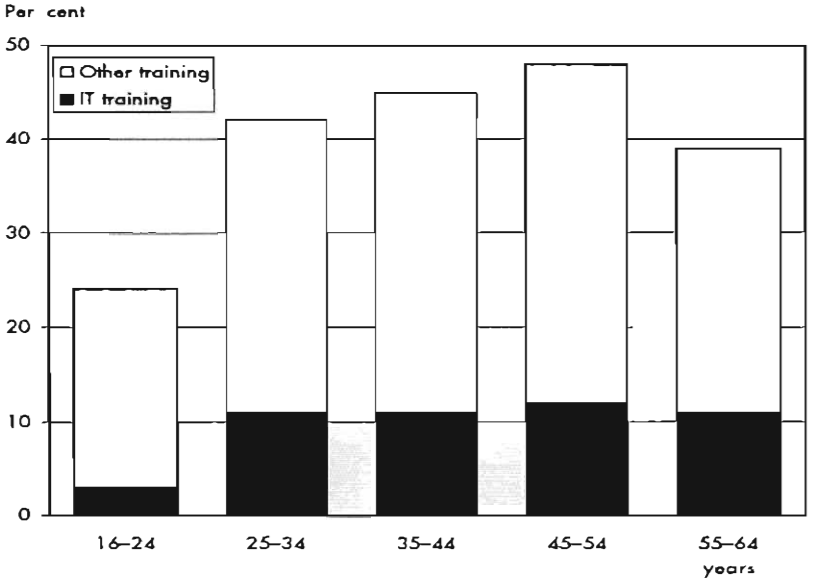


Fig 155: 12% of those working and belonging to the age group 45 — 54 years participated in internal computer training programs. They were the most frequent participants, while the youngest age group members, those of 16 — 24 years, were the least frequent participants. Only 3% of these young people participated in the internal computer training programmes. Of the age group members in between, 11% participated.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

Full time employees, 11%, were the ones most frequently represented in the IT training programs during the period. For part time employees working maximum 34 hours a week, the figure was 7%, and for those having shorter working hours, it was 3%.

Number of Participants in Internal Computer Training According to Number of Hours Worked During the First Half of 1995

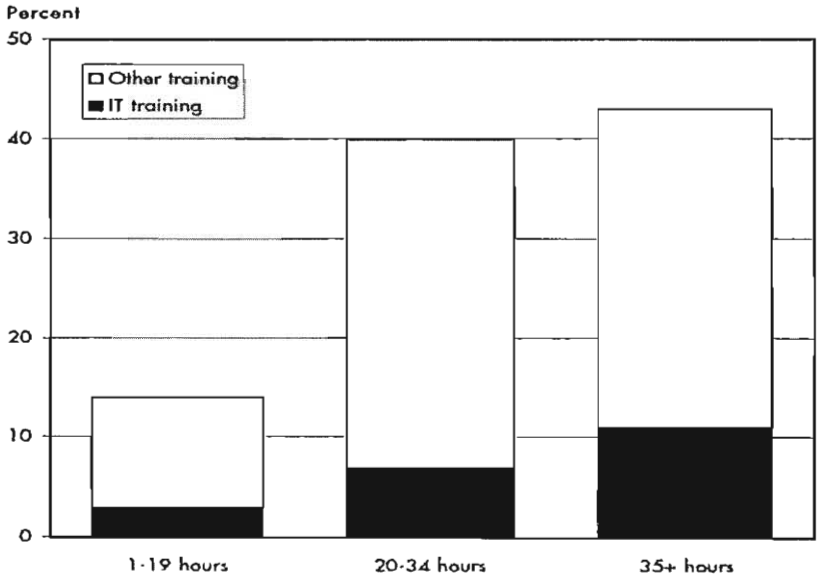


Fig 156: People working full time were the most frequent participants in internal computer training. 11% participated, in comparison to 7% of those working at least 35 hours per week, and 3% of those working less than 20 hours a week.

Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

4.4. Computers at School

Computers at school is a relative novelty in Sweden. Official statistics starts in 1993. In a report, no. 99, called *"Skolans datorer 1995 — en kvantitativ bild" (Computers at School — A Quantitative Report)* — from the school authorities, computer availability statistics from all types of schools are reported. The statistics include public schools as well as private ones.

A comparison between surveys made in 1993 and in 1995, shows that the number of computers available for educational purposes have doubled a number of schools.

Number of Computers for Educational Purposes in Different Types of Schools in Sweden in 1993 and 1995

Type of school	1993		1995	
	# comp.	# students per computer	# comp.	# students per computer
State primary school	21 143	38	45 013	19
Free primary school			1 526	12
State secondary school	22 728	10	38 053	8
County council secondary school	1 463	20	2 494	10
Free secondary school			974	6
Komvux (adult second. school)	4 417	n.a.	8 286	8
Special state school	1 294	8	1 821	6
Special free school			48	5

Fig. 157: The number of computers at school has more than doubled for the majority of the different types of schools. In the state primary schools, the number of students per computer has halved from 38 students to 19. In the free — or privately run — schools, there were 12 students per computer in the autumn of 1995.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

In the public primary schools, computer availability has changed from 38 pupils per computer to 19 pupils per computer. In the private primary schools, 12 pupils shared one computer during the autumn of 1995. In the secondary schools, the number of computers have increased by almost 70% from 1993. Special schools have increased their number of computers by 40%, and secondary schools for grown-ups have increased their computer count by almost 50%.

During the surveys, the headmasters were asked to what extent they have a fixed IT strategy for computer knowledge, and to what extent it is part of the curriculum. The differences between the two survey years 1993 and 1995 are important, generally speaking. Interesting to note is that the 1993 dominance by the public secondary schools has somewhat abated.

Number of Headmasters Having a Special IT Strategy in 1993 and 1995

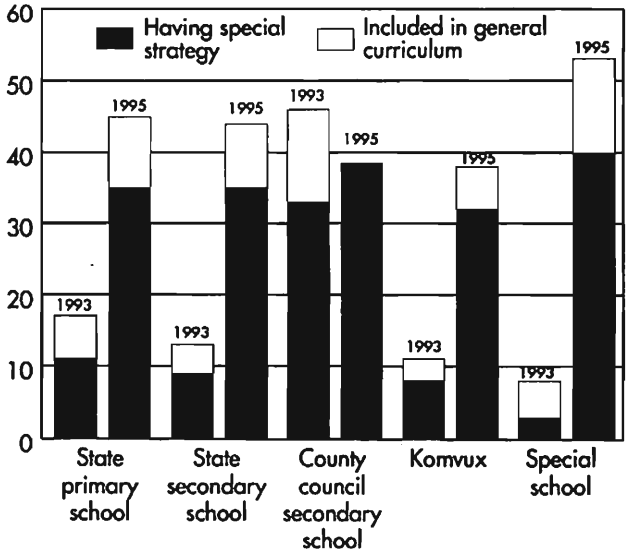


Fig 158: In 1995, more schools of all types declared that they had special IT strategies and action plans for their students' curricula than had declared so in 1993.

Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

4.5. Computers and Public Services

The majority of all people employed by the public administrations, some 80%, are working in computerised offices. This should be compared to 63% in 1989. These figures, as all figures in this chapter, are quoted from a survey made by Statistics Sweden during the summer of 1995. In some cases, there are comparisons between these figures and figures from similar surveys carried out in 1984 and in 1989.

Administration by Administration

Regarding computer usage within the public administrations, the increase is in many cases more important than in the private industries.

Computer Users in the Public Sectors of Employment in Sweden in 1989 and 1995

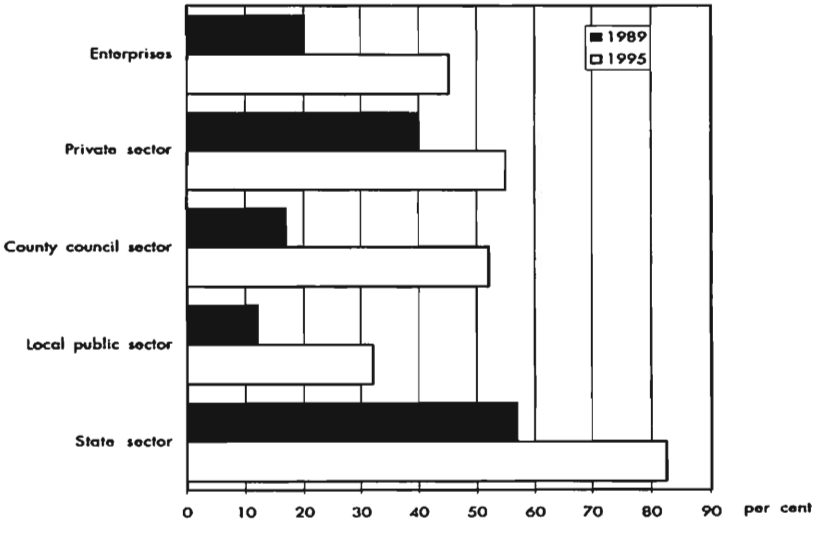


Fig 159: 80% of all public employees were working in computerised offices in 1995. The equivalent figure for 1989 was 63%.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

So, for instance, within the county concils, computer usage has almost trebled. Among the users in the local administrations, computers were used two and a half time as frequently in 1995 as they were in 1989. Also among the public enterprises, computer usage has more that doubled. In the state run administration, the increase has been more modest, 25% only. One reason for this is, that almost 60% of all civil servants were users already in 1989. The smallest increase, only 16%, took place within the private sector, excluding self employed persons. However, the starting point already being at 40%, this part held its second place in ranking.

Computer Users in Percentage of All Employees in Sweden in 1995 Distribution According to Labour Market Sector and Gender

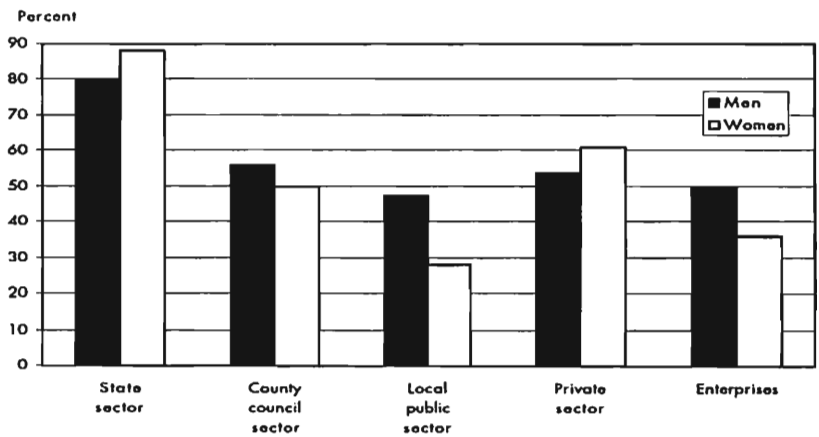


Fig 160: In the state sector, as well as in the private sector, the majority of the computer users are women, while men are the most frequent computer users in the county council sectors and in the local public sectors.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

The state sector, made up by ministries, public offices, agencies, public institutions, and universities, etc., has the largest number of computer users. 83% — or 170 000 employees — are computer users. In these organisations, women are more frequent computer users than men. 87% of all women are users. About two thirds believe they have adequate IT knowledge to carry out their IT work tasks. Almost 85% of the 148 000 civil servants, who are computer users, are hooked up to networks.

Computer Users and Appreciated Level of Knowledge per Labour Market Sector in Sweden in 1995

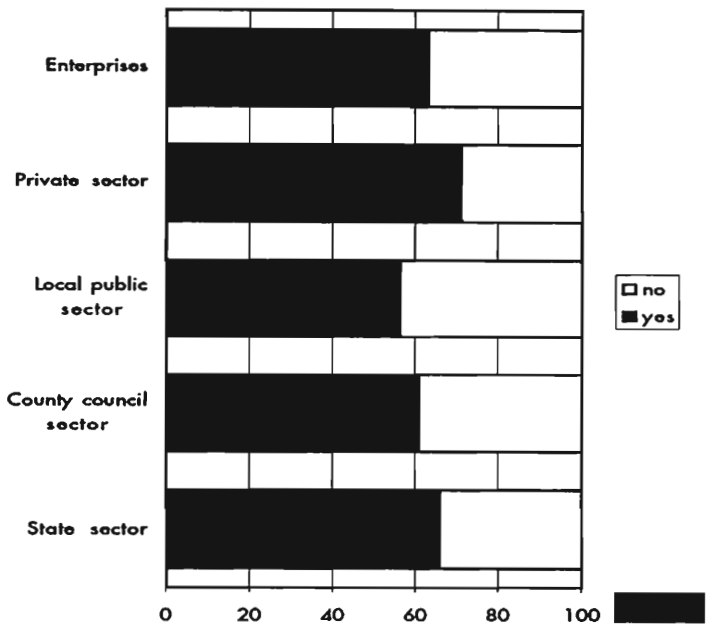


Fig 161: The majority of the Swedish computer users think that they have adequate computer knowledge to handle their work tasks. Most convinced are those working in the private sector, least convinced are those working in the local public sector, i.e. for local authorities and administrations.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

Computer Users Hooked up to Networks per Labour Market Sector in Sweden in 1995

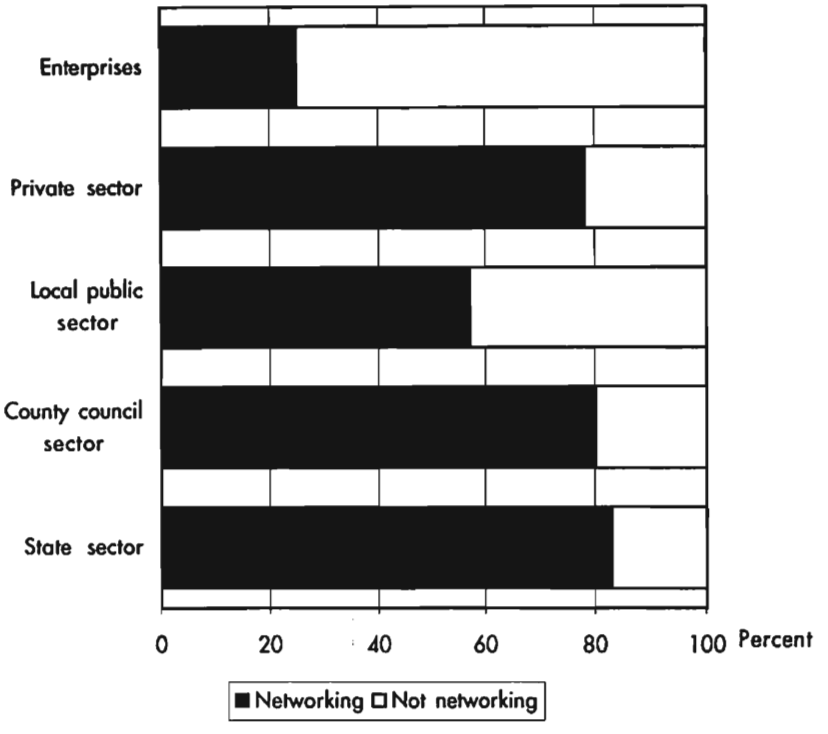


Fig 162: The large majority of all employed computer users in Sweden are hooked up to networks, mostly private ones. The least frequent network users are the public enterprises, which is a bit surprising considering the business advantages offered by networking.
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

Within the county councils (see diagram 1.40 above), some 150 000 employees use computers, which is a bit more than half of all those employed by the counties. 56% of the male employees are computer users, while 50% among the femal employees use computers. Some 60% of all computer users within the county councils believe they have adequate IT knowledge for their work tasks (see diagram 1.41 above). Some 130 000 computer users are linked to PC networks (see diagram 1.42 above).

Persons employed by the local authorities (see diagram 1.40 above) are using computers to a lesser degree than those employed in other parts of the public sector. Hardly one third, or 275 000 persons, are computer users. Women employees using computers amount to a meagre 28%, while 48% of the men employed by the local services are computer users. Only 25% of all users believe they have adequate knowledge to carry out their computer tasks (see diagram 1.41 above.). 250 000 of these computer users are using personal computers. Half of these are linked to networks (see diagram 1.42 above).

The private sector within the public one is defined as privately owned public companies, public companies owned by the state and by the local administrations, and foundations. Selfemployed persons in public service are not included in these figures, but are accounted for separately — see below. Within this sector, some 56% of all employees are computer users. That means 1.27 million persons. Once more, women are more frequent computer users than are men — 61% among the women use computers, while 54% among the men are computer users (see diagram 1.40 above). This sector has the largest percentage of computer users — 70% — convinced that they have adequate IT knowledge in order to handle their tasks (see diagram 1.41 above). More than 900 000 of those employed within this sector use personal computers. 80% of these are connected to PC-networks (see diagram 1.42 above).

Self employed persons, in this context, are defined as people working in their own company as freelancers for the public authorities. Less than half of these, or 195 000 persons, are using computers. 50% of the male entrepreneurs use computers, while 36% of the female ones are computerised (see diagram 1.40). 63% of all computer users believe they have adequate knowledge to carry out their computerised tasks (see diagram 1.41). 170 000, or 90%, of all computer users in this group are using personal computers. About one fourth is connected to networks (see diagram 1.42).

E-mail in the Public Sector

During the autumn of 1995, the Swedish Agency for Administrative Development, SAFAD, and the Swedish association for local administrations, carried out a survey of to what extent E-mail is used by the employees of the public sector, the state administration, the county councils, and the local authorities.

E-mail is here defined as a system for communication via personal computer or terminal.

SAFAD Survey of External E-mail Systems for Public Authorities

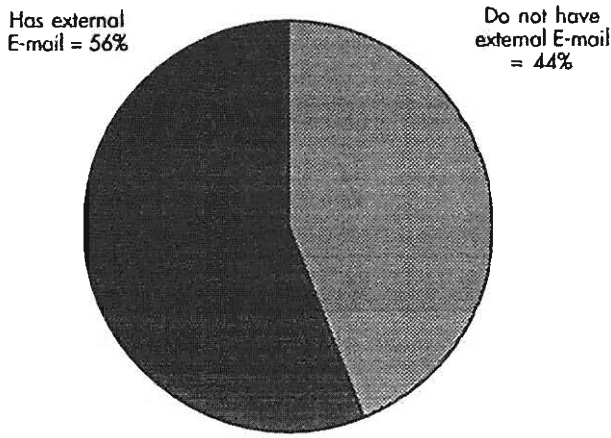


Fig 163: E-mail usage is increasing among public administrations. One consequence is that E-mail number catalogues are in great demand, and some authorities and county councils publish their own catalogues on paper as well as electronically. A third of the counties do not have any catalogue at all. E-mail users are generally positive to their systems and think they help them working more efficiently.
Sources: SCB: Datoranvändning 1995/The SAFAD E-mail survey/SCB: Data om informationstekniken i Sverige 1996

SAFAD sent a questionnaire to 232 central and regional authorities during the autumn of 1995. 166 had responded when the figures where put together. 78% had a system for internal electronic mail. 59% of those having E-mail, had made it available to all employees. Among the 21 county councils, responding to the questionnaire, all have internal E-mail systems, but these are available only for about a fourth of all employees.

Public Authorities in Sweden Using Internal E-mail Systems

Authorities/County councils	Numbers	Percent
Does not have E-mail	37	22
Has internal E-mail for:		
• a fourth of all employees	21	13
• half of all employees	5	3
• two thirds of all employees	23	14
• all employees	77	46
• no answers	3	2
Total	**166**	**100**

Fig. 164: In total 78% of the Swedish county councils and public authorities are using internal E-mail systems.
Sources: SCB: Datoranvändning 1995/The SAFAD E-mail survey/SCB: Data om informationstekniken i Sverige 1996

More than half of all responding authorities also have external E-mail systems (see diagram 1.43 above).

Regarding the 288 local authorities in Sweden, 60% have systems for internal E-mail within the central administrations. 62% (see diagram 1.44) among the local authorities have E-mail available for all administrations, while 23% use it only in their central administrations, and 15% within some of their administrations.

Percentage of the Total Number of Local Authorities whose Employees Have Internal E-mail

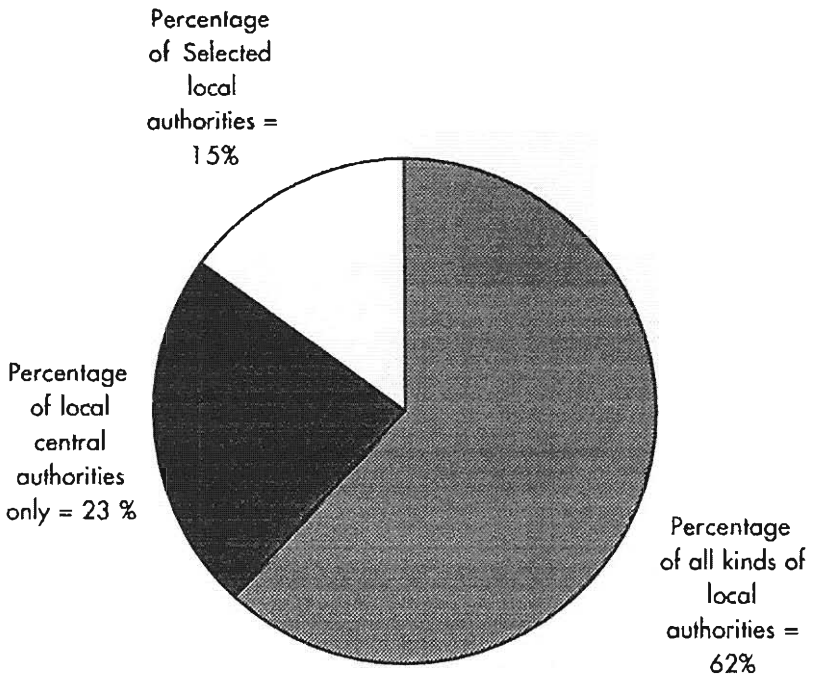


Fig165: This diagram is related to the local public administrations, the administrative units called "kommun" in Swedish. There are 288 "kommuner" in Sweden for the time being, some of the larger ones being in a state of division into smaller units. Each "kommun" has a number of specialised authorities, responsible for the local administration of for instance schools, childcare, social care, etc. The majority of these local authorities have provided their employees with internal E-mail systems. A report om the usage of e-mail by local authorities in Sweden, based on this surrey, is availible from Svenska Kommunförbundet. The report is called " Elektronisk post i kommunerna".

Sources: SCB: Datoranvändning 1995/Svenska Kommunförbundets undersökning om e-post i kommuner 1995/SCB: Data om informationstekniken i Sverige 1996

Percentage of Local Authorities whose Employees Have Internal E-mail

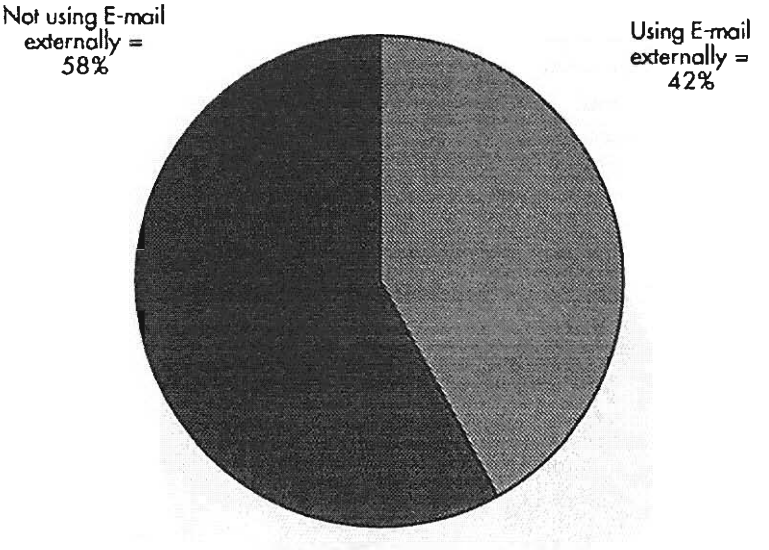


Fig 166: 60% of all persons employed by the Swedish "kommuner" have E-mail. Of these, 42% use E-mail externally, while 58% report that they have no usage for external E-mail.

Sources: SCB: Datoranvändning 1995/Svenska Kommunförbundets undersökning om e-post i kommuner 1995/SCB: Data om informationstekniken i Sverige 1996

The majority of the local authorities are connected to Internet. 42% of those having E-mail systems (see diagram 1.45) can use their systems externally. But the external mail function is not available to all employees, far from it. Many local authorities are connected to Komnet, a special service network for the Swedish local authorities.

4.6. Few Data about Computer Usage in Industry

According to Statistics Sweden, there are no trustworthy general data regarding IT usage within the manufacturing industry in Sweden available. Before 1994, Statistics Sweden tried to regularly measure computer hardware investment planned by the industry, including leasing of equipment. Now, this turned out to be a difficult task, because the industry found it difficult to differentiate their various computer investments, and thus avoided answering to questions regarding this. In 1993, Statistics Sweden made another trial to map computer and IT usage within the Swedish industry. The survey had to be aborted due to lack of response from the business world.

85% of Swedish Executives See Internet as a Must

According to a recent study (the results were announced to the public on March 2, 1997) carried out by Svenska Arbetsgivareföreningen, SAF, (The Swedish Employers' Association), in which the chief executives of some 1 000 Swedish companies were asked to answer a number of questions regarding their IT usage, 85% said they will be using Internet within six months. The study indicates, that 50% of the executives in companies having more than 100 employees have access to Internet. In small companies, with less than 5 employees, 15% of the executives have Internet access.

On an average, 20% of all Swedish companies have E-mail. 50% of all large corporations have it and use it. 5 — 10% of the small companies have E-mail. Among those companies having E-mail, 31% of all executives use it daily.

The SAF survey also indicates that 63% of the executives in large companies regard Internet as a very important tool for communication, while 32% of the small company executives feel it is a must.

SAF, having 42 000 members — companies only — is planning an extranet service for their members. Type http://www.saf.se for access.
Source: Interaktiv Tid Analys # 8, 28 February, 1997

The one reliable exception in industrial IT statistics is statistics about the utilisation of industrial robots by the Swedish industry. It peaked in 1994, when 650 units were installed, to be compared to 250 units for the previous year. The total number of industrial robots were 5 450 units in 1994 (see table 1.19 below).

Industrial Robots in the Swedish Industries
Distributed per industry and application area for 1985, 1991, and 1994

	1985	1991	1994
Industry			
Metal	286	718	999
Machinery	760	1 134	1 241
Electrical/electronic	587	300	346
Automotive	155	1 332	2 008
Others	258	615	856
Total	**2 046**	**4 099**	**5 450**
Application Area			
Material handling incl. machinery service	834	1 649	2 123
Welding	674	1 386	1 955
Mounting	n.a.	241	360
Others	538	823	1 012
Total	**2 046**	**4 099**	**5 450**

Table 167: The difficulties to provide reliable statistics about industrial usage of computers and IT do not pertain to the utilisation of industrial robots. One reason for this is that their application areas are relatively easy to distinguish, which is not the case for more general computer and IT utilisation.
Sources: SCB: Användningsområden 1995/Swedish Industrial Robot Association and International Federation of Robotics/SCB: Data om informationstekniken i Sverige 1996

The most frequent applications for industrial robots are material handling including machine service, and welding (see diagram 1.47).

Number of Installed Industrial Robots in Swedish Industry by early 1995, per Application Area

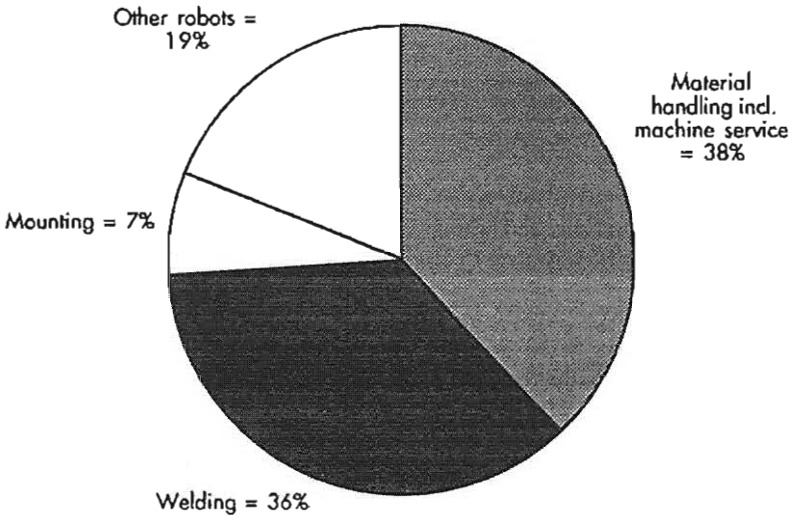


Fig 168: The two largest application areas for industrial robots in Swedish industry are material handling and welding.
Sources: SCB: Användningsområden 1995/Swedish Industrial Robot Association and International Federation of Robotics/SCB: Data om informationstekniken i Sverige 1996

Industrial robots are mostly utilised in the automotive industry, and in the metal industries. The automotive industry is using most industrial robots, followed by the machine tool industry.

5. IST Research in Sweden

In 1993, Sweden spent a total of 48 billion SEK, the equivalent of 3.3% of the GNP, on research and development. 69% of the total research was carried out within the industry area, and 22% by academic institutions. 9% was carried out by the public sector. But the public sector paid for more than 80% of all R&D carried out at the academic institutions, and over 10% of the industrial research.

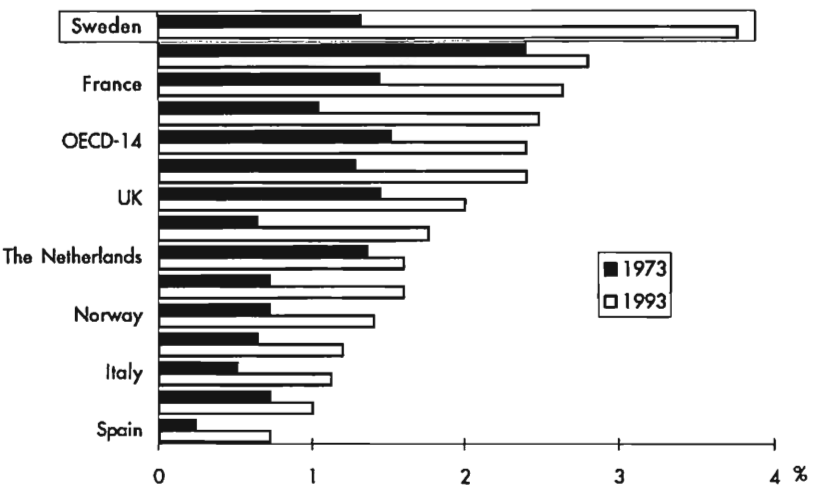
Costs for IST research for 1993 were almost 12 billion SEK for the industry related research, and some 450 million SEK for the academic research programs. The sum is equivalent to one fourth of the total money spent on R&D in Sweden.

Four industries belong to IST — office equipment, computers, telecommunications equipment, and electronic instruments, according to Statistics Sweden.

Over the past few years a closer relationship between industry and academia has resulted in a number of new research programs in the telecommunications and IT fields throughout Sweden. In many cases, local universities are heading research programs in direct collaboration with industry. This chapter gives an overview of IST related activities in Sweden.

Sweden World Leader in Research in 1993

Part of the total production, in percent, for 1973 and 1993



(Diagram 4:A:1): According to the OECD report "Science,Technology and Industrial Outlook 1996", Sweden is leading the research and development league when it comes to percentage of spending related to total production, 4% in 1993, compared to 1% twenty years ago.These are the good news. The bad news are that it is a handful of Swedish companies with international markets, that are responsible for the larger part of the research. 27% of the total research money in Sweden is spent in the electrotechnical area, including companies like Ericsson and ABB where telecommunications and IT belongs. 13% is spent in the medical field, another important Swedish export industry, 20% in the transportation industry, and the remaining 40% in other industries.
Sources: OECD/Ny teknik 1996:46

Research, Value Added, and Jobs Distributed per Industry in Sweden in 1996

In percent of the total industrial value

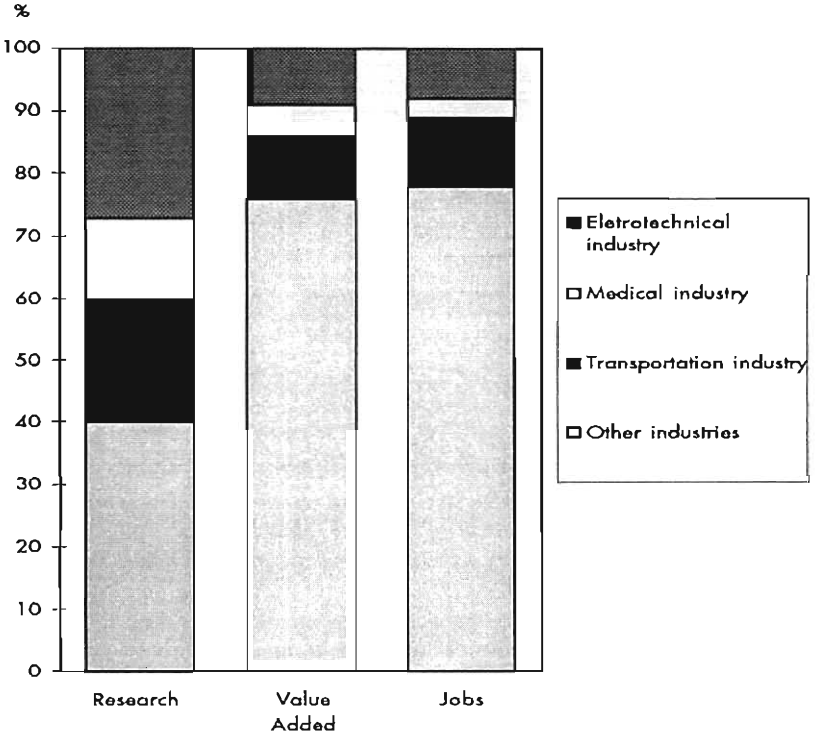


Fig. 169: Telecommunications products are expensive to develop. About one fourth of the total industrial Swedish research is spent in this area. Volvo, Scania, and Saab are spending some 20% of the total research money, and the medical industry, including Astra and Pharmacia Upjohn, spends 13%. But the most research intense companies are not creating the largest value added and the most jobs. In these areas, the other industries are about twice as successful as the research heavy industries.

Sources: Ny teknik 1996:46/Statistics Sweden

Share of Office, Computing, and Accounting Machinery in Manufacturing for the Period 1980 to 1992

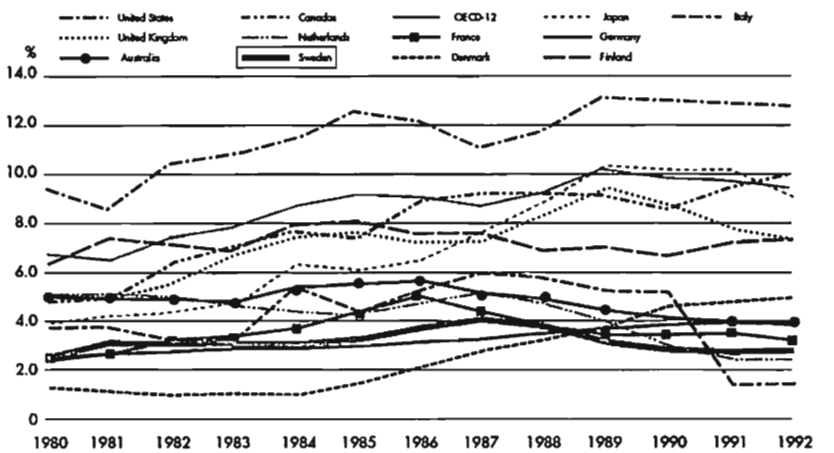


Fig. 170: The United States devotes by far the largest share of its BERD (BERD = Business Enterprise Expenditure on R&D) to office, computing and accounting machinery, the OCA sector, about 13%. This sector is among the largest manufacturing sectors in terms of R&D intensity. Sweden, together with France, Denmark, Finland, and Japan are decreasing their share in the OCA R&D.

Sources: STAN database (DSTI, EAS Division)/OECD: Information Technology Outlook 1995,

Evolution of Relative Technical Specialisation 1975 — 1993
in percent per country/region

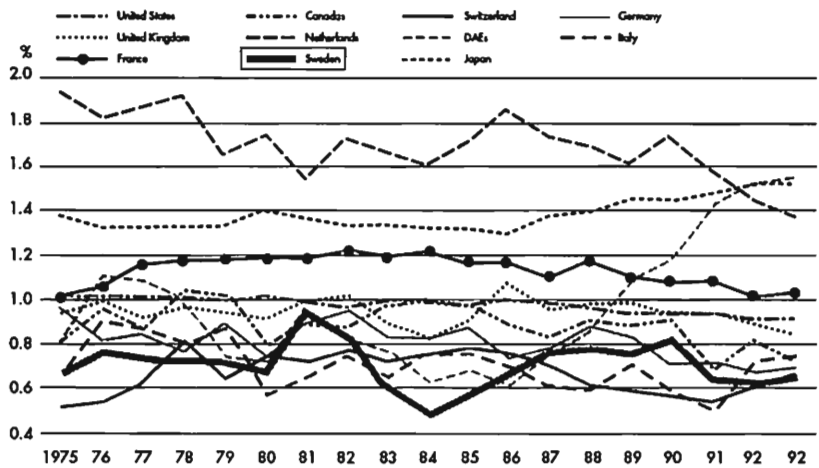


Fig. 171: Relative specialisation is measured by the country's share in patents filed in a given field in a given system, as a ratio of its share of all patents in that system. The diagram shows the evolution of the IT specialisation from 1997 to 1993 in percent of total patents filed.

Sources: CHI Research, Inc./OECD: Information Technology Outlook 1995, ©OECD, reproduced with the permission of the OECD

Business Enterprise R&D Intensity 1980 and 1991

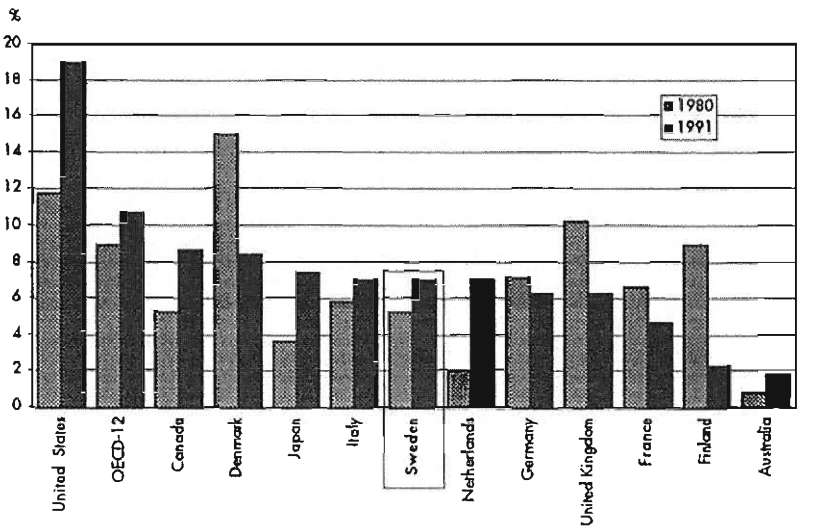


Fig. 172: The diagram shows the business enterprise R&D intensity in the OCA sector for 1980 and 1991 for selected OECD countries and the OECD-12 compound, in percent.

Sources: STAN database (DSTI, EAS Division)/OECD: Information Technology Outlook 1995, ©OECD, reproduced with the permission of the OECD

Patents Granted in USA in the IT Field for Selected Countries and Regions 1975 — 1993
Percentage of world total

	1975	1980	1985	1990	1993
Europe	19.5	19.7	19.9	16.6	12.9
EU	18.3	18.2	18.6	15.8	12.1
France	3.3	4.0	3.9	3.4	2.9
Germany	7.1	6.4	7.3	5.5	4.2
Italy	0.7	0.8	0.7	1.0	0.7
Sweden	0.8	0.7	0.8	0.5	0.4
UK	4.0	3.6	3.2	2.9	1.9
EFTA	1.2	1.5	1.3	0.8	0.8
Switzerland	1.1	1.4	1.2	0.8	0.7
North America	66.9	62.3	55.5	50.3	51.1
Canada	1.4	1.3	1.6	1.6	1.3
United States	65.6	61.0	53.9	48.7	49.8
Japan	12.2	16.1	23.3	30.7	32.0
OECD	98.8	98.4	99.0	97.9	96.3
DAE	0.1	0.1	0.2	1.3	3.2
Total	100.0	100.0	100.0	100.0	100.0
Number of patents	10 135	9 056	12 140	16 965	19 259

Fig. 173: International comparisons relating to information and communication technology involve the use of patent data. Patent applications are filed with the European Patent Office, EPO, or the US Patent Office, USPTO. Figures per industry as the ones used in this table, are only available from the USPTO.

Sources: CHI Research, Inc./OECD: Information Technology Outlook 1995, ©OECD, reproduced with the permission of the OECD

Patents Granted in USA in the IT Field by Country of Origin 1975—1993
In percent of total, United States excluded

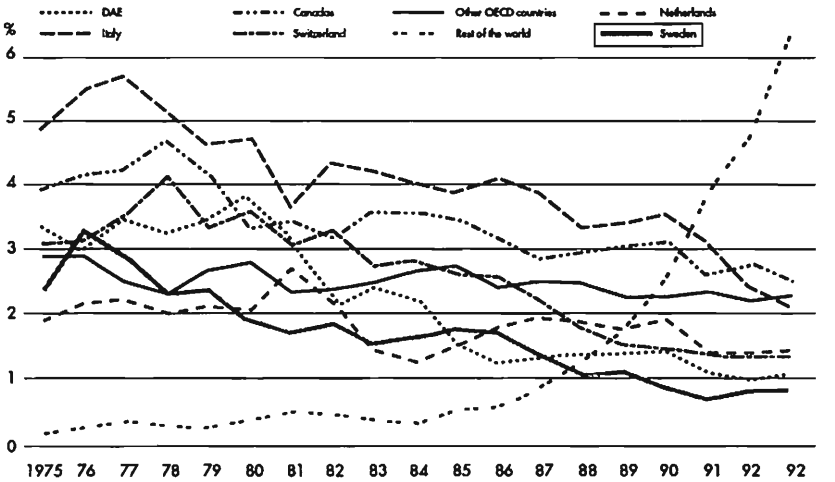


Fig. 174: 63% of all IT patents generated by non-Americans in the US are granted to Japanese companies. Germany is the second largest, getting 9% IT patents granted, followed by France, with 7%, and the UK with some 4%. These countries are not shown in the diagram. Among the countries shown, it is remarkable to note the rapid growth in patents for the DAE countries, while all others are declining. Now, this diagram shows the percentage of the total IT patents granted to foreign companies in the US. It should be kept in mind that the total number of patents have increased considerably. See the preceeding diagram.

Sources: CHI Research, Inc./OECD: Information Technology Outlook 1995, ©OECD, reproduced with the permission of the OECD

5.1. Swedish IST Research Institutions

5.1.1. Academic Research Institutions

According to Statistics Sweden, the following institutions are involved in ICT research programs in Sweden:

* Stockholms universitet — The University of Stockholm
* Karolinska institutet — The Karolinska Institute
* Kungliga Tekniska Högskolan i Stockholm — The Royal Institute of Technology at Stockholm
* Uppsala universitet — The University of Uppsala
* Linköpings universitet — The University of Linköping
* Lunds universitet — The University of Lund
* Göteborgs universitet — The University of Gothenburg
* Chalmers tekniska högskola — The Chalmers Insitute of Technology at Gothenburg
* Umeå universitet — The University of Umeå
* Universitetet i Luleå — The University of Luleå
* Högskolan i Karlskrona/Ronneby — The University College of Karlskrona/Ronneby
* Högskolan i Karlstad — The University College of Karlstad
* Mälardalens högskola — The University College of Mälardalen
* Högskolan i Skövde — The University College of Skövde
* Mitthögskolan — The University College of Sundsvall/Härnösand

The majority of the separate institutions involved belong to the faculty of technology; some IST research are carried out at the faculties for economics and social sciences; one medical institution is involved in IST research. No IST research is carried out at any humanistic institution in Sweden.

Five universities, those of Gothenburg, Luleå, Lund, Stockholm, and Uppsala carry out IST research at the institutions of social sciences.
Two universities have created what is described as new cross scientific institutions, dedicating themselves to IST research. At the university of Umeå, there is an institution called "The media and data didactic centre". At the university of Uppsala, there is a "Centre for man/computer".

At the university of Lund, there is a cross scientific research program going on regarding the information technology user, but all institutions participating belong to the faculties of social and economic sciences.

At the University of Linköping, there is a specific research program called "Tema T — Man, Society, and IT", where a number of interesting research projects on the interaction of humans with technology is carried out.

One important IST research institution is a privately owned business school, The Stockholm School of Economics, which is not included in Statistics Sweden's figures, which cover publicly financed academic institutions only. Several IST-related research programs are conducted at the various institutes of the Stockholm School of Economics, such as IUI, EFI, IMIT, and the newest one, CIC. See 5.1.2. for more information.

5.1.2. Selected Current Academic Research Projects

* Several advanced IC technological research programs are running at for instance:
  - The Chalmers Institute of Technology
  - The University College of Karlskrona/Ronneby
  - The Royal Institute of Technology
  - The University of Linköping
  - The University of Luleå
  - The University of Lund
  - The University College of Middle Sweden (Sundsvall/Härnösand)
  - The University College of Mälardalen (Västerås/Eskilstuna)

* User research program at the University of Lund: A cross scientific user research program, covering personal telephony seen from the following aspects
  - micro economics
  - social anthropological
  - media and communication science related aspects
  - telecommunications traffic systems
  - applied electronics

  So far, this is the most extensive research program of its kind in Sweden. Several reports have been published.

* Teleeconomic research programs are carried out by several institutes, such as:
  - IUI, Industrins Utredningsinstitut, The Industrial Research Institute, involved in several programs
  - EFI, Ekonomiska Forskningsinstitutet, The Institute for Economic Research looking into "telecommunications in the information society"
  - The Stockholm School of Economics, running several programs
  - The Institution for Microeconomics at the University of Stockholm, studying "teleeconomics and telecommunications utilisation"
  - The Institute for Economic Research at the University of Lund — see above.
  - IMIT, studying "the growth of telecommunications"
  - The Institute of Technology at the University of Linköping, running a program called "IT for humans and corporations"

- The University of Linköping through its program "Tema T" is looking into various aspects on the interface between humans and technical systems
- The University of Umeå is carrying out a pilot program called "utility creation by tele and data communication"

* Informatics for medical applications and learning is studied at the Karolinska Institute in Stockholm

* **The Center for Information and Communication at the Stockholm School of Economics**, CIC, is a newly created research center covering the areas of combining communication and information technologies and marketing strategies. The center was created in February 1997 with a long-term grant from the Swedish Transport and Communications Research Board to run until 2002.

  The center's main objectives are to stimulate and facilitate information and communications research, especially research orientated towards the user and the business sides of the IST technologies. The ambition is also to be a meeting place for all Swedish research and education in information and communications.

  Primarily, CIC will concentrate on the following areas of research, the focus to be on exchange and interaction patterns between companies and individuals:
  - the dynamics of information and communication technologies
  - infrastructures
  - the change in economical distribution systems due to technological development
  - complex systems
  - the development of new changes as well as changes in old systems and similar issues central to the development of marketing strategies in combination with information and communication technologies.

  The CIC web-site is to be an important tool for interaction among Swedish researchers and practioners, and international researchers, specialists, and practioners alike, in order to benefit as many as possible.

5.1.3. Industry Related Research Institutions

The following are some of the leading industry related research institutions and their major research programs:

* ABB Research — software processes
* CDT, Centrum för Distansöverbyggande Teknik, Luleå — a development center for advanced signal treatment
* SICS, The Swedish Institute of Computer Science — Computer science
* SISU, The Swedish Institute for System Development — Internet technology
* Telia Research — Net solutions for telecommunications and telecommunications applications

* **New National IST Research Institute by July 1997**

  Institutet för tillämpad informationsteknik, (The Institute for Applied Information Technology) was created by July 1, 1997. This is to be a national research institute, which will replace SICS, The Swedish Insitute for Computer Science; The Institute for Media Technology (Institutet för Medietekink); and SISU, The Swedish Institute for Systems Development (Svenska institutet för systemutveckling). The Foundation for the Development of Knowledge and Competence (Stiftelsen för kunskaps- och kompetensutveckling) is the funding organisation of the new research institute, which will absorb the researchers as well as the research programs of the present institutes.

  Sources: Several, among them Computer Sweden, 7 March 1997

5.2. Swedish Participation in International Research Programs

So far, Sweden has participated in several international research programs. NUTEK, Närings- och Teknikutvecklingsverket, a state agency responsible for, among other things, the coordination of the Swedish participation in the EU R&D programs, can provide detailed information on these. Information can also be provided by also the EU R&D Council, as well as by Statskontoret, which in 1995 published a report called *"Europeiska Unionen — IT, telekommunikation och nya medier"* (1995-12-01). Some examples of Swedish participation in past EU programs are:

- The EU COST Telecommunications Programme, among the COST projects in:
  * COST A4, 1992 — 1995: Social Shaping and Technology: Telematics in rural development, inter-organizational IT networks, EDI, domestic shaping of information technology, through MITS, The University of Linköping;
  * COST A5 1991 — 1994: Ageing and Technology: Work and ageing, health indicators, social integration, through MITS, The University of Linköping;
  * COST 14: Cooperation Technology, CSCW;
  * COST 248: The Future European Telecommunications User — Understanding for the Implementation of a European Research Action on the Future European Telecommunications User, through the University of Lund.

The background of COST 248, just as an example of a user research program, is described as follows by the Eurocrats:

"Poorly predicted and poorly understood changes in the residential user's demand for telecom services could undermine the long-term viability of many PTOs. Such changes in demnad could be triggered by new ways of living, new patterns of working, new tastes, and a new way of looking at telecom services.

... relatively little effort is made to focus on the ordinary consumer and user of telecom services. There is a strong need for research that improves our knowledge of his or her experience and perception of current and future telecom services.

The ultimate judge of a service is the end-user. Studies of the development of new technologies show that the involvement from the users may be a valuable source of knowledge for the development process. Compared to the commercial customer, the residential user has few channels of influence.

...But the business user has already been extensively studied while knowledge about the residential user is sadly lacking."

The following nations participate:
Denmark, France, Ireland, Croatia, the Netherlands, Norway, Switzerland, Slovenia, UK, Sweden, Germany, and Hungary.

A final report will be presented during 1997.

* The RACE project for 1994 —1998, in particular the ACTS project, ACTS standing for Advanced Technology Communication and Service. ACTS is made up by six sub projects:
  - multimedia
  - photonics
  - high speed communication networks
  - mobility and personal communications
  - intelligent networks
  - network security

* RESOLUTIONS, Re-use of Solutions, is a pilot project in the EU, described as follows:
  "Technical developments will be limited to exploit existing telematic technology for creating a cross-border demonstrator, featuring a multilingual multimedia distributed knowledge base that will both give access to information and services related to city life and describe some general administrative best-practice solutions to common practical problems...

... Presumably, the critical part of the project will not be related to the technology ... but it will reside on the problems of datasharing and of modification, harmonisation and standardisation of international procedures...

... The creation of a multi-language data-base would allow a transparency of public documents and of decisions procedures and therefore a deeper involvement of citizens into public life; hopefully, being able to examine in depth public facts and public affairs, citizens will stop showing laziness, time constraints, unwillingness and indifference towards problems of social interest. In addition, thanks to the proposed information system, they could also express their own opinions on specific problems so deeply felt in every life, and thus suggest new ways of problem solving or new technological requirements."

The City of Stockholm is participating together with Rome in working out how the democratic processes can be improved. Swedish members of the consortium are: The University of Stockholm - The Institution for learning; Enator AB; The communities of Botkyrka and Nacka.

Nordic Participation in EUREKA Projects* 1985 — 1995 Per Technology Area

Research area	Denmark Million ECUs	Finland Million ECUs	Iceland Million ECUs	Norway Million ECUs	Sweden Million ECUs
Medical and biotechnology	62.6	122.3	0.7	50.6	63.1
Communications	250.6	257.9	0	44.1	15.2
Energy	7.8	35.1	0.8	12.6	42.6
Environment	277.4	146.6	7	234.8	271.1
ICT	184.9	240.8	8.2	232.0	163.4
Laser technology	90.1	41.1	0	47.2	19.4
New materials	17.4	16.7	0.9	15.2	26.7
Automation	87.1	31.8	6.0	9.2	55.7
Transports	10.1	18.2	0	19.1	61.2

Fig. 175: The table shows the participation of the Nordic countries in various EUREKA projects during 1985 — 1995, in million ECUs, per technology area. The Nordic countries are important research parthers to each others: Denmark has Nordic participation in 50% of all research projects; Finland 52%; Iceland 67%; Norway 60%, and Sweden 53%.

Source: NORDForskning: Vitenskaps- og teknologiindikatorer for Norden 1996 (Science and Technology Indicators for the Nordic Countries)

5.3. Swedish IST Research and Development Programs

* The ITYPE-program, Informationsteknologi för yrkesutveckling och produktivitet i tjänstesektorn, (Information technology for professional development and productivity in the service sector) is supported by Rådet för arbetslivsforskning and NUTEK. The objective is to increase productivity and competence within the service sector. Six theme areas are supported:
  + IT support to public services
  + Telecommuting and decentralised production of services
  + Network based knowledge handling
  + Efficient and competence increasing interfaces between man and computer
  + IT for increased employment
  + System evaluation for more efficient usage of software.

  Source: Aktuell arbetslivsforskning, 2, 1995

5.4. IST Centres of Excellenc

There are several interesting IST centres of excellence, some of them closel related to academic research, others the result of local efforts. Some of th centres are veritable incubators for new companies — in most of them there ar several small and emerging IST companies, which are the results of spin-off from academic research institutes. The list is not complete, but it gives an ide that it may be well worth the effort to search for such centres in Sweden

* Satellitbild, Kiruna — global image analysis
* SoftCenter, Ronneby — software development by new and small companies
* TeleCity, Karlskrona — telecommunications
* Nocom Netscape Technology Center — Internet and WWW-technology
* Mjärdevi, Linköping — switching technology
* Ideon, Lund — mobile communications, software and systems development

5.5. Research Funding Agencie

Several organisations are acting as funding partners for various researc projects. Some of the most important ones, supporting IST research an development in Sweden are

* Kommunikationsforskningsberedningen, KFB
* Stiftelsen för strategisk forskning
* Stiftelsen för kunskaps- och kompetensutveckling
* Rådet för arbetslivsforskning
* NUTEK

KFB, The Swedish Transport and Communications Research Board, is a state agency, responsible for planning, initiating, coordinating, and supporting research, development, and demonstration projects regarding transportation, post and telecommunications, and the significance of these communications systems for envoronment, personal security, and regional development. The agency collaborates with other funding organisations in their support for research projects. KFB supports IST research projects in the following areas under its telematics programme:

* information technology in small companies
* the global telecommunications system
* data communications covering the information requirements of households
* video telephony for people with mental handicaps and aphasia

Stiftelsen för kunskaps- och kompetensutveckling, KK-stiftelsen, (The Foundation for the Development of Knowledge and Competence) is a state financed foundation with a total capital of some 4 billion SEK, the majority of which is supposed to be used for R&D programs at research institutes, universities, and university colleges. The foundation has on its program to support development programs at the small, regional university colleges and to encourage projects in which local industry is collaborating with academia. Regional school projects have high priority, as do IT-based programs for competence development. In June 1997, the foundation released three new projects it will support over the next few years:

* ethics and the Internet related to school applications
* teleworking in primary school, with specific interest given to collaborative efforts between small in language teaching
* new schools and differences between IT implementation in new and old schools

NUTEK, Närings- och Teknikutvecklingsverket, a Swedish government agency, supports effective collaboration between academia and industry regarding longterm research programs, among others in the areas of information technology. The efforts of the agency has resulted in Sweden having advanced industry oriented research in computer science, system development, and micro electronics. One part of the agency's responsibility is the coordination of Swedish participation in EU research programs.

5.6. Do You Know This About IST Research and Development in Sweden?

* **Virtual Universities**

  The University of Gothenburg, Göteborgs Universitet, is trying to create a virtual university by offering all students, some 30 000, and employees, 5 000, IT-training, including a personal Internet homepage, e-mail addresses, and a modem connection to the university network. The traditional lecture halls will be replaced by some kind of coffe shops, where each table offers plug-in possibilities. The thinking behind this effort is that the university should be open to as many people as possible, which is not possible without information technology. Students will be offered the opportunity to follow courses from all over the world. The virtual university of Gothenburg can be reached via http:/www.vu.gu.se/VU. The mass training courses start in 1997. After 1998 computer illiteracy should be erased at the Gothenburg University. If everything goes according to plan.
  Source: Dagens Nyheter, Oct. 24, 1996

* **Rymdbolaget** at Esrange in Kiruna in the very northern part of Sweden is housing one million pictures from the Spot satellite, and 650 000 pictures from Landsat. This information serves as raw material to Satellitbild, a highly specialised corporation for the development of satellite pictures. The Esrange specialists also tap other satellites on information, often in collaboration with other earthbased satellite stations all over the globe. Should you want to know more about the Swedish rocket lauching facility, type: http://www.ssc.se.esrange/
  Source: Computer Sweden, 17 January 1997

* **Telecom City** in **Karlskrona** is the base of a new national research faculty for tele informatics. By the beginning of 1997, **the University of Karlskrona/Ronneby** was granted new professorships in tele traffic systems, software engineering, computer science, applied signal processing, along with business economics and management, and English. The faculty is concentrating on applied research related to the design and management of global communication systems. The companies within Telecom City collaborating with the faculty are: Europolitan, Global One, Sun Microsystems, Ericsson, Nokia, Telia, Karlskronavarvet, Radius, Kipling Information Technology, and Karlskrona Kommun.
  Source:Telecom City Newsletter, February 1997

*** New IT Research Institution for PCC at the University of Linköping**

When the winter semester of 1997 starts at the University of Linköping, a brand new institution for IT research will open its doors to some 20 doctorate students. They will focus their research on applied information technology and industrial programming technology in order to construct the "fourth generation" mobile telecommunications system. The research program is called PCC, Personal Computing and Communication.
The institution is sponsored by the state run foundation for the development of knowledge and competence, Stiftelsen för kunskaps- och kompetensutveckling, in close collaboration with some of the leading Swedish industry groups like Ericsson, ABB, SKF, Saab, Celsius Tech, and some smaller companies like Sectra, Softlab, and Focal Point.
Source: Lite nytt från Linköpings universitet # 9, 1997, May 21

*** The Internet and E-mail Tools for International University Programs**

Ten students from the humanistics faculty at the University of Linköping hav participated in a collaborative project via the Internet together with 17 othe European universities. The project is called "Open to Europe" and is part of th EU Socrates exchange program. The Linköping students have participated i projects related to business, teaching, and logic
More information is available on: http://www.salford.ac.uk/iti/ote /homepage.htm
Source: Lite nytt från Linköpings universitet # 9, 1997, May 2

*** New Scientific AI Journal on the Net**
— Peer Review After Publication

In May 1997, a new type of scientific journal started on the Internet "Electronic Transactions on Artificial Intelligence", ETAI. The netbase journal will publicise early news from the AI labs and research programs, eve if the results have not gone through the traditional — and very time consumin — peer review. The peer review will, in fact, happen after publication. In spit of this, the reviewing process based on quality control is more strict and reliabl than the one of conventional journals. Research articles, news, debate about ne research results, and current bibliographies of other journals in the field are som of the contents. Type http://www.ida.liu.se/ext/etai to find out more
Source: Lite nytt från Linköpings universitet, # 10, June 11 199

6. Internet and Intranets

"It's Not a Medium, It's a Disease".
Source: Wired, October, 1996

6.1. A Brief Background for the Internet Novice

The Internet is the network of all computer networks, linked together for common traffic, based on Internet technology. In simple terms, this means that everyone is using the IP protocol (IP = Internet Protocol). All kinds of users, all kinds of organisations, and all kinds of computers are hooked up to the Internet. It is as fast and easy — or slow to send a message to President Clinton in the White House — or to Socks — as it is to get information about the current issues in the Swedish Government via "Information Rosenbad".

Growth in E-mail Traffic on the NFSNet backbone
November 1992 to November 1994

Millions

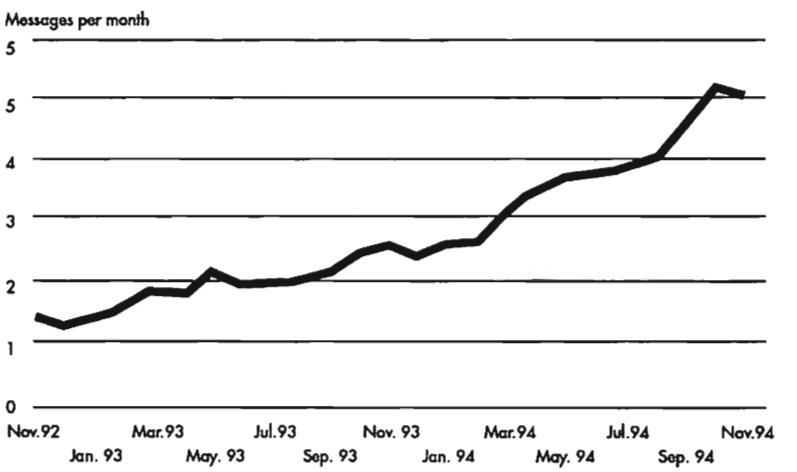


Fig. 176: By November 1994, more than 1 000 000 e-mail messages were sent per month via the NSFNet, i.e. the original Internet backbone, managed by the National Foundation of Science. Today, in February 1997, the Internet is largely self-funded, and is so large that volymes have lost importance.
***Sources: Internet Society/OECD: Information Technology Outlook 1995, © OECD,** reproduced with the permission of the OECD*

E-mail is only one of the services available via the Internet. Several thousands of databases, distributed ones as well as central ones, on hundreds of highly differing topics can be reached. Many, many international magazines and dailies are published on the Internet, as are scientific disertations and books. Software can be downloaded from the Internet, some for free, some to be paid for. Pictures, movies, music... whatever you need or want, you are likely to find it on the Internet. There is no central administration. All traffic on the Internet is regulated via bilateral and multilateral agreements between regional computer networks associations.

Once you have typed whatever address you want to reach, and you are connected, you just don't know where on the Internet you are, what computer is providing you with what material from where. You are in Cyberspace where longitudes and latitudes have no relevance.

Now, the development of the Internet has not been as smooth as all that. In Europe, there has been so intense controversies that some people even have been talking about a "protocol war". The reasons are, very briefly, and very simply, that it is not selfevident that one computer can communicate with any other computer. Mutual communication demands one common protocol. The fast growth of global computer usage, the development by the computer manufacturers of several competing technologies for propietory communication, and industrial politics, among other things, have resulted in there being no protocol, common to every computer in the world. There are several. The net result is, very simply put, that each communicating computer is hooked up to another communicating computer, which has one task only: to solve the protocol problem, and see to it that my message gets to its address, whatever the protocols involved may be.

The protocol war may be over, but now there is a battle over bandwidth — users of the WorldWideWeb are now talking about WorldWideWait. Why? Because there are so many millions of people wanting to use the Internet, that there is simply not room enough for everybody. But the Internet lets everyone join the traffic jam by letting everyone have his or her share of the waiting time. In Cyberspace.

How big is the Internet? There is no answer to that question. The number of users, computers, and nodes hooked up is just very large as a result of exponential growth over the last few years. For estimates, see the diagrams at the beginning of this chapter. Also see the following chapter.

6.2 The Basic Facts

The Internet and Its Exponential Growth by January 1996
Number of hosts worldwide

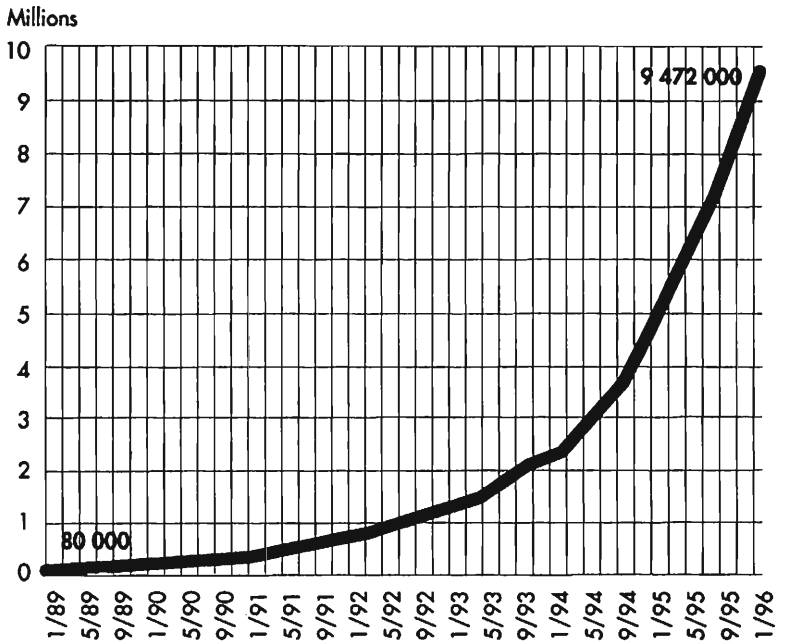


Fig. 177: The number of host computers making up the Internet universe is growing exponentially, as can be seen from this diagram. A host is a computer with a distinct Internet Protocol (IP) address. When it comes to deciding how many users there are per host, so far the figures are rather uncertain. Thus, we do not really know how many Internet users there are in the world — we can only guess. Compare to the following diagram.
Source: Network Wizards (http://www.nw.com)

Number of Internet Host Computers Worldwide
Growth August 1981 — January 1995 (Millions)

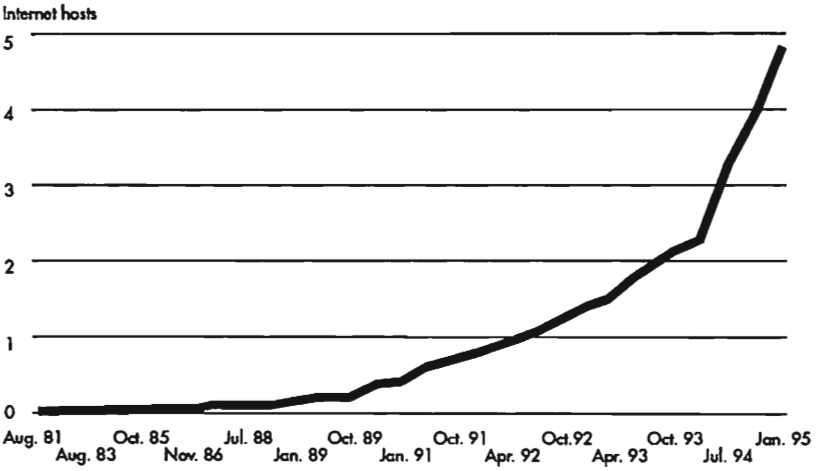


Fig. 178: How many Internet users are there? is a frequent question. According to specialists, the number of Internet host computers grew from 1 000 in 1984, to 100 000 in 1989, and to some 4.85 million in January 1995. By mid-1995, the number of Internet users probably passed 30 million, and by October 1996 there may well have been about 70 million users, according to some sources. These estimates are difficult to verify. Anyway by January 1995, 65% of the hosts connected to the Internet were in the United States, 22% were in Europe, and 7% in Asia-Oceania.

Sources: Network Wizards/OECD: Information Technology Outlook 1995, © OECD, reproduced with the permission of the OECD

Internet Hosts per 100 Inhabitants 1994 & 1995

In countries studied by DTI

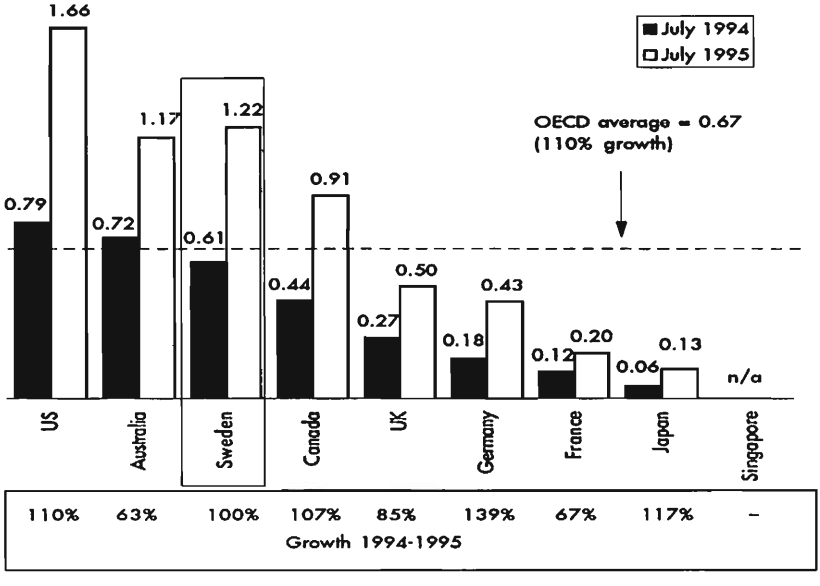


Fig. 179: The fact that the Internet penetration per 100 inhabitants is dominated by the US may reflect a number of factors, according to the researchers of DTI. Factors like a critical mass of local content — in this should be included content available in the national languages — high PC penetration, competitive pricing of high speed access, and a broad base of information and communication culture, influence users' reactions to new technology. In 1995, Sweden had the second highest penetration after the US. The growth rate is strongest in Germany, followed by Japan, US, and Sweden. See chapter 6 for more detailed information.

Sources: ITU/Network Wizzards, OECD: 1996 Information infrastructure Convergence and Pricing/Department of Trade and Industry & Spectrum: Development of the Information Society, 1996

North America Dominated the Internet in January 1996
Hosts by region in percent

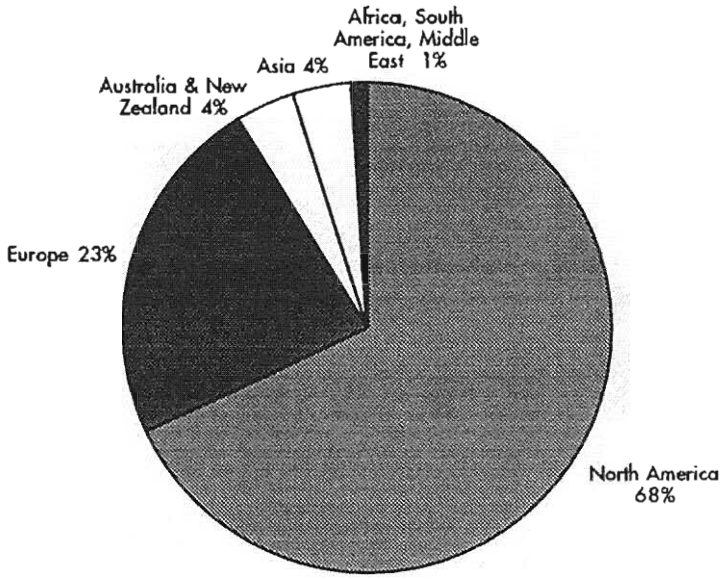


Fig. 180: This diagram shows the distribution of Internet host computers per region by January 1996, in percent of total number of hosts. So far, North America is dominating, but the Asian countries are showing the fastest growth, so the picture certainly has changed since January 1996.
Source: Network Wizards (http://www.nw.com)

Growth of Internet Hosts by Region 1994 — 95

In actual numbers

Internet hosts	Jan. 1994	Jan. 1995	Growth %
North America	1 685 715	3 372 551	100
Central & South America	7 392	N.A.	N.A.
Western Europe	550 933	1 039 192	89
Eastern Europe	19 876	46 125	132
Middle East	6 946	13 776	98
Africa	10 951	27 130	148
Asia	81 355	151 733	87
Pacific	113 482	192 390	70
Total	**2 476 641**	**4 851 873**	**96**

Fig. 181: When it comes to growth of the number of Internet hosts, Africa and Eastern Europe are the regions showing the fastest growth rate of the regions, according to this chart. Central and South America seem to be lagging behind. In real numbers, the US is dominating, followed by western Europe.

Sources: Network Wizards/Internet Society/OECD:Information Technology Outlook 1995, © OECD, reproduced with the permission of the OECD

The Global Market in Shares per Program for Web-server Programs

In percent, January 1997

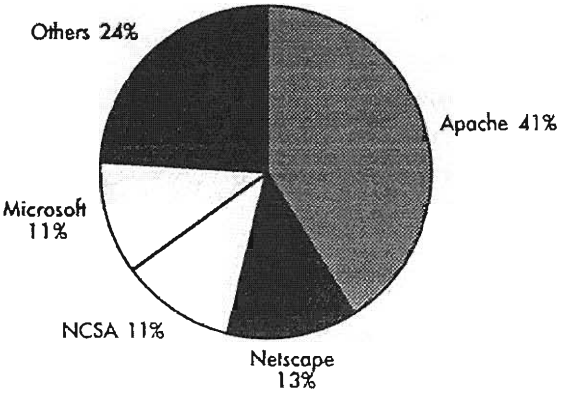


Fig. 182: Netcraft makes regular surveys of web server usage, among other things. The one reported here is from December 1996.
Type: http://www.netcraft.com/survey/ for further information.
Sources: Netcraft/Computer Sweden, 17 January 1997

Internet Hosts per 1 000 Inhabitants, January 1995

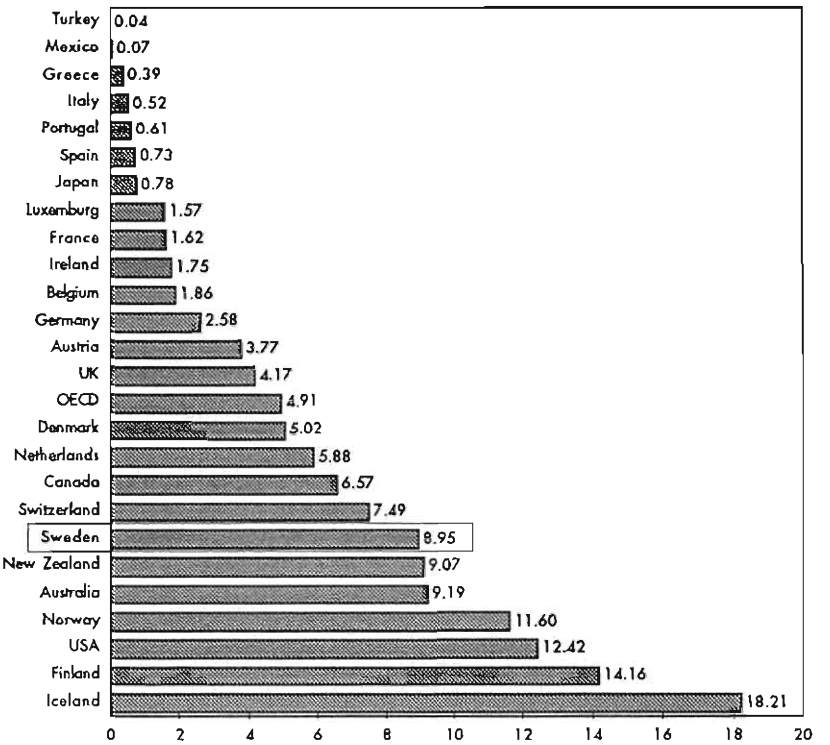


Fig. 183: The OECD average is 4.91 Internet hosts per 1 000 inhabitants. Small nations like Iceland and Finland have the most Internet hosts per inhabitants, 18.21 and 14.16 respectively. USA has 12.42 per 1 000 inhabitants, and Sweden, had 8.95 hosts per 1 000 inhabitants in January 1995.
Sources: Network Wizards/Internet Society/OECD Secretariat/OECD: Information Technology Outlook 1995, © OECD, reproduced with the permission of the OECD

Growth in Traffic on the NSFNet* Backbone From Internet January 1992 — November 1994, In gigabytes

* NSF = National Science Foundation

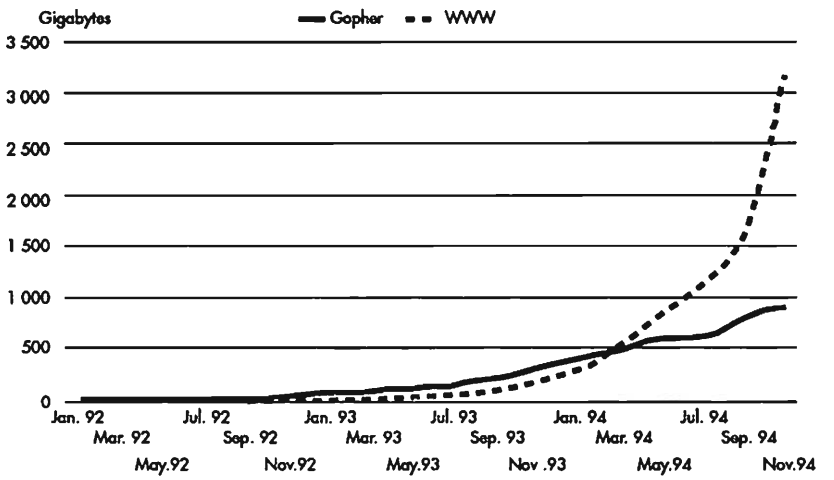


Fig. 184: At the beginning of the 1990s, applications linking information stored in different computers appeared. Gopher is a menu-based textual system that played a transistory role. Today, WorldWideWeb, www, based on a hypertext multimedia protocol, is linking together text, sound, and pictures from machines all over the world. Graphical user interfaces such as Mosaic and Netscape have made Internet available to a broad audience.
Sources: Internet Society/OECD: Information Technology Outlook 1995, © OECD, reproduced with the permission of the OECD

Projected Sales of Internet Related Products and Services 1995 & 2000 In US$ billion

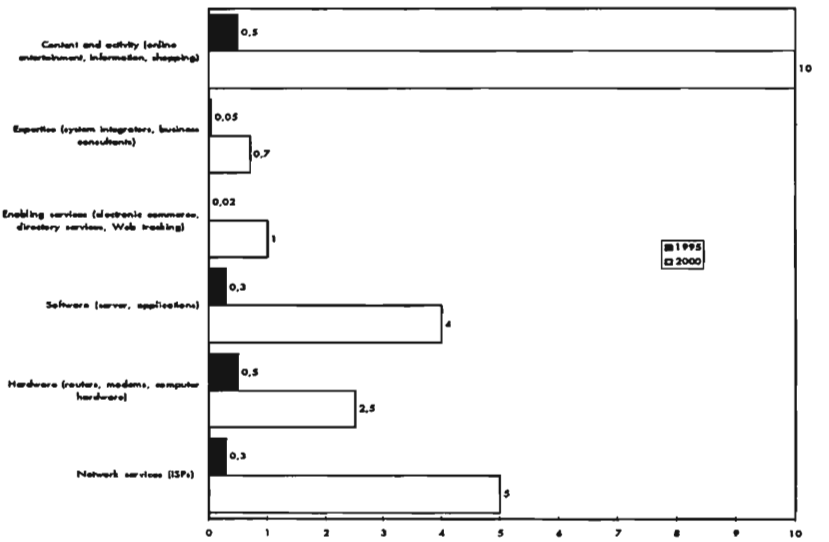


Fig. 185: The Internet content and activity market is estimated to be worth US$10 billion by 2000. Online entertainment, information, and shopping are believed to be the major segments of this market. Network services is likely to be worth half of that, US$5 billion, all according to the business consultants Hambrecht & Quist.

Source: Hambrecht & Quist (http://www.hamquist.com)

E-mail Software for the Internet Is High Growth News

Percentage of total number of new e-mail users for 1996 = 32 million

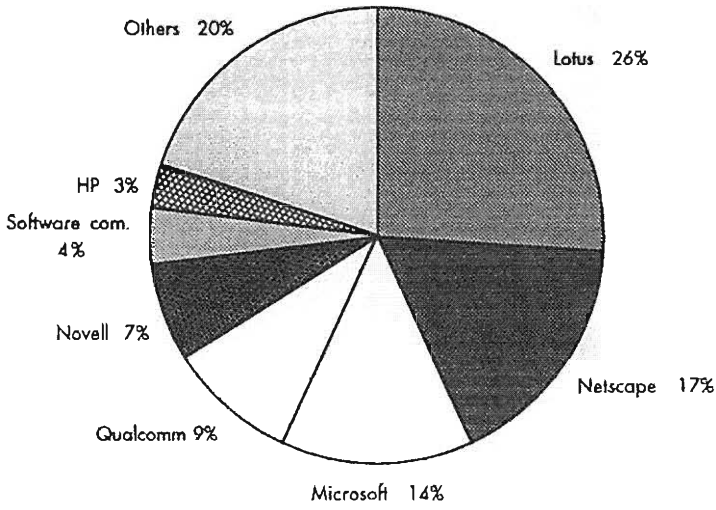


Fig. 186: During 1996, some 32 million e-mail users joined the existing mass of e-mailers in the world. The total market for message handling grew by 46%, while Internet based e-mail grew by 727%. The diagram shows the percentual distribution of e-mail programs among new e-mailers in 1996.
Sources: IDC/Computer Sweden, 7 March 1997

6.3. The Internet — What is it?

by Jill Melançon

According to the American analysts Hambrecht & Quist, "the Internet is arguably the most significant phenomenon impacting our commerce and culture for the remainder of the twentieth century". Built in 1969 as a network for government and academic communities, in recent years, the "Net" has grown faster and larger than all prognoses. Basically, all the Internet is, is a worldwide, open, collective network of computers. Yet, despite all the talk about the Internet, it has not even truly reached the mainstream in the U.S., let alone the rest of the world as yet.

From being mostly used by scientists and university students, the Internet took off in 1990, when Tim Berners-Lee of CERN, the European Laboratory for Particle Physics, created the World Wide Web, www. The Web allowed people to publish a "Web page" and let the audience come to them, rather than needing to mail the message directly to each individual addressee as previously. — Ignore the Web and you're dead, is the current catch phrase.

Until the Web, the Internet was mostly used for electronic mail — e-mail. Some of the impediments that have plagued the Internet, such as transmission speed, information and network security, and payment and transaction services, may probably find technical solutions during the next few years. This will allow Internet to enter a new surge of growth.

To sum up, the Internet is different from all standard practices of computer systems in that it is an open, standard system of relatively high bandwidth. Moreover, it is open to anyone, and costs are independent of distance. (At least they were in November 1996.)

Current Business Use of the Internet in the U.S.

In the second annual survey of technology executives made by *"Upside Magazine"* and KPMG Peat Marwick LLP in March 1996, the following facts became evident:

* 70% of the respondents believed it was "very" or "somewhat" important for their companies to have Web sites;
* Some 33% actually had a Web site;
* Many CEOs did not know what they were using the Web site for — but having a Web site is thought to be "cool" and therefore necessary!
  Source: Upside Magazine, March 1996

The Internet is evidently being used more for distributing information than to enable actual business transactions. According to an Information Week survey of 225 IS managers, **more than 70% of the respondents used the Internet as an intranet** for information distribution or for external Web sites to distribute marketing information. Less than 30% used Internet Web sites for actual supplier transactions.

How American Business Uses The Internet, April 1996

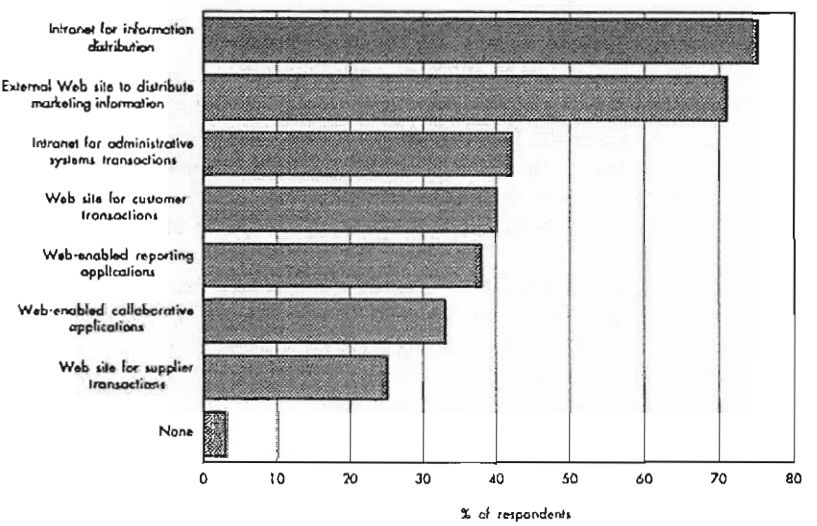


Fig 187: Information Week interviewed 225 IS managers in the U.S. about how their companies use the Internet. More than 70% are using it as an intranet for internal distribution of information, and 40% use it for administrative systems transactions. The Internet serves more as an intranet! Some 25% use their Web site for supplier transactions. This was in March—April 1996.
Source: Information Week, April 8, 1996

According to the seventh annual survey of North American telecommunications professionals, carried out by Deloitte & Touche Consulting Group, e-mail is the main use of the Internet, used by over 80%, followed closely by database access. Electronic commerce is used by less than 40% of the respondents in this survey.

Important Internet Uses by North American Telecommunications Professionals — May 1996

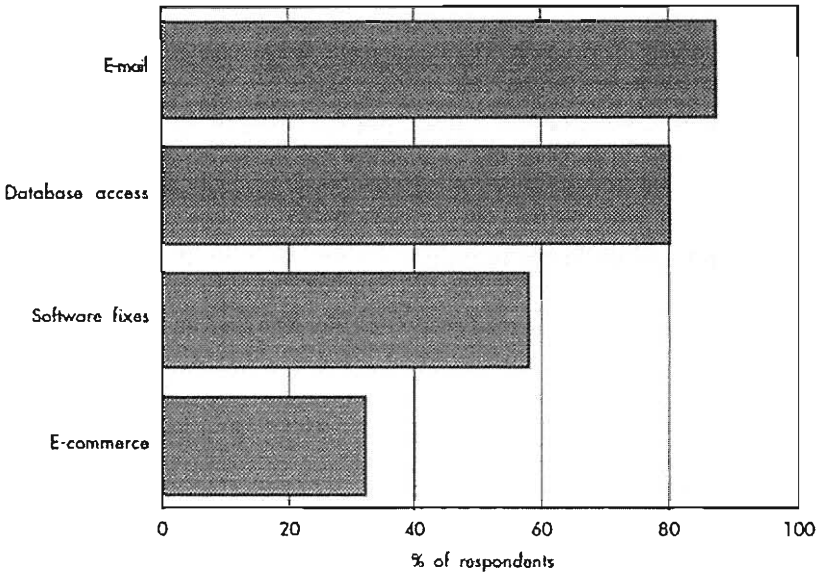


Fig. 188: More than 100 telecom professionals were interviewed in an annual survey made by Deloitte & Touche Consulting Group in May 1996. When asked about Internet usage, more than 80% responded that E-mail is the major task, followed by database access, used by almost 80%. 55% are using the Internet for software fixes, and some 35% for e-commerce.
Source: Information Week, May 13, 1996/DeLoitte & Touche Consulting Group

Many Internet applications have yet to be fully implemented but among the key uses are the following:

* **Electronic mail**
* **Corporate information:** The annual report is available on-line; up-to-date products and prices
* **Interactive services:** Reservations, bank account information, applications of all kinds and areas, where a clerk was needed before; now the Internet user can access the information directly, as well as provide an input, saving time as well as money;
* **Virtual Private Network:** In effect, a corporate WAN at a fraction of the cost;
* **Entertainment:** Hollywood goes on the Net with graphics and trivia on news movies;
* **Audio:** Still to be fully realized, audio broadcasts, or voice over the Internet puts the Net in direct competition with the broadcasting and telecom operators;
* **Malls:** Shopping on the Net is currently available but for a very limited range of products and services.

Who are The Current Internet Users — and The Future Ones?

The size and the growth of the Internet varies, depending on the source and exactly what is being measured. Below are some of what I have judged as the more trustworthy statements and estimates:

First a general statement from a survey made by the Georgia Institute of Technology:

* On-line customers to the Internet — have high incomes
  — are well educated
  — are mostly male.

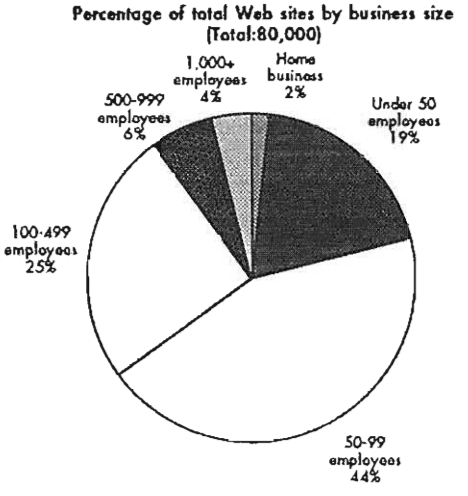
There are no surprises in this, most technology user research and studies will confirm this picture.

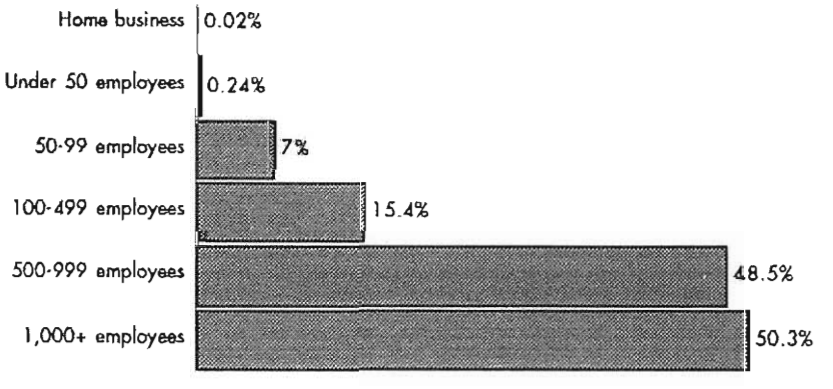
By March 1996, *"Upside"* stated that there are more than 40 000 Web servers and more than 76 000 domain names ending in ".com".

"CommunicationsWeek", April 15, 1996, refers to a survey made by the Yankee Group in Boston, U.S.:

"The Yankee Group, Boston, made a telephone and mail survey in January 1996 (in order to understand the use of) Web sites among U.S. businesses. According to their results, about 50% of all U.S. businesses with more than 500 employees already have established Web sites. Many of these companies have earmarked U.S.$ 500 000 for Web activities alone."

Current Web Use by U.S. Businesses, January 1996





Size of business	Total # of business	Web budget
Home business	7.6 million	$260-$500
Under 50 employees	6.3 million	$4k-$6k
50-99 employees	503,000	$15k-$25k
100-499 employees	130,000	$75k-$125k
500-999 employees	9,000	$250k-$350k
1,000+ employees	6,360	$500k+

Fig. 189: Small and medium-sized businesses account for the largest number of commercial Web sites, but the large corporations are more likely to have a Web site, according to the results of this survey made by the Yankee Group in Boston. The total number of Web sites when the survey was made in January 1996 was 80 000. It will be interesting to follow what home businesses and small businesses will do — can they make money via Web sites?
Sources: CommunicationsWeek April 15, 1996/The Yankee Group, Boston

The number of commercial domains registered with InterNIC, the Internet clearing organisation, grew 160% — from 29 202 to 75 875 — in the seven months ending July 31, 1995.
Source: The Internet Webbing the Digital Economy, J. Neil Weintraut, Daniel H. Rimer, Hambrecht & Quist, LLC Institutional Research, September 22, 1995

Hambrecht & Quist also estimates that the industry providing the enabling technologies of the Internet will grow from a US$ 1.1 billion market, focused primarily on equipment, in 1995, to a US$ 13.2 billion market, focused on network services and software in the year 2000. The greatest growth, according to H&Q is the market for Internet based content and activities, which is expected to grow from US$ 50 million in 1995 to more than US$ 10 billion by the year 2000.

Internet Enabling Technologies Industry in the U.S. 1995 — 2000 (in millions of US$)

	Equipment	Network services *	Software	Enabling services	Expertise	Total
1995	500	300	260	20	50	1 130
2000	2 500	5 000	4 000	1 000	700	13 200
CAGR	38%	76%	73%	119%	70%	63%

* Excludes approximately US$ 2.8 billion of revenues associated with consumer online service providers in the year 2000.

Fig. 190: The table shows the estimated growth in million of US dollars of sales of equipment and services related to the Internet enabling technologies. The total growth is estimated to be more than tenfold from 1995 to the year 2000. Enabling services are the ones representing the highest growth of all the technologies considered in this study.
Source: The Internet Webbing the Digital Economy, J. Neil Weintraut, Daniel H. Rimer, Hambrecht & Quist, LLC Institutional Research, September 22, 1995

The same study estimates that there were approximately 35 million Internet users worldwide. 10 million of these use the Web. By the year 2000, they predict over 300 million Internet users, and among these, 200 million will use the Web.

Estimated Worldwide Network Community 1995 and 2000

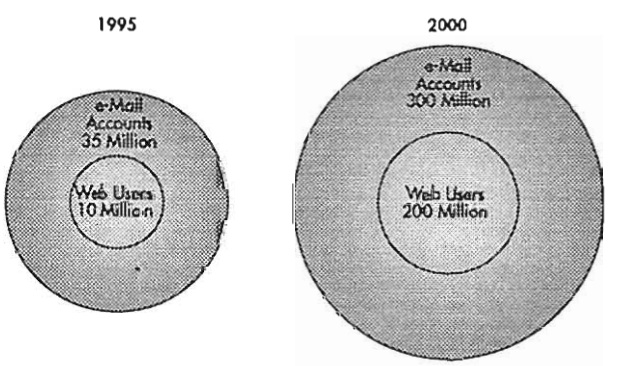


Fig. 191: The number of Internet users worldwide will grow tenfold according to this study in just five years, from 35 million to 300 million.
The estimates are made on the number of existing e-mail accounts in 1995.
Source: The Internet Webbing the Digital Economy, J. Neil Weintraut, Daniel H. Rimer, Hambrecht & Quist, LLC Institutional Research, September 22, 1995

The researchers at H&Q also state, that the Internet entering the U.S. mainstream will be followed by further stimulation as the international markets, which are approximately one to two years behind the United States, grow to equal the U.S. market in size.

According to another study entitled *"Internet Use in the United States"*, Internet address (http://www.2000.osgm.vanderbilt.edu/baseline/1995.Internet.estimates.html) made by researchers at the Vanderbilt Univeristy and the University of North Carolina, the following facts were stated:

* 28.8 million Americans of the age 16 and above have potential or actual access to the Internet;
* 16.4 million Americans use the Internet;
* 11.5 million use the Web;
* 1.5. million Americans have used the Web to make a purchase

Source: Web Week, April 29, 1996

Input, a research firm in Mountain View, California, estimates that global corporate spending on Internet and intranets will grow from US$ 12 billion in 1995 to US$ 208 billion by the year 2000. US$ 104 billion of these will be for services such as consultint, trining, systems integration, and outsourcing. In 1995, spending on Internet services was US$ 5.8 billion.

Worldwide Spending on Internet Services 1995 — 2000 (in billion of US dollars)

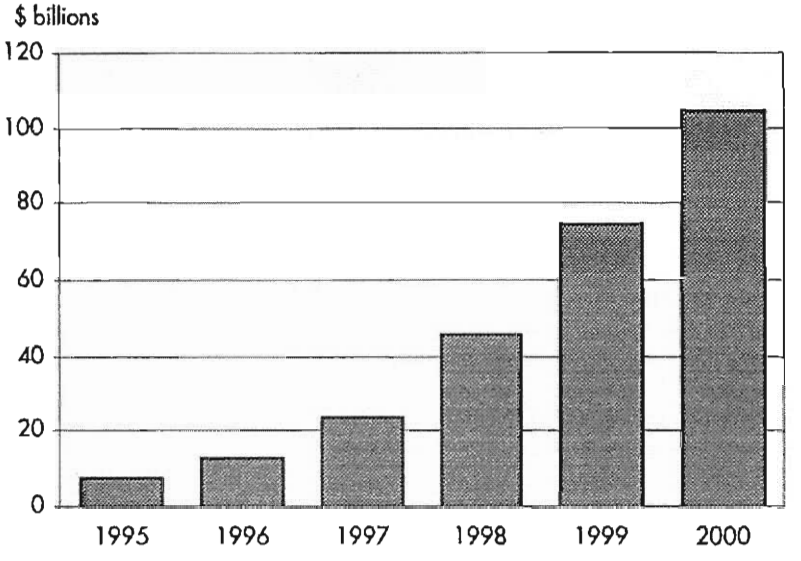


Fig. 192: The Mountain View-based Californian research firm Input makes these estimates for worldwide spending on Internet services up till the year 2000. Half of the projected spending will be for services, including consulting, training, systems integration, and outsourcing. The figures in this diagram should be put into the total perspective: In 1994, companies spent US$ 295 billion on all of their computer services.
Input has also begun a study to see which applications are likely to move to an Internet platform.
Source: Information Week, March 25, 1996/INPUT

But not everyone is jumping on to the Internet Information Highway according to a survey made by O'Reilly Associates, Sebastopol, California. Interviews with 1 003 MIS directors and Webmasters at U.S. and Canadian companies, randomly selected from a Dun & Bradstreet database of 7 million, showed that 28% of large businesses, 53% of mid-sized companies, and 79% of small businesses said they have no plans to use the Net now, or in the future.

U.S. Businesses Heading for the Net Early 1996

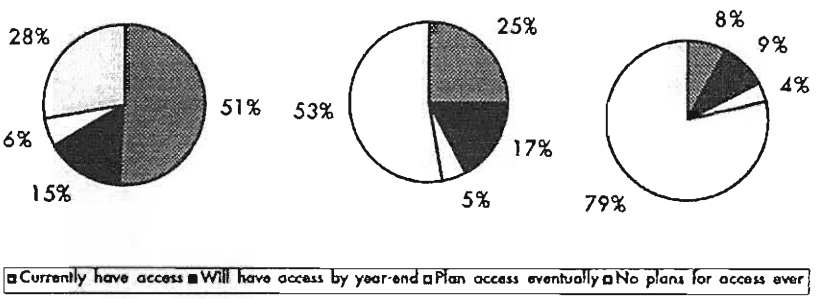


Fig. 193: O'Reilly Associates; Sebastopol, California, found that while many businesses are jumping onto the Internet as fast as they can, more than expected are adamantly refusing to consider such a move at all. 28% of large businesses, 53% of medium-size concerns, and 79% of small companies said they have no plans to use the Net now or in the future.
Sources: CommunicationWeek, March 25, 1996/O'Reilly Associates

To Advertise on the Web Is to Exist?

For the fourth quarter of 1995, 270 companies surveyed spent US$ 12.4 million for advertising on 175 Web sites, according to Webtrack, New York. AT&T advertised the most, spending US$ 567 000 for the fourth quarter. Netscape Communications was number two, buying ads for US$ 556 000 during the fourth quarter. Netscape was number one in receiving money with advertising revenues of nearly US$ 1.8 million. Activ Media estimates, that companies spent an additional US$ 83 million worldwide on Web site development. Webtrack found that 75% of the ad dollars spent on Web advertising in the fourth quarter of 1995 went to only 10 companies. US$ 4.2 million, equivalent to 34%, was spent by the top 15 advertisers, with US$ 6.3 million, 51%, spent by the top 30. Alex Brown & Sons estimates that Web ad revenue will jump to US$ 1.4 billion in 1998, from an estimated US$ 20 million in 1995. This is according to an article in the Wall Street Journals, December 8, 1995.

In the same article, an expert states that "even though the flow of dollars into Web advertising is a minuscule part of today's ad budgets, it is subtly changing the industry." How remains to be seen — ad agency creativity may have a challenge.

Possible to Make Money on the Internet?

With individuals' and companies' usage of the Internet increasing, the great growth in number of Web sites and greater and greater bandwidth requirements, Hambrecht & Quist expects, that the market for network services will grow from less than US$ 2 billion today to nearly US$ 8 billion by the year 2000. The researchers believe that most major corporations will have 20 to 200 connections and that the number of direct individual Internet connections, currently less than one million, will grow to more than 30 million by the end of the decade. Which are the business opportunities in this growth?

The software market may be one. The Internet market contains ten primary software segments, which are expected to grow fifteenfold from US$ 260 million in 1995 to US$ 4 billion by the year 2000, a 74% compound annual growth rate.

Hardware to utilise the Internet may be another, since it is required by the organisations and individuals wishing to access the Net. Network service providers build the Internet's infrastructure. From a US$ 500 million market in 1995, equipment is expected to grow fivefold to US$ 2.5 billion by the year 2000.

The service industries, including a number of service providers will most likely show at least equivalent growth. Regarding applications, we just have to wait and see which ones will find Internet platforms. The information from Input, the Redwood City research company, may provide some answers in the years to come.

How Secure Is the Internet?

There are several security issues related to the Internet, a statement familiar to all Internet users. But according to David Pensak, principal consultant for advanced computing technology at E.I. du Pont de Nemours & Co., the weakest link in every organisation is its — people! Anyone can be bribed to give away corporate secrets, which is far less expensive for competitors than breaking into a network. So, employers have better keep employees happy because they must trust them with corporate information.

Apart from this statement, primary results from a new U.S. survey by the Computer Security Institute and the FBI's Computer Crime Division show that nearly half of the 5 000 Fortune 500 companies, federal institutions, and universities polled had experienced computer security breaches within the last 12 months. These breaches ranged from unauthorised access by employees, to break-ins from unknown intruders.

In 1995, Computer Security Institute, San Francisco, surveyed 242 Fortune 500 companies concerning Internet security. Although for 1995, only 12% of the companies reported any losses as a result of system penetration, these totaled US$ 50 million. Specifically notable is, that there were two US$ 1 million losses because of telecommunications eavesdropping. Moreover, there were losses reported of US$ 300 000 and US$ 1 million as a result of address spoofing and active wiretapping, and losses of US$ 1 million and US$ 10 million from unauthorised access by insiders.

One major roadblock to uniform encryption implementation worldwide is the U.S. National Security Agency's tight restriction on the export of encryption technology. Without strong encryption, financial losses from breaches of computer security will mount to between US$ 40 billion and US$ 80 billion by the year 2000, according to estimates made by the Computer Systems Policy Project, a coalition of CEOs at major U.S. computer companies, including AT&T, IBM, and others.

Number of Fire Walls Sold in the World by 2000

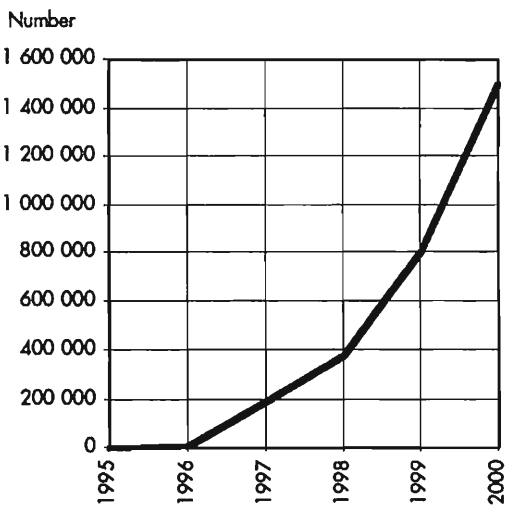


Fig. 194: According to IDC, more than 1.5 million fire walls will be installed by 2000. In 1993, there were in total three companies supplying fire walls. Today there are at least 120.
Sources: IDC/Computer Sweden 21 February 1997, (diagram after Fredrik Persson)

Intranets — Miniature Web Sites

The American journalist Ingrid Meyer has written a most interesting — and beautiful! — article in *"CommunicationsWeek"* of April 3, 1996, where she describes an intranet in the following way (may she forgive us for borrowing her words!):

"Think of the Internet and World Wide Web as a vast sea of information, punctuated by a few sharks in the form of hackers who would love to steal or confuse proprietary data. Fortunately, some companies have discovered they can avoid such sharks by using Web technology to create internal Internets, called "intranets".

These miniature Webs are like private company beaches, sheltered behind firewalls that keep unwanted intruders at bay. Resembling a combination of groupware and the Internet, intranets let users do the same kinds of things they can do on the Web — post documents, send electronic mail, chat with one another, and keep employees up to date — but on a more intimate scale."

Can intranets be explained in a better way?

Moreover, intranets permit users to collaborate on documents in real time, to access internal data bases about for instance sales, financial reports, product availablility, manufacturing plans, service schedules, etc., all continuously up-dated, to set up video conferences, meeting schedules and much, much more.

Intranets have become one of the main means of communication within quite a few companies. Some corporations, among those Digital Equipment, are even planning to integrate employee home pages into their intranets' electronic directory, in order to create a kind of "electronic camaraderie".

One intranet user, CBS, generating news 24 hours a day, has always had problems sharing information with its 208 network affiliates. By now, they have created an intranet, to which any affiliate with a computer and a modem can dial into the pass-word protected CBS Newspath World Wide Web home page and find organised information about national and regional news, sports, weather, and features, and, in addition, advise about news programming. This is according to *"InformationWeek"*, April 1, 1996.

Standford University in Palo Alto uses an intranet to post documents on campus life. Subjects like public safety, student housing, and a large collection of other documents are electronically available to students and other users.

Intranets can, of course, be expanded to more than one partner. This kind of extended intranets to include others than those directly employed or involved, is called **extranet.**

In the US, large corporations like National Semiconductor, Marshall Industries, Lockheed Martin, and Caterpillar have been running extranets for some time.

Extranets a Growing Global Market
Global Turnover in Billion SEK

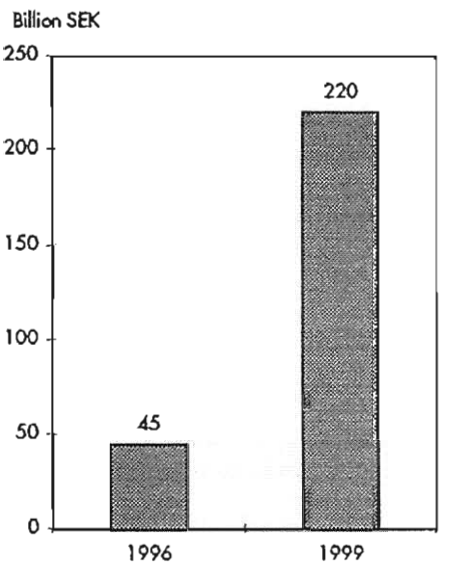


Fig. 195: According to Zona Research, the market for extranets will have grown manyfold by 1999.
Sources: Zona Research, California/Computer Sweden, 21 February 1997

The US Election 1996 A Test for the Mass Medium Internet

The 1996 presidential election of the US became a full scale test of the Internet as a mass medium, at least according to the Swedish magazine *"Ny teknik"*, 1996:46. The large news providers had millions of visitors, many of them ten times more than on a normal day. It was possible for viewers/visitors to follow the local elections in detail, which never is possible via TV, for instance. And it was possible for the information providers to evaluate the need for constant input to their home pages — quite a few were not very fast when it came to updating the figures, which caused certain irritation among curious visitors.

Irritation was also the dominant feeling among a fairly large number of users who never succeeded in logging on. Moreover, the technical capacity of the Internet was tested to the brink of collapse. A number of earlier unknown weak points were revealed, both locally and in the backbone capacity. These capacity problems must be solved before the Internet really can take over from TV news for the average viewer. But in spite of this and, evidently, a certain information chaos, the average Internet visitor was pleased with the experience.

6.4. The Internet in Sweden

* A Swedish Internet index is available via http://www.punkt.se

Swedes Surfing the Internet and/or Using E-Mail
In percent of the total population agend 16 — 65 years

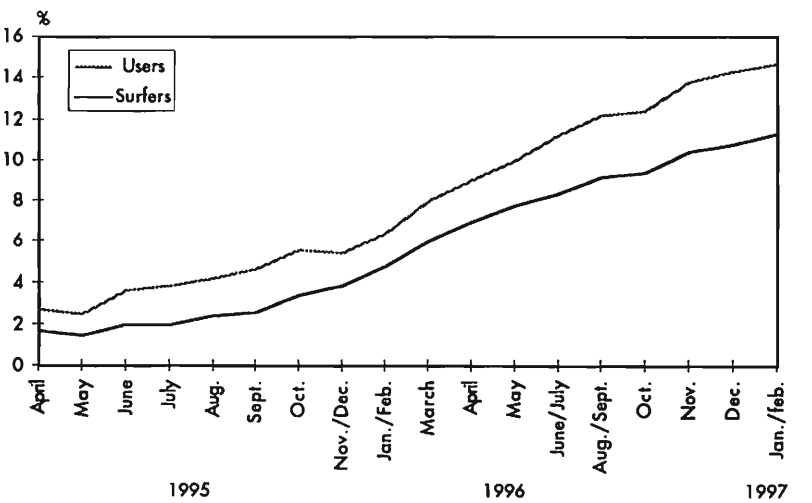


Fig. 196: This diagram shows the growth of Swedish Internet users in the age groups 16 – 65 years of the total Swedish population. The users are divided into surfers of the Internet and/or general users, including e-mail, according to a study carried out by FSI, Forskningsgruppen för Samhälls- och Informationsstudier.
Source: Österman, Torsten & Timander, Joachim, FSI: "Modern teknik i allmänhet och Internet i synnerhet", report April 1997

*** 100 000 New Surfers in Sweden per Month**

According to a study, made by the Swedish research group Skop for the news magasine *"Dagens IT"*, every third Swede had access to the Internet by April 1997. This means, that more than two million Swedes in the age groups between 18 and 74 years can use the Internet, should they chose to. Among the two million, 490 000 are surfing the Internet at least five days a week. A similar study, carried out in September 1996, showed that every fourth Swede has Internet access, and that more than 350 000 Swedes surfed the Internet at least five days a week. During the six months between the two studies, more than half a million Swedes have become Internet users. See following diagrams, which should be interpreted with some afterthought — they do not necessarily add up.

One of Every Three Swedes Has Internet Access

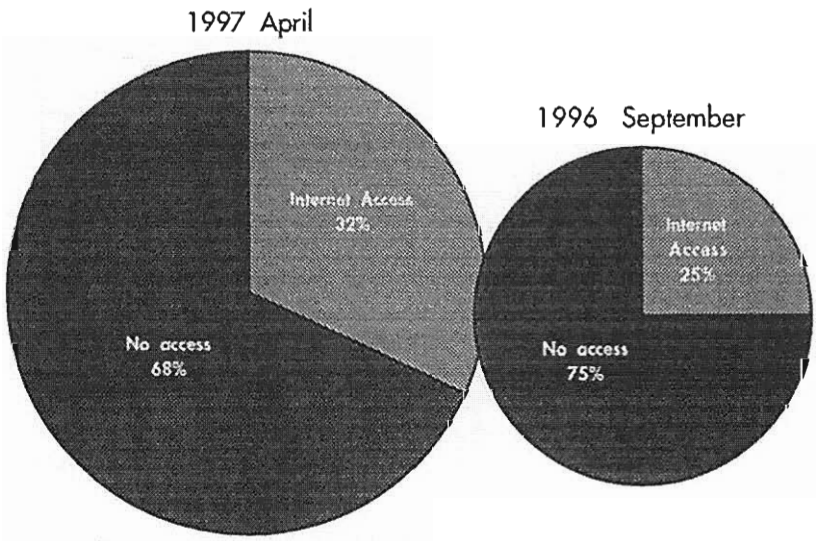


Fig. 198:: One Swede out of three had Internet access by April 1997 according to a study made by the Swedish market research firm Skop on behalf of the magazine "Dagens IT". In September 1996, a similar study was carried out. According to this, one Swede out of four had Internet access. In real number, this means that more than 100 000 Swedes have obtained Internet access during the six month from September to April.
Source: Skop/Dagens IT, April 29, 1997

Internet Access at Work and at Home in Sweden September 1996 and April 1997

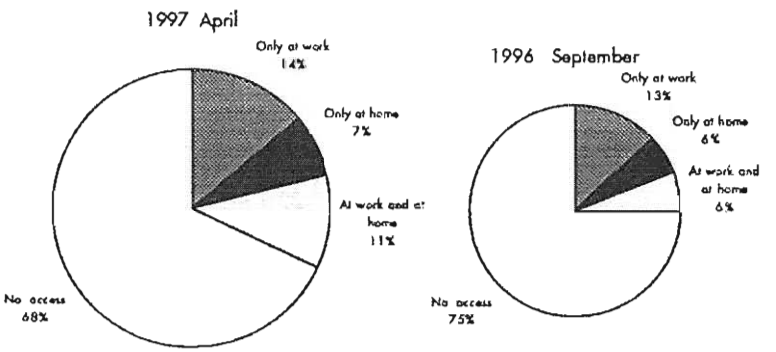


Fig. 198: The most interesting figure in this diagram is the percentage of Internet access at work as well as at home among Swedish users. It shows the fastest growth, almost double, from September 1996 to April 1997. Internet access at home is, of course, related to access to a PC with a modem. In 1995 — see fig. 132 (p. 167) there were some 1.4 million PCs in Swedish homes according to Statistics Sweden.
Source: Skop/Dagens IT, April 29, 1997

Frequency of Internet Connections Among Swedish Users

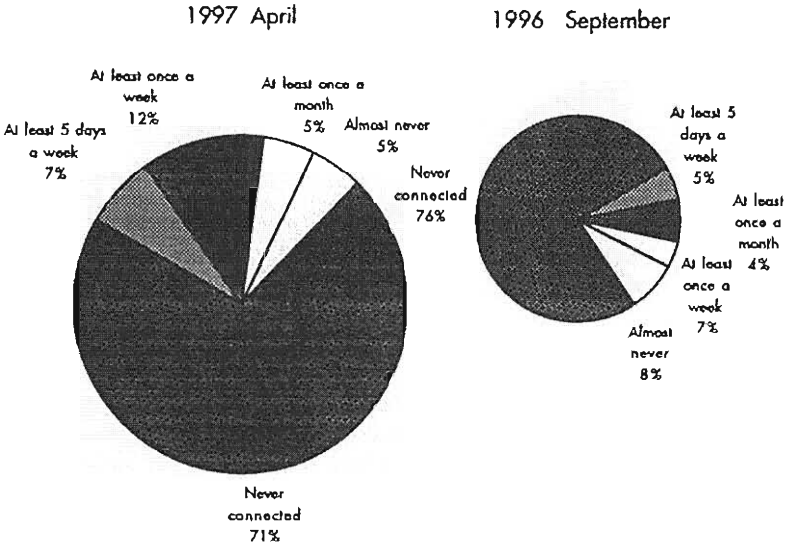


Fig. 199: The very large majority of those having Internet access never connect to the network. The Skop study indicates, however, that more and more Swedes do connect — 76% had never connected in September 1996, while 71% had not connected in 1997.
Source: Skop/Dagens IT, April 29, 1997

* Sweden Offers Internet Surfers Cheap Tariffs

According to a study by the OECD, it is cheap to surf the Internet for Swedish users. Only Canada, the US, and Finland have lower Internet tariffs than Sweden. 20 hours of surfing at peak hours, costs 360 SEK, and 300 SEK at low traffic hours. Austrian surfers pay twice as much as the Swedish ones.
Sources: OECD/Veckans Affärer/Dagens IT, April 29, 1997

*** 700% Increase in the Number of Swedish Websites Over 12 Months**

During the last 12 months, the number of Web-sites having their own domain, have increased from 1 400 to almost 12 000 in Sweden. The free Web server program Apache has 55% of the total Swedish market, followed by Microsoft, 15%, Netscape, 7%, NCSA, 5%, Cern, 5%, Webstar, 3%, and others, 10%. These figures are generated by the April survey made by Combras, type: http:// www.combra.se/internet/reports/, the Swedish equivalent to the international survey carried out by Netcraft, type: http://www.netcraft.com/survey/
Source: Computer Sweden, # 33, May 9 1997

*** New Media Internet Fair 97**

September 15, 1997, is the opening date of the New Media Internet Fair 97. It will go on for the rest of the year. Swedish media companies are offered an opportunity to get international exposure by the Export Council of Gothenburg.
Source: Veckans Affärer, April 21, 1997

* **25% of the Swedish population have access to the Internet at home** or at work
* 300 000 Swedes subscribed to Telia's Internet service
* 100 000 Swedes subscribed to Tele 2's Internet service
Sources: Dagens Nyheter, Oct. 22, 1996/Skop

During the first six months of 1996, the Internet finally became eveybody's network in Sweden. The three large operators offering Internet to the Swedish subscribers are Telia, Telenordia, and Tele 2. By the end of 1996, Telia had some 300 000 subscribers, and Tele 2 about 100 000. According to a survey made by Skop, a Swedish research institute, 25% of the Swedish population have Internet access at home or at work. Some 350 000 persons are connected to Internet at least five days a week.
Source: Dagens Nyheter, Oct. 22, 1996

* **Useful Internet addresses for Swedes who want to:**

  - know everything there is to know about illnesses, plagues, and their remedy, an use the Swedish data base Medical Link and via links reach the rest of the world. Type: http://www.medicallink.se
  - find information about exotic places to visit and their maps, what epidemic diseases are current, what creeps may sting, what places to visit, and how to avoid "Montezuma's revenge", is recommended to start via America Travelers Health and Graphical travel map. Type: http:// www.cdc.gov/
  - receive good advice about how to treat skin spots, colds, allergies, or mentrual problems, can turn to the Swedish pharmacies via: http:// www.apoteket.se

  Source: Dagens Nyheter, 10 April, 1997

*** Swedes are Leading Intranet Users**

According to the analyst firm The Butler Group, almost 90% of 150 Swedish companies asked are using some form of intranet. In the UK, 40% are using intranets, and in Switzerland and Germany 25%. The Butler Group sees the less hierarchic structures of Swedish organisations in general as one reason for the widespread intranet usage.
Source: The Butler Group

*** Strategic Business Information to All Ericsson Employees via the Intranet**

Ericsson, the leading Swedish telecom equipment manufacturer, has built a Business Information Center for its employees, available via the intranet. The Center buys information from a large number of external sources like Datapro, Data Quest, European Mobile Communications, Fiancial Times/Telecomeuropa, First, Forrester, Ovum, Reuters, and the Yankee Group, just to mention a few of the better known information providers.
Source: Kontakten # 8, 1997

* **85% of Swedish Executives See Internet as a Must**

According to a recent study (the results were announced to the public on March 2, 1997) carried out by Svenska Arbetsgivareföreningen, SAF, (The Swedish Employers' Federation), in which the chief executives of some 1 000 Swedish companies were asked to answer a number of questions regarding their IT usage, 85% said they will be using Internet within six months. The study indicates, that 50% of the executives in companies having more than 100 employees have access to Internet. In small companies, with less than 5 employees, 15% of the executives have Internet access.

On an average, 20% of all Swedish companies have E-mail. 50% of all large corporations have it and use it. 5 — 10% of the small companies have E-mail. Among those companies having E-mail, 31% of all executives use it daily.

The SAF survey also indicates that 63% of the executives in large companies regard Internet as a very important tool for communication, while 32% of the small company executives feel it is a must.

SAF, having 42 000 members — companies only — is planning an extranet service for their members. Type http://www.saf.se for access.
Source: Interaktiv Tid Analys # 8, 28 February, 1997

Why Will Swedish Companies Invest in the Internet?

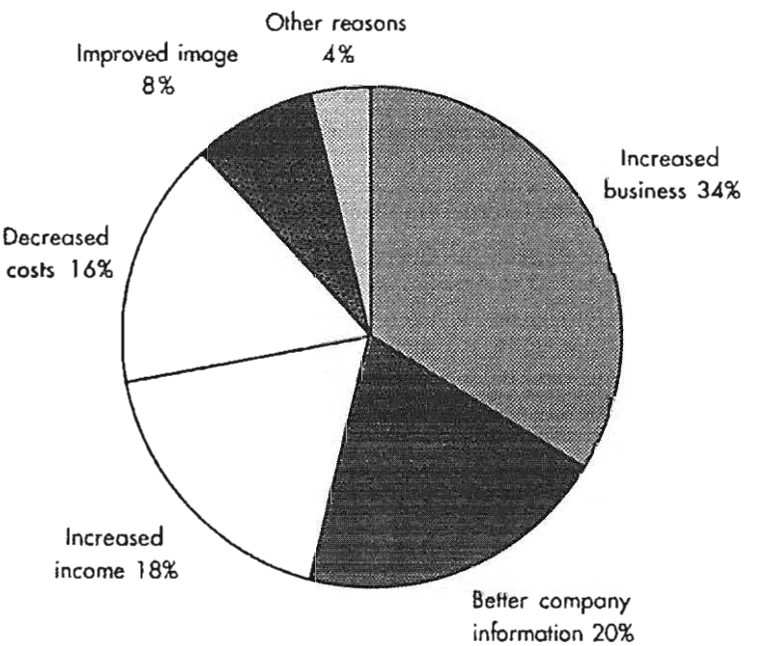


Fig. 200: The Swedish research firm Analysexperten AAA has looked into the reasons Swedish firms have to install the Internet for the web bureau i2i. 34% of all respondents said they wanted to increase business; 20% wanted to provide better information about their company; 18% responded that they wanted to increase their income; 16% thought it a good way to decrease costs; 8% thought they could improve their image by the Net; and 4% gave other reasons. 306 companies were interviewed.
Source: Computer Sweden, 28 February 1997

Intranets Common in Sweden
Share of companies using intranets

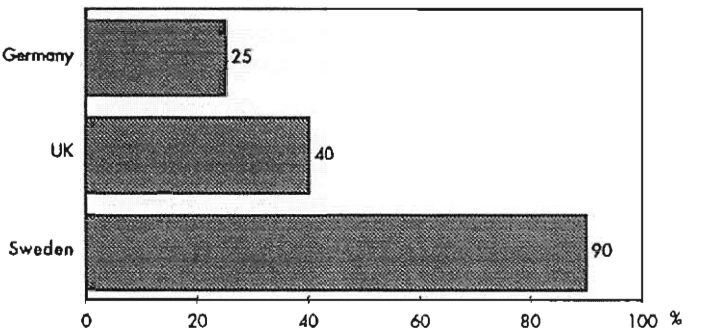


Fig. 201: A majority of Swedish firms seems to be using internets, at least according to a survey made by the British analysts The Butler Group.
Sources: The Butler Group/Computer Sweden 21 February 1997

*** Swedes Learn about the Internet via Exhibition**

A mobile exhibition, dedicated to the Internet and its usage is touring Sweden's public libraries. It started off in the south, in Malmö, in June 1996, and will slowly move its way through the country during the next two years to come. Nine computers are connected to the Internet, demonstrating among other things multi-media software, and how various persons utilise the Internet. A professor, a college student, a librarian, a journalist, and a university student are sharing their experiences with the audiences.
The exhibition is produced by Riksutställningar, in collaboration with the Telecom Museum, Apple Computers and Telia.
Source: Telia: Bilagan, # 3, 1996

*** Swedish Minority People on the Internet**

The Same people, the samoiedic minority group living in northern Sweden, has created a home page on the Web, providing a lot of information about the Same language, history, culture, and industries. The Same Parliament is also representented, so local politics can be followed. The address is: http:// www.sametinget.se
Source: MacWorld, # 7, September 1996

*** The Swedish Dailies Go Internet**

The Swedish research group TidningsStatistik, TS, charged with keeping count of the printed media circulation, is also keeping track of Internet visits to the electronic versions of the various media, dailies and weeklies. TS publishes its figures regularly. For January 1997 TS reported, that the four Stockholm-based dailies had the following number of visitors:
+ Aftonbladet 26 879
+ Expressen 12 012
+ DNet (Dagens Nyheter) 11 695
+ Svenska Dagbladet 7 598
Sources: TS/Dagens Nyheter 19 februari 1997

*** Virtual Companies**

Virtual companies seem to spread among Swedish small enterprises. PC/Fax Gruppen, set up in 1991, is a pool made up of 13 small IT companies, offering other groups of small businesses help in forming virtual companies.
Source: IT Nyheterna # 8 1996

*** Look for a Job in Sweden via the Net!**

Arbetsförmedlingen, the Swedish public labour exchange, is offering job hunters to look for new employment via the Internet. Employers are offered links to their own home pages. The service covers all of Sweden. Type http:// jobb.amv.se/ to find out what is available.
Source: PC Hemma december 1996

*** Sweden and the US are helping Lithuania to Democracy via the Internet**

In November 1995, 100 schools in Lithuania, whose school system totally collapsed after the fall of the Soviet Union, were connected to the Internet. The objective of the Swedish and American aid organisations working on the project is to provide all 1 600 schools with Internet access. Not only distance education and training will be available in this way — the organisations are also trying to help the rather confused Lithuanians to understand how they can govern their country by democratic means. Part of the Internet packet is an art gallery, providing local artists with their own home pages.
Source: Dagens Nyheter, 27 November 1995

*** Internet Access via GSM Tried by Scania**

Scania, Telia, and Ericsson are collaborating in testing a system for Internet access via the GSM networks. The idea is to give every Scania employee access to information in the corporate intranet.
Source: Computer Sweden, 21 February 1997

*** Keep Sweden Clean**

The oldest Swedish environmental foundation is most likely "Håll Sverige Rent" (Keep Sweden Clean). Type http://www.hsr.se/ for information about recycling, ongoing environmental projects in Sweden and Europe, and links to other environmental organisations.
Source: PC Hemma december 1996

*** The Swedish Local Authorities on the Net**

Should you wish to learn more about your own "kommun", i.e. your local public government, and you live in Sweden, information is available via this address: http://www.it-kompetens.se/swedish/kommun.html
Source: PC Hemma december 1996

*** The City of Stockholm via Internet**

Anyone interested in the local politics of the City of Stockholm can get detailed information about politicians and their politics as well as events and potential business partners in the city. Just type the following Internet address: www.stockholm.se/frames
Source: Svenska Dagbladet 22 January 1997

*** Swede from Umeå Finds His Lady in Philadelphia, USA — on the Net**

It has happened before! People, who normally would not meet, get in contact via the Internet. In this case, a young student in the northern city of Umeå met with a young lady in Philadelphia, USA, on the Net. After a number of hours chatting, and long telephone conversations, they decided to meet, a meeting that turned out memorable...
— Computers are OK, says the young man. But when it goes about human relations, one realises that they are nothing but machines. They cannot express feelings and nuances.
Source: Dagens Nyheter, 22 February 1997

*** Petted Perk for Swedes, the Corporate Car, Interactive on the Net**

To get a car along with your pay package has become something of a status symbol for some Swedes. The tax authorities have, of course, for a long time kept their eyes on this perk, that thanks to various complicated formulas, were more or less tax exempt. By now, the tax rules for corporate cars are so complex, that nobody can say without intense calculation to what extent it is good or bad business for the driver of the car to get a corporate car or to buy a private one. But there is interactive remedy on the Internet! Type http:// www.mrf.se and you will get the home page of the MRF, Motormännens Riksförbund. This association for motorists will help out.
Source: Bilbranschen, # 1, February 1997

* **Web advertising** in Sweden took off after a rather hesitant start, during the later half of 1996. So far, web-advertising is not a general project in the marketing plans of Swedish companies, but most of them are following the developments with interest.
Source: e.magasin # 6, 1996

6.5. Intranets

* **Ericsson**, the world's leading telecommunications equipment manufacturer, is using the Internet as well as their own intranet for interactive services, business intelligence, and for marketing of the company and its products to customers as well as to employees. Time to Market, or TTM, is an important competitive factor for Ericsson, and they see the Internet as one opportunity to bring their products to the market as fast as possible. It is also a tool for business development.
Source: Ny teknik, 1996:46

* **Distribution in Cyberspace:** Sweden's largest distributor of electronic components, Ericsson Electronic Distribution AB, has entered Cyberspace and is offering its electronic components from the company catalogue on-line via the Web on the Ericsson intranet. During the first two days on-line, last August, 8 559 visitors were registered.
Source: Ericsson "Kontakten" # 13, September 13, 1996

6.6. Do You Know This About Surfing, Netting, Webbing...?

* **The Embedded Internet** will be the next big thing to hit the Net. This means that the Internet will be wiring together millions of tiny computers embedded into everything we use. According to David Kline in "Wired" of October 1996, "this is no future vision — the products are hitting the market now."
Kline goes on, explaining:

"Embedded systems are tiny crash-proof computers, that are embedded or hardwired within everyday products and dedicated to the performance of specific tasks or groups of tasks."

He gives a number of examples of the omnipresence of these embedded systems in industrial products as well as consumer goods — you can find them in microwave owens, in VCRs and antilock brakes, in copiers, printers, telephones, and almost any electronic artifact you can think of. Technological development has by now come so far that the embedded systems are ready for the Internet.

But until the ordinary consumer becomes hooked up to the Internet via his or her embedded systems in the microowen or the faronmover, the potential of what is called the Industrial Net is far more powerful.

In the US, a number of industries are collaborating to develop the embedded technology, incidently saving lots of money by collaborating via the Net. Some of these collaborative efforts develop into Intranets, dedicated Internets with restricted access, if you so wish. There is nothing restrictive about embedded technology, however. It is everywhere. Or as Kline summarizes: "Here the Net becomes the omnipresent glue that binds society into a truly connected civilization". Those who want to know more are recommended to read David Kline's article "The Embedded Internet" in *"Wired"*, October 1996.

*** Suffering from the Internet Addiction?**

The results of the first study ever carried out of the psychological effects of frequent Internet usage is available at http://www.mu.edu. They show clear indications that some Internet users really suffer from the same kind of symptoms as some gamblers, who constantly crave for more and more gambling.

The study is carried out at the University of Buffalo, New York, USA. 185 persons were interviewed about their internet usage. 17% said that they "needed" Internet for more than 40 hours a week. Bad Internet addiction may lead to the final collapse of all social relations with real people. Among other things.

Source: IT Nyheterna # 8 1996

*** Chatting**

There are several ways of chatting via the Internet — for instance via World Wide Web, web readers, or special programs called Internet Relay Chat, IRC. Or via virtual worlds, 3D, telephony — you mention it, and it is likely to be there. Links to web chats can be found via DNet: http://www.dn.se

Source: Dagens Nyheter, 7 January 1997

*** Web Advertising in the US**

During the first six months of 1996, web-advertising generated some 71 million US$. In 2000, the estimated value of web-advertising is at least 3 billion US$.

Source: e.magasin, # 6, 1996

*** Few Internet Bugs**

According to IDG, 91% of Internet users have never found any **bugs** in material they have downloaded from the Net. For more information, type: http://www.idg.se/cs

Source: Computer Sweden, 21 February 1997

*** 50+ Surfers on Seniorsnet**

Have you turned 50, there is a home page that may interest you. Type http:// www.seniorsnet.com/ and you will get a chance to be elected the oldest surfer on the Net!
Source: PC Hemma december 1996

* According to Nicholas Negroponte of the MIT Media Lab, the number of **Web sites** is doubling every 53 days. Moreover, he is convinced that sending fax is the wrong thing to do — we must learn to transport bits instead of transporting atoms.
Source: Communication World, January/February 1996

*** SET, Secure Electronic Transaction to Come**

SET, Secure Electronic Transaction, is a standard for automated encryption of credit card numbers used for payment over the Internet, under development by software producers Microsoft and Netscape and credit card companies Visa International and MasterCard International. The idea is that whenever anyone is sending a credit card number over the net, it will be encrypted automatically, and stay so throughout the transaction. SET is based on the wellknown Data Encryption Standard. If the development program runs according to plan, SET can be in commercial utilisation by the end of 1996.
Source: Ny Teknik 1996:6

*** Cyberlanguage Clean Up?**

"The advance of prudery in the US continues apace, but every now and then it receives a setback. According to *The Chicago Tribune*, America Online, the country's leading online service company, banned the word "breast" from its computer communication service shortly before Christmas (1995) in order to "clean up cyberlanguage". But then it quickly unbanned it again after complaints from breast cancer patients who use the service to share information and support. This was the second time in six months that America Online has disrupted communication among breast cancer survivors by banning the word "breast"."
Source: New Scientist, 13 January 1996

*** Virtual Privacy**

"The Economist" (February 10th 1996) is warning its readers about the ever more transparent world. Prying, spying eyes can enter into anybody's life, collecting data about from what you last bought when you used your credit card, to your personal medical history, via sophisticated databases and their ability to talk to each other. Should anything be done about this? Well, the suggestion is that a consent-rule should be applied, i.e. anybody using a database should be asked if information can be sold to other marketing groups, for instance. Now, the magazine conceeds that this may not be the best of ways to protect your individual privacy, but on the other side we are just seeing the beginning of
how per se harmless scraps of information can be used to create something else.
Source: The Economist February 10th 1996

*** First Virtual Museum in Tokyo?**

In Shinjuku, a part of Tokyo, a very modern one, the curious visitor can make her way to the Virtual Electronic Museum of Art, has she made an appointment beforehand. Because the museum, owned and run by Toshiba, is also a demo center for new high speed fiber technology and compression techniques in real time. The visitor is placed before a large high definition screen (280 cm) and provided with a 3D mouse, which allows her to chose at what distance and from which angle she wants to scrutinize a particular work of art. Of course, real close-ups are possible. Available are some hundred works of Vincent van Gogh.
Source: Connaissance des arts, # 529, June 1996

* **Netday 96** took place on March 9 — 10, 1996, in California, USA. During that weekend, more than 20 percent of California's schools were connected to the Internet, according to the Financial Times. This could happen thanks to some 16 000 computer industry employees, who gave their spare time to help wire up the schools, working with hardware and software donated by some 1 000 companies in the state. The total value of donated working time and equipment is estimated to 300 million USD.
Source: Computer Sweden # 20, March 26, 1996

* Everybody, **virtually everybody, is on the Internet.** Type http://www.zpub.com/un/pope, and you will be connected to a web-site about the Pope. Type http://www.christusrex.org. and you will be connected to the Catholic church.
Source: Ny Teknik 1997:9

* **Japanese Internet surfers:** When a Japanese person wants to surf on the net, he or she connects via a "set top box", either built into the T.V.-set or placed on top of it. A special web software has been developed to make surfing by remote control easy. Internet is regarded more as a private fun and games arcade, rather than as a place for serious business.
Source: Dagens Nyheter, Oct. 19, 1996

* **Telephoning via the Internet** is rapidly becoming more and more popular — and you don't even need a computer. Special Internet-servers can be called directly and they will link the call via the Internet. It is possible to make such calls from telephone to telephone, from computer to telephone or to link private switches. Internet-calls are less costly for those who make longdistance calls, talking for a long time and frequently. The draw-back? The sound quality seems to be suffering.

One example of Internet telephony services is the AT&T **Worldnet Internet,** offering its users electronic shopping, publishing and marketing.
Source: Ny Teknik Data, September 5, 1996/Anon

*** The British Parliament on the Internet**

The daily transcripts of what is said by British MPs are published in *the "Hansard"*. This publication is now available in searchable form online, along with other parliamentary publications. Start at the home page by typing: http:// www.parliament.uk/

In September 1995, 12 of Britain's 600 MPs (members of parliament) had e-mail addresses. Now the number has increased to 32, and 15 have their own web pages. The Conservative Party can be reached at http://www.conservative-party.org.uk/index/html, the Labour Party at http://www.poptel.org.uk/Labour-Party/index-t.html, and the Liberal Democrats at http://www.libdems.org.uk/ And anybody interested in getting in contact with one of the parties not represented in Parliament, can type http://www.raving-loony.pv.org./ and reach the Monster Raving Loony Party.
Source: New Scientist, 9 November 1996/http://www.newscientist.com/

* **Booking plane travel online** is one of the latest Net-based services to take off. Several services are available, among them Microsoft Expedia, Preview Travel, and United Connection. Travelocity and EasySabre are two other such services. They all provide timetables, fares, alternative routings, bargains, and special offers. And they offer possibilities to book hotel rooms and rental car service along with your airline ticket. Many Americans already find these services far more attractive, for business travel as well as for leasure travel, than ordinary telephone or face-to-face conversations with live agents.
Source: Business Week, February 17, 1997

*** European Small Companies Weak on the Internet**

Only 4% of all European small companies in the G7-countries have Internet access, according to a report by the European Commission. The equivalent number for the large corporations is 98% having Internet access. This weak Internet interest is seen as an obstacle to access to the European projects on electronic trade via the Net. The G7-countries appreciate that 250 million users will have Internet access by 2000. In April 1997, 86 million persons were connected. Over the next three years, Internet access will grow by more than 60%.
Source: Computer Sweden, #27, April 17, 1997

*** Tired of the Internet Babble? Try "Electric Minds"!**

Howard Rheingold, one of the true Internet pioneers, has taken upon himself to create virtual communities of Internet users who want to participate in civilised and intellectual discussion. His own experience is such that he strongly believes that the Net can be used for intellectual exchanges on a large number of subjects. Type: http://www.minds.com
Source: Datateknik, # 10, May 29 1997

*** 7% of the Japanese are Surfers**

Seven percent of the Japanese over 15 years are using Internet in one way or another, according to a study carried out by Nikkei in April 1997. 3.3% of the 104 million Japanese in the age group had visited a www-homepage. Including those also using E-mail, the total percentage amounts to 7 percent. In Japan, as well as in most other countries, female users are a minority — less than one percent of Japanese women use the Internet.
Source: Ny Teknik, 1997:19

*** Footprints in the Cyberworld**

Every time anyone of us visits a Web site, we leave nice and clear footprints behind. It is evident where we come from, what kind of computers we have, what type of browser we are using, etc. In order to find out exactly what kind of information that we left behind, we can go to www.cdt.org. which is the Privacy Demonstration Page, sponsored by the American organisation the Center for Democracy and Technology.
Source: Wired, August 1996

*** The First Netizen?**

One of the true inhabitants of the Internet, a Netizen, is Justin Hall — type www.links.net — a young man, who is becoming the evangelist of the Internet. His home page is a description of his whole life, his family, and his friends. He spends most of his time giving courses to people who want to learn about the Internet and how to use it. One of his messages is that the Net is not only for those who want to make money but also for those who want to communicate. Now, Justin is not the first Netizen — Howard Rheingold (see above!) is most likely to be the first one!

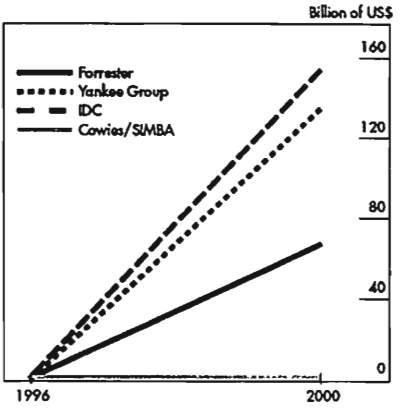
Source: Dagens Nyheter, May 23, 1997

*** Electronic Shopping on Internet A Multi-billion Dollar Affair?**

Shopping on the Internet is finally becoming what it has been expected to be for some time. According to recent surveys — May 1997 — 73% of the odd 60 million Internet subscribers globally, have used the Web for shopping during the past month, i.e. April 1997. IDC projects that by 2000, 46 million consumers in the US alone will do some of their shopping online, spending an average of US$ 350 a year each.

One of the reason for the slow take-off of shopping on the Net is the difficulties to find something to buy. Interesting enough, practically everything ever predicted about electronic commerce in 1994, has turned out to be wrong! In 1996, Internet shopping was estimated to some US$ 600 million.

Business-to-Business Market on the Net takes off?
Forecasts by American Market Gurus 1996 — 2000



Consumer Market on the Net takes off?
Forecasts by American Market Gurus 1996 — 2000

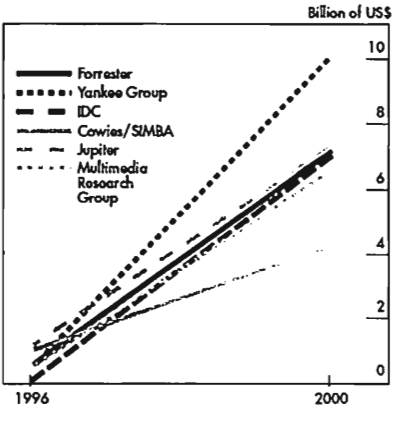


Fig. 202: The two diagrams show forecasts made by different analyst firms on electronic shopping, finally coming off age. The differences between the forecasts have to do with different definitions, among other things. During the next few years, business-to-business is expected to become the hot spot on the Net, while consumer shopping will be slower to take off. This may has to do with subtle things like there being no other shoppers to be seen in the virtual stores, that interfaces are too complicated and slow, that attractive products are difficult to find...But the market place is learning, rapidly. Thus the relative optimism.

Source: The Economist, May 10 1997

*** Next Generation Internet — NGI — or Internet II?**

Al Gore, vice president of the USA, announced early in 1997 that the US government is to support a development of what is called the "Next Generation Internet", NGI, with some US$ 12.3 billion over the next few years. The general idea is that 64 top institutions shall reengineer net technologies, routing, and quality of service in order to develop and demonstrate new applications within tele medecine, distance learning, and collaborative systems. 35 universities will be given access to what "the very high speed Backbone Network Service". Now, not all Americans are impressed by these efforts. Just listen to Steve G. Steinberg in a recent issue of *"Wired"*:

"The grand delusions of academia were starkly apparent when a consortium of 34 universities recently announced plans to create a new highpowered Internet, called Internet II (= the very high speed Backbone Network Service, vBNS). *The idea that a few schools will be able to drive technology forward faster than today's commercial demand is blatantly ridiculous. But even more egregioous is the delusion that universities need high-speed connectivity only to other universities, as if academia lives in its own, separate world. This is true only in one sense: Internet II participants are living in a dream."*
Sources: Dataeknik # 11, June 12, 1997/Steve G. Steinberg (hype-list@wired.com), in "Wired", January 1997

7. New Applications

"Socialization is not best done by segregating children into classrooms with kids of the same age. The computer is a medium in which what you make lends itself to be modified and shared. When kids get together on a project, there is abundant discussion; they show it to other kids, other kids want to see it, kids learn to share knowledge with other people much more than in the classroom."
Seymour Papert

Telecom users, private ones as well as professional ones, are constantly offered new services via the existing telecom network. Among such services available to Swedish telecom subscribers are:

* **answering service via the network**, the advantage being that no extra machines are necessary — the Telia service "TeleSvar" had some 200 000 subscribers less than six months after the launch of the service;
* a set of **"work-at-home" packages**, from a very simple one containing a fax machine and a faxbox, including a personal fax number, to a complete workstation, including an ISDN connection to the corporate computers;
* new **telephone card services**, for instance travel cards for those wanting to call home from abroad;
* **personal telephone numbers**, by which the subscriber always can be reached, no matter where he or she is.

The technical possibilities are there, which is no news, and now various service providers are jumping the band-waggon by offering ever more sophisticated opportunities, specifically so in the financial and banking sectors.

7.1. Cybermoney

Europe Leads Smart Card Usage

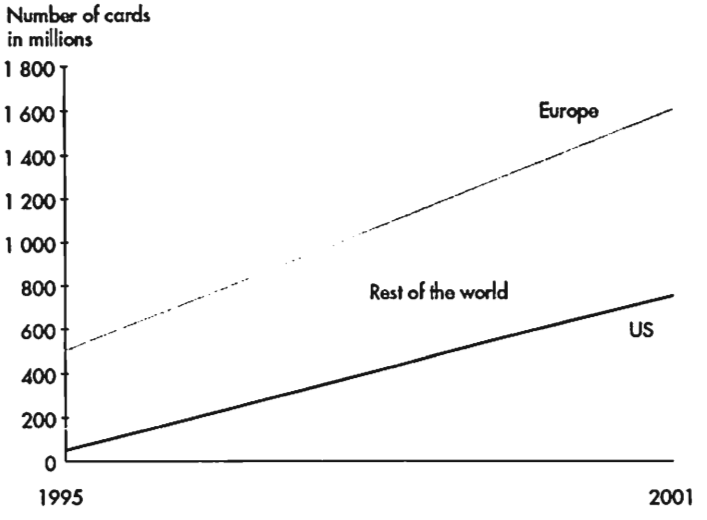


Fig. 203: Smart cards usage is predicted to increase by 54% annually in the USA during the next five years, which is a faster growth than the 22% annual growth predicted for Europe. By the end of 1995, 482 million smart cards were already in circulation in Europe.
Sources: Datamonitor/Computer Sweden 17 January, 1997

*** Swedes Use Pay Cards Less Than Their Nordic Neighbours**

Increasingly more Swedes are using pay cards according to a study carried out by the market research firm Sifo on behalf of Europay, the leader in pay cards in Europe. But Swedes seem to prefer good oldfashioned cash to a larger extent than their neighbours in Denmark, Finland, and Norway. This may change as more and more "intelligent" cards with chips are introduced in the Swedish market. Also, the introduction af the SET-standard for secure payment via the Internet, may make the Swedes replace the cash in their wallets with pay cards.

Distribution of Pay Cards Among the Swedish Population

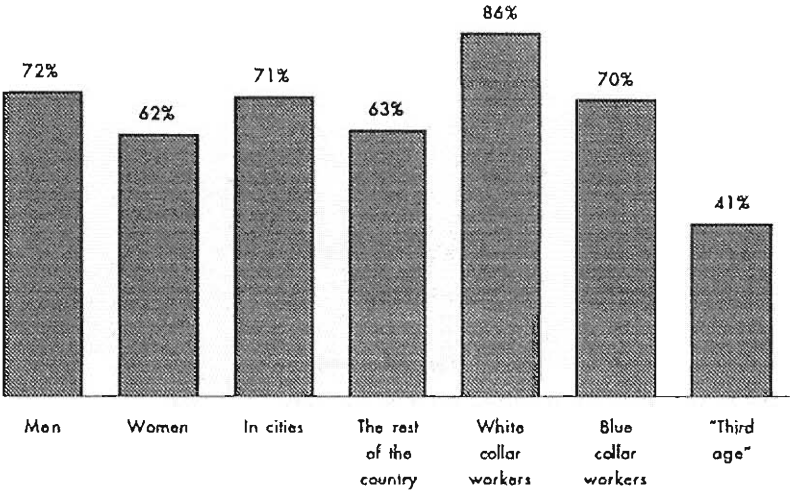


Fig. 204: Men are the most frequent users of pay cards, 72% of the Swedish male population pay their purchases by card. 10% less of the Swedish female population, or 62%, are pay card users. White collar workers are more frequent users than blue collar ones, and only 41% of all retired people in Sweden seem to rely on pay cards.
Sources: Europay/Feedback Research/Sifo/Dagens IT, April 29, 1997

* Cash Cards Tested in Uppsala and Halmstad

Sweden has been a latecomer when it comes to cash cards — the Danes have been users for several years, already. Late in the autumn of 1996, two Swedish banks, Sparbanken, and Nordbanken, announced that their customers in two cities, Uppsala and Halmstad, can buy smart cash cards to be used for small purchases instead of cash. The cash card is provided with a microchip that is loaded with money. For a start, 2 000 payment terminals are available in the two cities, mainly in kiosks, small coffee houses and similar places that do not accept existing plastic cards. In Uppsala, it is also possible to pay for taxi and bus fares. Some of the large food chains, like ICA, Vivo, and Konsum are accepting the new cash card, as well as some gazoline distributors. The SE-banken is also planning to participate, and will provide their customers with cards in early 1997.
Source: Ny teknik, 1996:46

*** Electronic ID via Nordic Post Offices**

The post offices in Denmark, Finland, Norway, and Sweden have developed a system for electronic identification, verification of authority, and signature of business agreements. This will be the basis for secure electronic transactions, whether it goes about using smart cards, signing an EDI contract, or making electronic purchases. The electronic ID is available via the post offices.
Source: e.magasin, # 6, 1996

*** EDI for Small and Medium Sized Companies**

Toppledarforum, a group of experts organised by Statskontoret, has developed and launched a package for **electronic trade** for small and medium sized companies. The first step is called PriCon Handel, and includes an electronic market place and an e-mail box. Orders and other business documents according to the Edifact standard will also be included. Electronic trade already has a history in the Swedish transportation and storing industries. Type the following addresses for more information about electronic trade for small and medium sized companies:

* http://toppled.nutek.se
* http://www.edifact-transport.se

Source: e.magasin, # 6, 1996

* **Cybercash** may become real, at last. MasterCard International and IBM are joining forces with Danish Payment Systems, a Danish on-line bank. Together they demonstrate a system for secure business transaction via the Internet. The method is based on the SET-standard (Secure Electronic Transaction), developed by Visa and MasterCard. The pilot program includes three companies and 750 clients. After Denmark, tests will be carried out in the US, Holland, and Japan.

Open Financial Exchange is a different standard, being promoted by Microsoft, Inuit, and CheckFree Corp.
Source: Nätvärlden # 1 1997

* **Mondex, The Electronic, International Purse**

Mondex is an electronic purse, a smart card, which is not tied directly to a bank account but which has to be locked and unlocked by its user, and which gives the user direct access to foreign currencies. The maximal sum that can be loaded into the card, depends on currency. Thus, in the UK, £500 is the maximum. The card can hold five different currencies, so far. No computer registers what the user buys and for how much, but th- information is loaded onto the card. There are some 90 000 Mondex card issued by Mastercard, which recently bought the company havin developed this "smart card purse". Canada and HongKong are the firs regions to have adopted the purs-
Source: Dagens Nyheter, 10 April 19

* **The Smart Card All in One — Cash, Banking, ID, Bus Fare, Telephone Card, and Health Card**

  Smart card-based electronic purses are becoming ubiquitous. Visa has launched a cash card in the UK, VisaCash, first as a test program in Leeds, where 70 000 inhabitants will test the cash card during one year. England's six largest banks are participating. Within two years, there will be 25 million users, according to the banks.
  Source: Dagens Nyheter, 10 April 1997

7 .2. Telebanking

New banking services — new banks based on on-line telecommunications service only — are coming to Sweden. Some of the new banks are:

* Ikanobanken
* Sesam Telefonbank
* Skandiabanken
* Stadshypoteks Bank
* Trygg-Banken
* Wasabanken

*** Swedes Like Internet Banking**

Banking business via the Internet has rapidly become the most popular Internet service in Sweden, according to the national business magazine *"Veckans Affärer"*. Late May 1997, 100 000 Swedes were connected to an Internet bank, and the banks estimate they will have at least 200 000 Internet clients by the end of the year. By 2000, they believe that up to 2 million Swedes will carry out their banking business via the Internet.

The Largest Internet Banks in Sweden by the End of May 1997

Bank	Number of Internet clients
SE-Banken	55 000
Sparbanken	25 000
Tryggbanken	7 000
Östgötabanken	2 000 – 3 000
Skandiabanken	2 000

Fig. 205: In June 1997, Sesam Telefonbanken, (Sesam the Telephone Bank), owned by the SE-Banken, claimed to have 30 000 banking clients, 25% of which are conducting their business via the Internet.
Sources: Veckans Affärer/Dagens IT, May 27 1997/Dagens IT, June 10 1997

*** New banks mean tougher competition**

(Translated from the *Skandinaviska Enskilda Banken annual report 1995*, p.7)

"During 1995, the Swedish banking market experienced a considerably tougher comptetion than ever before due to the creation of a large number of specialised banks. In general, this has resulted in more and better product development and better conceived marketing efforts.

The establishment of the new banks has so far resulted in tougher competition in the private market, in particular so in the savings market segment. This is expressed through generally higher interest on loans from clients, but has also resulted in changed pricing of banking services. Regarding credits, the increased competition has resulted in lower prices and product innovations.

Part of the picture is that a number of other companies, from outside the tradtional banking world, also has entered the market to compete for the placement and payment volymes of the households, for instance retailers, by offering their own payment card services and considerably higher interest rates.

In the market segment of small and mediumsized companies, the state owned PostGirot Bank has joined the competition, and a number of Nordic banks are also expressing their ambitions towards corporate clients.

The increased competition is mirrored in advertising and communication activities, in the service offering and in technical development. In the last few years, the marketing costs of the banking industry has multiplied. Locally, several other banks have followed the example of the Skandinaviska Enskilda Bank of longer and more flexible opening hours. The new telephone banks are trying to live up to the around-the-clock service the Sesam Telephone Bank is offering its clients. So far, none has followed suit totally. Many banks have the ambition to increase the number of fully trained private councellors and sales people of for instance insurance and payment services to corporations, areas in which the S-E-Banken has been the innovator.

The information technology of the future is being tested in the Swedish banking market. In Stockholm, Uppsala, and Göteborg, the S-E-Banken is running clients' tests with so called video kiosks, in which the client can ask for credit, sign up for retirement insurance policies by talking to a clerk via a TV-screen."

The first S-E-Banken automatic banking office is situated in central Stockholm. No manned desks are available, they have been replaced by automated teller machines, monitors for the stock exchange including touch screens for buying and selling orders, and other machinery, serving the clients automatically.

7.3. Industrial Applications

SCM Programs for Control of Flows and Logistics Show Global Increase

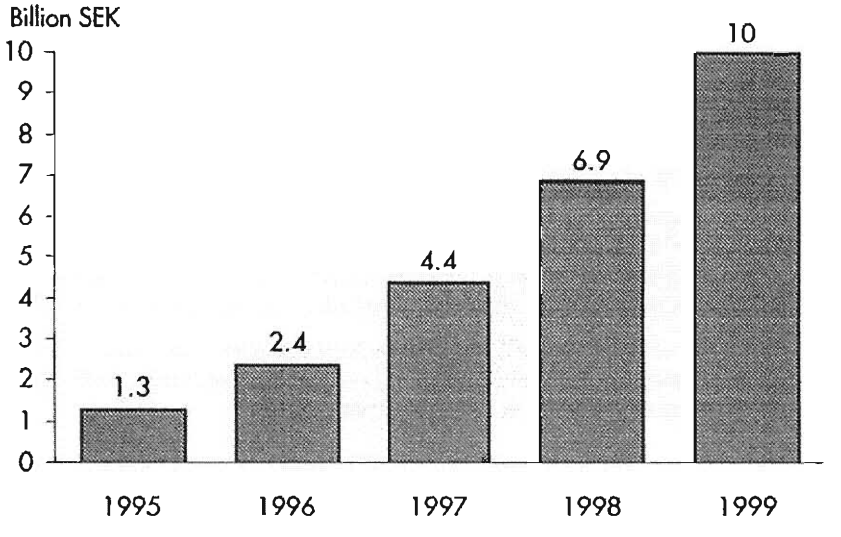


Fig. 206: The global market for SCM (Supply Chain Management) programs, are predicted to increase from 2.4 billion SEK in 1996 to some 10 billion SEK in 1999 by the Institute for Advanced Manufacturing Research. The programs become more and more powerful as they can link more and more administrative processes from the ordering of rawmaterials to the delivery of the finished products to the seller/user. International competition among manufacturing companies is one of the factors behind this rather remarkable growth.
Sources: Advanced Manufacturing Research/Computer Sweden 7 March 1997

7.4. Do You Know This About New Applications?

* **POSTNet www.torget.se** is the largest Internet site in all of Europe, at least according to Netscape. 51 273 visitors were noted as the top number of visitors during one day in November, 1996. Torget (The Market) was launched by the Swedish Post Office by the end of the summer 1996. Telia and Tele2 are Internet suppliers. Before the end of 1996, Torget had some 23 000 members, many of them mail order companies, offering their goods electronically as a complement to their traditional catalogs.

Torget has developed a special security system, so that buyers will not have to send the numbers of their plastic cards via the Net — their are using a personal code instead. International as well as national credit cards are accepted, right now (December 1996) Visa, Mastercard, Rikskort, Köpkort, Eurocard, and bank cards can be used. More will come.

But not only mail order companies see the benefits of Torget. Volontary aid organisations like Rädda Barnen (Save the Children) is one of the users. Rädda Barnen is collecting money for their various projects by having well known and popular artists signing a computer mouse, which is auctioned via the Net.

And, if your horse is ailing, you can get in contact with a specialised veterinary service. There are priests and clergymen to talk to. The number and variety of services is growing by the minute.
The E-mail address is: mail@postnet.se
Source: e.magasin, # 6, 1996

* The Swedish State department for civilian questions (Civildepartementet) is using new technology, i.e. the Internet, to provide a service called "Samhället Direkt" (The Society Directly). The idea is that in particular young people should be enticed to learn more about how society functions and to participate directly in the democratic process. Via mail-boxes and data bases any user can find out what questions the different state agencies are involved in at a specific moment.
Source: Statskontoret: Öppna system # 4:1995

* Freephone is a service, offering the Swedish-speaking user free telephone calls via a special 0200 number. The only thing the user has to do is to listen to advertising messages at the start of the call and then every 60 seconds.
Source: Computer Sweden, 25 February, 1997

*** Skoldatanätet, The Swedish SchoolNet**

"Skoldatanätet" is an Internet-based network for all Swedish primary and secondary schools. Via e-mail and conferences via the schoolnet and Internet, it is possible for pupils to look up data, to communicate with teachers and schoolmates, and to participate in lessons by other teachers than their own, in Sweden as well as abroad. A number of schools have organised computer conference based projects in collaboration with schools abroad. The results of such projects are published as a collective effort of all the students participating. Skolverket, the central Swedish school agency, the local councils, and several other agencies and organisations are collaborating to provide most Swedish pupils with Internet access and computers for their studies. Teachers are spending considerable time at looking into new methods for teaching. So far, the results have been mainly positive, not least so for so called "weak" pupils, not too interested in theoretical learning.

By June 1997, 1.25 billion SEK had been invested by the KK-stiftelsen in general IT projects for the Swedish primary and secondary schools.
Sources: Bolander, Lars: IT i skolan, TELDOK Report 100, 1995/Dagens Nyheter, June 19 1997

*** Sofia Distance Teaching — A School With Pupils on All Continents**

The Sofia School in Stockholm is in many respects an ordinary school for pupils preparing themselves for college. In one respect, however, the school is rather unique. 150 of its students are living all over the world. Each student follows the ordinary curriculum of a Swedish ninth grade via computer and modem. The project, called Sofia Distance Teaching, started out in 1994, when the school authorities wanted to provide a Swedish school program also for those Swedish children who live in places where no Swedish school is available. So far, the experiences of the program is so positive, that the distance school is permanent, its pupils are as enthusiastic as its teachers, and the school was awarded a Bangemann Award in the latest Bangemann Challenge. Moreover, some 20 handicapped pupils are connected to this distance school.
Source: Telecom idag, #2 1997

*** Swedish Culture on the Internet — One Home Page Only!**

It is already possible to visit a number of Swedish museums, to read the works of authors like Selma Lagerlöf, to study the history of Swedish industries, to listen to various Swedish dialects, and to look at the Linnéan collections via the Internet. Swedish culture will be much easier to access, once the project **"Kulturnätet Sverige"** is on the Internet. Via one single home page it will be possible to access most of the established Swedish cultural institutions and to search for information on a large number of subjects.

IVA, the Royal Academy of Engineering Sciences, and Vitterhetsakademien, the Royal Academy of Humanistics, are the leading forces behind the project, based on a study ordered by the government in 1995. A prototype for "Kulturnätet Sverige" is already on the Internet — type: http://www.regeringen.se/kulturnat

Source: IVA Aktuellt 1997:2

*** Swedish Customs Processes 150 000 Electronic Files — a Week!**

In the early 1990ies, the Swedish Customs processed some 45 million forms for customs clearance a year. In June 1997, the agency processed 150 000 electronic files a week. About 70% of all custom forms are transmitted from the computers of various companies directly to the customs' computers, so once the goods arrive at the Swedish border, clearance is fixed in a few minutes. Companies wanting to tranfer custom forms electronically, get an electronic identity for identification of all goods, based on intelligent cards. Some 10 000 companies have smart cards with two keys, one of which is known only to the custom's computers. Thanks to the card, the computers know who is at the other end of the communications line, and can close down, should it be someone not authorised to enter the system.

Source: DAgens Nyheter, June 19, 1997

*** Danes File Their Income Declaration via the Internet**

In 1997, some 19 000 Danes had filed their annual tax return reports and income declarations via the Internet. 450 000 Danes used the telephone, and the vast majority has done nothing at all. The Danish system is such, that you get your tax retur report already filled in. If all figures are correct, you do not have to do anything. If you want to change something, you can do that via your push-button telephone or the Interent. In total, 3.8 million tax returns are distributed in Denmark annually. About 1.5 million tax payers claim different kinds of deductions annually. One third have done so by using the telephone.

Source: Ny Teknik, 1997:19

*** "Deeper Blue" Chess Champion**

So it has happened — a computer has won a chess tournament against a reigning world champion. Russian Gary Kasparov was beaten by IBM's computer "Deeper Blue" in May 1997. Kasparov said he was unnerved by his digital opponent.

Sources: Several, among those: The Economist, May 17, 1997

*** 3-D Computing Has Taken Off**

3-D computing is still in its infancy, but ever more powerful PCs and multimedia programs are making 3-D available in applications as dif
ferent as medicine, flight simulators, war games for military purposes, computer games, movie making, advertising, engineering, science, and data visualisation, not to speak of virtual reality.
3-D computing is important because every single human being is accustomed to it since birth — that is the way we see. Our brains absorb three-dimensional information every moment we are awake. Or as one specialist put it:
— We think of 3-D as simply the highest-quality way of transmitting information from one mind to another.
Source: Business Week, September 4, 1995

*** Virtual Reality — The Zero Billion Dollar Industry**

"Virtual Reality", VR, is one of those arcane IST concepts that appears at computer shows, if nowhere else. So far, definitions are unclear, but one can summerise the VR industry by stating that it is based on several basic technologies, such as simulation, tele- and data communication, artificial intelligence (AI), and multimedia. In 1994, the global turn-over for VR-products was some US$ 320 million. By the end of 1997, VR is expected to turn over US$ 1 billion. Location Based Entertainment, LBE, an environment specially constructed for high tech games, is expected to be one of the fastest growing segments. This is all according to the American research firm 4th Wave Inc.
Source: Jonasson, Per A.: Virtuell verklighet — en amerikansk realitet, STATT report USA 9511

* In Sweden, telemedicine has a new centre, **Telemedicinskt utvecklingscentrum, TMC**, (The Telemedical Development Centre), at the hospital of Huddinge to the south of Stockholm. The centre is owned by the hospitals of Huddinge and Visby, situated on Gotland, the largest island in the Baltic. TMC will be involved in research and development, in training, teaching, and demonstrations of telemedical applications.

Thanks to TMC, a doctor in Visby, having difficulties in diagnosing a patient can connect via a PC, a telephone, and a video camera to the specialists at Huddinge, which is an academic hospital, and get second opinions. The new, digital X-ray unit of the Visby hospital can also connect to the network, whenever needed. The patient will not have to fly or go by boat to a hospital at the Swedish mainland, and can be treated faster than before. Moreover, doctors in local clinics can connect to the centre and get help.

In addition, two studios for video conferencing are built at Huddinge and Visby. These will be used for competence development of the medical staff, among other things. Within some years, TMC will also offer its vocational training and educational services to the Baltic countries.
Source: Medicinsk vetenskap vid Karolinska Institutet, # 3, 1996

* **Super fax is chasing thieves and shoplifters.** The trivial fax machine has become a medium for chasing and nailing down thieves and shoplifters. Each year, goods worth some 5 billion SEK are stolen from Swedish shops. Any shopkeeper in the country can ask to be hooked up to a central fax machine at Köpmannaförbundet (The Shop Keepers' Association) in Stockholm. As soon as a shop keeper encounters a problem, she/he sends a fax to the central fax machine, which in turn distributes a warning to all the other shops connected. In 40 minutes, 5 000 warnings can be sent. So, for instance, earlier this year, a general store detected that false 100 crown notes had been used in his shop. Within a few minutes a warning had been sent to some 200 shops in the same area of Stockholm.

Descriptions of stolen goods, serial numbers, anything, that can help others to avoid theft, are shared in this way.
Source: Dagens Nyheter, November 14, 1996

* Early in 1997, **Pulpex**, an electronic exchange for trade in Swedish paper and pulp, will start running in London. The paper and pulp market is known for its rather violent price fluctuations. SOP, The Option Exchange in Helsinki, Finland, has plans for a similar electronic exchange, covering the products of the Finnish forestry industry.
Source: Svenska Dagbladet, August 30, 1996

*** Electronics to the Tenants**

* Owners of large appartment houses in Sweden are considering new ways of increasing their service to tenants via existing cable television networks. Time booking of central utilities like laundries, electronic doorlocks, temperature control, and similar services are being considered by companies like Svenska Bostäder and Sabo. Their networks will be made available to all tenants.
Source: Dagens Nyheter, November 14, 1996

*** Damaged Retinas to be Replaced by Chips?**

Nobody has tried it yet, but researchers at the North Carolina State University have created a 2x2 millimeter electronic chip that can be operated into the eye and connected to the visual nervesystem. It will not restore full sight, but can give a totally blind person some sight back. The chip will be tested during 1997 at the John Hopkins University in Baltimore.
Source: Computer Sweden, 21 February 1997

*** Home Shopping in the US — Catalogs Beat Internet**

According to the Direct Marketing Association (DMA) of America, home shoppers picking their preferred goods from old fashioned paper catalogs spent 70 billion US dollars in 1995. 43 billion were spent by consumers, the rest by businesses. Sales through informercials and direct-response advertising on television amounted to 4.5 billion US dollars. Out of these, 2.6 billion dollars were generated by dedicated home shopping channels. According to Forrester Research, an American consultancy, sales of goods via the Internet and other on-line services were worth 518 million US dollars.

In 1995, 13.2 billion catalogs were sent by mail in the US. In 1983, the number was 8.7 billion. The DMA projects that the number of mailed catalogs will grow by 7% annually, until the end of the decade.
Source: The Economist, October 12th, 1996

*** Software for Robust Distributed Computer Systems**

A distributed computing system has been defined as "one in which the failure of a computer you didn't even know existed can render your own computer unusable". So called "brownouts", when it is impossible to communicate on the Internet, are fairly well known to Net users. They are often attributed to software errors, excessive traffic on transmission lines and overload failure of the Web servers.

Such failures are not acceptable in for instance networks for medical care, traffic control, financial services, and similar systems for surveillance, transmission, and warning. At US universities, such as Cornell, researchers have developed software packages for **robust distributed computing systems**. These packages contain tools that replicate and update data, keep track of process groups and assist in handling membership changes. More information about the system called Horus developed at Cornell in available from http://www.cs.cornell.edu./Info/Projects/HORUS/
Source: Scientific American May 1996

*** Digital cameras** belong to the emerging ICT consumer equipment. A few issues are not quite solved yet, such as for instance picture format — pictures are so far in proprietary formats, and thus cannot be used with common PC software, like Adobe Photoshop. Available now are cameras with displays and five megabyte memory for storage.
Source: Business Week, February 17, 1997

*** Digital toys** are being launched by a number of companies in the US. Home PC add-ons for toddlers, children's software, and talking, walking, singing robots, help the very young to get accustomed to computers. Just keep your eyes open — Bill Gates, a proud dad, is already there!
Sources: Several

* Microsoft Sidewalk is an entertainment guide, available on the Internet, for several American cities. The first city is Seattle, the home town of the firm. Before the end of 1997, Sidewalk is planned to be available for some fifteen cities, among others New York and San Francisco. The service will be paid for by advertising. The idea is that the user should be able to type in her interest profile and ask for special information about areas of interest.
Source: Ny Teknik 10 April 1997

*** Tamagotchi — The Electronic Chicken**

Easter 1997 brought a new phenomena to the Japanese, the Tamagotchi, or the electronic chicken. It is a small electronic device, containing some very smart programming, creating an "almost-alive" chicken on a minimal screen, a chicken that wants to be fed, comforted, cuddled... you name it! It brings out the parenting instincts in anyone, from very young children, to elderly distinguished gentlemen. As soon as a Tamagotchi is malcontent, it gives away an array of sounds, and becomes ill, when not properly looked after. Well... we will have to wait and see how Europeans and Americans will react to this electronic chick.
Sources: Several, among others Ny Teknik, 10 April 1997

8. The Global Information Infrastructures: The Brave New Digitised World

"The power of sheer numbers, in wealth or in crowds, to set up a dynamic drive toward growth and aggrandizement is mysterious."
Marshall McLuhan

"Digitisation of information is bringing about the convergence of telecommunications, computing and broadcasting technologies and industries, all of which are regulated separately in most countries."
Source: OECD: Information Technology Outlook 1995

We are experiencing the merger of five mega industries — the computer industry, the consumer electronics industry, the media industry, the entertainment industry, and the telecommunications industry. The American analyst firm CyberMedia keeps track of these mergers and describes them according to a model developed by John McLaughlin of the Harvard University. Below follows the CyberMedia Information Industy Map and the firm's description of the information technology industry by 2001 — the brave new media world.

The CyberMedia Information Industry Map

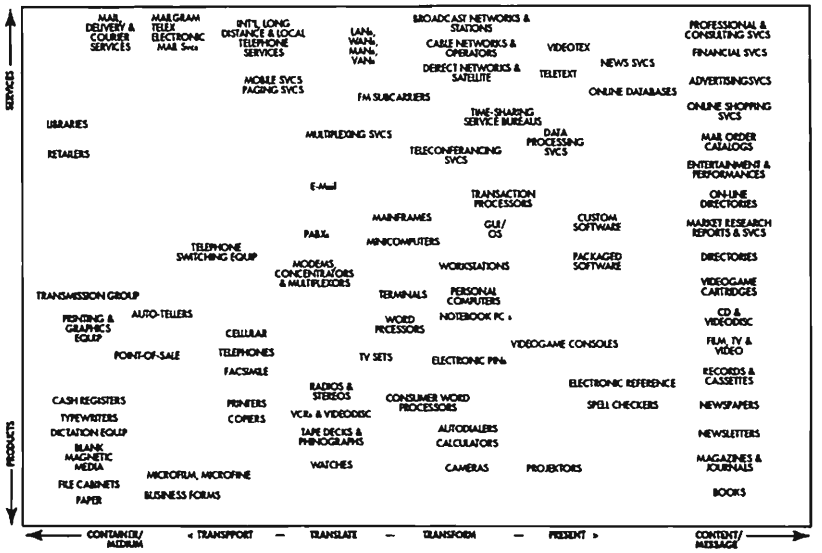


Fig. 207: The CyberMedia Information Industry Map gives a picture of the products and services generated by various media. The necessary functions are described as 'transport', 'translate', 'transform', and 'present'. Maybe 'generate' should have been included?
Sources: CyberMedia/Bern, Marie: "Online-tjänster i USA", STATT report USA 9504

2001: Fusion Powered Products and Services

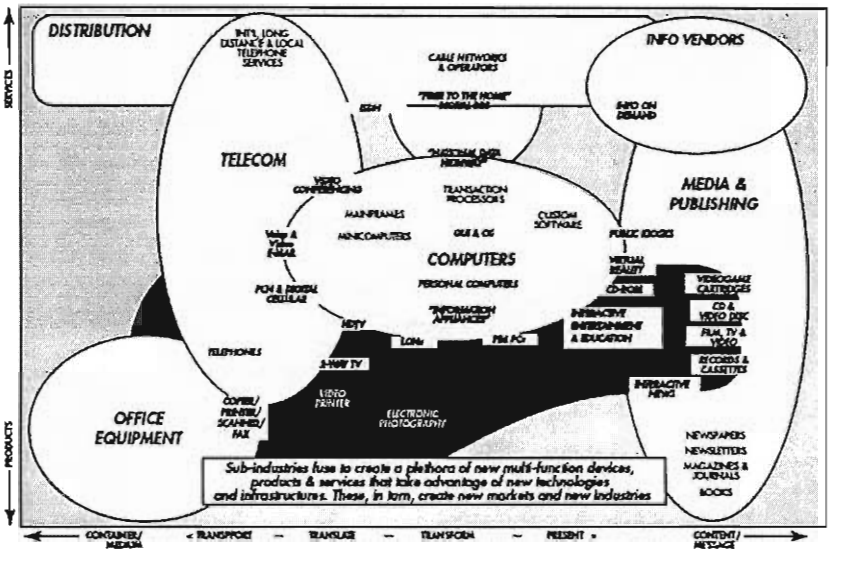


Fig. 208: The information industry in 2001. Sub-industries fuse to create a plethora of new multi-function devices, products, and services, that take advantage of new technologies and infrastructures. These, in turn, create new markets and new industries.

Sources: CyberMedia/Bern, Marie: "Online-tjänster i USA", STATT report USA 9504

* PUSH For The Ultimate Network Media

PUSH technology has been the talk of the town as the very latest for the TV addict, and it certainly has been turned around by the media gurus any way you can imagine. So far, PUSH promises to merge the mega industries, see the introduction to this chapter.

However, the fact is that several PUSH technologies exist in the market, technologies that help the avid TV-viewer to create her own TV-channel. You pick and chose what kind of programs you want to see, and then so called agents will be busy scanning the networks for you for those programs, download them, and see to it that you are served what you have ordered. Among the several possibilities in the market, there is PUSH technology based on the user's demands only, and there is PUSH technology that is based on sender needs. But this is only part of the truth.

According to an article on PUSH in *"Wired"*, March 1997, PUSH implies so much more. It implies broader and deeper new interfaces for electronic media, enabling the user to move seamlessly between media, which you steer in

interactive mode, and media steering you being in a passive mode. The new technologies work on the emerging universe of **networked media**, now rapidly spreading across telecosm. The new medium, so much bigger than the Internet, makes it possible for anything to flow from anyone to anyone, from anywhere to anywhere, anytime. It is a true network like the telephone system, rather than a radtiating system like radio or TV. Content is pushed to you, in contrast to the invitational pull you make when you click on the Web.

The analyst firm, the Yankee Group, predicts that within three years — by the year 2000 — nearly a third of the projected US$ 19.1 billion generated by the Internet, via advertising, transactions, and subscriber fees, will derive from push media.

So far, 1.7 million copies of Pointcast — one of the existing PUSH softwares — have been downloaded, so the interest is there. Instead of the traditional screensaver, you will get news or advertising or anything of your own choice to appear on your screen once it is idle. PUSH media arrive automatically — on your desktop, in your e-mail, via your pager. You don't choose to turn them on, only to turn them off. And there will be may invcentives not to.

One more decision to make! But don't push it! Standards have not been agreed upon, just yet.
Sources: Several, among others "Wired", March 1997

* 1 644 Newspapers On-line Worldwide by March 1997

By March 1997, 1 644 newspapers had gone on-line worldwide, according to a survey made by The Editors & Publisher Co. 944 were dailies. 1 020 of the on-line newspapers were Canadian or American, 327 European, and 77 Asian.

Type http://www.mediainfo.com/ephome/npaper/nphtm/stats.htm for more information. In addition, these figures are interesting, considering that on-line newspapers are low on what users see as important/interesting netbased services — see further information in this book.
Source: Information Society News, # 11, March 1997

* Well Established Authors Promote Print-on-demand

Three well established Swedish authors got fed up with their publishing houses not keeping copies of their earlier books on stock. The result: The trio has agreed with a service company to print their books on demand on a laser printer for about 100 SEK a copy, VAT not included, no matter how many copies are printed.

Print-on-demand via laser printers is regarded as an interested possibility to reprint old books with a limited audience, according to one of the leading bookstores in central Stockholm.
Source: Computer Sweden # 4, January 24, 1997

8.1. The InformationSociety Infrastructure

The Global Information Infrastructures, GIIs, and, with it, the Global Information Society, GIS, are being created.

Somehow, it all started with a National Information Structure, NII. This happened in September 1993, when the government of the United States presented a policy paper, called **"The National Information Infrastructure: Agenda for Action".** The paper outlines how information infrastructures are playing a crucial role in developing the economy and society, in particular so economic competitiveness. Since this declaration by the US government, a number of other OECD countries have presented papers and reports to the same ends. Which in turn lead to the US government releasing a new document in February 1995, called **"Global Information Infrastructure: Agenda for Cooperation".** The national information infrastructure had become global.

The G-7 Ministerial Conference on the Global Information Society took place in Brussels later that very same month and year. International cooperation was emphasised, and it was decided that the policy focus should cover a very broad range of issues. The G-7 partners agreed to collaborate in order to make their common vision of the Global Information Society come true. The Global Information Society will be achieved by:

a) promotion of interconnectivity and interoperability;
b) development of global markets for network services and applications:
c) ensuring privacy and data security;
d) protection of intellectual property rights;
e) cooperation in research and development and in the development of new applications;
d) monitoring the social and societial implications of the information society.

The basic principles, according to which the G-7 countries are working, are:

1. to promote dynamic competition;
2. to encourage private investment;
3. to define an adaptable regulatory framework;
4. to provide open access to networks.

While working according to these principles, the G-7 countries also decided to:

I. ensure universal provision of and access to services;
II. to promote equal opportunity to the citizens;
III. to promote diversity of content, including cultural and linguistic diversity;
IV. to recognise the necessity of worldwide cooperation with particular attention to less developed countries.

The Ministerial Conference also decided upon the implementation of 11 pilot projects, which are described in the conference papers.

Since then, a number of countries have released policy documents on information structures. In Sweden, a paper was issued by the Government Commission on Information Technology of the Prime Minister's Office, in August 1994 called **"Information Technology: Wings to Human Ability"**.

Sources: TELDOK Rapport 91: NII — USAs elektroniska motorvägar, alias Infobahn by Holst, G-M & Vedin, B-A, Stockholm 1994/OECD: Information Technology Outlook 1995

8.2. GII: The Case of Multimedia

According to the OECD, the growth of multimedia services through the convergence of the information technology, telecommunications, and information, and entertainment industries will affect the member countries' economies profoundly. Among other things, the convergence will make provision of existing services more efficient, and also rebundling of existing services may well increase national economic efficieny.

Most of the OECD member countries are concerning themselves with issues related to this multimedia development, and its emerging markets, which has resulted in a number of new challenges: the development of cost effective physical technical infrastructure; efficient exchange of information over the infrastructure; protection of immaterial rights; the development of applications that will bring the promised economic and social benefits. See OECD *"Information Technology Outlook 1995"* for detailed information.

The provision of multimedia services is taking shape as a distinct economic industry. It largely consist of activities, goods, and services provided by companies in existing industries such as IT hardware and software, telecommunications, communications, information, and entertainment. Technologies like microprocessing and fiber optic transmission have made multimedia services feasible from an economic point of view.

Multimedia services are composed of digital representations of sound, data, and visual content, delivered over digitised media platforms provided by combining computing and communications hardware and software. At present, the services include electronic mail, ordering and payment systems, videotelephony, interactive games and films, just to mention a few. These services can be delivered to individual consumers/users via personal computers, "intelligent" television sets, CD-ROMs, on-line over the public switched telephone and cable TV networks, and via the Internet.

Infrastructure Development in France, Germany, Italy, Japan, UK and USA 1994

Network development (telecommunications)	Digital main lines (% of total main lines 1993)	PC w/modems (% of households)	ISDN subscriptions per 1 000 population
France	86	1	1.93
Germany	37	3	3.71
Italy	57	1	0.05
Japan	72	N.A.	1.91
UK	75	4.5	0.69
USA	66	15	0.34

Fig 209: The growth of consumer on-line multimedia services is restricted by the capacities of the public networks. Traditional analog public networks are so much slower than the processing power of personal computers. Thus, countries having a high level of digital main lines offer increased availability and declining costs. According to this table, France should be in a good position for future high level growth of multimedia on-line services. Moreover, the public Minitel system in that country, with an installed base of more than 6 million dedicated terminals, and a growing number of firms offering access to the Internet, is the only major European on-line services provider. CompuServe, the US on-line services provider, reported having 200 000 subscribers in Europe by December 1994.

Sources: ITU/Inteco Corp from Wall Street Journal/OECD: Information Technology Outlook 1995 © OECD, reproduced with the permission of the OECD

On-line Hosts for Multimedia Services in the World 1994

On-line services Internet	Connections (host computers with direct access — thousands)
World	4 850
United States	3 370
Europe	1 090
of which	
France	101
Germany	301
Italy	35
UK	270
Asia	340
Others	50

Fig. 210: The United States had three times as many host computers with direct access to the Internet than Europe — 3 370 000 compared to 1 090 000, in 1994. Among the European countries, Germany had the most host computers, 301 000.

Sources: The Economist, April 15 1995/ European Electronic Messaging Association/©OECD: Information Technology Outlook 1995 (reproduced by permission of the OECD)

On-line Consumer Subscription for Multimedia Services in the World 1993 — 1994

In millions

On-line services by commercial providers	1993	1994
World	4.9	6.3
United States	3.13	5.36
Europe	< 0.05	0.2
Japan	1.4	1.9

Fig. 211: The United States were having some twentysix times more consumer subscriptions for multimedia services than Europe in 1994. The Japanese had 9.5 times as many as Europe.

Sources: Business Week, 13 Feb 1995/Financial Times, 6 March 1995/Association for New Media Developments/©OECD: Information Technology Outlook 1995 (reproduced by permission of the OECD)

Revenues for the Multimedia Industry Sectors in the US, Europe, and Japan, 1994
Billion of US $, converted by 1994 exchange rates

	Content (print and audio-visual)	IT	Telecommunications
United States	255	151	160
Europe	178	134	158
Japan	254	50	78.5

Fig 212: In telecommunications, Europe was spending almost as much as the US in 1994, 158 billion US $ in comparison to 160 billion. The Japanese were spending about half of what Europe spent on telecommunications, and a third of what the US spent on IT, while the content industries of the US and Japan were almost equal, 255 billion US $ to 254 billion. In this segment, Europe spent 178 billion US $.

Sources: European Commission/Ministry of Posts and Telecommunications, Japan/©OECD: Information Technology Outlook 1995 (reproduced by permission of the OECD)

Video Conferencing Systems via Desk Tops Growing in the US

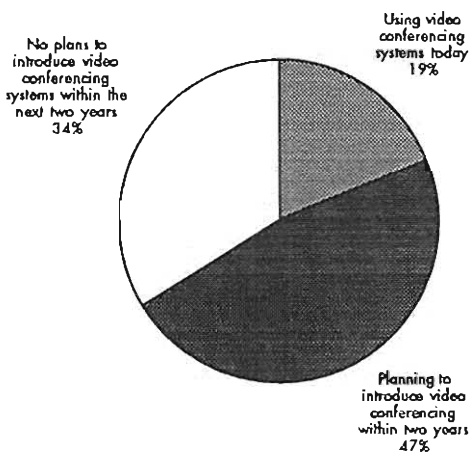


Fig. 213: 19% of companies responding to a study made by Sage Reseach in the US said that they are already using video conferencing systems from their desk top computers. 47% are planning to introduce such systems within two years, and the rest of the businesses questioned, 34%, are not planning any within two years.

Sources: Sage Research/Computer Sweden, 17 January 1997

* 1% of all telecommunications lines in the world are ISDN lines. Germany is leading by 5%. Sweden has 0.22% of all ISDN lines.
Source: Computer Sweden 17 January 1997

*** More TV and Radio Channels in the Nordic Countries**

Before 1985, there were in total seven local TV-channels in the five Nordic countries. In 1997, there are more than thirty, fighting for viewers with all the international channels. There were eleven national radio channels. Today, there are several hundred.
Source: SR SVT UR Mediebrev, # 100, December 12, 1997

Television and VCR Penetration in Countries Analysed by DTI, 1995
In percent of all homes

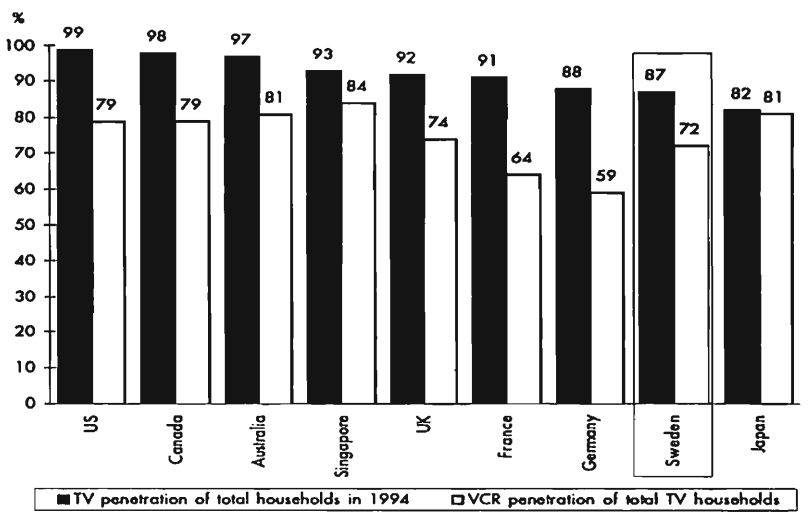


Fig. 214: According to the DTI researchers, there is much debate as to whether consumer uptake will be PC-based or TV-based. The great advantage of the TV over the PC is the high installed base. As can be seen from this diagram, almost every home in the countries studied has a television set, and a majority have access to a VCR. It should be remembered, that the vast majority of the world's inhabitants are not included in these figures.
Sources: ITU/TBI Yearbook 1996/DTI: Development of the Information Society, An International Analysis, 1996

Multichannel Penetration of TV Households in 1995
In countries studied by DTI, in percent of total TV households, divided between DTH satellite connections and cable, plus total

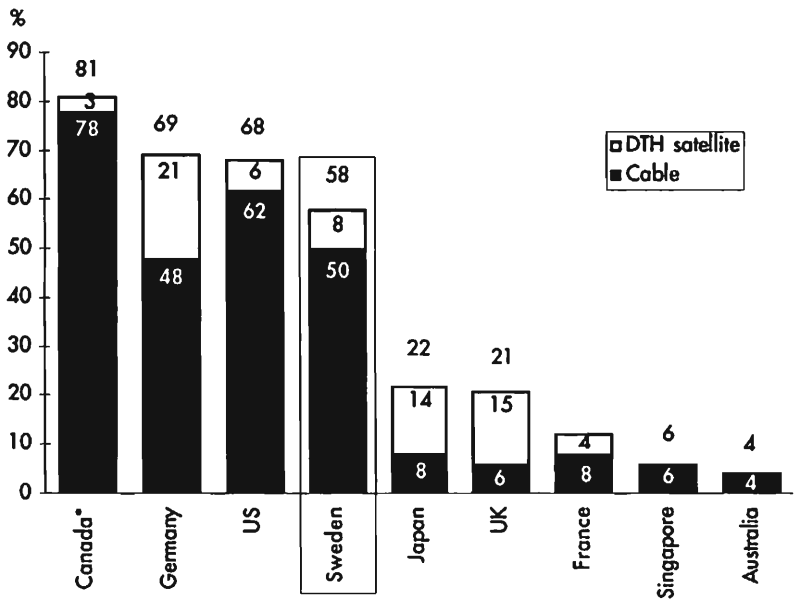


Fig. 215: There is considerable differences in multichannel penetration through cable or satellite between the countries compared by DTI.
Sources: TBI Yearbook 1996/TV International Sourcebook 1996/DTI: Development of the Information Society, An International Analysis, 1996

Cable Subscribers in Percent of Homes Passed by Cable, 1995 In countries studied by DTI

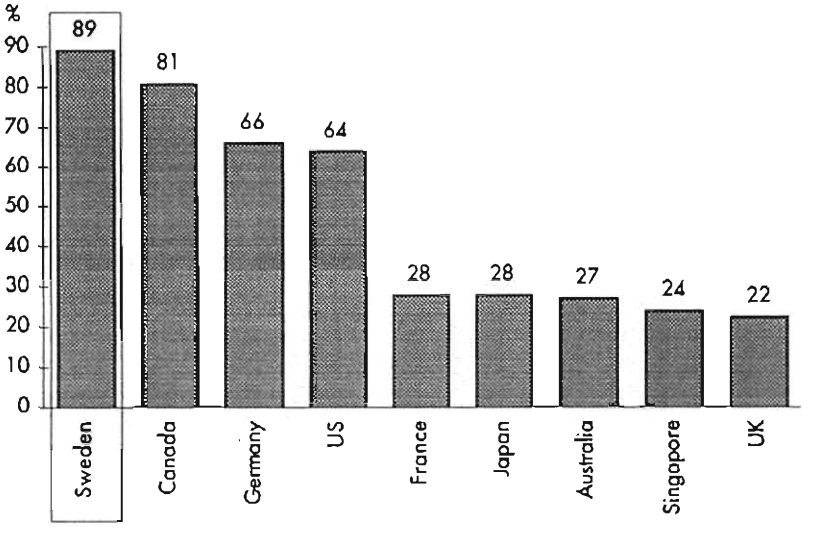


Fig. 216: This diagram shows the percentage of households subscribing to cable television services among those homes passed by cable. In Sweden, 89% of all households passed by cable are subscribers; in the UK 22% are subscribers. France, Singapore, and Australia have a low cable TV penetration as well as a low satellite penetration. 68% of all TV households in Sweden has Teletext, compared to 47.8% in the UK, 42.2% in Germany, 42% In Singapore, and 6% in Australia. In 1994, 60.3% of all Swedish homes were passed by cable, in comparison to 99.3% in the US, 88.4% in Canada, 64.7% in Germany, 35.5% in Singapore, 30% In Japan, 25.8% in France, and 17.8% in the UK.

Sources: TV International Sourcebook 1996/DTI: Development of the Information Society, An International Analysis, 1996

Percentage of Day Spent Watching TV in 1995 In countries studied by DTI

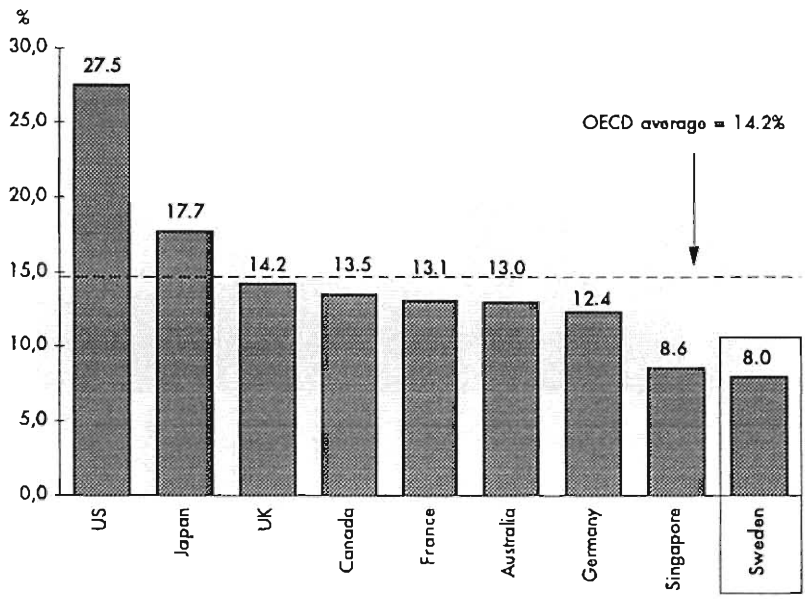


Fig. 217: In spite of having TV sets available, Swedes are spending the least time watching television among the nationalities studied by the DTI. According to recent research, Swedes tend to spend less rather than more time watching TV. N.B. "day" is defined as "time awake"

Sources: TBI Yearbook 1996/DTI: Development of the Information Society, An International Analysis, 1996

8.3. Digital Television

*** Three Countries Have Formal Plans for DTT**

By autumn 1996, three countries had formal plans to launch digital terrestrial television — DTT: Australia, UK, and Sweden.

The Swedish government has decided that the digital ground network for digital television shall start broadcasting in 1998. The existing analogue network is planned to shut down in 2008. Before the shut-down, all viewers must exchange their old TV-sets for new ones in order to be able to watch television.

Digital Television is Growing Fastest in Europe
Number of Set Top Boxes per Region 1995 and 2000

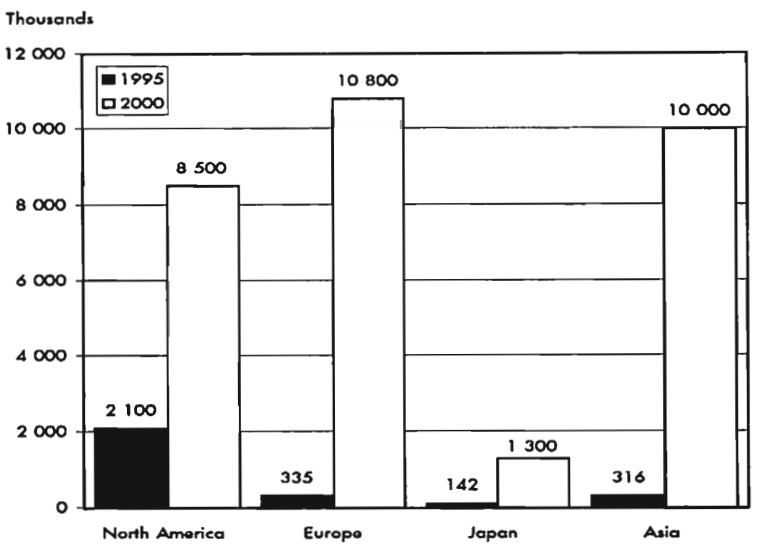


Fig. 218: The diagram shows the number of set top boxes in 1995 and 2000.The trend towards digital television is boosting the global semiconductor industry, according to the analysts firm Dataquest. The transition from analog to digital television will grow the semiconductor industry from US$ 575 million today to US$ 4.4 billion over the next years. Today's technical systems will propably survive until 1998 or 1999, when the first high resolution television sets will be available for a broader market. There are already systems for digital TV transmission in the market, for instance DirecTV, Primestar, and Echostar.
Sources: Dataquest/Computer Sweden, 17 January 1997 (After Fredrik Persson)

Within the ten years to come, digitisation will hit the world's television systems. Digital TV is part of the general digitisation of today's information systems — data communications, CD-technology and mobile communications. Digital TV opens up for interactive communication via whatever networks your TV-set is connected to. It can be used for training and education, for entertainment, for home shopping... you name it! Some 500 TV-channels will become available.

The common standard for the compression of digital TV and video signals agreed upon is called MPEG, an acronym for the Moving Picture Experts Group.

* Digital interactive TV will have a deep impact on High Definition TV. The USA FCC will soon define as a standard the digital system, which should be based on the MPEG-2. Europe which together with Japan has invested in analog HDTV according to the standard D2-MAC and HD-MAC via satellite, is now moving towards the digital logic.
Source: EITO: European Information Technology Observatory 94

*** Digital TV in Sweden Takes off in 2002 — or Before?**

In the spring of 1997, 300 TV-vendors in Sweden were interviewed about their sales forecasts for equipment for satelliterelayed digital TV, for instance digital disc antennas. The vast majority was convinced it will be at least five years before the Swedish digital TV-market will take off.

However, Telia starts broadcasting digital TV via its CATV network in Sweden in the autumn of 1997. The decoder necessary for viewing is the so called "Eurobox", a decoder based on the standard developed by the European Cable Communications Association. Telia Infomedia, the Kinnevik group (= Netcom Systems, including Comviq and Tele2), and the Swedish Television have acted jointly for the "Eurobox". The Swedish Television (state owned) is testing digital television broadcasting in ten areas of Sweden, and the French-Norwegian consortium Multichoice is broadcasting digital television programs via satellites to Swedish viewers. 50 — 70% of all Swedish households are connected to CATV networks. The digital networks will offer a number of interactive services.
Sources: Ny Teknik # 21, 1997/Computer Sweden, # 38, May 27 1997

8.4. Digital Audio

No sooner have electronics companies agreed on a single standard for building high-density video CDs than they are fighting again. This time the row is about the sound systems to be used on the new discs. The companies cannot agree on a system for redording the soundtrack on movie video discs, nor on which of several completely new sound systems to use for an audio-only version of discs, aimed at hi-fi buffs.

8.5. Do You Know This About The Brave New Media World in Sweden?

*** MTG to the Stockholm Stock Exchange?**

Modern Times Group, MTG AB, may be the next Swedish media conglomerate to become registered at the Stockholm Stock Exchange. The group is operating in five sectors - broadcasting, radio, publishing, electronic retailing, and media services. Currently, the Swedish conglomerate is active in Sweden, Norway, Denmark, The Czech Republic, France, and Finland. TV4, a popular Swedish television channel, belongs to MTG. In 1996, the MTG group had a media turnover of 3.6 billion SEK.
Source: Svenska Dagbladet, May 20, 1997

*** Swedes Listen Less to Broadcast Radio Programs**

In 1996, the average Swede listened to broadcast programs for 2 hours and 58 minutes, which is 18 minutes less than in 1995. The public service programs broadcasted by Radio Sweden had 66% of the listeners in 1996, compared to 69% in 1995. Private radio stations attracted 29% of the listeners, and 1% listened to local radio broadcasts.
Source: SR SVT UR Mediebrev, # 103, April 1, 1997

*** Swedish Radio Programs on the Internet**

A number of Radio Sweden's broadcast programs are available on the Internet. The address is: www@sr.se
Source: Nyhetsbrev från Sveriges Radio, April, 1997

*** Largest VOD Tests in Jarlaberg, Stockholm**

The largest test of Video-on-Demand services in the world are carried out in Jarlaberg, Stockholm. The tests started in 1995, and are now entering a new stage. As off December 1996, clients participating in the test are using a so called home terminal instead of the decoder they started out with. The new terminal will allow the user to take a break in their viewing of a film in order to follow a live TV-program or just stop watching for any reason. This test is called "Raket" (Rocket). Films and services are available via a video server, holding 250 GB, about equivalent to 100 films.
Source: Nätvärlden # 1, 1997

*** Swedish Media go Internet**

On March 7 1997, it was possible to look up 14 Swedish advertising newspapers, 49 Swedish dailies, and 249 Swedish magazines on the Internet via Sunet massmedia.
Source: The Internet: Sun Massmedia

8.6. Do You Know This About The Brave New Media World Everywhere Else?

*** Was McLuhan Right — Is Media the Extension of Man?**

In 1964, Marshall McLuhan asked two fundamental questions about the modern world in his book *"Understanding Media: The Extensions of Man"*:
1. What are communications?
2. How do communications affect mankind?

Maybe there is a unanimous answer to the first question. If so, we are not aware of it. To the second question we may now collect empirical knowledge of a world McLuhan certainly had no knowledge of — the Cyberspace and the Internet world. Or what about the following stories:

"Not content with inhabiting the global domain that is cyberspace, some Netizens want to go one stage further and create the newest nation on earth. All the necessary ingredients seem to be in place — the Net has an unbounded territory that remains largely unexplored, a national dish (pizza), its own currency (e-cash), and even indigenous people (you know who you are)."

Maybe *"Wired"* is the national news provider? See http://www.independence.xgw.fi/ for the declaration of independence of the Free Internet State.
Source: New Scientist, May 3, 1997

*** Microsoft's Intention to Buy WebTV Followed by American Authorities**

When Microsoft announced its intention to buy WebTV, several players in the market got the jitters. Not least so the American antitrust authorities, because Microsoft's purchase can be regarded as an attempt to limit competition to Internet access.
Sources: Inter@ctive Week/Interaktiv Tid Nyheter # 16, April 24, 1997

*** Toy Story** has in some contexts been named "film of the year" (in 1995). Two generations of playthings, a cloth cowboy and an action-figure rocket man fight and finally become friends in this animated film about all-too-human toys and thoughtless, even sadistic children. The film is computer created to 100%.
Source: Time International, December 25, 1996

***BSkyB**

BSkyB is a satellite-television broadcaster in the UK, having some 4.7 million households as subscribers, offering them 28 channels, most of them proprietory. BSkyB builds its network past another 250 000 British homes per month, and counts on adding 500 000 new subscribers over the next year. Sales of satellite dishes in Great Britain were higher in the first half of 1995 than they had been in the same period of 1994.
Source: The Economist February 10th 1996

*** Multimedia Programs in France**

In 1995, the French bought more than two million multimedia CD software packages, which is more than two and a half times as many as they bought in 1994. Some 15% of all households own PCs powerful enough to run these programs. 500 000 PCs dedicated to multimedia were sold for Christmas 1995. About the same percentage, 15%, of French households own a camcorder. This can be compared to 86% owing a car and 75% owing a hi-fi-machine.
Source: Le Nouvel Observateur, # 1631, du 8 au 14 fevrier 1996

*** The Future of Satellite TV in France**

According to a market research carried out by Télé Câble Hebdo in France on the prospects of the French adopting CTV and satellite TV, 82% of all viewers watching only the six established broadcasters, found that there were too many programs and that they did not have time to watch them all. 47% of those viewers who already receive cable TV programs, wanted more. 65% of all viewers did not want to pay anything for the reception of CTV, 13% could accept to pay 30 to 74 French francs, and 7% 150 French francs or more.
Source: Le Nouvel Observateur, # 1631, du 8 au 14 fevrier 1996

*** Mobile Telecom to All via Satellites**

Several large scale projects, based on a number of low-orbit satellites are on the drawing boards in several parts of the world. Two of them belong to two American consortia. One is the Iridium project, headed by Motorola, which is intended to bring global mobile GSM-quality telecommunications to every subscriber to a mobile telephone. 66 satellites will be needed to provide this service to be launched by 1998. There are Japanese, Chinese, Russian, Italian, Corean, German, and Thai partners involved in this project.

The second American project, Teledesic, is headed by Bill Gates of Microsoft. 840 low-orbit satellites are required for this project, which is intended to give every single inhabitant on our globe "Internet in Space", i.e. access to telecommunications, the Internet, and www. Mr. Gates is considering buying scrapped Russian missiles to bring his satellites into orbit, according to some sources.

But several more projects are in the pipeline. ACeS, Globalstar, ICO, Odyssey, Orbcom, and Planet 1, are some of the names. Globalstar is planning to launch 50 satellites to bring telecommunications to the underdeveloped part of the world. USA, Germany, France, and Corea, are among the partners. This is an interesting idea, taking into consideration that the present mobile telecommunications systems only covers 15% of "terra firma" of our planet. Orbcom is a project to launch low-cost e-mail services via satellite. The US, Canada, and some European firms are partners. Among these, is Swedish Rymdbolaget. ACeS, Asian Cellular Satellite, is planned to provide 2 000 000 Asian users with mobile telecommunications by 1999.
Source: Computer Sweden, 25 February, 1997

* In April 1997, it was announced that Microsoft buys WebTV, a company that has developed an access system to the Internet for an ordinary television set. This means that Microsoft is getting involved in technology for net computers, NCs, simple computers without a hard disc. In simple terms, an NC goes to the Internet to collect the software it needs in order to execute a program. Microsoft had said until now, that the firm will not get involved in NCs and set-top-boxes, which also is part of the business deal. The NCs and set-top-boxes will be provided with Windows CE and Explorer, well-known Microsoft software. Microsoft is planning to launch a new Windows version, into which the capability "Broadcast Architecture" is integrated, and will give access to the Internet and television at the same time.
Source: Ny Teknik, 10 April 1997

* Some European media conglomerates belong to the leading audiovisual providers in the world. Among the 15 largest ones, are German ARD, with a turnover of US$ 5.7 billion; Dutch PolyGram, turning over US$ 4.7 billion; the German Kirch Gruppe with a turnover of US$ 4.2 billion; and likewise German Bertelsmann, which is generating US$ 3.8 billion, or 34.1% of its total turnover of US$ 11.3 billion, in the audiovisual business.

Further down the list, we find other important European audiovisual producers like the British companies Thorn EMI, BBC, Carlton, BSkyB, and Rank; Italian RAI and Fininvest; CLT of Luxemburg, and Canal Plus, and TF1 of France.
Source: OECD: Communications Outlook 1997, vol.1

9. The Future

"The idea with such multiple scenarios, then, would be to understand what information to gather to better and at an early stage understand what development trends are emerging, and also to prepare — not least mentally — for a larger variety of challenges, decisions, and action."

Bengt-Arne Vedin

"Since the end of the cold war stalemate, defense projects are no longer always the driving force behind IT breakthroughs, but often entertainment applications instead."

Bengt-Arne Vedin

Three areas seem very difficult for us to forecast, no matter how much we try — the weather, human behaviour, and the future. All the same, we need to have some idea of what the weather is going to be like, shine or rain; we need to try to understand how IST users are going to react to a new product or service; and we need to have an idea about what the future is going to be like in order to concentrate on the right issues.

Looking back, it is obvious to anyone involved in the IST industries, whether manufacturer or user, that some of us were not thinking far enough ahead when constructing chips, computers, and electronic systems for communications. The idea of the second millenium and its consequences for internal clocks at the very turn of the century, Y2K as the acronym has it, was too far ahead.

Should the problem have been in the mind of the system builders? We have no answer to that question. We can only watch the effects caused by the rather immediate future, the year 2000, upon companies, public administrations, and agencies alike. Some are working energetically to solve their problems. Others are hoping for a godmother that will wave her magic wand to make all problems go away. For a small country like Sweden, where resources are scarce, a problem like this may be more serious than to large countries like the USA. A specific problem, not foreseen, takes all the energy there is to solve, while business as usual is being, if not neglected, at least put out of focus. Those who have questions regarding how the Swedish public administration is solving the Y2K problem, should turn to the specialists at Statskontoret, the public agency for administrative rationalisation.

We are likely to run into similar problems in the future Information Society, there is no doubt about it. Those who want to be a bit better prepared may want to apply the advice in the following article on the future and its many possibilities.

9.1. Scenarios for the Year 2007 — A Do-Them-Yourself Instruction

by Bengt-Arne Vedin

For a long while, it was common wisdom that computer terminals would provide the general access route to computer power and data processing capacity. The personal computer breakthrough came as a genuine surprise. It was fuelled by the necessary, even critically important access to software of high utility, first the VisiCalc spreadsheet.

This little story tells something about the difficulty in forecasting the trajectory and time table of IT developments. To this we must add the experience from the emergence of fax ubiquity. The telefax is older than the telephone, and its breakthrough had been ever so often foreseen in the 1970s and early 80s that eventually people started to believe that it would never happen. Then price and utility concurred to create the final critical mass, and an avalanche of fax diffusion was triggered.

This latter "avalanche" is an example of something called network economies, where utility shows an increase instead of a decrease with the number of subscribers or network nodes existing. This equals increasing marginal investment returns, not decreasing as in conventional economics. Such effects are difficult to bring into conventional calculations but they are extremely important, a subject we will return to.

Ten years ago, no one would have forecast the network economies and the critical mass now associated with the Internet, possibly triggered by software inventions such as Mosaic and the World Wide Web, eased by further developments such as, e.g., the search engine Alta Vista. Today, we contemplate whether Netscape or some other surfing tool will conquer the market. We discuss the fate of the net computer idea — in a way, a return to the concept of ubiquitous computer terminals. There is furthermore a lot of advocates for applets, the temporary downloading and need based utilization of whatever software modules are currently needed.

Thus an attempt to describe the state of the art of IT ten years into the future would have to be designed a bit differently than extrapolating current statistics. It would rather seem important to describe those developments that have had most impact, including, then, changes in individual, organisational, and societal information behavior. On some points, there seem to exist trends and counter trends simultaneously. Sometimes only one will win, sometimes, however, they may coexist, as we shall see.

The trick with scenarios

A scenario for the year 2007 might read something like this: the experience industry is by far the largest; people have their lives organized in short and long term portfolios, encompassing caring for others, sustenance, knowledge and competence acquisition, and experiencing. The scenario would give the percentages for these categories over the life time of people with cognitive and knowledge based tasks; those dedicated to interaction (possibly emotional also) and services; and those geared to tactile endeavors. It would perhaps describe individual lives of representatives for these different categories.

Instead of providing a fixed though multifaceted version of a future, of one future, of one or perhaps a couple of alternative scenarios, I suggest to provide the reader with a basis for producing her or his own set of pictures of the future. As a starter, however, let us discuss the idea of producing scenarios. Why would it be a worthwhile endeavor?

A scenario is a self-consistent, broad picture of some particular future. Thus it may be surprising and seem unlikely, while it must not be allowed to display any internal contradictions. Instead of focusing on forecasting the evolution of one or two salient features, it attempts to integrate a larger set of interdependent factors, and to interpret them into applications and consequences. Here the scenario builder relies upon various trend extrapolations, Delphi studies, etc. Thus development forecast for speed, capacity, numbers, prices, etc. will be taken into account.

It is important to note that the intention in most cases is not to forecast or foresee the future. It may, for example, well be that a scenario that seems not improbable but repelling, generates action to prevent it from coming true. Thus a scenario may be self-defeating — or self-fulfilling, and that may have been the idea behind.

This point of view is further stressed by the strong recommendation that no one produces just one, not just two, but several different scenarios. Aristotle said that "it is probable that something improbable will happen" and Herman Kahn, who used always to produce a basis scenario for the "surprise free development", claimed that of course "nothing would be more surprising than if this surprise free scenario actually came true". The idea with such multiple scenarios, then, would be to understand what information to gather to better and at an early stage understand what development trends are emerging, and also to prepare — not least mentally — for a larger variety of challenges, decisions, and action.

A word also on scenario format, on its presentation, apart from underlying documentation. "Scenario" may induce associations with a written description resulting in a scene or screen production. Often scenarios are written like journalistic reports from the future, sometimes, however, produced in some other written form, e.g., an annual report from the future. But there are also slide and theatre shows as wells as movie and video productions. Theme, creativity, purpose, target group, and, of course, resources are the decisive factors. An informative and provocative way of presenting the scenarios goes a long way towards providing a productive dissemination of underlying facts and stimulating a fruitful discussion. Eventually, one result, apart from mental preparedness, would be a guideline as to important indicators of new developments.

Looking for sea changes ... in international politics

Now to our problem, scenarios for the future of IT, or IT and its consequences in the future. Out of several starting points, we will concentrate on two, which are complementary rather that mutually exclusive. The first is to ask what future developments — likely to happen or not — would have most impact, in this case on the future trajectory of IT (in some other case, perhaps your case, on the future of a particular industry, market, technology, organisation, or individual). The second is to try to define how the subject under study — here IT — might be described, in what dimensions and under what influencing forces.

Adopting, first, the global viewpoint, we pose the question which developments in international politics which might impact drastically on IT development. Since the end of the cold war stalemate, defense projects are no longer always the driving force behind IT breakthroughs, but often entertainment applications instead. Various international confrontations calling for a new arms race thus would reflect upon IT developments.

There is also the concern that new "wars" might turn into information wars, where false information and especially attacks upon the information infrastructure would be of great importance, conceivably difficult to trace to a particular aggressor or the aggressor not necessarily being a nation but some other type of organisation. The first attacks of this type might then give impetus to entirely new developments with the eventual objective of securing IT systems integrity.

The reader is invited to produce yet other major shifts in international relations. Perhaps only developed countries are vulnerable to "information wars"? Perhaps there may emerge "crazy states" (or do they exist already?) that neglect to adhere to the conventions of international diplomacy and "decent

behavior" between nations. May they play the defector's role in the "prisoner's dilemma", playing on other nations' unwillingness to let international law and order break down? Will we see the emergence of new powerful political doctrines, of religious creeds, or cultural perceptions that energise nations or groups so as to create upheavals of a radical nature? What, then, the consequences for IT?

... in international trade and commerce

One particular arena of international relations is of singular interest: international trade and commerce. A more interdependent world might be less likely to generate armed conflict. But is the development towards trade liberalisation unstoppable? What are the odds for a return to stiff trade and tariffs barriers? How would different outcomes affect IT development, or a particular organisation? Is there a definite shift of economic power to, e.g., South East Asia, and will, e.g., Europe as a consequence of this lose out, not just in relative terms but in absolute as well? With what consequences? An obvious dichotomy would be a real downturn in the economy, like 1929 and after, versus blockbuster growth.

Information has a lot to do with international trade and commerce. The relationship is constantly growing more lopsided, so the figure that the international money flow, on paper, no, in bits, is eighty (yes, 80) times as large as the underlying trade in goods and services may be all too conservative. This figure relates to what is sometimes called speculation but what is rather the market trying to allocate resources as efficiently as possible, i.e., gaining whatever arbitrage there may be in return on government and other bonds, or currencies, or company stock. And it is also insurance instead of speculation — hedging one's bets against currency fluctuations, different markets reacting differently to different changes in the world economy.

... and markets in general

If electronic money contributes to less transaction costs, this huge money flow might increase substantially. Perhaps there will be new services allowing for the proverbial man in the street to do for himself, possibly with new software, and banking services, dedicated to such activity. This further growth in money flow might also imply a still larger increase in a risk that concern a considerable number of money men: there might develop instabilities in the system, because of its complexity, speed, and its tenuous relationship to fundamentals, unleashing a severe crisis just because no one is in control and thus the process might run wild. Clearly, no single nation or corporation or organization has a handle on the process as such, and it is difficult to see how one could emerge. If it did, however, that would imply a major shift.

The enormous money flows, the lack of control, and the risks implied have generated a number of ideas for restraining "the system". One is to tax money transfers, possibly having the UN receiving the proceeds. Another is to have some type of "border control", like the customs. Such suggestions seem to assume a true global consensus and application. But it is hard to see how the flow of bits might be controlled and taxed. Again, our message for the scenario builder would be to say: important if... so: be on the lookout.

With this, we have touched upon an issue which may be termed the functioning of markets. Currently, it contains two major aspects, digital money and new ways of selling information, liberating it as it were. Digital money would possibly reduce transaction costs radically, making transactions at the nanodollar (one billionth of a dollar, or tens of millionths of cents) level feasible. Since money serves the double purpose of being the voucher for exchange and the representation of underlying value — though most central banks no longer promise any underlying gold value as a backup — digital money offers the opportunity for just about everyone to generate digital monetary instruments. To the extent that the market doubts that full backup exists, they may command a discount.

Apart from such expressions of intangibles, the Internet would turn into an enormous shopping mall, dedicated, of course, to such goods and services that lend themselves to marketing this way, possibly calling forward new distribution means. Digital money would require the solution of a number of difficult problems related to IT integrity. The shopping mall would, however, be more quid-pro-quo between seller and buyer in the sense that buyers with similar interests might get together easily, swiftly and also temporarily, to negotiate a rebate, to join forces in knowledge development, or to press the seller on a warranty issue.

Before buying, there is marketing and selling, basically information activities, affected by multimedia and IT developments in general, but of course depending upon the particular goods or services being marketed. Then there is the transaction, followed by some kind of transfer of what has been sold. There may also be after sales service and support, possibly including teaching on the one side, learning on the other, often with instructions built into the product.

... new types of organizations

Early on, book and gramophone record (CD) selling turned out to be efficiently handled on the Internet, with new brokers establishing themselves, relying directly on networking with producers and publishers. Book shops instead offered contacts with live authors, and agreeable coffee corners. Music distribution now seems to be turning into downloading directly from the Net, copyright issues obviously the critical, and difficult, obstacle to negotiate.

The one studying IT is prone to look at the software business as a bellwether for tomorrow. Though important and still growing rapidly, software is something fairly particular. With this caution, we again see the opportunity for downloading directly from the Internet, with the added idea of giving the basic version away for free, money made instead on support and later or extended versions of the application. This is the general business formula pursued by the enthusiasts for "information wants to be free": music, software, newsletters are provided without any cost, profit generated instead through live concerts or seminars, or consulting.

We may regard the international community as well as "the market" as partly self-organising super-organisations. On the next level, we have nation and corporation, all types of large corporations, not just business firms. So we have smaller groups with a personal acquaintance, and finally individuals. All the way, we see lesser importance allocated to the legal entity, the business corporation, networks and virtual corporations complementing and sometimes substituting it — possibly with a new broker function at work.

... new conditions for decision making power to emerge

Markets are only partly self-organising, because there are various restrictions. We may also distinguish between market decisions, legal and administrative procedures, abiding by formal rules, negotiations between different parties, and democratic procedures, of which there are many constitutional variants.

Having dealt with possible changes in market mechanisms, we shall return to what seems to be shifts in information behavior, impacting upon most of these different mechanisms. Let us just note that while currently there are concerns about IT playing too large a role in electoral campaigns, there are also ideas in progress on how to develop and improve democracy with new information and feedback tools. Could possibly major changes of this type impact on the fate of the organisational or functional unit under consideration?

A fairly large number of experiments with digital democracy are under way in different parts of the world. Voting directly, substituting parliamentarians, is not the highest priority. But establishing the agenda, allowing citizen access to decision making, and to nominating candidates belong to facets that meet with enthusiasm among the people — and concern among party hierarchies.

There are systems allowing participants to play out their relationships as community members in a digital community that they themselves create (e.g., Habitat). It turns out that certain rules for human interaction emerge spontaneously, because without those, people vote with their feet, i.e., opt out of the community. One might note that this is a community where membership is voluntary which is less the case with real, not virtual villages. But could it be that such spontaneous rules will prove efficient enough to be translated back into real community?

The technology issue

Before going into the tricky field of human information behavior, let us discuss something that has been conspicuously absent until now: technology. Apart from a rapid development in general, foreseeable at its technology roots, two more radical deviations will be considered here.

The first is a very speculative and vague one. Telecommunications networks are complex organisations, bordering to biological organisms in several ways, something demonstrated by applying the emerging science of complexity. Complex systems sometimes display a completely surprising behavior, not easily understood just by looking at the system as the sum of its parts. Life is the prime example: we have just four basic components, oxygen, hydrogen, nitrogen, and coal — but there are many, many of them! — and the forces governing their interactions are comparatively simple also. Yet we have the astonishing phenomenon of — life!

Speculation, then, would suggest that telecommunications systems develop not life of their own but behavior that will first seem odd and make for problems, possibly also opportunities. They certainly fulfil the requirement of consisting of a great many components, which furthermore may be regarded as of few and simple types, linked together through simple relationships. One suggestion would be that networks became susceptible to infectious diseases — not, of course, in the literal sense but through some phenomenon approximately resembling infection. It is important to note that this would have nothing to do with computer viruses but be a property generated by the network itself.

Here an example. It is not ideal because emergent properties are surprises and if we could forecast them, they would be no surprises. But a major telephone exchange on the American West Coast suffered a severe breakdown that was extremely hard to spot. It turned out that instead of signalling a greater switching delay under heavier load, which is the way to tell other exchanges to take over some of the job, it inverted the sign and signalled an impossible over capacity, which other nodes were more than eager to exploit. Thus it would be the task of the scenario producer to try to dream up such possible improbabilities.

The second major technological change has been discussed a lot and implies the slowdown from fast to less drastic development. From around 1950, Moore's Law has prevailed, implying a reduction by half in computer power cost every eighteen months. Every decade the end to this rapid cost reduction has been in sight, mostly because of problems with miniaturisation, reaching noise or photographic resolution limitations of a physical kind. These problems have, time and again, been resolved in ingenious ways.

When Gordon Moore himself now foresees the end to his law, it is because of something else: cost. Concomitant with cost reduction, chip factories have grown in complexity, eventually creating such demands on investments that they will be insurmountable by the year 2005 or so.

The spectacular cost reduction has been an important driving force. Is Moore right, and, if so, have we arrived at the end of history? Of course, engineers have come up with ideas to ease the demand for capital forecast by Moore and underpinned by trends so far. Another argument, which is more than somewhat true, is that since computer power has increased so swiftly, we have been less concerned with harnessing it to its potential or using it very efficiently. Thus if development came to an end, there would still be another ten years to go before the potential of technology already existing had been fully utilized. And the same might be said for application programs, and for information organisation.

With this reasoning, it would take another twenty years after Moore's last super-factory before innovation ground, not to a halt but to the small improvements of a mature technology. The question looms large, however.

The closer to the sources of IT, microchips, the more concern for the scenario writer, however. And from this story, and the hypothesis that underlie it, we may discern a number of changes in emphasis.

But are microchips still the sources of IT? The growing emphasis on telecommunications stems from breakthrough developments also in optics and transmission technology. Furthermore, it stems from great strides in applied mathematics, allowing computer power to be harnessed to allow for radical signal compression.

May we, when producing our scenarios, suggest other such mathematical breakthroughs (think of public-private key, pretty good privacy, and others)? Is it true that such "soft" innovation, including computer software innovation, is characterised by something different from the ordinary laws of nature: human logic? And is it true that this implies different rules governing innovation activity and the achievement of innovative results?

Here developments have not been so orderly as they seem to have been in microelectronics — seem to have been, because here too there are steep curves indicating drastic cost reductions and capacity increases. Thus we may come to understand that the underlying forces are not really depending on engineering efforts as such but rather market forces inducing such efforts.

The power of investments

Here, then, forces are of two types, or two categories of one factor — investments. Traditional infrastructural investments is one category, though some may not be entirely traditional, as we will see. The other is anonymous, discrete, individual small investments, as much, perhaps in time and effort as in hardware — what eventually creates critical mass.

Looking ten years into the future, we may identify at least one possible new huge investment in infrastructure, and that is an airborne (or spaceborne?) mobile telephone system. Motorola came out first, with Iridium, comprehending some seventy satellites. Next a consortium with Microsoft as one prominent participant claimed to be going for lower orbit satellites but then some eight hundred of them. But there are several more contenders, including a scheme with stationary high altitude balloons. Anyhow, these are systems that cannot be launched piecemeal but need a (near) full scale launch.

There are, to be sure, infrastructural investments that are moderate, such as Mosaic and the World Wide Web, tools that needed to be developed and which generated the run-away success of the Internet. Possibly, future such general tools and interfaces, available to all may become instrumental in the break-through of this or that development.

The fax breakthrough of the 80s was not something caused by massive investments into fax networks or fax servers. It was just the arrival, finally, of critical mass: a sufficient number of faxes "out there" to justify the acquisition of, not investment in, another fax. Certainly prices had come down, something which happened partly because of general cost cutting in IT, partly because of larger production volumes.

The Internet, like the telephone almost a century ago, is the same story. Critical mass makes for higher utility attracting more adherents which increases utility even further, attracting... And making for a larger increase in traffic than the simple addition of new members or nodes would indicate.

This is an example of network economies, mentioned initially, which run counter to ordinary economies. Instead of diminishing marginal returns as new members are added to the network, we see increasing returns. The utility for the individual member or subscriber is approximately proportional to the number of members or subscribers. Critical mass has arrived when it is just too costly to stay outside this profitable system. There is one important provision, though. New nodes must not cause the system to choke, so the information volume of future messages (live pictures, 3D virtual realities...) and bandwidth and switching availability will have something to do with future trade-offs.

Increasing returns

Network economies, in turn, provide one example of knowledge economies, and this is just one group of economic phenomena sharing the characteristic that they display increasing marginal returns. The return on the first amount of investment is Q; normally the return on the next equal amount of investment would be less than Q, but here it is larger instead. Thus there is an incentive to rush forward with new increments of investments even faster.

Seldom one actor is alone in this, and if knowledge grows in sharing, it is a collaborative undertaking. Thus we claimed that the first successful personal computer, Apple II, actually became a success only after the introduction of the VisiCalc spreadsheet. With sufficient numbers of computers available, other software producers started developing their own products. They competed, but they also collaborated in that they were all instrumental in creating a new market, a market needing both hardware and software.

Sometimes the win-win process coalesces around one standard, making losers out of those not adhering to that standard. The new industry as a whole still displays increasing returns, but there are some losers, those left out of the standard, by their own design or by various types of barriers having been erected. Sony Beta versus JVC is typical for the first type of battle, with the pioneering (and technically somewhat better) Beta turning out to be the eventual loser. The IBM PC became the industry standard, IBM supporting a win-win process by laying the standard open to all interested players — too open for its own good, some observers claim. And the MS-DOS, later Windows, became the dominant standard for operating systems. The current attempts by Microsoft to retake the lead from Netscape in Net-surfing tools must be seen in this perspective, as Bill Gates makes evident in his book, *"The Road Ahead"*.

Consequently, the identification of such run away processes, and future standards, are crucial for successful scenarios. Many fax producers had given up on any breakthrough ever happening, after so many false starts, and as we have concluded, PCs and the Internet were hardly foreseen, especially not the exact timing. Therefore, our scenarios should not concentrate on the timing of such events but rather on different outcomes and indicators as to their imminence.

To reiterate: it would be all too ambitious to try to generate some kind of all-encompassing IT scenario for the future, including, technology, applications, and social and societal effects. Instead, the idea is to provide the reader with some tools and inputs to make it possible for him or her to produce a set of scenarios pertaining to a particular situation. We have already mentioned a number of salient features to take into account, but when we now approach the individual level, what should we look for in suggesting important shifts in information behavior?

What individual communications behavior?

A few scattered examples of changes in information behavior might serve better to color the abstract term. The advent of the copying machine led to a surprising proliferation of copies. One way of describing this phenomenon might be to say that now a lot of copies of copies were made — in fact, the great majority. Or you might point to the fact that when people lining up to wait for making copies called forward the installation of another copying machine, this led to a step increase in copies made. One study showed that of all the documents arriving in an ordinary individual office, one half of them had any business there, the other half was superfluous. And of the half that was relevant, one half found its appropriate place in the waste paper basket after being studied.

A completely different discovery was that electronic mail caused people to be much less restrained in personal communication in this medium than in letters or on the telephone — rude, insulting. On the other hand, in serious decision meetings, where normally in the US white male participants would dominate, digital meetings made for equal opportunity also for women and minorities. And it turned out that such meetings handling of collective attitudes to risky projects changed in a tangible way.

In retrospect, we may say that such effects are obvious: the medium may not quite be the message, but it is well known that media temper our communication and thus can affect the dynamics of it. The point for us as producers of scenarios is of course to try to suggest such future shifts in behavior.

The change in work patterns related to the advent of photocopying make important points about convenience, human convenience, as a governing concern when people develop their information behavior. Thus it would be too limited just to take into consideration available economic resources when looking at our information future. Time and convenience, including propensity to learn, to find motivation and concentration to learn how to use various future possibilities will be decisive. Must learning be painful — can it become more rewarding in itself?

People are different, and producers of services especially are often reminded that they are operating on a mass market of one individual at a time. The service, or the goods combined with services, may be described as consisting of a combination of offers requiring producer efforts involving hand, head, and heart. Or we might, as mentioned initially, look at producers in general as working with cognition and knowledge; interaction and services; or tactile — those hands. How will various activities incorporate these factors, and what role will IT play? Again, one has to decide what is the theme of the scenario.

9.2. The New Technologies

The Evolution of Communications and Computing Technology 1950 — 2000

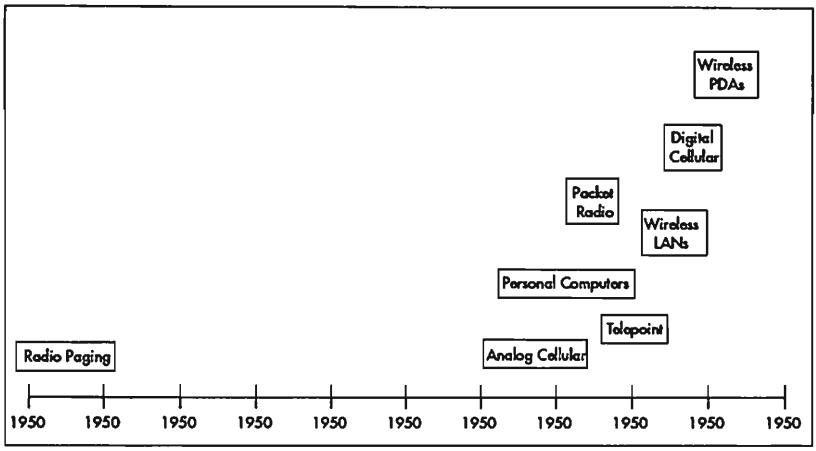


Fig. 219: The diagram shows the development of the wireless communications that we see exploding today. Although radio paging was used already in the 1950ies, it took until the early 1980ies for mobile communications to take off. Several books tell the fascinating story of the technological developments in the area. As can be noted from many diagrams in this book, fixed communications are rapidly being overtaken by mobile ones, whatever terminals we use — telephones, computers, fax, etc.
Source: EITO: European Information Technology Observatory 94

Micro Machines on the Chip

"The electronics industry relies on its ability to double the number of transistors on a microchip every 18 month, a trend that drives the dramatic revolution in electronics. Manufacturing millions of microscopic elements in an area no larger than a postage stamp has now begun to inspire technology that reaches beyond the field that produced the pocket telephone and the personal computer.

Using the materials and processes of microelectronics, researchers have fashioned microscopic beams, pits, gears, membranes and even motors that can be deployed to move atoms or to open and close valves that pump microliters of liquid. The size of these mechanical elements is measured in microns — a

fraction of the width of a human hair. And like transistors, millions of them can be fabricated at one time.

In the next 50 years, this structural engineering of silicon may have as profound an impact on society as did the miniaturization of electronics in preceding decades.

Micromechanical devices will supply electronic systems with a much needed window to the physical world, allowing them to sense and control motion, light, sound, heat and other physical forces."

Souce: Scientific American, September 1995, p. 118ff. "Engineering Microscopic Machines" by Kaigham J. Gabriel

Trends in microelectromechanical systems

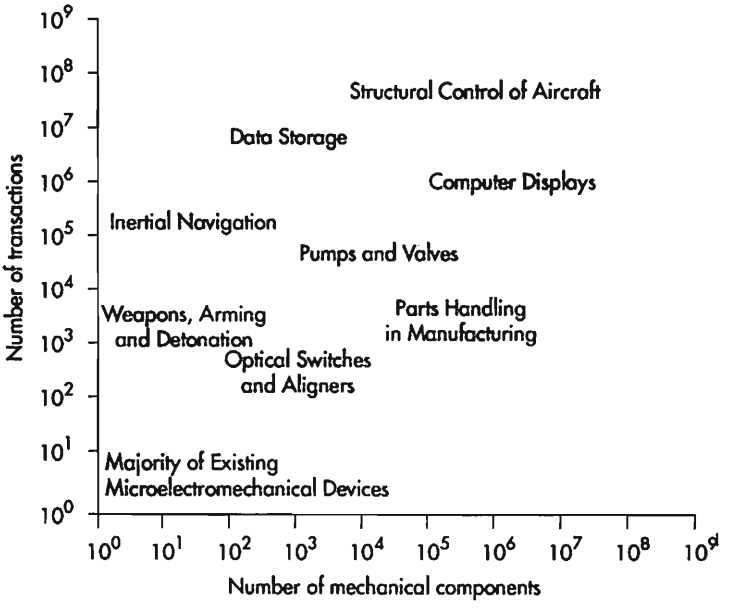


Fig. 220: The integration of small machines and sensors with electronic circuits will make it possible for electronic systems to sense and control motion, light, sound, heat and other physical forces. The area at the bottom to the far left represents devices that have already been developed.
Souce: Scientific American, September 1995, p. 118ff. "Engineering Microscopic Machines" by Kaigham J. Gabriel

All-Optical Networks

A lot of effort goes into solving the most important development problem in optical communications — that of building the optimal optical amplifier. Until such a device exists, the optical transmission technology is realising only a small fraction of the promise of the technology. So far, all the hair-thin optical fibers do are transmitting voice, video and data at speeds 10 to 100 times faster than standard copper wires. With all-optical networks (and no need to convert to slow copper) a single fiber could transport 25 terabits per second, which is sufficient to carry simultaneously all the telephone calls in the U.S. on Mother's Day!

Souce: Scientific American, September 1995

Quantum Components

Four generations of quantum components, i.e. electronic components based on quantum physics, are presently considered in semiconductor research and production. The present methods used for the production of quantum semiconductors are called MBE, Molecular Beam Epitaxy, and MOCVD, Metal-Organic-Chemical-Vapour-Deposition. The generations can be described as follows:

* The first generation includes a number of high volume components, for instance HEMT, High Electron Mobility Transistor, QWL, Quantum Well Lasers, and HBT, Heterojunction Bipolar Transistors. They are used in the following applications:
  - HEMT for high-speed digital signal switching and low-noise amplification in, for instance direct broadcasting via satellite;
  - QWL for semiconductor lasers;
  - HBT for power-device applications in, for instance, portable telephones and computers.
* The second generation is represented by more sophisticaded developments of the first generation technologies, operating at a scale of less than 10 nanometers.
* The third and fourth generations are still in the research fields. But there are clear ideas about their applications, which can be seen from the following diagram.

Examples of the Four Quantum Electronic Component Generations

Generation	Physics	Device Types	Feature Exploited	Operational/ Production Timescale
1st	Quantum confinement, 2D Dos, blue shift	QW laser	Low threshold current density, structure-tunable wavelength	In production
	Quantum confinement, spatial separation of carriers	HEMT	Low-noise, higher speed, less dependent on temperature	In production
2nd	Greater quantum confinement	P-HEMT	Lower noise, even higher speed	In production
	Hot electron injection	Heterojunction Gunn diode	Higher efficiency, lower noise, less dependent on temperature	In production
3rd	Tunnelling	ASPAT	Less dependent on temperature	Prototyping 1 year to market
	Resonant tunnelling	Diode as source/mixer low power	Very high speed, high efficiency	Highly special applications so far. Bandwidth links in space/ on earth > 10 years
4th	Ballistic motion, quantum reflection	Split-gate transistor as terahertz source/mixer	Ultra-high speed, very low power	Possible high bandwidth links in space/on earth > 10 years

Fig. 221: This diagram shows an overview of the emerging quantum electronic components. These represent the future for mainstream electronics. Molecular electronics and all-optical computing are alternatives in the strategic research fields.

Sources: EC DG III/EITO: European Information Technology Observatory 94

Flat Screens

Flat screens, or flat displays, are one of the most strategically important products in the IT industry, according to the OECD (OECD: Information Technology Outlook 1995). They are regarded as key components in some of the fastest growing markets in the IT field, for instance in notebooks and other portable personal computers, in cellular telephones, which rapidly are becoming multifunction terminals, and in digital assistants.

Estimation of the Global Market for Flat Displays 1995 and 2001

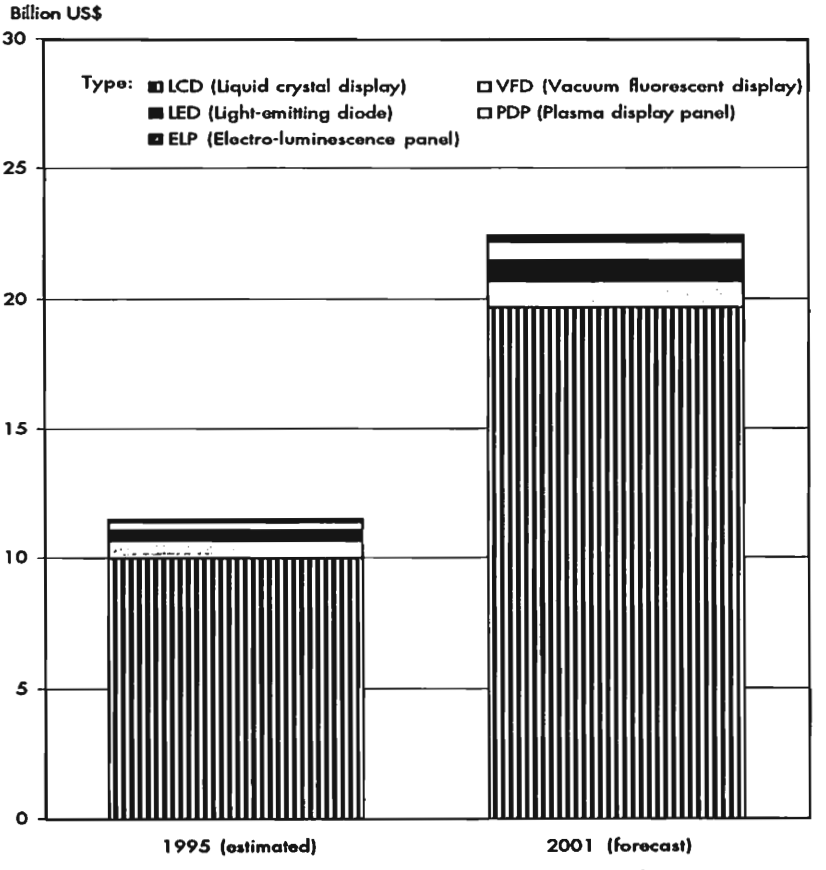


Fig. 222: Several technologies are underway for flat screens. For the time being, LCD displays are dominating the market. PDP is regarded as a strong candidate for large flat sceens.

Sources: Stanford Resources/OECD: Information Technology Outlook 1995 ©OECD, reproduced with permission of the OECD

After 2020?

New production technology for microprocessors and electronic circuits will most likely replace current photolithographic methods, about to reach their limits. Researchers are looking into new ideas, which they hope will take miniaturization down to molecular levels. Some of the ideas worked at are — according to **David A. Patterson** in **Scientific America, September 1995,** are:

* **Quantum dots and other single-electron devices**, i.e. molocular arrays allowing researchers to trap individual electrons and monitor their movements. The possibilities to develop quantum computing techniques are being studied at MIT, the Massachusetts Institute of Technology;

* **Molecular computing**: At the Syracuse University, USA, investigators are trying to develop data storage systems using biological molecules instead of making components out of silicon;

* **Nanomechanical logic gates**: Beams or filaments, only one atom wide are moved to carry out logical operations;

* **Reversible logic gates**: These gates will recapture some of the energy expended in the components of ever more densly populated chips and in this way generate less waste heat. This will solve some of the problems caused by the heat generated by computations.

Paying for peace of mind?

Will we have to pay not to be disturbed by e-mail messages, Internet, fax, mobile telephones and computers, paging systems, and whatever else there is of communication gear? It may well be that personal peace and quiet will be quite expensive in the future. So far, Swedes have to pay Telia for **not** having their telephone number in the directory.

* Is **artificial intelligence** (AI) finally coming of age? At least it seems as if some programming techniques have been developed that can emulate human logic reasoning and learning. Such programs are already helping out in maintenance and service of complex telecommunication networks and traffic control. But we are still at the very beginning of this technology, part of the problem still being our lack of understanding of human cognitive skills.

*** Internet and Telecommunications via the Electricity Network?**

Internet access, along with cheap local telecommunications, and video on demand, may come with the electricity supply lines, at least if trials planned by the British company Norweb prove successful. Interactive monitors will check electricity consumption, reveal how much money Norweb is owed, and automatically report faults. The company is experimenting with power-line communications to cut the costs of connecting customers to the phone network. The idea of the electricity network being used for telecommunications is not new. So, for instance, in the early 60ies, Marshall McLuhan pointed to the telecommunications opportunities offered by the finely meshed electricity grid. One only wonders why it took so long.

Source: New Scientist, January 18, 1997

10. The IST Companies, Operators, and Equipment Manufacturers

The European telecommunications market shall be fully deregulated by January 1, 1998, according to several EU agreements, presented in, for instance the "Services Review" of March 22, 1993. However, some governments are having troubles in this privatisation process. So, for instance, is Deutsche Telekom the only company holding a license to provide facilities-based international switched voice services in Germany. Partial privatisation of the company took place in November 1996, but the German government will retain a majority of the shares until 2000.

Regarding France, the situation is similar as far as goes the license holding — only France Télécom holds one to provide facilities-based international switched voice services. And the French government has over the past years displayed a kind of on-again/off-again privatisation policy, with no decisions taken as yet.

In Spain, Telefónica de España still has a monopoly over international telephone services, although the government approved competition for the provision of voice and data services within closed user groups in the beginning of 1996. In Italy, the license situation is similar, so far, only Telecom Italia holds a license to provide international services.

Sweden got its first telecommunications law on July 1, 1993. At the same date, Swedish Telecom, Televerket, was incorporated as Telia AB. So far, 100% of the shares are owned by the Swedish state. However, competition is free in Sweden, and Sweden was together with New Zealand ranked as the most liberated among the OECD countries by the OECD in 1993[1].

In sum, deregulation is on its way even in Europe, there is no doubt about it, but a fully liberalised telecommunications market may be a bit further off than most of the European users may wish. The implications of the strategic alliances, so important to this industry, are not yet evident. The Ovum Telecoms Industry Alliances Map 1995, see page 45, gives an inkling.

Not only Europe is struggling, however. The British weekly *"The Economist"* of February 24, 1996, comments on the liberalisation of the Japanese market in an article on telecoms in Japan (p.73) as follows:

[1] See OECD "Communications Outlook 1993" and "TELDOKs Årsbok 1994", fig. 144, p. 202.

"(Early 1995,) Japan's Ministry of Posts and Telecommunications, MPT, set up a committee to advice whether Nippon Telegraph and Telephone, NTT, should be broken up in the interests of competition. On two previous occasions — in 1985, when it was privatised, and in 1990 when a similar committee recommended a break-up — NTT had fought off threats to split it up.

For the time being, therefore, NTT will probably remain intact. How much does this matter? If you take some statistics at face value, you might conclude that Japan has little need of sharper competition in telecoms. It already possesses more than 100 carriers, and foreign companies have been investing heavily."

So what is the caveat? Well, one is that NTT is the only operator having a national network that others have to buy into in order to reach the consumers, at connection rates decided by NTT. Thus, the Japanese consumer pays unnecessarily high tariffs for their telephone calls. But technology may be the response to a liberalised Japanese market. NTT may well see its network bypassed by cellular operators. During the period April 1995 to April 1996, mobile phone users in Japan has doubled to 8.7 million.

When reading this chapter, it becomes evident to the attentive reader, that there are a number of companies which should have been presented here but which are not included. Examples are the German media giant Bertelsmann, American Microsoft, Italy's (and Berlusconi's) Fininvest Italia SpA, just to mention a few. Our feeble reason for this is that there are just too many of them in our field. More seriously, first of all, we have chosen to describe companies that are directly or indirectly active in the Swedish market, although we cannot guarantee that we have covered them all. Secondly, we have chosen to stay with a rather conservative definition of the telecommunications industry, since we are not capable of telling you where it starts and where it ends.

Finally, there are some very, very new players in the Swedish telecommunications market, so new that there is no public information available about them. Such companies are:

— FT Nordphone AB
— TELiT AB
— First Telecom Sweden AB
— Tele Express International SA

According to information on the Internet, these are described by Sam Spens Clason as *"not known at directory enquieries, so there isn't really much to write about them yet. If they don't even have a phone of their own..."*

The sources of information for this chapter are several and not indicated in each separate case. Information about the operators and suppliers has been collected from companies' home pages, and, in some cases, from their annual reports, from several OECD reports, in particular ***"Communications Outlook 1997"***, from two guides from TeleGeography, ***"The TeleGeography 100 — A Graphical Guide to the World's Leading Information Companies"***, and ***"New***

International Carriers 1996", and from the general press. One of several interesting sources on the Internet is the Telecom Observer's *"Industry Talk"*. More information can also be found in OVUM's *"The Major Telcos in 1996"*.

The British telecom intelligence firm Ovum has mapped the major telecommunications operators of the world and their strategic alliances, as shown the diagram on page 44. Several interesting facts should be noted:
i) not one single telecommunications operator is large enough to cope with global telecommunications on its own;
ii) in spite of the appeal a number of people see in transnational and transcontinental mergers to build global communication conglomerates, most people's calling habits still are related to their physical communities. Only the very avid Internet users, and so far they make up a minority of the global telecommunications users population, take advantage of the mergers at present;
iii) by March 1993, there were in total 1 660 strategic alliances formed within the IT industries. 366 pertained to telecommunications. How many are there now? And what are the capacities of each one?[2]
Source: Ovum

[2] For further information see information from the following sources: Hagedoorn and Schakerad, Maastricht Economic Research Institute in Innovation and Technology, quoted in The Economist, March 27, 1993, and "TELDOKs Årsbok 1994" p. 204.

The Top 10 Telecommunications Operators in the World in 1995

Company and country	1995 revenues in million of US$	Number of employees
1. NTT (Japan)	84 045	231 000
2. AT&T (USA)	51 374	127 000
3. Deutsche Telecom (Germany)	46 151	213 500
4. France Télécom (France)	29 613	167 660
5. BT (UK)	22 785	130 700
6. GTE (USA)	19 957	106 000
7. Telecom Italia (Italy)	18 503	90 222
8. Bell South (USA)	17 886	87 571
9. MCI (USA)	15 265	50 367
10. Telefónica (Spain)	13 958	69 570

Fig. 223: This ranking was made by the OECD, based on the figures of 1995. It includes only companies operating within the OECD countries. Swedish Telia AB is number 25 on this list, with revenues of US$ 5.8 billion, and 33 065 employees.
Source: OECD: Communication Outlook 1997, Vol. 1, ©OECD, reproduced with the permission of the OECD

Major Telecommunication Equipment Manufacturers in the OECD Area in 1995

Company	Country	Revenues in million US$	Number of Employees
1. Siemens	Germany	61 942	373 000
2. NEC	Japan	46 729	152 719
3. Fujitsu	Japan	39 978	165 056
4. Alcatel NV	France	32 141	191 830
5. Motorola	USA	27 037	142 000
6. Lucent Technologies	USA	23 286	124 000
7. Ericsson	Sweden	13 846	84 513
8. Northern Telecom	Canada	10 653	63 715
9. Nokia	Finland	8 429	31 948
Totals:		**264 042**	**1 328 781**

Fig. 224: The largest telecommunication equipment manufacturers in the OECD area in 1995 spent US$ 23.9 billion on research and development, and employed 1 328 781 persons.
Source: OECD: Communications Outlook 1997, Vol. 1, ©OECD, reproduced with the permission of the OECD

10.1. National IST Initiatives and Authorities

A great number of countries have initiated national information and communications initiatives, demonstrating local creativity, national political will-power, and financial strength, by expressing more or less ambitious plans for ICT development, and its role for future economical growth. Most countries have expressed their political intentions in official documents, mostly created by a ministry or an authority. However, the field of operations and the areas of power for the existing regulatory and licensing authorities differ from country to country. Those specificly interested in national initiatives can find information in a report called: "*IT världen runt — nationella initiativ*", STATT 9502. by the Swedish Office of Science and Technology, (STATT).

10.2. Liberalisation

As has been mentionned several times in this document, liberalisation is being pushed by the EU, among others, and promoted by the recent WTO agreement. The old monopolies of Western Europe are being deployed more or less rapidly, depending on national politics and economics.

In order to provide an understanding anf the facts of the national telecommunications regulatory situations, the OECD has undertaken a study among their member countries, asking them to answer a certain number of questions related to the competitive status in their countries. The results are publicised in "*Communications Outlook 1997, volume 2, Regulatory annex*". According to this publication the Swedish situation is described as follows:

Telecommunication Market Situation in Sweden by January 1997

Infrastructure provision for following service	Regulatory status	Number of licensed operators	Date of future proposed regulatory change
Local PSTN	Open competition	6	1997
National PSTN	Open competition	6	1997
International PSTN	Open competition	6	1997
Leased lines	Open competition	5	1997
Analog cellular mobile (NMT, etc.)	Open competition		1997
Digital cellular mobile (GSM, etc.)	Open competition	6	1997
Other mobile communication (PCS, PCN, CT-2, etc.)	Open competition	3	
Radio paging	Open competition	2	1997
Payphones	Open competition	2	1997
Cable television infrastructure	Open competition	2	none
Data communication	Open competition	numerous	1997
Internet access	Open competition	numerous	1997

Source: "Communications Outlook 1997, volume 2, Regulatory annex", ©OECD, reproduced with the permission of the OECD

10.3. The Operators

(N.B. All figures refer to 1995 unless otherwise indicated. Current information is available via the homepages of each company on the Internet.)

AirTouch Communications, Inc.

Country of origin: USA

Some basic facts:

* AirTouch is the largest international mobile telephone company in the world
* The company was formed in 1994, as a spin-off from Pacific Telesis
* AirTouch has a stake in Globalstar, a company planning to offer satellite based telephone services to its subscribers by 2000

The company in numbers:

* 1995 revenues: US$ 1.59 billion (1994: US$ 1.24 billion)
* Number of US subscribers in 1995: 2.3 million
* Number of international subscribers: 800 000

Ameritech - American Information Technologies

Country of origin: USA

Primary operations:

* In 1993, Ameritech offered telecommunications services in the states of Illinois, Indiana, Michigan, Ohio and Wisconsin — covering 17% of the US population. In 1995, the company is announcing that it is growing in order to reach new customers in 50 states and 40 countries
* Core businesses are: Telephony, cellular and paging, caller ID, Internet services
* Projected growth of the world communications market: From US$ 677 billion in 1995 to US$ i trillion in 2000, a growth rate of 57% over five years
* Ameritech International was founded in 1990 in order to exploit business opportunities outside of the US

International partners:

*** In North America:**	Atlantic Canada On-Line
	CCL Group, Canada
	Software Kenetics, Canada
	Unisys Canada
*** In Europe:**	Belgacom S.A., Belgium
	Credit Communal, Belgium
	Kredietbank, Belgium
	Singapore Telecom
	SOFINA, Belgium
	Tele Danmark, Denmark
	Matav RT, Hungary
	Deutsche Telekom, Germany
	NetCom GSM, Norway
	Comvik, Norway
	Orkla, Norway
	Polska Telefonia Komorkova, Poland
	France Télécom, France
	Telekommunikacja Polska S.A., Poland
*** In Asia:**	China Unicom, China
	ChinaCom, China
	Sky Network Television
	Bell Atlantic
	TCI
	Time Warner
	Telecom Corporation of New Zealand

The company in numbers:

* 1995 revenues: US$ 13.4 billion (1992: US$ 11.15 billion)
* Number of employees: 65 345 (1992: 71 300)
* Mainlines 1995: 19 057 000
* Mobile subscribers: 1 891 000

AT&T

Country of origin: USA

Some basic facts:

* AT&T was incorporated in 1885
* Today, the company is focused on offering its customers a full menu of communications and information services — long distance telephony service, local telephony service, wireless service, on-line and Internet access services, and home entertainment
* AT&T is the driving force behind the global alliance WorldPartners, and the company is moreover a member of Uniworld
* AT&T is an important partner to Swedish Telia
* Until 1984, when deregulation came into effect, AT&T was the largest company in the US. Since then, the company has downsized thanks to tri-divestiture operations:
  In 1995, AT&T decided to spin off its global information solutions business, NCR, and its manufacturing and R&D business, Lucent Technologies, into separate publicly listed companies.
  AT&T retained the core communications businesses — long distance services, and AT&T Wireless, formerly McCaw Cellular Communications — and its credit card business.
  In 1996, AT&T sold 17.6% of Lucent to the public for US$ 3 billion
* Lucent Technologies is made up of former Western Electric and Bell Labs
* AT&T's international operations are influenced by the FCC, the Federal Communications Commission, the US regulatory authority
* The AT&T network is the most extensive one in the world. It includes more than 2.75 billion circuit miles of transmission facilities. This network transmits more than 95% of all traffic via fiber-optic circuits
* More than 210 million voice, data, and image calls are handled each day of business
* AT&T provides long-distance telephone service to every country and territory in the world, 280 in all. The company offers direct-dial access to more than 260 countries and territories
* AT&T has a subsidiary in Sweden since 1988

The company in numbers:

* 1995 revenues: US$ 79.61 billion (1994: US$ 75.09 billion; 1992: US$ 64.9 billion). Breakdown of 1995 revenues: 62% AT&T Corp.; 26% Lucent; 10% NCR, and 2% AT&T Capital Corp.
* Number of employees at present: 127 000 (1994: 300 000; 1992: 312 700)
* Number of mobile subscribers in 1995: 5 500 000

Banverket

(The Swedish National Rail Administration)

Country of origin: Sweden

Some basic facts:

* Banverket is relatively new as a telecommunications operator in Sweden. In 1988, the Swedish State Railroads, SJ, was divided into two companies, SJ, handling railroad transports of passengers and goods, and Banverket, responsible for the infrastructure, covering 9 820 kilometers of railroads, and 11 000 kilometers of main cables
* 7 000 kilometers of optical fiber-cable, 90 switches, and 2 300 cellular base and link stations are part of the telecommunications infrastructure

The company in numbers:

* 1995 revenues: 14 billion SEK
* Number of employees: 6 405

Belgacom

Country of origin: Belgium

The company in numbers:

* 1995 revenues: US$ 4.3 billion
* Number of employees: 26 012
* Number of mainlines: 4 623 000
* Number of mobile subscribers: 302 000

Bell Atlantic Corporation, since 1996 also including NYNEX

Country of origin: USA

Some basic facts:

* In 1992, Bell Atlantic had 18 million telecommunication subscribers in eastern US, in the states of New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and Washington D.C. In 1995, the firm reported 19 million mainline subscribers
* In 1994, Bell Atlantic's chairman Ray Smith put the concept of the information highway on many people's mental maps. He announced that the firm would merge with TCI, the largest US cable TV company. The deal was never closed,
  but the vision of a multi-purpose communication network which could deliver hundreds of channels of voice, data, and video information to homes and offices still influence our ideas of the future. Bell Atlantic has pursued the vision through its full merger with NYNEX in 1996. For details about NYNEX before the merger, see page 353
* Bell Atlantic Mobile merged with NYNEX Mobile in 1995, becoming Bell Atlantic NYNEX Mobile, the largest cellular carrier on the American east coast. Earlier, the two companies started an interactive TV joint venture
* Under the 1996 U S telecommunications law, Bell Atlantic and NYNEX can offer long distance service jointly, which is one of the reasons for the full merger of the two eastern US operators

The company in numbers:

* 1995 revenues: US$ 13.4 billion (1994: US$ 13.8 billion; 1993: US$ 13.1 billion; 1992: US$ 12.6 billion)
* Number of employees: 61 800 (1992: 71 400)

Bell Canada

Country of origin: Canada

The company in numbers:

* 1995 revenues: US$ 5.9 billion
* Number of employees: 48 333
* Number of mainlines: 10 001 100

Bell South

Country of origin: USA

Some basic facts:

* Bell South provides telecommunications services through 21 million lines to subscribers in the southern states of Alabama, Florida, Georgia, Kentucky, Lousiana, Mississippi, North Carolina, South Carolina and Tennessee. This makes Bell South the largest RBOC (Regional Bell Operating Company) currently
* Bell South supplied telecommunications services to the 1996 Olympic Summer Games in Atlanta
* Through Bell South Interactive Media Services, Inc., Bell South is providing cable TV, video programming and distribution, and developing video-on-demand and other entertainment services
* The company is involved in the operation of mobile networks in five Latin American countries: Argentina, Chile, Mexico, Uruguay, and Venezuela
* The largest of Bell South's international interests is in Australia, where the company is part of the Optus consortium, with 24.5%. The Optus consortium, the second operator in Australia, is currently constructing a digital mobile network
* Bell South has interests in Ram Mobile Data which is constructing and operating mobile data networks in the US, UK, Denmark, France, Australia, the Netherlands, Belgium, and Singapore
* European headquarters are based in Brussels

The company in numbers:

* 1995 revenues: US$ 17.9 billion (1992: US$ 15.2 billion; 1994: US$ 16.6 billion)
* Number of Employees: 87 571 (1992: 97 112)
* Number of mainline subscribers: 21 133 000
* Number of mobile subscribers: 3 600 000

BT

Country of origin: Great Britain

Some basic facts:

* BT's main products and services are local, long-distance, and international calls;
  telephone lines, equipment and private circuits for homes and businesses; private
  networks; and mobile communications services
* In the UK, BT has 20.5 million domestic and 6.8 million business exchange lines
* BT handles about 100 million local, national, and international calls every day
* BT offers per second pricing on direct dialled calls to its customers
* Through Cellnet, BT offers mobile GSM services across the UK
* BT has the ambition to develop and grow new business in the UK market, which is one of the most open and competitive in the world, with more than 150 licensed operators
* BT has a 20% stake in American MCI Communications Corp., with whom it owns the joint venture company Concert, offering a one-stop shopping facility for customers with global communications needs
* In Europe, BT is involved with joint ventures with Spanish Banco Santander, German VIAG, and Italian Banca Nazionale del Lavoro
* BT has formed Telenordia together with TeleDanmark and Norwegian Telenor in order to offer telecommunications services in the Swedish market

The company in numbers:

* 1996 revenues: £ 14.5 billion (1995: £ 13.8 billion, 1993: £ 13.2 billion)
* Number of employees: 130 700 (1993: 170 000)
* BT was privatized in December 1984 and the British state now owns 23%. BT has more stockholders than any other company in the world
* In 1995, BT spent more than £ 2 billion on modernising and expanding its networks and supporting systems

Cable & Wireless (C&W)

Country of origin: Great Britain

Some basic facts:

* Founded in 1929 as a private company, it was nationalized in 1946. In 1981 the company was privatized once again
* Hong Kong has been a core business and was in 1993 responsible for 43% of revenues and 65% of the trading profit. Hongkong Telecom's international telecom traffic rose by 15%, while traffic between Hong Kong and South China increased by 35%. After 1997, HongKong will be governed by China
* C&W operates 15 mobile communications companies in the world, and had agreements for six additional companies to start during 1994
* A 25 year license, starting in 1984, gave Mercury Communications Ltd., C&W's public network operator in Great Britain, the same status as BT. C&W operates
  4 800 kms of fiber optic cable and an additional 2 000 kms of digital microwave links
* "The Global Digital Highway," a digital network based on fiber optic cable, connecting the world's economic and financial centers, is a core activitiy in the company's strategy
* Asia and Oceania are the most important markets, the Caribbean and the Middle East also have high priority
* Many subsidiaries and well-developed cooperative agreements are part of the C&W strategy as well. These exist in Hong Kong, USA, Japan, Bahrain, the Philippines, Vanuatu, West Indies, Sweden (Tele2), Eastern Europe and China
* US operations occur via an alliance with US Sprint
* C&W owns 39.9% of the Swedish operator Tele2 — see Tele2 AB — while the Kinnevik group owns 60.1%

The company in numbers:

* 1996 revenues: £ 5.5 billion (1995: £ 5.1 billion; 1992: £ 3.2 billion)
* Number of employees: 39 636 (1992: 38 835)
* In 1996, C&W reported losses at its One 2 One venture with Mecury of £ 66 million; at Vebacom, Germany, of £ 20 million; a break even for its Australian Optus venture;
  and a profit of £ 2 million at Swedish Tele2 (in 1995, Tele2 reported losses of £ 3 million)
* C&W have operations in over 50 countries, with concentration in the former British empire and the core business in Hong Kong

Cable & Wireless Flightnet Limited

Country of origin: Great Britain

Some basic facts:
* C&W Flightnet Ltd. is a subsidiary of C&W — see above — offering in-flight telecommunications services
* The company holds a license to offer TFTS mobile telecommunications services from aircraft in the Swedish market

Comviq GSM AB

Country of origin: Sweden

Some basic facts:
* Comviq GSM AB provides mobile telephony according to the GSM standard
* Comviq GSM AB has the ambition to be the cheapest GSM operator in Europe, an objective the company has achieved according to its Internet homepage
* It offers its subscribers value added and additional services, such as directory service, secretarial services, informational services, and limited time calling
* Comvik has signed roaming agreements with Denmark, Finland and Germany
* The company was established in 1989
* The firm is owned by Kinnevik — see Tele2AB
* Comviq GSM has offices in Malmö, Jönköping, Göteborg, Karlskoga, Västerås, Stockholm, Borlänge and Sundsvall, and its headoffice in Stockholm

The company in numbers:
* 1995 revenue: 1.088 billion SEK
* Number of employees: 350

Deutsche Telekom AG

Country of origin: Germany

Some basic facts:

* Deutsche Telekom increased its revenues from 1989 to 1995 by 73%
* Deutsche Bundespost was separated into three business areas on January 1, 1990: Postdienst, Postbank, and Telekom.
* By the end of 1995, the company represented an investment of DM 120 billion in infrastructure, systems, and service provision
* Deutsche Telekom has gone from a state monopoly to a privately held, competitive international operator, concentrating on being the leading full service provider in Germany, and at the same time developing new markets such as multimedia, and securing a healthy growth internationally
* International growth is the particular task of Global One, an alliance Deutsche Telekom has formed with France Télécom and Sprint
* Global One obtained EU approval in July 1996
* On January 1 1995, Deutsche Telekom became a publicly held corporation
* Deutsche Telekom supplies all types of telecommunications and related services — fax, teletex, interactive videotex, cable TV, personal paging services, land mobile radio, video conferences, electronic mail, etc.
* Deutsche Telekom is Europe's largest telecom operator/supplier. Some numbers:

Service	1990	1991	1992	1993	1994	1995
Telephone lines						
- analog and digital (in millions)	31.9	33.6	35.4	37.0	38.8	40.4
Telephone calls						
- national (in billions)	35.4	41.0	44.6	49.2	51.0	52.5
- international (in billions)	796.7	921.8	1011.6	1179.7	1384.0	1464.8
ISDN						
- basic access ('000)	14.5	595.1	138.8	281.3	509.2	924.7
- primary rate access ('000)	1.8	5.6	11.3	18.7	27.6	36.9
- channels ('000)	84.1	285.8	616.8	1122.9	1845.3	2956.4
Mobile communications						
- C network ('000)	274	533	772	794	724	648
- D1 network ('000)	—	—	69	481	887	1482
- Cityruf paging ('000)	65	132	207	277	336	342
Inmarsat users	—	0.8	1.1	1.5	2.3	3
CATV						
- Households connected (in millions)	8.1	9.9	11.8	13.5	14.6	15.8
- Households passed (in millions)	16.0	17.7	19.6	21.5	23.2	24.2
Longdistance network						
- Copper cables ('000 km)	193.3	197.4	148.2	148.2	148.3	147.0
- Optical fiber cables ('000 km)	30.9	42.1	57.1	68.4	81.1	86.0
- Broadband cables ('000 km)	279.5	327.0	352.0	372.2	387.4	402.0

Source: Deutsche Telekom

The company in numbers:

* 1995 revenues: DM 66 billion = equivalent to US$ 46.1 billion (1992: DM 53.9 billion; 1993: DM 60.1 billion; 1994: DM 63.8 billion)
* Number of employees: 1995: 220 000 (1994: 231 000; 1993: 234 000; objective for 2000: 170 000)

Dotcom Data & Tele Communication AB — Enator Dotcom AB

Country of origin: Sweden

Some basic facts:

* Dotcom was founded in April 1990 by a group of specialists — 230 persons — on corporate switching, all former employees of Ericsson Sweden AB, which merged with Televerket in 1989
* Dotcom offers its users data and telecommunications services, such as LANs and WANs, switching, and multimedia services
* In 1994, Dotcom obtained a telecommunications operating license from PTS
* Dotcom has merged with the ICT consulting group Enator, and is now operating under the name of Enator Dotcom AB
* Enator Dotcom is based in Linköping, and has 38 offices all over Sweden. The head office is situated in Kista, north of Stockholm

The company in figures:

* Number of Dotcom employees in September 1996: 500
* The parent company, Enator AB, employs 4 800 persons in the Nordic countries and Germany
* In 1996, total revenues of the Enator Group was SEK 4.5 billion

Europolitan AB — NordicTel Holdings AB

Country of origin: Sweden

Some basic facts:

* In January 1991, Europolitan obtained its GSM frequencies for mobile telecommunications from PTS. The Europolitan network was inaugurated on September 1, 1992
* Europolitan is owned by NordicTel Holdings AB, see below, in turn owned by the American mobile telecommunications operator AirTouch Communications (51%) and British Vodafone (19.5%). 29.5% of the shares are held privately
* Europolitan is offering its clients quality, and the firm was the first GSM operator to obtain ISO-9001 certification for the construction and management of mobile telecommunications networks
* Europolitan has a license to construct a DCS-1800 network in Sweden
* The firm has a sister organisation called Europolitan Stores, which is running 18 speciality stores for mobile communications in Sweden
* Europolitan has its head office in Karlskrona, in southern Sweden

The company in figures:

* Revenues in 1995: 752 million SEK (preliminary); by September 30, 1996, the company reported 9 months revenues of 995 million SEK as compared to 531 million SEK for the same period in 1995. 1996 was the first year the company could report a positive net result
* Number of employees by the end of 1996: 600
* On September 30, 1996, Europolitan had 241 000 subscribers
* The Europolitan GSM network reaches 96% of the Swedish inhabitants

Finnet Group

Country of origin: Finland

Some basic facts:

* Finnet Group belongs to what is called the private Telephone Companies Group in Finland, i.e. telecommunications companies not belonging to the state owned Telecom Finland
* The private Telephone Companies have formed several joint ventures to manage nationwide functions — Kaukoverkko Ysi Ltd. for long-distance calls, Finnet International Ltd. for international calls, and Radiolinja Ltd. for mobile telephony

The company in numbers:

* 1995 revenues: US$ 1.2 billion
* Number of employees: 8 657
* Number of mainlines: 2 018 716
* Number of mobile subscribers: 133 807

France Télécom

Country of origin: France

Some basic facts:

* France Télécom is the world's fourth-largest telecommunications carrier
* The company provides local and long-distance telephony services, and also data, wireless, on-line, Internet, cable-TV, and value-added services
* Through its subsidiary TDF, France Télécom is a leading European television and radio broadcaster
* France Télécom was the first public telecom operator to launch ISDN services. Today, there are 1.27 million ISDN B channels in operation
* The Transpac subsidiary operates a data network with 128 000 access points in Europe. In 1995, there were more than 200 Internet access points connected to the Transpac network
* France Télécom's on-line information service for private users, Minitel, had more than six million Minitel terminals in France by 1992. In early 1997, there were more than 25 000 services and more than 14 million users. However, the number of terminals does not grow as fast
* An on-line package called Wanadoo offers the 25 000 Minitel-services as well as access to the Internet
* The GSM cellular network is called Itineris, and had 860 000 subscribers as of May 1996
* France Télécom owns and operates the Telecom 1 and Telecom 2 satellites
* France's trunk network is 100% digital: All lines are connected to fully electronic digital switches
* France Télécom became public in January 1991, since then, France Télécom has been governed by the on-again/off-again privatisation plans of the French government, with no definate decisions mada as yet
* In February 1996, France Télécom with several collaborators, was selected by STATTEL, the Swedish state telecommunications procurement organisation, as a main provider of telecommunications services for all Swedish state agencies and municipalities. The contract was worth 12 billion SEK (US$ 1.8 billion), and covers a period of five years

The company in numbers:

* 1995 revenues: US$ 29.6 billion (1992: Ffr 122 billion; 1994: Ffr 154.6 billion = US$ 25.7 billion)
* Number of employees: 167 660 (1992: 153 300)
* Number of mainlines: 32 400 000
* Number of mobile subscribers: 996 000
* Prepaid calling cards sold: 112 million
* In 1992, 1.8 billion Ffr were spent on R&D at the Centre National d'Etudes des Télécommunications (CNET)

FT Nordphone AB

Countries of origin: Sweden and France

* FT Nordphone AB is a company created for the Swedish market by France Télécom. It was FT Nordphone AB that won the STATTEL agreement in close cooperation with Global One, the strategic alliance formed in 1996 between France Télécom, Deutsche Telekom, and Sprint. See each of these for further information

FTNS Nordic AB — Global One

Some facts:

* FTNS AB is short for France Télécom Network Services, which is in reality an operating arm of Global One — see Global One
* FTNS was founded in 1992. Today, the company is called either FT Nordphone AB or Global One

Global One

Countries of origin: France, Germany, and USA

Some basic facts:

* Global One is one of the new worldwide consortia, being formed in order to offer global telecommunications services
* Global One started its operations in 1996
* The consortium has 1 200 switching centers in 60 countries
* DT's and FT's joint venture Altas, including eunetcom, is now part of Global One
* By January 1, 1998, Deutsche Telekom's and France Télécom's data networks will be integrated into Global One
* According to Global One, it is "the new telecommunications operator, owned by three of the largest and most innovative operators in the world — Deutsche Telekom, France Télécom, and American Sprint, having merged their international businesses"
* Global One has existed in Sweden since 1992, then as France Télécom Network Services — see FTNS Nordic AB
* In 1996, Global One — see France Télécom — won part of the STATTEL contract, providing Swedish public authorities and municipalities with up-to-date telecommunications
* Global One has offices in a number of countries, the idea being of offering its customers one point of contact for any needs of global communications

The company in numbers:

* 1997 revenues (estimates) globally: US$ 800 million; in Sweden: 200 million SEK
* Number of employees globally: 2 900 persons in 1 200 offices; in Sweden 130

KDD, Kokusai Denshin Denwa Co., Ltd.

Country of origin: Japan

Some basic facts:

* KDD is an international telecom operator, with Japan as a base, which offers:
  - International telephone services
  - ISDN services to 13 countries, including G4-fax, video conferencing, transmission of data and images
  - Leased lines
  - International TV transmission via satellite
  - Owns and operates a global network consisting of satellites and undersea cables of various types
* KDD has a strong focus on developing advanced telecommunications services which can be paid for with many major credit cards
* The KDD group has 33 subsidiaries with operations in Europe, USA, Africa, Asia, Australia and Latin America
* China and the USA have shown strong growth, and KDD has a number of cooperative agreements as well as R&D projects in progress in these countries
* KDD is cooperating with Unisource, a strategic alliance between Telia and the Dutch and Swiss PTT's

The company in numbers:

* 1995 revenues: ¥247.9 billion = US$ 3.05 billion (1994: ¥246.4 billion; 1993: ¥ 240.1 billion; 1992: ¥ 244.5 billion; forecast for fiscal year 1996 (April 1, 1996—March 31, 1997: ¥ 334 billion)
* Number of employees: 5 614 (March 31, 1992: 6 004)
* KDD was founded in 1953, but has its roots in the international telecom traffic going back to 1871.

Koninklijke PTT Telecom — KPN

Country of origin: Netherlands

Some basic facts:
* KPN was partially privatised in 1994, the Dutch state having been its sole owner until then
* KPN is one of the Unisource partners, together with Spanish Telefónica, Swedish Telia, and Swiss Telecom — see Unisource. In April 1997, Telefónica announced that it is leaving Unisource
* KPN has made significant investments in the Czech, Hungarian, Ukranian, and Indonesian telecommmunications markets

The company in numbers:
* 1995 revenues: US$ 8.5 billion
* Number of employees: 32 288
* Number of mainlines: 8 124 000
* Number of mobile subscribers: 513 000

Mannesmann Mobilfunk

Country of origin: Germany

The company in figures:
* 1995 revenues: US$ 1.89 billion
* Number of employees: 3 556
* Number of mobile subscribers: 1 450 000

MCI Telecommunications Corporation

Country of origin: USA

Some basic facts:

* MCI was founded in 1968. In 1969, it was the first company to receive permission from the FCC, the US regulatory authority, to compete with AT&T in the longdistance market
* In August 1990, MCI purchased MCI Telecom USA, the fourth largest longdistance operator
* The purchase of Overseas Telecommunications, Inc. (OTI) in September 1990 gave access to 24 communications satellites and the development of satellite communications
* In 1994, BT bought 20% of the voting interest of MCI
* MCI recently paid US$ 1 billion for the acquisition of the Canadian software company, SHL Systemhouse
* The firm has invested in Australia's News Corporation, and it has an alliance with Microsoft
* MCI offers its customers a large assortment of telecom services such as domestic and international longdistance calls, telephones with telephone cards, special "non-peak" charges, special services for large users of longdistance traffic, 071 (calling-party pays) numbers for domestic and international calls, electronic mail, fax, telex, etc.
* MCI International has 80 offices around the world, including one in Sweden
* MCI's network was digitalised in 1991, and has a total length of 78 800 kms
* A transatlantic fiber cable, TAT-X, in agreement with BT, was finished during 1993
* "MCI's success in winning over 25% of the US long distance market is legendary" according to "The TeleGeography 100" of 1996. By 2000, the same source sees the company generating half of its revenue from local services, including wireless telephone, systems integration, Internet access, and entertainment — it is already selling pop music over the phone!
* Swedish users are being offered access to the MCI global network Concert via Telenordia

The company in numbers:

* 1995 revenues: US$ 15.3 billion (1992: US$ 10.5 billion; 1993: US$ 11.9 billion; 1994: US$ 13.3 billion)
* Number of employees: 50 367 (1991: 27 857; 1992: 30 964; 1993: 36 235; 1994: 40 667)

MFS Communications AB — now WorldCom, Inc.

Country of origin: USA, Swedish subsidiary of MFS Communications Company Inc., which in 1996 was taken over by WorldCom Inc.

Some basic facts:

* MFS started out in the US with 20 employees in 1987
* The company covered three business segments:
  — telecommunications services
  — Internet services
  — network systems integration services
* MFS became a public company in 1993
* MFS operated in 52 metropolitan areas globally, 45 of which in the US, and 7 in international financial centers
* In 1996, MFS was the tenth largest telecommunications operator in Sweden
* In August 1996, MFS Communications was acquired by WorldCom, one of the former RBOCs, and the fourth largest US long distance operator, through a stock deal valued at US$ 12 billion
* WorldCom has been built step by step through mergers and acquistions, one of the latest ones being that of MFS, giving the company an operating licence in Sweden, among other things
* According to Telegeography, the different peices of WorldCom seems to be working. It has a larger international reach than most US dometic operators, and the US as well as the international revenues are growing

The companies in numbers:

* MFS 1995 global revenue: US$ 583.2 million
  WorldCom global revenue: US$ 3.27 billion
* MFS global number of employees: 5 000

Netcom Systems AB — see Comviq and Tele2

Country of origin: Sweden

Some basic facts:

* Netcom Systems is the umbrella company of the telecommunications activities within the Kinnevik Group. It has interests in the following companies:
  - Comviq GSM AB, a mobile telecommunications operator; 100% of the shares
  - Tele2 AB, a national and international telecommunications operator; 60.1% of the shares, Cable & Wireless holding 39.9%
  - NetCom GSM A/S, mobile telecommunications operator in Norway; 32% of the shares; Orkla A/S holding 16%; Ameritech International 25%, Singapore Telecom 25%, and others 2%
  - Kabelvision KB, a cable TV provider; 38.3% of the shares, United Communications International holding 26.5%, Time Warner 20.7%, Bonniersfären 13.8%, Formator 0.5%, and others 0.2% — for further details, see Comviq, and Tele2
* In 1979, Kinnevik bought the first mobile operator in Sweden, a company called Comvik, which marked the take-off of the NetCom Systems conglomerate
* Kabelvision is collaborating with STOKAB, a Stockholm-based provider of fiberoptical infrastructure in order to improve service to cable-TV subscribers (AB STOKAB holds a license for fixed telecommunications operations)

The company in figures:

* 1995 revenues: SEK 1 995 million =US$ 280 million (1994: SEK 941 million)
* Number of employees: 567
* Number of mobile subscribers: 665 000
* By the end of 1995, 458 000 Swedish households were connected to the cable networks of Kabelvision

NordicTel Holdings AB — see Europolitan

Country of origin: Sweden

Some basic facts:

* NordicTel Holdings AB is the mother company of Europolitan and Europolitan Stores. See Europolitan above;
* Europolitan is operating the Europolitan GSM mobile network
* NordicTel was founded in 1990
* The company obtained a license as a GSM mobile telecommunications operator in Sweden on March 4, 1991 (in the 900 MHz frequency area)
* British Vodafone and American AirTouch Communications became partners and owners in 1993. AirTouch owns 51% of the shares
* NordicTel was introduced on the Stockholm Stock Exchange on May 27, 1994
* Together with France Télécom, Europolitan won the STATT contract in February 1996 — see France Télécom
* The company has its headquarters in Karlskrona

The company in numbers:

* Revenues in 1995: SEK 752 million (1994: SEK 278 million)
* In 1992–93, the company invested some SEK 500 million in constructing Europolitan's GSM network. In 1995, investments were SEK 414 million, and in 1994 SEK 501million. The acumulated investments were SEK 1 600 million
* Number of employees: 398 (1994: 273; 1993: 150)
* Number of subscribers: 148 000

Nordiska Tele8 AB

Country of origin: Sweden

Some basic facts:
* Nordiska Tele8 was established in 1992
* Nordiska Tele8 AB is owned to 51% by FaCilicom International, LLC, USA
* The company has its headoffice in Malmö, in southern Sweden
* Tele8 Kontakt AB holds an operating license for mobile services (DCS 1800) in Sweden
* FaciliCom, holding 51% of the shares, is a member of the American Armstrong-group, specialising in telecommunications and cable-TV

The company in numbers:
* Revenues 1995: SEK 11.4 million (1994: SEK 282 758)
* Investments 1995: SEK 26.1 million (1994: SEK 8.2 million)
* Number of employees: 16

NTT - Nippon Telegraph and Telephone

Country of origin: Japan

Some basic facts:

* Nippon Telegraph and Telephone Corporation and its subsidiaries are the largest nationwide suppliers of telecommunications services in Japan, offering telephone, cellular telephone, telegraph, leased circuit, data communication facilities, digital data exchange, pocket pagers, and other services to its customers;
* Eleven regional divisions are responsible for telecommunications services within Japan
* In 1985, NTT International Operations, NTTI, was founded to assist existing users outside of Japan's borders
* Privitised by the end of 1984, NTT is currently owned to 74.5% by the Japanese state, while 90% of the common stock is owned by private persons. Non-Japanese nationals are now able to hold NTT stock
* Japan's telecom authority, Minister of Posts and Telecommunications (MPT), keeps NTT's activities in check, and prohibits international telephony operations
* NTT is the world's second largest telecom operator. Some numbers from 1992:
  - 55.8 million telephone subscribers; **in 1995, 60 million**
  - 846 000 mobile telephone subscribers
  - 387.1 million telephone cards sold
  - 973 000 leased circuit lines
  - 3 859 000 pocket pager subscribers
  - 482 000 fax network subscribers
  - 90% of Japan's population has access to ISDN
* Three laboratory groups and 13 laboratories make up the research and development department of NTT

The company in numbers:

* 1995 revenues: ¥ 7 044 billion = US$ 84.05 billion according to the OECD, US$ 79.1 billion according to NTT (1992: ¥ 6 398.4 billion; 1993: ¥ 6 504 billion; 1994: ¥ 6 687 billion)
* Number of employees in 1995: 235 000 (1994: 248 000; 1993: 249 000; 1992: 257 000)
* R&D expenditure in 1992 were ¥ 286.9 billion.

NYNEX Corporation, now Bell Atlantic

For Bell Atlantic, see page 332

Country of origin: USA

Some basic facts:

* NYNEX Corporation is a global communications and media company providing
  a full range of services in the norteastern US and selected markets around the world
* NYNEX describes itself as a leader in telecommunications, wireless communications, cable television, directory publishing, video entertainment, and information services
* NYNEX has approximately 15 million subscribers in New York and the states of New England
* NYNEX is collaborating with Bell Atlantic in Bell Atlantic NYNEX Mobile in order to provide a full range of wireless local, long distance, data, and paging communications, offering 3.4 million customers these mobile services (Dec. 1995)
* NYNEX is the second largest cable network owner in Great Britain
* FLAG, Fiber-optic Link Around the Globe, is a giant submarine cable, the world's longest, which will link several Middle Eastern and Asian countries on its path from the UK to Japan. NYNEX is the prime mover of this project
* In 1996, NYNEX merged with Bell Atlantic, see Bell Atlantic, page 332

The company in numbers:

* 1995 revenues: US$ 13.4 billion (1992: US$ 13.15 billion)
* Number of employees: 65 800 (1992: 81 900)
* Number of mainlines: 17 138 000
* Number of mobile subscribers: 3 400 000

Pacific Telesis, merged with SBC Communications Inc.

For SBC, see page 356

Country of origin: USA

Some basic facts:

* Pacific Telesis, normally called PacTel, covers the states of California and Nevada and serves 11 million telecom users
* The company offers its customers the following services:
  - voice services, for instance local toll telephone services
  - data services such as fast packet switching
  - Internet access
  - network management
  - video services via wireless, digital TV networks of more than 100 channels offer video-on-demand and interactive viceo applications
  - mobile communications via PCS, personal communications services
* Pacific Telesis is running a California Research and Education Network, a high-speed data network for the development of interactive and multimedia applications
* The Pacific Telesis "Education First" program equips the Californian schools with online access
* In 1994, through divestiture, PacTel had to spin off its cellular telephone business, now known as AirTouch — see page 328e
* SBC Communications, Inc., the former South Western Bell, has aquired Pacific Telesis, PacTel, for US$ 17 billion, making SBC the third largest US telephonecompany after AT&T and Bell ATlantic/NYNEX

The company in numbers:

* 1995 revenues: US$ 9.04 billion (1992: US$ 9.94 billion)
* Number of employees: 48 889 (1992: 61 346)
* PacTel has 11 subsidiaries throughout the world

RSLCOM, former Cyberlink Sweden AB

Country of origin: USA

Some basic facts:

* Cyberlink Sweden AB is owned by the American firm Cyberlink Europe, based in the UK, in turn owned by RSLCOM
* RSLCOM Sweden AB, the Swedish subsidiary was introduced in October 1994 as Cyberlink Sweden AB
* In May 1995, Cyberlink was granted an operating license by PTS
* In Sweden, the company is operating as Cyberlink, while its name is RSLCOM in other parts of the world
* RSLCOM has as its business idea to offer global voice, fax, data communication, and Internet services to businesses as well as to private subscribers at competitive prices
* In May 1996, RSLCOM purchased Sprint Corporation's international voice-transmission businesses in France and Germany
* RSLCOM has the ambition to become the largest independent telecommunications operator in Europe within 10 years. Today, the company has subsidiaries in Finland, Germany, England, and France, outside the US
* The global strategy is to have a network around the world
* RSLCOM is a privately held company, and does not reveal its financial situation

The company in numbers:

* RSLCOM Sweden AB has some 20 employees
* Global annual revenues: US$ 130 million (est.)

SBC Communications Inc. — formerly South Western Bell — now including Pacific Telesis

For Pacific Telesis, PacTel, see page 354

Country of origin: USA

Some basic facts:

* South Western Bell's original territory covers Arkansas, Kansas, Missouri, Oklahoma, and Texas, with a total of 9.7 million subscribers
* SBC is offering national and international services in the following areas:
  - telephone services
  - wireless products and services
  - messaging services
  - interactive video services
  - cable TV services
  - advanced technology resources
  - international operations
* SBC is one of the most successful companies on Wall Street, having achieved a total return to its shareholders of 985% over the past 12 years
* SBC is the second largest wireless communications company in the world, serving more than 3.7 million subscribers
* In Mexico, SBC owns 10% in Telmex, the largest long distance carrier in the country
* In Israel, South Western Bell has 50% of the cable TV company Golden Hannels Ltd., which reached 279 000 households in 1994
* SBC is a partner of several strategic alliances
* Pacific Telesis, PacTel, was acquired for a sum of US$ 17 billion, making SCB the third largest US telephone operator after AT&T and Bell Atlantic/ NYNEX. Together, SBC and PacTel provide service to more than 30 million telephone lines in the US

The company in numbers:

* 1995 revenues: US$ 12.67 billion (1992 revenues: US$ 10.02 billion)
* Number of employees: 59 300 (1992: 59 500)
* Mainlines: 14 223 000
* Mobile subscribers: 3 659 500

Singapore Telecom — Singapore Telecom International Svenska AB

Country of origin: Singapore

Some basic facts:

* Singapore Telecom has through its international branch, Singapore Telecom International made investments in 15 countries since 1988
* The company has formed several strategic alliances and is operating services in telecommunications, cable television, and related areas
* Singapore Telecom is involved in China, Norway, Thailand, and Vietnam, among other countries
* Its Swedish subsidiary, Singapore Telecom International Svenska AB was formed in 1992, concentrating on providing cable TV services via StjärnTV
* The Swedish subsidiary holds a license to operate a telecommunications network in Sweden
* Singapore Telecom has ambitions to become the most important telecoms investor and operator in China

The company in numbers:

* 1995/96 revenues: US$ 3.999 billion (1994/95: US$ 3.5 billion)

Sirti S.p.A.

Country of origin: Italy

Some basic facts:

* This Milan based company is part of the STET holding, one of several state owned holding companies in the telecommunications area in Italy — IRI is the largest one
* Sirti's main business is network installation and maintenance, Telecom Italia being the main customer
* According to its advertising, Sirti is bringing telecommunications to the world from Italy
* Sirti does not have an operating license in Italy, Telecom Italia being the only company to be a fully fledged operator
* In 1998, the Italian market is supposed to be free for all

Sprint Corporation

Country of origin: USA

Some basic facts:

* Sprint's long distance division provides voice, video, and data services to nearly 8 million users
* Sprint operates the only 100% digital, fiber-optic network in the US
* Sprint North Supply is on of USA's largest wholesale distributors of voice, data, and teleconferencing equipment, and security and alarm systems. Another subsidiary publishes 325 telephone directories, having an annual circulation of more than 17 million in 20 states of the USA
* Sprint is, together with Deutsche Telekom and France Télécom, one of the partners of the consortium Global One — see above
* Sprint has formed a partnership with three of USA's largest cable companies: Tele-Communications Inc., Comcast Corporation, and Cox Communications, in order to provide personal communications service, PCS, to more than 182 million Americans
* In 1994, the company spun off its cellular and wireless division as a result of the new US telecommunications legislation
* On February 26, 1992, United Telecommunications, Inc. changed its name to Sprint. United Telecommunications was founded in 1899 in Kansas City

The company in numbers:

* 1995 revenues: US$ 12.765 billion (1994: US$ 11.98 billion; 1993: US$ 10.91; 1992: US$ 10.1 billion)
* Number of employees: 48 268 (1992: 43 400)
* Sprint provides local telephone service to 6.7 million customers in the US

STET, Società Finanziaria Per Azioni

Country of origin: Italy

Some basic facts:
* STET is the major holding company for telecommunications activities in Italy, majority-owned by the Italian state (53%)
* STET is the majority-owner of Telecom Italy, the so far only holder of an operating license in Italy
* STET has made major investments in Chile, Argentina, and Bolivia, and is one of the major operators in these countries
* STET has formed strategic alliances with Siemens and IBM

Some numbers:
* 1995 revenues: Lire 37 000 billion; (1994: Lire 33 752 billion; 1993: Lire 31 378 billion)

Swiss Telecom PTT

Country of origin: Switzerland

Some basic facts:
* In spite of Switzerland not being a member of the European Union, the country has agreed to join the liberalisation of the European telecommunications market by January 1, 1998
* Swiss Telecom bought a stake in the Czech carrier SPT in 1995
* In 1993, Swiss Telecom formed the Unisource consortium together with Swedish Telia and Dutch KPN — see Unisource

The company in numbers:
* 1995 revenues: Sfr 10.507 billion (= US$ 8.9 billion; 1994: SFr 9.748 billion; 1993: SFr 9.445 billion)
* Number of employees: 20 143
* Number of mainlines: 4 318 000
* Number of mobile subscribers: 447 167

Tele 1 Europe AB

* This start-up company has its headoffice in Stockholm, Sweden
* Tele1 holds an operating license for telephony in Sweden

Tele2 AB

Country of origin: Sweden

Some basic facts:
* Tele2 is a supplier of international and domestic telecommunications with Sweden as a base
* The company is owned by Swedish NetCom Systems AB (60.1%), which belongs to the Kinnevik industrial group, specialising in farming, packaging and packaging materials, TV & media, telecommunications, and financial operations, and by Cable & Wireless (39.9%)
* Tele2 has been present in the Swedish market since December 1985, having Comvik Skyport as its original base. In September 1990, the company was registered as Tele2 AB
* The NetCom group operates in the markets of GSM (via Comviq), Internet, fixed-line telecommunications, and cable-TV
* Tele2 is operating SwipNet, which offers Internet access to its users. It has a cooperative agreement with SNUS (Swedish Network User Society) for the use of SwipNet for external data transmission, file transmission, message handling, as well as data communication between UNIX computers and local networks
* See Comviq and NetCom above

The company in numbers:
* Revenues in 1995: SEK 937 million
* Number of Employees 1991: 70

Telecom Eireann

Country of origin: Ireland

The company in numbers:
* 1995 revenues: US$ 1.7 billion
* Number of employees: 12 025
* Number of mainlines: 1 320 000
* Number of mobile subscribers: 158 000

Telecom Finland

Country of origin: Finland

Some basic facts:

* The Finnish telecommunications market become open to competition in July 1994. t
  The major telecommunications operators in Finland are the private Telephone Companies group — see Finnet Group — and Telecom Finland Ltd. Telecom Finland is a limited company, owned to 100% by the Finnish state
* Telecom Finland is presently active in the following countries as well as in other parts of western Europe:
  - Estonia, Latvia, Lithuania
  - Sweden
  - Belgium
  - The Netherlands
  - Russia
* Telecom Finland has 55% of the total Finnish telecommunications market
* Telecom Finland holds operating licenses for GSM networks in Estonia, Latvia, Turkey, Hungary, and the St Petersburg area of Russia
* In Sweden, Telecom Finland has obtained a telephony operating license
* Telecom Finland and Telia have started large-scale fixed network construction in collaboration with Estonian Telecom
* Telecom Finland offers the full range of mobile communications services, basic telephone services, data and voice services for corporations, business services such as fax, conference, e-mail, Internet, and the TeleSampo market place, and advanced data networking via DataNet

The company in figures:

* 1995 revenues: FIM 5.7 billion (= US$ 1.3 billion)
* Number of employees: 7 067
* Number of mainlines: 786 700
* Number of mobile subscribers: 905 319

Telecom Italia

Country of origin: Italy

Some basic facts:
* Telecom Italia is owned by the Italian state via the holding company STET — see STET
* So far, Telecom Italia is the only company, holding an operating license in the country
* Telecom Italia is likely to join the global consortium Unisource, consisting of Swedish Telia, Swiss Telecom and Dutch KPN. Spanish Telefónica resigned from the same consortium in April 1997. See also Telia, Swiss Telecom, KPN, and Unisource

The company in figures:
* 1995 revenues: US$ 18.5 billion
* Number of employees: 90 222
* Number of mainlines: 24 854 000

Tele Danmark International

Country of origin: Denmark

Some basic facts:
* In 1994, Tele Denmark was privatised and is now owned to 51% by the Danish state. The remaining shares are held by approximately 60 000 private and institutional investors from all over the world. The company's shares are quoted on the Copenhagen Stock Exchange and the New York Stock Exchange
* The Danish telecommunications market became fully liberalised in 1996
* In December 1995, a consortium consisting of Tele Danmark, Ameritech, and Singapore Telecom became the strategic partner of Belgacom
* Tele Danmark belongs to two other consortia having obtained operating licenses for GSM systems in Poland and Lithuania
* In Sweden, Tele Danmark has formed Telenordia in partnership with BT and Telenor in order to offer domestic and international telecommunications services, primarlily to business customers

The company in figures:
* 1995 net revenues: DKK 18.846 billion (= US$ 3.4 billion; 1994: DKK 17.878 billion, 1993: DKK 16.293 billion; 1992: DKK 15.653 billion; 1991: DKK 15.251 billion)
* Number of employees: 16 476
* Number of mainlines: 3 203 000
* Number of mobile subscribers: 550 000

Telefónica de España

Country of origin: Spain

Some basic facts:

* Telefónica is a de facto monopoly, and Spain is still, largely speaking, a closed market in telecommunications, in spite of its scrambling to catch up with 1998 liberalisation
* Telefónica was founded in 1924 by ITT. In 1945, the Spanish government purchased a portion of the stock and gave Telefónica a monopoly status for domestic and international telephony services
* By the end of 1991, the Kingdom of Spain owned 33.69% of the stock in Telefónica, and still is the largest single owner. Other shareholders own no more than five percent
* The Spanish telecom network is the fifth largest in Europe with over 15 million installed lines (13.5 million in June 1992)
* In preparation of the 1992 World Exhibition in Sevilla, and the Olympic Games in Barcelona, ESP 130 billion was invested to modernise the telecom network
* Telefónica is offering its customers a number of services, like Internet-based "enREDados", a sort of cyberspace shop to make users learn more about communications; "TeleSpac!o", interactive shops where users can fill in their orders and have whatever goods they have asked for delivered at home
* Telefónica is an avid user of Internet and websites — InfoVía — for marketing
* Telefónica has been successful in its investments in Latin America. The company is involved in several joint ventures in for instance Chile, Peru, Venezuela, and Argentina
* On January 15, 1997, Telefónica signed an agreement to buy 35% of Brasilian Compañía Riograndense de Telecomunicaciones (CRT)
* Telefónica was a member of the global consortium Unisource together with Telia, Swiss Telecom, and KPN until April 1997, when the company announced that it was no longer a partner — see Unisource, Telia, Swiss Telecom, and KPN

The company in numbers:

* 1995 revenues: ESP 1 740.55 billion (= US$ 13.95 billion; 1994: ESP 1 578.85 billion; 1992: ESP 1 154 billion)
* Number of employees: 69 570 (1991: 74 437)
* Number of mainlines: 15 095 377
* Number of mobile subscribers: 928 955

Telenor

Country of origin: Norway

Some basic facts:
* Telenor is the state-owned Norwegian telecommunications monopoly
* It is the national distributor for Concert, the BT/MCI global telecommunications network
* Telenor is concentrating its foreign investments on mobile and satellite projects in Europe
* Telenor is a partner of the Swedish telecommunications company Telenordia together with BT and Tele Danmark

The company in figures:
* 1995 revenues: US$ 3.1 billion
* Number of employees: 18 480
* Number of mainlines: 2 431 271
* Number of mobile subscribers: 748 000

Telenordia —TBT Communication AB

Country of origin: Sweden

Some basic facts:
* Telenordia was introduced to the Swedish market on May 4, 1995
* The company is described as "a new Swedish telecoms operator and supplier of advanced voice and data communications services"
* Telenordia is owned jointly by British BT, Danish Tele Danmark, and Norwegian Telenor
* Telenordia sees its market as all companies with a need for national and/or international communications solutions. It offers, among other things, a seamless Nordic telecommunications market
* The Telenordia network is 100% digital
* Telenordia offers access to Concert, the global network and services of BT and MCI

The company in numbers:
* Number of employees in 1996: 250 (1995: 150)
* The company has three offices

Telia AB

(Televerket until July 1, 1993)

Country of origin: Sweden

Some basic facts:

* The Telia Group is made up of the parent company Telia AB and 27 wholly owned operating subsidiaries but a modern key player in the most liberalised market in Europe
* On July 1, 1993, Televerket changed its name to Telia AB in order to mark that it was no longer a state owned monopoly
* During 1992, Televerket was obligated by the Swedish government to pay a one-time sum of SEK 5 billion to the state treasury, as well as to buy out a state loan of SEK 2.2 billion
* In 1992, Sweden received its first regulatory authority in the National Post and Telecom Agency, PTS, and the previously free Swedish market became regulated
* In June 1992, Televerket together with Dutch KPN, founded a global consortium called Unisource
* In December 1992, an agreement was signed, together with Telecom Finland, involving the development of the Estonian telecom network. Telecom Finland and Telia own 49% of The Estonian Telephone Company
* In January 1993, together with the Swiss PTT Telecom, Unisource signed an agreement of intention that would expand Unisource to a joint-venture among the Dutch, Swiss and Swedish telecom operators. The objective was to be able to compete in the European and the international markets. In 1995, Spanish Telefónica joined the Unisource consortium — see Unisource below — and in April 1997, this company announced that it was no longer a partner of Unisource
* In 1995, Telia formed two new subsidiaries, Telia A/S in Denmark, and Telia Norge AS in Norway
* In May 1995, Telia acquired 94% of the shares of Stofa A/S, the second largest cable-TV company of Denmark, serving roughly 500 000 Danish households
* During 1995, Telia formed a special division for media and information services, Telia TeleRespons
* Swedtel is the international consulting company of the Telia Group
* Sweden being the world's most deregulated country when it comes to telecommunications, Telia is fighting competition with beneficial charges to its customers. Thus, Sweden continues to offer its telecommunications users among the lower telephone tariffs in the world. According to the OECD and EURODATA, Sweden has the sixth lowest telephone charges among the OECD countries. Only Norway, UK, Canada, Germany, and Turkey can offer lower charges — see OECD: *"Communications Outlook 1997"*

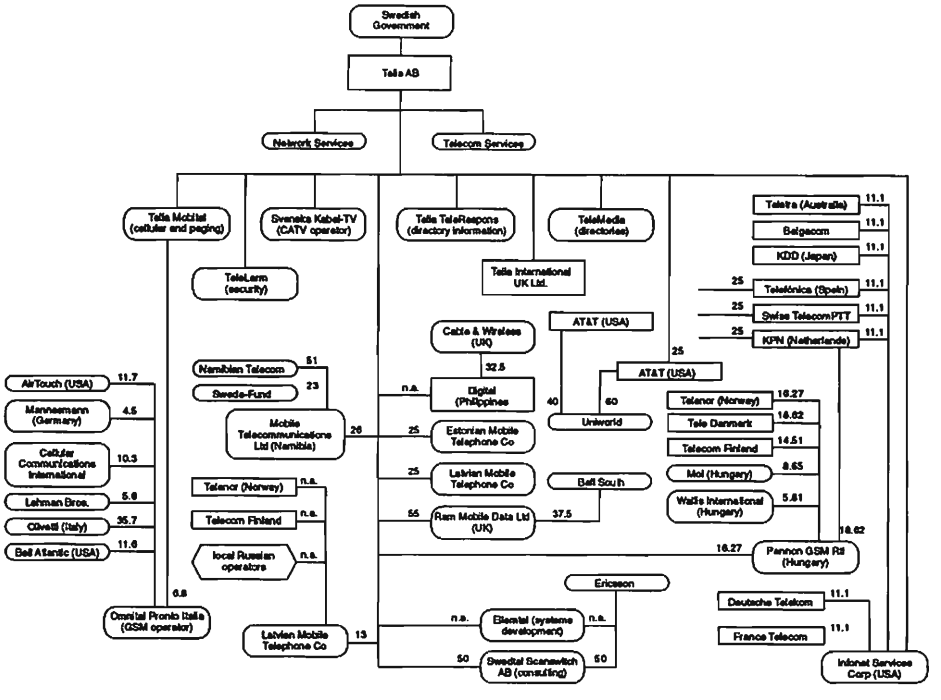


Fig. 225: The TeleGeography map of the Telia Group as it appears in "The TeleGeography 100, A Graphical Guide to the World's Leading Information Companies". Each company is mapped in a similar way. The map describes the situation as it was by the end of 1995.

Source: The TeleGeography 100, A Graphical Guide to the World's Leading Information Companies, 1966

The company in numbers:

* 1995 revenues of the Telia Group: SEK 41.06 billion (= US$ 5.8 billion; 1994: SEK 37.939 billion; 1992: 35 billion SEK)
* Number of employees: 33 065 (1992: 41 771)
* Number of mainlines: 6 013 000
* Number of mobile subscribers: 1 800 000
* R&D costs reached approximately SEK 1.2 billion, or 3.5% of revenues.
* By the end of 1996, Telia's fibre optical network covered 40 000 km. 5 000 km is added each year
* By the end of 1996, 96.1% of the more than 6 million Telia subscribers were connected to AXE switching stations, making so called PLUS-services available, for instance call forwarding, call waiting, three party call, call waiting tone, etc.
* By the beginning of 1997, Telia had invested SEK 86 billion in a state-of-the art network for the telecommunications Swedish users

Telstra Corporation, Ltd.

Country of origin: **Australia**

Some basic facts:

* Telstra is owned by the Australian government, but shares are beginning to be sold to outside investors as off early 1997
* Telstra is developing a broadband overlay network, FoxTel, in collaboration with News Corp.
* Telstra has 80% for the Australian long distance market
* Via Infonet Services Corp., based in USA, Telstra is collaborating with the Unisource consortium

The company in figures:

* 1995 revenues: US$ 11.3 billion
* Number of employees: 76 522
* Number of mainlines: 9 500 000
* Number of mobile subscribers: 3 100 000

Unisource

Country of origin: **The Netherlands**

Some basic facts:

* Unisource describes itself as "the first truly pan-European telecom company, providing telecommunication services to European corporations and individuals at work, on the move, or at home". "One contact, one contract" is the explicit business idea *(according to the Internet homepage)*
* Unisource is owned by Swedish Telia, Dutch PTT Telecom Netherlands, Swiss Telecom PTT, and Spanish Telefónica
* Unisource is made up by corporate headquarters in Hoofddorp, Netherlands, and the following subsidiaries:
  - Unisource Business Neyworks
  - Unisource Satellite Services
  - Unisource Mobile
  - Unisource Card Services
  - Unisource Carrier Services
  - Unisource Information Services
* Unisource has signed distributor agreements with the following telecom providers:
  - Telia for Sweden, Denmark, Norway, the Baltic states
  - PTT Telecom Netherlands for the Netherlands
  - Swiss Telecom PTT for Switzerland
  - Telefónica for Spain
  - SIRIS for France
  - CNI, Communications Network International, for Germany
  - AT&T for UK
  - Helsinki Telephone Company for Finland
  - Unisource Business Networks Belgium for Belgium
  - Unisource Business Networks Italia SpA for Italy
* Unisource has close collaboration with AT&T, manifested by the formation of the company AT&T-Unisource Communication Services, having 450 employees, also based in the Netherlands
* Unisource is one of the partners in the global alliance WorldPartners, owned by American AT&T, Japanese KDD, Singapore Telecom, and Unisource
* Unisource was founded in 1992
* In April 1997, Telefónica announced that the company is leaving Unisource

The company in numbers:

* 1995 revenue: NGL 1.3 billion
* 1995 investments: NGL 326 million
* Number of employees: 2 229

US West, Inc.

Country of origin: USA

Some basic facts:

* US West covers US 14 states and thereby the largest land mass of the seven Regional Bell Operating Companies, providing telecommunications services to 25 million customers
* US WEST Media Group is a leading media company, operating domestic and international cable television and wireless telecommunications networks, publishing directories, and developing and marketing interactive multimedia services
* In February, 1996, the US WEST Media Group announced a merger with Continental Cablevision
* In May 1993, US West and Time Warner Entertainment (1995 revenues: US$ 17.7 billion) announced an alliance to provide information services, entertainment, and telephone service over the Time Warner cable systems

The company in numbers:

* 1995 revenues: US$ 11.7 billion (1994: US$ 10.95 billion; 1992: US$ 10.3 billion)
* **Number of employees: 61 047 (1992: 63 700)**
* Number of mainlines: 14 847 000

10.4. Selected Suppliers

Alcatel Alsthom Compagnie Générale d'Electricité

Country of origin: France

Some basic facts:

* The Alcatel Group is a world-wide supplier of high tech systems in telecommunications, electronics, and electro-mechanics
* Alcatel was founded by the merger of French CGE and American ITT in 1986. The company is 100% owned by French Alcatel Alsthom
* The Alcatel Group conducts its business through the following sectors:
  - telecommunications
  - cable
  - systems
  - GEC Alsthom, combining energy and transport
  - batteries
* Alacatel Telecommunications has, in collaboration with its partners, operations in 125 countries, manufacturing digital switches, transmission systems, broadband products, access products, and mobile communications systems
* In 1991, Alcatel invested ECU 1.8 billion in R&D
* In July 1991, Alcatel purchased Rockwell International's Network Transmission System Division. This made Alcatel, after AT&T, the second largest supplier in the US
* In 1994, Alcatel acquired STC Submarine Systems, which made Alcatel the world's leading provider of undersea fiber optic bable systems. Demands are booming
* The European market has shrunk, but the company has built a strong presence in the Far East, in particular in China, where Alcatel presently shows an annual growth of 30%

The company in numbers:

* 1995 revenues: Ffr 67.724 billion (= US$ 13.6 billion)
* Number of employees: 95 000 (1992: 125 782)
* Alcatel Telecom answered for 46.5% of the total turnover in 1994

Bosch

Country of origin: Germany

Areas of operation:

* The company was founded in 1886
* The Bosch Group is well-known for their electronic automotive systems
* In 1995, the group restructured and formed Bosch Telecom, including Telenorma and ANT Nachrichtentechnik GmbH
* Bosch Telecom has three divisions, each one dominated by at least one previously independent company:
  - For public communication, based on ANT Nachrichtentechnik GmbH
  - For private communication, based on Telenorma GmbH and J S Télécom
  - For mobile communication, based on Blaupunkt-Werke GmbH
* Germany is the Bosch-group's home market. Telenorma GmbH was Germany's second largest telecommunications company after Siemens. It is the third largest in Europe after Alcatel and Siemens
* Nearly 90% of the company's sales are generated in the home market
* Bosch has, through purchases of telecommunications companies such as Telenorma Telefonbau, Normalzeit Lehner & Co., ANT Nachrichtentechnik GmbH, Blaupunkt-Werke GmbH and Jeumont Schneider Télécommunication (J S Télécom SA) firmly established itself in the German telecom market as Bosch Telecom

The company in numbers:

* Revenues in 1995: US$ 21 billion (1992 revenues: DM 34.4 billion)
* Number of employees 1992: 169 804
* Bosch Telecom has 21 000 employees, and annual revenues of DM 5.3 billion

Ericsson

Country of origin: Sweden

Some basic facts:

* The parent company is called Telefonaktiebolaget LM Ericsson
* Ericsson is active in more than 100 countries
* Ericsson has 40% of the global cellular market and is the world leader in digital mobile communications
* For 1995, the company reported the following figures per division:
  - Radio communications, SEK 56.4 billion (1994: SEK 40.9 billion)
  - Public telecommunications, SEK 27.2 billion (1994: SEK 25.9 billion)
  - Business networks, SEK 14 billion (1994: SEK 13.5 billion)
  - Components, SEK 7.7 billion (1994: SEK 6.3 billion)
  - Microwave systems, SEK 3.7 billion (1994: SEK 2.9 billion)
* With 60% of revenues, Europe is the largest geographical market, with Sweden respresenting 13%
* The USA and Canada generate about the same revenues as Latin America, with 12% and 11% of sales respectively
* AXE systems are found in 101 countries, both for fixed and mobile networks;
* Ericsson's mobile telephone systems have over six million users in 48 countries, equivalent to 40% of the world market
* A number of former Eastern Block countries have signed agreements with Ericsson to supply mobile telephone networks — Slovenia, Romania, Hungary and Poland, to name a few
* In Japan, Ericsson acts through Ericsson Toshiba Telecommunications Systems K.K.

The company in numbers:

* Net sales 1995: SEK 98.780 billion (1994: SEK 82.554 billion; 1992 sales: SEK 47 billion)
* Number of employees: some 90 000 (1992: 66 232)
* Fully or partly owned subsidiaries in 64 countries
* In 1992, investments in R&D went up to SEK 7.377 billion, or the equivalent of 16% of net sales

GEC Plessey Telecommunications (GPT)

Country of origin: Great Britain

Some basic facts:

* The main business area is the manufacture of public and private switches, PABX's, package switches and transmission equipment
* Manufactures private switching system ISDX and i-SLX
* More than 40 telecom operators use GPT's pay telephones for coins, credit and charge cards
* Four major business areas:
  - Telecommunication systems (switches)
  - Transmission
  - Business systems
  - International services

The company in numbers:

* 1994 revenues: US$ 1.7 billion
* Number of employees 1992: 156 000

Italtel spa

Country of origin: Italy

Some basic facts:

* Italtel spa was formed in January 1996 through the merger of Italtel of the STET group and Siemens Telecommunicazioni, Italian subsidiary of Siemens
* In 1996, the company forecasts the following percentual distribution of sales per operating sector, forecasting total sales to ITL 3 742 billion:
  - Public switching = 35%
  - Network systems and services = 13%
  - Mobile radio = 26%
  - Transmission and radio = 26%
* For 1996, export share is forecast to 43%
* "Old" Italtel had six main business areas:
  - Societá Italiana Telcommunicazioni (SIT) - network services
  - Telematica - telecom and computer communications services
  - Sistemi - systems
  - Tecnoelettronica - electronics
  - Tecnomeccanica - mechanics
  - Telesis
* Italtel has operations in some 40 countries

The company in numbers:

* 1995 revenues: ITL 3 710 billion (1994: ITL 3 290 billion; 1992 revenues: ITL 2,973 billion)
* Number of employees by the end of 1996: 16 599 (1992: 16 517)
* Italtel has worked together with AT&T since 1989, providing Italtel access to Bell Laboratories. The agreement has resulted in a marketing company for AT&T and Italtel's products.

Motorola

Country of origin: USA

Some basic facts:

* Morotrola has two major businesses, both being key parts of the networked economy:
  - computers
  - mobile telephony
* Operations are divided into three main sectors, and four self-supporting groups:
  - Land Mobile Products Sector with two-way radios and electronic communications systems
  - Semiconductor Products Sector with semiconductors, integrated circuits, and microprocessors as well as microcomputers
  - General Systems Sector includes mobile telephony, land mobile radio, microcomputer boards, and information processing equipment
  - Paging and Telepoint Systems Group
  - Information Systems Group
  - Government Electronics Group
  - Automotive and Industrial Electronics Group
* Motorola is the second largest producer of microprocessors in the US
* One of the world's leading suppliers of terminals for wireless services — pagers, cellular telephones
* Motorola is the prime mover behind the Iridium project, aiming at offering global wireless communications via 66 low earth orbit satellites by 1998
* In Japan, Motorola owns Nippon Motorola Ltd, established in 1975

The company in numbers:

* 1995 revenues: US$ 27.04 billion (1994: US$ 22.25 billion; 1992: US$ 13.3 billion)
* Number of employees: 142 000 (1994: 132 000; 1992: 107 000)
* Operations in 34 countries
* Approximately 8% of net sales is invested in R&D, distributed among eight centers for advanced research
* The Nordic countries, with 700 employees, are corresponding to approximately 8% of European sales

NEC

Country of origin: Japan

Some basic facts:

* NEC strives to advance societies worldwide through "C&C"
* The company has four main business areas:
  - Communications systems and equipment are equivalent to 26% of the total sales, with products such as electronic and digital telephones, videotelephones, fax, CATV-systems, teleconference systems and fiber optic communications systems
  - Computers and industrial electronic systems are the largest business area, with 43% of sales from products such as super, mini and personal computers, as well as software
  - Electronic equipment includes integrated circuits, microprocessors and transistors, and is responsible for 22% of total sales
  - Home electronics includes TV's, video equipment, CD players, and kitchen appliances, with 7% of NEC's sales
* Domestic sales account for 75%, international sales, 25%
* NTT purchased a third of their digital switches, digital transmission systems and fiber optical hardware from NEC
* In March 1996, the Trans-Siberian Microwave Communications Network, stretching from Moscow to Khabarovsk, was inaugurated, NEC being a major contributor of SDH systems
* NEC is running PHS trials in China
* NEC has 15 subsidiaries and offices in Europe, including Sweden
* NEC markets and manufactures in Europe in four sectors:
  - Semiconductors: DRAM, ASIC
  - Home electronics: video equipment
  - Microwave and satellite communications systems
  - Communications equipment: fax, mobile radio

The company in numbers:

* 1996 revenues: ¥ 4 397 billion (1995 : ¥ 3 769.39 billion; 1994: ¥ 3 579.79 billion; 1993: ¥ 3 514:98 billion; 1992: ¥ 3 514 billion)
* Number of employees: 152 716 (1995: 151 069; 1994: 147 910; 1992: 117 994;
* NEC has 78 factories, 51 subsidiaries/branches and 375 offices in the world
* NEC invests approximately 16% of annual sales in R&D

Nokia Corporation

Country of origin: Finland

Some basic facts:

* Nokia was formed in 1865, over its century of operations developing into a diversified industrial conglomerate
* Today, Nokia is concentrating on two business areas, mobile telephones, and telecommunications called:
  - Nokia Mobile Phones, 1996 net sales of Fmk 21.6 billion, generated by 11 300 employees
  - Nokia Telecommunications, 1996 net sales of Fmk 13.3 billion, generated by 13 500 employees
* In 1991, mobile telephones made up 16% of total revenues, in 1995 it was 44%
* Telecommunications are responsible for 28% of 1995 revenues
* Nokia claims to have 20% of the global market for handsets
* Nokia has formed a joint venture with Mitsui & Co., Ltd. in Japan since August 1993 — Nokia Mobile Phones (Japan) K.K.

The company in numbers:

* 1996 revenues: Fmk 39.3 billion (1995: Fmk 36.81 billion ; 1994: Fmk 30.18 billion)
* Number of employees: 31 000 in 45 countries

Northern Telecom

Country of origin: Canada

Some basic facts:

* Northern Telecom, Nortel, was founded in 1882 as the equipment supplier to Bell Canada
* Bell Canada Enterprises Inc., a holding company for Bell Canada, owns 52.1% of Northern Telecom
* The company operates in four global business areas:
  - broadband networks
  - enterprise networks
  - public carrier networks
  - wireless networks
* Northern Telecom has an installed base of over 50 million lines in more than 60 countries
* In February 1996, Nortel consolidated all its R&D resources under the Nortel name. It created Nortel Technology as an umbrella group for advanced design research
* The international market for future growth includes Australia, France, Japan, New Zealand, Germany, Great Britain and Eastern Europe
* Manufactures PABX-switches, System A345 and System M345 for Telia

The company in numbers:

* 1996 revenues: US$ 12.85 billion (1995: US$ 10.67 billion; 1992: US$ 8.4 billion)
* Number of employees: 68 000 (1992: 57 955)
* In 1988, Northern Telecom invested 13.1% of total revenues in R&D;
* At the end of 1992, Northern Telecom had invested a billion dollars on the development of standards for synchronous optical networks (SONET).

Philips Electronics NV

Country of origin: The Netherlands

Some basic facts:

* Since 1987, Philips has been going through an extensive restructuring, which has led to the sale or divestment of a number of previous businesses
* Philips is the world's third largest electronics manufacturer
* The company concentrated on communications and chips for next-generation electronics like interactive television, while competitiors were busy making memory and microprocessors. Philips' semiconductor division is the fastest growing segment of the company
* PolyGram, one of the world's three largest record companies, belongs to Philips, and is making inroads in the global entertainment industry
* Philips has a dominant position in the Dutch market
* The company has a strong position, approximately 40%, in the European consumer electronics market
* Philips has subsidiaries in over 60 countries, including 17 in Europe.

The company in numbers:

* 1996 revenues: NGL 69.2 billion (1995: NLG 64.462 billion; 1994: NLG 60.977 billion; 1992: NLG 58.5 billion)
* Number of employees: 262 500 (1995: 250 600; 1992: 252 200)
* In 1994, NLG 2.0 billion, 6.1% of revenues, was generated by telecom

Siemens AG

Country of origin: Germany

Some basic facts:

* 17 business segments, including semiconductors, passive components and electronic tubing, transportation systems, public communications networks and private communications systems, generate total sales of almost DM 95 billion annually
* The most well known telecom products are EWSD switches with installations in some 40 countries, Hicom PABX, EWSP packet switches and Transdata 960 communications computer systems
* International sales account for approximately 55% of the total revenues, Germany for about 45%
* Siemens Stromberg-Carlson accounts for 5% of the American public switching market
* Through corporate acquisitions, Siemens has become the third largest supplier of public networks in North America, after AT&T and Northern Telecom
* Well-established in Eastern Europe for a long time, Siemens is provided with a strong base for growth

The company in numbers:

* 1996 revenues: DM 94.18 billion (1995: DM 88.76 billion; 1994: DM 84.598 billion; 1993: 81.648 billion; 1992: DM 78.5 billion)
* Number of employees 379 000 (1995: 371 420; 1992: 413 000

10.5. Do You Know This About the Telecom Operators and the IST Manufacturers?

*** AT&T Is Investing in New Telecom Network**

ATA& is investing in a telecommunications network which will cover nine out of ten American households. In 1997, the operator is investing some US$ 10 billion in its new network, in order to take up competition with the Baby Bells and GTE in the local telephony market, which has an annual value of some US$ 100 billion.
Source: Telecom idag, #2, 1997

*** The European Commission Accepts BT-MCI Alliance Concert**

In May 1997, the European Commission announced that it has accepted the alliance between BT of the UK and MCI of the USA. Thus Concert is a reality. One condition is that the companies must let go of any business resulting in too much control over Transatlantic telecommunications and teleconferencing in the UK. Concert will have an annual turnover of some 310 billion SEK.
Source: Computer Sweden, May 20, 1997

*** China Telecom Makes Deal about Hongkong with C&W**

The state owned China Telecom has agreed with the British # 2, Cable & Wireless, of which Hongkong Telecom is a subsidiary, to take over 30% of the shares in Hongkong Telecom. A new company — China Telecom (Hongkong) will be formed, owned by China Telecom and C&W. This will give the British compay a very good position in the Chinese market, where only 6 households out of 100 have a telephone subscription.
Source: Svenska Dagbladet, June 10 1997

*** France Télécom Sold Out by the French Government in May 1997**

On May 6, 1997, the French government started the privatising of its fully owned telecommunications operator, France Télécom, by selling out shares at a value of between 40 billion and 66 billion FFr. France Télécom is the last of the large telecom operators within the EU to go to market.
Source: Dagens IT, April 2, 1997

*** Nokia Believes in the Growth of Data Communications**

The next big step for the mobile telecommunications opertors is to hook the mobile phone to the Internet. According to Nokia's president, 20 — 30% of the operators' turnover will be generated by data communications in the future. The firm's solution for linking GSM and the Internet is called Artus.
Source: Dagens Nyheter, May 29 1997

*** Philips Merges with Lucent Technology**

By October 1997, the Dutch consumer electronics firm Philips merges with American Lucent Technologies. A new company called Philips Consumer Communications is formed, and has the digital mobile telephony market as their main focus.
Source: Svenska Dagbladet, June 19, 1997

*** Telia, KPN, and Telecom Eireann Start in Ireland**

Swedish Telia, Dutch KPN, and Irish Telecom Eireann started a new telecommunications service company in Ireland on June 1, 1997. Accuris, as the new company is called, is competing with other European telecom operators in the Irish market.
Source: Datateknik # 11, June 12, 1997

*** TELiT Invests 300 Million SEK in Northern Sweden**

A relative newcomer to the Swedish telecom market, TELiT AB, owned by American Galesi Telecom International, has planned to invest 300 million SEK in the Swedish cities of Sollefteå and Söderhamn, located in northern Sweden. The company invests in tele- and datacommunications. The Swedish government has given the company different regional grants to a value of 60 million SEK. The company is supposed to generate some 226 new jobs. TELiT AB holds an operating license for telephony services.
Source: Computer Sweden # 13, December 15, 1995

*** Unisource Creates Largest Telecom Network in Europe**

The three Unisource partners, Dutch KPN, Swiss Telecom, and Swedish Telia are creating the largest single telecom network in Europe when they merge their international networks by the beginning of 1998. International calls, data communications, and Internet-services are offered to multinational clients via the operator Unisource Carrier, UCS, based in Zürich, Switzerland. 25 European metropols will be covered, and the company will turn some US$ 2 billion annually. AT&T is also a partner in the Unisource alliance, which now is competing head on with the Concert and Global One alliances.
Sources: Dagens Nyheter, June 5, 1997/Svenska Dagbladet, June 5, 1997

11. Organisations and Acronyms

There are many sources to the information collected in this chapter, so many that it is only possible to mention a few. An interesting one for computing terms in general, but not necessarily for acronyms, is "A Glossary of Computing Terms", edited by the British Computer Society. Another one is "Networking Glossary", compiled by N.E.T. Network Equipment Technology of Redwood City, California. Magazines, annual reports, technical reports and articles, and even dailies often contain lists of acronyms important to the subject they are treating. So, the sources are many, it is just a matter of compiling the acronyms...

11.1. Swedish Organisations

Cert is a Swedish organisation having the charter to disseminate information about security questions and issuing warnings for attacks from hackers. The idea is to create security for the Internet users;

Dataföreningen i Sverige (The Swedish Computer Association), is a professional association for people working with computers;

Edis, Svenska EDI-föreningen, the Swedish EDI association;

IMT, Institutet för Mediateknik, the National Institute for Media Technology;

Informationstekniska standardiseringen arbetsgrupp 12, ITS/AG12, is a Swedish organisation responsible for the standardisation Swedish E-mail addresses. The group is made up of representatives of the following organisations: Post- och telestyrelsen (PTS), Patent- och registreringsverket (PRV), Statskontoret, ITS, Nätanvändargruppen SNUS, Stockholms universitets SUNET, Telia, Tele 2, Telenordia, and IBM;

ISOC-SE, Internet Society i Sverige, is the Swedish bransch of the Internet Society, collaborating with Swedish standardisation organisations and national legislative authorities;

IT-Delegationen is a government committee, charged with councelling the government members on ICT related questions;

IVA, Ingenjörsvetenskapsakademien, The Royal Academy of the Engineering Sciences, initiates, supports, and sponsors a large number of program for all engineering sciences, including ICT;

KFB, Kommunikationsforskningsberedningen, the Swedish Transport & Communications Research Board, is a central government authority, whose task it is to plan, initiate, coordinate, and support research, development and demonstration projects, by allocating funding in the following areas of research:

* strategic communications research
* telematics/information technology
* physical transports
* vehicles and fuel;

MTL, MobilTeleLeverantörerna, is the Swedish organisation for mobile telephony suppliers;

NUTEK, Närings- och teknikutvecklingsverket, is a government agency, charged with responsibility for the development of technology knowhow in Sweden, by collaborative efforts between Swedish enterprises, universities, and other research organisations;

PROMIS, Svenska Multimediaproducenter, an organisation for multimedia producers specializing in such legal matters as the right to information, copyright etc. The organisation is also involved in standardising the Swedish terminology and nomenclature for the industry;

PTS, Post och Telestyrelsen, is the central authority for regulation regarding post, tele, and radio communication. Among other things, PTS distributes radio frequencies, and is responsible for telephone number plans in Sweden. According to the government's proposition to the parliament of March 12, 1997, PTS will be the agency responsible for the adherence of all partners to the Swedish telecommunications law;

Radio- och TV-verket is the Swedish supervisory board for radio and television broadcasting;

SCB, Statistiska Centralbyrån, Statistics Sweden, is a public organisation in charge of public Swedish statistics;

SEIS, Säkrad Elektronisk Information i Samhället (Secured Electronic Information in Society), is an organisation, constituted in March, 1995, open to public agencies and private enterprises, interested in ICT security;

SEK, Svenska Elektriska Kommissionen, The Swedish electric standards institute, is representing Sweden in the European standardisation organisation CENELEC;

SICS, Swedish Institute of Computer Science, is a research organisation dedicated to technical research programmes in the field of information technology. Multimedia, broad band communication, and virtual reality, are examples of the research areas. SICS is a bridge organisation between academic reseach and industry research;

SIMBA, Stiftelsen insamling av miljöfarliga batterier, is an industry organisation for the recycling of batteries used by the ICT industry and by ICT users;

SIKA, Statens Institut för Kommunikationsanalys, The State Institute for Communications Analysis, is a government agency, responsible for official statistics and analysis of communications in the wide sense, including transportation of people, goods, and bits;

SITI, is the Swedish association of telecom and IT industries;

SIS, Standardiseringskommissionen i Sverige, is the Swedish standardisation commission, representing Sweden in ISO and CEN. SIS has nine industry related subcommittees. One such sub-committee is SIS-ITS — see separate entry;

SIS-ITS, Standardiseringskommissionen i Sverige — Informationstekniska standardiseringen, (ITS) is the special subcommittee of the Swedish standardisation commission, handling all questions related to IT and telecommunications standardisation;

SISU, Svenska Institutet för Systemutveckling, is a Swedish industry association for research and development of system development;

SITO, Svenska IT-företagens organisation, is a Swedish organisation for IT businesses. Formerly, it was called LKD;

SRL, Sveriges radio- och hemelektroniklevernatörer, is an organisation for suppliers of home electronics;

Statskontoret is a government agency, charged with the task of rationalising and coordinating all public administration in Sweden. Among other things, Statskontoret scrutinizes and accredits suppliers to the public services, and regularly issues lists of accepted suppliers;

Svensk Programvaruindustri, The Swedish Association of Software Industry, has some 65 member companies, looking after the interests of Swedish software manufacturers;

Svenska Kabel-TV föreningen is an association for cable TV suppliers to the Swedish market;

Sveriges Tekniska Attacheer, STATT, is the Swedish Office of Science and Technology, an organisation with offices in nine OECD countries, among other things reporting on new technological developments in these countries to the Swedish public;

SWEDAC, Styrelsen för teknisk ackreditering i Sverige, issues accreditation to testing laboratories and certification organisations in Sweden;

SWIRA, The Swedish International Robot Association, is an organisation for industrial robot users.

VIS, Videotexföreningen i Sverige, is a national association of information providers for the videotex medium;

11.2. National and International Organisations

ACT, Association of Commercial Television;

ACTE is the EU committee for telecommunication connection standards, issuing the Common Technical Regulations, **CTR**, i.e. European telecommunications standards;

AIG, Arabian Interest Group, is the Arab regional organisation for GSM network operators within GSMMoU. Early 1995, 14 network operators and 11 countries were members;

AIPA, The Authority for Information Technology in the Public Administration, is part of the Italian Prime minister's office. It is responsible for technical standards, procurement, and coordination of national Italian IT programs;

AIPLA, the American Intellectual Property Law Association;

ANSI, American National Standards Institute, is responsible for the development of U.S. standards for transmission codes, protocols, media, and high level languages;

APIG, Asia Pacific Interest Group, is the Asian and Pacific regional organisation for GSM network operators within GSMMoU. Early 1995, the organisation had 45 network operators and 22 countries as members;

ASTM, the American Society for Testing of Material;

ATM Forum is an industry organisation with 450 members, having as objectives to speed up the development, standardisation, and deployment of ATM products;

BOC, Bell Operating Company, is one of 22 local telephone companies spun off from AT&T as a result of the American divestiture. They are organised into seven Bell RHCs, known as RBOCs;

BSA, Business Software Association, is a group of software providers fighting software piracy in any form;

CIIBA, Comité Interministeriel de l'Informatique et de la Bureautique dans l'Administration, covers information technology in central ministries in France;

CICCP, Committee for Information, Computer and Communications Policy, is the OECD organ, responsible for telecommunications and information technology. The committee publishes regularly *"The Communications Outlook"* and *"The Information Technology Outlook" ;*

CCIR, Comité Consultatif International des Radiocommunications, is the advisory committee of the ITU for radio related questions;

CCITT, Comité Consultatif International Télégraphique et Téléphonique, in English International Consultative Committee for Telegraph and Telephone, since 1993 the standardisation organisation of ITU-TE. CCITT was recently renamed the **Telecommunications Standardisation Sector, TSS.** It defines technical standards for all internationally controlled aspects of analog and digital communications. Some well known CCITT standards are X.21, X.25, etc. CCITT/TSS standards are often equivalent to ISO standards;

CCTA, Central Computer and Telecommunications Agency, is the United Kingdom's authority for information technology in the public administration;

CCTS, Comité de Coordination des Télécommunications par Satellites, is handling questions regarding telecommunications via satellite within CEPT;

CECD, Confédération Européenne du Commerce de Detail, is the European organisation for retailers;

CEN, Comité Européen de Normalisation, is the European standardisation organ, responsible for the European Norms, **EN;**

CEPT, Conference Européenne des Administrations des Postes et des Télécommunications, is the European association of PPTs;

CEST, Centre for Exploitation of Science and Technology, is the British organ for promoting – science and technology;

CLTA, Comité de Liaison des Télécommunications Transatlantiques, is the CEPT committee handling transatlantic telecommunications;

COS, Corporation for Open Systems, is a consortium established for conformance testing, certification, and promotion of OSI products;

Cose, Common Open Software Enviromnent, was formed in 1993 by UNIX suppliers;

COSINE, Cooperation for Open Systems Interconnection Networking in Europe, is the European collaborative organ for OSI;

CSAIG, Central and Southern African Interest Group, is one of the African regional organisations for GSM network operators within GSMMoU. Early 1995, 11 operators and 9 countries belonged to the organisation;

CSI, Consejo Superior de Informatica, is a political body in control of coordination of computerisation in the public administration in Spain. It has an executive body called **CIABSI, Comisión Interministerial de Aquisición de Bienes y Servicios Informáticos;**

DSTI, Directorate for Science, Technology and Industry, is a group within OECD;

DTI, Department of Trade and Industry, U.K.;

EBU, Eutopean Broadcasting Union;

ECCA, European Cable Communications Association, is among other things working out a common European standard for top boxes for digital television;

ECE, European Electronic Commerce, is a new umbrella organisation for associations and companies involved with electronic trading;

ECMA, European Computer Manufacturers' Association;

ECITC, European Committee for IT and Telecom Testing and Certification;

EEIG, European Economic Interest Grouping;

EFTA, European Free Trade Association;

EIA, Electronic Industries' Association, is a national trade organisation in Washington D.C., set up to promote domestic electronics. More than 1 000 U.S. electronic manufacturers are members;

EIG, European Interest Group, is the regional, European organisation for GSM network operators within GSMMoU. Early 1995, 67 operators and 34 countries were represented;

EITO, European Information Technology Observatory;

EIUF, European ISDN Users Foundation;

EMUG, European MAP — Manufacturing Automation Protocol — Users' Group;

EOTC, European Organisation for Testing and Certification;

ETNO, European Public Telecommunications Network Operations Association, is the European telecom operators' industry association;

ETSI, European Telecommunications Standard Institute, is the European standardisation organ, having some 300 members, among those the Swedish standardisation institute, SIS-ITS;

EURESCOM, European Institute for Research and Strategic Studies in Telecommunications, is the institute for research and development of the European telecom operators;

EUROBIT, European Association of Business Machines and Information Technology Industry Organisation is an association of European IT industry organisations;

EUROSAT is a European association of 26 countries for transmitting telecom and TV signals via satellite. It also contributes to the commercial development of the European space industry;

EUSIDIC, European Association of Information Services;

Eutelsat, European Telecommunications Satellite Organisation;

EWOS, European Workshop for Open Systems;

FCC, Federal Communications Commission, is a U.S. federal agency that licenses and controls standards for all forms of radio and electromagnetic transmissions;

FEWITA, Federation of European Wholesale and International Trade Association;

Frame Relay Forum is an American organisation for frame relay equipment vendors and service providers;

GSMMoU Association is the global association for GSM operators, having its headquarters in Geneva, Switzerland. GSMMoU is divided into regional organisations and several expert groups;

ICA, International Communications Association, is an interest organisation for anyone involved in **CPE**, Customers Premises Equipment;
ICC, International Chamber of Commerce;
IEC, International Electronical Commission;

IEEE, Institute of Electrical and Electronic Engineers, is an American group involved in recommending standards for the computer and communications industries;

IEPRC, International Electronic Publishing Research Centre;

IETF, Internet Engineering Task Force, is looking after the .com-addresses on the Net, among other things;

INMARSAT is organising communication between ships at sea;

INTELSAT is looking after intercontinental telecommunications via satellite;

InterNIC, the central Internet clearing organisation;

INTUG, International Telecommunications Users' Group, is a European users' organisation;

IRDA, Infrared Data Association;

ISO, International Standard Organisation, is the organisation issuing tele and data communication standards according to the OSI model;

ISPO, the Information Society Project Office, is an agency of the European Commission, responsible for, among other things, dissemination of information about IS and IST technology;

ITI, Information Technology Indutry Council, is an American organisation for ICT groups;

ITU, The International Telecommunications Union;

JEIDA, Japan Electronic Industry Development Assosiation, a Japanese industrial organisation;

JESSI, Joint European Sub-micron Silicon Initiative, is a project within EUREKA, created in order to support European manufacturing of advanced integrated circuits;

KBSt, Koordinierungs- und Beratungsstelle der Bundesregierung für Informationstechnik in der Bundesverwaltung, is the Federal Government agency for ICT in Germany;

MEDIX, Medical Data Interchange Committee;

MSAF, Multimedia Services Affiliate Forum, is a group of leading IT, software, and telecommunications companies, working on the future development of Wide-Area Networking (WAN) and Internet applications;

NAIG, North American Interest Group, is the north American regional organisation for GSM network operators within GSMMoU. Early 1995, 1 network operator and 1 country were members;

NATA, North American Telecommunications Association;

NCUG, National Centrex Users Group, in an American organisation for Centrex users;

NEMA, National Electrical Manufacturers' Association, is an American industry organisation;

NIST, National Institute of Standards and Technology, is what the former American National Bureau of Standards is called today;

The **Nordic Radio Society** is dealing with radio communication systems adapted to mobile telephony, among other things;

NORDTEL is an industry association for the Nordic telecom operators;

OECD, Organisation for Economic Co-operation and Development, was formed in Paris in December, 1960, in order to promote policies designed for its member countries to achieve the highest sustainable economic growth and employment; to contribute to sound economic expansion; and to contribute to the expansion of world trade. Member countries are: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxemburg, Mexico, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States;

OFTEL, Office of Telecommunications, is a British government agency responsible for telecommunications and IT;

OMG, Object Management Group, is developing standards for distributed object management architecture;

OSF, Open Software Foundation;

PCCA, Portable Computer and Communications Association, is an industry association, aiming at developing standardised interfaces for mobile communications;

PCMCIA, Personal Computer Memory Card Industry Association, is an industry standard organisation for manufacturers of cards to PCs, PDAs, PDPs, etc.;

PTO, Public Telephone Organisation, is a governmental organisation serving as the common telephone provider in European countries, formerly known as PTT. Most European operators are PTOs;

PTTs, Post, Telephone, and Telegraph Operators, often publicly owned. The Western European former PTTs are being privatised by EU decree;

PUC, Public Utilities Commission, is a U.S. state regulatory agency that decides telephone tariffs in each of the states of U.S.;

RARE, Reseaux Associés pour la Recherche Européenne, is the united networks for research and development in Europe;

RBOC, Regional Bell Operating Company, see BOCs;

SOGT, Senior Officials Group on Telecommunications;

SPA, The Software Producers' Association;

SWIFT, The Society for Worldwide Interbank Financial Telecommunications, is a global user organisation for finacial institutions, having as one of its objectives to create and support standards for international, electronic transmission of financial information;

The Advanced Digital Audio Committee keeps an eye on the developments of the various audio standards for hi-fi recordings, such as AC-3, developed by Dolby Laboratories, USA; and MPEG Musicam, developed by European companies like Philips;

TCA, Tele-Communications Association, is a U.S.-based organisation;

TSS, Telecommunications Standardization Sector, see CCITT above;

UNCITRAL, United Nations Commission on International Trade Law;

USITA, United States Independent Telephone Association;

USTA, United States Telephone Assocation;

VESA, Video Equipment Standards Association;

VISUAL, Vendor Independent Software Users Associates Ltd. is a British forum for independent software manufacturers;

WIPO, World Intellectual Property Organisation, is a UN organ responsible for the development of legal tools for the protection of intellectual property;

X/Open is a consortium of computer manufacturers, computer users, and standardisation committees, working towards common open standards.

11.3. Important Standardisation Organisations and Acronyms

Active cards are credit cards with built in computer chips, i.e. a microprocessor and memory. Thus they are called **smart cards**;

AMPS, Advanced Mobile Phone Service, is an analog cellular radio standard developed by AT&T. AMPS and GSM are the most widely used standards for mobile telephony — see chapter 2 for distribution;

American National Standards Institute is the standards institute of the United States;

ARA, Acoustic Renaissance for Audio, an international group of audio experts, working towards global audio standards;

ASCII, American Standard Code for Information Interchange, is a seven-bit binary code for use by PCs and some other types of computers to represent alphanumeric and graphical characters;

BECN, Backward Explicit Congestion Notification is the TSS's industry standard for a congestion notification methodology;

CCIR, Comité Consultatif International des Radio-Communications, International Radio Consultative Committee, was until March 1993 the main body responsible for technical standards for radio operations within **ITU**, see **ITU** and **TSB;**

CCITT, Comité Consultatif International de Téléphonique et Télégraphique, International Telegraph and Telephone Consultative Committee, was until March 1993 the main group within **ITU** responsible for telecommunications standards, see **ITU** and **TSB;**

CEN, Comité Européen de Normalisation, is responsible for all areas of standardisation in Europe, with the exception for the electrotechnical industry and telecommunications;

CENELEC, Comité Européen de Normalisation Electrotechnique, is the European organisation for electrotechnical standardisation;

DECT, Digital European Cordless Telephony, is the pan-European standard for wireless voice and data communications, ratified in July 1992;

ECITC, European Committee of IT & T Testing and Certification, is an organisation responsible for testing and issuing certification to IT and telecom products for all of Europe;

EDI, Electronic Data Interchange, is an international standard and a generic name for different techniques for computer-to-computer information and business interchange;

EDIFACT is a standard layout for electronic business messages, used in EDI;

EISA, Extended Industry Standard Architecture, is a PC bus architecture;

ETS, European Telecommunications Standard;

ETSI, European Telecommunication Standards Institute, is responsible for European telecommunications standard making;

EWOS, European Workshop for Open Systems, is responsible for fuctional standards;

FDDI, Fiber Distributed Data Interface, is a standard for local network transmission based on optical fiber, operating at 100 Mbit/sec;

GOSIP is the U.S. government OSI profile;

GSM, Groupe Speciale Mobile/Global System for Mobile Communication, is a digital cellular standard, and the most commonly used system for mobile communication, developed in Europe;

IEC, International Electrotechnical Commission, is responsible for global electrotechnical standardisation. Many of its activities are directly related to IT and telecommunications;

IETS, Interim European Telecommunications Standard;

Information Infrastructure Standards Panel is a US informal forum set up to facilitate consensus-making among all parties interested in the National Information Infrastructure;

ISA, Industry Standard Architecture, is the expansion bus in the IBM PC AT and PC compatible computers;

ISO, International Organisation for Standardisation, has several subcommittees involved in IT and telecommunications standardisation;

ITU, The International Telecommunications Union, is a global organisation for telecommunications, a subcommittee of which is **TBS, Telecommunications Standardisation Bureau,** responsible for international industry standards, see **TBS**;

JPEG, Joint Photographic Experts Group, is one of three primary standards for continuous tone picture compression/decompression used for video conferencing;

JTC1 and **JTC2** are **Joint Technical Committees**, specialising in different areas within **ISO**, see above;

MAP27 is a technical standard defining an interface allowing computers and other terminals to be connected to a mobile radio transceiver;

METRAN, Managed European Transmission Network, is a standardised European transmission network for SDH connections, which is in preparation for future telecommunications;

MIME, Multipurpose Internet Mail Extensions, is a message standard for e-mail, including graphics, video, and sound;

MPEG, the Motion Picture Experts Group, is the agreed upon standard for compressing digital video and TV signals;

NET, Norme Européenne pour Télécommunications;

NMT-450, Nordic Mobile Telephone standard at **450** MHz;

NMT-900, Nordic Mobile Telephone standard at **900** MHz;

NMT-F is a French variation of the NMT-900 standard;

Odette is another standard layout for computer-to-computer messages under EDI;

ONP, Open Network Provision, is a set of rules for standardisation and regulation of technical and commercial connections to and utilisation of former monopolised networks;

OSI, Open Systems Interconnection, is a set of protocols recommended by ISO for communication between computers of different types and makes;

OSI/RM is the **OSI Reference Model;**

OSI, Open Systems Interconnection, is a set of protocols recommended by ISO for communication between computers of different types and makes;

PCMCIA, Personal Computer Memory Card Industry Association, is an industry standard organisation for manufacturers of cards to PCs, PDAs, PDPs, etc.;

Px64 is a worldwide videoconferencing standard for twoway full motion video;

RIP, Routing Information Protocol, is a de facto international standard for intra-AS routing;

SET, Secure Electronic Transaction, is a standard for automated encryption of credit card numbers used for payment over the Internet;

SNA, Systems Network Architecture, is an IBM standard communications protocol;

SNMP, Simple Network Management Protocol, is a TCP/IP protocol, addressing network monitoring;

SOGITS, Senior Officials Group of IT Standardisation;

SONET, Synchronous Optical Network, is a set of standards for transmission over fiber optic networks a speeds as fast as 13 Gbps;

TBS, Telecommunications Standardisation Bureau, was formed in March 1993 as a main body within ITU, replacing CCIR and CCITT, responsible for coordination of the definitions of technical standards, as well as the ratification of these, and the recommendations for telecommunications and radio communications;

TCP/IP, Transmission Control Program/Internet Protocol, is a set of communication protocols, having become a de facto standard for communication between computers of different makes;

Token Ring is IBM's IEEE 802.5 LAN standard;

USO, Universal Services Obligations;

VESA, Video Equipment Standards Association;

W3C, World Wide Web Consortium, is an interest group of representatives of the largest actors in the World Wide Web. W3C developed the PNG standard;

X/Open is a consortium of computer manufacturers, computer users, and standardisation committees, working towards common open standards;

X.21 is a CCITT/TSS specification for layer 1 interface in X.25;

X.25 is a recommendation by ISO and CCITT/TSS for an interface between terminals and computers for packet transmission in public networks. Nordic telecom operators have based their Datapak services on X.25;

X.400 is an ISO and CCITT/TSS standard for handling and distribution of e-mail;

X.500 is an ISO and CCITT/TSS standard for distributed directory services.

11.4. Industry and Technology Acronyms and Terms

A

AAL, ATM Adaptation Layer, is converting non-ATM bit streams into ATM cells;
ACD, Automatic Call Distribution, is a system used to distribute high volumes of calls according to priority. It is also used to route calls to appropriate parties;
ACTS, Advanced Technology Communication and Service, is a EU-based R&D project related to new developments within IT;
ADM, Add/drop multiplexor;
agent is a piece of software designed to carry out different tasks, for instancesearching for information on networks;
Aglet is an acronym for software agents that on its own can search and manipulate information in most of the computers connected to the Internet, without destroying any of the information it is copying or manipulating;
ALS, Asymmetrical Digital Subscriber Loop, is a new access network technology, making it possible to tranfer 6Mbit/s — corresponding to the current quality of television sound and picture — via the existing access networks based on two pair cupper lines;
AMPS, Advanced Mobile Phone Service, is an analog cellular radio standard developed by AT&T. AMPS and GSM are the most widely used standards for mobile telephony — see chapter 2 for distribution;
ANI, Automatic Number Identification, provides the receiver of a call with the telephone number of the caller, after having verified it;
APC, Association for Progressive Communication, is an association of computer networks having nodes in four continents;
API, Application Program Interface, is a set of programming conventions, providing access to protocols;
Applet is a Java-based applications software, that can be downloaded from the Internet;
ARA, Acoustic Renaissance for Audio, an international group of audio experts, working towards global audio standards;
AS, Autonomous Systems, are part of the Internet Layer that routers use to relate to network connectivity and addressing;

ASCII, American Standard Code for Information Interchange, is a seven-bit binary code for use by PCs and some other types of computers to represent alphanumeric and graphical characters;
asynchronous means that a transmission rate is variable, without predictable time relationship to a specified event;
ATM, Asynchronous Transfer Mode, a broadband switching technology, offering continuous transportation of different bandwith;
AWT, Alternative Window Toolkit, a software package for animation in Windows;

B

Backbone network is a primary transmission medium in a hierarchically distributed system;
bandwidth is a measure used for transmission capacity;
baseband is the frequency band occupied by a single or composite signal in its original form;
base station is a fixed radio transceiver in a cordless communications system;
BBS, Bulletin Board System, is an electronic bulletin board, run by for instance organisations, associations or other groups of users, having common interests;
BECN, Backward Explicit Congestion Notification is the TSS's industry standard for a congestion notification methodology;
B-ISDN, broadband ISDN, based on ATM;
bipolar signal is the predominant signaling method used for digital transmission services;
BITNET, Because IT is There NETwork, is an American network, having a European equivalent in **EARN**;
Blob, Binary Large OBject, is a large file, for instance, stored in a data base;
BPR, Business Process Reengineering;
bps, bits per second, is a unit for measuring transmission speed. bps often has a prefix: k = kilo (10x10x10), M = mega (10x10x10x10x10x10), or G = giga (10x10x10x10x10x10x10x10x10), meaning that the transmission speed is augmented equivalently;
broadband is used for high-speed, high-capacity communications;
Broadband network is a transmission network running at minimum 2 Mbps;
broadcast is used when a simultaneous transmission to multiple receiving locations is made;
brouter is a device that combines bridge and router functions to route specific protocols and bridge others;
BTR, Basis for Technical Regulation;

C

CAI, Common Air Interface, is a definition of the technical parameters of control and information signals passed between a radio transmitter and a receiver, normally used in CT, cordless telephony;
card is a single printed circuit board for insertion in a slot in a computer, a switch or other electronic devices;
CASE, Computer Aided Software Engineering;
CATV, Community Antenna Television, is also known as cable television. Transmissions are received at a central site and transmitted to subscribers via a cable network;
CCD, Charge Coupled Devices;
CCIRN, Coordinating Council for Interncontinental Research Networking, is doing just that, coordinating networking globally;
CCM, Commission du Control du Marché, the French governmental agency for market regulation;
CCMI, Commission du Control du Marché Informatique, controls the computer market in France, part of CCM;
CDMA, Code Division Multiple Access, is a method used in mobile communications to spread radio spectrum;
cell for ATM technology is a basic 53-byte packet of information, including a constant five-byte address header;
cell related to cellular telephony, is a basic geographic unit in a cellular network, having a radio transmitter/receiver covering a specific area;
CERN is where the WWW was developed **see** chapter 6 on the Internet;
channel is an electronic communications path;
CISC stands for **Complete Instruction Set Computing** architecture for microprocessors;
CMIP, Common Management Information Protocols;
CMIS, Common Management Information Services;
common carrier is what a company offering data and voice communications services to the general public is called. A common carrier is regulated by the national agencies;
CORDIS, Community Research and Development Information Service, is a EU R&D program;
CTI, Computer Telephony Integration, is the merger of computer technology with those of telecommunications;
CTR, Common Technical Regulation;
CT2 and **CT3, Cordless Telephone,** second generation and third generation;

D

Data mining is a support tool for decision making, a tool that can search a large amount of data and pick out valuable relations or detect patterns hidden in the masses of information;
Datapak is Telia's X.25 networking service;
DATEX is one of Telia's networks for data communications;
DBMS, Database Management System;
DCS, Digital Cellular System, is a new, more efficient technology for digital mobile telephony, transmitting over a different band of frequencies than for instance the earlier NMT and GSM systems. Also stands for **Digital Cross Connect System;**
DECnet is a protocol for data communications developed by Digital Equipment Corporation;
DECT, Digital European Cordless Telephony, is the pan-European standard for wireless voice and data communications, ratified in July 1992;
DME, Distributed Management Environment, is an OSF program to develop a toolset providing common systems and network management functions;
DMI, Digital Multiplexed Interface, is a gateway providing 23 digital PCM channels plus one signalling channel;
DOS, Disk Operating System, is the most widely used operating system in PCs. It was originally developed by Microsoft;
downloading is the process of moving software or data from one node in a network to another;
DP, Device Processor;
DPR, Digital Property Rights;
DSP, Digital Signal Processor;
DSRR, Digital Short Range Radio;
DTMF, Dual Tone Multifrequency Signaling, is the basis for the signaling operation of the push-button telephones;
DTT, Digital Terrestrial Television, is a system for digital television transmission;
DVD, Digital Video Disc, a global industry standard for recording video pictures on high-density CD;
DWDM, Dense WDM, a technology by which the transfer channels are separated by a few millimeters;
DXC, Digital Cross Connect;

E

EARN, European Academic Research Network, is a European network for university based researchers. EARN is connected to the American BITNET;
Ebone is a European Internet Protocol backbone network, having nodes in Stockholm, Amsterdam, Geneva, Paris, and London. Some 25 regional networks are connected;
EBT, Electronic Benefits Transfer, is used in the US to pay social wellfare money to some 28 million people in need of financial support but not having bank accounts;
EDI, Electronic Data Interchange, is an international standard and a generic name for different techniques for computer-to-computer information and business interchange;
EDIFACT is a standard layout for electronic business messages, used in EDI;
EID, Electronic Indentification Documentation, is a standard (under development) for electronic documents for identification;
EISA, Enhanced Industry Standard Architecture, is a PC bus architecture;
ELP, Electro-Luminescence Panel, is a technology for contructing flat displays;
EM, Element Manager, support systems for remote control of several network elements;
E-mail is a system for transmission of text based messages between different computers. In Swedish, e-mail is called **e-post;**
emulate is to imitate one system with another in such a way that both systems accept the same data and execute programs the same way;
EMC, Electro Magnetic Compatibility, is a technique to avoid different electronic gear to interfere with other similar equipment;
E-Pin, Electronic Post-It Note;
Equal Access is a principle applied in order to make it equally easy to make calls independent of operator;
ERMES, European Messaging System, is a pan-European digital radio paging system;
ESPRIT, European Strategic Programme for Research and Development in Information Technology, is the present EU research program for information Technology, running 1994 — 1998;
Ethernet is a high speed computer network sometimes regarded as a variety of LAN, Local Area Network. Transmission can be made via several protocols simultaneously;
EUREKA is a European program for collaboration between companies in marketing oriented technical research and development. It started in 1985. 20 countries participate;
EuroCAIRN, European Cooperation for Academic and Industrial Research Networking, is a follower of the COSINE project;
EuropaNET is a European computer network, connecting a number of academic networks;

F

FDDI, Fiber Distributed Data Interface, is a standard for local network transmission based on optical fiber, operating at 100 Mbit/sec;
FDM, Frequency Division Multiplexing, equivalent to HDWDM;
FFOL, Fiber Follow On LAN, is an emerging LAN technology;
FidoNet is a public network, having several tens of thousands nodes globally, used by private users as well as companies;
file server is a LAN station dedicated to provide file and mass storage services to other stations on the network;
firmware is what a permanent or semi-permanent control coding implemented at a micro instruction level for an application program is called;
FITL, Fiber In The Loop, is a technology becoming economically feasible for telephony, narrow band ISDN, and cable TV distribution;
FMAS, Facility Management System, a support system for transmission networks, developed by Ericsson;
FNC, Federal Networking Council, is a US organisation coordinating research networks supported by different federal authorities;
FTTC, Fibre To The Curb;
FTTH, Fibre To The Home;

G

GDSS, Group Decision Support System;
Gif (Graphics Interchange Format), a standard for graphics, in certain contexts now being replaced by **PNG** — see separate entry;
GII, Global Information Infrastructure, is what vice president Al Gore's vision of the NII in its global version is called;
GIS iis used by among others EITO as an abbiviation for the Global Information Society;
GK7, international standard for common channel signalling;
GOSIP is the U.S. government OSI profile;
GPS, The Global Position System, is a military system, also available for civilian applications, for geographical positioning via satellite;
GSM, Groupe Speciale Mobile/Global System for Mobile Communication, is a digital cellular standard, and the most commonly used system for mobile communication, developed in Europe;
GUI, Graphic Unit Interface;

H

handshake is in the electronic world an exchange of predetermined signals, occuring when the connection requested between two data sets is first established;
HDLC, High Level Data Link Control, is an ISO protocol for X.25 international communications;
HDTV, High Definition TV;

HDSL, Highbitrate Digital Subscriber Loop, is a new access network technology, making it possible to transfer 2 Mbit/s via the existing access networks based on two pair copper lines;
HDWDM, High Dense WDM;
HMD, Head Mounted Display/Helmet Mounted Display, is a screen used for VR projections;
HPCN, High Performance Computing and Networking, is a subprogram under ESPRIT;
HTML, Hypertext Markup Language, is a computer language used for creating home pages for the HTTP protocol by marking documents for WWW, showing links, texts, grafics, etc;
HTTP, Hypertext Transfer Protocol, is a communications protocol, developed for Internet;
hybrid network is a network comprising both public and private facilities;
hypermedia is an updated version of hypertext, including text, sound, grafics, video, etc.;
hypertext is a file of texts on hypercards, containing links to other texts;

I

ICT, Information and Communications Technology, is defined as equipment, software, and services related to computers, information technologyand telecommunications;
IDA, Interchange of Data between Administrations, is a set of guidelines for coordination of data interchange between the administrations of the EU member countries;
IEC, Interexchange Carrier, is a long distance provider;
IGP, Interior Gateway Protocol;
infotainment is provided by the integration of computer and cable TV (interactive TV), providing opportunities for the viewer to participate directly in TV programs, or to manipulate a TV program to the personal taste;
Interface (in Swedish gränssnitt) is a shared boundary defined by common physical interconnection characteristics;
Internetwork is what you call two or more connected networks, similar or dissimilar;
IP, Internet Protocol, is part of the protocols used in TCP/IP;
IPR, Intellectual Property Rights;
ISA, Industry Standard Architecture, is a PC bus architecture;
IR, Infra Red;
ISDN, Integrated Services Digital Network, is a multiservice network, transmitting speech, data, and video via one single transmission line;
ISM, Industrial, Scientific and Medical, is a range of frequencies allocated for general purpose use, in for instance microwave ovens, medical probes, and scientific intruments;

IT, Information Technology, is defined as traditional hardware, software, communications, and services related to computers;
ITSEC, Information Technology Security Evaluation Criteria;
IXC, Interexchange Carrier, in the U.S. synonymous with IEC, long distance carrier;

J

Java is the current craze in programming languages for www and the Internet;
Jpeg, Joint Photographic Experts Group, is one of three primary standards for continuous tone picture compression/decompression used for video conferencing. This standard is now being replaced by PNG in certain contexts — see PNG below ;

K

KIF, Knowledge Interchange Format, is a language for exchange of knowledge between computer programs;
KQML, Knowledge Query Manipulation Language, is a proposed standard for interaction between agents;

L

LAN, Local Area Network, is a local network for data communications, for instance within a company;
LBE, Location Based Entertainment, is an environment constructed around a theme for high tech entertainment;
LCD, Liquid Crystal Display, is a technology for constructing flat displays;
leased line is a dedicated circuit permanently connecting two or more locations;
LED, Light-Emitting Diode, is a technology for building flat displays;
LEO, Low Earth Orbit satellite system, which will be the base for the Irdium global wireless communications system;
LMDS, Local Multipoint Distribution Service;

M

MAC, Media Access Control, is an IEEE standard LAN protocol;
MAC, Message Authentication Code;
MAN, Metropolitan Area Network, isa wider version of LAN;
MAP, Manufacturing Automation Protocol, is a component of OSI;
MAPI, Messaging Application Program Interface;
MBS is Telia's national network paging from telephone to FM radio. MBS tells the paged person which number to call. Is being replaced by the **Minicall** service;
METON, Metropolitan Optical Network;

METRAN, Managed European Transmission Network, is a standardised European transmission network for SDH connections, which is in preparation for future telecommunications;
MIB, Management Information Base;
microseconds appear frequently when you are dealing with switches and computers. One microsecond = one millionth of a second;
MIME, Multipurpose Internet Mail Extensions, is a message standard for e-mail, including graphics, video, and sound;
MMF, MultiMode Fiber, is a fiber optic cable that will be replacing coaxial cables and shielded twisted pair as the high speed backbone for computer networks;
Mobitex is a public national Swedish network for mobile digital communication. Text, data, and voice can be transmitted simultaneously;
MODEM, MOdular-**DEM**odular;
Mosaic, or rather NCSA Mosaic after the National Center for Supercomputing Applications, University of Illinois, is a multimedia user program, important to the breakthrough of WWW in 1993— 1994;
MPEG, the Motion Picture Experts Group, is the agreed upon standard for compressing digital video and TV signals;
multimedia generate computer based presentations, combining serveral types of presentations — text, graphics, video, and sound. The user is able to manipulate the presentation interactively;
MWTN, Multi-Wavelength Transport Network, an optical transmission network, is the result of a multinational RACE project for the development of new technologies for optical transmission. The project has the following participants: BT Laboratories, UK; CSELT, Italy; Ericsson Telecom, Sweden; Ericsson Telecommunicazione, Italy; France Télécom CNET, France; Italtel, Italy; Pirelli Calvi, Italy; Telia and Ellemtel, Sweden; The University of Essex, UK; and the University of Paderborn, Germany;

N

NAC, Network Adapter Card;
NC, Net Computer, is a very simple, low cost computer for mass distribution without a harddisc that fetches the programs it needs to execute an application on the Internet;
NFS, Network File System, is a file system allowing computers access to several hard discs;
NIC, Network Interface Card, is a workstation or PC adapter card that provides connectivity to a LAN or a WAN;
NII, National Information Infrastructure, is a political initiative by the American vice president Al Gore, aiming at creating the national infrastructure for the information society;
NGO, Non-Governmental Organisation;

NMT-450, Nordic Mobile Telephone standard at **450** MHz;
NMT-900, Nordic Mobile Telephone standard at **900** MHz;
NMT-F is a French variation of the NMT-900 standard;
NORDUnet, NORDic University network, is a collaborative network between the national academic networks in Denmark, Finland, Norway, Iceland, and Sweden;
NOS, Network Operating System, is network control software, overseeing resource sharing;
notebook is a portable computer, the size of an A4 pad of paper;
NSFnet, National Science Foundation network, is a backbone network in the US, connecting a number of regional American networks for research;
NTM, Network Traffic Management, is a system for switching and supervision of telecommunications traffic;
NVOD, Near Video on Demand, is a simlified version of Video on Demand;

O

OCA, Office, computing and accounting equipment;
ODBC, Open Data-base Connectivity, is an interface for data access in a mixed environment, supporting many different databases without specific adaptations;
Odette is another standard layout for computer-to-computer messages under EDI;
OEM, Original Equipment Manufacturer, is a manufacturer of Equipment which is marketed by another vendor under the name of the reseller;
OLTP, On-Line Transaction Processing;
ONP, Open Network Provision, is a set of rules for standardisation and regulation of technical and commercial connections to and utilisation of former monopolised networks;
OSI, Open Systems Interconnection, is a set of protocols recommended by ISO for communication between computers of different types and makes;
OSI/RM is the **OSI Reference Model;**

P

PAMR, Public Access Mobile Radio — in France, Germany, and the UK competing services are provided by regional and independent operators;
PAD, Packet Assembler/Disassembler, is a protocol conversion device, allowing end users access to X.25 and other packet switched networks;
PBX/PABX, Private (Automatic) Branch Exchange, is a type of switch used by companies and other organisations, needing their own switch to handle voice and data and to connect to the public network;
PCA, Personal Communications Assistant, is a pen-based handheld computer, combining communications with sophisticated organiser software, see **PDA**;

PCM, Pulse Code Modulation, is a digital transmission technique used to transmit analog signals;
PCN, Personal Communications Network;
PCS, Personal Communication Services, are a new set of wireless capabilities offered to users of mobile equipment by licensees of frequencies, often in the gigahertz spectrum. It may include telecommunications services in combination with cable television services;
PDA, Personal Digital Assistant, is a powerful, multifunctional pocket computer with a pen and handwriting recognition, which is regarded as the successor of PCs, laptops, etc., see **PCA**;
PDP, Plasma Display Panel, is a technology developed for the construction of large, flat displays;
PEM, Privacy Enhanced Mail, is an Internet standard for enchryption and verification of e-mail. A Swedish standard, **COST-PEM** is available;
One **Petabyte** is equivalent to 1000 **Terabyte,** i.e. one million **Gigabyte,** or one million billions of bytes;
PGP, Pretty Good Privacy, is a sophisticated program for enchryption, available via the Internet: http://pgp.stupi.se/pgp/;
PIN, Personal Identification Number, is a standard used for, among other things, securing personal access to for instance mobile telephones and smart cards;
P-mail, Paper-based mail, can also be interpreted as **Primitive mail. Sometimes called Snail-mail;**
PN, Private Network, a network used exclusively by one single organisation or group of people;
PNG, Portable Network Graphics, is a standard for graphics, replacing old standards like **Gif (Graphics Interchange Format)** and **Jpeg (Joint Photographic Experts Group);**
POTS, Plain Old Telephone Services, same as PSTN;
PPP, Point to Point Protocol, is a further development of **SLIP;**
protocol is what the rules needed to establish communications between nodes on a network is called;
PPV, Pay-Per-View, or paid TV, is a distribution service of entertainment;
PSTN, Public Switched Telephone Network, same a POTS;
PTO, Public Telecommunications Operator;
PUSH technology is used to create the new seamless networked media, making it possible to access any information available on, for instance, the Internet or on the odd 500 000 TV-channels that will be available in the world, at your own choice;
PVC, Permanent Virtual Circuit, is a packet-switching connection with a single dedicated transmission path;
PVN, Private Virtual Network, is a private network, available to a limited group of people, utilising public networks for transmission;
Px64 is a worldwide videoconferencing standard for twoway full motion video;

Q

QAM, Quadrature Amplitude Modulation;
QWL, Quantum Well Laser;

R

RAID, Redundant Array of Inexpensive Disks, are palmsized disk drives;
RAM, Random Access Memory, is a type of memory in which data is stored temporarily, while waiting for processing;
RARE, Réseaux Associés pour la Recherche Européenne, is a European organisation, coordinating academic networks;
RBOC, Regional Bell Operating Company;
RFI, Radio Frequency Interference, or **Request For Information;**
RHC, Regional Holding Company, see **RBOC;**
RIP, Routing Information Protocol, is a de facto international standard for intra-AS routing;
RISC, Reduced Instruction Set Computing, is a microprocessor architecture that eliminates a number of procedures to improve response time and processing speed;
router is a device that connects LANs;
ROA, Recognised Operating Agency, is the ITU nomenclature for operators;
RPC, Remote Procedure Call;

S

SCAI, Switch to Computer Application Interface, provides the means for integrating **CPE** with host computers;
SCSI, Small Computer System Interface, is a common interface for computers and controller boards;
SDH, Synchronous Digital Hierachy, is a new generation transmission technology, increasing the capacity of existing optical networks up to 2.5 Gbit/s per fiber pair;
SDLC, Synchronous Data Link Control, is a protocol used with SNA Networks;
SDMS, Spatial Data Management System, is a project at the M.I.T. Media Lab aiming at developing multi-media in such a way that users can access data via computers in much the same way they access anything else — by reaching for it;
SEARN is the acronyme of the Swedish EARN node;
SEED, Self Electro Optic Effect;
server is a computer that provides shared resources, such as applications, databases, printers, and so on, to a number of nodes;
SET, Secure Electronic Tansaction, is a standard for automated encryption of credit card numbers used for payment over the Internet;

SGN, Stockholm Gigabit Network, a demonstration facility for optical fiber transmission, involving Telia, Telia Research, The Royal Institute of Technology, Ericsson, Ellemtel, and SICS, The Swedish Institute for Computer Science;
SHPCnet, Swedish High Performance Computing Network, is a pilot network for super computer applications, included in **SUNET;**
SIM, Subscriber Identity Module, is a smart card carrying information about subscriber identity, that has to be inserted into certain mobile telephones before they can be used;
SLA, Synchronous Line Equipment, provides the user with higher transmission capacity and improved self supervision;
SLIC, Subscriber Line Interface Circuit, is an electronic circuit, built into every single telephone, handling the transmission of the call;
SLIP, Serial Line Internet Protocol, is a term used for modem connections to TCP/IP networks;
smart card is a plastic card provided with a micro processor, that can be loaded with information, see chapter 7 for cash cards;
SMS, Short Message Service, is a GSM message service;
SMTP, Simple Mail Transfer Protocol;
SNA, Systems Network Architecture, is an IBM standard communications protocol;
SNMP, Simple Network Management Protocol, is a TCP/IP protocol, addressing network monitoring;
SONET, Synchronous Optical Network, is a set of standards for transmission over fiber optic networks at speeds as fast as 13 Gbps;
SQL, Structured Query Language, a programming language for manipulating data base information;
STP, Shielded Twisted Pair, is a shielded telephone cable used to interconnect computers;
subnotebook is a portable computer that is smaller than a notebook but larger than a PDA;
SUNET, the Swedish University Network;

T

T1, T3, and **T4** are various digital telecom transmission facilities;
TACS, Total Access Communications System, is an analogue cellular telephone network used in the United Kingdom;
TAG, Telematics in Administrations Group;
TBS, Telecommunications Standardisation Bureau, was formed in March 1993 as a main body within ITU, responsible for the coordination of the definitions of technical standards, as well as the ratification of these, and the recommedations for telecommunications and radio communications;

TCP/IP, Transmission Control Program/Internet Protocol, is a set of communication protocols, having become a de facto standard for communication between computers of different makes;
TCSEC, Trusted Computer Systems Evaluation Criteria;
TDD, Time Division Duplex;
TDMA, Time Division Multiple Access, is a technology allowing several simultaneous voice and data conversations over the same medium;
Telepoint is a cordless telephone base station, available to the public, owning compatible cordless telephone sets;
TETRA, Trans European Trunked Radio Access, is a pan-European digital trunked radio system;
TDM, Time Division Multiplexing, is a digital transmission methodology;
TMN, Telecommunications Management Network, is an international standard for the integration of the support systems of different operators;
TMOS, Telecommunication Management and Operation Support, is a platform for support systems, directly switched to defined parts of the networks;
Token Ring is IBM's IEEE 802.5 LAN standard;
TOP, Technical and Office Protocol, is a component of OSI;

U

ULSI, Ultra Large Systems Integration;
UNIX is an operating system developed by Bell Laboratories in the early 60ies, widely used globally;
UPT, Universal Personal Telecommunication, is a personal telephone number, related to an individual rather than to a terminal. Thanks to a UPT, anyone can connect from any terminal, and get billed for the service he/she uses;
UTP, Unshielded Twisted Pair;

V

VA, Virtual Anything, is hereby launched and free for use for anything relating to the virtual world;
VAC, Value Added Carrier, is a vendor that designs and enhances communications networks and resells the services;
VACTOR is a **virtual actor,** often an animated figure, controlled by the movements of a real person;
VANs, Value-Added Network Services, is used by telecom operators for their offerings of various packages, containing more than basic telecom services;
VC, Virtual Container;
VC, Virtual Channel;
VCC, Virtual Channel Connection, is a connection in an ATM network;
VDT, Video Display Terminal, is another way of describing commonly used desktop computer terminals;

VHF, Very High Frequency, is an operating band for television and radio, ranging between 30 MHz and 300 MHz;
Virtual LAN is an ATM software feature;
VLSI, Very Large System Integration;
VOD, Video-on Demand, a service offering entertainment via the telecom networks;
VP, Virtual Path;
VPC, Virtual Path Connection, is another type of connection in an ATM network;
VPN, Virtual Private Network, network capacity available for leasing from operators by for instance corporations and functioning as a private network within the public one;
VR, Virtual Reality, is what the research area of man-machine interface is called. Advanced sensor technology hooked up to fast computers, is used to create impressions of real life experiences in interactive, 3 D environments;
VRML, Virtual Reality Modeling Language, is a standard for threedimensional surfing on the Internet;
VRU, Voice Response Unit, allows incoming voice calls to be answered automatically by a computer;
VSAT, Very Small Aperture Terminal, is a parabol antenna of very small diameter for telecommunications via satellite;

W

WAN, Wide Area Network, is a network covering a large area, connecting an number of LANs of different protocols;
WATS, Wide Area Telephone Service, is a leased service for long distance calls;
WDM, Wavelength Division Multiplexing;
WLL, Wireless Local Loop, replaces the last bit in the network to the subscribers home, with radio based technology;
WORM, Write Once Read Many, is a type of optical disc that allows data to be written only once and to be read many times;
WWW, the World Wide Web, or just **"the web",** is the part of the Internet that grows every single day. It is a global information system for Internet, developed at CERN. Documents are stored in hypertext systems and the links are transmitted from computer to computer. An alternative interpretation is: **www — world wide wait;**

X

X.21 is a CCITT/TSS specification for layer 1 interface in X.25;
X.25 is a recommendation by ISO and CCITT/TSS for an interface between terminals and computers for packet transmission in public networks. Nordic telecom operators have based their Datapak services on X.25;

X.400 is an ISO and CCITT/TSS standard for handling and distribution of e-mail;
X.500 is an ISO and CCITT/TSS standard for distributed directory services.

Y

Y2K, Year 2 Kilo, the year 2000, and whatever may be its implications;

11.5. Cool Cyberspace Buzz Words

Attachment is a text file, a photograph, any picture, a video sequence, etc. attached to an e-mail message;
Brownout is a breakdown on one — or several — components of the Internet, which renders communication on the Net is impossible;
Browser is a web program for looking at text files in the Web. Several browsers are available, Netscape Navigator and Internet Explorer are two well known ones;
to chat is to communicate with other people interactively via the keyboard;
Cookies are small data packets, generated each time you visit a web-site. It registers who you are and make up your "cyber shadow". Cookies can be used to build a profile of a web-site-visitor — and they can be erased;
Cybernaut is what a person may be called when he/she is moving in new dimensions like cyberspace or a virtual reality of that person's choice, often using specific computerised interfaces to make the "journey";
Cyberpunk is described as an anarchistic culture created by William Gibson's book "Neuromancer", 1984;
Cyberspace is the total mass of electronic communication networks, databases, and whatever else is needed for global communication via the Internet;
Cyborgology, the knowledge of cybernetic organisms — see *"The Cyborg Handbook "* for more information;
Egosurfing is what you are up to when you are scanning the Internet, the databases, or the research papers looking for mentions of your own name;
FAQ, Frequently Asked Questions, some Web-sites provide answers to FAQs before they are being asked;
to flame is to inundate a person's e-mail by sending inumerable e-mail messages in order to block the account, often in order to punish someone who has offended the **Netiquette**;
GNN, the Global Network Navigator, is a site on the Internet, offering news and pointers to important events;
Homeless is everyone without a home page;
HTML, Hyper Text Markup Language, is the language used for producing pages for the Web;
HTML-editor is a program for editing home pages for the Web;

IAD, Internet Addiction Disorder, is as real as alcoholism, according to the Canadian Medical Association Journal. **Source: Wired, October, 1996**
IRC, Inter Relay Chat, is a system for direct communication via the Internet;
Java is the current craze in programming languages for www and the Internet for creating platform independent applications;
MUDs, Multi-User Dimensions, is a simple, text-based, on-line dimension of virtual reality;
Netiquette is a set of rules that any Internet user should adhere to. Breaking the Netiquette may result in the offender being flamed;
Netizen is an inhabitant of the Internet;
newsgroup is a forum for discussion about anything by anybody via e-mail;
Para-site is a parasitic website in the sense that it presents the contents of other websites as its own. This is, of course, causing some problems about who is the true source of the information, with all its implications;
PGP, Pretty Good Privacy, is an enchryption program for e-mail on the Net, type: http://www.ifi.uio.no./pgp ;
smiley is the utilisation of characters on the keyboard like .:-/%-) etc. in order to express personality, emotions, spirit, and so on. Common smileys are: :-) = happy; :D = very happy, :- I = neutral; :* = drunk:-< = angry. Abbreviations can also serve as smileys, for instance CUL8R = see you later; U2 = you too, just to mention a few;
to spam is to massdistribute e-mail messages or advertising to large groups of e-mail accounts, not a very popular activity;
URL, Uniform Resource Locator, is simply a www address;
Usenet is a part of the Internet, made up of news groups and discussion groups;
Virtual Reality, VR, permits people to behave as if they were somewhere they are not. Current technology, including rather clumpsy helmets and sensor-laden gloves, will be replaced by new and smarter interface technology, and faster computing. Lightweight "glasses", equipment integrated with everyday clothing and sensors transmitting from a distance will replace today's cybernaut gear. New technologies will also simulate human senses like the feeling of force, resistance, texture, and smell;
Web spoofing means that somebody surrounds a user with a completely false Web environment, looking exactly like what one would expect but with different functions. So, for instance, it would be possible to build a "vitual bank" as a spoof. Only very sophisticated and patient users can discover spoofed environments. Type www.cs.priceton.edu/sip to find out more;
WWW, the World Wide Web, or just **"the web",** is the most popular Internet network, signing on new users every single day;
Yahoo is a site on the Internet, offering news and pointers to important events — also see GNN.

12. For Those Who Want to Read More About Information and Communication Technology — Browse and Surf

The titles included here appear mostly in their original languages. Available translations are referred to only in a few cases. Some titles appear under several headings. This is due to the fact that the doubled titles can be of interest in more than one context. More reading about ICT in Sweden is available in the TELDOK reports, which are listed separately at the back of this book.

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12.10. For the Surfers: Internet Home Page Addresses to Selected Swedish and International Information Providers by Field of Activity

12.10.1. Telecom Operators, IT Companies, and Organisations

* Deutsche Telecom: http://www.dtag.de
* TELDOK: http://www.framfab.se/teldok/
* Telia: http://www.telia.se
* Telia's Internet Marketplace: http://www.passagen.se

12.10.2. Swedish Banks and Insurance Companies

* SE-Banken: http://www.sebank.se/sebank
* Sparbanken: http://www.sparbanken.se
* Trygg-Hansa: http://www.trygghansa.se
* Skandia: http://www.skandia.se
* Aktsam: http://www.itz.se/aktsam
* Wasa: http://www.wasa.se/wasaa

12.10.3. E-mail Address Directories

Sweden:

* http://directory.ausys.se/ecatalog/search.htm
* http://epostkatalog.telia.com

USA:

* http://www.four11.com/
* http://www.whowhere.com/index2.html
* http://www.bigfoot.com

12.10.4. European Organisations

* ESPRIT, Information Technologies Programme: http://www.ecrc.de
* EUROBIT: http://www.fvit-eurobit.de/eurobit
* Information about Government On-line and G 7 projects: http://www.ispo.cec.be/
* The Parliamentary EU 96 Committee: http://eu96.pol.umu.se

12.10.5. Swedish Public Services

* Skolnätet provides information regarding websites at Swedish schools. For more information type:
  http://www.projector.se/strategi/art.html.
  http://www.skolverket.se/stats/statfeb.html, jos.html
  http://www.projector.se/strategi/topplista.html

* Sametinget, the home page of the Same people: http://www.sametinget.se
* The Swedish Government IT Commission: http://www.skolverket.se/skolnet/it-kommissionen/
* Ungdomens IT-råd: Internet:http://www.ungit.se (The Swedish Youth' IT Commission)
* The Swedish Government Information Office, Information Rosenbad: http://www.sb.gov.se/

12.10.6. Shares and Investment:

* The Stockholm Stock Exchange: http//www.xsse.se
* Facts about Swedish corporations: http//www.bolagsfakta.se
* The Innovation Market: http://www.hedtofta.se
* OM: http://www.omgroup.com
* The Daily Finance Market: http://www.wineasy.se/invest
* The Aktiespararna: http://www.aktiespararna.se

12.10.7. Selected General Swedish and International Media:

* Dagens Industri: http://www.bonnier.se/di
* DNet — Dagens Nyheter: http://www.dn.se
* Dow Jones: http://dowvision.vais.net
* Financial Times: http://www.ft.com
* Finanstidningen: http://www.fti.se
* Svenska Dagbladet: http://www.svd.se
* Veckans Affärer: http://www.bonnier.se/va
* Wall Street Journal: http://www.wsj.com or http://update.wsj.com

12.10.8. Selected Swedish Telecommunications and IT Publications:

Internet and/or E-mail addresses

* Computer Sweden: http://www.idg.se/cs/
* Dagens IT: redaktionen@dagensit.se
* eMagasin: emagasin@neo.se
* IT Nyheterna: info@itnyheterna.media.se
* Kunskapspunkten: http://www.etc.pi.se/DINK/
* MacWorld: http://www.idg.se/macworld/
* Ny teknik: http://www.nyteknik.se
* Nätvärlden: info@natvarlden.media.se
* PC Hemma: pchemma@pchemma.medstroms.se

12.10.9. Swedish Telecommunications and IT Research Institutes:

* Telecom City: http://www.karlskrona.se/telecomcity

13. Cross references

Special notations

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