



## 4. Sweden, the IST Industry and the Users

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

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 — May, 1996*, available in Swedish, only).

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 Sweden, wholly or partially involved in the manufacturing of IT products. In addition to the manufacturing companies, there are a number of other industries closely related to IT, for instance detailers, retailers, telecommunication operators, and various consulting services businesses.

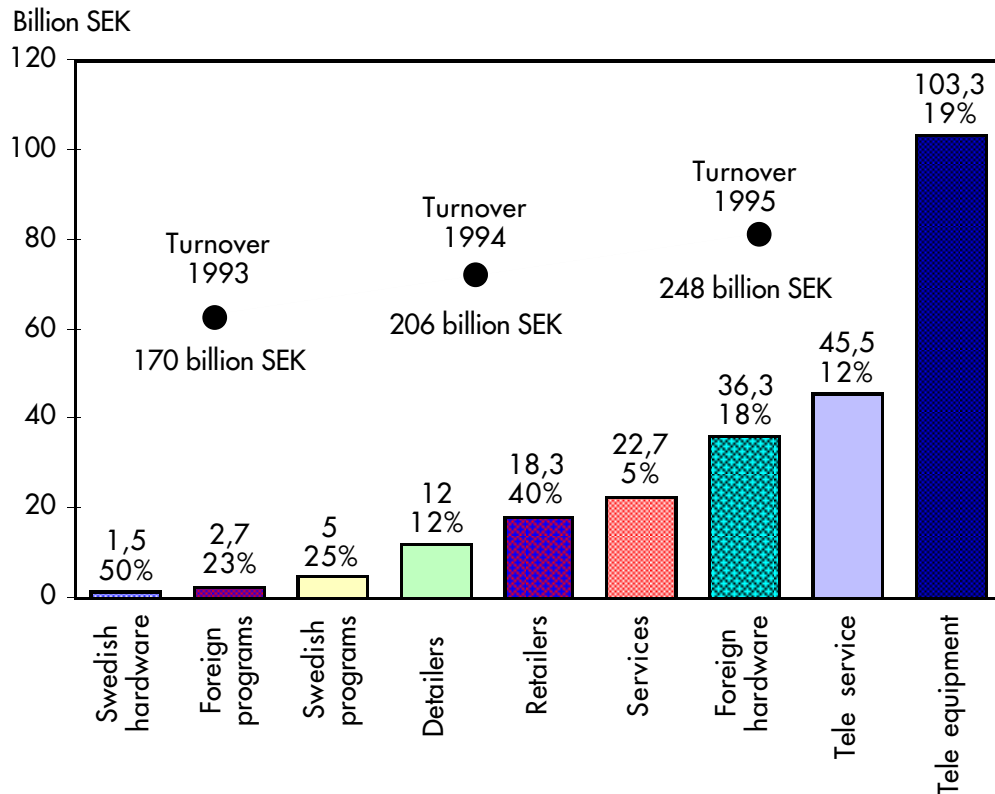
#### Industries Marked by Growth

The IT industries of Sweden are growing. In 1995, the IT companies reported a total turn-over of 248 billion SEK (Swedish Crowns), according to the computer magazine "*Datavärlden*", which published its annual industry survey on June 7, 1996.

## The Swedish IT Industry in 1996

Total IT turnover: 248 000 million SEK

**Total turnover: 264 000 million SEK**

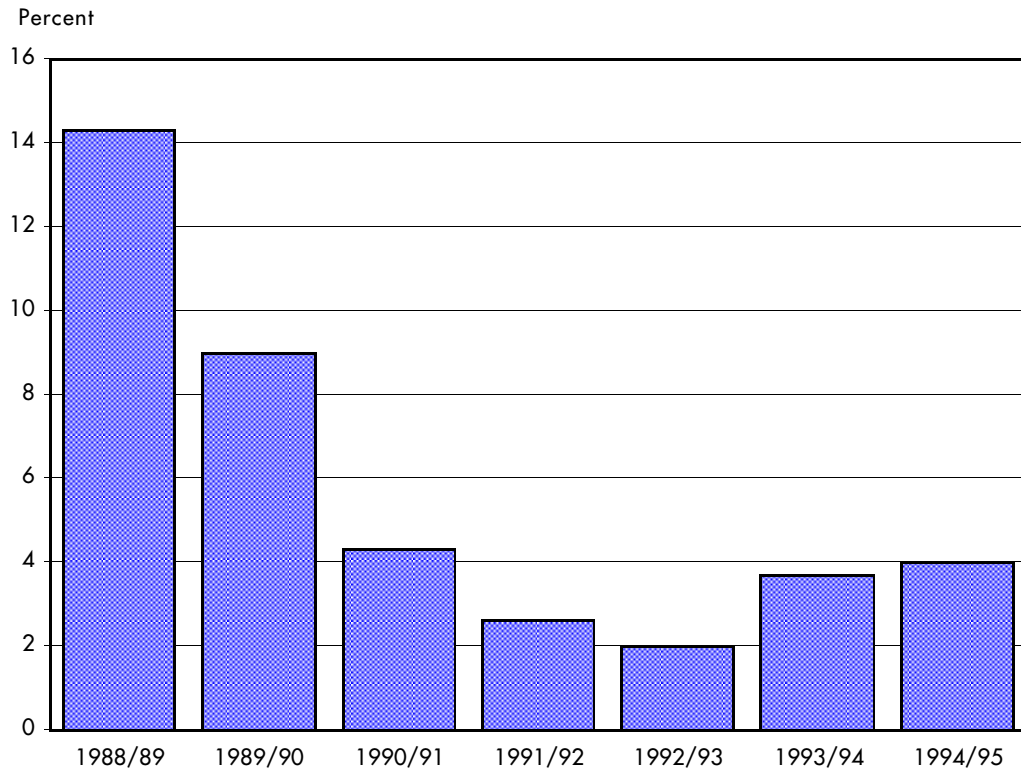


*Fig. 13: The Swedish IT industry has grown by 20% during two consecutive years. Only the forestry related industries can compete with this kind of growth. Included in services are data consulting services as well as outsourcing. The Swedish IT industry is by and large made up of Ericsson and Telia, responsible for 56% of the total turnover. The total values are expressed in billion Swedish Crowns.*

Source: Datavärlden, June 7, 1996.

The equivalent for 1994 was 204 billion SEK. The annual growth amounts to more than 21%. This can be compared to equivalent figures for the west European IT-market.

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



*Fig. 14: 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*

”*Datavärlden*” lists the top 500 IT companies in Sweden. The two largest local players, Ericsson and Telia, contribute more than half of the 248 billion SEK — Ericsson 98.8 billion and Telia 41.1 billion SEK for 1995.

### Increased Foreign Interest

”*Datavärlden*” also states that ever more foreign IT companies are restructuring their Swedish companies to become pure sales offices, while any strategic decision making takes place outside of Sweden. So, for instance, market planning for IBM and Apple is made in Paris, France. So far, during the 90ies, the Swedish managements of foreign subsidiaries have seen their scope of action curtailed. Even logistics is moving 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 IT companies in Sweden. Excluding the two giants Ericsson and Telia from the top 500, the remaining 498 companies represent an annual turnover of 108 billion SEK. 350 of these companies, representing 45% of the total turnover, are Swedish owned. In 1994, the relationship between Swedish and foreign ownership was 50 — 50, and in 1995, 51 — 49, in non-Swedish favour. The publication is evidently looking for trends, one way or the other!

Another Swedish computer magazine, "Datateknik", states that 1995 was another, very successful year for the IT industry in Sweden — total revenues increased by 18%. The difference between the increase in turnover between the two magazines is explained by the fact that "Datavärlden" has counted the "top 500", while "Datateknik" has counted only companies having a total turnover of more than 20 million SEK. Thus "Datateknik" ends up listing 265 companies, i.e. little more than half of the number listed by "Datavärlden".

### Not Influenced by the General Business Cycle

In its industrial analysis, "Datateknik" states that the general recession in Sweden has not marked the IT industry. While private consumption increased by dismal 0.3%, PC sales figures were up by 50%, according to the international research group IDC. IDC predicts that this increase will continue during 1996, and then slow down toward the millenium turn.

### PC Sales in Sweden 1990 — 2000

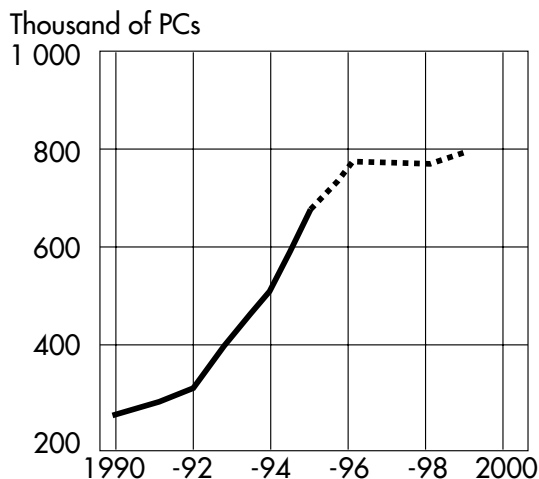


Fig DT:1 The Swedish PC sales are slowing down. The professional market is saturated, while there is room for growth in the private market segment, so far having a penetration of only 27% — i.e. 27% of all households have a PC.

Source: Datateknik, no. 11, June 13, 1996/IDC

The PC market is slowly becoming saturated, not least so in the professional segments, where penetration is almost 100%. The private PC market still has some room for growth. The overall increase in PC sales was 30% for 1994, meaning 710 000 computers, compared to a 50% increase for sales to the private users. In spite of this hefty increase, the penetration of the private market was only 27%. More can be done in this segment, at least according to some suppliers.

”Datateknik” splits the IT industry, which it calls the high growth industry No. 1, into nine sub-industries. Interesting to note from the diagram DT:2 below is, that hardware showed the smallest increase of turnover from 1994 to 1995, 15% only, while data communication grew by 41%.

### IT — High Growth Industry No. 1

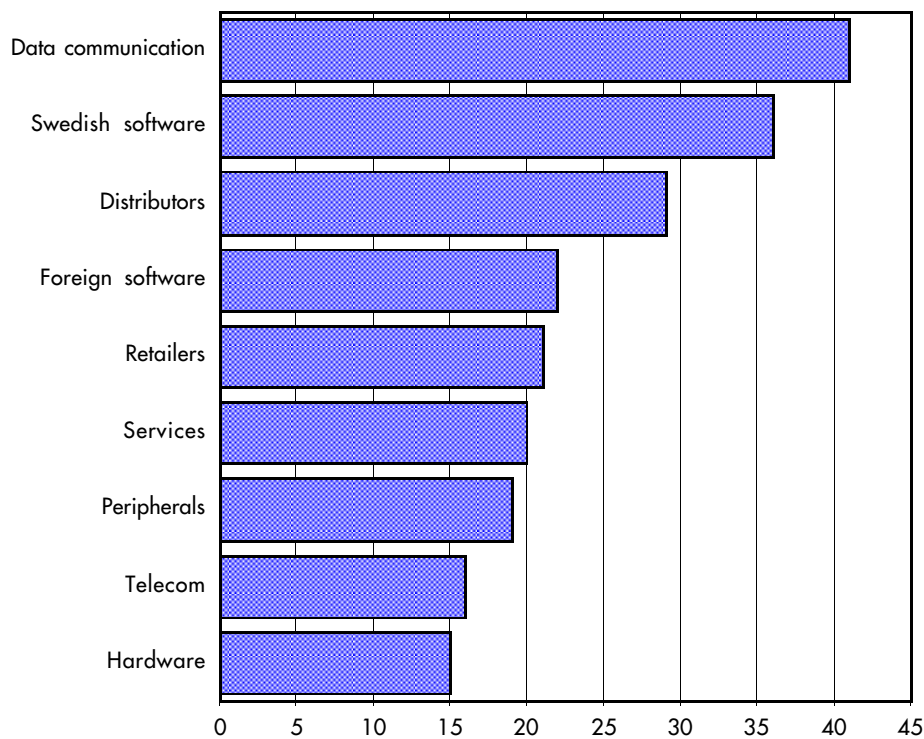
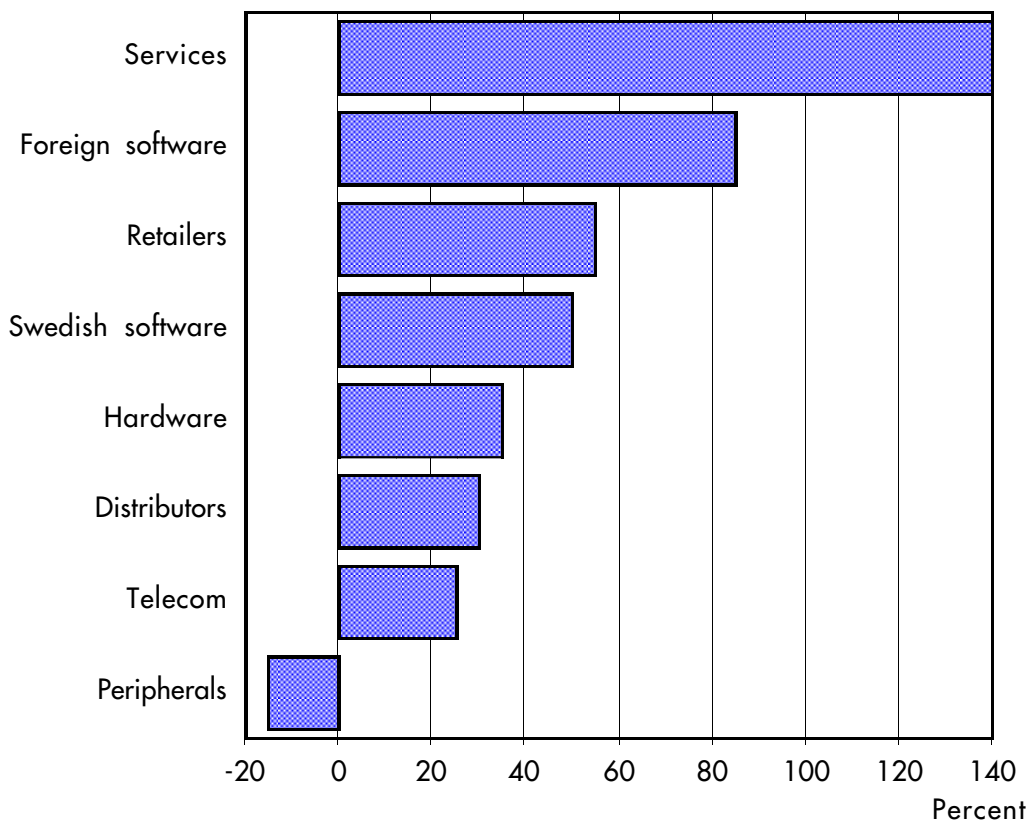


Fig DT:2 According to the publication ”Datateknik”, the information technology industry can be divided into the following nine sub-industries: Data communication, locally generated software, distributors, imported software, retailers, services, peripherals, telecom, and hardware. Communication is the sub-industry representing the fastest growth. The figures indicate the change in turnover per industry in percent from 1994 to 1995.

Source: Datateknik, no. 11, June 13, 1996

Regarding changes related to results, the IT industries show a different internal order. Data services are leading the ranking list, followed by sales of non-Swedish software.

### Changes in Results for the IT Industries from 1994 to 1995



*Diagram DT:3 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.*

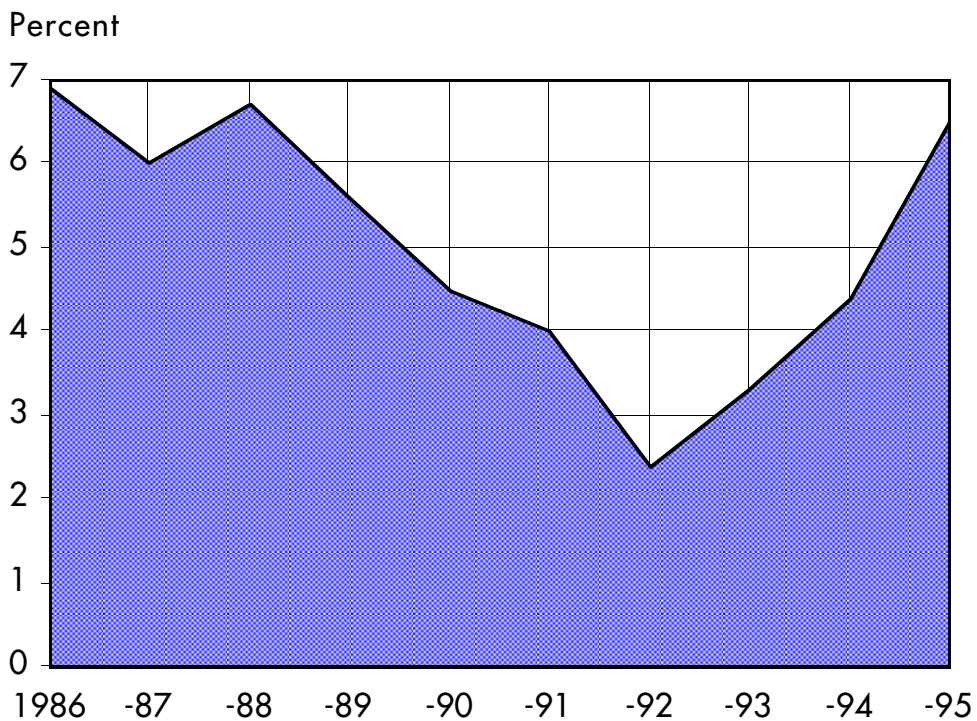
*Source: Datateknik, no. 11, June 13, 1996*

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

## Increased Margins

According to "Datateknik", profit margins for the IT companies increased for the third consecutive year. The increase among the analysed companies from 1994 to 1995 was some 2%. For 1995, the increase is close to those of the record years 1986 and 1988. However, from 1988 to 1992, the curve dropped sharply, in order to take another sharp turn the other way in 1992 to 1994, and from 1995 to turn ever sharper in the upward direction.

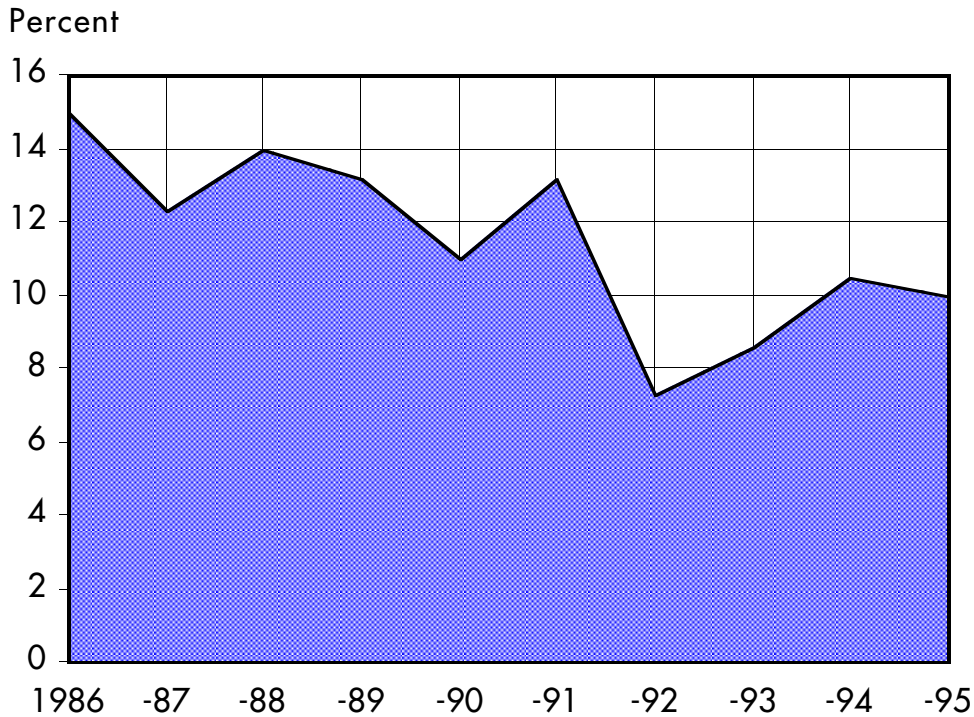
## Profit Margins for the Top 265 IT Companies in Sweden 1986 — 1995



*Diagram DT:4 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*

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



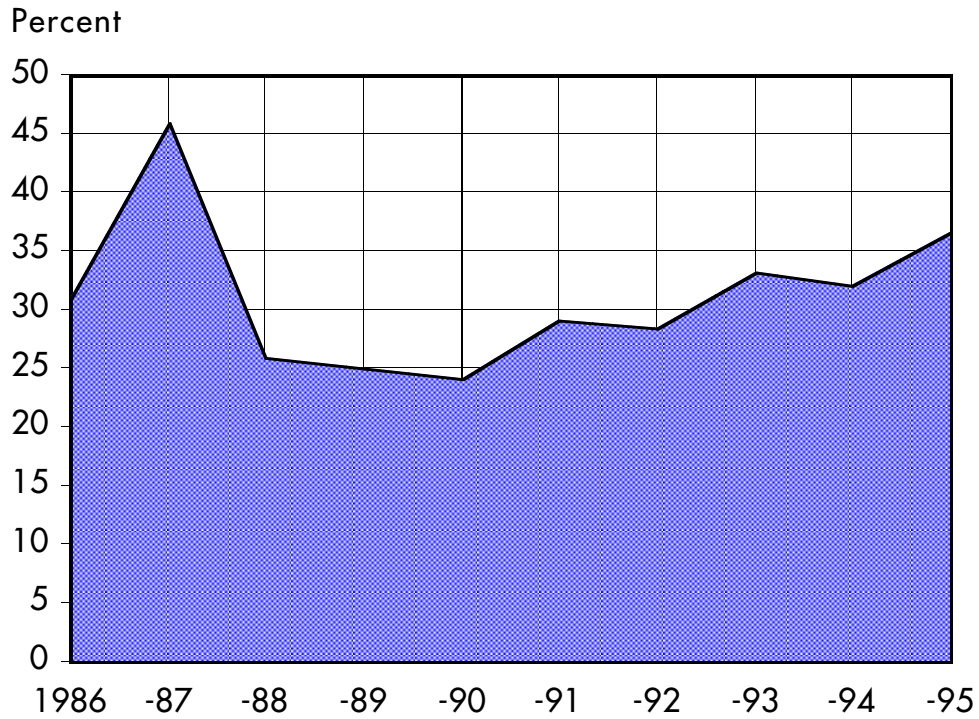
*Fig DT:5 Return on investment of the total investment in 265 Swedish IT companies, in percent of capital invested, for the period of 1986 to 1995. In 1986, the return was 15%, in 1992 half of that, some 7%, and in 1995 just above 10%, which is slightly down from 1994, when it was 11%.*

*Source: Datateknik, no. 11, June 13, 1996*

The curve for return on investment for the very same companies during the same period of time, resembles the one for profit margins above, with one important exception. While the curve for profit margins turns upwards from 1994 to 1995, the one for return on investment turns downwards, which means less return per SEK invested. One conclusion is that the companies have more capital than before, and that investors evidently have confidence in IT. The messages from IT stock traded on the Stockholm Stock Exchange in 1995 and, so far, in 1996, strengthen this impression.

This fact is confirmed by the curve showing how solidity has developed among the investigated companies. It is rather similar to the one for profit margins above, starting off by a steep increase for the years 1994 and 1995, from 33% to 36%.

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



*Fig DT:6: 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*

The surveys quoted above indicate, as already pointed out, that Ericsson and Telia are the largest IT-suppliers in Sweden in 1995 — see also table DV:2 below. IBM, in spite of losing 4% in turnover, held the third position, before Scribona, which increased its turnover by 23%.

## The Largest IT Companies in Sweden in 1995

Ranking	Name	IT related turnover million SEK	IT related production %	No. of employees
1	Ericsson	98 780	100	84 513
2	Telia	41 060	100	32 825
Te	Telia Mobitel	6 685	100	2 185
3	IBM	6 563	97	2 294
4	Scribona	5 025	83	1 801
Te	Telia MegaCom	4 346	100	820
5	Enator	3 904	96	4 690
6	WM-data	3 260	100	2 545
7	Nokia	3 228	100	1 058
8	Philips	2 720	46	662
9	Hewlett-Packard	2 511	85	410
10	Intel	2 424	100	n.a.
11	ICL Holding	2 375	100	800
12	Compaq	2 360	100	65
13	Cap Programator	2 326	100	2 843
WM	Owell	2 314	100	646
14	Ingram Micro	2 200	100	n.a.
15	Netcom Systems	1 995	100	n.a.
16	Motorola	1 987	100	139
Te	Telia Data	1 980	100	1 437
17	Digital Equipment	1 821	100	913
18	Office	1 700	100	700
Er	Ericsson Data	1 633	100	1 132
19	Sema Group Sweden	1 518	100	1 444
20	CMA	1 496	100	238
21	Santech	1 366	100	80
22	Microsoft	1 286	100	n.a.
23	Apple	1 274	100	103
24	AST	1 269	100	90
25	Kontorslandslaget	1 249	91	n.a.
26	Volvo Data	1 217	100	n.a.
27	SDI	1 200	100	325
28	Allgon	1 175	100	615
29	Computer 2000	1 161	100	84
30	Canon	1 104	89	371
31	Alfa Laval Automation	1 080	100	1 200
32	Texas Instruments	1 074	75	39
33	Unisource	1 050	100	n.a.
34	Sun Microsystem	987	95	195
NS	Tele 2	937	100	n.a.
35	Intenia	877	100	815
36	EDS Sweden	866	100	842
37	Nordic Datadistribution	786	100	69
38	Europolitan	752	100	66
Sc	Curt Enström	734	100	311
39	Dell	729	100	75
40	Siemens Nixdorf	724	100	286
41	Merkantildata	722	100	232
42	IBS	717	100	1 041
IBM	Responsor	690	100	550

*Table DV:2 The table lists the 42 largest IT companies in Sweden, size based on IT turnover in million of Swedish Crowns during 1995. The original list compiled by the "Datavärlden" magazine and published in June 1996, contains a lot more information that may be of interest to anyone making a financial analysis of the Swedish IT market. The 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 IT turnover of the country. The letter combinations in this diagram indicate that a company is owned by another major player. Thus, Te = Telia; WM = WM-data; Er = Ericsson; NS = Netcom Systems; IBM = IBM.*

*Source: Datavärlden, no. 6 — 7, 1996*

Whenever an industry, or several ones, in order to be correct when talking about IT, are growing heavily, the individual companies often show great variations, as can be concluded from the table above. The consulting firm Cap Programator increased their turnover by 21% from 1994 to 1995. In spite of this impressive increase, the company lost its number nine position on the ranking list and ended up number thirteen. The wholesale firm and distributor Computer 2000 increased its turnover by 78% but advanced only one single position in ranking, from the twenty-ninth position to the twenty-eighth one.

### IT Industry by IT Industry

What kind of picture do we get, should we choose to look at the separate IT industries as industries in their own right? For the sake of simplicity, we will stay with the structure indicated in diagram DT:2 above.

Regarding computer hardware, the majority of the providers to the Swedish market are not Swedish, which is very evident from the following table.

### Computer Hardware Suppliers in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	IBM Svenska	6 766
2	Hewlett-Packard	2 954
3	Intel Sweden	2 424
4	ICL Holding	2 375
5	Compaq	2 360
6	Motorola	1 987
7	Digital Equipment	1 821
8	Texas Instrument	1 433
9	Apple Computer	1 274
10	AST Sweden	1 269
11	Sun Microsystems	1 039
12	Dell Computer	729
13	Siemens Nixdorf	724
14	Bull	595
15	Unisys	502
16	Datapoint	219
17	Silicon Graphics	179
18	Hitachi Data Systems	178
19	Tandem Computers	134
20	Data General	129
21	Intergraph Sverige	114
22	Scandic Products	98

*Fig DT:7 It is interesting to note, that there is not one single Swedish company among the computer hardware suppliers, providing hardware to the Swedish market. This should be compared to the providers of hardware for telecommunications, compare the table above. In a way, there are no great surprises in the ranking list — most of the companies represented have successfully operated in the Swedish market for a number of years.*

*Source: Datateknik, no. 11, June 13, 1996*

IBM is the leading computer hardware provider, followed by Hewlett-Packard, Intel and a number of other non-Swedish companies. In the context, it is important to remember that Ericsson is qualified as part of the telecommunications industry, which will be discussed below.

The ranking list of foreign software providers — see the table below — is headed by Microsoft, which is three times the size of number two, Oracle Sweden, and more than seven times as large as number three, Autodesk.

### Foreign Software Manufacturers in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	Microsoft	1 286
2	Oracle Svenska	325
3	Autodesk	178
4	Adobe System Nordic	150
5	Computer Associates	134
6	SAP Svenska	123
7	Sybase	100
8	Informix Software Sc.	79
9	SAS Institute	68
10	SDRC Svenska	62
11	Mentor Graphics	53
12	Symantec	50
13	Novell Svenska	48
14	Lotus Development	43
15	Cincom Systems of Sw.	41
16	BaaN Nordic	33
17	Hyperion Software	30
18	Cognos	26

*Table DT:8 Microsoft is three times the size of number 2 in this list, and thus the success of Microsoft in the Swedish market, as well, is evident. But certain industry followers doubt that Microsoft can keep up with the demand for networking and Internet access.*

*Source: Datateknik, no. 11, June 13, 1996*

One of the Swedish computer journalists, Mr. Lars Dahmén of "Computer Sweden", stated in his magazine of October 27, 1995:

— 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 up and grown quietly, behind the media spotlights, but this time it is not about manufacturing hardware. The new successful companies are making their living in the software area. The suppliers of administrative software serve as good examples: Intenia, IFS, and IBS are the leaders.

In the list of leading Swedish program manufacturers, made by the magazine "Datateknik", Saab Combitech is number one, followed by Intenia and IBS, see following table.

## Swedish Software Manufacturers 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	Saab Combitech	1 175
2	Intentia	877
3	IBS	826
4	Frontec	572
5	Industri-Matematik	330

*Table DT:9 The Swedish companies in this table had a total turnover of 3 780 million SEK in 1995. The five largest, non-Swedish software manufacturers represented in the preceding table, reported a total turnover of 2 073 million SEK. One conclusion could be, that the Swedish software industry is doing quite well, in comparison.*

*Source: Datateknik, no. 11, June 13, 1996*

The IT industry coping with most troubles during 1995 was manufacturers of peripherals, for instance printers.

## Peripherals Manufacturers in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	Strålfors	1 737
2	Canon Svenska	1 241
3	UBI	635
4	Olivetti	425
5	Axis	328
6	NEC Scandinavia	313
7	OKI Systems	209
8	StorageTek	174
9	CD Plant	173
10	Fujitsu Nordic	164
11	Network Technical	150
12	EIZO Sweden	144
13	Tektronix	113
14	Intertex	63
15	Sectra	56
16	Fiskars Power Systems	56
17	Pricer	31
18	Array Printers	31

*Diagram DT:10 The total turnover for the peripheral manufacturers increased by 19% in 1995, but the result decreased by 13% and the profit margin by more than 1%. Evidently, 1995 was not a strong year for peripheral manufacturers in Sweden.*

*Source: Datateknik, no. 11, June 13, 1996*

It is true that the total turnover increased by 19%, but on the other hand the result decreased by 13% and the profit margin by more than 1%. Companies like Strålfors, Canon Svenska and UBI are the ones having the largest turnover.

Leader of the data communications league is 3Com Nordic. Number two and three are Bay Networks and NCR. This industry showed a negative profit margin in 1994, but made a turnaround to some 5% in the positive during 1995.

Interesting to note is that the Swedish subsidiary of the multibillion dollar company Cisco Systems has not provided input to the research. Cisco, based in California, and reporting a worldwide turnover for 1995 of 1 979 million US dollars, is the largest manufacturer of data communications equipment in the world. Earlier this year, the company paid 4 billion US dollars, more than 25 billion Swedish crowns, for Stratacom in order to get access to its knowledge of advanced data switches and telecom know how.

### Data Communications Providers in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	3Com Nordic	442
2	Bay Networks	353
3	NCR	239
4	Alcadon	138
5	UB Networks	112
6	Ale Datapanel	73
7	Datalogic	55
8	Cabletron Systems	54
9	Dafix	53
10	Westermo Teleindustri	32

*Diagram DT:11 These companies, the ten largest in the business of data communications, reported a total turnover of 1 551 million SEK in the Swedish market for 1995. Against all intuition, this industry is not doing as well as one would believe, judging by marketing activities, at least not just yet.*

*Source: Datateknik, no. 11, June 13, 1996*

The telecommunications industry is, thanks to its number one and two members Ericsson and Telia, the one having the largest turnover of all the IT sub-industries. Number three is Finnish Nokia. Several of the telecommunications operators are showing rather heavy losses for 1995.

## 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

*Table DT:12 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*

## Distributors in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	Scribona	6 054
2	Santech Sverige	1 366
3	Computer 2000	1 161
4	Nordic Datadistr.	786
5	Facit	541
6	Martinsson Elektronik	430
7	Micro Software Sv.	406
8	Gandalf Data	331
9	Metric	324
10	Berendsen Comp.	317

*Table DT:13 1995 was a strong year for the distributors of PCs in Sweden. According to the research company IDC, the industry increased by more than 30%. In total, 710 000 PCs were sold in Sweden in 1995.*

*Source: Datateknik, no. 11, June 13, 1996*

The distributing industry is the one IT industry, answering for the largest part of the turnover increase for the whole industry. Scribona, Santech Sweden, and Computer 2000 are the biggest players.

## Retailers in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	Office	1 663
2	CMA Computer Markt.	1 496
3	Kontorslandslaget	1 100
4	SDI-gruppen	891
5	Q D System	620
6	Alfaskop Partner	529
7	Tandy's Computer City	490
8	Pulsen	460
9	Computerland	405
10	IMS Data	392

*Table DT:14 The three top retailers have a total turnover of 4 259 million SEK, which is more than half of the total turnover, 8 046 million SEK, of the top ten retailers in Sweden.*

*Source: Datateknik, no. 11, June 13, 1996*

The major clients of the distributors, the retailers, are facing some difficulties, due to the fact that they are seeing competition from the traditional radio and television retailers. The retailers' ranking list is headed by Office, CMA and Kontorslandslaget.

During 1995, the computer service companies increased their profit margins for the third consecutive year. VM-data, second after Enator, showed according to "Datateknik", a profit margin of 9.7%, while number three, Cap Programator, was down to 5.6%. Capella, thirteenth in ranking, had a profit margin of 13.8%.

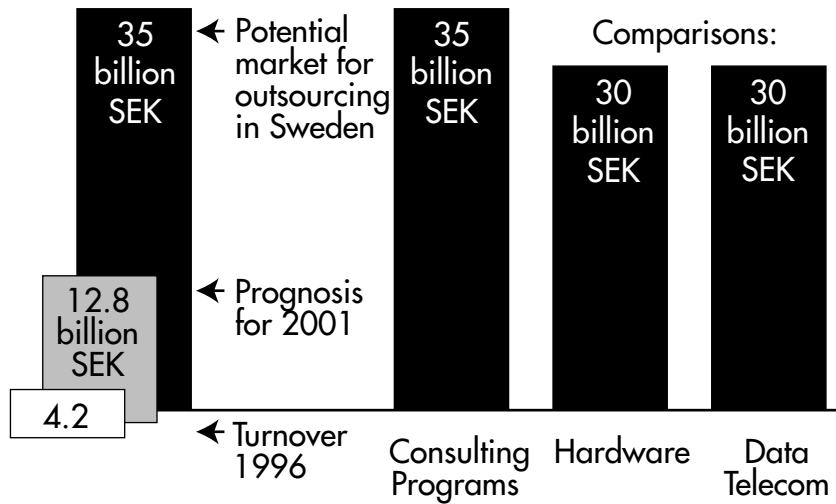
## Computer Service Companies in Sweden 1995

Ranking 1995	Company	Turnover 1995 million SEK
1	Enator	4 067
2	WM-data	3 260
3	Cap Programator	2 326
4	Sema Group Sweden	1 518
5	EDS Sweden	866
6	Merkantildata	722
7	Mandator	350
8	Capella	283
9	Tietotehdas Sweden	244
10	Enea Data	198

*Table DT:15 The top ten among the service companies had a total turnover of 13 834 million SEK in 1995. The top three were responsible for more than two thirds of this total turnover, 9 653 million SEK.*

*Source: Datateknik, no. 11, June 13, 1996*

## Outsourcing in Sweden Trebles in Five Years 1996 — 2001



*Fig. Feb. 18. 8: 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*

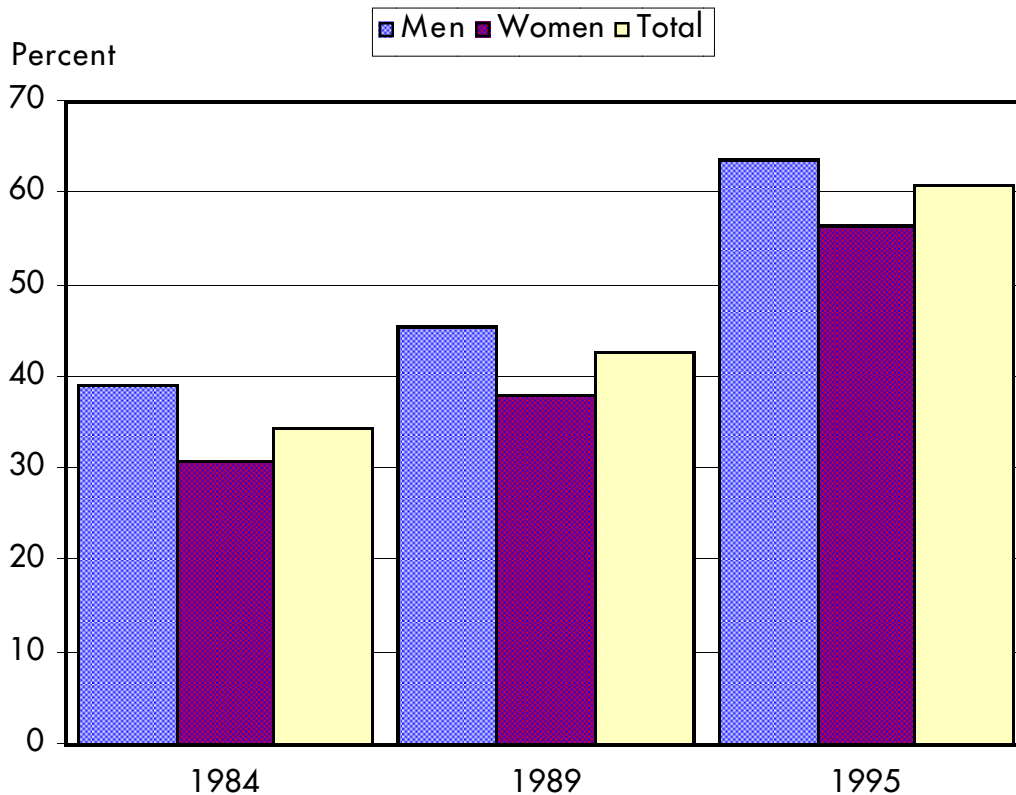
## 4.2. The IST Users in Sweden

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 1.1 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.

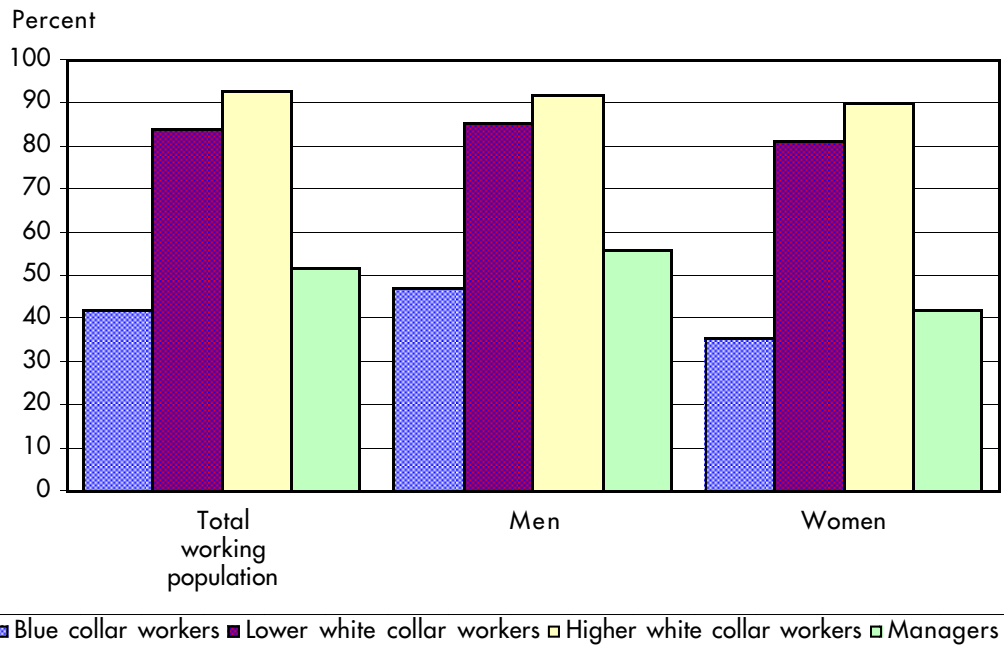
The data in the following chapter is based on the latest survey of computer habits among Swedish users, carried out during 1995 by Statistic Sweden on commission of the Swedish government's IT Committee. Similar surveys were

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



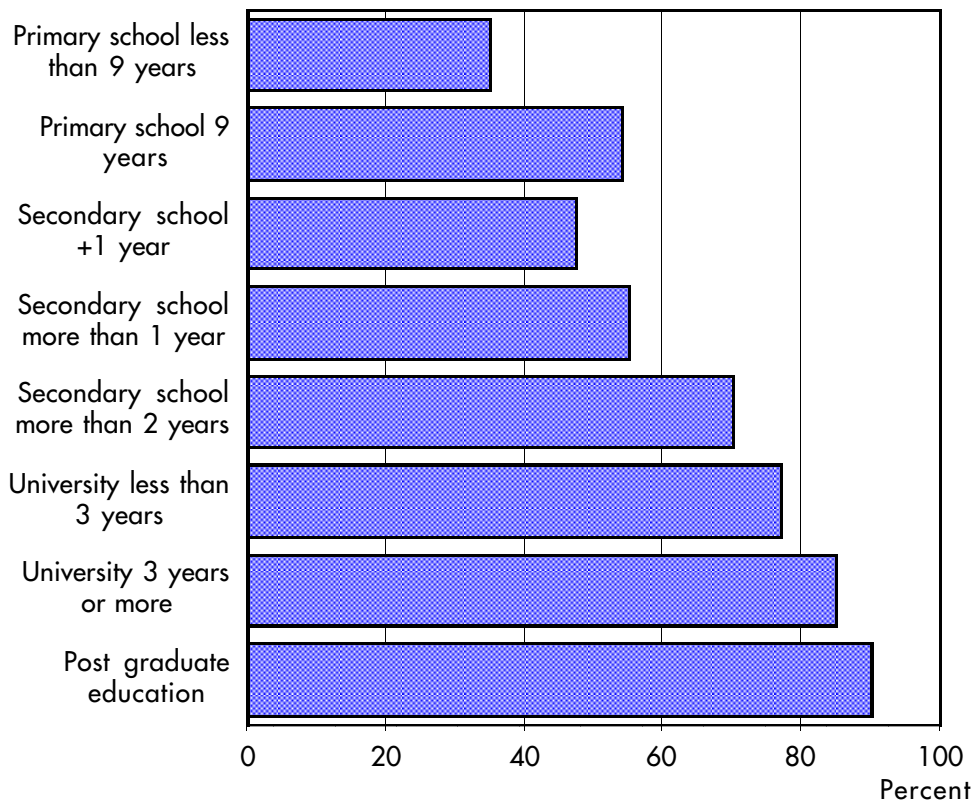
*Fig 1.2 The diagram shows the socio-economic distribution in percent of Swedish computer users among blue collar workers, lower white collar workers, higher white collar workers, and managers. Figures are given for each category in total as well as the distribution per category among men and women.*

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

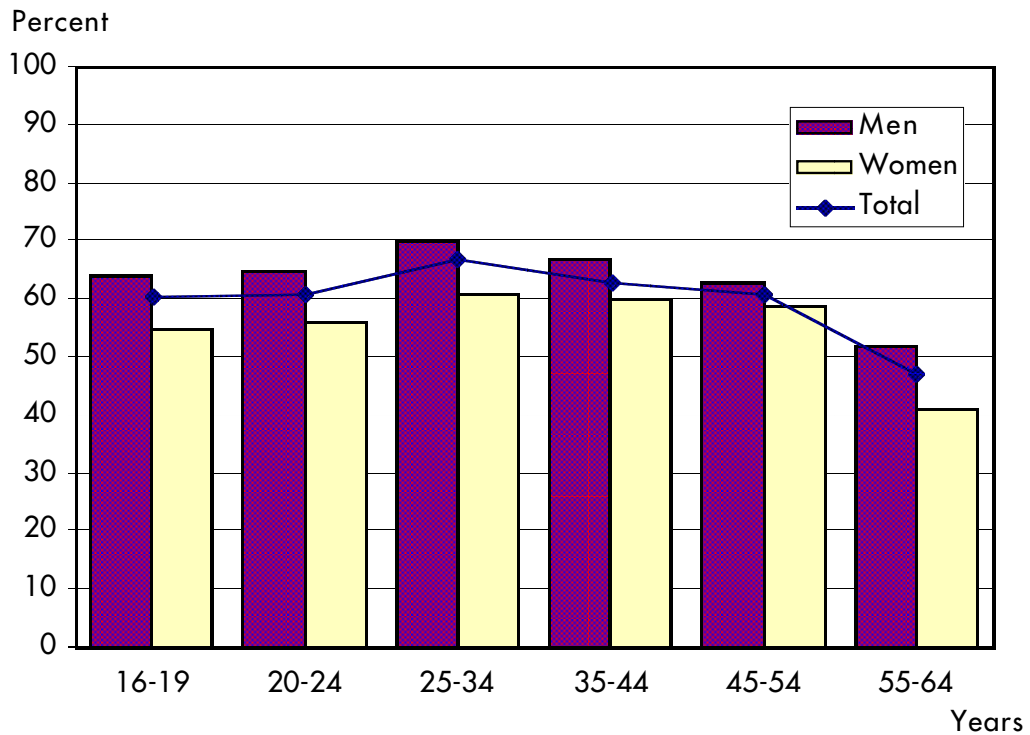


*Fig 1.3. The best educated Swedes are the most frequent computer users. Interestingly enough, Swedes having left primary school after 9 years, are more frequent users than those having spent some time in secondary school. Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden*

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 than 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 1.4 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.*

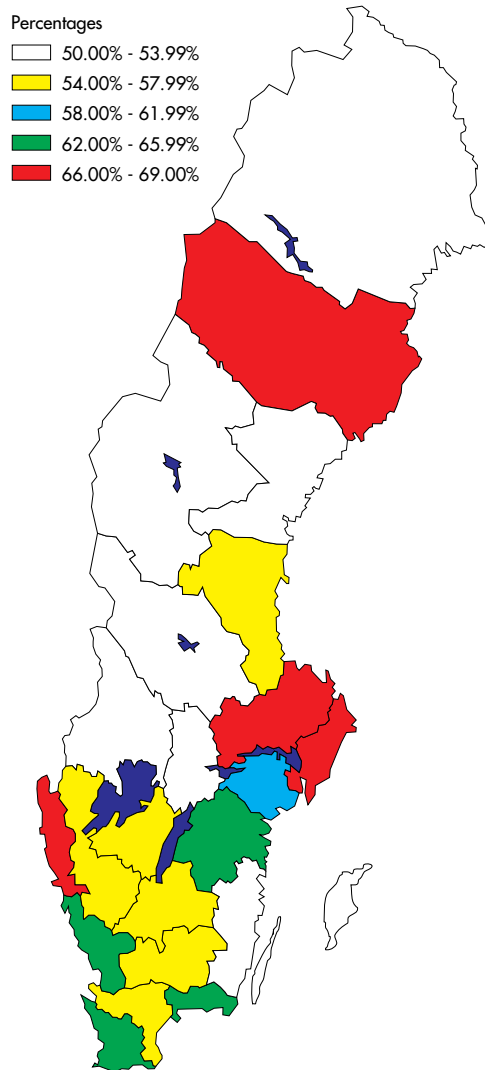
*Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden*

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 1.5 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*

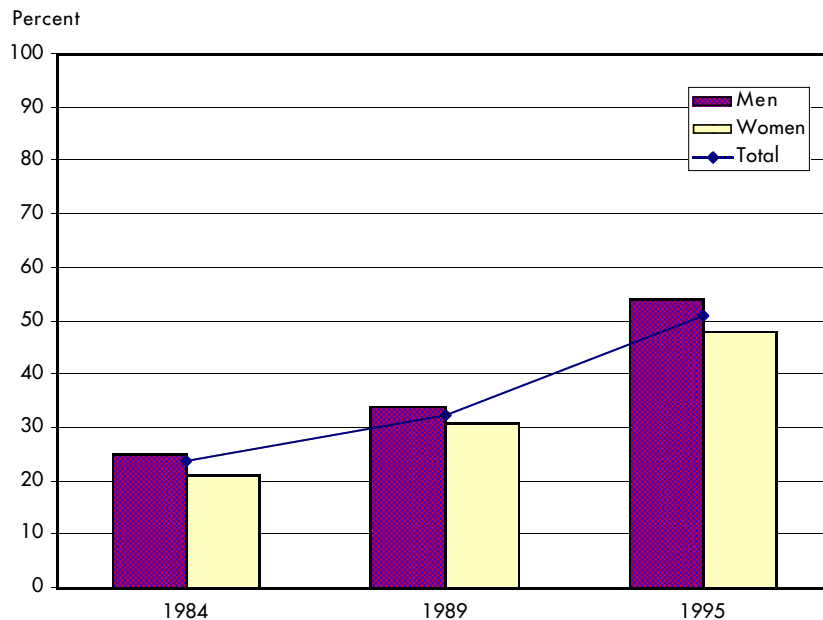
The council of Västerbotten in the north is one of the most user intense areas — 67% of its inhabitants are computer users, while their immediate neighbours all belong to the less user intense computer user areas of Sweden.

### 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

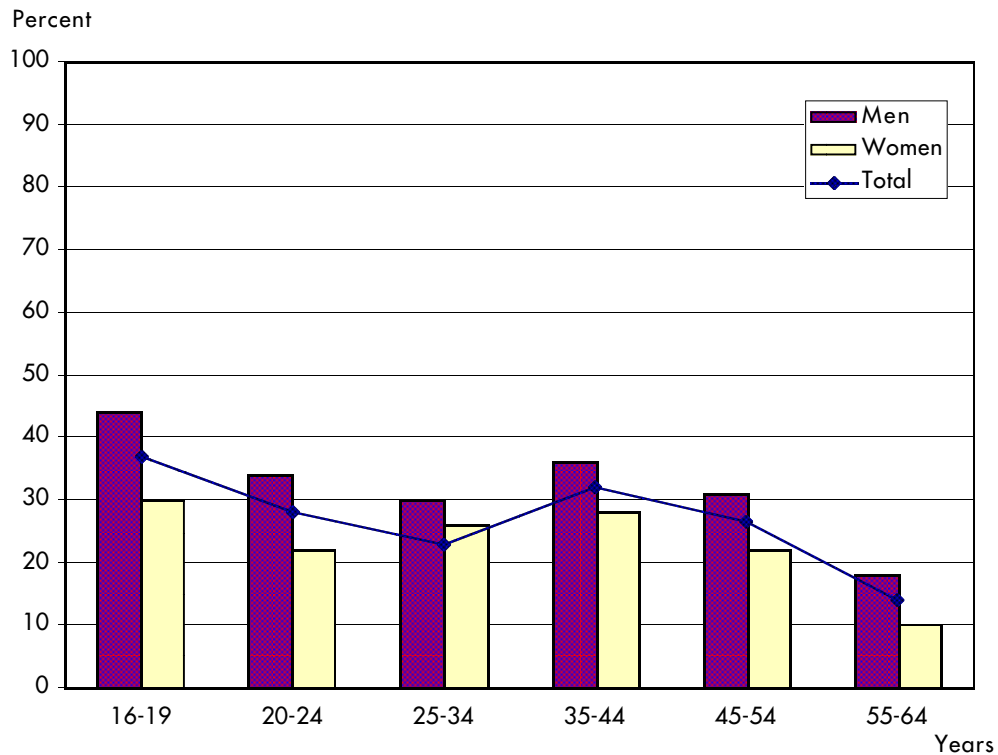


*Fig 1.6 Statistics Sweden has so far made three surveys of computer usage among the Swedish working force, in 1984, 1989, and 1995. At the first two occasions, Sweden had one of the most computerised working forces in the world. This is no longer so, countries like Denmark and Switzerland have overtaken 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 1.7 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.*

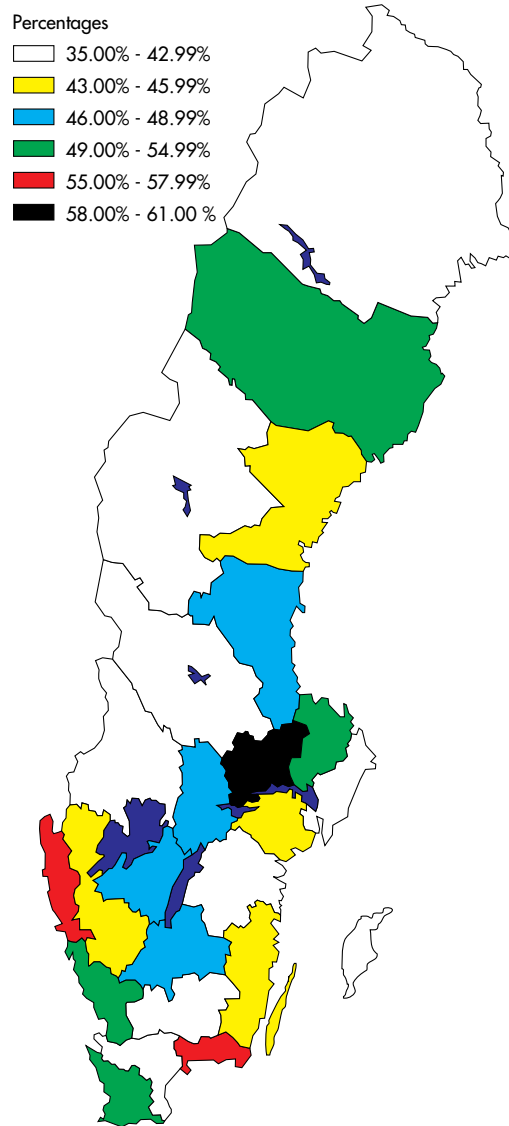
*Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden*

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 1.8 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".

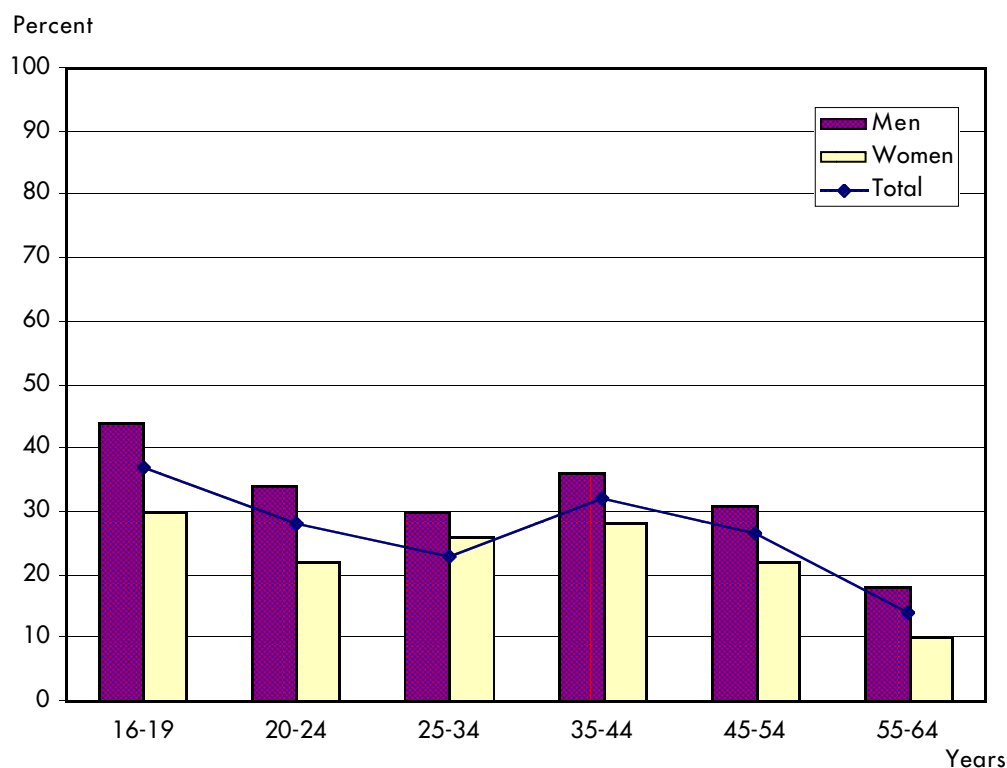
Among those using personal computers, 70% are connected to networks. 57% of all users of personal computers, some 930 000 persons, are using networks in order to share information. Sharing is related to the sharing of data such as electronic documents and databases, while the sharing of operating systems 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 administrative 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



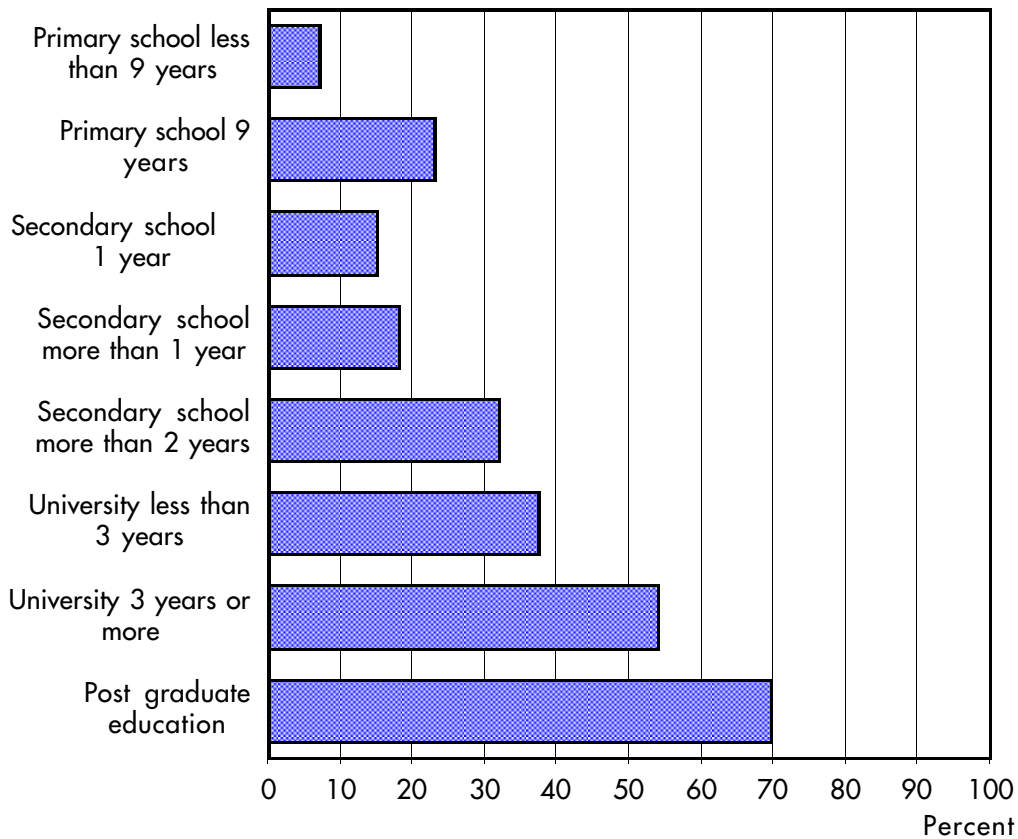
*Fig 1.9 At home, the most frequent computer users are the young ones, those aged 16 to 19 years. Again, the men are dominating, more than 40% are computer users, while less than 30% of the young women use computers at home.*

*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 home as 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**



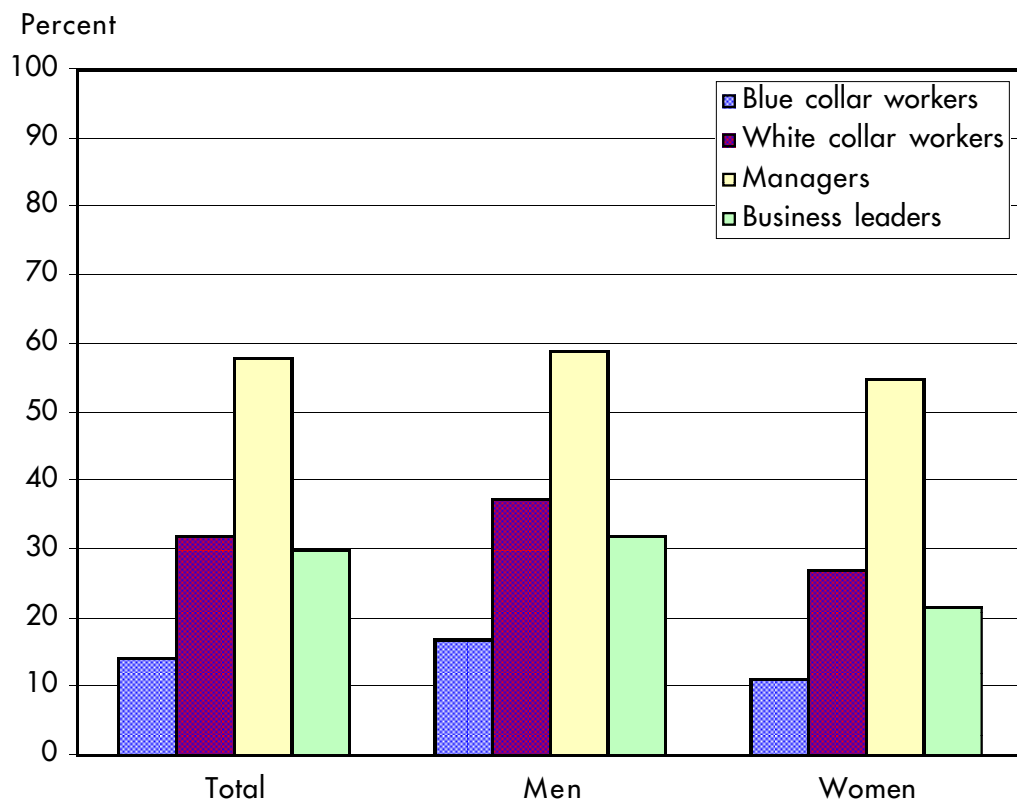
*Fig 1.10 The correlation between computer usage at home and level of education is a strong one. Almost 70% of those holding post graduate degrees are using computers at home, in comparison to less than 10% among those having spent less than 9 years at primary school.*

*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 1:11 People belonging to the category "managers", i.e. white collar workers in high positions, 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.*

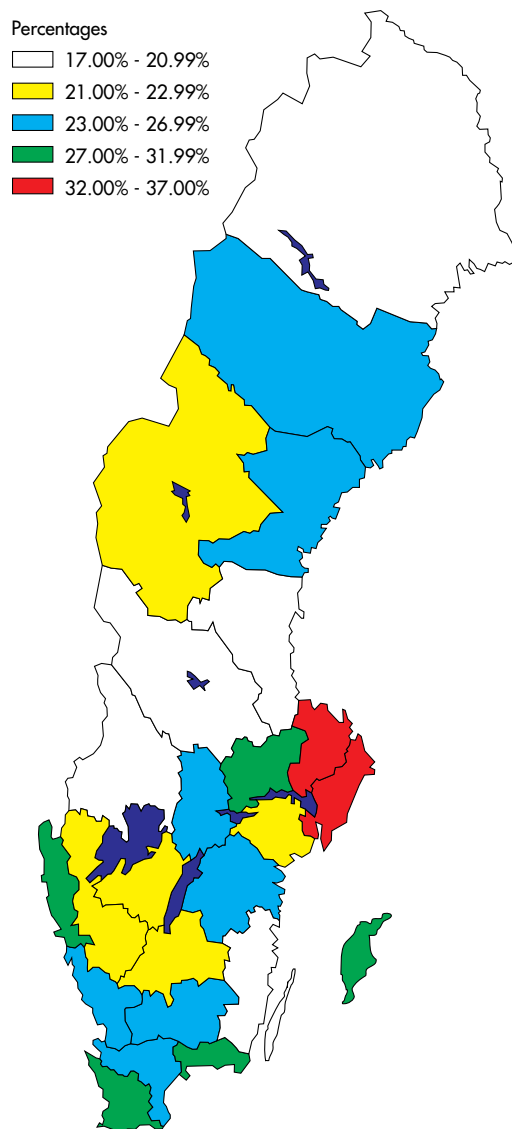
*Source: "Data om informationstekniken i Sverige 1996", SCB/Statistics Sweden*

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 voluntary 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 1.12 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*

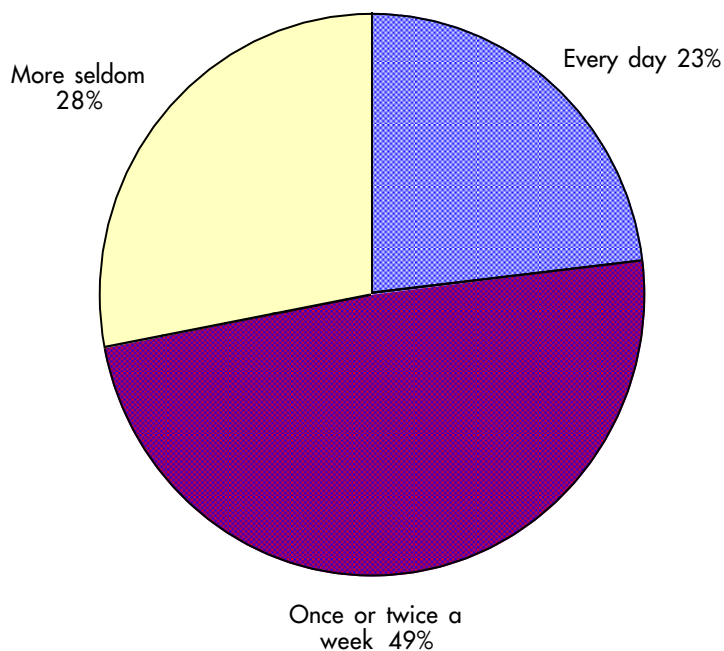
A map of the geographical distribution of home computer usage shows that the counties of Stockholm and Uppsala are the areas most densely populated by home computer users — some 35% of the total population.

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



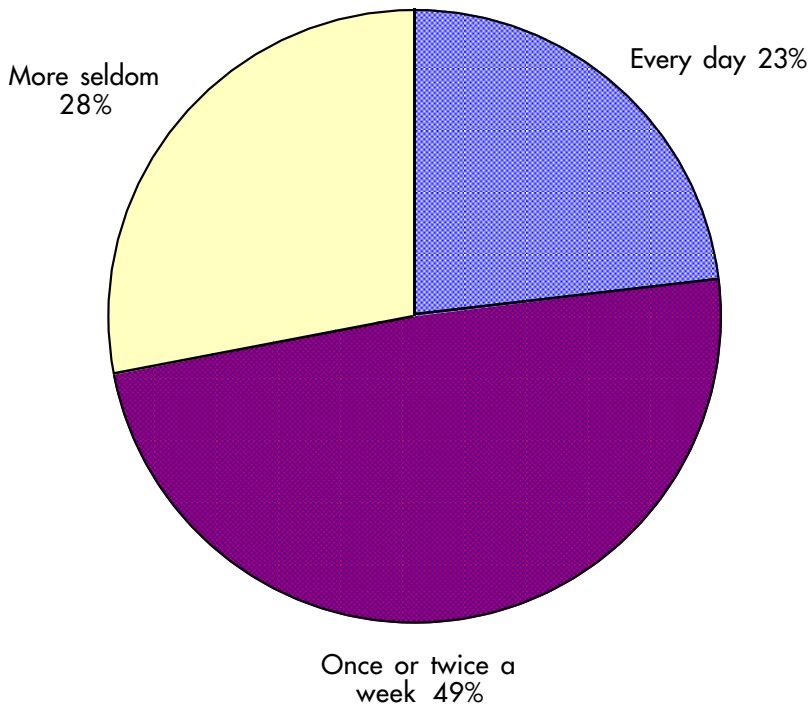
*Fig 1.13 A PC is defined as a computer running under one of the operating systems DOS/Windows, OS/2 or NT. PCs are dominating at home, as well as at work. 15% are Macintosh-users, which is equivalent to 210 000 persons.*

*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 1.14 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

*Table 1.3 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 wherever 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

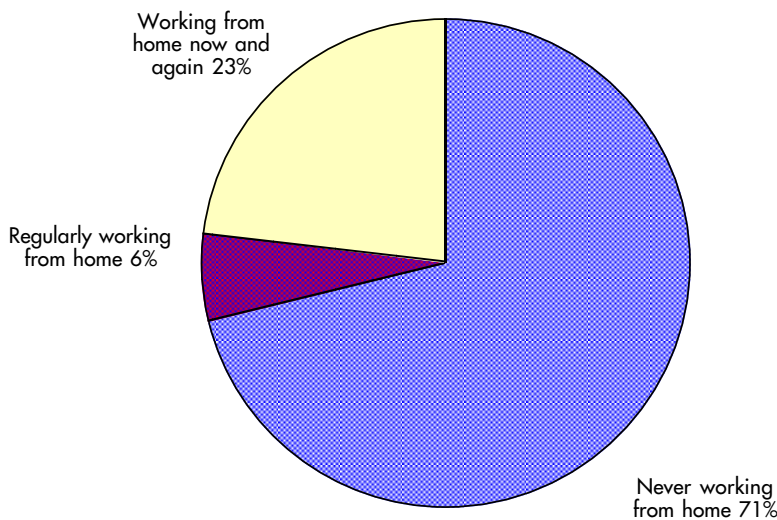


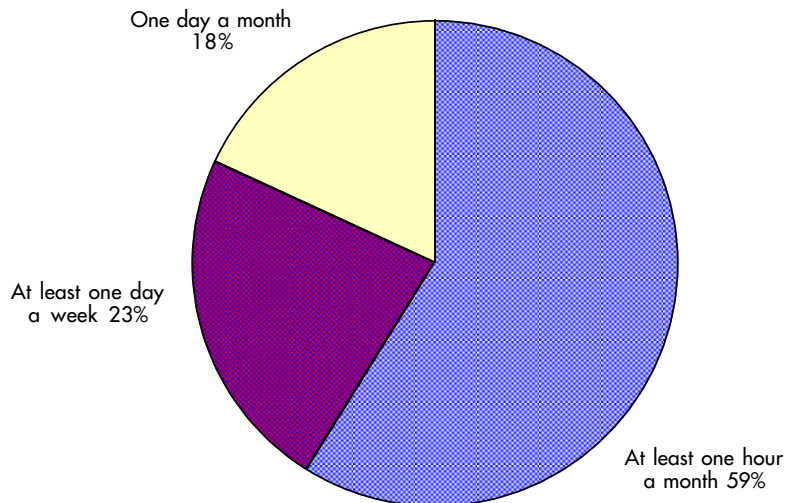
Fig 1.15 The total Swedish working force consisted of 3 466 000 persons by the end of 1995. 23% of these were working from home now and again, 6% said they were working from home regularly, while the great majority, 71%, said they never worked from home. In total, some 800 000 people are working from 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



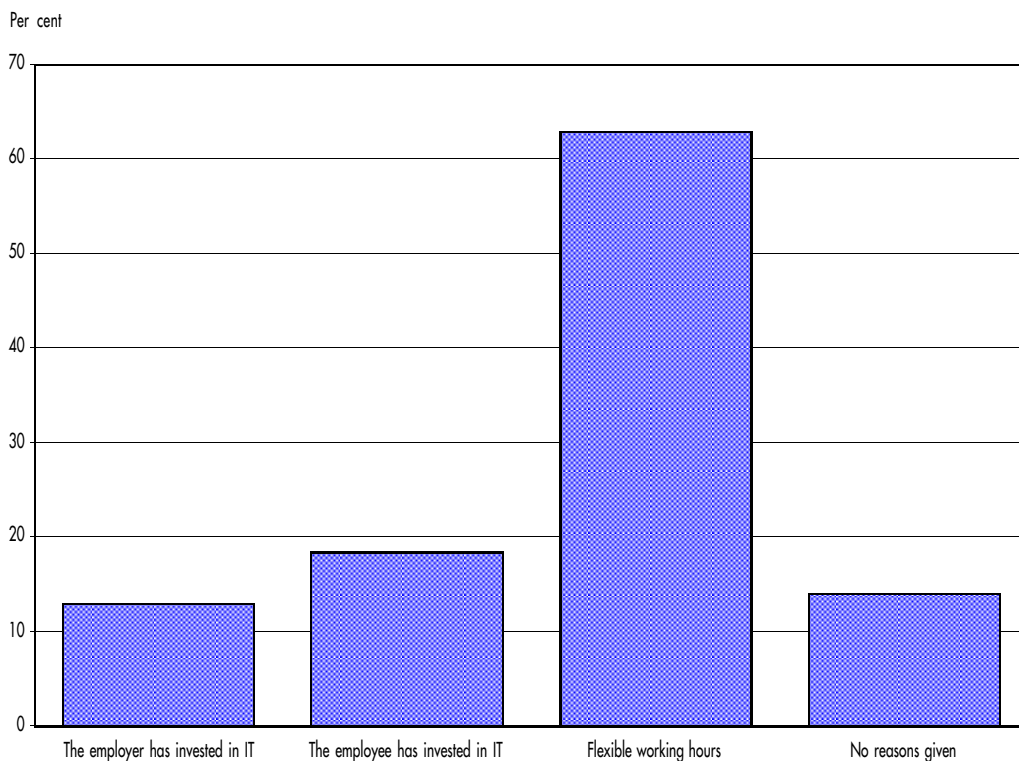
*Fig 1.16 Some 800 000 Swedes are working from home some of their regular working hours. 23% say that they work from home at least one day a week, while the great majority are infrequent workers from home — 59% spend at least one hour a month working from home.*

*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

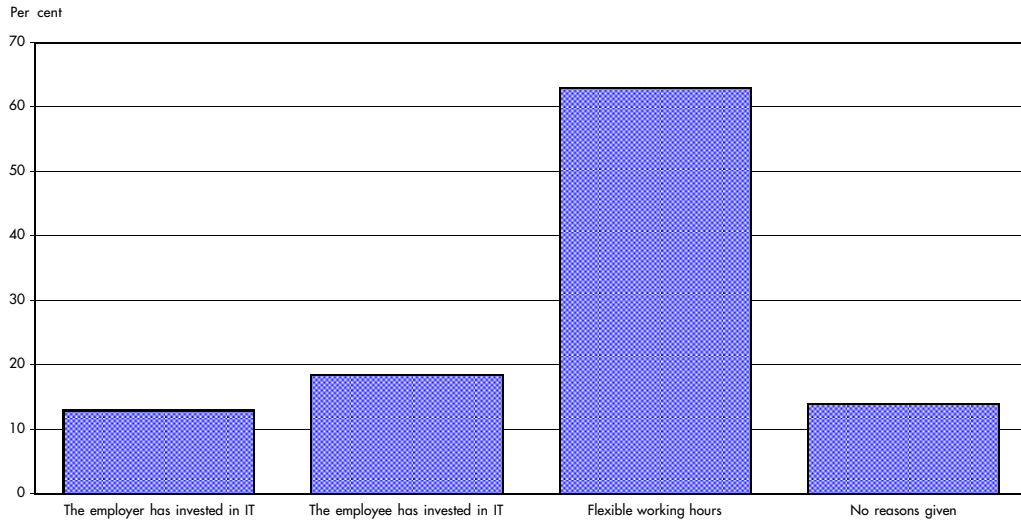


*Fig 1.18 The dominant reasons given for working at home are temporary time pressure and a need for peace and quiet when solving problems. In this survey, less than 10% have said they "want to avoid travelling time" as a reason for working at home.*

*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

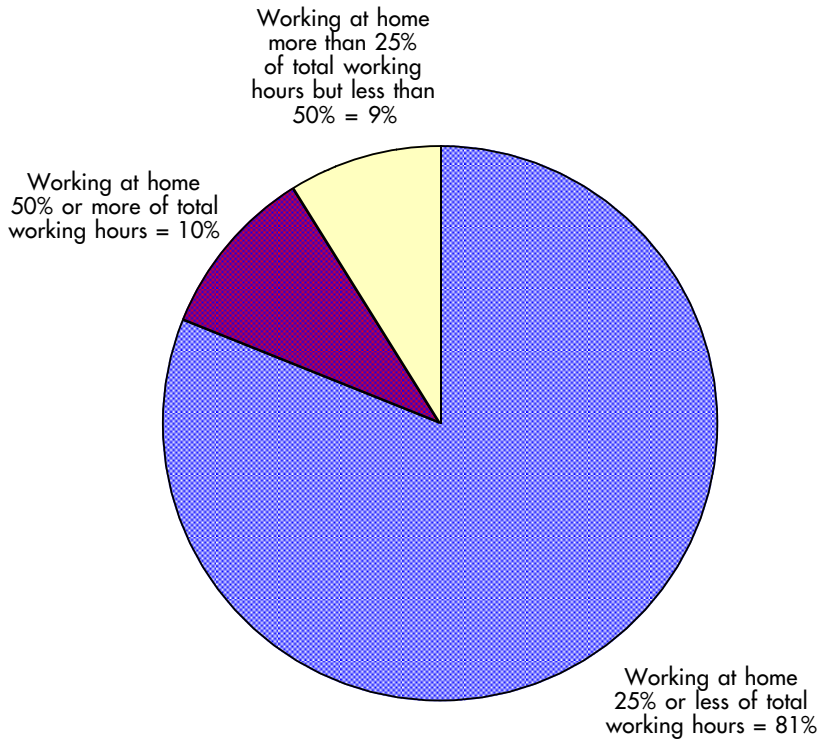


*Fig 1.17 The above diagram gives major reasons for which people in Sweden work at home now and again. The most important factor is the flexible working hours, while it is of less importance that the employer has invested in IT equipment stationed at the employee's home.*

*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 1.19 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.

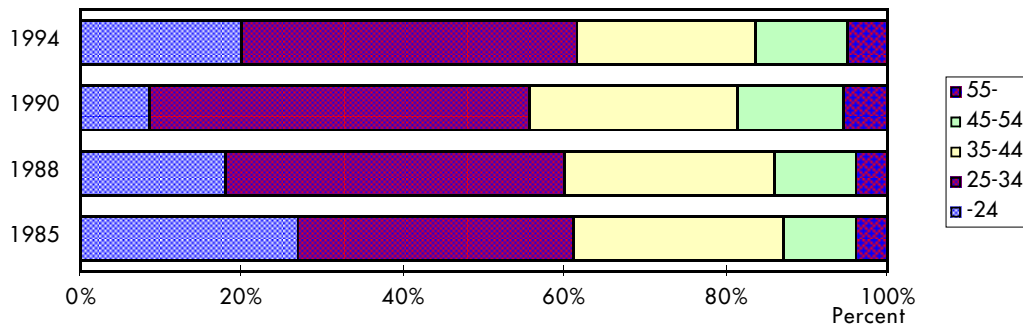
According to the regular surveys on finished educations, carried out by Statistics Sweden, the following number of IT diplomas and academic degrees have been awarded during the period 1985 — 1994 in Sweden:

\* 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**

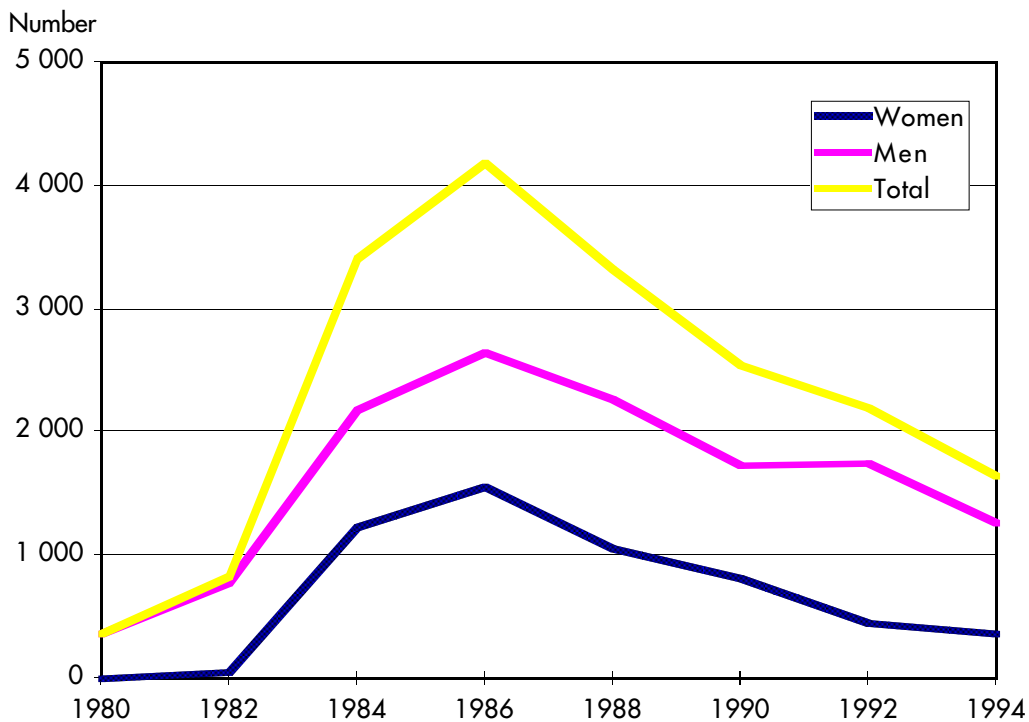


*Fig 1.24 The largest percentage of persons having some kind of IT education and/or training still is found in the age groups 25—34 years.*

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.**

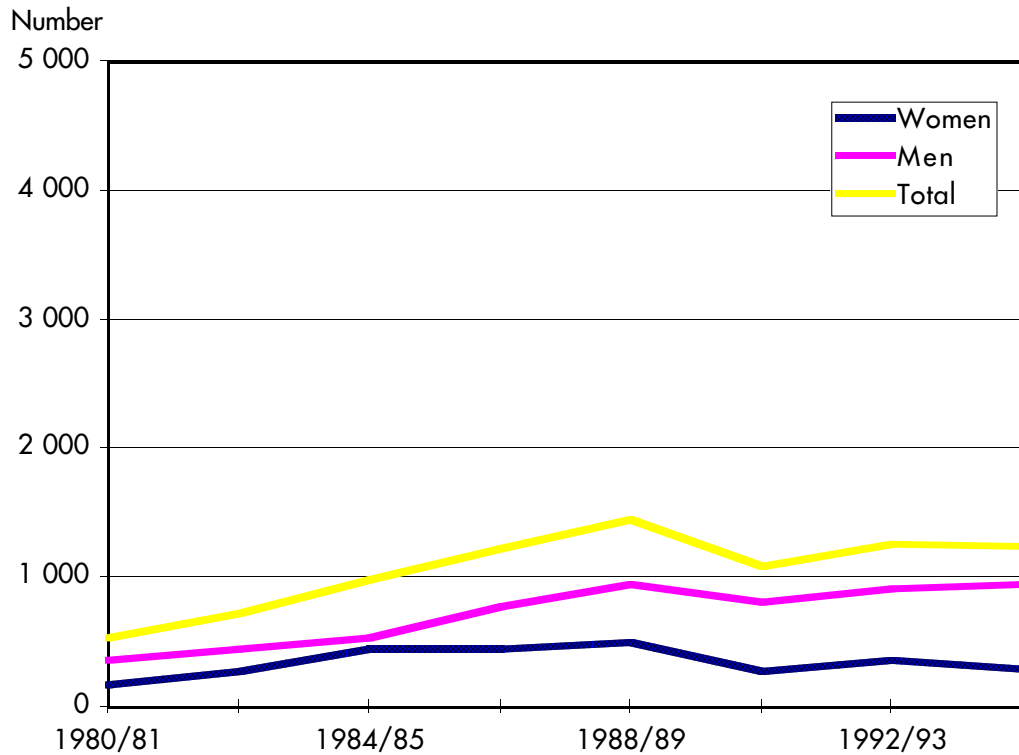


*Fig 1.25 There were fewer students taking the specialised IT courses in 1994 than in 1986. During the same period, fewer female students participated in these courses. One reason for the decreased student interest in the specialised courses is, that there were more integrated IT courses offered in 1994 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.**

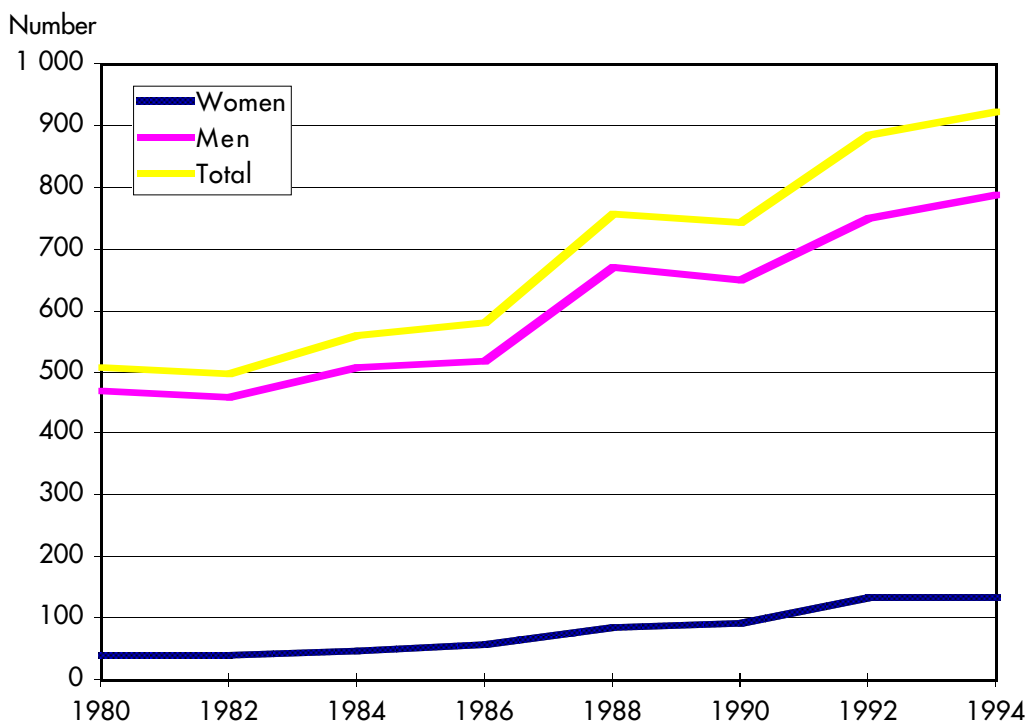


*Fig 1.26 According to these statistics, the number of female students has decreased. But these changes are partly due to changes in curricula structures at the universities — large number of students are participating in what are called "free courses", i.e. courses not being part of a formal education 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.**

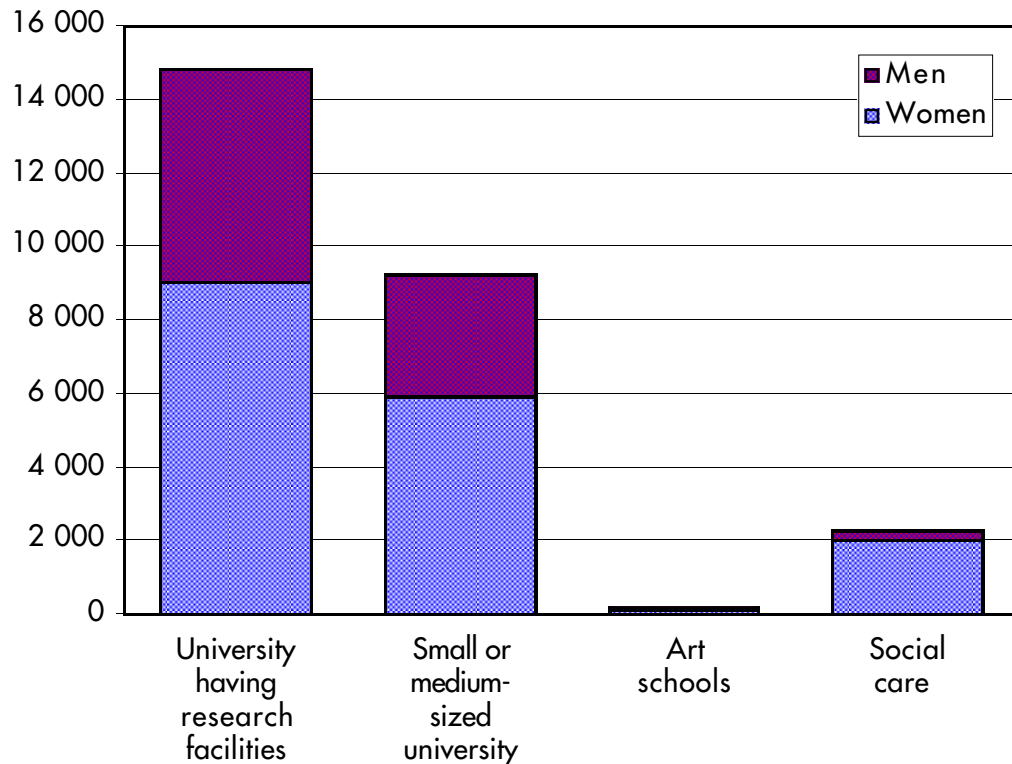


*Fig 1.27 While students' curricula at high schools and universities have undergone considerable structural changes, making statistical comparisons over a period of time difficult, the scientific IT research programmes have not changed. It should be noted, that relatively seen fewer women are participating in the research programmes.*

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

An ever larger number of students are choosing 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 1.28 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 voluntary 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

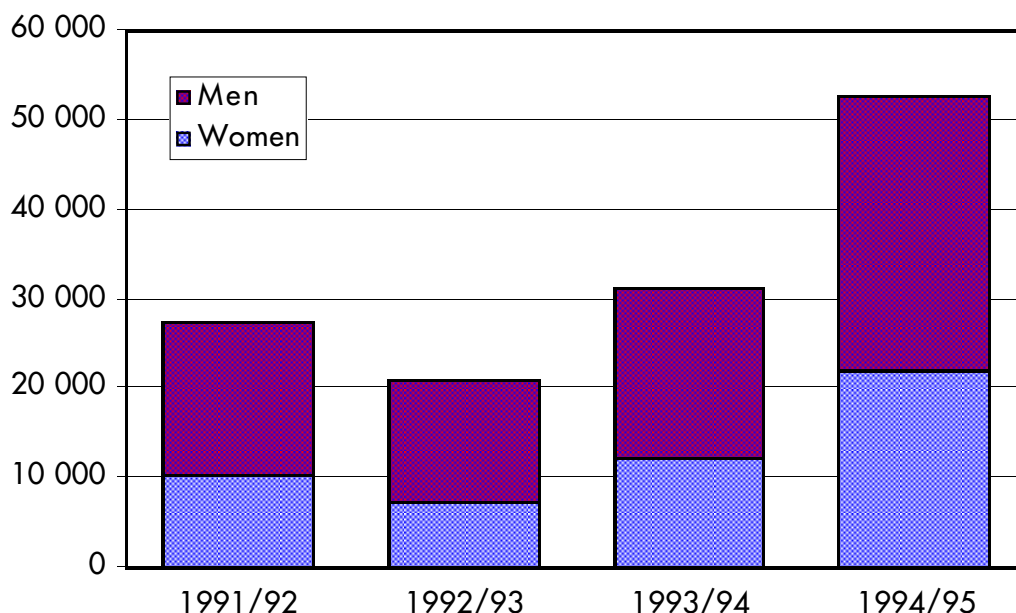


Fig 1.29 54 000 persons participated in IT courses offered by evening schools in Sweden during the academic year of 1994/95. This should be compared to some 28 000 students in the academic year of 1991/92. 40% of all students in 1994/95 were women.

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

Table 1.10 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

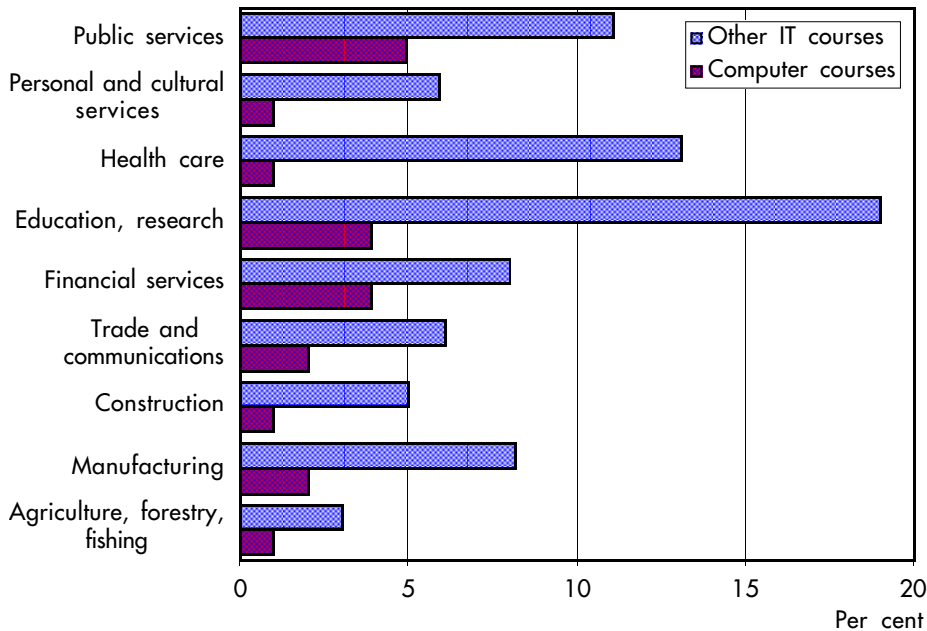
## Internal Training Programs

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



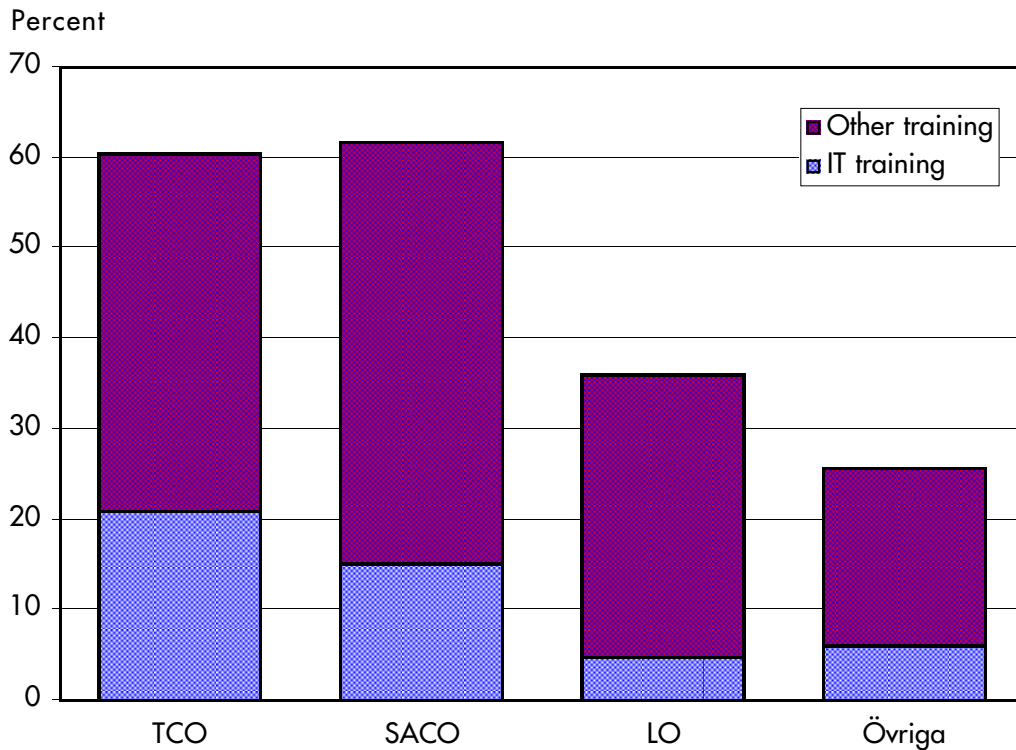
*Fig 1.30 In 1995, 416 000 persons in Sweden participated in computer training programmes paid for by the employers. The majority of the training programmes concentrated on computer usage. 27% of all students were trained in general computer knowledge, while 11% received training in programming and system 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 1.32 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.*

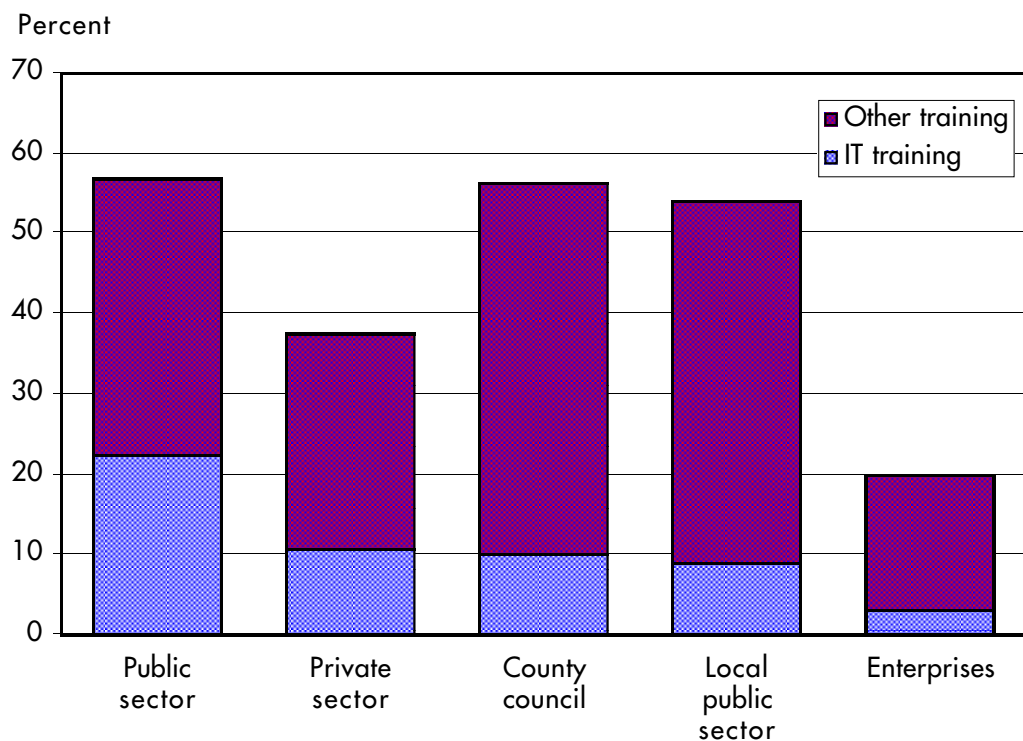
Source: SCB: Datoranvändning 1995/SCB: Data om informationstekniken i Sverige 1996

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

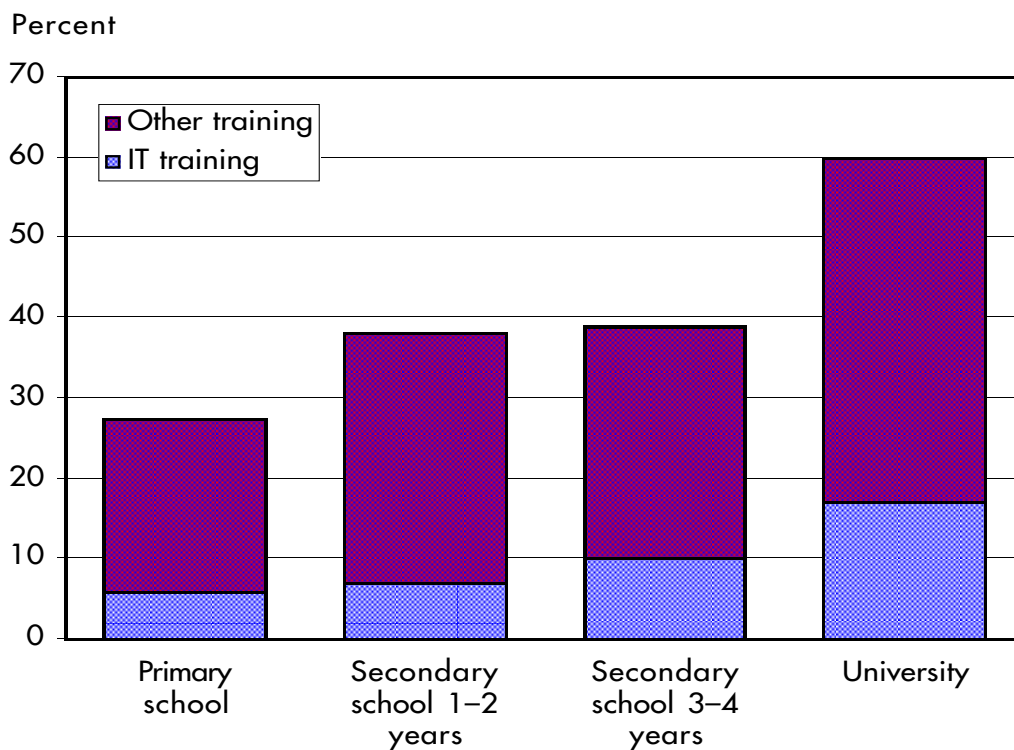


*Fig 1.33 Persons employed by the public state sector are the most frequent participants in any type of internal training courses, as well as in computer training programmes. People employed in private enterprises within the public sector are the less frequent participants.*

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

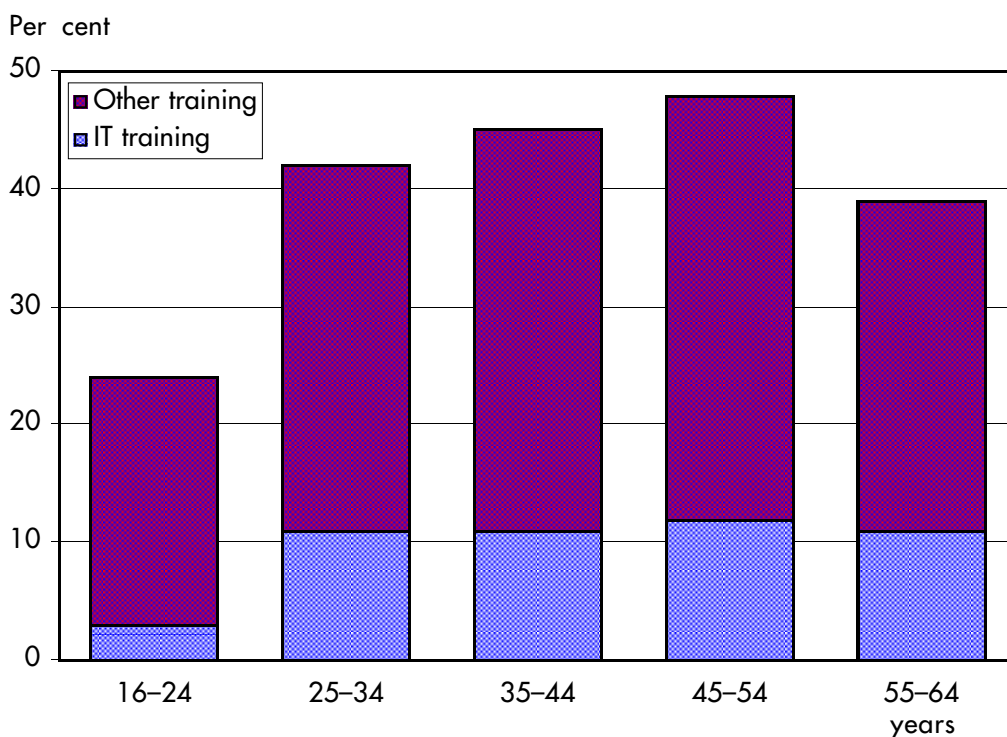


*Fig 1.34 About three times as many persons holding an academic degree as people having primary education only, participated in internal computer training programmes during the first six months of 1995. Participation in internal training programmes shows a general pattern: 60% of those employees holding 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

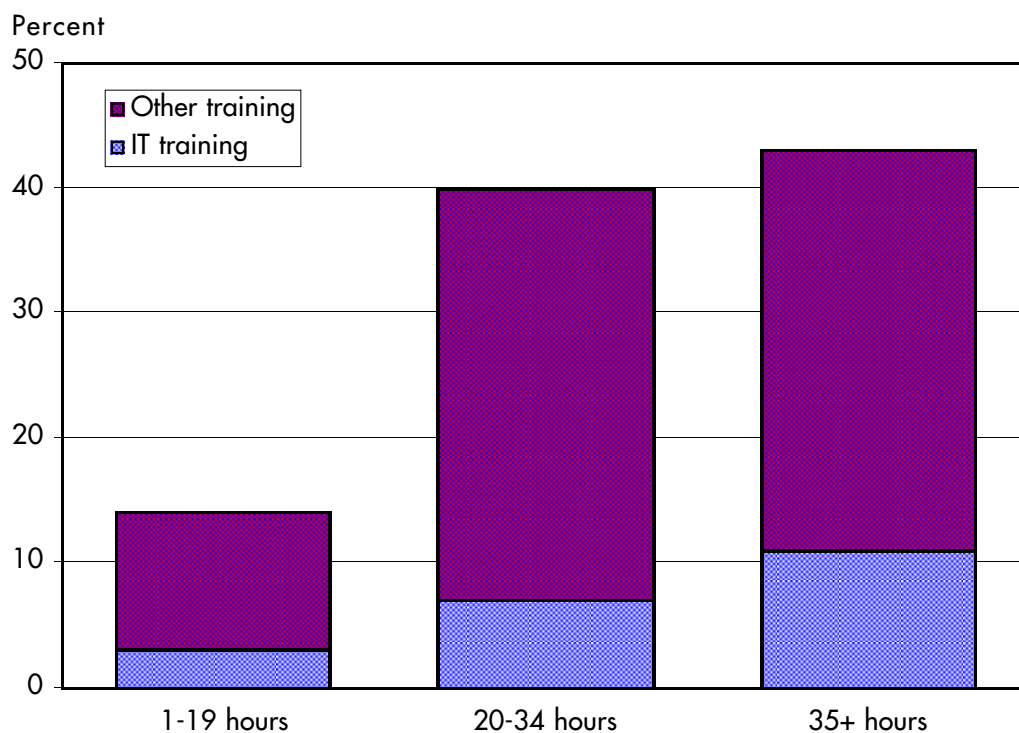


*Fig 1.35 12% of those working and belonging to the age group 45 — 54 years participated in internal computer training programs. They were the most frequent participants, while the youngest age group members, those of 16 — 24 years, were the least frequent participants. Only 3% of these young people 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 1.36 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

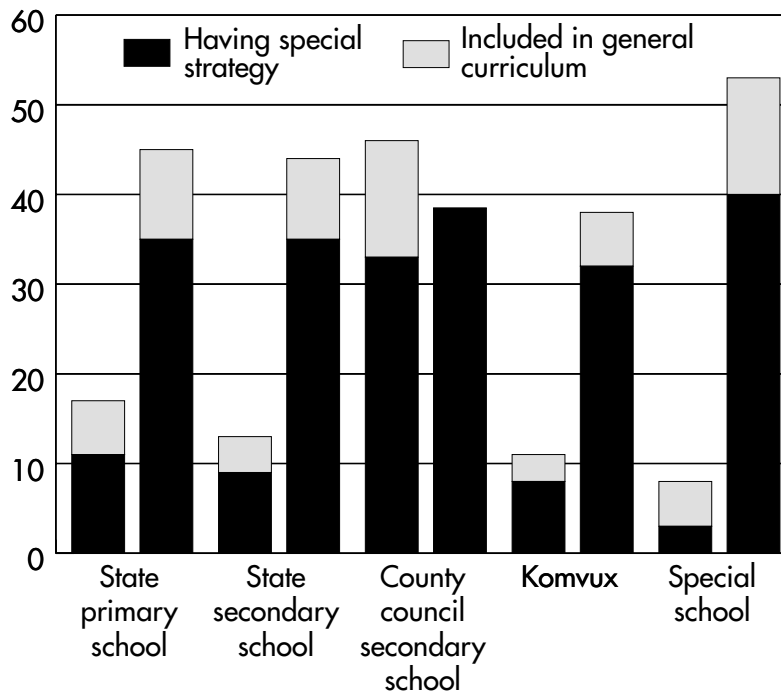
*Table 1.11 The number of computers at school has more than doubled for the majority of the different types of schools. In the state primary schools, the number of students per computer has halved from 38 students to 19. In the free — or privately run — schools, there were 12 students per computer in 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 1.38 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

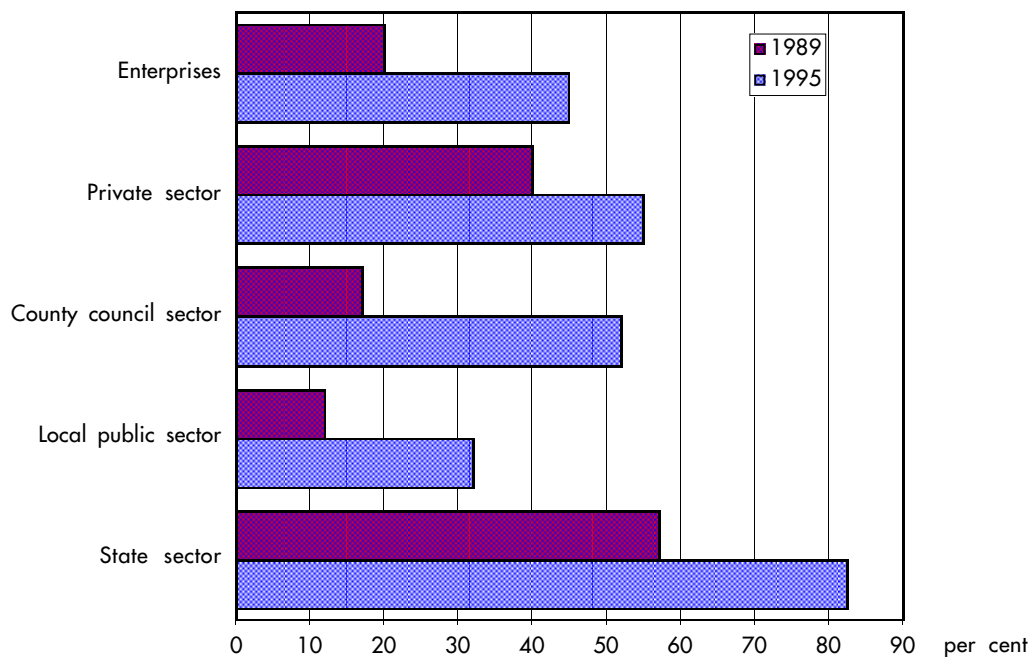
## 4.5. Computers and Public Services

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

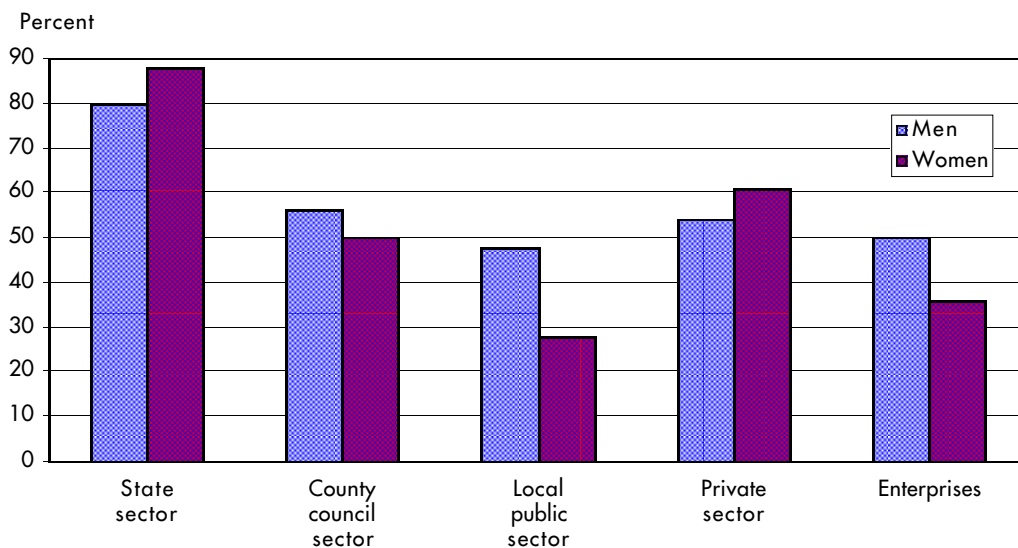


*Fig 1.39 80% of all public employees were working in computerised offices in 1995. The equivalent figure for 1989 was 63%.*

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

So, for instance, within the county councils, computer usage has almost trebled. Among the users in the local administrations, computers were used two and a half times as frequently in 1995 as they were in 1989. Also among the public enterprises, computer usage has more than 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

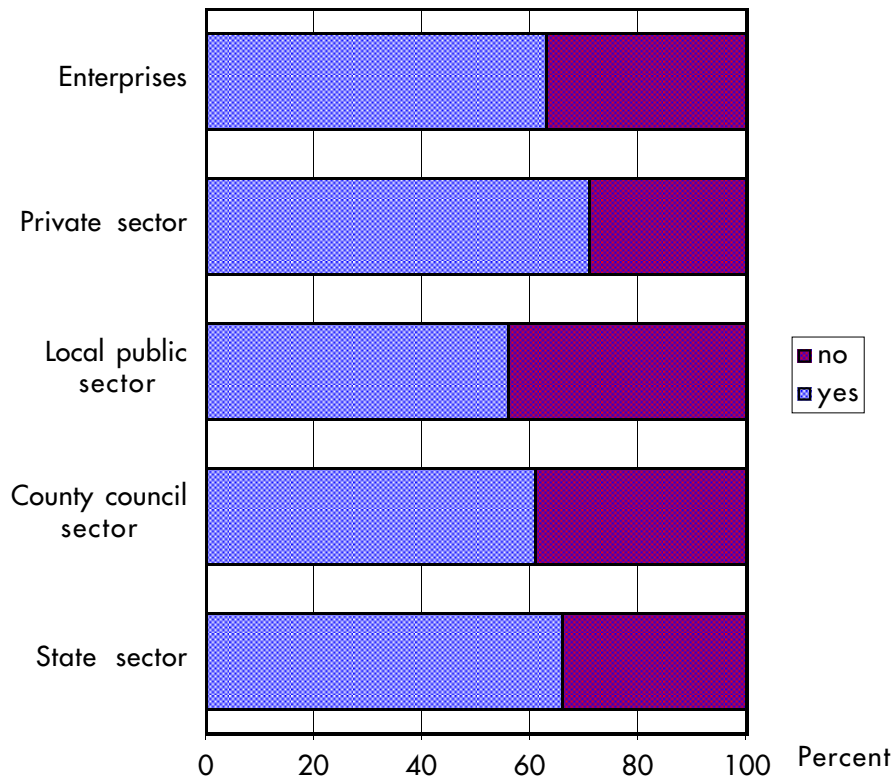


*Fig 1.40 In the state sector, as well as in the private sector, the majority of the computer users are women, while men are the most frequent computer users in the county council sectors and in the local public sectors.*

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.

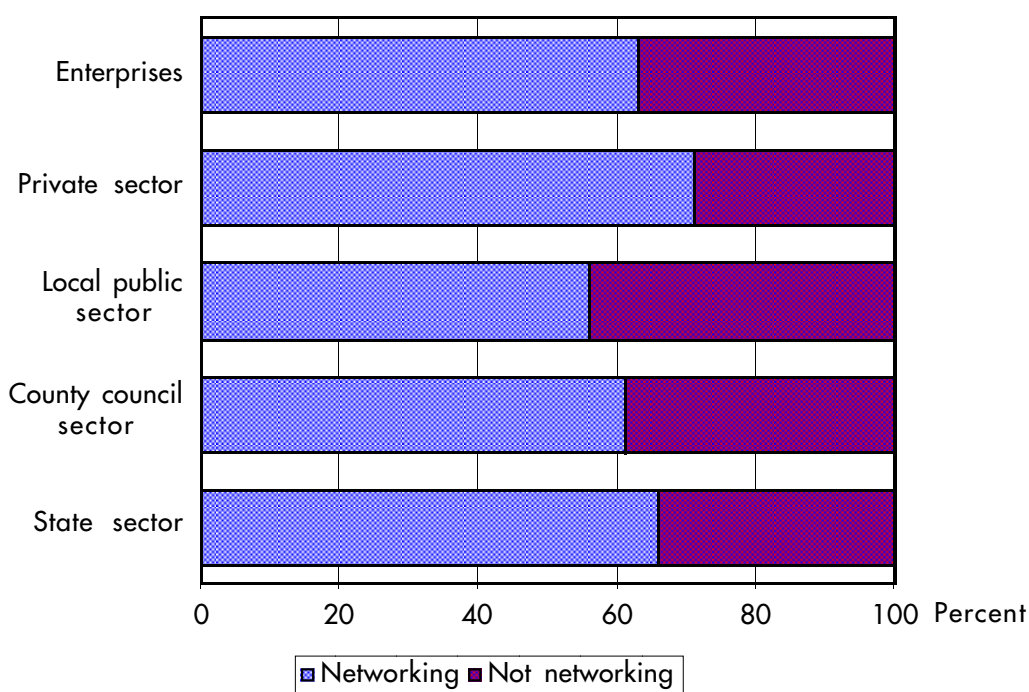
**Computer Users and Appreciated Level of Knowledge per Labour Market Sector in Sweden in 1995**



*Fig 1.41 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 1.42 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 female 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).

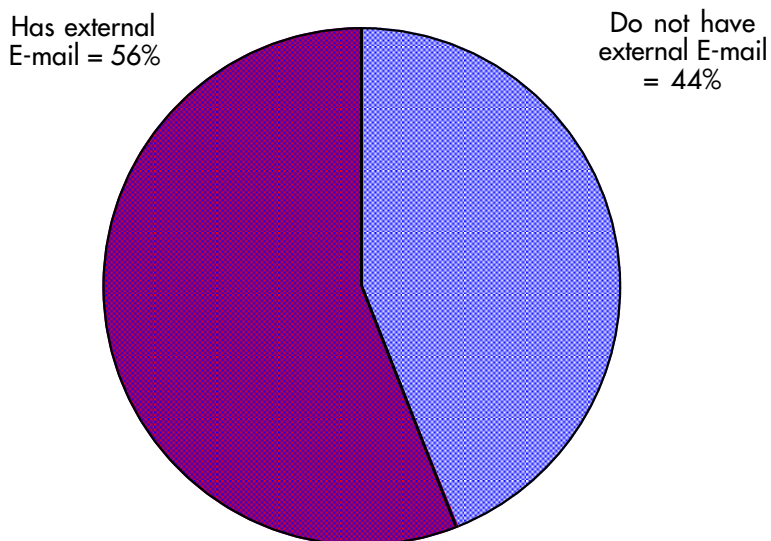
Self employed persons, in this context, are defined as people working in their own company as freelancers for the public authorities. Less than half of these, or 195 000 persons, are using computers. 50% of the male entrepreneurs use computers, while 36% of the female ones are computerised (see diagram 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 1.17 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 were 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
<b>Total</b>	<b>166</b>	<b>100</b>

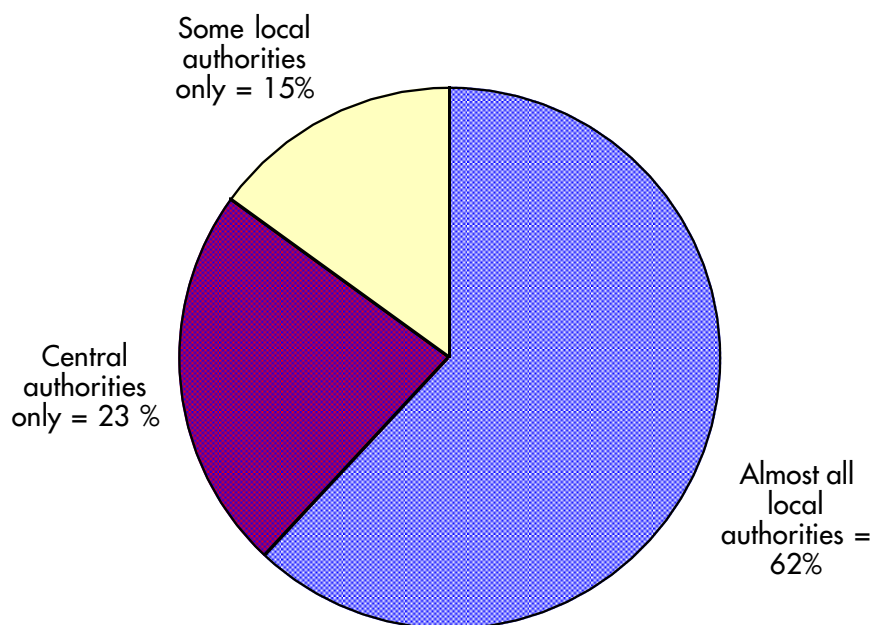
*Table 1.17 In total 78% of the Swedish county councils and public authorities are using internal E-mail systems.*

*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.

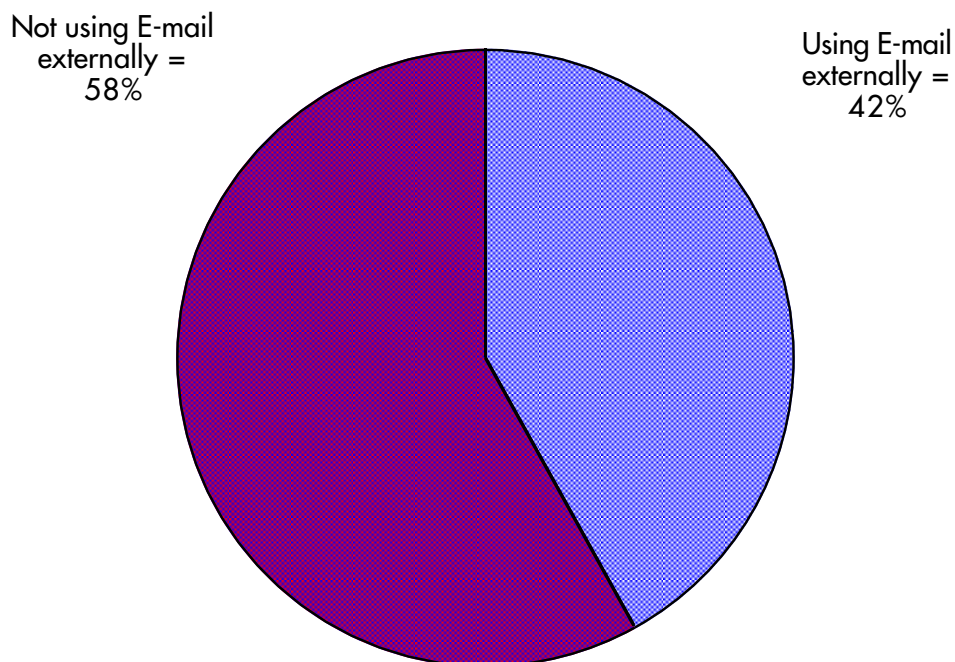
## Percentage of Local Authorities whose Employees Have Internal E-mail



*Fig1.44 This diagram is related to the local public administrations, the administrative units called "kommun" in Swedish. There are 284 "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.*

*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 1.45 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**

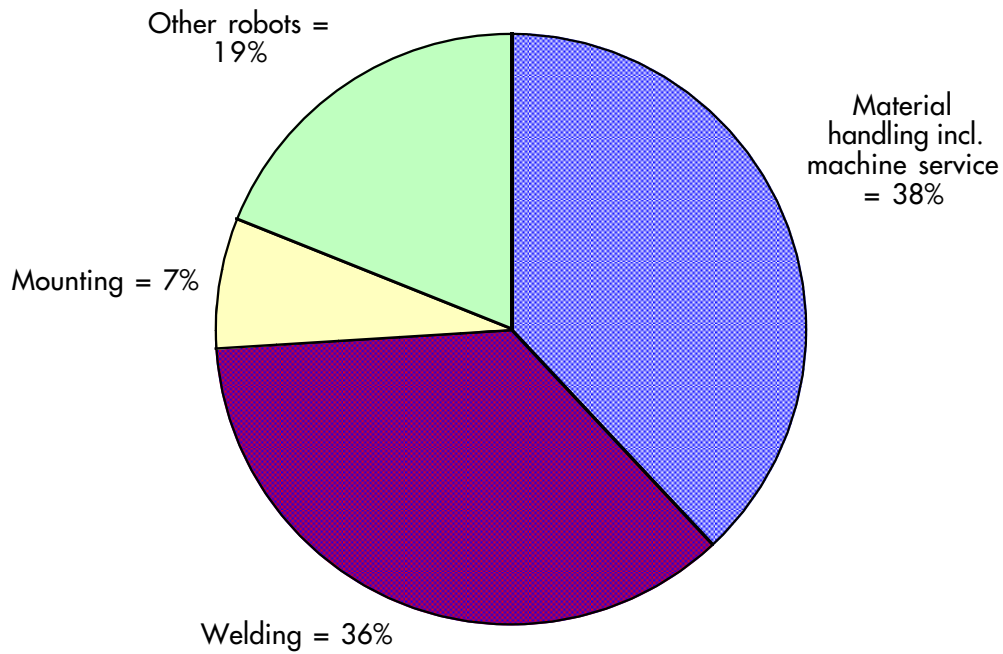
	1985	1991	1994
<b>Industry</b>			
Metal	286	718	999
Machinery	760	1 134	1 241
Electrical/electronic	587	300	346
Automotive	155	1 332	2 008
Others	258	615	856
<b>Total</b>	<b>2 046</b>	<b>4 099</b>	<b>5 450</b>
<b>Application Area</b>			
Material handling incl. machinery service	834	1 649	2 123
Welding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

*Table 1.19 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 1.47 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.