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**DSTI/ICCP/IE(97)8/FINAL**



Organisation de Coopération et de Développement Economiques  
Organisation for Economic Co-operation and Development

**OLIS : 16-Jul-1998**

**Dist. : 17-Jul-1998**

PARIS

**English text only**

**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY  
COMMITTEE FOR INFORMATION, COMPUTER AND COMMUNICATIONS POLICY**

**DSTI/ICCP/IE(97)8/FINAL  
Unclassified**

**Working Party on the Information Economy**

**USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES AT WORK**

**67602**

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## USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES AT WORK

### Introduction

Spectacular advances in information and communication technologies have been transforming many aspects of work for almost two decades. Computers and communication tools have become an integral part of people's working lives. A few national studies have been launched to examine the extent of access to and use of these technologies in the workplace. This document attempts to highlight broad similarities in the variables covered by these surveys and presents some of the data in graphical form. **Readers should note, however, that data are not strictly comparable.**<sup>1</sup>

### Extent of use at work

In several OECD Member countries, the share of employees using a computer has increased from less than a quarter of workers in the mid-1980s to between 40 to 56 per cent of workers by the mid-1990s (Figure 1). The growth in use has not been smooth over the decade. The fastest growth over the period occurred in Canada, especially between 1987 and 1989 (about 27 per cent). Notwithstanding the apparent slowdown in penetration since then, the rate of increase in Canada remains higher than that of other countries for which data are available, except for Sweden. Finland, on the other hand, seems to have the highest computer penetration in the workplace.

The share of persons having access and recourse to an electronic communications tool in the workplace is less well documented. Access to the Internet, as measured by the number of Internet hosts, provides an indicative measure, which nevertheless includes other users such as households and universities (Figure 2). Based on this measure, access in early 1997 was highest in several Nordic countries, particularly Finland, followed by the United States. In New Zealand, access to the Internet had been growing much faster than the world average up to 1995, but in 1995 and 1996, it approached a rate close to the average annual growth, estimated at between 60 per cent and 80 per cent. Other data indicate that:

- In Canada, about 14 per cent of employed persons were connected to the Internet in 1994. Actual use of the Internet was dominated by science and engineering workers (40 per cent), social scientists (23 per cent), and teachers (23 per cent).
- In Denmark, every fourth *firm* (23 per cent) with more than 20 employees used e-mail, and every sixth (17 per cent) had a graphical Internet connection in April 1996; every third among the latter had a Web site.

- In Finland, three out of four employees used a communications tool in 1996 and the share of employees who use a facsimile or e-mail service increased particularly markedly during the 1990s, to reach one in five by 1996.
- In France, 30 per cent of employees used the Minitel at work.
- In Sweden, 70 per cent of those who use a PC in the workplace are linked into a network.
- In the United Kingdom, a quarter of all companies are connected to the Internet and 16 per cent have a Web site.

### **Use by characteristics of the firm**

#### ***Industrial activity of firm***

While information technologies are being used in both manufacturing and service industries, penetration remains low in agriculture and construction (Figure 3). Those employed by the finance and insurance services make greatest use of these technologies, compared to total employment in this industry, generally followed by those in public administrations. Workers in real estate and business activities, utilities, and mining also tend to use these technologies more than the average.

This measure differs from computerisation by industry, that is, the percentage of businesses with computers compared to total businesses. In Australia, for example, almost 50 per cent of businesses have computers. Firms in the electricity, gas, and water supply industry have the highest penetration, 86 per cent. The finance and insurance industry comes fourth, by this measure, with a computer penetration of 71 per cent, after the communications services industry, and the property and business services industry, which includes the computer services industry itself.

#### ***Type of employer***

Penetration grew in both public and private enterprises between the late 1980s and the early 1990s (Figure 4). Use in enterprises continued to be higher in the public sector than in the private sector in countries such as France and Sweden. Within government, information technology is most commonly used by central government, and to a lesser extent by municipalities.

### **Use by characteristics of workers**

In addition to the wide variability in the use of computers according to the industrial activities of firms, workers with different characteristics *within firms* will experience even more unequal access to information technologies. Differences in gender, age, occupation and educational attainment levels, account for large disparities in the use of computers in the workplace.

#### ***Occupations***

As mentioned above, differences in occupations account for very large variability in the use of computers at work. The highest use is found in *high-skill* occupations such as administrative, managerial

and professional workers (Figure 5), but also in lower-skilled ones such as clerks and salespeople. In Canada in 1994, 95 per cent of scientists and engineers were using computers, while only 15 per cent of service workers, 20 per cent of those employed in primary activities and 22 per cent of those involved in manufacturing/processing activities had access to computing machinery, the average for all occupations being 48 per cent. In France in 1993, the values ranged from 6.5 per cent for elementary occupations, to 54 per cent for technicians and associate professionals, and 70.5 per cent for legislators, senior officials, managers and professionals. Commercial or sales activities had slightly higher than average use in all countries for which data are available.

### ***Gender***

In four of the five countries for which data are available (all except Sweden) women tend to use computers at work more frequently than do men (Figure 6). Most of this difference can be explained by different participation rates in industries and different occupational distributions: women have higher shares of employment than men in industries and occupations where computer use is more prevalent (e.g. service sectors, or administrative, technical and sales occupations). Data from Sweden show that within occupations, the difference is no longer significant, except for primary occupations and services (where use by men is significantly higher), and transportation and communication (where the opposite is true) (Figure 7). In Finland in 1996, women had higher usage rates than men in service occupations, technical and humanistic work, and to a lesser extent, industrial work (Figure 8).

### ***Age***

As expected, the use of computers varies greatly with the age of persons, and the plot of use against age reveals inverted-U curves for all countries corresponding to low use for young persons (less than 30 years old), highest use for persons between 30-45 years, and rapidly declining use thereafter (Figure 9). Times series data from France (1987-93) and the United States (1989-93) confirm that the use of computers in workplaces is increasing for all age groups.

### ***Educational attainment***

Given the close link between educational attainment and occupation, disparities in computer use between workers are directly linked to the level of education they have successfully completed (Figure 10). Data for Finland demonstrate this point. In 1996, 79 per cent of women and 84 per cent of men with tertiary level education were using information technology at work. The values drop to 57 and 54 per cent respectively for those having only completed upper secondary education, and 41 and 37 per cent for primary or lower secondary education.

### **Purposes of use at work**

Computers in the workplace are used for a wide variety of purposes with word-processing frequently taking the lead (Figure 11). In the case of communications tools, data for Sweden demonstrate that 57 per cent of employed persons linked to a network use it to share various types of information, including information stored in databases, within the firm; 21 per cent of those having access to a network access external databases, bulletin boards, and the Internet; and in the broader population of all those who use a

computer at work, 10 per cent use it to search, and download information from databases. Other data indicate that:

- in Denmark, 51 per cent of firms with more than five employees exchange data with other firms electronically; almost every one firm in three uses EDI, if only to a limited extent; and
- in the United Kingdom, access to the Internet is being used for a wide variety of activities including e-mail (41 per cent) and information gathering, as well as advertising, marketing and, to a lesser extent, purchasing.

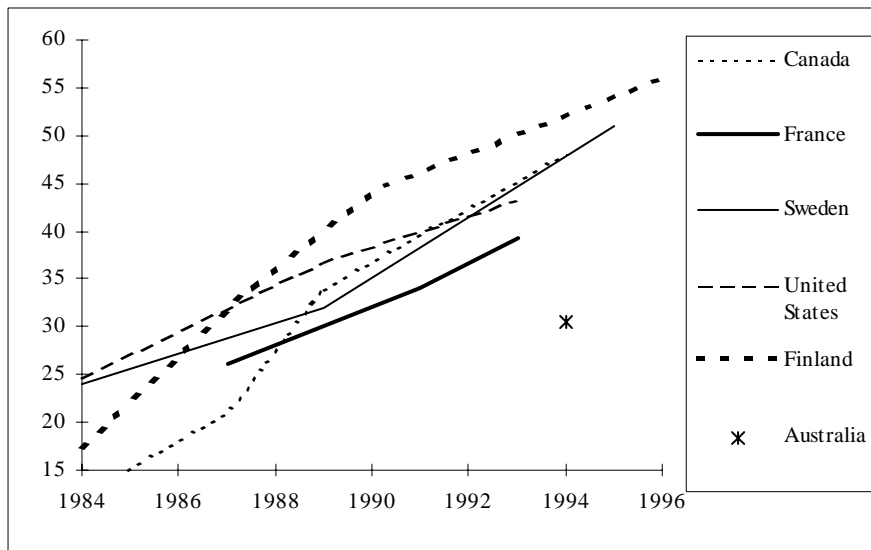
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## NOTE

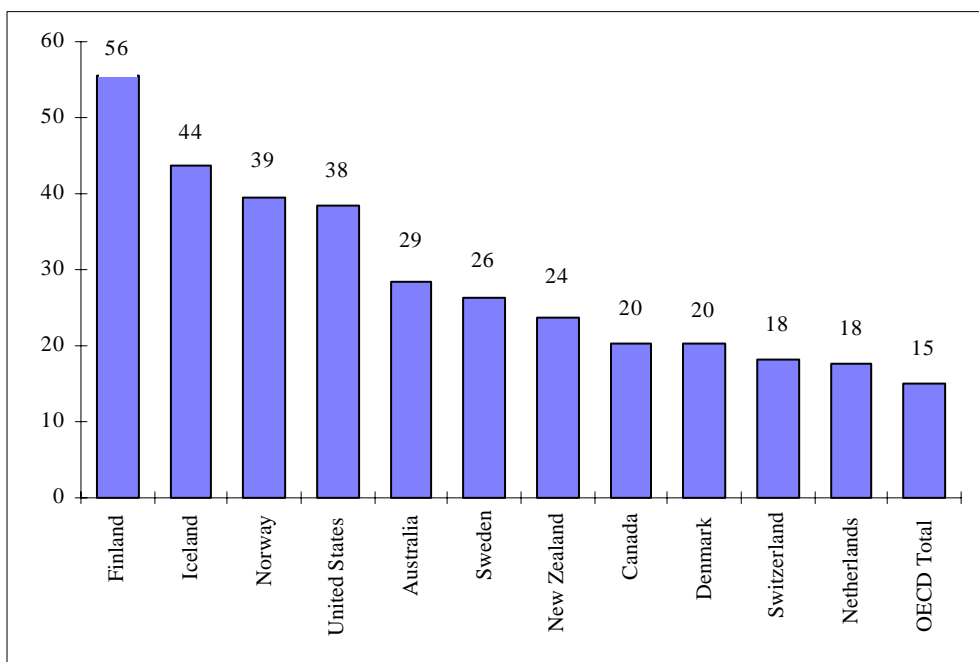
1. For example, the definition of IT in the Finnish survey includes computer-linked cash registers or terminals, programmable machines, computerised control equipment for production processes and other computer-aided control, measurement and supervision devices, in addition to PCs, computer terminals and word processors which are covered in most surveys.

Figure 1. Percentage of persons using a computer in the workplace



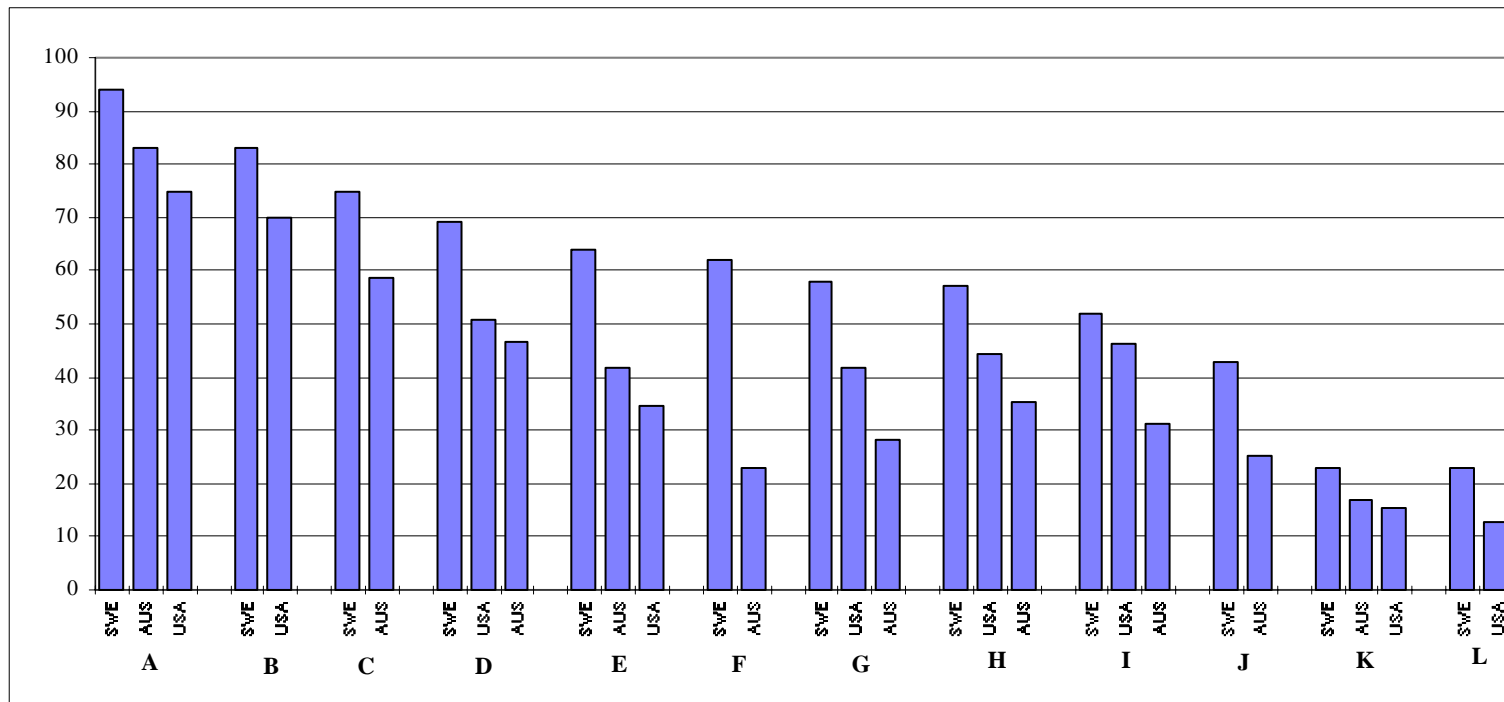
Source: See Bibliography.

Figure 2. Number of Internet hosts per 1 000 inhabitants – January 1997



Source: OECD (1997).

Figure 3. Percentage of persons using computers by industry in Australia (1994), Sweden (1995) and the United States (1993)



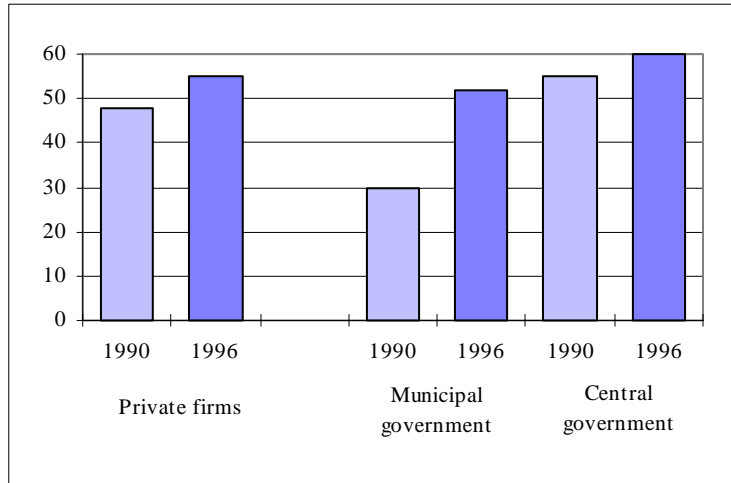
- A. Finance, insurance (incl. real estate for the United States).
- B. Public administration, defence.
- C. Electricity, gas, water.
- D. Real estate, business svcs. (business svcs. only for the United States).
- E. Wholesale and retail trade (wholesale trade only for Australia).
- F. Education (incl. health and community svcs. for Australia).
- G. Manufacturing.
- H. Mining.
- I. Transport, storage and communications. (communication svcs. only for Australia).
- J. Social and personal services.
- K. Construction.
- L. Agriculture, forestry (agriculture only for the United States).

Source: See Bibliography.



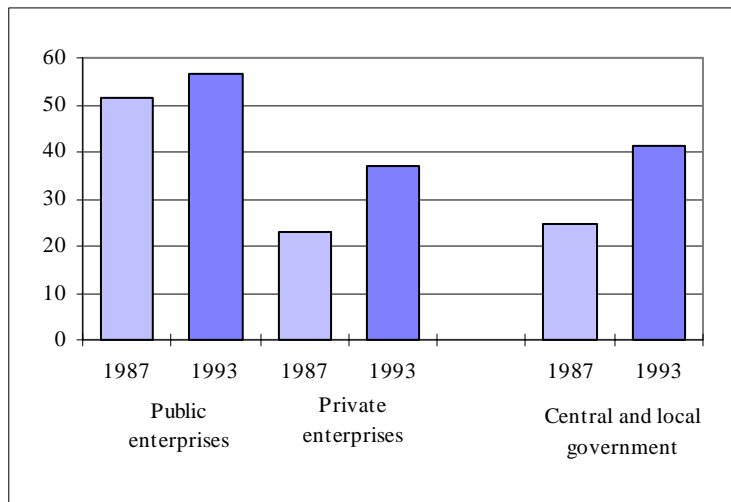
Figure 4. Percentage of workers using computers by type of employer

Finland



Source: See Bibliography.

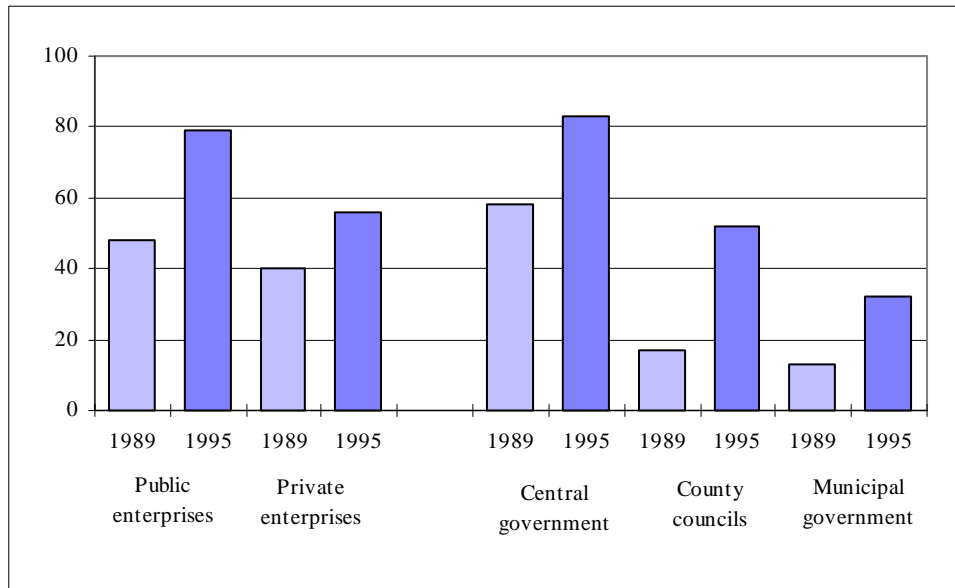
France



Source: See Bibliography.

Figure 4. (continued)

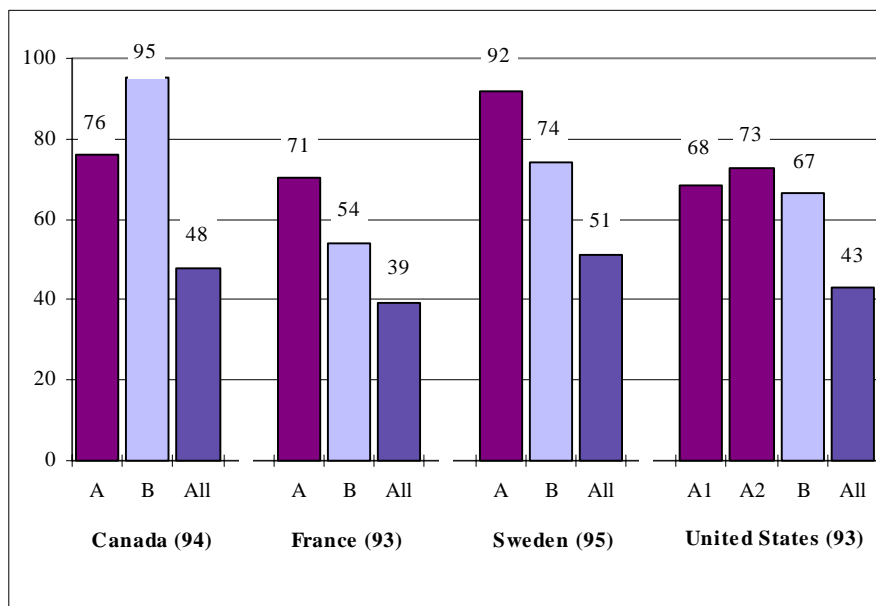
Sweden



Source: See Bibliography.

Figure 5. Share of workers using computers at work in managerial/administrative (A), technical/scientific (B), and all occupations

Percentage



Canada: A: managerial and administrative occupations. B: science & engineering occupations.

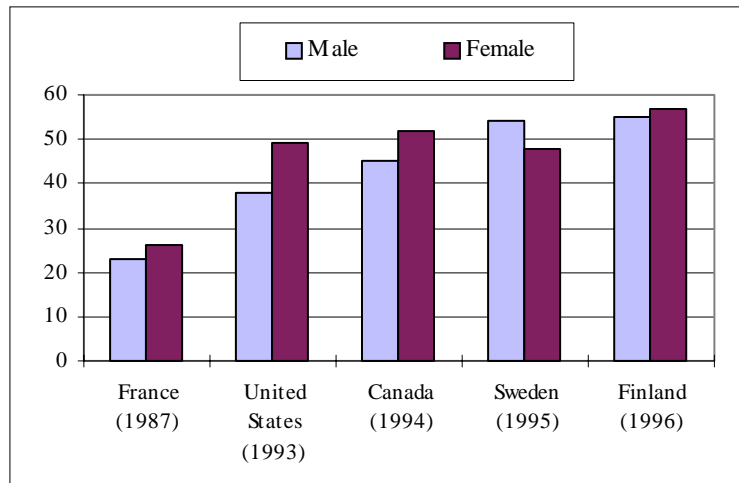
France: A: legislators, senior officials, managers, professionals. B: technicians, associate professionals.

Sweden: A: administrative workers. B: technical, natural sciences, humanities & arts.

United States: A1: executive, administrative, managerial occupations. A2: other administrative (incl. clerical). B: technical and related support occupations.

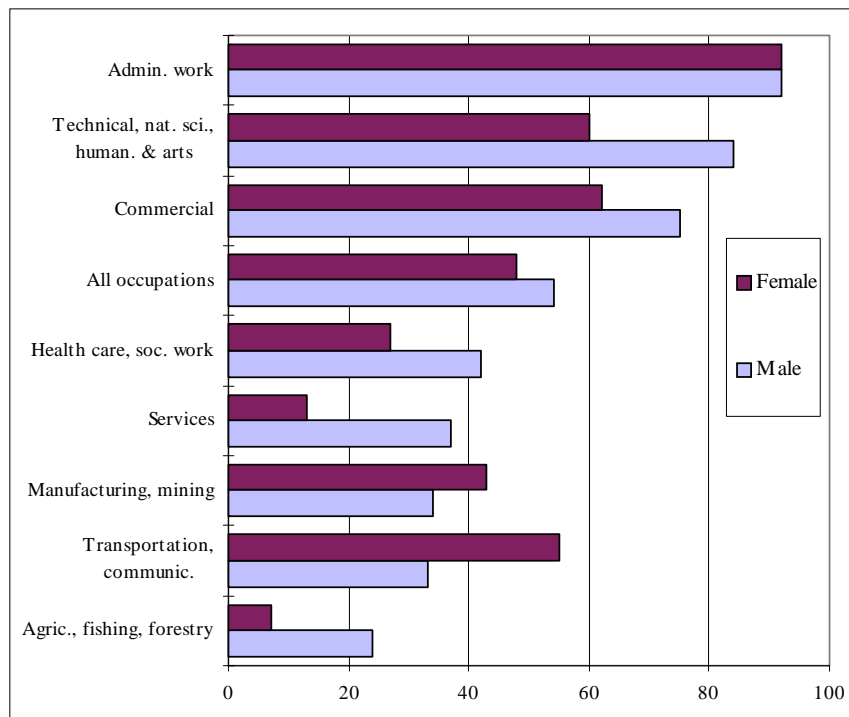
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Figure 6. Percentage of workers using a computer, by gender



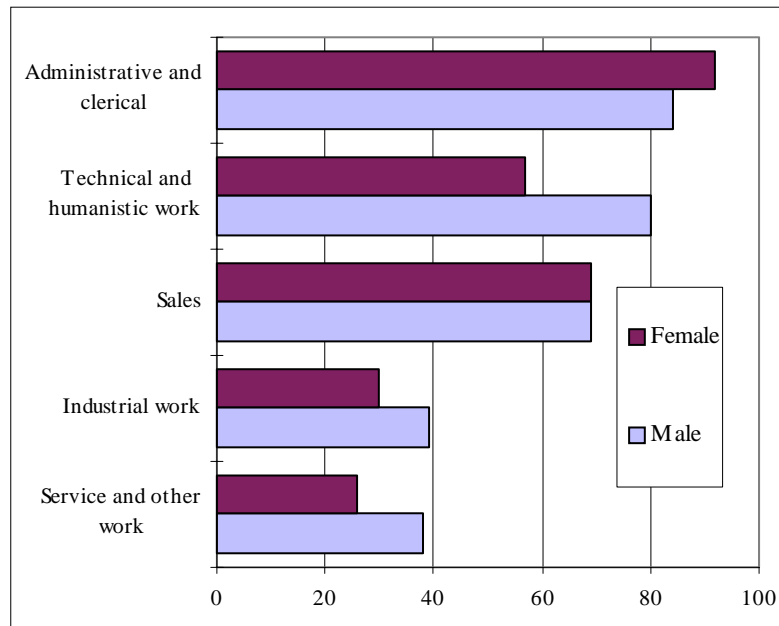
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Figure 7. Percentage of workers using a computer in Sweden, by gender and occupation, 1995



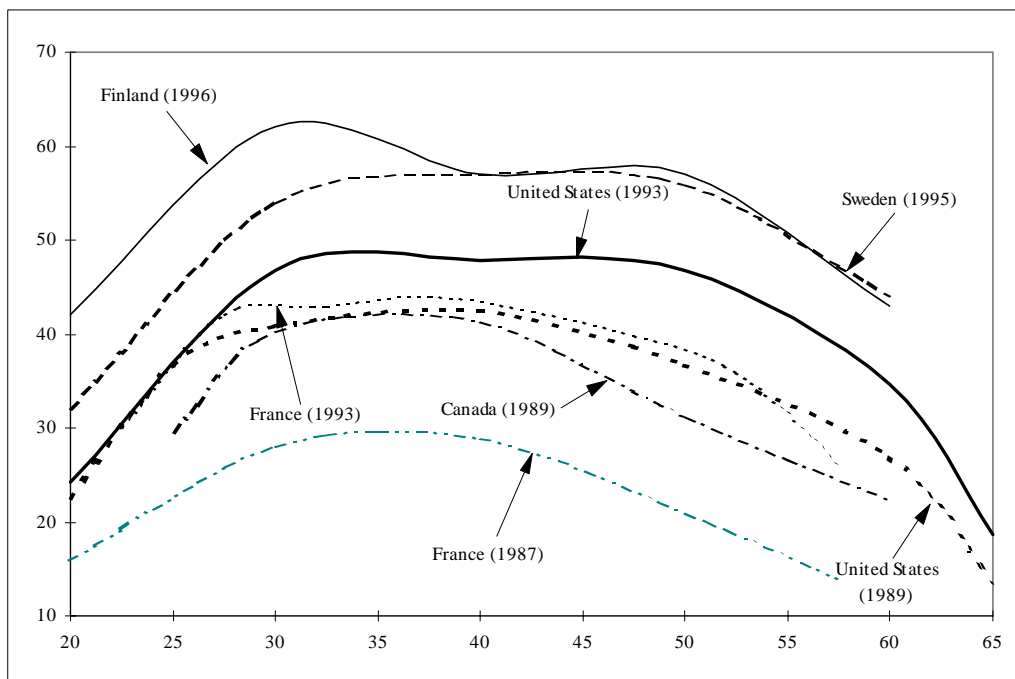
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Figure 8. Percentage of workers using information technology in Finland, by gender and occupation, 1996



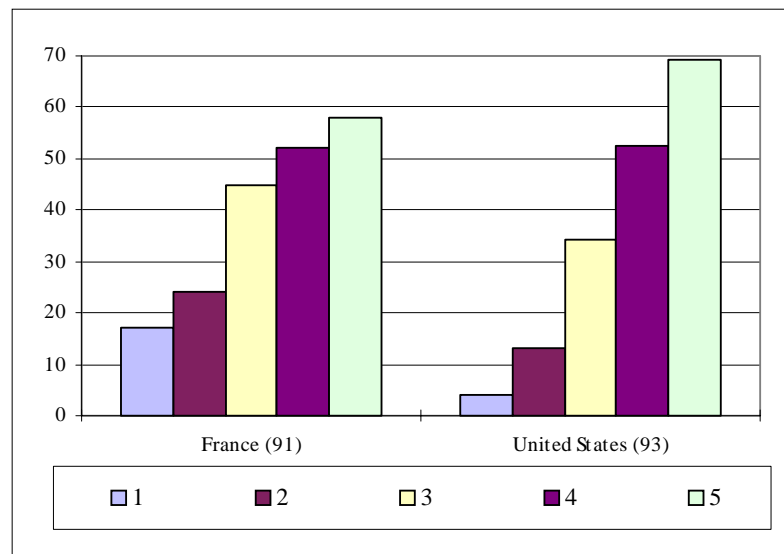
Source: See Bibliography.

Figure 9. Percentage of workers using a computer, by age



Source: See Bibliography.

Figure 10. Percentage of workers using a computer in France (1991) and the United States (1993), by educational attainment



France: 1: Having completed a "certificat d'études".  
 2: CAP completed.  
 3: BEPC completed.  
 4: Baccaulaureate completed.  
 5: Higher than Baccaulaureate.

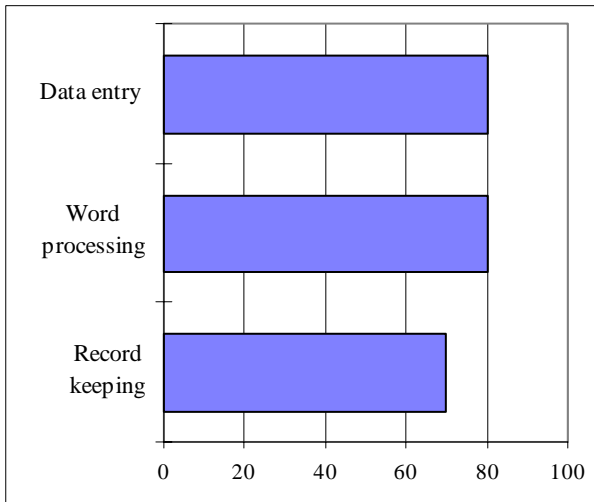
US: 1: Less than grade 9 completed.  
 2: 9th to 10th grade.  
 3: High school graduate.  
 4: Some college, assoc.  
 5: Bachelor degree or higher.

Source: See Bibliography.

Figure 11. Use of computers in the workplace

Canada, 1994

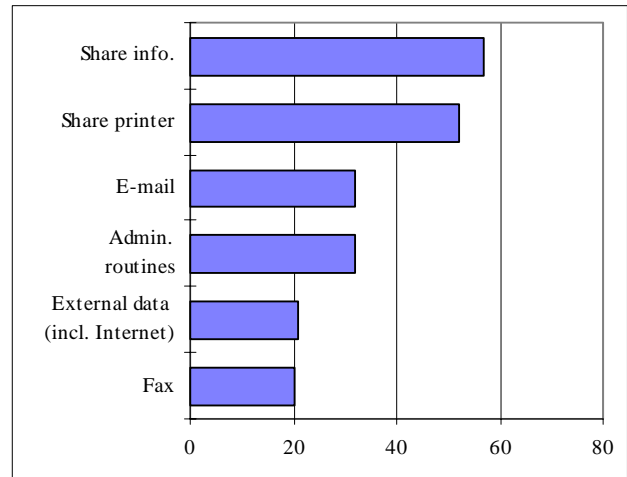
As a percentage of those using computers at work



Source: See Bibliography.

Sweden, 1995

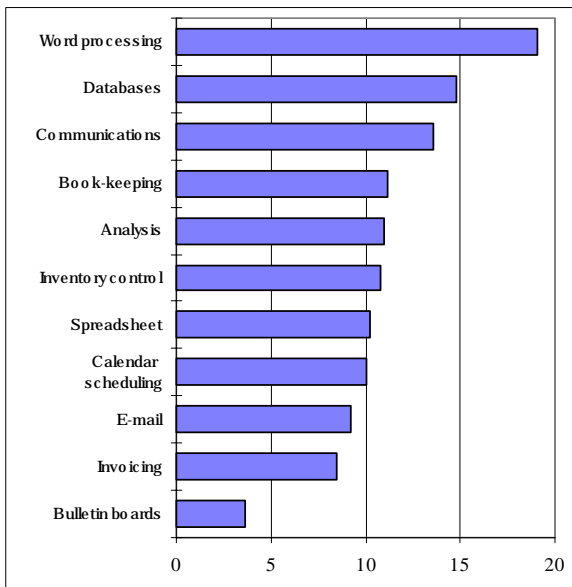
As a percentage of networked users



Source: See Bibliography.

United States, 1993

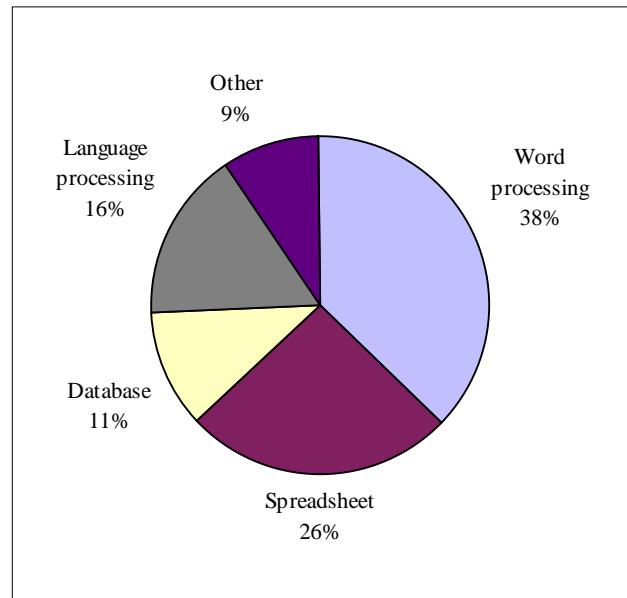
As a percentage of those employed



Source: See Bibliography.

Japan, 1992

Main use in percentage



Source: See Bibliography.