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

OLIS : 27-Jan-1998
Dist. : 29-Jan-1998

Or. Eng.

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

THE SOFTWARE SECTOR: A STATISTICAL PROFILE FOR SELECTED OECD COUNTRIES

This paper is a revised version of the document DSTI/ICCP/AH(97)4 and is circulated to Delegates of the Working Party on Information Economy (18-19 February 1998) for information.

61179

Document complet disponible sur OLIS dans son format d'origine
Complete document available on OLIS in its original format

Unclassified DSTI/ICCP/AH(97)4/REV1
Or. Eng.

TABLE OF CONTENTS

Tables

Figures

Main points

1. This paper constructs a statistical profile of one of the most rapidly growing information and communication technology (ICT) industries, the software industry, and examines several issues of importance to the information economy. This ICT sector is, arguably, the most important segment of ICT economically, and is to the knowledge-based economy what the steel and automobile sectors were to the industrial economy. From a statistical perspective, it also raises issues which are at the heart of the changes that are taking place as the information economy spreads. Because of its intangible nature, software is difficult to measure and more easily subject to duplication and piracy.

2. This paper seeks to alleviate the shortcomings of both private and public data by blending the two sources and to examines ways to build integrated statistics that allow for international comparison of a small number of software and computer services indicators. It is not exhaustive, either in terms of statistical sources or of geographical coverage, and covers only certain OECD Member countries (United States, Japan, Canada, Australia, New Zealand, Finland, France and the Netherlands) . It aims to create a framework that can be altered and extended to include new variables and countries.

3. Three types of sources were used: internationally comparable official statistics, national statistics (both government and other national sources), and market and firm-level data. The respective classifications and definitions are provided.

4. Data for the software and computer services sector are presented for value added, employment, number of establishments, R&D, and investment. On the basis of the available national data, sub-sector breakdowns are provided for revenue, employment and number of enterprises.

5. The dynamism of software and computer services is evident in several of these variables. The sector's revenue has grown at an annual average rate of more than 13 per cent over five years in the United States and Japan. In all the countries examined, this sector accounts for more than a quarter of the business R&D expenditures by the services sector. It is also growing in terms of employment; in the United States, the annual average growth rate has been over 9 per cent since 1990.

6. Trade data make even more acute the measurement problems associated with this sector and provide an indication of the role of international trade in this industry. Nearly half of all sales by US producers are international.

7. Market data show the growing share of software and services in the world-wide IT market -- from 46 per cent in 1987 to 52 per cent in 1995 -- and the dynamism of the Asia-Pacific region in terms of relative growth, with an average 22 per cent between 1995 and 1996.

8. Several studies estimate prices indexes for PC software and show a price decline of between 2.7 and 9.7 per cent from 1986 to 1994, depending on the software and the country.

9. Finally, firm-level data and data from private providers give information on industry ranking or concentration in terms of revenue.

Introduction

10. 'Moving target' is the expression often used to qualify measurement issues concerning the information economy. The nature of supply and demand is extremely fluid, being driven by rapid technological change and a very dynamic, international market. Consequently, obtaining quantitative data on the topic is difficult, and impossible in some areas. Information which is 'up-to-date' and 'close to the market' are almost exclusively from private sources, expensive and often present a timely but limited picture that focuses on the market, not broader issues of interest to public policy makers. Frequently, such data suffer from weaknesses in terms of robustness, coverage and accuracy. On the other hand, official statistics are more versatile and rigorous, but are usually obtained with a substantial time-lag and typically only give rather crude insight into the field. These shortcomings limit their utility in a field as fast changing as Information and Communication Technology.

11. The purpose of this paper is to conduct a pilot study of one ICT industry, software, which attempts to reduce the inherent shortcomings found in both private and public data by blending the two sources. The intent is also to provide an example of what the OECD can currently do with existing resources. It reflects an attempt to identify a way of building integrated statistics that could allow international comparisons for a small number of indicators of the software and computer services sector, both of which are of great economic importance, using the existing statistics.

12. This particular ICT sector was selected because, arguably, it is the most important segment of ICT economically, but it also poses unique statistical challenges. Software represents about 20 per cent of the total Information Technology market, and taken together with IT services, the sum exceeds sales of hardware. It is a key, and quickly growing intermediate product for nearly every industry, and as such is an important element towards the goal of achieving productivity gains. **From a statistical perspective, software raises issues that are at the heart of the transformations associated with the growth of the information economy**. Developments in software have led to a blurring that can occur between the formerly distinct categories of hardware and software; for example, as software switches replace hardware switches in communication networks. Software is usually not sold separately, but its value is only obtained when it is bundled with other products such as services. Its existence in digital form makes it both intangible and thus difficult to count, as well as amenable to exact duplication and thus piracy. These qualities constrain any attempt to analyse the use of, and demand for, software. It is likely that many of these statistical problems will grow as software is embedded into a greater variety of products, as free software becomes more common (e.g. browsers) and as the electronic delivery of software develops.

Scope and limitations

13. The approach taken here is based on the characteristics of the available data sources, which lie along the classic statistical continuum of timeliness versus accuracy:

1. **International comparable official statistics**, based upon official international statistical sources such as those maintained at the OECD, which strive to achieve a high-level of internationally comparability but are of limited coverage, highly aggregated and relatively poor in terms of timeliness.

2. **National statistics** can be split into two main sources 1) the national government official statistical sources, and 2) other national sources, mainly trade and sectoral associations (i.e. Software Publishers Association in the United States, Japan Information Service Industry, Syntech Informatique for France, etc.).

3. **Market and firm level data** that are based on firm data, provided either by the firms themselves or by private consultancy organisations (Gartner Group, IDC). These data have relatively good detail and timeliness, but may be methodologically and statistically less rigorous.

14. This report begins by presenting the various definitions at international and national levels. In a majority of cases, software is combined with computer services; thus, to improve comparability and coverage, the software sector is expanded to "software and computing services" unless otherwise stated. To get an overview of the sector from official sources, data for the main economic variables (value added, employment, number of establishments, research and development expenditures, investment) is presented. Because they raise specific issues, trade data have been provided separately. Private sources are used to show the growing importance of software within the total IT market, its concentration and changes in the price of software. Finally, an attempt to analyse the demand (user) side is made using some examples, but demand side data is at this stage very limited. Some important economic and technological variables such as software patents[1], skill levels, occupations, are not covered in this paper.

15. The present "stocktaking exercise" does not pretend to be exhaustive either in terms of statistical sources or in terms of geographical coverage and is limited to only some OECD Member countries (United States, Japan, Canada, Australia, New Zealand, Finland, France and the Netherlands)[2]. It is instead intended to present a framework that can be altered and extended to include new variables and countries.

16. In order to get a more complete coverage of data on the total production of computer software and services, it would be necessary to get an indication of secondary production made by sectors such as accounting firms (ISIC 7412) or management consultancy firms (ISIC 7414), which are non negligible computer software and services producers[3]. Likewise, nearly every industry now develops, and in many cases sell software (e.g. the Sabre reservation system by American Airlines), but this software is not typically captured by private sources (Figure 1) or by public sources. At the country level, the ratio between own account produced software and total investments in software has been estimated by the respective national Institutes of statistics at 50 percent in 1990 in the Netherlands, 42 percent on average for the years 1985-90 in France and 51 percent on average for the years 1990-94 in Italy[4]. In the United States, this ratio has decreased from 68 to 64 percent between 1987 and 1992, according to the US Bureau of Economic Analysis[5]. Thus, to a higher degree than with most products, it is important to identify primary, secondary and ancillary production of software.

1. Definitions of software and computer services industry

17. The definition of software (product and/or industry) varies according to the source, but are generally grouped with computing services in the official classifications. In order to be consistent, private sources definitions of computing services have therefore been provided.

Official international classifications

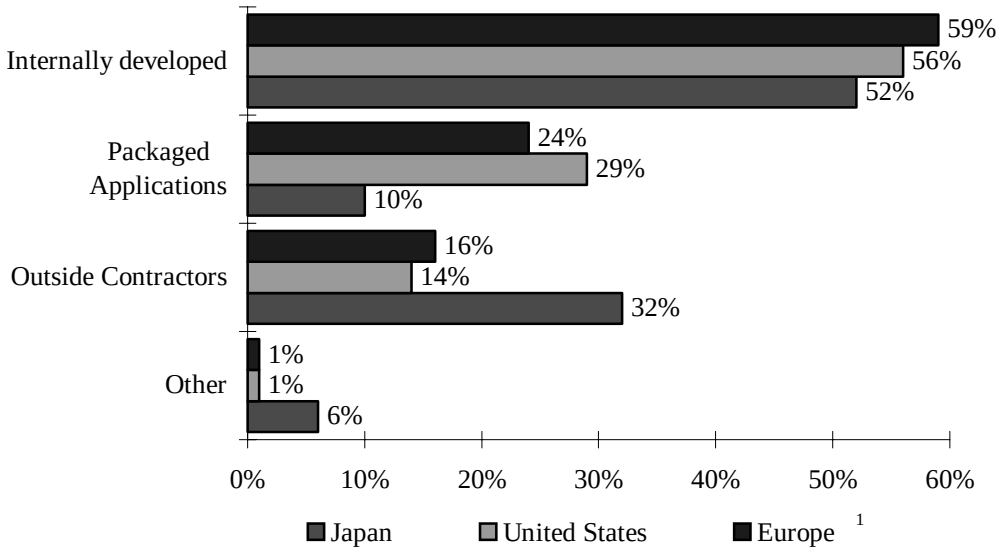
18. The Table 1 provides the definitions of computing and information services according to various international classifications or official sources for international trade services.

Official national classifications

19. Definitions of software and computer services vary across the national classifications, and are revised within national classifications over the time. Generally, revisions tend toward a more detailed and precise breakdown of activities.

20. Table 2 provides the detail of national classifications related to software and computer services for selected countries. For Finland, NACE Rev.1 of the table 1 should be referred to.

Figure 1. **IT Customers allocation of software spending**



1. Germany, France, and United Kingdom only.
Source : IDC, quoted in *EITO 1993* .

Table 1. **Definition of the software and computer services industries in international classifications**

NAME	**ISIC Rev. 3**	**CPA**
	International Standard Classification Revision 3	Classification of Products by Activity
Items	72 COMPUTER AND RELATED ACTIVITIES *72.1 Hardware consultancy* Exclusions: Similar activities carried out by units selling computers are classified in class 3000 (Manufacture of office, accounting and computing machinery) or in division 51 (Wholesale trade and commission trade, except of motor vehicles and motorcycles) or 52 (Retail trade except of motor vehicles and motorcycles, repair of personal and household goods). *72.2 Software consultancy and supply* Exclusions: Reproduction of non-customised software is classified in class 2230 (Reproduction of recorded media). Similar activities carried out as an integrated part of the reselling of software are classified in class 5239 (Other retail sale in specialised stores). Software consultancy provided in conjunction with hardware consultancy is classified in class 7210. *72.3 Data processing* Exclusions: Renting and leasing of computers and computer-related hardware and adding and calculating machines are classified in class 7123 (Renting of office machinery and equipment, including computers). Development of computer systems ready to use, including programming, is classified in class 7220 (Software consultancy and supply). Maintenance and repair of computing machinery are classified in class 7250. *72.4 Data base activities* Exclusions: Computerised documentation activities provided by libraries and archives are classified in class 9231 (Library and archives activities). *72.5 Maintenance & repair of offices, accounting & Computing machinery* *72.6 Other computer related activities*	K. Real estate, renting and business activities 72 COMPUTER AND RELATED ACTIVITIES *72.1 Hardware consultancy* *72.2 Software consultancy and supply* 2.20.1 Data-bearing media of a kind used in automatic data processing 72.20.2 Programming Services of Packaged Software Products 72.20.3 Software consultancy and other supply services *72.3 Data processing* *72.4 Data base activities* *72.5 Maintenance & repair of offices, accounting & Computing machinery* *72.6 Other computer related activities* *22.3 Reproduction of recorded media* 22.33.1 Reproduction Services of Software
	Source: ISIC, Series M, n° 4, UN, Rev. 3	*Source*: CPA

Table 1. **Definition of the software and computer services industries in international classifications** (continued)

NAME	**CPC**		**CN / HS**
	Provisional Central Product Classification United Nations	Central Product Classification Version 'New', incorporating the recommendation of the Voorburg Group to June 22 1996	Combined Nomenclature / Harmonised System
Items	COMPUTER AND RELATED SERVICES *841 Consultancy services related to the installation of computer hardware* 84100 Consultancy services related to the installation of computer hardware 84210 Systems and software consulting services 84220 Systems analysis services 84230 Systems design services 84240 Programming services 84250 Systems maintenance services *843 Data processing services* 84310 Input preparation services 84320 Data-processing and tabulation services 84330 Time-sharing services 84390 Other data processing services *844 Database service* 84400 Database services 84500 Maintenance and repair services of office machinery and equipment including computers *849 Other computer services* 84910 Data preparation services 84990 Other computer services not elsewhere classified	*Group* Class Section 8 Business and Production Services DIVISION 82 COMPUTER AND RELATED SERVICES *821 Development of packaged software products* 8211 Development of systems and user tools software 8212 Development of application software *822 Computer consultancy and management services* 8221 Hardware consultancy services 8222 Software consultancy services 8223 Computer facilities management services 8224 System maintenance services 8229 Other consultancy and management services	Based on Custom tariff nomenclature. Few classes of information goods could be relevant as indirect indicator for software : 8523 Prepared unrecorded media for sound recording or similar recording of other phenomena (excl. products of Chapter 37) 8524 Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices
	Source: Provisional Central Production Classification, Statistical Papers, Series M, n° 77, UN.	*Source*: Draft Paper	*Source*: CN / HS

Table 1. **Definition of the software and computer services industries in international classifications** (continued)

NAME	**NACE Rev.1**	**1997 NAICS**	**INTERNATIONAL TRADE SERVICES**
	Statistical Classification of Economic Activities in the European Union	North American Industrial Classification	Definition of the Manual of Balance of Payment 5th Edition
Items	K. Real estate, renting and business activities 72 COMPUTER AND RELATED ACTIVITIES 72.1 Hardware consultancy 72.2 Software consultancy and supply 72.3 Data processing 72.4 Data base activities 72.5 Maintenance & repair of offices, accounting & Computing machinery 72.6 Other computer related activities	51 INFORMATION AND CULTURAL INDUSTRIES *511 Publishing Industries* 5111 Newspaper, Periodical, Book and Database Publishers 51114 Database and Directory Publishers 511140 Database and Directory Publishers 5112 Software Publishers 51121 Software Publishers 511210 Software Publishers *514 Information Services And Data Processing Services* 5141 Information Services 51419 Other Information Services 514191 On Line Information Services 514199 All Other Information Services (Provide, store or provide access to information) 5142 Data Processing Services 51421 Data Processing Services 514210 Data Processing Services (Process data and transactions) 54 PROFESSIONAL, SCIENTIFIC AND TECHNICAL SERVICES *541 Professional, Scientific and Technical Services* 5415 Computer Systems Design and Related Services 54151 Computer Systems Design and Related Services 541510 Computer Systems Design and Related Services	COMPUTER AND INFORMATION SERVICES The definition of this item is identical to the definition of *computer and information services* in the BPM5 paragraph 259. It covers "computer data and news-related service transactions between residents and non-residents. Included are: data bases, such as development, storage, and on-line time series; data processing - including tabulation, provision of processing services on a time-share or specific (hourly) basis, and management of facilities of others on a continuing basis; hardware consultancy, software implementation - including design, development, and programming of customised systems; maintenance and repair of computers and peripheral equipment, news agency services - including provision of news, photographs, and feature articles to the media; and direct, non-bulk subscriptions to newspapers and periodicals".
	Source: *Information Society Statistics; an outline of a compendium*, Paper distributed at the Working Group on Information and Communication Statistics Meeting of 18-19 March 1997, Doc. Ref. S6-IC/97/04. En, Appendix.	*Source*: Statistics Canada	*Source*: *International Trade in Services 1985-1994*, Eurostat, 1997.

Table 2. **Definition of the software and computer services industries in some national classifications**

Country	**UNITED STATES**		**CANADA**
	Standard Industrial Classification (SIC)		Standard Industrial Classification (SIC)
Items	**SIC 1977** *737 Computer programming and other software services* 7372 Computer programming and other software services 7374 Data processing services 7379 Computer related services, not elsewhere classified	**SIC 1987** *737 Computer programming, data processing, and other computer-related services* 7371 Computer programming services 7372 Pre-packaged software 7373 Computer integrated system design 7374 Computer processing and data preparation services 7375 Information retrieval services 7376 Computer facilities management services 7377 Computer rental and leasing 7378 Computer maintenance and repair 7379 Computer-related services, not elsewhere classified	7720 *Computer and Related Services* Establishments primarily engaged in providing computer services and in the maintenance and repair of computer equipment. • Computer consulting • Computer input preparation • Computer maintenance • Computer processing • Computer programming • Computer rental or leasing
	Source: United States Standard Industrial Classification.		*Source*: Statistical Review: Information Technology & Content Industries, 1995. Industry Canada 1995.
Country	**JAPAN**	**AUSTRALIA / NEW ZEALAND**	**FRANCE**
Items	84 INFORMATION SERVICES, RESEARCH AND ADVERTISING 841 *Information Services* 8411 Computer programming and other software services 8412 Data processing services 8413 Research and information services, except marketing or opinion research services 8419 Miscellaneous information services	Industry Code: ANZSIC 7831 Data processing services 7832 Information storage and retrieval services 7833 Computer maintenance services 7834 Computer constancy services	Nomenclature d'activité par produit (NAP) until 1992 then Nomenclature d'activité Française (NAF) in use since January 1993. NAF *72 Computing service activities* 72.1Z Hardware consultancy 72.2Z Software consultancy and supply 72.3Z Data processing 72.4Z Data base activities 72.5 Maintenance and repair of offices, and computing machinery
	Source: Japan Standard industrial Classification	*Source*: ABS 1995b, Cat. n° 8126.0	*Source*: Enquête Annuelle d'Entreprises 1994, INSEE.

Table 2. **Definition of the software and computer services industries in some national classifications** (continued**)**

Country	**THE NETHERLANDS**	
	Classification in use since the beginning of 1993	
Items	72	Companies for computer service and information technology
	721	Firms of consultants concerning automation and system developers
	7210	*Firms of consultants concerning automation and system developers*
	7210.1	System developers [Provide 'total solution' for automation based on clients possibilities and wishes. Total solution contains supply via sales, rent or lease of automation systems (hardware. and software), in combination with other automation services, such as advises, systems analysis and system development, program services, maintenance of supplied systems, rent of computer time, training and support.]
	7210.2	Firms of consultants concerning automation [Advises about computers and configuration, and application of programs.]
	722	Services for system development, system analysis and programming
	7220	*Services for system development, system analysis and programming* [to analyse, design and program systems ready to be used: • analyse needs and problems of the user and give advice on best solution; • development, production, supply and arrangement of documentation for standard programs and for special programs on request; • writing programs on users' request. Reproduction of standard programs (2233) is excluded]
	723	Computer centres, data-entry and punching
	7230	*Computer centres, data-entry and punching* • data processing, with client programs or own programs • permanent administration of, and work with data processing equipment from others
	724	Data banks
	7240	*Data banks* • composition of data banks: collect data from various sources • data storage: compose computer record for such data • availability of the data bank: supply data for on-line search or make data, sorted on request (administered by the computer), accessible to everyone or to certain user groups • videotex banks.
	725	Maintenance and repair of computers and office equipment
	7250	*Maintenance and repair of computers and office equipment*
	726	Other services concerning automation
	7260	*Other services concerning automation*
Source:	*Standaard Bedrijfsindeling 1993* , Bureau de statistiques des Pays-Bas	

Selected definitions of computer software and services from private sources

21. **IDC**[6]

Packaged software includes commercially available programmes for sale or lease from system vendors and independent software vendors (ISV). Not included are specially designed applications software solutions added by turnkey systems houses to systems acquired from a hardware manufacturer or other third party.

- *Systems software and utilities*: programmes designed to: *i)* operate hardware through basic operating systems and programming languages, increase the efficiency of systems personnel through system performance measurement tools, improve the operating capabilities of the hardware system by routing the flow of data among machine units, and handle data entry and delivery; or *ii)* ensure programme integrity through maintenance and security programmes, convert programmes from one language to another, organise data resources through sort/merge products, and monitor machine usage. Major components include operating system enhancements (e.g. multiple virtual storage/enterprise system enhancements), network operating systems, and data centre management software, especially automated operations programmes.

- *Application tools:* programmes that allow users to retrieve, organise, manage, and manipulate data and databases. This group is divided into four sub-categories: data access/retrieval, data management, data manipulation, and programme design/development. It includes all database management system (DBMS) software; decision-support and executive information system (EIS) programmes; spreadsheets; front- and back-end computer-assisted software engineering (CASE) tools; and emerging areas such as co-operative processing and/or object management applications development tools.

- *Application solutions:* programmes designed to provide packaged solutions for specific problems inherent in an industry or a business function. Such software can address "cross-industry" functions (e.g. accounting, human resource management, payroll, project management, word processing and other office activities) or specific industry solutions for vertical markets (e.g. banking/finance, manufacturing, health care, oil and gas exploration, etc.).

Services

- *Professional services:* payment for contractual services for system and/or software development; system design, integration, installation and related training/education, facilities management, and consulting services for IT purposes only (i.e. management consulting services are not included). This does not include, however, data processing that a vendor may resell from the client's site to a number of unrelated users at other sites, nor does it include traditional time-sharing services or so-called processing services.

- *Support services:* repair or replacement of components of computer systems hardware (including data communications equipment). Maintenance revenue may be generated by on-site maintenance, time and materials, parts for self-maintenance, and/or depot services, in each case on a services contract or non-contract basis. To avoid double-counting with the packaged software or professional services categories, the support services category excludes software support contracted as a part of long-term update and support agreements.

22. **OVUM** breaks the software market into: *i*)Application Development Tools, *ii*) Business Applications, *iii*) Databases, and *iv*) Operating Systems.

23. **Gartner Group**[7] defines the following data processing products segments :

- ***Software***. All licensed software products, including packaged applications or toolsets, database management systems, operating systems, utilities.

- ***Services***. Computer related services, including third-party processing, custom/contract software, facilities management, system integration, disaster recovery.

- ***Maintenance***. All maintenance contract revenues from hardware to software (excluding that bundled into rental equipment), as well as time and labour charges.

24. **INPUT**[8] breaks the software and computer services into the following categories:

- ***Application Software***. Application software products are packaged programs used to support home, business, or other institutional functions on a variety of hardware platforms, including mainframes, minicomputers, workstations, and personal computers. Applications software includes everything from widely used business productivity programs (e.g. word processing, spreadsheets, graphics) to more complex programs such as company accounting and human resources packages, which often are written to run on high-powered mainframes and minicomputers.

- ***Systems Software***. Systems Software commonly includes PC and network operating systems, system management tools, programming language, and database management software. Systems Software products form the bridge between computer hardware and application software, and between computer and its users.

25. The two preceding categories are frequently lumped together under the common label of "**packaged software**", which refers to an application or system software product written in a generic form for the use of many different customers (unlike custom programs).

- ***Systems Integration Services*** refer to the consolidation of heterogeneous hardware and software products into seamless computer networks, generally designed to meet specific end-user requirements. They may be provided for all levels of a project, including system design, hardware and software recommendations, system installation, software customisation, and end-user training.

- ***Outsourcing Services*** encompass external processing services and/or external system management services. Processing services, such as data entry and disaster recovery, often are 'outsourced' to take advantage of remote processing centre's capacity and/or technology. Outsourcing services also include external system management (also called 'Facilities Management'), whereby a client transfers responsibility for some or all of its information technology division from in-house control to a third-party vendor. The vendor assume responsibility for operating, managing, and maintaining a client's information systems.

- ***Custom Programming Services*** involve the compilation of code to create or customise software programs. Custom programming may entail the development of an entirely new application, or the customisation of an existing package software product.

2. Non-trade variables

26. International and national sources were used to generate tables 3 to 10 which present the currently available data for the software and computer services sector on value added, employment, number of establishments, R&D and investment for the tables 3 to 7, and sub-sector national available data for revenue, employment and number of enterprises for the tables 8 to 10.

27. One problem than can plague this sector as the technology and the market redirect economic activity is that of sectoral classification. The reclassification of an individual firm from one ICT sector to another (e.g. hardware to software) can significantly alter industry totals for economic variables, such as value added, investment, or R&D expenditure. Such reclassification can be due to changes in the primary activities of a company's establishments, as well as shifts in a firm's organisational structure (e.g. mergers and acquisitions, divestitures, etc.). For example, in the United States, the reclassification of a single firm in 1992 resulted in a shift of more than US$ 3 billion in R&D expenditure, or 2.5 per cent of US BERD for that year. In the 1993 US R&D survey, the change in activities of two large multi-unit companies resulted in a reclassification of activities from manufacturing to non-manufacturing, generating significant changes in R&D expenditure figures. It is estimated that in 1993 this amounted to over US$ 5.5 billion being shifted to non-manufacturing R&D; this represented 6.4 per cent of total US BERD, and more than 30 per cent of OECD-14 BERD in the office and computing machinery sector (ISIC 3825)[9].

28. Another example comes from the Australian Industry Survey on Computer Services, where it was originally (late-1980s) thought that the sector was much larger than what was confirmed survey. How categories of computer services are defined will have a clear impact on the size of the sector. The measure of output of systems integrators, for example, is clearly function of the definition of their output (combination versus bundle of goods and services)[10]. Box A provides example of detailed definitions and survey coverage of software and computer services for Canada and Japan, revealing differences in definitions and survey methods.

29. Similar issues could apply to employment statistics, where the outsourcing of IT functions to firms in the computer services industry leads to an apparent increase of employment in this sector, but in many cases this is offset by a corresponding decline in in-house IT employment.

Box A. **Software and Computer Services definitions and surveys in Canada and Japan**

Canada

The computer service industry consist of software goods development, professional and processing services.

Software products development includes systems software and user tools (operating systems, network control, data centre management tools), as well as applications development tools like compilers, CASE (computer assisted software engineering) tools, fourth generation languages, etc., and application software products like word processors and spreadsheets.

Professional services include corporate electronic data processing consulting, systems and technical consulting (systems integration), custom software development, contract programming, training and education, and facilities management (outsourcing). Outsourcing involves the adoption of the computer operations of the client by an external party. Normally the outsourced functions are considered to be "non-core" thus allowing the client to concentrate on his/her main activities. The outsourced functions may include long term ownership of platforms, or the development of networks and applications, for example. In contrast, systems integration involves the development of systems solutions incorporating hardware, software and necessary services like customisation, and training and education which are provided to the client on-site.

Finally, data processing includes network services (electronic information services) such as on line databases, applications such as value added networks, electronic data interchange and e-mail, and also shared and other processing services, and data entry. Processing services may include disaster recovery, electronic off-site data storage or transaction processing, and generally refer to charging customers for the provision of computer resources on a quantity basis.

Data used in the software and computer services industry profile do not include software produced for own use nor that which is embedded in other products. As well, products sold through a foreign subsidiary are not included as production or exports, but rather the proceeds are classified as dividends, royalties or management fees under international services transactions in the System of National Accounts. The Statistics Canada annual survey of the software and computer services industry does no track computer services supplied by other industries, for instance telecommunications services, engineering and scientific services, or computer wholesalers. As a result, the total value of software products and computer services produced in Canada based on SIC 7720 is actually an under representation of total activity.

Source: Industry Canada, *Software Products and Computer Services Industry Overview*, March 1996.

Japan

The data concerning service industry in Japan are collected through surveys conducted by the Service Industry Statistics Survey Office of the Research & Statistics Department of the MITI. The survey on Information Services is made on a yearly base, and covers the following activities :

a. Compilation of computer programs and related Services such as research, analysis, consultation, etc...

b. Calculation services with computer by contract

c. Entering Services in data media (entering in punch card, magnetic tapes, floppy disks, etc...)

d. Data offering Services of collected, processed or accumulated information.

e. Management Services of user's information processing systems, computer room, etc...

f. The work of marketing research or think tank

g. Machine time sales

It does not include the establishments which sell only software products produced by other establishment or/and news agencies, inquiry offices, advertising businesses, newspaper offices or broadcasting stations.

Source: *Outline of the Survey on the Service industry by MITI,* MITI, March 1993.

Table 3. **Software and computer-related services - Value added**

US$ millions

	1975	1980	1985	1990	1991	1992	1993	1994	1995
United States [1]	..	..	45 132	88 299	94 363	104 651	116 834	133 143	152 213
as % of bus. services	..	..	17.9	21.1	22.3	22.6	23.5	..	..
as % of services	..	..	1.7	2.3	2.4	2.5	2.6	..	..
as % of GDP	..	..	1.1	1.5	1.6	1.8	2.0	2.3	2.7
Canada[2]	..	..	..	3 165	3 591	3 772	3 815	3 941	4 275
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GDP	..	..	..	0.7	0.8	0.9	1.0	1.0	1.1
Japan [3]	..	295	655	4 056	5 234	5 627	5 860	6 042	6 764
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	3.4	9.3	..	..	..	5.2	..
as % of GDP	..	..	0.5	1.4	1.5	1.5	1.4	1.3	1.3
Australia [4]	..	..	..	..	..	..	3 062	..	..
as % of bus. services							..		
as % of services	..	..	..	..	..	..	1.5	..	..
as % of GDP	..	..	..	..	..	..	1.1	..	..
New Zealand [3]	..	..	..	..	..	..	..	507	594
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GDP	..	..	..	..	..	..	..	1.0	1.0
France	..	..	..	..	..	13 080	10 573	11 393	13 201
as % of bus. services	..	..	..	..	..	12.5	10.1	10.0	9.8
as % of services	..	..	..	..	..	1.5	1.3	1.3	1.3
as % of GDP	..	..	..	..	..	1.0	0.8	0.9	0.9
Netherlands [6]	..	..	722	1 935	2 009	2 278	2 349	2 467	3 305
as % of bus. services	..	..	8.4	9.6	9.5	9.3	..	..	..
as % of services	..	..	0.8	1.1	1.1	1.1	..	..	..
as % of GDP	..	..	0.5	0.7	0.7	0.7	..	..	..
Finland	88	225	331	1 058	897	736	616	674	891
as % of bus. services	15.2	17.8	20.1	19.1	18.9	18.9	19.3	17.1	16.4
as % of services	0.7	1.0	1.3	1.6	1.4	1.3	1.3	1.3	1.4
as % of GDP	0.3	0.5	0.7	0.9	0.8	0.8	0.8	0.8	0.8

1. Estimated receipts for taxable firms.
2. Millions of 1986 C$ converted in US$ with current exchange rates.
3. Sales.
4. Income by broad commodity category. Own production includes income from products and services produced by the business and from license fees and royalty paiements. The production value for packaged software is for "off the shelf" software.
6. 1986 instead of 1985. New classification from beginnning of 1993.

Source : US Bureau of the Census, Service Division, 1997. Statistics and Industry Canada, *Statistical Review : Information Technology & Content industries 1995* , JISA and JIPDEC Annual Reports, various years. Australian Bureau of Statistics, *Information Technology in Australia 1992-93* , and Australian Productivity Commission, *Mapping the information Industries* , 1996. *Statistics on Information Technology in New Zealand* , Ministry of Commerce, March 1997. INSEE, *Enquête Annuelle dans les Services* , various years, *Standaard Bedrijfsindeling 1993* , Statistics Netherlands, Statistics Finland, and OECD.

Table 4. **Software and computer-related services - Employment**

	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996
United States [1]	..	363 549	637 409	779 656	791 031	838 334	894 256	955 094	1083 977	1223 263
as % of bus. services	..	13.3	15.4	15.3	15.5	16.3	16.1	16.0	16.4	17.5
as % of services	..	0.6	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.3
as % of total employment	..	0.4	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0
Canada [2]	..	..	..	71 660	90 015	72 024	79 021	99 056	123 312	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..	..
as % of total employment	..	..	..	0.5	0.7	0.6	0.6	0.7	0.9	..
Japan	57 164	93 271	162 010	458 462	493 278	488 469	445 662	424 867	407 396	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	6.7	..	..	..	5.4	..	..
as % of total employment	..	..	..	0.9	..	..	..	0.8	..	..
Australia	..	..	..	..	..	..	30 068	..	58 177	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	0.5	..	..	..
as % of total employment	..	..	..	..	..	..	0.4	..	..	..
New Zealand [3]	..	..	..	5 430	5 140	5 350	5 690	6 102	7 001	8 576
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..	..
as % of total employment	..	..	..	..	0.4	..	..	..	..	0.5
France [4]	..	62 509	100 181	144 766	146 220	151 347	147 881	153 329	158 544	..
as % of bus. services	..	6.2	9.0	8.7	8.7	8.8	8.6	8.3	8.4	..
as % of services	..	3.1	4.6	5.0	5.0	5.1	4.9	4.8	4.9	..
as % of total employment	..	0.3	0.5	0.6	0.6	0.7	0.7	0.7	0.7	..
Netherlands [5]	..	..	28 400	39 100	41 500	41 000	43 600	54 200	62 300	82 500
as % of bus. services	..	..	0.9	1.0	1.0	1.0	1.0	1.2	..	..
as % of services	..	..	0.1	0.1	0.1	0.1	0.1	0.1	..	..
as % of total employment	..	..	0.1	0.1	0.1	0.1	0.1	0.1	..	..
Finland	4 800	8 200	14 100	18 000	17 500	16 200	17 000	16 500	17 400	..
as % of bus. services	10.9	15.2	18.6	15.9	16.0	16.3	17.6	16.4	15.9	..
as % of services	0.4	0.7	1.1	1.3	1.3	1.2	1.4	1.3	1.4	..
as % of total employment	0.2	0.4	0.6	0.8	0.8	0.8	0.9	0.9	0.9	..

1. 1982 instead of 1980, 1987 instead of 1985.
2. Including self employment.
3. Includes Software Development, Computer Consultancy, and Data Banks industries employment.
4. Wage earners as of 31December. 1981 instead of 1980.
5. 1987 instead of 1985. New classification from beginnning of 1993.

Source : See Table 3.1.

Table 5. **Software and computer-related services - Number of establishments**

	1975	1980	1985	1990	1991	1992	1993	1994	1995
United States [1]	6 443	16 610	25 191	..	43 553	54 431	..	..	56 480
as % of bus. services	5.2	10.3	9.7	..	14.1	17.8	..	..	16.3
as % of services	..	..	..	..	..	..	..	..	..
as % of total eco.	0.2	0.4	0.4	..	0.7	0.9	..	..	0.9
Canada	..	..	..	10 924	11 447	12 001	13 203	13 611	14 364
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of total eco.	..	..	..	..	..	..	..	..	..
Japan	1 276	1 731	2 556	7 042	7 096	6 977	6 432	5 982	5 812
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	0.6	..	..	..	0.5	..
as % of total eco.	..	..	..	0.1	..	..	..	0.1	..
Australia [2]	..	..	1200	..	..	..	4 886	..	9 672
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of total eco.	..	..	..	..	..	..	..	..	..
New Zealand	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of total eco.	..	..	..	..	..	..	..	..	..
France [3]	..	..	..	..	..	..	21 154	21 083	21 900
as % of bus. services	..	..	..	..	..	..	9.9	9.6	..
as % of services	..	..	..	..	..	..	4.0	3.9	4.0
as % of total eco.	..	..	..	..	..	..	..	..	..
Netherlands [3,4,5]	..	..	3 300	5 000	5 500	5 800	8 700	9 400	9 600
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of total eco.	..	..	..	..	..	..	..	..	..
Finland [3]	..	..	..	..	..	..	..	..	2 579
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of total eco.	..	..	..	..	..	..	..	..	1.4

1. Data from *ITI Databook 1960-2006* . 1995 are estimated data.
2. For 1985, S*oftware Industry Survey Result* , Department of Industry, Technology and Commerce, October 1986.
3. Number of enterprises.
4. New classification from beginning of 1993.
5. 1987 instead of 1985.

Source : See Table 3.1.

Table 6. **Software and computer-related services - Business enterprise R&D expenditures**[1]

US$ millions

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
United States	3 805	3 828	3 784	4 629	5 769	6 663	5 729	4 293	5 982	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	48.5	36.4	27.0	22.3	20.3	23.0	21.6	18.4	23.0	..
as % of total BERD	4.1	3.9	3.7	4.2	4.9	5.6	4.9	3.6	4.5	..
Canada	207	205	214	229	231	280	318	430	464	519
as % of bus. services	..	..	..	..	..	..	..	..	..	
as % of services	19.2	18.9	18.0	17.3	15.9	16.1	15.5	18.1	18.8	19.3
as % of total BERD	4.8	4.4	4.4	4.4	4.3	4.8	4.9	6.0	6.1	6.4
Japan	..	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..	..
as % of total BERD	..	..	..	..	..	..	..	..	..	..
Australia [2]	287	393	474	540	582	652	693	688	690	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	90.0	88.8	89.6	90.9	90.8	92.9	88.9	87.2	76.5	..
as % of total BERD	19.7	21.9	23.8	25.7	24.6	22.8	22.2	19.7	16.3	..
New Zealand	..	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..	..
as % of total BERD	..	..	..	..	..	..	..	..	..	..
France	..	..	..	..	..	2 606	2 812	2 683	2 779	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	38.1	38.5	36.4	35.6	..
as % of total BERD	..	..	..	..	..	2.5	2.6	2.5	2.5	..
Netherlands	..	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..	..
as % of total BERD	..	..	..	..	..	..	..	..	..	..
Finland[3]	..	..	36	..	65	..	35	..	74	..
as % of bus. services	..	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..	..
as % of total BERD	..	..	..	..	..	..	..	..	..	..

1. Except for Finland, the data comes from the Analytical Business Enterprise Research and Development (ANBERD) database. The ANBERD database contains OECD estimates that adjust for deficiencies and anomalies that exist in the OFFBERD database, which contains the official data submissions from the OECD countries.
2. For Australia, the total service R&D expenditure is estimated based on only few sectors. This might explain the dominant role of computer and related services sector.
3. The decrease from 1995 to 1996 is partly due to methodological changes in data collection and also due to a merger of two large computer service enterprises in Finland.

Source : Statistics Finland and OECD, ANBERD database.

Table 7. **Software and computer-related services - Investment**

US$ millions

	1975	1980	1985	1990	1991	1992	1993	1994	1995
United States	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GFCF	..	..	..	..	..	..	..	..	..
Canada	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GFCF	..	..	..	..	..	..	..	..	..
Japan	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GFCF	..	..	..	..	..	..	..	..	..
Australia	..	..	..	..	..	..	98.2	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GFCF	..	..	..	..	..	..	..	..	..
New Zealand	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GFCF	..	..	..	..	..	..	..	..	..
France	..	..	..	..	..	..	606.5	646.7	824.4
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	2.1	3.6	4.2
as % of GFCF	..	..	..	..	..	..	..	..	..
Netherlands	..	..	..	..	..	..	..	..	..
as % of bus. services	..	..	..	..	..	..	..	..	..
as % of services	..	..	..	..	..	..	..	..	..
as % of GFCF	..	..	..	..	..	..	..	..	..
Finland	9.5	31.1	54.9	110.1	70.0	90.9	64.2	35.4	97.3
as % of bus. services	21.7	28.6	23.9	15.9	15.8	29.7	38.6	23.9	19.9
as % of services	0.3	0.6	1.2	0.9	0.7	1.1	1.2	0.6	1.3
as % of GFCF	0.1	0.2	0.4	0.3	0.3	0.5	0.5	0.2	0.5

Source : See Table 3.1.

Table 8. **Software and computer-related services sub-sectors, selected countries-Revenue**

US$ millions

		1990	1991	1992	1993	1994	1995
United States							
737	Computer programming, data processing, and other computer-related services	88 299	94 363	104 651	116 834	133 143	152 213
7371	Computer programming services	21 318	23 376	24 973	27 964	32 434	37 447
7372	Prepackaged software	16 523	18 306	21 236	24 648	27 597	31 087
7373	Computer integrated systems design	12 916	13 751	15 177	17 084	18 953	20 592
7374	Computer processing and data preparation and processing services	17 820	18 824	20 447	22 604	26 641	31 144
7375	Information retrieval services	3 547	3 691	3 931	4 316	4 644	5 489
7376	Computer facilities management services	1 994	2 206	2 608	2 638	2 814	3 110
7377	Computer rental and leasing	2 644	2 396	2 385	2 252	2 205	2 213
7378	Computer maintenance and repair	7 000	6 919	7 660	7 559	7 764	8 228
7379	Computer related services n.e.c.	4 537	4 894	6 234	7 769	10 091	12 903
Japan							
841	Information services industry	4 056	5 226	5 628	5 858	6 043	6 764
	Online/Offline information processing (excl. commissioned computing services)	665	813	869	907	945	1 038
	soft.development& programing	2 388	3 193	3 392	3 429	3 410	3 931
	processing services(machine time sales)	37	44	37	39	32	37
	database services	130	160	169	190	195	210
	system management & operations service commission	191	229	287	323	351	379
	data entry	141	156	159	172	180	189
	various surveys / studies	180	233	219	223	242	255
	others	323	398	496	575	688	726
Australia							
Total of the above sectors		..	..	..	5 384	..	11 367
7831	Data processing services	..	..	..	70	..	123
7832	Information storage and retrieval services	..	..	..	736	..	614
7833	Computer maintenance services	..	..	..	1 837	..	4 572
7834	Computer consultancy services	..	..	..	2 741	..	6 059
France							
72	Computer and related activities	..	..	..	..	..	25 195
72.1	Computer integrated systems design	..	..	..	..	..	7 387
72.2	Software producing	..	..	..	..	..	7 488
72.3	Data processing	..	..	..	..	..	7 515
72.4	Databank activities	..	..	..	..	..	487
72.5	Computer and office machinery maintenance and repair	..	..	..	..	..	2 318
Finland							
72	Computer and related activities	..	..	..	..	..	2 048
72.1	Hardware consultancy	..	..	..	..	..	12
72.2	Software consultancy and supply	..	..	..	..	..	1 192
72.3	Data processing	..	..	..	..	..	621
72.4	Database activities	..	..	..	..	..	95
72.5	Maintenance and repair of office, account. & comput. machin.	..	..	..	..	..	121
72.6	other computer related activities	..	..	..	..	..	7
Netherlands							
72	Computer and related activities	..	..	..	..	..	6 650
72.1	Data processing services	..	..	..	..	..	1 550
72.2	Information storage and retrieval services	..	..	..	..	..	3 953
72.3	Computer maintenance services	..	..	..	..	..	693
72.4 to 72.6		..	..	..	..	..	454

Source : See Table 3.1.

Table 9. **Software and computer-related services sub-sectors, selected countries-Employment**

		1990	1991	1992	1993	1994	1995	1996
United States								
737	Computer programming, data processing, and other computer-related services	771 900	797 000	835 500	892 800	958 600	1 089 900	1 207 900
7371	Computer programming services	150 800	156 900	168 600	188 300	209 900	245 300	271 900
7372	Prepackaged software	112 800	124 400	130 800	144 800	157 400	180 800	198 900
7373	Computer integrated systems design	97 500	98 700	102 500	109 500	116 400	129 900	142 400
7374	Computer processing and data preparation and processing services	196 700	198 200	204 400	207 300	209 500	223 100	231 300
7375	Information retrieval services	47 700	45 200	45 200	46 200	48 000	56 900	68 400
total	7376 to 7379	166 400	173 600	184 000	196 700	217 400	253 900	295 000
Australia								
Total of the above sectors		..	..	..	5 384	..	11 367	..
7831	Data processing services	..	..	..	70	..	123	..
7832	Information storage and retrieval services	..	..	..	736	..	614	..
7833	Computer maintenance services	..	..	..	1 837	..	4 572	..
7834	Computer consultancy services	..	..	..	2 741	..	6 059	..
France [1]								
72	Computer and related activities	144 766	146 220	151 347	147 881	153 329	158 544	..
72.1	Computer integrated systems design	..	..	..	33 639	42 153	45 508	..
72.2	Software producing	..	..	..	45 837	47 976	50 803	..
72.3	Data processing	..	..	..	43 232	42 797	42 200	..
72.4	Databank activities	..	..	..	4 255	4 582	4 438	..
72.5	Computer and office machinery maintenance and repair	..	..	..	20 918	15 821	15 595	..
Finland								
72	Computer and related activities	..	..	..	..	..	15 511	..
72.1	Hardware consultancy	..	..	..	..	..	155	..
72.2	Software consultancy and supply	..	..	..	..	..	9 802	..
72.3	Data processing	..	..	..	..	..	4 487	..
72.4	Database activities	..	..	..	..	..	225	..
72.5	Maintenance and repair of office, account. & comput. machin.	..	..	..	..	..	771	..
72.6	other computer related activities	..	..	..	..	..	71	..
Netherlands								
72	Computer and related activities	39 100	41 500	41 000	52 800	54 200	62 300	..
72.1	Data processing services	..	..	..	..	..	16 700	..
72.2	Information storage and retrieval services	..	..	..	..	..	36 300	..
72.3	Computer maintenance services	..	..	..	..	..	5 600	..
total	72.4 to 72.6	..	..	..	..	..	3 700	..

1. Wage earners as of 31 December.

Source : See Table 3.1.

Table 10. **Software and computer-related services sub-sectors, selected countries-Number of enterprises**

	1990	1991	1992	1993	1994	1995
United States [1]						
737 Computer programming, data processing, and other computer-related services	..	..	59 052	..	..	..
7371 Computer programming services	..	..	23 285	..	..	..
7372 Prepackaged software	..	..	7 108	..	..	..
7373 Computer integrated systems design	..	..	5 011	..	..	..
7374 Computer processing and data preparation and processing services	..	..	7 266	..	..	..
7375 Information retrieval services	..	..	1 090	..	..	..
7376 Computer facilities management services	..	..	675	..	..	..
7377 Computer rental and leasing	..	..	854	..	..	..
7378 Computer maintenance and repair	..	..	5 041	..	..	..
7379 Computer related services n.e.c.	..	..	8 722	..	..	..
Australia						
Total of the above sectors	..	..	..	4 886	..	9 672
7831 Data processing services	..	..	..	262	..	379
7832 Information storage and retrieval services	..	..	..	67	..	31
7833 Computer maintenance services	..	..	..	242	..	422
7834 Computer consultancy services	..	..	..	4 315	..	8 840
France [2]						
72 Computer and related activities	..	..	..	21 154	21 083	21 900
72.1 Computer integrated systems design	..	..	..	8 231	8 517	8 370
72.2 Software producing	..	..	..	6 070	6 427	7 180
72.3 Data processing	..	..	..	4 971	4 145	4 220
72.4 Databank activities	..	..	..	811	760	720
72.5 Computer and office machinery maintenance and repair	..	..	..	1 071	1 234	1 360
Finland						
72 Computer and related activities	..	..	..	..	..	2 579
72.1 Hardware consultancy	..	..	..	..	..	118
72.2 Software consultancy and supply	..	..	..	..	..	2 018
72.3 Data processing	..	..	..	..	..	190
72.4 Database activities	..	..	..	..	..	35
72.5 Maintenance and repair of office, account. & comput. machin.	..	..	..	..	..	208
72.6 other computer related activities	..	..	..	..	..	10
Netherlands						
72 Computer and related activities	..	..	..	..	..	9 600
72.1 Data processing services	..	..	..	..	..	4 100
72.2 Information storage and retrieval services	..	..	..	..	..	4 300
72.3 Computer maintenance services	..	..	..	..	..	400
72.4 to 72.6	..	..	..	..	..	800

1. Number of establishments.
2. Wage earners as of 31 December.

Source : See Table 3.1.

3. Trade data

30. The various modes of delivering software and computer services raise potential trade measurement issues. Valuation at the border, especially in the case of package software, was very often based on the medium (e.g. tape, disk, CD) rather than the product (e.g. software, music). This problem is compounded when the medium is an online network that allows the electronic delivery of software (and music). This mode of transport circumvents the normal administrative channels such as customs where data on imports and exports occurs. *A Model Survey of Computer Services* (United Nations, 1992) describes this problem:

> "The import or export value of computer services delivered through public telecommunication networks can be difficult to measure owing to the fact that the provision of such services can involve more than one enterprise, that is, the computer service firm and one or may telecommunication carriers. The measurement difficulty can best be explained with the following example: an individual or a business subscribes to a telecommunication carrier's "gateway" service to gain access to a number of databases, some of which are foreign. The client extracts data from a foreign source; therefore an import of services should be recorded. The individual -- the importer -- transacts with a domestic enterprise, the telecommunication carrier, which acts as a broker. The bill received includes both the telecommunication charge (which itself can include an imported element) and a charge for the use of the database service. This part of the bill is remitted, less a collection charge, to the foreign database vendor by the telecommunication carrier. Although the individual is the importer, the telecommunication carrier is likely the best source to obtain information on imports of database services in these instances. In the absence of "integrated billing", the importer (in this case the business or individual accessing the foreign database) would be the best source of the information".
>
> *A Model Survey of Computer Services*, United Nations, 1992.

31. Leaving aside the piracy issue (see below), there are several other reasons why the measurement of software trade is becoming increasingly difficult. According to the way the software is sold to the final customer, it will be taken into account in the statistics under different forms. For example[11], if a software application is sold by a US company directly abroad, the operation is recorded as exporting goods. If this software is sold to a hardware producing company, which then exports the computer with embedded software ('bundled'), the value of the software will be included in the value of exported machine. If a copy of the software is sold to a foreign firm which pays royalties, this will appear in the Balance of Payments (BP) as export of business services. But if the same copy of the software is sold through a branch of the company abroad, the income generated will be recorded as income of the branch and will be components in its profits. Once remitted to the home country, they will appear in the BP as investment income[12].

32. Table 11 provides an example of possible underestimation of the value of the software contained in the medium. The first two rows correspond to trade value of software (medium value) as declared by the countries (differing records). The second and third row provide data for the same declaring country (US) based on the same classification, but from different databases (differing sources). The fourth and last row provides software trade statistics (content value) from a Japanese survey.

33. Based on official data[13], Table 12 provides an overview in 1994 and 1996 of the share of computer related services trade within total trade (total goods and total services) for selected countries.

34. Related to trade data, market coverage and regional origin of the consumed products (packaged software) for the triad (US, Japan, EU) for 1991 was made available in 1993 by IDC (Tables 13 and 14). The data should be interpreted with caution, and more as an order of magnitude than real value data. Furthermore, the figure given in 1993 for the 1991 world-wide market was 51.05 billion current US$. In 1995, the world-wide market for the same year (1991) was estimated by IDC at more than 60 billion (current) US$. This points out one of the weaknesses of such kind of data, which are regularly revised for a given point in time (a year in the time serie), and thus make it difficult to build reliable time series [14].

35. As shown in Table 15, foreign sales from US pre-packaged software vendors also provide information on the importance of the US software industry as an 'exporter'[15]. It is worth noting that the share of non US-sales within the total sales has increased during the period.

36. The dominance of software originating from the United States in the imports flows is also the case for Japan (88 percent of the Japanese 1996 software imports originated from United States), as shown in Tables 16 and 17, as well as for France, where US software represented 60 percent of the French total software imports in 1995. If the software imported from the United States were combined with the software developed in France by US companies, the total would amount to 70 percent of the total French packaged software market[16].

Table 11. **The measurement problem: Japan-United States trade in software, 1994**

Definition	Declaring country	Imports (million US$)	Exports (million US$)	Source
Imports and exports of software [1]	Japan	216. 8	33. 8	OECD, FTS database, Harmonised System Classification, Rev. 2 [2]
Imports and exports of software. **Imports corresponds to US exports to Japan.**	US	209.8	37.7	OECD, FTS database, Harmonised System Classification, Rev. 2 [3]
Software products from the US trade balance in advanced technology products. **Imports corresponds to US exports to Japan.**	US	261.0	26.0	US Bureau of the Census, based on Harmonised System Classification data.
Statistical survey on software trade. Game software excluded.	Japan	2 436.2	18.2	JEIDA, JISA, JPCSA

1. Lines 852431, 852440, 852491, and 852499 of the Harmonised System Classification, Rev.2
2. 1994 estimates based on the 1996 share of the lines defined above within the larger category of exports.
3. 1994 US estimates based on the corresponding japanese 1996 share of software within the 4-digit category, applied to US 1994 4-digit category.

Source : *Measuring electronic commerce: International Trade in Software* , OECD, 1998, forthcoming.

Table 12. **Trade in goods and services, and computer services for selected zones or countries, 1994 and 1996**[1]

Billion US$

Declaring country/region	Partner country/region		Exports		Imports	
			1994	1996	1994	1996
EU 15	World	Total Goods	1 623.0	1 983.3	1 531.0	1 848.4
		Total Services	479.9	538.6	465.8	535.8
		Computer Services	7.0	8.4	7.0	8.9
	Intra EU15	Total Goods	1 026.9	1 152.8	932.6	1 038.7
		Total Services	259.2	271.0	260.9	278.7
		Computer Services	3.7	3.9	3.7	4.5
	United States	Total Goods	123.6	127.5	119.4	125.9
		Total Services	81.2	81.5	73.7	76.7
		Computer Services	1.6	1.7	2.4	2.5
	Japan	Total Goods	33.0	36.4	66.6	68.7
		Total Services	12.8	14.2	7.9	8.4
		Computer Services	0.1	0.1	0.1	0.1
United States	World	Total Goods	512.5	624.8	689.2	817.8
		Total Services	178.2	189.5	120.7	128.3
		Software Products [2]	3.0	2.6	0.4	0.6
		Computer Services [3]	3.8	4.1	0.4	0.6
Canada	World	Total Goods	165.4	201.2	155.1	175.0
		Total Services	17.6	21.2	25.5	29.3
		Computer Services [4]	0.6	..	0.7	..
Japan	World	Total Goods	397.0	412.6	275.2	349.6
		Total Services	57.2	63.9	109.2	121.6
		Computer Services [5]	0.1	0.1	2.5	3.6
Australia	World	Total Goods	47.6	59.9	53.4	65.5
		Total Services	13.5	15.1	15.2	17.2
		Computer Services [6]	0.2	..	0.1	..
Finland	World	Total Goods	29.6	40.4	22.1	28.1
		Total Services	5.4	7.2	6.8	9.4
		Computer Services	0.6	0.7	0.5	0.8
France	World	Total Goods	224.3	290.3	216.3	275.3
		Total Services	89.2	96.0	70.7	76.9
		Computer Services	0.2	0.4	0.5	0.5
Netherlands	World	Total Goods	140.3	197.1	124.4	174.1
		Total Services	43.4	47.2	41.8	45.3
		Computer Services [7]	0.8	..	..	..
India	World	Total Goods	25.1	33.3	26.8	37.5
		Total Services	7.5	33.3	8.7	37.5
		Computer Services [8]	0.5	1.1	..	..

1. For EU15 and EU member countries except the Netherlands, Information Services are included. 1995 instead 1996.

2. US trade in software products was broken out from the US trade in Advanced Technology Product category covering computers & telecommunication products. The original source of the data is the US Bureau of the Census and the Department of Commerce. 1990 to 1994 data were published in National Science Fundation -NSF- (1996) *Science & Ingineering Indicators* .

3. Reported by Eurostat, United States beeing declaring country. Information Services included with Computer Services. 1995 instead 1996.

4. Data refer to commodities rather than industries. Statistics Canada.

5. Statistical Survey on Software Export/Import, Japan Information Services Association (JISA), December 1997.

6. 1993/94 data, Australian Bureau of Statistics (ABS).

7. 1993 data, Statistics Netherlands.

8. Software Exports, National Association of Software and Services Companies of India.

Source: OECD Secretariat, based on data from Eurostat, World Trade Organisation, National Science Fundation, US Department of Commerce, Statistics Canada, JISA, ABS, Statistics Netherlands, Statistics Finland, and National Association of Software and Services Companies of India.

Table 13. **Breakdown of the world-wide packaged software market, 1991**

Million US$

Origin of consumed products	**Consumption areas**				*regional origin of the consumed products*	regional weight in the world consumption % of the total
	United States	**Europe**	**Japan**	**RoW**		
United States	19.93	13.28	2.95	3.81	*39.98*	78.3
Europe	0.49	7.38	0.37	0.00	*8.24*	16.1
Japan	0.00	0.12	2.09	0.00	*2.21*	4.3
Rest of World	0.12	0.37	0.00	0.12	*0.62*	1.2
Regional consumption	**20.54**	**21.16**	**5.41**	**3.94**	51.05	100.0
Share of world consumption (%)	40.2	41.4	10.6	7.7	100.0	

Source : OECD Secretariat, based on IDC in "EITO 93".

Table 14. **Packaged software market coverage, 1991**

Zone	Million US$		%
	Domestic products consumed in domestic market	Total consumption of the region	**market coverage**
United States	19.93	20.54	**97.0**
Europe	7.38	21.16	**34.9**
Japan	2.09	5.41	**38.6**
Rest of World	0.12	3.94	**3.1**

Source : OECD Secretariat, based on IDC in "EITO 93".

Table 15. **Total and non-US sales of leading independent pre-packaged software vendors**

Billion 1995 US$

	Total Software sales	Non-US Software sales	Per cent non-US sales
1987	6.8	2.9	42.3%
1989	9.8	4.4	44.6%
1990	12.2	5.6	45.8%
1991	13.7	6.6	48.0%
1992	16.1	7.8	48.2%
1993	18.6	8.9	48.1%
1994	22.6	10.6	46.9%
1995	28.7	12.9	45.2%

Source: OECD Secretariat, based on data from Economist Incorporated.

Table 16. **Japan software trade, 1994-96**

Million US$

	Exports			Imports		
	1994	1995	1996	1994	1995	1996
Americas	18.7	8.8	13.2	2 458.8	3 840.3	3 273.7
Basic	8.0	5.3	7.7	1 823.5	2 489.8	2 201.2
Application	10.6	2.1	5.4	538.7	1 039.8	809.7
Custom	0.1	1.4	0.1	96.6	310.7	262.8
of which: **USA**	17.8	8.6	12.8	2 383.7	3 733.8	3 170.8
Basic	7.1	5.2	7.4	1 787.4	2 388.5	2 105.5
Application	10.6	2.0	5.3	531.5	1 035.3	802.5
Custom	0.1	1.4	0.1	64.8	309.9	262.7
Europe	10.9	9.5	7.9	33.7	101.3	220.9
Basic	7.5	7.2	6.9	20.6	30.4	39.6
Application	2.6	1.0	1.0	10.2	40.9	175.4
Custom	0.7	1.3	0.0	2.8	30.0	6.0
Asia	20.3	19.2	27.8	33.1	210.5	107.1
Basic	7.5	10.0	9.9	14.2	7.7	50.0
Application	12.3	7.8	15.2	3.1	192.0	41.0
Custom	0.5	1.3	2.7	15.8	10.8	16.2
Rest of the world	3.9	4.3	3.4	13.3	19.8	15.4
Basic	3.7	3.7	3.3	3.3	7.6	6.2
Application	0.1	0.1	0.1	2.2	3.3	3.3
Custom	0.1	0.5	0.0	7.7	8.9	5.9
World	53.7	41.8	52.2	2 538.9	4 171.9	3 617.1
Basic	26.6	26.2	27.8	1 861.6	2 535.5	2 296.9
Application	25.6	10.9	21.6	554.3	1 276.0	1 029.3
Custom	1.5	4.6	2.8	123.0	360.4	290.9

Source: *Statistical Survey on Software Trade* , JISA, october 30, 1997.

Table 17. **Japan game software trade, 1996**

Million US$

	Exports		Imports	
	Value	%	Value	%
Americas	6.1	39.4	8.7	91.3
USA	6.1	39.4	8.7	91.3
Europe	4.3	28.0	0.8	8.7
Asia	4.4	28.5	0.0	0.0
Rest of the world	0.6	4.1	0.0	0.0
World	15.4	100.0	9.5	100.0

Source: *Statistical Survey on software Trade* , JISA, october 30, 1997.

37. On the other hand, the US trade in software products shifted between 1990 and 1996 towards destination of Asian countries. As the NAFTA partners dropped from more than one third of the exports in 1990 to slightly more than one forth in 1996, and the main European countries saw their share decline from 26 to 17 percent, the Asian countries (mainly Japan, Republic of Korea, Chinese Taipei, Hong Kong and India) jumped from 18.6 to 27.7 per cent. South America represented in 1996 5 per cent of the US exports. On the imports side, it is worth noting that Asian countries (mainly Singapore, Taiwan and Malaysia) have slightly increased their share during the period, mainly to the detriment of Canada and to a lesser extend the main European countries (Table 18).

Table 18. **Share of selected OECD countries in US software product trade, 1990-96**

	Exports							Imports							Trade balance						
	1990	1991	1992	1993	1994	1995	1996	1990	1991	1992	1993	1994	1995	1996	1990	1991	1992	1993	1994	1995	1996
World Total (million US$)	**1 328**	**1 625**	**2 050**	**2 526**	**3 031**	**3 058**	**2 618**	**157**	**196**	**295**	**360**	**436**	**560**	**588**	**1 171**	**1 429**	**1 755**	**2 166**	**2 594**	**2 498**	**2 030**
Share of world total (percentage)																					
NAFTA partners																					
Canada	33.0	30.6	28.1	26.9	27.3	28.3	25.1	35.5	34.9	36.8	30.1	26.8	23.9	29.0	32.6	30.0	26.7	26.4	27.4	29.3	24.0
Mexico	1.3	1.5	1.9	2.3	3.4	1.8	2.3	1.6	2.0	1.2	1.5	0.7	0.5	0.8	1.2	1.5	2.0	2.5	3.9	2.1	2.8
EU-4	**26.2**	**24.6**	**26.2**	**24.8**	**22.0**	**19.0**	**17.2**	**18.9**	**19.3**	**19.0**	**18.9**	**16.2**	**16.8**	**16.0**	**27.2**	**25.4**	**27.4**	**25.8**	**23.0**	**19.5**	**17.6**
Germany	8.3	8.7	10.4	10.3	8.4	6.7	5.5	5.5	6.2	7.4	4.6	5.3	7.1	6.7	8.7	9.1	11.0	11.2	9.0	6.6	5.1
France	4.6	4.5	4.3	3.8	3.7	3.4	2.8	4.7	2.7	2.3	3.8	3.1	2.7	2.4	4.6	4.8	4.7	3.8	3.8	3.6	2.9
Italy	2.7	1.8	1.9	1.5	1.7	1.8	2.1	0.6	0.3	0.4	0.5	0.7	0.9	0.6	2.9	2.1	2.1	1.7	1.8	2.1	2.5
United Kingdom	10.6	9.5	9.5	9.2	8.2	7.1	6.8	8.1	10.1	8.9	10.1	7.1	6.2	6.2	10.9	9.4	9.6	9.0	8.4	7.2	7.0
Asia	**18.6**	**18.5**	**17.6**	**18.8**	**18.6**	**23.2**	**27.7**	**26.9**	**30.6**	**26.0**	**24.0**	**28.5**	**30.5**	**30.3**	**17.5**	**16.8**	**16.2**	**17.9**	**16.9**	**21.6**	**27.0**
China	0.5	0.4	0.8	1.2	1.0	0.8	0.7	0.1	0.3	1.6	2.5	1.4	0.6	0.6	0.6	0.4	0.7	1.0	0.9	0.8	0.8
Chinese Taipei	1.5	1.4	2.0	2.1	1.6	1.6	2.1	3.8	5.5	4.5	3.6	3.1	2.8	6.6	1.2	0.9	1.6	1.8	1.4	1.3	0.7
Hong Kong	1.2	1.6	1.5	1.7	1.6	2.9	2.5	0.9	1.2	3.1	0.6	0.6	0.4	0.6	1.3	1.6	1.2	1.9	1.8	3.4	3.0
India	0.4	0.3	0.3	0.3	0.3	1.1	1.1	0.5	0.3	0.2	0.7	1.1	1.4	1.3	0.4	0.3	0.3	0.2	0.2	1.0	1.1
Indonesia	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.1	0.1
Japan	10.7	10.5	8.7	8.1	8.6	11.0	14.7	14.1	16.0	9.7	7.1	6.0	5.4	4.2	10.2	9.7	8.5	8.3	9.1	12.3	17.7
Rep. of Korea	1.9	2.0	1.9	2.6	2.8	3.0	3.6	1.4	1.3	0.7	0.6	0.3	0.2	0.6	2.0	2.1	2.1	2.9	3.3	3.6	4.5
Malaysia	0.2	0.3	0.3	0.4	0.4	0.4	0.6	0.0	0.0	0.0	0.0	0.0	0.2	9.4	0.2	0.3	0.3	0.5	0.5	0.4	-1.9
Singapore	2.0	1.9	2.0	2.4	2.1	2.4	2.4	6.2	6.0	6.1	9.0	15.9	19.4	7.1	1.4	1.3	1.4	1.3	-0.2	-1.5	1.0
South America	**1.1**	**2.2**	**2.4**	**3.6**	**4.3**	**4.4**	**4.9**	**0.1**	**0.0**	**0.0**	**0.2**	**1.8**	**0.8**	**0.2**	**1.2**	**2.5**	**2.8**	**4.2**	**4.7**	**5.3**	**6.3**
Argentina	0.1	1.1	0.9	1.4	1.2	0.6	0.8	0.0	0.0	0.0	0.2	1.7	0.8	0.0	0.2	1.3	1.0	1.6	1.1	0.6	1.0
Brazil	0.7	0.7	1.2	1.8	2.6	3.1	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.8	1.3	2.1	3.0	3.7	4.3
Chile	0.2	0.3	0.4	0.4	0.3	0.6	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.4	0.4	0.4	0.7	0.8
Peru	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3
Africa	**0.1**	**1.1**	**1.2**	**1.5**	**1.7**	**1.7**	**1.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**1.2**	**1.4**	**1.7**	**2.0**	**2.1**	**2.3**
Kenya	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nigeria	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
South Africa	0.0	1.0	1.1	1.4	1.7	1.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.3	1.7	2.0	2.0	2.3
Eastern Europe	**0.2**	**0.5**	**0.8**	**1.0**	**1.2**	**0.7**	**0.5**	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**	**0.3**	**0.8**	**0.3**	**0.5**	**1.0**	**1.1**	**1.3**	**0.8**	**0.4**
Hungary	0.2	0.3	0.5	0.4	0.3	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.5	0.4	0.3	0.1	0.0
Poland	0.1	0.2	0.3	0.3	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.2
Russia	0.0	0.0	0.1	0.3	0.5	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.1	0.3	0.6	0.4	0.2

Source: US trade in advanced technology products, *Science & Ingeneering Indicators 1996*, from Census Bureau, US Dept. of Commerce unpublished tabulations, and data from US Dept. of Commerce.

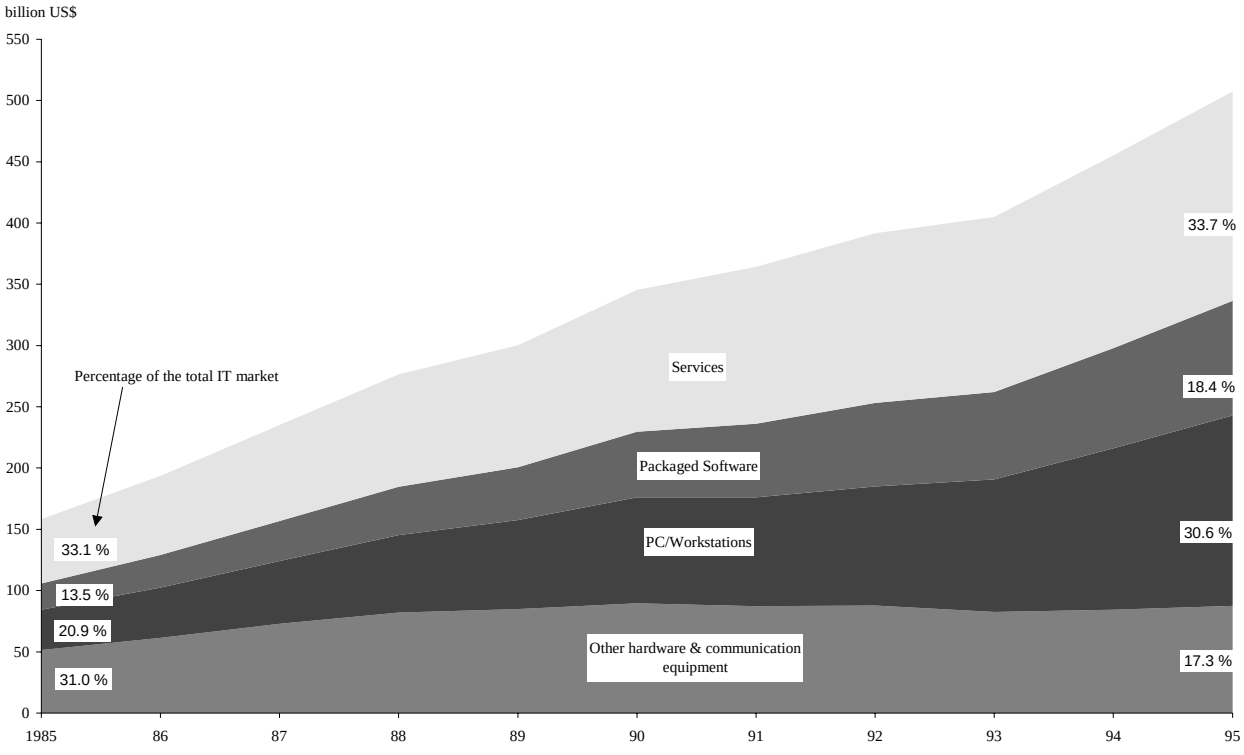
4. Market data

38. Software now represents a significant share of the world-wide IT market. Since 1985, the world-wide software and computer services markets have respectively increased at a CAGR of 15.9 and 12.5 per cent (12.4 for the total IT market) and, taken together, now represent a larger share of the IT market than hardware **(**Figure 2).

39. According to IDC market data, software has shown much higher growth than services, the former climbing from 14.1 to 19.1 per cent of the total IT market between 1987 and 1995 while services grew in proportion to the total market with its share increasing slightly from 34.1 to 35 per cent (Table 19).

40. SPA figures, although reporting US application software sales only, seem to be far below the level of the IDC data. They show that those countries with the most dynamic market belong, with the exception of Mexico, to the Asia Pacific region (Table 20). The problem of piracy remains important and leads to an underestimate of the economic contribution of the software industry by an order which can be very significantly depending on the country (Table 21, Figure 3).

Figure 2. **World-wide IT market by segment, 1985-95**[1]



1. 1995 estimated.

Source: IDC and OECD.

Table 19. **Evolution of IT market with details for software and services for selected OECD countries, 1987-95**

	1987											
	Total IT market	Packaged software and services		Total packaged software					Total Services			
				Level	percentage of total market				Level	percentage of total market		
	Billion US$	Level (billion US$)	Percentage of market	Billion US$	System soft. & utilities	Application tools	Application solutions	Total Pack.soft.	Billion US$	Professionnal services	Support	Total services
United States	105 255	52 200	49.6	16 610	5.3	4.1	6.4	15.8	35 590	13.5	20.3	33.8
Canada	5 428	2 326	42.9	581	3.6	2.6	4.5	10.7	1 745	17.0	15.2	32.1
Mexico	676	258	38.2	86	5.3	3.8	3.6	12.7	172	12.7	12.7	25.5
Japan	35 794	16 015	44.7	2 947	3.4	1.6	3.2	8.2	13 068	23.2	13.3	36.5
Australia	4 211	1 558	37.0	553	4.2	3.2	5.7	13.1	1 005	8.3	15.6	23.9
New Zealand	596	243	40.8	76	3.0	2.8	7.0	12.8	167	9.5	18.4	28.0
Austria	1 344	653	48.6	221	5.3	4.7	6.4	16.5	431	16.4	15.7	32.1
Belgium	2 278	1 267	55.6	570	8.4	6.2	10.4	25.0	696	14.5	16.1	30.6
Denmark	1 283	606	47.2	187	3.8	4.3	6.4	14.6	419	22.6	10.1	32.7
Finland	1 372	554	40.4	188	3.6	3.9	6.2	13.7	366	17.7	9.0	26.7
France	12 352	6 543	53.0	1 440	4.2	2.7	4.8	11.7	5 102	24.2	17.2	41.3
Germany	13 923	7 088	50.9	1 986	4.1	3.9	6.2	14.3	5 103	18.4	18.3	36.7
Greece	365	85	23.2	30	2.2	0.6	5.3	8.1	55	6.3	8.8	15.0
Hungary	131	70	53.1	22	5.9	2.9	7.7	16.5	48	20.7	15.8	36.5
Ireland	355	137	38.7	48	4.3	3.7	5.5	13.5	89	12.0	13.1	25.2
Italy	8 027	3 689	46.0	1 235	4.3	5.0	6.2	15.4	2 454	15.4	15.1	30.6
Netherlands	3 169	1 439	45.4	506	4.1	4.9	6.9	16.0	933	16.5	12.9	29.4
Norway	1 118	532	47.6	153	4.3	3.6	5.8	13.7	379	20.8	13.1	33.9
Portugal	478	127	26.6	47	4.1	2.3	3.4	9.9	80	6.9	9.8	16.7
Spain	3 181	1 264	39.7	395	3.2	3.1	6.1	12.4	869	11.9	15.4	27.3
Sweden	3 115	1 717	55.1	390	3.7	3.2	5.7	12.5	1 327	30.0	12.6	42.6
Switzerland	2 878	1 525	53.0	552	5.7	5.1	8.5	19.2	973	17.2	16.7	33.8
United Kingdom	12 826	6 251	48.7	2 322	5.0	4.2	8.9	18.1	3 929	13.7	16.9	30.6
Turkey	106	13	12.7	5	1.5	0.4	2.7	4.5	9	4.6	3.6	8.2
OECD 24	220 261	106 160	48.2	31 151	4.7	3.6	5.9	14.1	75 009	16.5	17.6	34.1

Table 19. **Evolution of IT market with details for software and services for selected OECD countries, 1987-95 (continued)**

	1995 [1]											
	Total IT market	Packaged software and services		Total packaged software					Total Services			
				Level	percentage of total market				Level	percentage of total market		
	Billion US$	Level (billion US$)	Percentage of market	Billion US$	System soft. & utilities	Application tools	Application solutions	Total Pack.soft.	Billion US$	Professionnal services	Support	Total services
United States	212 745	118 145	55.5	43 660	4.7	6.0	9.8	20.5	74 485	21.2	13.8	35.0
Canada	14 861	8 419	56.7	2 452	4.6	3.9	8.0	16.5	5 966	29.8	10.3	40.1
Mexico	2 045	923	45.1	258	2.5	4.5	5.6	12.6	665	21.2	11.3	32.5
Japan	82 296	38 524	46.8	9 102	2.5	2.6	6.0	11.1	29 421	24.4	11.4	35.8
Australia	8 987	3 649	40.6	1 492	4.0	5.1	7.5	16.6	2 158	16.4	7.6	24.0
New Zealand	1 717	789	45.9	315	3.2	4.4	10.7	18.3	474	20.5	7.1	27.6
Austria	3 169	1 708	53.9	737	4.9	7.0	11.3	23.3	971	17.2	13.5	30.6
Belgium	4 342	2 641	60.8	1 352	6.9	9.6	14.6	31.1	1 289	14.7	15.0	29.7
Denmark	2 810	1 457	51.9	539	3.9	6.4	8.9	19.2	918	22.7	10.0	32.7
Finland	1 861	929	49.9	337	3.5	6.1	8.6	18.1	591	22.0	9.8	31.8
France	23 155	14 138	61.1	4 488	4.3	6.3	8.7	19.4	9 650	26.8	14.9	41.7
Germany	36 236	20 983	57.9	8 292	3.8	8.1	11.0	22.9	12 691	21.8	13.2	35.0
Greece	538	229	42.6	102	3.6	1.7	13.7	19.0	127	15.3	8.3	23.6
Hungary	696	281	40.3	115	4.6	2.8	9.1	16.6	166	16.3	7.5	23.8
Ireland	724	336	46.4	150	5.1	6.3	9.4	20.8	186	13.9	11.8	25.7
Italy	11 980	7 386	61.7	2 641	4.7	7.5	9.9	22.0	4 745	24.4	15.3	39.6
Netherlands	7 686	4 478	58.3	2 040	3.8	8.8	14.0	26.5	2 437	19.3	12.5	31.7
Norway	2 258	1 185	52.5	427	3.8	6.0	9.1	18.9	758	22.6	10.9	33.6
Portugal	852	326	38.3	150	4.9	4.6	8.2	17.6	176	10.2	10.4	20.7
Spain	5 457	2 773	50.8	1 222	3.6	5.7	13.0	22.4	1 551	14.1	14.4	28.4
Sweden	4 977	2 841	57.1	800	3.2	4.8	8.1	16.1	2 041	31.0	10.0	41.0
Switzerland	6 530	3 882	59.4	1 746	5.3	7.2	14.2	26.7	2 136	19.1	13.6	32.7
United Kingdom	23 798	12 739	53.5	5 456	4.7	5.8	12.3	22.9	7 283	18.2	12.4	30.6
Turkey	586	202	34.4	83	2.7	1.2	10.2	14.1	119	13.2	7.1	20.3
OECD 24	460 305	248 962	54.1	87 957	4.1	5.6	9.4	19.1	161 005	22.0	13.0	35.0

1. Estimated.

Source: OECD Secretariat, compiled from IDC data.

Table 20. **US computer application software sales[1] for selected countries/regions, 1995-96**

Million current US$

	1995	1996	variation
United States and Canada	9 772.0	10 580.0	8.3%
Benelux	169.0	192.7	14%
France	343.7	357.4	4%
Germany/Austria	578.2	531.9	-8%
Greece	6.8	6.8	0%
Italy	131.1	159.9	22%
Nordic countries	132.4	154.9	17%
Spain & Portugal	71.8	84.0	17%
Sweden	111.0	111.0	0%
Switzerland	102.7	107.8	5%
UK/Ireland	531.4	595.2	12%
Total Western Europe[2]	2 171.3	2 301.6	6%
Australia & New Zealand	191.0	219.7	15%
China	4.7	8.5	81%
Hong Kong	31.3	29.7	-5%
India & Pakistan	12.0	12.0	0%
Japan	788.1	1 000.9	27%
Korea	36.3	41.0	13%
Malaysia	13.7	19.4	42%
Singapore	42.6	29.8	-30%
Chinese Taipei	39.0	33.5	-14%
Thailand	11.9	14.8	24%
Total Asia-Pacific[2]	1 175.2	1 433.8	22%
Brazil	64.1	81.4	27%
Mexico	29.1	42.8	47%
Other Latin America	83.4	101.8	22%
Total Latin America[2]	177.7	227.4	28%
Total of the above regions	13 296.2	14 542.8	9.4%

1. Based on total revenues in each region/country of U.S.-based software firms.

2. Includes sales not allocated to individual countries

Source: OECD Secretariat, based on Software Publishers Association (SPA) data, SPA, various Press Releases. (http://www.spa.org/research/research.htm)

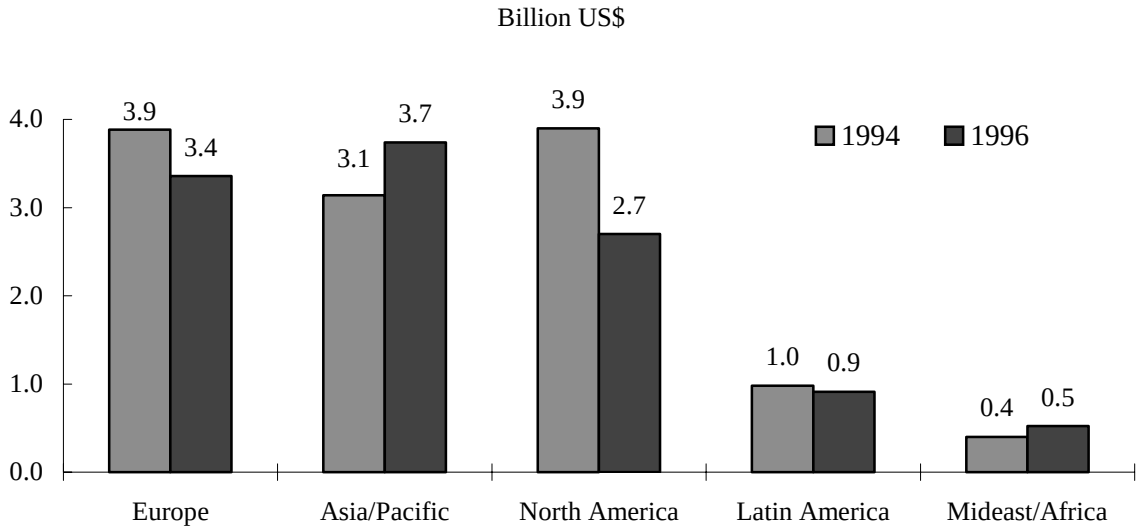
Table 21. **Software application piracy rates, selected OECD countries, 1994-96**[1]

	percentage		
	1994	1995	1996
Country/Region			
North America [2]	32	27	28
United States	31	26	27
Canada	46	44	42
Mexico	78	74	67
Asia / Pacific [3]	68	64	55
Japan	66	55	41
Australia	37	35	32
New Zealand	43	40	35
Korea	75	76	70
Western Europe	52	49	43
Austria	47	47	43
Belgium and Luxembourg	53	48	39
Denmark	48	47	35
Finland	53	50	41
France	53	51	44
Germany	48	42	36
Greece	87	86	78
Ireland	74	71	70
Italy	69	61	55
Netherlands	64	63	53
Norway and Iceland	53	54	54
Portugal	65	61	53
Spain	77	74	65
Sweden	54	54	47
Switzerland	38	47	43
United Kingdom	42	38	34

1. Piracy rate is defined as the ratio between software applications installed (demand) and software applications legaly shipped (supply).
2. Excluding Mexico.
3. Including non OECD countries.

Source: Business Software Alliance, 1997.

Figure 3. **Losses due to software piracy, 1994 and 1996**



Source : BSA/SPA *Global Software Piracy Report, Facts and Figures, 1994-96*

5. Prices

41. As the importance of software both as an industry and as an input to other products grows, the need to track price changes grows as well. As with IT hardware, accurately evaluating software price changes may be a key element in determining the productivity impact of ICT and solving the productivity paradox. As in the case of hardware, software raises several measurement problems. Some of these issues are common to issues confronting the measurement of hardware such as whether to adjust prices through hedonic or match-model methods. Other issues are more akin to the problems faced when measuring services such as valuing convenience or tailoring to the individual. Others appear to be specific to intangible products like software -- such as the ability to delivery the product electronically[17] and the prevalence of network economies and increasing returns to scale where as more people use a particular product it's overall utility increases, attracting new members to the network. This creates an environment where software producers have a strong incentive to establish their software as a standard from which a network will evolve by lowering prices, or in some cases giving the product away.

42. Several studies estimate price indexes for PC software, based either on hedonic price indexes or on matched-model methods. One study[18], based on data from SPA using matched-model price indexes, clearly shows a software price decline between 1987 and 1993, especially for database software. As a result, sales of PC software grew in real terms at an average annual rate of 22.8 per cent (Table 22).

43. Another study[19], based on prices for PC database software in Germany between 1986 and 1994, which assesses the differences between traditional and quality-adjusted indexes by computing hedonic and matched-model price indexes, shows declining prices regardless of method used. Quality-adjusted database software prices declined by 7.4 percent per year on average during the period; the matched-model version of the index declined at an even faster rate of 9.3 percent. This is due to the simultaneous selling of old and new versions of a given software product, with sharply reduced prices for the former. This study also confirms the importance of network effects in the case of software products. Higher prices characterise those software products which do have code compatibility with the dominant database software product (users may share programs, not only data), and to a lesser extent with those software products able to read and write data in the dominant spreadsheet format (users may share their data only).

44. Another source of price information could be obtained from administrative data maintained by countries by their central purchasing agencies. Examples include the US General Services Administration or Canada's PWGSC (Public Works and Government Services Canada) micro-acquisition guide. In the United States, the Consumer Price Index (CPI) does collect retail prices for the software industry, but it is for home use only -- not for the business consumer --, and this software information is grouped together with computer retail prices, and not available separately[20]. The US Bureau of Labour Statistics will publish for the first time a producer price index (PPI) for pre-package software (US SIC 7372) in early 1998.

Table 22. **Nominal sales of PC application software in North America, 1987-96**

	Total nominal sales		Word processors		Spreadsheets		Databases	
	As reported by Oliner & Sichel [1]	As reported by SPA press Releases [2]	As reported by Oliner & Sichel [1]	As reported by SPA press Releases [2]	As reported by Oliner & Sichel [1]	As reported by SPA press Releases [2]	As reported by Oliner & Sichel [1]	As reported by SPA press Releases [2]
1987	2 313.0	..	339.3	..	344.7	..	207.2	..
1988	3 247.5	..	499.5	..	442.9	..	337.7	..
1989	3 633.9	..	686.3	..	571.4	..	318.0	..
1990	4 585.8	4 585.8	917.9	917.9	703.1	701.3	345.0	345.0
1991 [3]	5 713.2	..	1 136.0	..	946.7	..	396.8	..
1991 [3]	5 063.6	5 036.6	812.4	812.4	739.1	739.1	309.7	309.7
1992	5 745.4	5 745.4	829.5	829.5	795.3	795.3	348.5	348.5
1993	6 809.6	6 329.2	1 021.6	1 027.4	801.2	815.9	475.5	388.7
1994	..	6 717.8	..	1 029.3	..	829.2	..	350.1
1995 [4]	..	9 772.0	..	1 085.0	..	865.2	..	336.6
1996 [4]	..	10 580.4	..	976.3	..	881.6	..	429.8

	Annual log differences [5]				Annual log differences [5]				Annual log differences [5]				Annual log differences [5]			
	Nominal sales	Matched model price changes	Growth of real sales	Nominal sales	Nominal sales	Matched model price changes	Growth of real sales	Nominal sales	Nominal sales	Matched model price changes	Growth of real sales	Nominal sales	Nominal sales	Matched model price changes	Growth of real sales	Nominal sales
1987-88	33.9	-1.5	35.4	..	38.7	-0.4	39.1	..	25.1	-1.5	26.6	..	48.8	-3.0	51.8	..
1988-89	11.2	-2.1	13.3	..	31.8	3.4	28.4	..	25.5	-7.5	33.0	..	-6.0	-4.2	-1.8	..
1989-90	23.3	-3.7	27.0	..	29.1	-1.3	30.3	..	20.5	-4.4	24.9	..	8.2	-8.8	17.0	..
1990-91	22.0	-1.6	23.6	9.4	21.3	-1.9	23.2	-12.2	30.0	2.5	27.5	5.2	14.0	-10.5	24.5	-10.8
1991-92	13.2	-6.5	19.7	13.2	2.1	-6.4	8.5	2.1	7.3	-9.1	16.4	7.3	11.8	-1.0	12.8	11.8
1992-93	17.0	-0.8	17.8	9.7	20.8	0.1	20.7	21.4	0.7	-4.0	4.7	2.6	31.1	2.6	28.5	10.9
1993-94	..	..	..	6.0	..	..	..	0.2	..	..	..	1.6	..	..	..	-10.5
1994-95	..	..	..	37.5	..	..	..	5.3	..	..	..	4.2	..	..	..	-3.9
1995-96	..	..	..	7.9	..	..	..	-10.6	..	..	..	1.9	..	..	..	24.4
Average growth [6]																
1987-93	20.1	-2.7	22.8	11.8	24.0	-1.1	25.1	13.1	18.2	-4.0	22.2	10.0	18.0	-4.2	22.2	7.2
1987-96	..	..	..	18.4	..	..	..	12.5	..	..	..	11.0	..	..	..	8.4

1. Stephen D.Oliner and Daniel E.Sichel, *Brookings Papers on Economic Activity, 2/1994* , tables 6 to 8 pp. 298-301.
2. SPA press releases for each year available on the SPA internet site at the 26th of June 1997. In order to be consistent with the other source, only separated identified categories were selected, although integrated software do include word processors, spreadsheets and database software.
3. In 1991, the SPA revamped their data procedures, yielding two sets of figures for that year. For complete details, see Oliner & Sichel, Table 6 p.298.
4. 1996 data were released with 1995 data revision.
5. (Log (Value Year N) - Log (Value Year N-1)) * 100
6. Data from Oliner and Sichel, and compound annual average growth rate (CAGR) for SPA press release data.

Source: OECD Secretariat, compiled from *Brookings Papers on Economic Activity, 2/1994* , Stephen D.Oliner and Daniel E.Sichel, Tables 6 to 8 pp.298-301, and SPA press releases on the SPA internet site (http://www.spa.org).

6. Firm level data

45. There is a wide variety of sources of firm-level data. Increasingly, the Internet is the source of significant data with the web site of the firm being an obvious first source. For software and computer service firms, this is almost a 'passage obligé' (mandatory path)[21]. Firm-level data is also increasingly available from public sources. For publicly quoted firms in the United States (public companies), a free online database give access to official reports which provide detailed corporate information to the Securities Exchange Commission (SEC) [22], such as '10K'[23]. Lastly, private consultancy companies provide annual firm rankings according to the revenues obtained from ad-hoc market segments (Table 23).

Table 23. **1996 World-wide packaged software top market share**

IBM	11.9
Microsoft	9
Computer Associates	3.8
Oracle	3.1
HP	2.1
SAP AG	1.7
Siemens Nixdorf	1.1
Novell	1.1
Others	66.2

Source : IDC, quoted in *Le Monde Informatique,* 30 mai 1997.

46. Through these sources, as well as traditional annual reports, it is possible to build aggregated time series for the most important software and services firms. Historical data can go back to 10 to 15 years ago in case of 'old' companies. While there is no doubt that this is a dynamic market, it is interesting to note that the biggest software and computer services firm in the world has always been the same computer manufacturer firm, IBM **(**Tables 23 and 24). Taking into account the mergers and acquisitions of the past ten years for the top 20 firms would also provide information about the evolution of the concentration (relative or absolute) in those sectors, as shown in Table 25.

47. Regular reported examples highlight the increasingly global nature of the software and computer services firms, the links between important companies and local software and services firms --which can vary from alliances to foreign affiliates. This activity has recently been growing in some Eastern Countries [24] and in India[25]. Possible reasons for this shift are salary differentials and the availability of a high level of local skills, and a corresponding shortage of software engineers in OECD countries [26].

Demand (user side)

48. Although the information on Information Technology expenditure -- especially on software and services expenditure-- from the user side is very scarce, various (official or private) sources[27] provide heterogeneous but interesting information on some segments of information technology expenditures.

49. The following examples are not intended to be exhaustive but illustrate rather the variety of sources and information available. The government budget on IT purchasing is available for Australia in 1995[28] or United Kingdom IT expenditures in 1994/5 by industries[29]. In France, data on software type used by SMEs (according broad economic sectors) is available on a yearly base since 1993[30]. In Japan, a yearly survey provides detailed information on user information technology spending, broken down by hardware and software related expenditures[31].

Table 24. **Top 20 world-wide software companies, 1990 and 1996**

	Software revenue Million US$	
	1996	1990
IBM	13,052.0	9,842.6
Microsoft Corp.	9,247.0	1,289.9
Hitachi Ltd.	3,960.0	956.3
Computer Associates International Inc.	3,945.0	978.2
Oracle Corp.	3,615.0	695.8
Fujitsu Ltd.	2,000.0	1,820.8
SAP AG	1,692.0	190.4
Bull NH Information Systems Inc.	1,457.8	600.6
Digital Equipment Corp.	1,224.9	1,529.4
Novell Inc.	1,208.0	433.1
Siemens Nixdorf	1,020.0	933.3
Sybase Inc.	1,011.5	76.7
Sun Microsystems Inc.	1,000.0	137.9
Informix Software Inc.	823.7	146.1
Hewlett-Packard Co.	798.5	442.3
Adobe Systems Inc.	786.6	303.7
SAS Institute Inc.	620.4	240.2
Unisys Corp.	600.0	758.3
Parametric Technology Corp.	596.3	52.4
Cadence Design Systems	587.0	322.0

Source : OECD Secretariat, compiled from various sources.

Table 25. **Concentration of software and services market for selected countries, 1990-95**

Percentage

Country		Industry leader's share						Industry top 10 vendors share					
		1990	1991	1992	1993	1994	1995	1990	1991	1992	1993	1994	1995
Austria													
	Software	0.6	0.8	1.7	2.8	6.0	6.9	3.9	5.3	9.8	11.1	21.0	25.2
	Services	1.5	1.8	2.6	3.0	2.1	1.8	9.8	12.6	15.8	15.9	10.0	9.0
Belgium/Luxembourg													
	Software	2.0	2.1	4.1	3.1	3.1	3.6	12.2	12.6	14.8	15.6	10.1	11.8
	Services	1.8	2.5	5.1	2.9	3.0	4.3	8.2	12.2	21.1	19.5	17.6	16.7
Denmark													
	Software	2.2	2.3	3.6	2.9	7.4	7.7	12.4	12.7	14.9	13.0	17.4	18.2
	Services	11.1	9.1	21.5	4.4	4.2	4.3	31.7	24.2	44.8	16.8	14.0	14.0
Finland													
	Software	11.3	9.0	4.7	5.6	7.7	8.3	40.2	33.8	23.6	24.7	30.0	33.2
	Services	10.4	12.4	11.0	8.4	9.5	11.0	34.2	35.2	30.2	26.2	22.3	21.9
France													
	Software	6.0	6.8	6.7	7.1	7.4	7.4	42.0	23.5	19.0	22.8	19.7	20.9
	Services	12.8	12.8	10.0	4.4	4.2	4.7	72.7	23.5	33.4	22.3	18.6	17.9
Germany													
	Software	3.3	3.4	4.3	5.9	6.4	6.5	16.2	12.9	18.0	14.9	20.0	22.0
	Services	2.2	1.9	3.6	5.7	3.3	4.5	11.6	9.9	16.2	19.8	10.3	13.0
Italy													
	Software	2.5	2.3	2.1	2.5	4.6	5.0	14.5	14.0	13.2	9.3	15.2	15.0
	Services	15.9	16.2	6.9	8.1	8.1	9.1	44.3	45.0	40.1	30.8	17.8	10.9
Netherlands													
	Software	3.2	2.3	1.8	4.2	2.9	3.1	15.0	10.4	12.8	17.8	14.4	14.9
	Services	19.2	19.0	28.2	12.2	10.4	12.5	65.7	73.7	67.7	34.9	27.9	30.9
Norway													
	Software	3.0	4.2	4.2	31.0	11.1	10.5	18.0	16.3	26.0	19.1	26.1	29.4
	Services	3.3	3.8	3.9	2.5	2.2	3.0	26.0	21.4	25.0	14.2	13.5	16.3
Spain													
	Software	4.8	3.7	4.8	6.4	12.2	16.9	30.7	11.7	14.3	19.7	32.3	37.3
	Services	19.9	13.0	15.3	11.6	9.0	8.6	40.7	33.8	26.1	37.5	37.3	36.4
Sweden													
	Software	5.8	2.5	2.8	2.7	9.9	20.7	24.7	15.6	17.9	12.7	24.0	34.0
	Services	9.3	12.3	8.0	6.3	5.7	7.5	31.0	26.3	22.4	26.5	24.4	21.0
Switzerland													
	Software	0.1	0.6	1.6	2.9	6.7	6.7	0.8	3.8	5.6	8.3	19.7	20.3
	Services	1.8	1.6	5.9	1.8	1.6	1.4	11.8	10.1	11.6	7.6	4.8	4.7
United Kingdom													
	Software	3.2	4.9	4.3	5.4	5.1	4.8	14.7	17.4	17.1	16.5	16.1	16.0
	Services	4.7	4.2	6.2	4.4	4.4	4.9	25.9	23.5	30.9	32.7	27.0	31.2

Source: OECD Secretariat, compiled from European Information Technology Observatory, various editions.

NOTES

1. On software patents, see for example *Patents, When Novelty is Not New*, Scientific American, April 1996, p.27.

2. In 1995, those 8 countries accounted for almost 70 per cent of the world-wide Software and Computer Services market, the United States alone more than 40 per cent.

3. For a complete discussion on limits and methodological aspects of data collection for computer services, see *A Model Survey of Computer Services*, Statistical Papers, Series M n°81, United Nations, 1992.

4. See *The investments in software in Italy: estimation methodologies and preliminary results for the years 1990-94*, p.4. Ref. STD/NA(97)20, OECD, 1997. Available on the web under the following address: http://www.oecd.org/std/nameet/na9720.pdf

5. See *Estimation of investment in computer software, U.S. Bureau of Economic Analysis*, p.3. Ref. STD/NA/RD(97)6, OECD, 1997. Available on the web under the following address: http://www.oecd.org/std/nameet/nard976.pdf

6. See INTERNATIONAL DATA CORPORATION (IDC) (1995), *World-wide Black Book; World-wide Information Technology Spending Patterns, 1994-1999: An Analysis of Opportunities in 40 Countries*, November, Framingham, MA.

7. See GARTNER GROUP (1994), *Yardstick Top 100 World-wide 1994*, Gartner Group, Stanford, CA.

8. See US INTERNATIONAL TRADE COMMISSION (US ITC) (1995), *Global Competitiveness of the U.S. Computer Software and Services Industries*, U.S. ITC, June, Washington DC., pp. 2-6 and Appendix C.

9. OECD (1997), *Information Technology Outlook 1997*, Box 4.1. Available on the web under the following address: http://www.oecd.org/dsti/sti/it/prod/itout-97.pdf

10. *A Model Survey of Computer Services*, op.cit., p.19.

11. See *Measuring Electronic Commerce: Trade in Software*, OECD (1998), forthcoming.

12. See *the UN report The economic and social situation in the World: 1996*, pp.266-267, quoted in *Measuring Electronic Commerce: Trade in Software*, OECD (1998), op.cit.

13. See *International Trade Trends and Statistics*, prepared by the Economic Research and Analysis Division and the Statistics and Information Systems Division, WORLD TRADE ORGANISATION, 1995. In order to be consistent between services and goods, WTO data were used rather than OECD Services database data. OECD Services database provides computer-related services trade data for United States (earliest year available: 1986), Germany (1986), Italy (1990), United Kingdom (1992), Canada (1981) and Norway (1982), 1994 being the latest year available.

14. A time series (going back to 10 years) published by IDC in a given year will be revised the year after, and in order to avoid growth rates becoming 'unrealistic', the complete series is modified accordingly. The earliest point in time of the series is then revised year after year, and finally differs significantly from the

first valuation, even if this first valuation was made 2 years after. A methodology of such 'retrocasting' exercises has never been published.

15. See *Measuring Electronic Commerce: Trade in Software*, op.cit.

16. *Software industry report: France*, June 1997, Charles Defranchi, The Commercial Service, American Embassy, Paris.

17. For a development on the new software economy, see *The Software Industry Survey*, The Economist, May 25th 1996, as well as *Des logiciels libres à la disposition de tous*, Bernard Lang, Le Monde Diplomatique, Janvier 1998.

18. *Brookings Papers on Economic Activity, 2:1994*, Stephen D. Oliner and Daniel E. Sichel.

19. *Prices indexes for PC Database Software and the value of code compatibility*, Discussion paper N.96-17, Zentrum für Europäische Wirtshaftsforshung GmbH, 1996, Dietmer Harhoff and Dietmatr Moch.

20. This price information is listed under "Information Processing Equipment" (cuur0000se69 - US Bureau of Labor Statistics Internet Homepage code) and was introduced in December 1988. The US BLS internet homepage is available under the following adress : http://stats.bls.gov/

21. There is no no-Internet site firm in the 1995 world-wide top 20 software and computer services firms presented in Datamation, June 15, 1996.

22. EDGAR, the Electronic Data Gathering, Analysis, and Retrieval system, performs automated collection, validation, indexing, acceptance, and forwarding of submissions by companies and others who are required by law to file forms with the U.S. Securities and Exchange Commission (SEC). The Internet site of this database is : http://www.sec.gov/edaux/wedgar.htm

23. Form 10-K is the annual report that most reporting companies file with the Securities and Exchange Commission. It provides a comprehensive overview of the registrant's business. The report must be filed within 90 days after the end of the company's fiscal year.

24. For example, banking is an especially strong niche for the software developers in some eastern countries : ICL bought a 51% stake in Polish bank software developer Softbank, and in the Czech Republic, the central bank reporting system developed by KPMG was in competition with local packages developed by Czech companies APP and EDITEL (Business Central Europe, Survey information Technology, March 1996).

25. For example in Bangalore (India), software writers of Wipro Infotech have redesigned General Electric's internal system in 1996 (The Economist, march 9th 1996). Oracle, Novell and Siemens have established large software engineering subsidiaries in Bangalore. Reebbok France uses a distribution management application package designed and built by Infosys, India (Financial Times, December 6, 1995).

26. *Help Wanted: the IT Workforce Gap at the Dawn of New Century*, Information Technology Association of America, 1997.

27. See *Usage Indicators, A New Foundation for Information Technology Policies*, ICCP n°31, OECD, 1993.

28. Mapping the Information Industries, Staff Information Paper, Australian Productivity Commission, July 1996, p.43

29. Computer Weekly and Kew Associates, Computer Weekly March 27, 1997

30. Enquête Annuelle PME-PMI Informatique - Bureautique, Années 1992/93 à 1996/97, UFB Locabail

31. JIPDEC Computer usage survey, User spending, Monthly operating expenses of EDP sections.