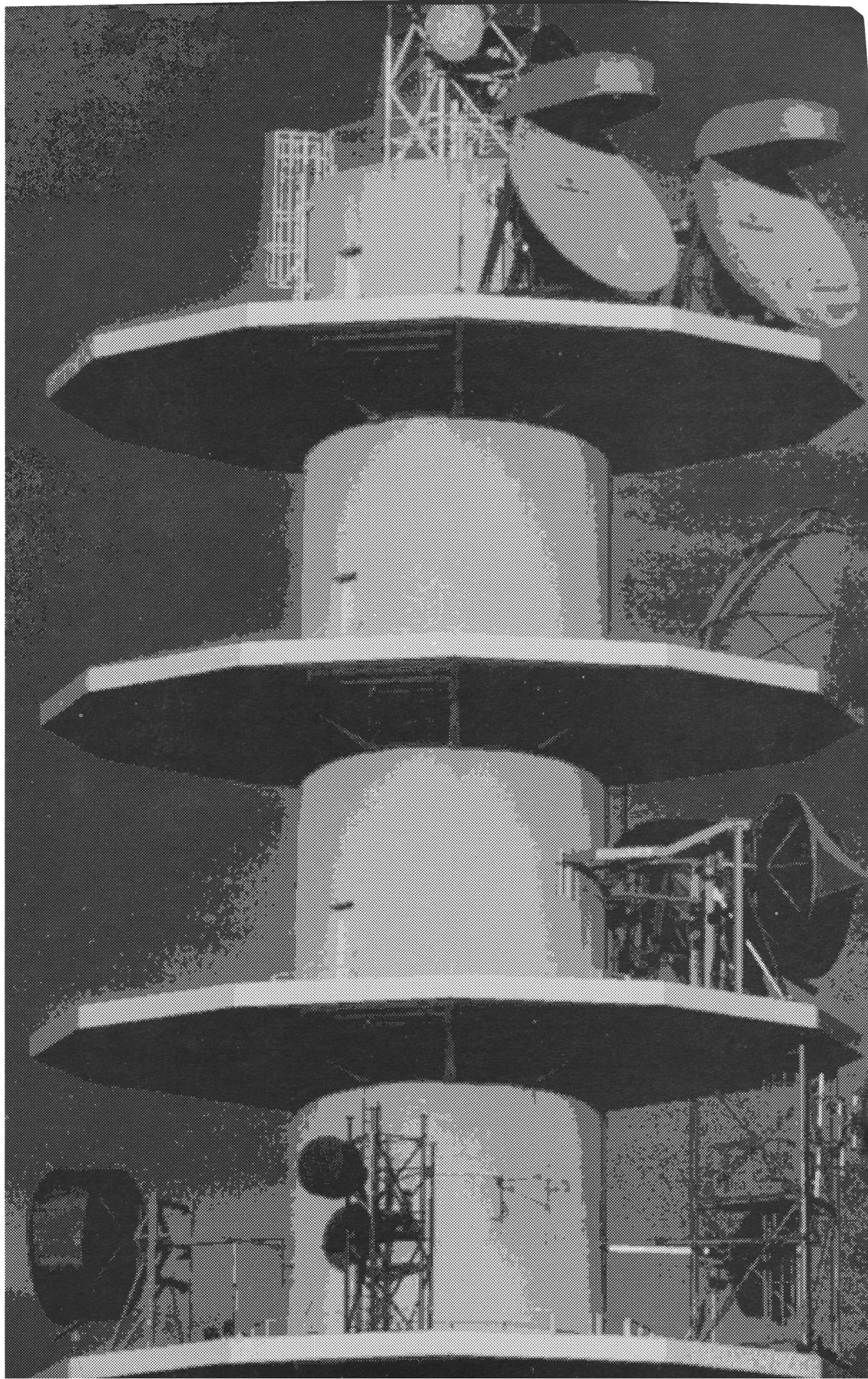


Information services



Over the last decade, we have witnessed rapid developments in the information services industry.

The consolidated value of this industry (telecommunications, software and computing services, electronic information services) is estimated to be worth over 120 billion ECU for the EC and has increased by over 11% during 1989.

Recently, the increase in information services has been characterised by the much more extensive development of computing capacities in an increasingly competitive market.

Impact of the industry on the EC economy

With a production of 120 billion ECU, information services within the EC account for almost 3% of the Community's GDP and approximately a quarter of the world market. They can be broken down into telecom services (71%), software and computing services (28%) and electronic information services (1%).

Telecom services, which represent the major branch of information services, recorded an increase of between 9 and 10% in 1989 and are considered to be worth 85 billion ECU. In the USA, this market accounts for approximately 155 billion ECU.

Although the trade in voice transmission continues to prevail, accounting for over 80% of the overall total, it now increases by only 5 to 7% per year, whilst the trade in image data and video signals has reached an annual growth rate of 20%.

In 1989, the EC concentrated 26% of the overall world telecommunications turnover

(330 billion ECU) and approximately 30% of the world value-added services market, mainly located in North America, within the EC and Japan.

In 1989, the software and computing sector increased by almost 19%, reaching 33.5 billion ECU.

The EC's market share is approximately 25% of the world market, compared with 55% in the case of the United States and 8% accounted for by Japan.

Electronic information services have increased by almost 19%, reaching approximately 1.8 billion ECU.

The European Community ranks second, with over a quarter of world data bank production. European data bank production is dominated by reference material. However, in terms of turnover, financial services are markedly more significant. In the United States, the sector is aimed at the financial sectors, legal sectors and news information.

29

Description of the industry

Telecommunication services are covered by section 790 of the NACE list, which encompasses postal and telecom services. The sector includes voice telephony, text services, mobile communications, data and image communications, videotext and ISDN or (integrated services digital network).

Computer services include software products which are sold or commercially licensed, consultation services and processing and training services.

Electronic information services include on-line and off-line queries to data banks.

The NACE list makes little distinction between these two sectors.

Structure of the industry

The structure of this industry can be distinguished by the public authorities' active involvement in telecom and electronic information services, whereas private groups dominate the software and computing services sector.

In most Community countries, the telecommunications infrastructure is owned by a public authority which is responsible for the sector and its management. There are differences in the extent of the public authorities' involvement. Moreover, the regulatory environment shows a tendency to move in a more liberal direction.

The sector has been influenced by the creation of separate postal and telecom services, and, in some cases, by the introduction of privatisation or the involvement of private companies in the provision of telecom services. In the United Kingdom, for example, British Telecom (privatised in 1984) assigned regulatory and supervisory responsibility to a privately-

owned company, Oftel. Very recently, the Netherlands and the Federal Republic of Germany restructured their telecommunication authorities, Spain adopted a new telecommunications law and France proposed a new status for France Télécom. Belgium, Italy and Portugal are well on the way to structural reform within the sector. The deregulation of the telecommunications market encourages the creation of value-added networks and new players have appeared on the market, offering services which, according to the regulations of each country, are confined to non-voice traffic, or may also involve telephony.

In the electronic information services, the public sector also prevails, but the production of on-line data banks is increasingly becoming the role of private organisations.

External trade

It is extremely difficult to measure trade flows and balances.

For example, the international telephone service has a mechanism for sharing revenue between countries which depends on telephone usage in the country of origin and the tariffs applied. Some amounts must also be charged to the owners of intercontinental infrastructures, and satellite fees are paid in Europe to Intelstat. Thus in 1988, the European Community produced a surplus, in relation to the United States, of approximately 900 million ECU.

As far as new services are concerned, it is even more difficult to measure trade. Estimates, however, lead us to believe that the Community is in deficit in respect of the United States, particularly with regard to electronic information services such as data banks. However, it is a fact that in

1989, the Community produced 1048 data banks. Non-EC exports totalled 304 data banks, 26 of which were for the United States. The United Kingdom mainly exports to the United States whilst the Federal Republic of Germany exports more or less equally to Switzerland and North America.

Non-EC suppliers of software and computing services tend to operate on the EC market via the intermediary of subsidiaries and associated firms established in the Member States, thus contributing to employment and added value in the Community which, however, is still in deficit. Finally, there is still considerable inter-community trade in the field of software and computing services as well as in the field of electronic services.

Geographical features

Within the Member States of the EC, the development of the information services industry has undergone significant changes. The many differences in number of lines, tariff levels and income have helped to create great variations in the contribution of services to the GDP of EC countries. The supply of electronic information services has, for the most part, been determined by national guidelines. The computing services sector has also developed differently in some Member States.

Risks and opportunities

Several regulatory, technical and economic factors influence the development and prospects of the information services sector.

1992 and regulatory context Although the telecommunications market cannot be completely deregulated to the detriment of the public service, which the authorities of each country have provided up to now, it can be opened up to competition. In this re-

spect, the EC would like to follow the example of the United States, Japan and Great Britain.

This means that real market requirements must be considered, as well as the technological restrictions experienced by present-day national operators. General guidelines for new regulations were defined for standard services at Community level.

Discussions are in progress regarding the deregulation of service markets (excluding basic telephony and telex) and public markets within the Community. Furthermore, legislative measures finalised in other specific areas, for example the co-ordinated introduction of communications such as mobile phones and integrated services digital networks, exert their influence on the development of the EC telecommunications infrastructure.

Technology The next generation of services will be dependent on the digitalisation of the network, the increased accessibility of a wide range of services (ISDN) and, finally, broadband services.

This development, as well as the continual updating of network and terminal equipment, will enable the services available to be improved in terms of diversity, speed and quality.

Technical progress, combined with the heightened competitiveness of the services available, lead to a reduction in the real cost of services, and there is clearly a demand for improved telephone services as well as new non-voice traffic services, especially as far as commercial businesses are concerned.

Technological progress in methods of processing, storing and filing information will have a powerful impact on the software and computing services market as well as

electronic information systems.

In the field of telecommunications, the contrast of networks is certainly the major difficulty. In order to fulfil the expectations of European firms, a pan-European network support system for business networks (Global European Network) has been specified by several operators. This network should be available during the second half of 1991, and should enable data exchange to be carried out at a speed of 34 Mega-bytes/s.

Eastern Countries Eastern Europe will undoubtedly be one of the catalysts of development in the present-day telecommunication sector and during the next decade.

It must set up networks adapted to the requirements of the market economy it is striving to implement.

With 10 major lines per 100 inhabitants, Eastern Europe is in keeping with the world average. However, these 10 lines must be compared with the 45 usually found in the industrialised countries.

The countries of Eastern Europe account for a considerable market for all the players in the information services sector despite powerful economic restrictions.

Single market Stimulated by world-wide application, EC businesses are today seeking, at the lowest price, means of international communication transporting voices, data and images and supporting an increasing number of services adapted to their profession and market.

The opening of the large internal market, with the necessity for economic operators to provide each other with information on businesses, markets and regulations within Member States, should increase the need for information services.

Outlook

The deregulation of telecommunication services, the globalisation of markets, increased competition and technological progress are all factors determining the future growth of the information services industry.

Bearing in mind the influence of these factors, it is predicted that the telecommunications sector will develop as rapidly in the years to come as it has in the recent past, and will maintain a growth rate in excess of 9% per year on average.

It is foreseeable that top-of-the-range telephony services, which have accounted for 1% of the sector's turnover, will increase by approximately 30% per year. Other services which, from 1990, will experience a higher rate of growth than that of vocal telephony are marketing services related to the mobility of users: paging, radio telephone.

Unlike the computing materials industry, which is subjected to the combined competition of the United States and Japan, the software and computing services sector has good growth prospects of between 15 and 20%. Increasing competition should help stimulate the wave of mergers and acquisitions which has prevailed in recent years.

Finally, professional electronic information services should gradually become more widespread as the information infrastructure of the single market develops; growth in excess of 20% is predicted, as well as the emergence of new private suppliers and the development of groupings and alliances.

**Revised by: Sema Group Management
Consultants
Based on Panorama 1990**

The telecommunications service sector forms an integral part of the fast-expanding information services sector. The telecoms sector alone already accounts for roughly 6% of the Community's GNP.

The market is still largely dominated by voice transmission but technological and regulatory developments indicate that data and document transfer already represent a significant share and that image transfer as well as mobile communications are also making rapid headway.

Eastern Europe is bound to have a catalytic effect on the telecoms services sector over the next ten years:

the initial introduction of a radio communication architecture, followed by an optical fibre infrastructure which will eventually pave the way for broadband services.

The next generation of services will stem from the digitalisation of the network, wider access to an extensive range of services (ISDN) and, finally, broadband services. The Community has already made substantial progress in this area.

Introduction

Although voice transmission is still the most common type of telecommunications service, accounting for over 80% of PTT revenues, it is actually growing by a mere 5 to 7% per year, whereas data, image and video signal transfer is growing by some 20% per year.

Demand on the part of firms which use data processing facilities is no longer based on the notion of two interconnected computers or a few users connected to a

central system but rather interconnected users working as part of a network.

Consumer electronics, particularly videos, is becoming ever more closely related to information technologies and calls for the same processing capabilities as the most powerful computers. The growing success of the interactive video or "smart TV" in certain countries such as the USA and Japan, is further proof that the notion of networks means more than simply distributing images.

Having long been regarded as the poor relation of data processing, telecommunications is now rapidly gaining importance.

Approximately 50% of the world market for information technologies and services is devoted to telecommunications and various studies show that the level of computer power installed is set to increase at least one hundredfold over the next ten years, generating new transmission needs on a scale never seen before. Many firms, moreover, are acquiring local networks capable of handling volumes in the order of 100 megabits per second.

Alongside these technological developments, the internationalisation of the economy has completely transformed the markets - firms have launched into the international markets and many have themselves gone international, thus contributing to the deregulation of markets. EC firms, for example, which just a few years ago, were content to deal in low-volume national trade are now looking for competitively priced international communication devices which can transfer voices, data and images and offer a growing number of services tailored to suit their particular profession and market.

Definition of the sector

Telecommunications offer several types of services:

- voice traffic services (telephone, mobile communications);
- services for the transfer of written material (telex, teletex, fax);
- data or frozen image transfer services (computer-based information services, telematics);
- animated image transfer services (video signals, programme transmission).

All of these services still use specific net-

works although telecommunications network user laboratories are now introducing integrated services digital networks (ISDN) which meet international standards and enable any type of information to be relayed on a single network. Telephone communications are still the major service in EC countries, accounting for over 80% of national operators' revenues. NACE 790 covers both postal and telecommunications services, two areas which are being increasingly separated, from both an institutional and organisational point of view.

Current situation

Telecommunications is the key component in the information technology industry as a whole. Its world turnover in 1989 was 330 billion ECU and material investment in this area exceeded 66 billion ECU in the same year. By comparison, over the same period, worldwide investment in data processing stood at 166 billion ECU, whereas 100 billion ECU was invested in consumer electronics.

The EC telecom market accounts for around 6% of the gross national product

Table 1
Telecommunications
Main indicators

		Turnover (excl.VAT) millier ECU	Number of persons employed
Belgique/België	1987	1 699.4 ⁽¹⁾	26 664 ⁽²⁾
Danmark	1987	1 514.7 ⁽²⁾	18 997 ⁽³⁾
BR Deutschland	1987	17 872.4 ⁽²⁾	216020
Hellas	1987	777.2 ⁽²⁾	24 475 ⁽⁴⁾
España	1988	5179.2	39 008 ⁽⁵⁾
France	1988	15 107.2 ⁽²⁾	163 389 ⁽³⁾
Ireland	1987	701.3 ⁽²⁾	14 615 ⁽²⁾
Italia	1981	10 260.0 ⁽²⁾	89797
Luxembourg	1987	90.7 ⁽²⁾	693 ⁽³⁾
Nederland	1986	2879.4	29 833 ⁽³⁾ ⁽⁶⁾
Portugal	1987	867.2 ⁽²⁾	22 820 ⁽³⁾
United Kingdom	1987	13 373.5 ⁽²⁾	223084

(¹) 1985
(²) Total receipts for telecom services according to UIT (Union Internationale des Télécommunications)
(³) Total effective of telecom services according to UIT.
(⁴) 1978
(⁵) 1980
(⁶) 1987
Source: Eurostat

(GNP). This percentage varies according to the Member States, depending on the number of lines, tariff levels and revenue. There is no uniform connection between the GNP per capita and the percentage attributed to telecommunications. Telecommunications is the only sector where "services" account for 80% of turnover as a whole, with an annual growth rate of 10%.

This high level of growth in telecommunica-

Table 2
Total investments (¹)
in telecommunications, 1987/1988

(million ECU)	1987	1988
Belgique/België	462.3	417.8
Danmark	435.9	514.5
BR Deutschland	8 022.1	8 133.0
Hellas	169.5	202.3
España	1 293.6	2 592.3
France	4 385.8	4 128.4
Ireland	172.2	170.0
Italia	4 003.1	4 737.7
Luxembourg	26.1	31.1
Nederland	669.5	832.1
Portugal	234.6	367.7
United Kingdom	2 989.9	4 106.6
USA	22 933.1	22 093.0
Japan	13 058.5	12 514.4

(¹) Including land and buildings.
Source: UIT, Eurostat

Table 3
Telecommunications income by sector, 1987

(million ECU)	Total income telecommunication services	Income telephone system	Income telex services	Income other services	Telephone as proportion of total (%)	Revenue per main line (ECU)
Belgique/België	1 699.4 ⁽¹⁾	1356.3	98.4	244.7	79.8	411
Danmark	1 514.7	947.5	43.3	523.9	62.6	351
BR Deutschland	17 872.3	15 794.9	442.1	1 635.3	88.4	592
Hellas	777.2	661.2	26.4	89.5	85.1	200
España	3 802.8	3 446.6	N/A	356.2 ⁽²⁾	90.6	345
France ⁽³⁾	15 107.2	12 252.3	347.3	2 507.6 ⁽⁴⁾	81.1	508
Ireland ⁽⁵⁾	701.4	640.9	20.5	40.0	91.4	801
Italia	10 265.1	9 248.0 ⁽⁶⁾	427.4	589.7	90.1	500
Luxembourg	90.7	82.6	7.0	1.1 ⁽⁷⁾	91.1	413
Nederland ⁽⁸⁾	2 879.3	2 641.2 ⁽⁹⁾	226.3	11.8	91.7	440
Portugal ⁽⁸⁾	867.2	583.9	46.7	236.5	67.3	389
United Kingdom	13 373.4	11 390.8	510.9	1 471.6	85.2	511
EC 12	68 950.7	59 046.2	2 196.3	7 707.9	85.6	494.5

⁽¹⁾ Radio and television licensing services not included.

⁽²⁾ Including income from official permits for private use of telecommunication media and systems

⁽³⁾ Provisional figures.

⁽⁴⁾ 1985 including subscription charges, rental, maintenance, global connection charges, transfer and cessation of service and telegraph service.

⁽⁵⁾ Estimates.

⁽⁶⁾ Including income from other telephone services.

⁽⁷⁾ Specialised lines, telegraphic addresses, sound and television programme transmissions, etc...

⁽⁸⁾ 1986

⁽⁹⁾ Including data, facsimile transmission services.

Source: Eurostat

tions services is mainly due to the increase in the number of computers, particularly micro-computers, over the past ten years. No doubt the number will continue to grow until we reach a saturation rate of one computer for every employee. For operators throughout the world, telephony still accounts for the largest share of revenue, although data transfer is fast becoming a major sector. In the United States, for example, data transfer was responsible for 5% of operators' revenue in 1984, compared with 20% in 1989.

In this respect, the EC is far behind the United States. Data transfer in the EC in

1989 only accounted for 5.5% of operators' income and is not expected to exceed 9.5% by 1992.

This shortfall in relation to the United States is attributed to a number of reasons:

- ❖ the effect that regulations have on tariff levels;
- ❖ the degree to which services are deregulated;
- ❖ the way in which the regulatory authorities are organised and their influence (federal/national);
- ❖ the fact that EC countries are highly diverse in terms of both technology and

tariff levels.

The EC has around 128 million main lines, i.e. an average of 39 to 40 lines for every 100 inhabitants. By comparison, the United States has almost the same number of lines (129 million) but a higher degree of market penetration with an average of 52 lines per 100 inhabitants. Japan, with 52 million lines, has achieved market penetration of 42 lines per 100 inhabitants. Table 5 gives a detailed breakdown of the main lines in the various Member States of the European Community.

Of the various services involving the transfer of written material such as telex, teletex and fax, only telex services lend themselves to an accurate market assessment, since they operate on a dedicated network which is presented separately in the operators' revenues (see table 3). While this method of transfer remains widely used throughout the world, the number of lines is declining in the most indus-

Table 4
Telecommunications
Comparison of tariffs

(base unit =100)	Private use		Professional use	
	1989	1990	1989	1990
BR Deutschland	103	98	106	96
France	101	97	122	120
Italia	100	100	100	100
United Kingdom	78	76	85	83

Source: OFTEL

Table 5
Telecommunications
Distribution of main lines and digitalisation rate

	Main lines (1) (million)			1989/85 (%)	Main lines per 100 inhabitants 1989(2)	Estimated digitisation 1990 (3) (%)
	1987	1988	1989			
Belgique/België	3.3	3.4	3.5	12.9	35.5	31.5
Danmark	2.7	2.7	2.8	12.0	54.4	25.0
BR Deutschland	26.7	27.6	28.4	10.9	46.4	9.0
Hellas	3.3	3.5	3.6	16.1	36.1	5.0
España	10.0	10.2	11.0	18.3	28.1	22.0
France	24.1	24.5	25.5	10.9	45.6	70.0
Ireland (4)	0.8	0.8	0.8	14.3	23.6	65.0
Italia	18.5	19.1	20.1	15.5	35.0	30.7
Luxembourg	0.2	0.2	0.2	8.4(5)	45.2	23.0
Nederland	6.0	6.2	6.5	12.1	43.8	35.0
Portugal	1.5	1.7	1.9	35.7	17.8	20.0
United Kingdom (4)	22.3	23.3	24.4	16.7	42.8	42.0
EC 12	119.4	123.2	128.7	13.9	39.6	35.0
USA (6)	122.2	126.7	129.7	9.6(6)	52.7	N/A
Japan	47.6	49.2	51.1	10.6(6)	41.7	N/A

(1) 1/1 each year

(2) Population end of 1988

(3) Percentage of user lines linked to digital focal switches

(4) 31st of March

(5) Calculated as relation of the total

(6) This number includes main lines already connected and main lines available for future connection, including those used for the technical operation of the exchange (test numbers).

Source: UIT

Table 6
Telecommunications
Distribution of telex subscriber lines

	Telex subscriber lines (1) (thousand)			1989/85 (%)	Telex subscriber lines per 10 000 inhabitants (2) 1989
	1987	1988	1989		
Belgique/België	27.6	27.6	25.0	-5.7	25.2
Danmark	13.4	13.1	11.7	-12.0	22.8
BR Deutschland	167.3	167.7	158.3	-2.0	25.9
Hellas	22.7	24.7	25.4	25.7	25.4
España	40.0	42.0	41.2	11.7	10.5
France	132.1	141.5	147.3	18.3	26.4
Ireland	6.6	N/A	N/A	N/A	18.7(3)
Italia	69.4	74.4	72.8	11.3	12.7
Luxembourg	2.7	N/A	N/A	N/A	72.6(3)
Nederland	40.2	38.6	33.1	-15.8	22.4
Portugal	20.9	24.3	27.7	50.5	26.6
United Kingdom (4)	111.5	116.2	116.0	17.2	20.3
EC 12	654.4	679.4(5)	667.8(5)	8.6	20.6
USA	100.5	78.4	81.1	-31.2(6)	3.3
Japan	44.5	43.0	41.0	-9.3(6)	3.3

(1) 1/1 each year

(2) Population end of 1988

(3) 1987

(4) 31st of March

(5) Estimates

(6) 1989/88 (%)

Source: UIT

Table 7
Telecommunications
Cable TV in Europe, in 1988

	Number of households (million)	Number of connections (million)	Subscribers (million)	Penetration rate (%)
Belgique/België	3.80	3.40	3.10	82.00
BR Deutschland	23.10	8.90	3.20	36.50
France	19.50	1.00	0.14	14.00
Nederland	5.60	4.40	3.50	72.00
United Kingdom	20.60	1.40	0.25	18.00
USA	86.90	69.50	40.20	57.80

Source: consortium PACE 90

trialised countries where firms prefer to use other means of access and services to transfer written documents:

- micro-computers or teletex machines which use a data and message transfer network capable of transliterating and re-transmitting to a telex machine;
- fax on the connected telephone network.

Communications other than telephony, written material and data, i.e. mobile communications services and video signal transfer have not yet been widely adopted. In Germany and France, the advent of the CT2 process (cordless public telephone) which is already widely used in the United Kingdom and the opening up of the GSM network scheduled for 1991 will generate large-scale demand for both voice and data transfer services. In the United Kingdom, many firms already use portable micro-computers equipped with modems, and cellular radios with EDI applications (Electronic Data Interchange).

The cable transmission of video signals (television programmes) could also grow substantially due to the drop in the price of optical fibre and the emergence of broadband networks. Table 7 shows the degree of market penetration achieved by cable TV.

Structure of the industry

In most EC countries, the telecommunications infrastructure belongs to a public network operator who is responsible for the sector and its running. Differences arise, however, in the degree of public ownership, the balance between government and commercial control and the degree of competition allowed.

Owing to the increase in corporate demand for telecommunications, national operators have leased out part of their infrastructure.

A number of new players have appeared on the market, offering what is commonly referred to as value-added services. Depending on the regulations of the country concerned, such services tend to be confined to non-voice transmission or may also include telephony. Thus, suppliers of computer services, many of whom manage computer centres on behalf of third parties, have set up private telecommunications networks. As operators of value-added networks, these suppliers of services see an opportunity to develop new, profitable activities in both the communications and services industry, on an international scale.

New development opportunities are also available to information and cable TV

bodies, and other user firms with their own communication infrastructures (railways, electricity companies, etc.) view this as an opportunity to diversify the services offered to their customers as well as a means of making their internal investments pay.

The demand for broadband services, meanwhile, could be met by new players capable of setting up a light network infrastructure throughout the EC, without having to maintain existing networks and services and without having to devise a policy for bringing together the various architectures implemented at a national and EC level. Their investments, which would be considerably smaller than those which France Télécom or any other national operator would have to make, could well give rise to a competitive and economic imbalance.

Geographic factors

The current situation is summarised in table 8. The general trend is to separate postal services from telecommunications, to inject a greater degree of commerciality into management practices and in some cases, to create separate companies or bodies to handle operations such as data transfer or international traffic.

In the United Kingdom, competition in the

Table 8
Telecommunications
Regulatory and operational functions in the telecommunications sector of the EC

	Regulations and supervision	Main operators
Belgique/België	Ministry of Communications and PTT	Telecommunications Administration (RTT)
Danmark	Ministry of Communications Telecommunications Inspectorate	Telecom Denmark Telecom of South Jutland Telephone Companies of Copenhagen, Jutland and Fyn
BR Deutschland	Ministry of Post and Telecommunications	Deutsche Bundespost - Telecom Second Mobile Telephone Operator
Hellas	Ministry of Transport and Communications	Hellenic Telecommunications Organizations (OTE)
España	Ministry of Transport, Tourism and Communications	Telefonica SA
France	Ministry of Post, Telecommuni- cations and Space	France Télécom French Radiotelephone Society (SFR) Transpac
Ireland	Ministry of Communications	Telecom EIREANN
Italia	Ministry of Post and Telecommunications (Inspectorate of Regulation)	ASST, DCST, SIP, Itacable (possibility of creation of a 'Super-Stet' holding company)
Luxembourg	Ministry of Finance (PTT Admin.)	PTT Administration
Nederland	Ministry of Transport and Public Works	PTT Telecom plc
Portugal	Ministry of Public Works, Transport and Telecommunications Communications Institute of Portugal	Post and Telecommunications (CIT) Porto and Lisbon Telephone Operator (TLP) Radio Marconi Company of Portugal (CPRM)
United Kingdom	Ministry of Trade and Industry (DTI) Office of Telecommunications (OfTel)	British Telecom (BT) British Telecom International (BTI) Mercury Communications City of Kingston-Upon-Hull Cellnet, Vodafone

Source: EC Commission, DG XIII, May 1989

field of basic telephony has been stimulated by the fact that a second 100% privately-owned company has been granted ownership of the infrastructure and the right to manage it. The original owner of the network and supplier of services, British Telecom (formerly the Post Office) was privatised in 1984 when 51% of its shares were sold off. A separate body, OfTel, was set up to regulate the running of the industry, control tariffs, issue licences and grant access to other suppliers of services (including mobile communications services) as well as to provide general guidelines with a

view to further deregulation. Changes have also occurred in most of the other EC countries. The Dutch State-owned PTTs were granted the status of a commercial company (NV, i.e. limited liability company) at the beginning of 1989, although for the time being they are still in public hands. Since 1st July 1989, Deutsche Bundespost (DB) Telekom has been independent from the post office, even though it is still wholly publicly-owned. On 4 October 1990, Deutsche Bundespost Telekom and the former telecommunications authorities in East Germany

merged. The German government has confirmed that the Deutsche Bundespost Telekom may be partially privatised in the medium term. Both France and the Federal Republic of Germany are well on the way to deregulating value-added services and mobile communications. Spain has adopted its new law on telecommunications while Belgium, Italy and Portugal are largely committed to a programme of structural reforms. In France, a bill proposing a new status for France Télécom was adopted on 27 June 1990. As of 1st January 1991,

Table 9
Telecommunications
Patterns of corporate alliances, 1982-90

	Pattern 1 Intra-European Agreements		Pattern 2 Global agreements		Total of which %	US N.	%	Japan N.
	%	N.	%	N.				
1982/83	32	24	68	52	53	40	11	8
1984/85	31	38	69	83	55	66	1	13
1986/87	34	33	66	63	56	54	8	8
1988	40	16	60	24	43	17	13	5
1989	36	16	64	28	47	20	17	8
1990	43	20	57	26	40	17	11	5

Source: European Research Associates

new telecommunications and postal service structures have been introduced: France Télécom is now an independent public body with a large degree of operational freedom. It is due to sign operational contracts with the Government some time in 1991. Its aim is to realise 10% of its turnover outside France by the year 2000.

The legislation and guidelines adopted at an EC level are also having a significant impact on the supply of "telecom" services. The markets for terminal equipment were deregulated in 1988 and the European Telecommunications Standards Institute is already operational.

In June 1990, a Commission directive concerning the liberalisation of national markets for telecom services was adopted. On the same date, a framework directive giving all suppliers of services equal access to public services was also adopted (ONP directive: open network provision). In addition, a Council directive on the liberalisation of public sector contracts for telecom equipment was adopted in September 1990. Various legislative provisions drawn up in other specific areas, such as the coordinated introduction of mobile communications and the integrated services digital

network are also helping to shape the development of the telecommunications infrastructure in Europe.

In December 1990, for example, the Council adopted a joint position on a directive and a recommendation concerning the coordinated introduction of digital European cordless telecommunications in the Community (DECT: Digital European Cordless Telecommunications).

DECT is a new technology offering a whole range of mobile communications applications (cordless telephones for residential use, telepoint services, cordless PABX, cordless on-site data transfer).

The recommendation, aimed at the coordinated introduction of DECT in the Community, seeks to direct and speed up the efforts of the Member States, telecommunications organisations and the industry in general in favour of a joint solution. The proposal is based on the work carried out within the European Telecommunications Standards Institute (ETSI) which has undertaken to formulate a DCT standard by the end of 1991. The Council also recently adopted a resolution on the implementation of the pan-European digital mobile cellular GSM system.

The Commission hopes to address the

issue of the future overall development of mobile communications within the framework of a green paper, due to appear before the end of 1991.

Changes in the regulatory framework

The telecommunications market has no choice but to open itself up to competition. The EC is keen, in this respect, to follow the example of the United States, Japan and the United Kingdom. Such a move means taking into account the actual needs of the various markets as well as the technological constraints imposed on current national operators. The main guidelines for a new set of regulations have been devised for conventional services at EC level. As far as standards and trading standards are concerned, recommendations have been drawn up and circulated among system manufacturers and developers. Protocol testing and vetting centres (OSI transport, logging, X 400 messaging,...) have been set up and made available to developers in the case of every national operator.

Three decisive stages, as set forth in the Green Paper guidelines, have been reached since 28 June 1990:

– Final adoption of the directive on "Open



Network Provision" (ONP). As regards the method of opening up networks, the documents relating to ONP set forth directives and guidelines and the EC is encouraging various working parties, whose members include EC operators, to define the various stages involved in harmonising access and the use of PTT networks (voice telephony, leased lines, data-switching and ISDN);

- Adoption of a guideline on certification procedures for telecommunications terminal equipment. A joint position was established on 14 November 1990;
- Member countries have been asked to abolish state monopolies in the case of all services other than harmonic telephony.

These monopolies could be gradually phased out over a six-year period.

At the end of 1990, the Council of Ministers adopted a directive deregulating public sector contracts in the telecommunications sector.

Cooperation agreements

1990 saw a new wave of co-operation agreements (mergers, acquisitions, acquisitions of minority holdings, joint ventures) in the telecommunications sector. 46 co-operation agreements involving suppliers of services and equipment manufacturers were concluded in 1990 compared with 44 in 1989. In addition, agreements in the services sector increased compared with those in the equipment sector: for the first time, services accounted for 50% of the total figure, in keeping with the constant pattern of the past eight years.

Agreements between EC and non-EC firms continued to outnumber those purely confined to EC partners. The proportion of "Eurodeals" however, reached 43% in 1990, their highest level since 1982/3.

Among the most important agreements was the merger between CGE's telecommunications business (France) and Fiat.

Siemens consolidated its holdings in the North American telecommunications industry by combining its operations with those of Stromberg Carlson. Siemens is also seeking to set up in Spain, one of the main EC markets, where its operations are still fairly limited (together with France). Alcatel meanwhile, is also busy: the main effect of the agreement between CGE, its parent company, and Fiat will be the merger between its Italian subsidiary FACE and Telettra. The agreement is currently being examined by the Commission under the new merger control regulation. At the same time, Alcatel is pressing ahead with its efforts to penetrate the American market.

Value-added services and new services

Although voice transmission continues to dominate the telecommunications network, there is considerable potential for the development of non-voice transmission. One example is the value-added services market which, although still limited, is rapidly expanding. At present, the main suppliers of services are public network operators, particularly in the case of data transfer, and large international private companies, such as Reuters, IBM or Geisco. Other suppliers include consortia of companies which supply information services aimed at the banking sector, transport sector, etc. (e.g. Swift, Sita, Istel, Visa, American Express). These private user groups tend to have their own networks, in the sense that they operate their own switching systems on leased lines. These electronic information services are dealt with in greater de-

Table 10
Telecommunications
Percentage of cooperation agreements involving equipment and services

(%)	Equipment	Services
1982/3	98	2
1984/5	86	14
1986/7	69	31
1988	63	37
1989	65	35
1990	50	50

Source: European Research Associates

tail in a special chapter relating to subgroup 839.3 of the NACE.

The expression "value-added services" applies to situations where lines, or part of the network capacity, are leased by the network owner and where voice, text, data or image processing services outside the public infrastructure are supplied to a third party. The Commission has proposed that service provision in this area be liberalised and gradually available to everyone. The process of liberalisation would begin with value-added services and later be extended to data-switching services as well as the resale of leased line capacities. Some reserved services, such as voice telephony, would be temporarily excluded from the process.

The world value-added services market (mainly composed of North America, Europe and Japan) was estimated at around 12 billion ECU in 1988, with the Community accounting for 30% of this figure. The EC market grew by roughly 20% compared with 1987. These figures include both a charge for transport and a charge for the information itself, where appropriate. The two main types of services provided within the EC are information retrieval using databases (1.5 billion ECU) and services such as financial transactions within closed user groups (1.5 billion ECU). Other value-added services include elec-

Table 11
Revenues telecom 1988 comparison Central Europe - Western Europe
(thousand dollars)

	Telecom revenues	Revenues for main lines	Revenues per inhabitant	Number of telex lines	% of revenues from telex
ex-GDR	652.3(*)	440.2(*)	39.06(*)	17 363	17.5
Hungary	255.3	297.7	24.11	12 614	8.5
Poland	408.9	138.5	10.82	33 544	7.6
Czechoslovakia	1252.6	589.6	80.17	11 700	5.9
BR Deutschland	21312.5	759.0	348.36	155 831	2.2
France	18932.7	788.3	332.83	150 010	2.1
United Kingdom	16768.7	757.5	295.42	111 505	3.8

(*) 1989
 Source: OCDE, UIT

tronic document interchange and electronic messaging as well as data transmission facilities.

Mention should also be made of the extension of the videotex, which opens up the value-added services market to residential users and small firms. The service is most highly developed in France, since the latter had over 90% of the total capacity installed within the EC in 1987. In the same year, videotex income reached 400 million ECU, which includes both transport charges and charges for the supply of the information.

External trade with regard to services

The international telephone service has a mechanism whereby revenue is shared among the various countries. The revenue to be shared however clearly depends on telephone usage in the country of origin and the tariffs charged, with the result that major trade imbalances often arise between countries. Certain amounts also have to be paid to the owners of intercontinental infrastructures, and in Europe satellite fees are paid to Intelsat.

The European Community had a surplus in relation to the United States of around 300 million ECU in 1988. This balance is influenced by a number of factors. When tariff levels for international calls fall in Eu-

rope compared with the United States, for example, and revenue collection decreases, the EC's surplus tends to grow. Insofar as telephone usage is encouraged, revenue collection in Europe increases and the surplus diminishes. Given that residents in high-income countries generally make longer and more frequent calls, high-income countries will always tend to show a deficit in this area.

As far as the new services are concerned, measuring trade balances and trade flows is even more difficult. The estimates tend to indicate, however, that the EC has a deficit in relation to the United States, particularly as regards electronic information services such as databases. A study carried out in 1986 on the information services market seems to suggest that EC exports to the United States amounted to approximately 2.5 million ECU, while imports stood at 42.6 million ECU, i.e. a deficit of around 40 million ECU.

Prospects offered by Eastern European Countries

With ten main lines per 100 inhabitants, Eastern Europe comes close to the world average. This figure of ten lines has to be compared, however, with the figure of 45 commonly encountered in industrialised countries.

The countries of Eastern Europe therefore need to set up specially adapted networks in order to meet the requirements of the market economy which they are currently seeking to introduce.

The telephone which up until now, was intended as a tool in the running of large national firms and the army, has made few inroads in the residential market and the length of the waiting lists is such that one can normally expect to wait 15 years to have a poor-quality line installed. Faced with this problem, firms turned to the telex which will no doubt remain the best means of communication for some years to come, owing to its reliability and the fact that there are no data transmission networks.

Besides underdeveloped networks, other features of Eastern Europe's telecommunications include the obsolete nature of existing equipment and that produced by local industry.

In the short term, improvements in the quality of the service, the creation of infrastructures similar to those found in the West and the opening up of new services by the year 2000 will mean:

- adapting regulations (tariff policy, opening up the market to foreign operators...);
- overhauling the way in which operating bodies are organised and managed;

- training technical staff;
- introducing "crash programmes";
- formulating long-term plans.

With this end in view, the EC Council of Ministers has adopted a number of conclusions on the need to involve Eastern Europe in an integrated European telecommunications system with the EC and EFTA countries.

The Eastern European market is thus a very important one for Western European suppliers of telecommunications equipment and services: a number of European firms, such as Siemens and Alcatel, have already taken steps to secure entry.

In November 1990 the Italian firm Italtel concluded an agreement with the Soviet Minister for Communications in order to set up a joint venture with the Soviet firm Krasnaya Zarya in Leningrad, for the manufacture of digital watches. Italtel will hold a 40% stake in the new venture.

The Swedish firm Ericsson has bought its Australian licensee and distributor, Schrack Elektronik. The aim of the move is to strengthen Ericsson's position in Eastern Europe.

Outlook

Several factors, technical, regulatory and economic, influence the development and

prospects of the telecommunications services sector. Network digitalisation together with ever more sophisticated network and terminal equipment mean that suppliers of services are constantly improving in terms of diversity, speed and quality. Technological progress coupled with increasingly competitive supply is helping to bring about a drop in the real cost of services and there is clearly a demand for improved telephone services as well as new non-voice transmission services, particularly on the part of commercial companies.

The telecom services revenue of EC public network operators has increased by around 8% over the past few years and the market is expected to increase from 70 billion ECU in 1987 to around 120 billion ECU by 1993, i.e. an annual nominal growth rate of 9.5%. It seems likely that top-of-the-range telephony services, which accounted for 0.5 billion ECU of the total figure for 1987, will increase by around 30% per year to reach 2.7 billion Ecu in 1993. Top-of-the-range services are designed to supplement traditional telephony services and include itemised invoicing, call forwarding and holding, etc.

Among the various other services which,

from 1991 onwards, will grow at a faster rate than voice telephony are marketing services related to user mobility: paging, radio telephony.

The efforts undertaken by the European Community, in terms of reallocating frequencies and implementing standards, coupled with technological developments, have paved the way for a pan-European network, the GSM (Special Mobile Group), the cornerstone of modern cellular radio-telephony. The future PCN (Personal Communication Network) based on the same principles as GSM, but managing smaller cells, is expected to attract a large number of subscribers, which current studies put at 12 million by the year 2000. In addition, the development of mobile radio will be encouraged by data communication, bearing in mind the experiences of Northern European countries such as the United Kingdom, Sweden and Finland.

The development of radiocommunications could well receive a further boost thanks to Eastern Europe, whose outdated and inadequate infrastructures will have to be replaced within such a short timescale that only hertzian technology will be able to cope with the deadlines involved.

With regard to document transfer and data

Table 12
Telecommunications in Eastern Europe and in USSR

	Main lines 1988 (1 000)	Population 1988 (1 000)	Main lines per 100 inhabit. 1988	Annual growth rate (%) 1978-1988	To reach OECD Lines (1 000)	level by 2 000 Growth rate (%)
ex-GDR	1 761	16 661	10.6	3.4	4 903	11.7
Bulgaria	1 650	8 970	18.4	4	1 938	6.7
Eastern Europe	11 047	112 645	9.8	3.6	34 011	12.4
Hongary	858	10 590	8.1	5	3 378	14.2
Poland	2 953	37 800	7.8	4.5	12 167	14.6
Rumania	1 700	23 000	7.4	2.2	7 500	15.1
Czechoslovakia	2 125	15 624	13.6	2.7	4 125	9.4
USSR	33 991	283 100	12	6	79 249	10.5
Yugoslavia	3 267	23 641	13.8	9.7	6 189	9.3
Countries of OECD	341 303	825 000	41.4	4.2	-	-

Source: OCDE, UIT

communication, these would appear to be moving towards new facilities. The EC market in facsimile terminals is expected to grow by over 20% in the years ahead. The number of machines installed in Europe was already around 1 million in 1987, with the result that the fax and, to a certain degree, electronic mail are now replacing the telex. Telex services will always find a market, however, because documents sent by telex retain their special legal status.

In the long term, the commercial introduction of the Integrated Services Digital Network (ISDN) and, later on, the Integrated Broadband Communications network - "IBC", encouraged by the RACE programme, will have major repercussions on the way in which telecommunications services are supplied and used. The commercial ISDN is already in operation in three EC countries (France led the way in 1988,

followed by West Germany and the United Kingdom). The task of interconnecting the ISDN is already under way. By the end of 1990, Numeris, the French ISDN, will be connected to the British, Belgian, German and Japanese ISDN, as well as the ATT in the USA. In 1991, Numeris will be connected to the Italian and Spanish networks. The entire public telephone network can be digitalised (i.e. including local connections) by incorporating software and electronic equipment, without any need to replace the existing copper wiring. This will enable a series of services (voice or non-voice) to be incorporated in the same network using a limited set of interfaces. This in turn will lead to more sophisticated voice transmission (e.g. call diversion, completion of call, call identification, etc.) and enable users to gain simultaneous access to services which are currently separate: voice telephony and switched public tele-

phone network, telex, circuit switched data and packet switched data.

The introduction of the integrated broadband telecommunications network in the second half of the nineties (including optical fibre networks, satellite links and broadband switches) will lead to an increase in communication capacity, faster transmission and fully integrated voice and data communication.

**Revised by: Sema Group Management
Consultants
Based on Panorama 1990**

In 1989, the software and computing services market in the Community was estimated at 33.5 billion ECU, i.e: approximately 19% more than the previous year.

Software packages, including turnkey systems, accounted for the major market segment (42%) and were followed by customised software and other similar professional services (35%) and data processing and network services (20%).

The highest rate of growth in sales was recorded for network services, systems integration and software packages.

A wave of business mergers and acquisitions followed.

Definition of the sector

The software and computing services sector consists of all the intellectual services supplied in the form of information services consultation and production.

The segmentation of this huge service, which is, moreover, undergoing continual technological change, must maintain a double objective:

- isolating services which are sufficiently similar and/or closely related to be grouped into a uniform category, or profession, the distinguishing economic and technological features of which can be identified;
- understanding the dynamics and the development of these professions as well as the supply dynamics of the major categories of suppliers (Manufacturers of computer equipment, computing engineering firms, manufacturers of software products and management consultancy/strategy firms).

Twelve professions, grouped into three ca-

tegories, are thus identified as shown in figure 1.

Distinctions can be drawn between the various segments according to method of payment (fixed-rate/state-controlled or mixed), skills required (functional and sectorial, technical and technological engineering, methods/instruments used).

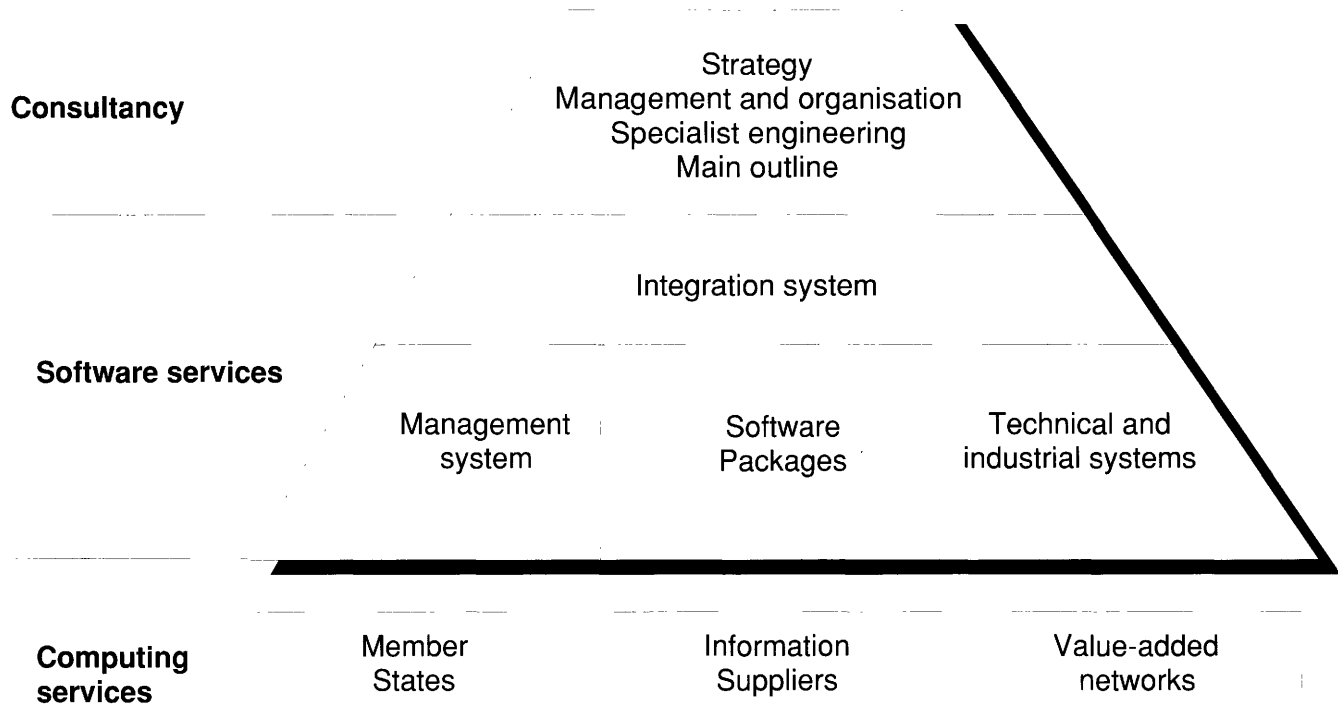
In order to assess the size/extent of this sector, the area concerned is confined to the services and software supplied by those providing external services to client firms. It does not take into consideration services such as consultation, production and implementation supplied within these firms by their functional computing and organisational management.

Only the added value of intellectual computing and information services is taken into account.

Data sources

At EC level, there are no official statistics available in respect of the software and computing services sector.

Figure 1
Software and computing services
The computing professions



Source: Sema Group Management Consultant

Some information concerning this branch of activity was gathered from national statistics, data from professional associations or surveys carried out by the specialist press. This was analysed by market research firms specialising in the information processing sector, particularly the IDC and INPUT.

Information service activities are difficult to measure. However, measuring segments of professions in terms of the sales of

each supplier by markets (geographical, user sectors), allows us to appreciate their volume and their development at EC level.

Current situation

The software and computing services market in the Community can be estimated at approximately 33.5 billion ECU for 1989, in other words, a progression of approximately 19%, compared with a figure of 17% for the previous year. The EC market share accounts for approximately 25% of

the world market, compared with 53% in the United States.

A more detailed examination reveals significant disparities according to the categories of products and services in the EC national markets.

The German and French markets, (24.9% and 23.5% respectively) are practically equal in terms of size, followed by the British market (19.2%) and the Italian market (13%). The four other EC countries account for a market share of 19.4%. However, market estimates for such a complex sector in terms of defining professions and sector-based market segments, require cautious interpretation.

As far as the various types of products/services are concerned, software packages, for example, are most strongly represented in the Federal Republic of Germany (48%), but are of secondary importance in France, whilst personalised

Table 1
Estimated world market for software computing services ⁽¹⁾ by region, 1987-89

(1 000 million ECU)	1987	1988	1989 (²)	Market share (%) 1989	Growth rate (%) 1989/88
Western Europe	27.6	32.3	38.6 (²)	29	19
USA	53.2	62.1	72.3	53	17
Japan	7.8	N/A	15.6	12	N/A
Rest of world	7.4	18.0	8.5	6	N/A
Total world	96.0	112.4	135.0	100	20

⁽¹⁾ As far as possible, market estimates exclude the revenues for the hardware elements of systems.

⁽²⁾ The size of the Community market is estimated at ECU 33500 million — 25 % of the world market.

⁽³⁾ estimates

Source: Input, IDC, OECD, other

Table 2
Software and computing services revenues in the Community (EC 8),
by product/service class, 1987, 1988 and 1994

	1987 (1) (million ECU)	Market share (%)	1988 (1) (million ECU)	Market share (%)	1988/87 growth (%) (6)	1994/88 forecast (7) CAGR (7) (%)
Package software	9 642	38.8	11660	40.8	20.9	21.2
Custom software and consultancy	7 075	28.4	7881	27.6	11.4	13.9
Processing services (2)	6 673	26.8	7290	25.5	9.2	10.5
Training	1 494	6.0	1744	6.1	16.7	21.4
Total software and services revenues (3)	24 884	100.0	28573	100.0	14.8	16.9

(1) Data for 1987 were collected in 1988.

(2) Includes facilities management and network services.

(3) These revenues accrue to hardware manufacturers (35.9%), system houses (18.5%) and independent vendors (45.6%).

(4) Dollar-based forecast.

(5) Compound average growth rate.

Source: IDC

software and expert-consultation services in this country represent the dominant sector (37.3%). Data processing services are in third place in all the countries taken into consideration and income from training services account for between 4 and 8% of national markets.

According to data supplied by INPUT (table 4), the EC software and computing services market (EC11) in 1989 could be estimated at 33.5 billion Ecus, or 18.7% in relation to 1988. The market segmentation carried out by INPUT also includes software packages and software, two system categories: "turnkey systems" (which use software) and systems integration (which are mainly based on personalised software). With 36%, network systems recorded the highest growth rate in 1989, but they only occupy a small share of the market

(3.6%). In the same way, systems integration also experienced a high rate of growth (27%) with a relatively poor market (3%).

The lowest growth rate (7%) was recorded by processing services, the market share of which decreased, from 20.7% in 1987 to 16.7% in 1989. Income from professional services (including personalised software, training and management consultancy) increased by 21%

Software packages obviously constitute the dominant market segment. In table 4, they basically appear twice: when they are sold separately (market share: 31.6%) and when they are sold as an integral part of "turnkey systems" (market share: 10.2%). Sales income for the two categories of products have increased from 9.7 billion Ecus in 1987 to approximately 14 billion Ecus in 1989, collectively accounting for a market share of almost 42%.

According to IDC, the Community computing market should increase at an average rate of 12% between 1989 and 1994. Compared to the growth rate for the EC as a whole, approximately 3%, this figure is sat-

isfactory. But from now on the growth of the computing industry is sustained by software and services and no longer by materials. However, closer examination reveals significant disparities according to categories of products and services and according to EC national markets.

Structure of products market

The Finance sector (banking, insurance, financial services) accounts for the largest user segment of the software and computing services market. It should continue to grow at a higher rate (16.18%) until 1993, stimulated by the creation of the single market in 1992, which will have a major im-

Table 3
Software and computing services revenues in the Community (EC 8),
by product/service class, 1988

(million ECU)	D	F	I	UK	EC 8
Package software	3 414	2 101	1 460	2 483	11 660
Custom software and consultancy	1 608	2 499	1 039	1 342	7 880
Processing services (1)	1 503	1 803	991	1 302	7 290
Training	592	302	221	352	1 743
Total revenues	7 117	6 705	3 711	5 479	28 573
Share (%)					
Package software	48.0	31.3	39.3	45.3	40.8
Custom software and consultancy	22.6	37.3	28.0	24.5	27.6
Processing services (1)	21.1	26.9	26.7	23.8	25.5
Training	8.3	4.5	6.0	6.4	6.1
Total revenues	100.0	100.0	100.0	100.0	100.0
Country share in EC 8 total	24.9	23.5	13.0	19.2	100.0

(1) Includes facilities management and network services.

Source: IDC

Table 4
Software and computing services revenues in the Community (EC 11) and Western Europe, 1987 to 1994

	1987 (1 000 million ECU)	Market share (%)	1988 (1 000 million ECU)	Market share (%)	1989 (1 000 million ECU)	Market share (%)	1989/88 growth (%) (10)	1994/89 forecast CAGR (%) (9)
Software products	7.1	29.5	8.6	30.4	10.6	31.6	23	20
Professional services (1)	8.1	33.6	9.7	34.3	11.7	34.9	21	20
Turnkey systems (2)	2.6	10.8	3.0	10.8	3.4	10.2	13	19(9)
Systems integration (3)	0.6	2.5	0.8	2.8	1.0	3.0	27	26(9)
Processing services (4)	5.0	20.7	5.2	18.4	5.6	16.7	7	6
Network services (5)	0.7	2.9	0.9	3.2	1.2	3.6	36	24
EC 11	24.1(7)	100.0	28.2	100.0	33.5	100.0	19	
Total Western Europe (8)	27.6		32.3		38.6		19	19
USA	53.2		62.1		72.3		17	15

(1) Includes custom software (76%), consultancy (12%), training (11%) and facilities management (1%).
 (2) Includes (standard) systems and applications software; excludes hardware (assumption: 50% of system value).
 (3) Includes software products and professional services; excludes computers, communications hardware, etc. (assumption: 40% of system value); only contracts above USD 1 million.
 (4) Includes transaction, utility and other processing services.
 (5) Includes managed network services (VANs), network (e.g. EDI) applications and electronic information services.
 (6) Compound average growth rate. Dollar-based forecast.
 (7) Input's adjusted sector aggregate for EC 11 compares with IDC's sector total of ECU 23 700 million for EC 8.
 (8) The forecast relates to the total value of the system.
 (9) EC 11 and five EFTA countries.
 (10) Input's growth rates by products
 Source: Input

impact on the structure of this sector (concentration/merger, creation of insurance-bank, increased range of financial services offered by commercial and deposit banks, need for improved productivity in banking networks, etc). Other services (transport, energy,...) would maintain their growth rate (14-16%).

The outlay on computing in the industrial sector (mechanical, automotive,...) should experience a tailing-off in growth (12-14%), bearing in mind rationalisation efforts since 1988. However, industrialists' efforts continue to have a significant effect

on the opening up of their computing systems towards external networks (suppliers in particular) and the integration or optimisation of commercial and technical functions (Computer Integrated Manufacturing).

The defence sector should maintain its position, bearing in mind new programmes which may be enlisted following the experience of the Gulf crisis.

Market trends and commercial exchange

The software markets have developed greatly during the present decade and have still not achieved their maturity point.

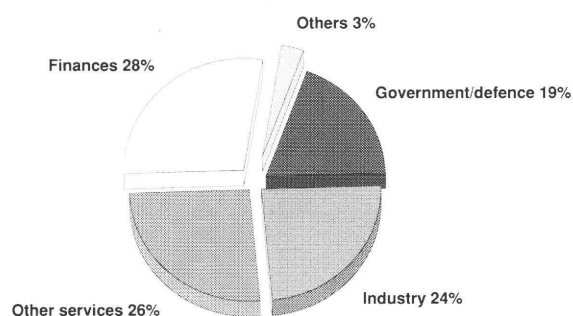
Table 5 shows the market's historical background. The table also shows the growth rates for the two periods from 1981 to 1984 and 1984 to 1988.

Over this seven year period, total income from software and computing services increased to an average annual rate of 23%. Income from software packages in turn increased by 33% per year.

These figures may be compared to the annual growth rates of approximately 16% for data processing equipment and approximately 50% for personal computers (expressed in ECU). It is commonly admitted that the very high demand for personal computers (PC) was the single most motivating force for the creation of software and the development of the software market in general.

By virtue of this fact, the share of software packages in the entire software and computing services market has, according to IDC, increased from 23.4% in 1981 to 40.8% in 1988. Data processing services, the predominant sector in 1981 with 41.5%

Figure 2
Software and computing services
Distribution of software and computing services market by sector, 1989,
within the EC



Source: Consultrionique

Table 5
Trend in software and computing services revenues in the Community (EC 8), 1981-88 and 1994

	1981 (million ECU)	1981-84 CAGR (%) (%)	1984 (million ECU)	1984-88 CAGR (%) (%)	1988 (million ECU)	1988-94 CAGR (%) (%)	1994 (million ECU)
Package software	1 568	40	4 347	28	11 660	21	36 977
Custom software and consultancy	1 998	26	4 041	18	7 880	14	17 208
Processing services/facilities management	2 778	18	4 576	12	7 290	11	13 293
Training	353	25	683	26	1 743	21	5 572
Total revenues, EC 8	6 697	27	13 649	20	28 573	17	73 037
Western Europe (1)	7 944	27	16 244	20	34 076	17	87 142

(1) EC 8 (EC 12 minus Greece, Ireland, Luxembourg and Portugal) plus EFTA 5 (Austria, Finland, Norway, Sweden and Switzerland).
(2) Compound average growth rate.
Source: IDC

of the market, have lost their importance and their market share has dropped to 26%.

The American market share was estimated in 1988 to be between 55 and 60% in the software segment, between 19 and 20% in the personalised software and consultation sector, and 35 to 40% in the data processing services sector. In respect of all the software and computing services sold in the Community in 1988, the average American market share was assessed to be 40%. If we consider that the apparent consumption of software and computing services was 28.2 billion ECU in 1988, that "imports" increased to 11.3 billion ECU and that exports rose to 0.8 billion ECU (the ECSA considers the latter to be 4 to 5% of European production), we can estimate that the Community's total production of software and computing services was around 17.7 billion ECU in 1988 and 21 billion ECU in 1989. The suppliers of software and computer services outside the EC tend to operate via the intermediary of subsidiaries and associated firms established in the Member States, thus contributing to employment and added value in the Community. With regard to commercial trade within the Community in software and computing services, ESCA considers that

France and the United Kingdom are the most active countries in this area, insofar as their major suppliers have exported approximately 10% of their production during recent years.

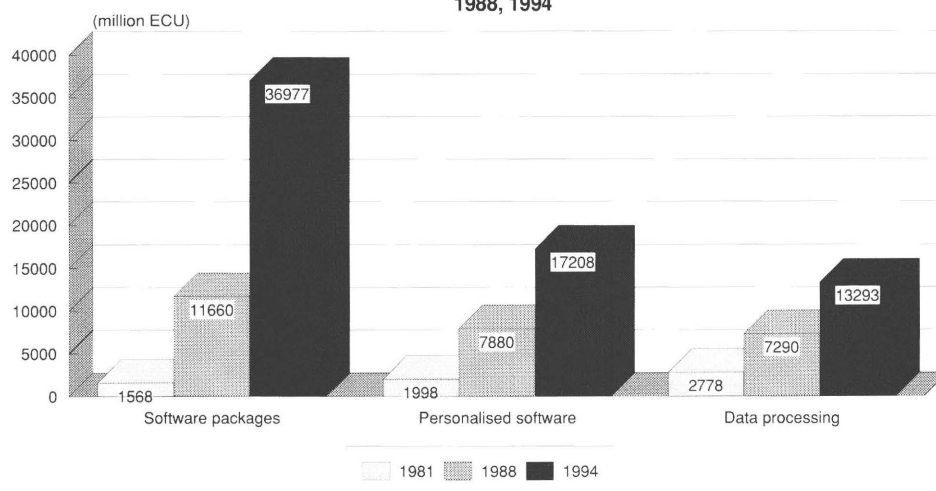
Technological trends

Technological progress in methods of processing, storing and filing information has a far-reaching impact on the software and computing services market:

- Cooperative processing enables computer equipment (such as computers, software, networks, disks) to be distributed within a business, and means that structures for new customer-oriented applications can be created;

- Artificial intelligence is beginning to attract the attention of users, bearing in mind its possibilities and contributions in decision support systems. Its potential applications are just as likely to include the sectors of large scale computer users (finance), as other sectors such as transport, electronics or medicine;
- Business communication systems, local office automation and industrial networks, offer the possibility of linking together various computing systems or applications and stimulate the increasing interest of users from various economic sectors (branch banking system, research services etc.);

Figure 3
Software and computing services
Software and computing services compared for countries within the EC, 1981, 1988, 1994



Source: IDC

Table 6
Revenues and market shares of the top 5 and top 10 independent software and services vendors in the Member States, 1988

	Total revenues (!) (million ECU)	Top 5 vendors %	Top 10 vendors %
Belgique/België	1 212.7	27.8	38.1
Danmark	1 071.5	46.9	53.2
BR Deutschland	7 118.0	11.7	16.9
España	1 005.5	28.8	42.9
France	6 703.6	21.5	32.0
Italia	3 711.6	30.5	39.3
Nederland	2 270.6	25.1	35.1
United Kingdom	5 479.9	20.8	33.2
EC 8	28 573.4	21.9	31.1

(!) The figures exclude the software and training revenues of hardware manufacturers.
 Source: IDC/CEC

– The calculation powers of work stations and the emergence of optical disks (CD-ROM) now enable us to envisage the development of systems for processing and manipulating images and integrating them into existing information systems structures.

Structure of the industry

It can be estimated that in 1989, the EC included around 15,000 software production companies, with a total workforce of about 350,000.

During the last two decades, the software and computing services sector experienced an increase in its growth rate (15 - 20%) which now exceeds the figure for the computing materials and equipment industry. Relatively low entrance requirements, high profitability rates and new opportunities continue to attract new entrants. However, competition has also become more intense:

– in certain segments, profitability and attraction rapidly deteriorate when, at a particular moment, competitors adopt the same strategy and do not hesitate to break the price structure, bearing in mind their cost advantages (government sales, processing to order, distribution and edi-

ting of software);

– variations in profitability (net profit/sales) between the most effective companies and the others remain high (from +10% to -15%);

– merger-acquisition is now becoming the vehicle which is restructuring the sector.

The need to serve multinational customers and offer them a range of increasingly comprehensive services has effectively led companies in the sector to adopt an aggressive external development strategy with a view to acquiring or developing new professions, new market segments, new geographical markets and new software packages. Only a limited number of European companies are truly international companies, in particular, Cap Gemini Sogeti, SD-Scicon, Sema Group.

– at the same time, seeing their traditional activities in rapid decline, manufacturers of materials are also trying to suggest or develop the same engineering services (particularly systems integration) for their clients. These new entrants are, in the long-term, capable of offering a comprehensive solution which would of course be based upon their technological skills (software, networks, data banks, ma-

terial/software integration);

– information technologies also accelerate the restructuring process, as the number of technologies to be mastered and the speed of their development probably escape the internal control of the sector's companies;

– companies which have as their main activity the production of software and computing services account for approximately 80% of the sector's total production; these are companies of various sizes, ranging from tens of employees to over 10,000 in the case of the major ones. The major companies are Cap Gemini Sogeti (F), Finisiel (I), Sema Group (UK/F), SD-Scicon (UK), Sligos (F). The American company EDS achieves approximately 30% of its turnover through its European divisions, which puts it on a par with these other companies.

– there are also a great many producers of computing material which have significant activities in the sector. In order of turnover in Western Europe solely for software and computing services, first of all we find: IBM (United States) and Nixdorf(D), volume of sales of which places them in the forefront of the sector's specialist companies.

Then we find companies such as Unisys, Siemens, Digital, Olivetti, Bull., McDonnell Douglas, the sales of software and computing services of which are comparable to those of specialist companies. Producers of computer equipment achieve approximately 15% of sales within the sector. Other companies specialising in other fields are also increasingly involved in the sector (e.g.: networks and data transfer: Reuter, Transpac, audit and management consultancy: Andersen Consulting).

Regulatory context

A directive on the legal protection of computer programmes is currently being discussed at the European Commission.

Within the Community, a common stance was adopted in this connection by the European Council at the beginning of 1991, and the directive should be passed this year. This directive is provoking lively debate between EC software producers and non-EC software producers (mainly the United States) as to the extent of protection to be adopted: On one side, the ultrarigid parties such as IBM argue in favour of an absolute protection. At the other extreme, Japanese manufacturers (Fujitsu in particular) are trying to convince the authorities of the benefits of more flexible legislation. In the middle, the Europeans (especially Bull, but also the principal representatives of SSII through their union, the ESCA) have adopted a more subtle approach.

The debate equally divides the small producers and the "giants" of the sector. Whatever the final position adopted by the Council, the passions aroused by this directive demonstrate the stakes it represents for the sector.

Prospects

In contrast to the Community computer equipment industry which is subjected to the combined competition of the United States and Japan, software and computer services companies will have favourable development prospects in both the short and medium-term.

Growth for the major categories of software and services activities stands, according to sources, at between 15% and 20% per year for the major segments, despite a risk of a tail-off in investments. Software

Table 7
Information services technologies

Markets	Today's Technologies	Tomorrow's Technologies
Banks/Insurance	LAN, Workstation AGL, AI	Image processing, IA, AGL
Transport	CD ROM, communications network	AI, Image processing
Health	Progiels, LANS	AI, image processing
Industry	LANS, Workstation (CAD/CAM)	CIM, AI
Distribution	LAN, AGL	Communications network

Source: Sema Group Management Consultants

packages continue to increase satisfactorily, particularly software engineering tools. Demand for data communication is a motor for the development of communication software and software for networks management as well as adaptation work vital for the existing systems. Conversely, the trend towards the development of official standards in all areas, universal microprocessors or RISC, exploitation systems (UNIX, MS-DOS), interface data banks and networks, man-machine dialogue (Windows), methods (EUROMETHOD), and tools (PCTE), will have to be confirmed to a greater extent for the future. However

the existence of "de facto" standards unique to certain manufacturers will continue to affect competition over specific gaps in the market. All these factors serve to strengthen the future dominant position of software and software packages in the information and communication systems of organisation. In parallel, the demands by consumers for new computing services are rapidly expanding in accordance with the opportunities and threats within their own markets:

- the need to revitalise obsolete applications by using the most modern technologies (data bank systems, relational systems,

Table 8
Some examples of mergers-acquisitions

Companies	Acquisitions
Cap Gemini	1989 Compact Data Systems (USA), 100% Systemation Inc (USA), 100% Accept Data (Sweden), 100% Apsis (F), 100% 1990 Hoskyns (UK), 70% United Research (USA), 100% Sema Group (UK), +6% (Total participation in the group: 28%)
Sema Group	1989 ADV/ORG (D), higher than 50% Tibet (F), 49%
Sligos	1989 Poli-Rub (E), 100% CMG (F), 47% Actis (D), 75% Syslog (F), 18.3%
CGI	1989 Production Holding Systems (USA), 75% SRS-Network (USA)

Source: Sema Group Management Consultants

Table 9
The main EC companies and their turnover (1)
(million ECU)

	Companies	Turnover	Country
Cap gemini Sogeti	1000.0		France
Finsiel	533.0		Italia
Sema-Group	434.0	France/United Kingdom	
SD-Scicon	418.0	United Kingdom	
Sligos	357.0		France
Concept	324.0		France
Logica	284.0	United Kingdom	
Hoskyns	279.0	United Kingdom	
Volmac	264.0		Nederland
Datev	258.0	BR Deutschland	
GSI	255.0		France
Software AG	255.0	BR Deutschland	
BT. Customers	252.0	United Kingdom	
Thorn-Emi	207.0	United Kingdom	
Télé systèmes	199.0		France
SAP	176.0	BR Deutschland	
CGI	175.0		France
Cisi	163.0		France
Istel	163.0	United Kingdom	
Data centralen	148.0		Danmark
CMG	125.0	United Kingdom	
Steria	123.0		France
SG2	122.0		France
Bis	120.0	United Kingdom	
Eni Data	119.0		Italia
Syseca	119.0		France

(1) Companies whose main activity is the production of software and computing services. Turnover applies to all their activities.
Source: Sema Group Management Consultants

- ergonomic work stations, optical disks, local networks).
- the need to adapt the existing applicative systems to the changes caused by the single market (customs formality, European regulations, pollution norms, European currency, ECU);
- the emergence of strategic partnerships aiming to share, within or outside the in-

- dustry, information and computing resources (mutual marketing programmes, sectorial networks, supplier/client networks);
- the development of new applications to support business growth and diversification strategies (piloting system, decision support);
- finally, users in certain sectors are begin-

ning to explore the opportunities offered by new technologies such as artificial intelligence, image processing and optical disks.

However, the software market also runs the risk of a crisis.

The disparity between demand and availability of computer scientists, and the increasing cost of developing systems, represent major problems for companies in the sector. In order to confront these challenges, the most efficient companies are channelling their efforts more than ever into productivity methods, training and techniques relating to management and project management. These companies are also interested in the industrial applications of technologies which are considered to be promising such as programme-orientated subjects, knowledge processing and graphics processing systems.

Revised by: Sema Group Management Consultants.

Based on Panorama 1990.

Although still modest in size compared with the communications industries, the computer services industry (software, timesharing, valued added networks) or the business services sector (legal, financial services), professional electronic information services (on-line and off-line database inquiries) make a vital contribution to the competitiveness of European firms. With the notable exception of financial and stock market information services (which alone account for nearly 70% of the turnover of on-line information services) and a few large scientific and technical databases, these markets, and in particular services giving information on firms, are still very much nationally based.

Changes

Cumbersome and costly, the computers of the 1970s were mainly used by firms for management purposes while databases intended for professional use were adopted by public bodies.

Over the past ten years, technological developments in data processing facilities have radically, and no doubt irrevocably, propelled our civilisation from the industrial age towards a society based on information. This technological progress affects every link in the chain used by suppliers of information:

- ❖ processing facilities;
- ❖ distribution channels;
- ❖ reception systems.

As computers have developed into super-calculators, their peripheral equipment and in particular their mass memories have also evolved, and now offer several gigabytes of storage capacity in highly compact form.

Thanks to the digitalisation of networks and the use of optical fibre, telecommunications operators can now offer data and image transmission capabilities some 10 to 20 times greater than those available at the beginning of the 1980s; the next decade, moreover, will see the advent of broadband networks with transmission capabilities in excess of 100 megabytes per second, thus allowing integrated voice, data, image and video signal transmission. Operators within the telecommunications sector have also worked hard to improve distribution. The networks, whether telephone networks or specialist data transmission networks, provide almost 100% geographical coverage, with the result that every individual or firm now has access to telecom services, particularly those created by the operators. Finally, the most significant development in the field of data processing facilities has undoubtedly been the personal micro-

Table 1
Electronic information services
Forecasted turnover for on-line services, 1989-92

(million ECU)	1989	1990	1991	1992
Belgique/België, Luxembourg	38	47	65	81
BR Deutschland	204	256	317	405
España	9	14	20	26
France	290	345	408	492
Italia	43	56	64	77
Nederland	47	56	69	84
United Kingdom	1 072	1 236	1 485	1 770
EC 7	1 704	2 009	2 429	2 936
Switzerland	225	262	311	360
Rest of Europe	119	139	168	196
Total	2 048	2 410	2 908	3 492

Source: The European Electronic Information Industry, 1988-92; Link resources, February 1989

computer; the size of the PC market has enabled manufacturers to cut costs and hence furthered the development of our electronic environment. An extensive range of processing systems priced to suit even the smallest of firms, reliable, high-performance means of communication and low-cost terminals, such as minitel or micro-computers, have spawned a new market for "data centre" systems and information systems which no longer cater exclusively for firms but rather for individuals, for professional, cultural or leisure-related use. A new information service industry is beginning to take shape.

Databases, production

The IMO (Information Market Observatory), which operates under DG XIII of the EC and is based in Luxembourg, has compiled a census of on-line databases worldwide. In 1989, 2,214 of these databases intended for professional use were American (USA); the EC ranked second, with 1,048 databases and a turnover in 1989 of around 1.7 billion ECU (7-member EC).

The United Kingdom is the EC's largest producer (63% of turnover for the 7-member EC), followed by France (17%) and West Germany (12%). The United Kingdom and Germany together produce over half of

the EC's databases (34% and 20% respectively).

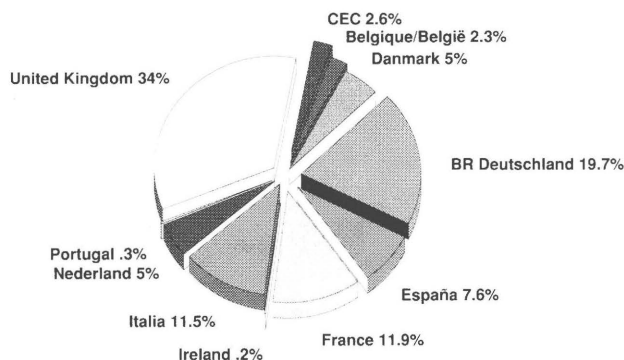
A comparative analysis of the EC and United States shows that EC production is mainly aimed at the research market. The number of EC databases in this sector is slightly higher in terms of absolute value than that of American databases (585 as against 567). In the legal sector, however, US output is three times that of the EC, in the financial sector - five times greater and in the news information sector - seven times greater.

In the United States, these three areas, which are the most buoyant sectors of the market, have contributed to the growth of private companies. Over 80% of US databases are actually managed by private bodies, compared with less than 50% in the European Community.

It is interesting, in this respect, to compare the various EC Member States. In Southern Europe, databases are mainly managed by public sector bodies, whereas in Northern Europe, the private sector predominates, particularly in the United Kingdom (71%) where, as in the United States, the telecommunications market has been deregulated.

Over the past ten years, the difference between European and American markets has narrowed, from a ratio of 1 to 10 to 1 to 3; it should narrow even faster once the deregulation of the telecommunications market and the recommendations and guidelines described in the EC Green Paper take effect, particularly the "Open Network Provision" (ONP) directive, whose primary objectives are to harmonise European communication networks (access and transport) and to adopt joint certification procedures for terminal equipment.

Figure 1
Electronic information services
EC database production, 1989



Source: Commission of the European Communities, DG XIII

These changes in European statutory constraints and the harmonisation of communication networks and terminal equipment should favour the emergence of new information suppliers, private companies, interested in the end user market.

With its Teletel network and over 5 million Minitel terminals, France generated 85 million hours of videotext traffic in 1989 (i.e. 16.5% up on 1988), equally divided between professional and mass consumer use.

Videotext, which is often seen by French firms as an economical means of transactional communication, is continuing to expand on the professional data services market. It has not managed, however, to transcend national borders due to the multiplicity of standards adopted by adjacent countries.

Optical disk technology provides a new method of distributing database services. The readers for these disks known as CD ROMs have not yet been widely adopted and are intended to replace microfilm file readers. The advantage of this technology is that it enables information to be transmitted in the form of a full text complete with pictures. The market for this type of system is aimed at professions within the construction industry, electronic or avionic maintenance, professions where access to full information is absolutely essential. In 1989 the number of readers installed was estimated at under 50,000 units.

The internationalisation of information services and the fragmentation of the European market

The internationalisation of database services varies from one sector to the next. In the field of finance, patents or science and technology for example, information

Table 2
Electronic information services
Distribution of database production per country, 1989

	Non-Profit	For-Profit	Reference	Source
Belgique/België	13	11	17	7
Danmark	40	12	31	21
BR Deutschland	116	90	143	63
España	71	9	46	34
France	84	41	82	43
Ireland	1	1	1	1
Italia	71	50	63	58
Nederland	38	14	40	12
Portugal	2	1	2	1
United Kingdom	103	253	139	217
CEC	27	0	21	6
EC 10	566	482	585	463
USA	344	1 870	567	1 647

Source: Directorate - General for Telecommunications, Information Industries and Innovation (DG XIII)

services already operate on a worldwide scale. A few European suppliers or suppliers who originated in Europe have managed to gain a firm footing in these sectors: Reuters, Derwent, Questel, Beilstein. In other areas (legal information, company directories, solvency information, marketing data on consumer behaviour and media audiences), the market, which tends to be made up of medium-sized firms, has hitherto been more or less nationally based. No doubt it is here that the advent of the single market will bring about the greatest number of changes.

27% of the databases distributed by EC database service centres however, are foreign, with 18% coming from countries outside Europe.

In the United States, only 11% of databases are manufactured by non-American companies, whereas in Japan the percentage is 75%.

In Europe, the United Kingdom, Italy and West Germany are the leading importers of databases.

As regards exports, the EC exported a quarter of the 900 or so databases produced, half of them to the United States.

West Germany and the United Kingdom are the only countries which export databases, for two main reasons:

- ❖ the industrial maturity of these two countries which use databases as a vehicle for marketing their products and services;
- ❖ and the English language. West Germany for example, has adopted a multilingual approach (30% of its output).

Substantial investments are needed in order to overcome the fragmented nature of national markets: sales networks, acquisition of holdings. So far only a small number of North American firms have made a systematic effort to establish themselves on a European scale: Dun & Bradstreet (acquired Schimmelpfeng in Germany, Cosmos in Italy and Datastream in the United Kingdom), ITT World Directories. The European players have also embarked upon a series of mergers and alliances, whether in terms of sharing marketing costs (bridges between database service centres) or forming pan-European databases based on national databases. Alliances are being forged in the company catalogue and product sphere (acquisition of Kompass by the Office d'annonces and

Table 3
Electronic information services
Origin of databases available on EC hosts, 1989

	Total distribution	Domestic	EC	USA	Others
Belgique/België	33	19	5	0	9
Danmark	63	54	4	0	5
BR Deutschland	280	210	16	34	20
España	89	82	0	0	7
France	163	119	10	15	19
Italia	203	123	26	27	27
Luxembourg	27	0	25	0	2
Nederland	44	43	1	0	0
Portugal	3	3	0	0	0
United Kingdom	351	263	25	32	31
Total EC	1 256	916	112	108	120
USA	3 348	2 977	206	/	165

Source: Directorate - General for Telecommunications, Information Industries and Innovation (DG XIII)

SEAT), economic forecasting (GSI-Pittagora), sales information (Or Télématique-Infotrade-Ecodata), freight markets (Lamy/Kluwers), transport (Transpotel), CD-ROM printing of company accounts and balance-sheets (Van Dick-Infocheck). At the same time, a number of European service centres have established themselves on the North American market, via agreements (Inka as part of the STN network), a vigorous acquisitions policy (acquisition of IP Sharp by Reuters, of SDC-ORBIT and BRS by Pergamon) or by setting up subsidiaries (Questel Inc.).

Prospects

In addition to the inherent growth of the

electronic information services markets (approximately 20% per year), we can expect to see further growth brought about by the opening up of the single market, as businessmen seek to find out more about firms, markets and regulations in the various Member States. With the deregulation of telecommunications services, leading to the emergence of value added networks, professional electronic information services will gradually come to play a vital role as the information infrastructure of the single market. This trend will become more pronounced as new ways of distributing data in a form which can be read by machine (CD-ROM) or other forms

begin to infiltrate the market: programme transmission (optical fibre) and HDTV. With this end in view, the European professional information services industry, made up of a few firms backed by large communications groups (Maxwell, Reed, Bertelsmann, Kluwer, Springer, Pearson, Elsevier) and several hundred medium-sized independent firms, operating mainly on national markets, have embarked upon a new restructuring phase: alliances and mergers.

Written by: Directorate-General for Telecommunications - information industries and innovation (DG XIII).

Address: rue de la Loi 200, B-1049 Brussels; tel: (32 2) 235 11 11, fax: (32 2) 235 01 48

Revised by: Sema Group Management Consultants