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TO THE COUNCIL, THE EUROPEAN PARLIAMENT AND THE ECONOMIC AND SOCIAL COMMITTEE

IMPACT Programme

Main events and developments in the electronic information services market

1991

1. This Communication concerns the IMPACT Programme (EC plan of action for setting up an information services market) adopted by Council Decision 91/691/EEC of 12 December 1991.
2. In conformity with Article 6 of Council Decision 91/691/EEC, a report has been prepared on the main events and developments which occurred in the electronic information services market in 1990-1991 and is attached to this Communication. Two similar reports, covering the state of the market in the periods 1988-89 and 1989-90 have been forwarded to the European Parliament and to the Council as docs. SEC(90) 1788 final, dated 24 September 1990, and SEC(92) 1536 final, dated 2 September 1992.
3. This third report reviews the most important trends identified over the period 1990-1991 within the following sectors:

online ASCII database services,
videotex services,
CD-ROM publishing,
fax-based and audiotex services.
4. The report highlights the following major findings, some of which to some extent confirm those findings found in these previous reports:
 - In 1990, turnover by EC-based producers and distributors of electronic information services was around BECU 3.1, providing employment for an estimated 32,000 people in 7,000 firms, of which those in the finance and business sectors represent around 95% of all revenues. The electronic information services sector on this basis is in between two other strategically important sectors: market research (BECU 1.9) and management consultancy (BECU 3.5).
 - The United States continues to dominate international markets for professional electronic information services. US industry value in 1990 was around BECU 6.9, more than twice the size of total EC-based activity (BECU 3.1). Typically, the average European company is smaller, less vertically integrated and more nationally-oriented than its US counterparts. Disparities continue to exist between the US and the Community in terms of database production and the number of market operators.
 - Japan remains a relatively minor player in world markets for electronic information, but there is a strong public sector commitment to encourage innovation in the provision of electronic services.
 - Significant differences exist between the Member States in relation to information market development. Particular problems are faced in the Community's "less-favoured" regions in relation to demand, local supply and the telecommunications infrastructure.
 - Most information providers operate on a predominantly national basis delivering professional information services to their own national communities.
 - Technical, linguistic, administrative and legal obstacles continue to hamper the development of a common market in information services. Despite the opportunities presented by the Single European Market, few truly pan-European information services have been brought to the marketplace. This reinforces the need for market broadening and awareness raising activities, as supported by the INFO EURO ACCESS central strategic concept of the IMPACT programme.

5. Since the publication of the previous IMO Annual Report, three important new developments have become apparent:

- Evidence from both supply and demand side indicators collected by the IMO points to a slow-down in the rate of growth of international markets for online information. In 1990, the European electronics information services supply grew by only 12.5% as against previous estimates of 20%-30% per annum. This slow-down appeared in the beginning of the second half of 1990 and continued throughout 1991. Recessionary pressures in the global economy appear to have depressed demand in EC, North American and Japanese markets.
- Intra-EC "trade" in online ASCII databases was the fastest growing market segment between 1989 and 1990 with a growth rate of 26.1% (in absolute terms), while exports to destinations outside the Community grew by only 6.0%.
- Merger and acquisition activity is a significant force in the European information market as industry actors seek to integrate information production and distribution activities. The number of vendors active in the European market is gradually declining and is predicted to fall from 7,000 firms in 1991 to no more than 5,500 by 1995.

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INTRODUCTION

When on 26 July 1988, the Council adopted a plan of action for setting up an information services market (the IMPACT programme), it asked the Commission to establish an Information Market Observatory (IMO) in Luxembourg and to present an Annual Report on the most significant developments and trends in the European electronic information services market. This third Annual Report, based on data collected during 1991, reviews the state of the European market for professional information services and identifies the most important trends which became apparent that year.

As before, this Report reviews developments in four key segments of the European marketplace for professional electronic information:

- o online ASCII database services
- o videotex services
- o CD-ROM publishing
- o audiotex and fax-based services

As well as presenting detailed findings of work undertaken or commissioned by the Information Market Observatory, this Report attempts to widen the usefulness of the work by stressing the competitive strengths and weaknesses of European service providers.

EXECUTIVE SUMMARY

If Europe is to remain competitive in world markets for goods and services, and to continue to make advances in science and technology, organisations of all kinds must have access to the best possible information. The commercial value of timely and relevant information, especially in strategic areas of decision making such as investment or market analysis, is increasingly being realised and, as a result, a significant market for tradeable information is developing within the Community. Recorded information comes in two forms: paper-based or electronic. The traditional publishing sector is dominated by printed newspapers, periodicals and books, while the electronic information sector includes online ASCII databases, videotex, CD-ROM and other optical information media, together with new and emerging forms of service delivery such as audiotex. Since the early 1980s, the market for electronic information has evolved away from its origins in science and technology towards specialised professional information services covering financial and company data, market research, business-to-business information and news services. Innovation and diversity on the supply-side are essential to the continuing growth and stimulation of demand for information services. It is for this reason that the Commission has placed considerable emphasis on co-funding a number of leading edge demonstration projects.

A decade ago, the European market for professional electronic information was insignificant in economic terms. With an annual turnover in 1990 of around BECU 3.1, the electronic information services market is still relatively modest in comparison with the massive telecommunications (BECU 70) or the computer services (BECU 33.5) industries. Nonetheless, the sector is becoming increasingly important in terms both of turnover and numbers of people employed - strategically important sectors of similar size to the electronic information services sector in Europe include market research (BECU 1.9) and management consultancy (BECU 3.5).

A major impetus to the electronic information services marketplace will, of course, come from the general expansion of cross-border business activity after the Single Market is consolidated over the next few years. As businesses in all sectors of the economy adjust to the new realities of pan-European market competition and regulation, they will require more external information to function effectively. This is likely to result in the stimulation of new demand for Community-wide information, particularly in the areas of mailing lists, credit ratings, and company information.

Despite the evident importance of this emerging sector as a 'trigger' to downstream productivity gains and its contribution to growth in the European economy as a whole there has, until recently, been relatively little reliable information on the size and structure of the information industry, especially in the area of electronically-delivered services. There are many gaps in our detailed knowledge of the nature of the demand for electronic

information and of the factors that encourage and shape that demand. This means that newcomers to the electronic information industry find it very difficult to gauge the market potential for their services, especially on a pan-European basis. The work of the Information Market Observatory is intended to give a better insight into the information services market and provide the Commission with a basis for formulating policy in this field and for representing the interests of European actors in international fora.

Between 1989 and 1990, turnover in the European electronic information services sector grew by 12.5 per cent (unadjusted for inflation) from BECU 2.8 to BECU 3.1, with finance and business information generating more than 95 per cent of all revenues. Finance alone, including information relating to stocks and shares, banking, foreign exchange and insurance, accounted for more than 70 per cent of sales. While performance in the sector outstripped the rate of growth in the economy as a whole, the 12.5 per cent measured growth between 1989 and 1990 contrasts with typical estimates for the preceding three years in the region of 20-30 per cent. A number of factors may account for this apparent slackening in demand, not least the generally difficult trading conditions in the second half of 1990 (especially in the UK financial services sector). Trading conditions in 1991 were far from ideal and there is convincing demand-side evidence to show that the rate of growth in international online markets fell sharply, affected by the twin effects of a slowdown in financial services markets and the worldwide economic recession. At the same time, it can be argued that these same factors have actually underlined the importance of external information as a source of competitive advantage and this is likely to ensure the continuing growth of the electronic information sector in the future. When drawing conclusions, it is important to differentiate between cyclical and structural factors. The North American experience suggests that there is still much potential for market development in the longer-run, although the effects of cyclical down-turns might obscure this.

Europe has a number of competitive strengths in world markets for professional information services, not least because of the presence of world ranking information and media conglomerates within the Community and the existence of large and powerful markets for information in key industrial sectors such as chemicals and financial services. Yet, despite these strategic advantages, the European market for electronic information lags behind that of North America, both in terms of supply and demand. The differences are striking. On the supply-side, North America accounted for almost 59 per cent of world online ASCII database production in 1991, and its database producers and host services outnumbered its European counterparts by almost two to one. Compared with the United States, Europe also lags behind in terms of total industry value. According to evidence produced by the US Department of Commerce, the turnover by US suppliers in 1990 was BECU 6.9, more than twice that reported within the Community. Europe's other main competitor, Japan, is currently a relatively minor player in world markets for electronic information, but it has undoubted strengths in hardware and there

is a deep public sector commitment to encouraging innovation in the provision of information services.

Europe faces greater internal barriers to sector development than either the USA or Japan. This, together with the relatively poor financial performance of many European players in the electronic information services marketplace provides much of the driving force and the rationale behind the European Commission's IMPACT programme.

1. ELECTRONIC INFORMATION SERVICES IN AN INTERNATIONAL CONTEXT

Information is a key factor in the industrial production, distribution and marketing chain. For some service sectors, such as finance, insurance and tourism, it has been described as a basic raw material, such as energy is in the manufacturing industries. The commercial value of timely and relevant information, especially in strategic areas of decision making such as investment or market analysis, is being realised by growing numbers of decision makers. As a result, sizeable markets for tradeable information often in electronic form, are emerging in many of the world's developed economies. The European Commission's IMPACT programme aims to promote the exploitation of this valuable resource to the full, both as an aid to competitiveness and to stimulate the emergence of an EC-wide electronic information services market.

Since the early 1980s, the market for electronic information has evolved away from its origins in science and technology towards specialised information services, delivering financial and company data, market research, business-to-business information and news services to groups of professional users. Information services are currently being brought to the European marketplace in a range of electronic formats, from online ASCII databases, videotex, to CD-ROM and other multimedia publications, and audiotex. It is likely that this trend towards diversity, both in the services themselves and the ways in which they are 'packaged' and delivered to users will continue, opening up market opportunities in the areas of leisure, education and training, and for information services with a social or cultural emphasis.

1.1 World markets and global competition

In 1979/80, the first issue of *Cuadra's Directory of Online Databases* catalogued some 400 databases and 59 international host services across the world. By 1991, there had been a more than tenfold increase in supply-side activity, with more than 5,026 databases available through 731 host services. As is clearly demonstrated in Table 1, world production and distribution of electronic databases is very much concentrated in the highly developed economies of North America and the European Community. The differences between North America and the European Community are particularly striking. North America produced almost 59 per cent of the world's publicly-available professional ASCII database services in 1991, and North American database producers and host services outnumbered their counterparts in the EC by almost two to one. In the high revenue-generating area of business databases, North America produced more than three times as many databases as Europe. North American host services enjoyed a further advantage over Europe in terms of a more highly concentrated database distribution sector, as indicated by higher database to host ratios (7.3 in North America; 5.7 in Europe).

Table 1
Online ASCII database production / distribution; worldwide, 1991.

	Databases	Database producers	Hosts	Gateway services
North America	2,956	1,223	404	57
European Community	1,280	651	226	26
Rest of the world	790	284	101	23
Total	5,026	2,158	731	106

Source: Directory of Online Databases, Cuadra/Elsevier, July 1991.

1.2 European markets for electronic information

In addition to the supply-side imbalances mentioned above, compared with the United States, Europe faces a considerable gap in market turnover for electronic information services, of the order of 2:1. While North America is still clearly ahead of the rest of the world (including Japan, incidentally) both in terms of database production and distribution, the European information services market remains fragmented by linguistic, regulatory and technical barriers, with service developments often taking place on a national, rather than a truly pan-European, basis.

Over the past decade the European electronic information services sector has been characterised by markedly uneven patterns of development. In 1991, the example, combined industry value for the United Kingdom and France was much higher than in the other Member States, accounting for well over half of all EC turnover. The reasons are largely historical. France, for example, has a booming videotex market which achieved the remarkable figure of nearly 105 million hours of traffic in 1991. The position of the City of London as a key international financial centre goes some way to explaining the development of a significant market for real-time financial services in the United Kingdom and other parts of Europe. Germany and the United Kingdom lead the field in terms of database production, particularly in the strategically important areas of science and technology, if videotex services are excluded.

A major impetus to the European electronic information marketplace will, of course, come from the general expansion of cross-border business activity as the Single European Market is consolidated over the next few years. As firms in all sectors adjust to the new realities of pan-European market competition and regulation, they will require a great deal of external information to function effectively and efficiently. This will stimulate further demand for Community-wide information, particularly in the areas of market data, mailing lists, credit ratings and company

information.

1.3 USA

The majority of the world's database producers and distributors are located in the United States. In 1991, the US had almost twice as many database producers as the EC (1,111 as against 651) and nearly fifty per cent more host or gateway services: 461 as against 252. Assuming that overall counts of database producers are in some way indicative of market demand, then the US clearly had a major strategic advantage over the EC, both in terms of the scale of database production and in the diversity of services on offer.

The US dominance of the electronic information service sector extends beyond sheer numbers of services. According to the *1992 US Industrial Outlook* published by the US Department of Commerce, the 1990 turnover for the electronic publishing sector (online ASCII databases and services; CD-ROM publishing; videotex; and audiotex) was around BECU 6.9, which was more than twice the size of the total industry value for the European Community in 1990 (BECU 3.1). Table 2 records the growth in US electronic information service revenues (estimated) over a five year period from 1988 to 1992. One general trend, evident from the Table, is that year-on-year growth in US markets appears to be showing signs of declining growth, albeit gradually. Two possible explanations may account for this slowdown. The first is the widely accepted notion that some sectors of the US market for electronic information services are now saturated and that the industry is showing signs of early maturity. Another proposition might simply be that sales of electronic information have been adversely affected by cyclical factors in the wider economy.

USA

BECU and percentages

Table 2
Electronic professional information service revenues; USA,
performance and estimates, 1988-1992.

	1988	1989	1990	1991	1992
BECU	5.0	6.0	6.9	8.2	9.6
Annual growth (%)	-	20.0	15.0	18.8	17.1

Source: US Department of Commerce, 1991.

The reasons behind the leadership of the US electronic information services industry can be found in its early development coupled with a number of other factors. The current US specialised information sector was partially created by public intervention.

The stimulus was both oriented towards the creation of databases within the federal agencies, through the action of the Committee for Scientific and Technical Information (CSTI), and the financing of the automation of learned societies' publishing systems through the action of the National Science Foundation (NSF). In addition to the positive stimulus given to the sector in terms of public intervention, the sheer size of the US domestic market sustained significant economies of scale and the development of profitable telecommunications networks and information services.

European players entered the electronic information services arena some years later than their counterparts in the US, although, naturally, this lag in market entry will become less important as time goes on. More importantly, their primary national markets offer fewer opportunities for the economies of scale which are to be found in the large, homogenous, English-speaking US domestic market. The continuing strategic advantages of the US are reflected in terms of exports. The US Department of Commerce estimates (1991 figures) that around 30 per cent of revenues for electronic information services are attributable to export earnings. In fact, the figure for Europe is roughly the same proportion, so the advantage here is relative rather than absolute. There are several reasons, apart from language, why the US is successful in export markets. One is that US suppliers tend to be very well represented overseas and the presence of a large number of US foreign subsidiaries has certainly been a facilitating entry factor in European markets for both US hosts and information providers. Another factor is that US suppliers are more and more keenly aware of the need to find overseas customers in order to increase their chances of surviving in an increasingly competitive environment. US suppliers have clearly identified international prospects as the key to future growth, with the EC and Japan as the prime targets.

1.4 Japan

According to the Japan Information Services Association (JISA), the total revenues of the Japanese database industry were around MECU 1,037 in 1989, compared with total revenues flowing to EC-based producers and distributors that same year of MECU 2,799. The Japanese supply-side was dominated by seven major players in 1991, who between them achieved a remarkable 87 per cent share of the total Japanese market (Table 3). The largest electronic information markets in Japan are in the financial services; patents; and scientific, technical and medical (STM) sectors.

While Japan is currently a relatively minor player in world markets for electronic information, there is a very deep public sector commitment to developing the electronic information services sector. The main action lines of the Ministry of International Trade and Industry (MITI) in this area may be summarised as follows: supporting database production, often at a small-scale local level; research and development activities aimed at making electronic databases easier to use; support for the development of more efficient database services; the production of public sector database services; and the expansion of government-owned data supply. A public sector Database Reserve Fund was established in

1987 to support the massive initial investment necessary for database production. Further private support for database production is provided through the Japan Development Bank which provides low-interest financing for capital and other loans to those producing databases in the private sector.

Japan

Percentages

Table 3
Online ASCII databases; Japan, market shares of key players, 1991.

	Market share	Market sector
Quick	54.0	Financial services
Nihon Keizai Shimbun	9.0	Financial services
Kyodo Press	6.5	Stock market
JAPIO	6.5	Patents
JICST	5.0	STM
Maruzen	3.0	Foreign database agent
Kinokuniya	3.0	Foreign database agent

Source: Electronic Publishing Services Ltd, 1991.

It is possible that Japan will emerge as a major force in electronic information, but possibly by adopting a strategy which capitalises on their undoubted strengths in hardware. By integrating data and hardware in convenient new packages, such as electronic books and games (*Nintendo*, for instance), the Japanese may be able to reap significant market opportunities for the delivery of electronic information. The recent wave of Japanese acquisitions of foreign 'software' concerns, like the takeover of *CBS* by *Sony* may be early indicators of their intentions.

The close relationships between government and industry in Japan is another factor to consider. Two recent examples of this closeness both emphasise the medium- to long-term threat which Japan may pose in international markets for electronic information. The first is the designation by the Ministry of International Trade and Industry (MITI) and the Ministry of Post and Telecommunications of more than 60 towns and areas outside Tokyo as testing grounds for the use of advanced information technologies; in effect creating a series of experimental 'information societies' with considerable investment in human skills. In June 1991, MITI announced that it intended to make a large investment (MECU 24) by a 'Hyper Network' laboratory. This is an exercise to develop videotex and advanced telecommunications for Japanese industry which will involve the cooperation of *France Télécom*.

While there is clearly a trend towards the production of localised database products and greater self-sufficiency Japan still has to overcome many problems before competing in the global

information marketplace on an equal basis. The most obvious of these is Japanese itself and the considerable costs of translation in other languages. In the meantime, Japanese demand is characterised by a high degree of dependence on domestically-produced sources of data. It is estimated, for example, that spending on foreign databases in 1989 accounted for only one-third of total expenditure, but two-thirds of available services.

1.5 Emerging markets in Eastern Europe

The dramatic changes which have taken place in the former Eastern Bloc or former Council for mutual Economic Assistance (CMEA) countries have provoked considerable interest in the medium- and long-term opportunities for growth in information services trade with these countries, particularly for EC-based suppliers. However, there are a number of infrastructural problems which mean that the emergence of information services markets is likely to take some considerable time. Whereas Western Europe has benefitted from diverse and efficient sources of information supply, the former CMEA countries have had to rely on state-controlled agencies to gather and disseminate data. In the post-war years Eastern Europe has lagged behind the West in nearly all aspects of telecommunications and information technology and massive infrastructure problems persist within the former CMEA countries. The development costs to remedy these structural problems have been estimated, by one industry commentator to be of the order of BECU 350. Apart from the lack of a well-developed information infrastructure, there are other factors which militate against short-term entry into international markets such as political uncertainty and a lack of hard currency.

2. EUROPE'S COMPETITIVE STRENGTHS AND WEAKNESSES

2.1 European supply-side strengths and weaknesses

Europe has a number of competitive strengths in world markets for professional information services, not least because of the presence of world ranking information and media conglomerates within the EC. Many of these have been active in the field of electronic information services for more than a decade: *Reuters*; *Pearson-Financial Times*; *Reed International*; *Elsevier*; and *VNU*, to name a few. In addition, the information services sector in Europe is characterised by large and well-established markets for professional electronic information in such key industrial sectors as chemicals, pharmaceuticals, and financial services. Yet, despite these advantages, the market for professional electronic services in Europe remains relatively underdeveloped in comparison with North America, which, as has already been seen, enjoys considerable advantages over Europe in terms both of database supply and demand for information in electronic format. The 1989/90 co-ordinated survey of hosts and information providers (*CEC/EIIA*) revealed that almost 49 per cent of European respondents were not operating at a profit. The mismatch between the relatively poor performance of European players in the electronic information services arena and the considerable market potential which exists, especially after 1992, has provided much of the driving force and rationale behind the Commission's two IMPACT programmes.

European players face strong competition from non-EC operators in a number of specialised (or 'vertical') markets, of which chemistry is perhaps the most notable example. In vertical, as in more general interest (or 'horizontal') market sectors - for products such as dictionaries or news services - the realisation of scale economies will increasingly determine competitive advantage. North American suppliers are in a strong position to develop scale economies since their home markets are large and effectively monolingual.

Certain segments of the market for electronic information are global by their very nature. This is particularly true in the area of scientific and technical information, since research in these areas knows few national boundaries. While many of the largest scientific and technical databases are North American, European providers still command large shares in a number of global vertical markets (such as *Derwent* in the case of patent information and *INSPEC* in the areas of electronics, computing and physics). Similarly, the trend towards the increasing economic interdependence between the countries of Europe and other trade blocs means that markets for macro-economic data and financial information services are becoming increasingly international in scope.

Creating and maintaining databases involves considerable time and investment: in the EC much of this effort often tends to be concentrated in the production of reference databases, often in STM

subjects. While Europe has a lead over the USA in the number of bibliographic *databases* produced, US databases tend to be much bigger (on average about three times bigger). This means, in absolute terms, that the USA produces many more database *records* than the EC. In addition, the US has a considerable lead over Europe in the production of full text and other 'source' databases. So, while the EC produces almost as many scientific and technical databases as the United States, it produces many fewer news and current affairs services (despite the presence of well-established newspaper and other traditional publishers on European soil). The production of bibliographic database services, aimed at intermediaries in libraries and documentation services in research organisations and in the larger public and private sector institutions, is still a dominant feature of supply-side activities in the EC. If Europe is to redress the imbalances in the demand for professional electronic information, then the solution must lie with marketing services directly to end-users: to financial directors, jurists, engineers, and marketing executives.

A further issue regarding the competitiveness of the European supply-side relates to the optimal number of distribution outlets for electronic services. Critics have long argued that Europe is oversupplied with national host services and that this factor tends to exacerbate market fragmentation and work against the realisation of critical mass demand. In many sectors, such as legal and statutory information, information on company solvency, or market intelligence, supply is heavily dominated by national operators. In other words, the main database services have developed along national lines, to serve national rather than international markets. On the other hand, these same factors tend to work against the entry of American operators into a European marketplace which continues to be dominated by dozens of medium-sized European suppliers operating essentially within their own national markets. To reach international markets in a number of key subject areas, providers must be willing to invest heavily in data collection, form strategic alliances, or gain access to the information base of foreign companies through acquisition or merger. These are barriers which must be crossed if pan-European information services are to be established.

Paradoxically, many of Europe's strengths are, at the same time, also weaknesses. For example, the existence of a highly developed and efficient supply structure for traditional printed business and professional information in many EC countries is a factor which may contribute to a relatively underdeveloped market for electronic information. Further evidence of Europe's simultaneous strengths and weaknesses in the global information services marketplace can be marshalled by observing the commercial strategies of some of the larger European media conglomerates. In the early 1980s, several Dutch and British media corporations invested aggressively in the US in preference to the EC, taking the view that the likely returns on investment were very uncertain in Europe. British publishers have tended to develop strategies which are 'transatlantic' in nature, a natural outcome of their shared language and good trading

relations with the US. Dutch publishers, confined to a small national market, have tended to grow by acquisitions both in the US and, more recently, in Europe.

2.2 Strengths and weaknesses in European telecommunications

The European Community's vision of a market without obstacles to the free movement of goods, services, capital and people, to be achieved by the end of 1992, needs to be supported by a flourishing Community-wide market in professional information services and by an advanced telecommunications infrastructure which can deliver those services competitively. As well as stimulating information market development through a variety of mechanisms under the IMPACT programme, the CEC has a significant role to play in shaping the legal and regulatory environment within which pan-European electronic information services can flourish. In the wake of telecom's liberalisation, an EC-wide regulatory framework is needed to ensure free competition. The framework which is currently being laid down will ensure that former monopoly operators do not abuse their dominant position in the market, through mechanisms such as cross-subsidy or the imposition of proprietary standards. Similar processes of liberalisation have been taking place in the United States with the deregulation of AT&T. This has been the subject of much public debate, not least because the American press and media are understandably reluctant to share the income from electronic advertising with the telephone operators. Currently, with the recent lifting of restrictions, five of the seven *Regional Bell Operating Companies (RBOCs)* are engaged in the delivery of a range of transport and information services, including electronic yellow pages and audiotex services. The full significance of these developments has yet to be seen, but analysts think it is likely that the RBOCs will seek entry to a number of foreign markets, including European ones. In Europe, many of the large national operators have already entered the information services marketplace and are involved in the provision of host services, videotex and kiosk services, gateways, electronic messaging services, and electronic telephone directories and *Yellow Pages*.

While a more liberal regulatory environment within Europe is beginning to show signs of assisting information market development, progress in the technical area of developing a European broadband network has been much slower. The current revolution in telecommunications technology has considerable implications for the way that information services will be delivered in the future. Broadband communications, which enable huge quantities of data to be transmitted at high speed, make it feasible to integrate text, voice, sound, and images and so open up new markets for innovative service providers, in areas such as video conferencing and training.

Major progress has been made on installing an Integrated Services Digital Network (ISDN) infrastructure within the Community, but a great deal remains to be done. By 1990, four Member States were already offering commercial services, but partly as a result of a lack of agreement over standards, the ultimate goal of

replacing the analogue public switched telephone network with a fully-fledged pan-European ISDN has been delayed. It is now four years since the twelve PTOs operating in the EC agreed to implement a European ISDN infrastructure by 1992. While basic ISDN lines are already installed in most European countries, the rate of progress is highly uneven, as can be seen in Table 4. Naturally, this has implications for the development of an advanced information market across the Community.

EC Member States

Numbers

Table 4
ISDN basic lines; projected EC infrastructure, 1994.

	Current population(a) (million)	ISDN lines by 1994	Basic lines per 000 population by 1994
Belgium	10.0	140,000	14.0
Denmark	5.1	125,000	24.5
Germany	79.6(b)	1,250,000	15.7
Spain	39.0	420,000	10.8
France	56.4	1,100,000	19.5
Greece	10.1	170,000	16.8
Ireland	3.5	30,000	8.6
Italy	57.6	825,000	4.3
Netherlands	15.0	280,000	18.7
Luxembourg	0.4	7,000	17.5
Portugal	19.9	60,000	6.1
UK	57.4	1,000,000	17.4
EC	344.0	5,407,000	15.7

(a) *OECD Employment Outlook, 1990.*

(b) For unified Germany.

Source: Yankee Group, 1992.

ISDN is not the only technology around which new forms of information service delivery will develop. There is an intention that an even more advanced Integrated Broadband Communications (IBC) network will be set up within the Community. The IBC network could take over from ISDN which does not have a broad bandwidth and is therefore unsuitable for advanced multimedia services. The prospects are that Integrated Broadband communications (IBC), currently still at the developmental stage within the context of the Commission's RACE (Research & Development in Advanced Communications in Europe) programme should be available commercially from about

1995 onwards. If these assumptions hold good, then another major enabling element in the European information environment will be in place before the end of the decade.

In its Green Paper on the development of a common market for equipment and services, issued in 1987, the CEC outlined a programme of regulatory change meeting the challenges of the Single Market of 1992 and of technological development. The Green Paper argues that there must be an opening up of the public telecommunications infrastructure to allow equality of access of both private service providers and the public network operators, and that equality of access should be based on clear common rules and practices. The common principles regarding the general conditions for the provision of networking infrastructure to users and competitive service providers, in particular for transborder services, have become known as Open Network Provision (ONP). The Council directive on the establishment of the internal market for telecommunications services through the implementation of ONP identifies the following priority areas where ONP conditions are to be developed: leased lines; voice telephony; packet data services; and ISDN. Users and analysts agree that ONP is an important catalyst to change but that progress has so far been slower than expected. In this respect, ONP has still some way to go in order to achieve its main objective; to give competitive service providers and users uniform access to Europe's public networks.

As a result of action by the Commission of the European Communities as well as through market forces, further convergence and harmonisation of standards in telecommunications will continue to be beneficial forces in the European marketplace for electronic information, although inevitably, new equipment and technologies will create new disparities and divergences. While considerable progress has been made, transparency in the videotex marketplace remains elusive. Even here, however, technical developments on two broad fronts are helping to break down some of the barriers to the pan-European market acceptance of videotex. One is the increasing network transparency which gateway solutions can offer. The other relates to the availability of multistandard terminal hardware and the continuing diffusion of the personal computer and multistandard software into the home and office environment, developments which have a significant role to play.

2.3 Reducing the gaps and imbalances within Europe

Although in recent years there has been a steady and well documented growth in the European electronic information industry, this growth has tended to be concentrated within the more developed countries such as France, Germany and the United Kingdom. Over the past decade, the European information market has been characterised by a markedly uneven development of products and services, with some countries showing a high commitment to electronic services, whilst others are largely ignoring them. Between individual Member States there are significant variations given to the various technical options. This shows itself, for

example, in the heavy commitment given in France to public videotex and, in the UK, in the emphasis on a market preference for online ASCII databases and audiotex services.

Particular problems are faced by the 'less favoured' regions (LFRs) of the Community, who are not as yet major participants in the electronic information services market, either as producers or users. For strategic business reasons, such as minimising telecommunications costs or needing to maintain close contacts with major customers, hosts tend to be located in the major metropolitan areas of the Community; equally, telecommunications carriers tend to concentrate their new network investments and services in the central markets of national economies. Another difficulty is that divergences between telecommunications tariff structures have further reduced the demand for electronic information within the LFRs. There is a danger, therefore, that information market development in the LFRs will continue to lag behind the Community as a whole, and that their prospects for improved economic and social development through the exploitation of electronic information services will fade. This underlines a continuing need for the market broadening activities initiated by DG-XIII under the IMPACT programme's INFO EURO ACCESS theme, which is designed to improve the accessibility of information at the European level for all interested parties.

Differences in the political and regulatory environment, especially in the field of telecommunications, coupled with economic imbalances between the various Member States of the EC have contributed to this uneven development - and the moves to further deregulate telecommunications and so favour the emergence of value added networks, actually runs the risk of widening rather than closing the gap between Member States. These disparities are particularly acute in the case of the 'less favoured' regions of the EC, those at the geographical periphery and those which lack an adequate telecommunications infrastructure, the equipment, and the know-how to exploit electronic information services to the full.

Advanced telecommunications are currently at the forefront of regional economic development. One of the key aims of EC telecommunications policy is to reduce the disparities in development between the various regions of the Community. In an attempt to boost the usage of data communications in some of the Community's poorest regions, the European Commission set up a initiative in 1991 known as *Télématique*, jointly managed by the regional development (DG-XVI) and telecommunications (DG-XIII) directorates. This initiative is designed to reinforce and broaden the progress made under the Commission's STAR programme. The emphasis of *Télématique* is put on services, specifically on data communication applications. As regards the development of data communication services in small- and medium-enterprises (SMEs), the initiative is intended to assist access to the same databases and information services as those available in more central locations in the Community. A further aim is to help firms to work with or become suppliers of data services in the fields, for example, of design, accounting, financial management, joint ordering, and stock

management. Under the *Télématique* scheme, eligible regions are those with a per capita domestic product less than 75 per cent of the European average (areas which qualify include Greece, Ireland, Portugal, together with the poorest regions of France, Spain, Italy, and the UK).

3. TRENDS IN THE DEMAND FOR ELECTRONIC INFORMATION

3.1 Indicators of European demand

The emergence of an identifiable, if ill-defined information industry has not been accompanied by the collection and publication of regular, standardised industry statistics. Mapping and measuring the electronic information services sector presents many problems of definition and classification and nowhere is this more apparent than in relation to demand-side indicators. It is for these reasons that the Information Market Observatory was established to further the collection of industry data and provide a deeper understanding of the market.

The total demand for electronic information within the EC is the sum of imported information products and services plus local consumption of EC-produced electronic information. Unfortunately, electronic information by-passes export and import regulations, customs posts and tariffs and therefore goes unrecorded in national trade statistics. At the same time, online databases are accessible internationally through an increasingly complex world-wide system of host computers, gateways and data communications networks, making it virtually impossible to produce any meaningful figures for cross-border transactions. Similarly, 'portable' databases carried on media such as optical disk or magnetic tape are very easily shipped across national frontiers.

As a result, there is a massive gap in our detailed knowledge of the nature of demand for electronic information and the factors that encourage and shape that demand. In the absence of adequate mechanisms to capture demand-side indicators, policy makers and investors have to rely on gross estimates of market size and shape. Despite these qualifications, the following sections will attempt to present an overview of the current state of the European market and key trends in demand for electronic information, based on available information.

Demand for electronic information services (including online ASCII databases; videotex; audiotex; and broadcast information services) in Western Europe was estimated at more than BECU 3.5 in 1990. Table 5 gives a broad indication of relative market size in selected EC countries and confirms that the largest European national markets for electronic information services are located in the United Kingdom, France and Germany. Finer detail is given in Table 6 of the level of European demand for the various delivery technologies which are included in the total market figures presented in Table 5.

Table 5
Electronic information services(a); estimates of demand in selected EC markets, end-1990 and projections to 1994.

	end-1990 estimates	1994 projections
Germany	295	1,000
Spain	105	315
France	950	1,685
Italy	195	685
Netherlands	260	435
UK	1,205	1,960
Western Europe(b)	3,535	7,480

(a) Includes online ASCII databases; videotex; audiotex; and broadcast information services.

(b) Total demand across EC and EFTA countries.

Table 6
Electronic information services; estimates of demand in selected EC markets by delivery technology, end 1990.

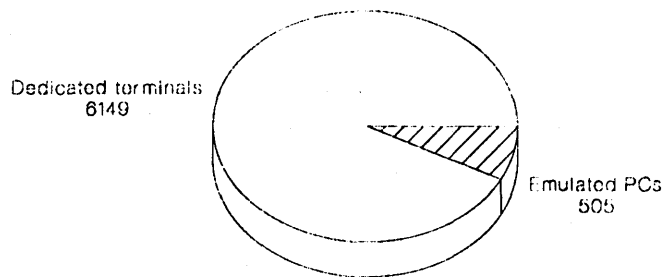
	Online ASCII databases	Videotex services	Audiotex services	Broadcast information services
Germany	270	20	5	*
Spain	90	15	*	*
France	285	505	155	5
Italy	170	15	10	*
Netherlands	160	*	100	*
UK	860	15	240	90
Western Europe(a)	2,325	580	530	100

(a) Total demand across EC and EFTA countries.

Source (Tables 5 and 6): Communications & Information Technology Research Ltd, 1991.

While demand indicators for online ASCII database services are very difficult to compile, for the reasons already mentioned, the situation is very different with respect to videotex network services. The reasons for this are threefold. First, European markets for videotex information tend to be almost exclusively national. Secondly, unlike online ASCII services which may be accessed through a standard personal computer, a very high proportion of users access services by means of dedicated videotex terminals (as may be seen in the pie chart).

Videotex terminals; EC, end-1990 (thousand units)



Source: Table 7.

Thirdly, videotex services have typically been offered by the national telecommunications network operator in most European countries. This feature of videotex usage makes it possible to establish indicators of the installed terminal base (Table 7). The total European installed base of videotex terminals is estimated to have reached more than 6.6 million by the end of 1990. Comparing this figure with similar indicators for North America and Japan, it is possible to say that in 1990, on average, there was one videotex terminal for every 61 inhabitants in Europe, compared with 1 for every 131 inhabitants in North America and 1 for every 1,134 inhabitants in Japan. However, figures for the European installed base of videotex terminals are distorted by France's massive contribution of 87 per cent of the total.

However, taking into account the shortcomings and disparity of sources, comparisons between countries should be made with prudence. The most critical areas for discrepancies relate to how the figures for the installed base of terminals is presented, where three main considerations need to be taken into account:

- o national estimates do not clearly distinguish between terminals and users;

- o in most EC countries, the national operators provide estimates of the number of dedicated videotex terminals, but do not include estimates of the number of general purpose personal computers running videotex emulation software;
- o in some EC countries, the videotex operators estimate the installed base in terms of the number of subscribers; it should be noted that the number of users may be greater than the number of subscriptions, also that there may be more users than terminals.

EC Member States

Numbers, percentages and dates

Table 7
Dedicated videotex terminals; installed base, EC, end-1990.

	Installed base of videotex terminals(a)	Share of total EC installed base (%)	Year service commenced
Belgium	7,700	0.12	1986
Denmark	6,000	0.09	1987
Germany	130,000(b)	3.91	1983
Spain	60,000(c)	2.25	1986
France	5,607,000(d)	87.41	1980
Greece	1,000	0.02	1990
Ireland	3,000	0.05	1988
Italy	145,000	2.18	1986
Luxembourg	1,000	0.02	1986
Netherlands	25,000(e)	1.50	1980
Portugal	3,500	0.05	1989
UK	160,000	2.40	1979
EC	6,149,200	100.00	

(a) Dedicated terminals only.

(b) Plus an additional estimated 130,000 videotex-emulated PCs.

(c) Plus an additional estimated 90,000 videotex-emulated PCs.

(d) Plus an additional estimated 210,000 videotex-emulated PCs.

(e) Plus an additional estimated 75,000 videotex-emulated PCs.

Source: Information Market Observatory.

Despite the inevitable limitations in these indicators, they remain useful in conveying a sense of the overall size and shape of European videotex markets. Videotex was initially designed to simplify the access of consumers to information and transactional services, with households having a link installed between their televisions and telephones.

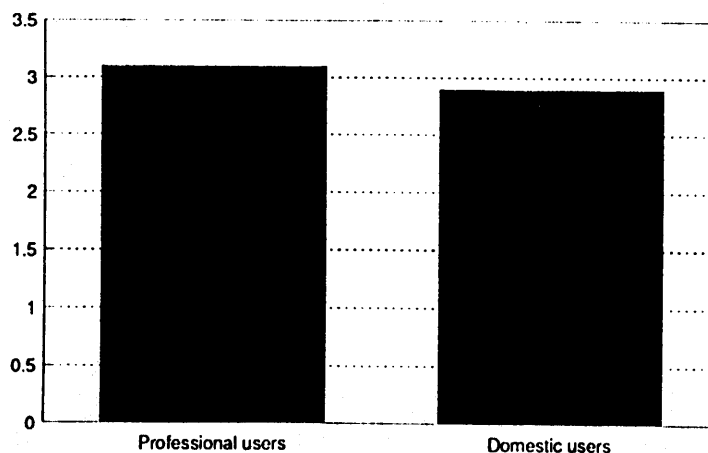
Table 8
Videotex; total and professional users, EC, end-1990.

	Total number of users	Professional users	Share of professional users (%)
Belgium	7,700	7,315	95
Denmark	6,000	4,740	79
Germany	260,000	156,000	60
Spain	150,000	90,000	60
France(a)	5,256,300	2,628,150	50
Greece	1,000	1,000	100
Ireland	3,000	3,000	100
Italy	145,000	72,500	50
Luxembourg	1,000	1,000	100
Netherlands	100,000	75,000	75
Portugal	3,500	1,750	50
UK	100,000	80,000	80
EC	6,033,500	3,120,455	52

(a) Ten per cent of Minitels are inactive (France Télécom).

Source: Information Market Observatory, 1992.

Videotex users; EC, end-1990 (millions)



Source: Table 8.

The dissemination of low cost terminals in France created a mass-market of consumer services, which has been useful in the design of professional services. Although *Télétel* traffic is

currently split more or less evenly between professional and consumer or general interest services, according to *France Telecom*, it is professional use which is the fastest growing sector. In other Member States professional usage dominates, as can be seen from Table 8 and the accompanying chart.

3.2 Trends in the demand for professional electronic information

3.2.1 *Competition between information delivery media*

From a single act of keyboarding, a database publisher may create a series of information products and services in formats ranging from print-based products to data broadcasting services. The impact of alternative electronic information media and their acceptance in the marketplace is complex, but it is of enormous interest for the industry. Although very difficult to quantify, it is becoming evident that alternative information media, notably in the form of CD-ROM and in-house networked systems, are beginning to have a significant impact on the marketplace for electronic information. Table 9 attempts to identify some of the key characteristics and differences between the main forms of electronic information delivery considered in this Report: online ASCII databases; videotex; audiotex; and CD-ROM. While there are clear advantages and disadvantages associated with each delivery technology, they are not necessarily in direct competition with one another. Indeed, the different forms of delivery may be highly complementary. A good example is the relationship between CD-ROM and online ASCII database services, where there may be considerable advantage to an organisation to have both modes of access to what is essentially the same data. CD-ROM offers the possibility of easy and frequent access to key sources at no incremental cost, while online services circumvent the slow updating cycles of optical media.

Electronic information services are pervasive throughout the whole economy and are produced across a very broad range of industries. A corollary of this is that there is an increasing diversity in the number and types of players who operate in information service markets; from the 'traditional' online sector, to publishers, telecoms operators, and the service industries themselves. In particular, the low entry costs associated with optical publishing have been a significant factor tempting many new players into the marketplace. At the same time that the 'traditional' online sector is facing increased competition from these new entrants, their market position with their end-users is being gradually eroded by the advent of gateway services and local area networks (LANs). The connect-hour approach to pricing, customer support, and the protection of copyright all take new dimensions when users gateway out of a LAN and onto an online host. If LANs represent a challenge to online services, then they offer both a threat and an opportunity to the CD-ROM industry. To deal with the opportunity first, CD-ROM is a natural file-server, and an ideal tool to place at the hub of a distributed network. The threat

is the difficulty of establishing suitable pricing mechanisms and the potential loss of revenue as many more users are able to access the data (similar problems are faced by suppliers of software for LAN-based applications). This issue is being addressed through multi-user site licensing agreements. The main point is that LAN technologies are here to stay and that the industry must learn to adapt to new market conditions.

3.2.2 Slowdown in demand for online ASCII databases

One notable development in the European marketplace for electronic information in 1991 was evidence of an apparent decline in international demand for online ASCII database services. It is difficult to establish the full extent to which the demand-side suffered and whether this represented a slackening in the rate of expansion of the market, or a real fall in market value over previous years since, at this stage, the evidence is partial. There were several reports in the trade press, for instance, which indicated that international demand (as measured by total connect hours) for a number of market leaders in the text and bibliographic services area decreased by as much as 30 to 36 per cent in the first six months of 1991, compared with the same period in 1990. A re-analysis of the results of the *CEC/EIIA* co-ordinated survey for 1989 and 1990 by the UK-based *Policy Studies Institute* revealed that two important factors contributed to the recent downturn in demand experienced by EC-based suppliers between 1988/89 and 1989/90 - slow growth in the UK market (compared with the EC as a whole) and negative real growth in US sales.

It is only possible to speculate what causal factors might explain this slowdown. Certainly, general trading conditions were far from ideal during 1991 and this may well have had a negative effect on information purchasing behaviour. At the same time, there is an argument that the recessionary pressures being felt in most highly developed economies are likely to increase the importance attached to timely external information - early indications from the financial services sector suggest that demand held up well in 1991 despite the recession. The growing recognition of the strategic value of external information is likely to ensure the continuing healthy growth of the online database sector as a whole.

3.2.3 Awareness of electronic information services by executives

It is clear that the further use of electronic information services will in the first instance be evident in the professional and business sectors. Just as PCs were initially regarded as being of no or little use to executives, over time with more exposure and with the development of more user-friendly interfaces, a wide range of information technology is now in daily use by the office executive, across a wide range of industry sectors. Yet a survey of a European panel of executives conducted by the IMO in 1991 indicated that two-thirds of executives do not currently use electronic information services. The reasons given for non-use

Table 9
Key characteristics of electronic information delivery media

	Online ASCII databases	Videotex	Audiotex	CD-ROM
Minimum hardware requirements	PC plus modem	dedicated terminal or emulating PC	DTMF telephone handset	PC plus disk drive
Mode of access	online	online	online	offline
Training requirement	high	medium	low	medium
Graphics capability	low	medium	n/a	high
Typical mode of interrogation	command language or menu	menu	touch tone /voice recognition	command language or menu
Frequency of updating	frequent	frequent	frequent	infrequent
Mode of delivery	character by character	screen by screen	analogue voice	character by character
Data volume limits (storage)	unlimited	unlimited	limited	limited to 0.65Gb
Data volume limits (transmission)	high to medium	medium	very limited	high to medium
Method of payment	invoice from service provider	billing from kiosk operator	billing from kiosk operator	subscription basis
Method of billing	combination of subscription & usage	usage only	usage only	fixed price (independent of usage)

Source: Information Market Observatory.

include the difficult access procedures for logging in to database hosts and expensive data retrieval. In general, it seems that many executives prefer to rely on traditional sources of information such as reading hard-copy journals and attending trade fairs or exhibitions in preference to new information technologies. This is likely to shift in the future, however, since 87 per cent of executives anticipated an increasing requirement for external information services in the future. In fact, 73 per cent of the non-users in the panel said that they intend to use online services in the future. While it can be said that European executives appear to appreciate the usefulness of electronic information services (especially in France), there is generally a considerable degree of ignorance of the opportunities presented by videotex, audiotex and kiosk system facilities. If the market for professional and business electronic information services is to expand beyond the ranks of information professionals and documentalists, there is clearly much to be done in terms of raising awareness among executives of the benefits of using electronic information services.

4. TRENDS IN THE PRODUCTION AND SUPPLY OF ELECTRONIC INFORMATION

4.1 Indicators of European supply

In this section, indicators of the supply-side of the European industries are presented, focusing on the direct contribution which they make to the economy, as opposed to market size which includes European demand for foreign (non-EC) products and services. Table 10 presents a series of broad indicators of the level of database production and distribution activity in each of the EC Member States in mid-1991.

EC and World

Numbers

Table 10
Online ASCII database production / distribution; EC, 1991.

	Databases	Database producers	Host services	Gateway services
Belgium	47	23	5	-
Denmark	28	25	16	1
Germany	233	121	20	4
Spain	102	45	25	1
France	275	173	63	1
Greece(a)	-	-	-	-
Ireland	2	2	-	-
Italy	110	32	19	3
Luxembourg	23	5	2	1
Netherlands	51	32	16	-
Portugal	9	8	9	2
United Kingdom	400	185	51	13
EC	1,280	651	226	26
World	5,026	2,158	731	106

(a) Although *Cuadra* does not identify any Greek online ASCII services, at least six organisations are known to be actively involved in the CD-ROM business (1992) as publishers or information providers (*EIIA*).

Source: Directory of Online Databases, Cuadra/Elsevier, July 1991.

Although in recent years there has been a steady growth in the European electronic information industry, supply-side activity

remains highly concentrated in the more developed countries of France, Germany and the United Kingdom. Nearly 74 per cent of EC database producers are located in these three countries, similarly 54 per cent of host services and 69 per cent of gateway services. Counts of databases and information industry players may be useful as broad indicators of the supply-side activity, but they are a limited tool since they say little about the impact of database supply on the economy, nor about the richness and diversity of information services. Much more detailed and valuable information about the size and shape of database supply can be obtained by means of carefully designed industry surveys. Through the joint efforts of the European Commission's Information Market Observatory and the *European Information Industry Association (EIIA)*, a valuable base of supply-side data is being built up through an annual co-ordinated survey of hosts and information providers. The latest *CEC/EIIA* survey, provides highly comparable data for the two calendar years 1989 and 1990 and allows an analysis of European supply-side activities in terms of human resources and turnover broken down by delivery medium, subject interest, service/product type, and geographic distribution.

4.1.1 Structure of the European supply-side

The results of the *CEC/EIIA* co-ordinated survey confirm that online ASCII databases are still the most dominant (and fastest growing) component of the European online information services sector, accounting for revenues worth 2,054 MECU in 1990 or 78 per cent of total online revenue. Professional videotex services are also a significant area, and are estimated to account for between 16 and 18 per cent of all online service revenues in EC countries (the remaining 5 per cent is attributable to a range of 'unclassified' online services).

A significant finding of the *CEC/EIIA* survey, highlighted in Table 11, is the contribution of offline services, including such activities as optical publishing, document delivery, consultancy and information brokerage services to the revenues earned by electronic information industry players. Turning to the sources of revenue by subject (Table 12 and the accompanying pie chart), it is clear that finance and business-oriented information services together accounted for nearly 96 per cent of the value of EC electronic services industry. Finance alone accounted for more than two-thirds of the industry value. As regards growth, finance enjoyed a growth rate higher than that of the industry as a whole, but it is interesting that one of the smaller sectors, government, also grew at a faster rate than the average. This may indicate that some small niche operators may have achieved some success. The growth of business-oriented services, as opposed to financial information services, appears to have levelled out, indicating that this market might be approaching maturity. The STM subject area also displays relatively weak growth. Again, STM is a market which may be close to maturity, with a high proportion of academic and public sector users, many of whose budgets were under pressure over the period.

EC

MECU and percentages

Table 11
Professional hosts and information providers in the EC; turnover by service or product type, 1989/90.

	1989 turnover MECU	1990 turnover MECU	Growth 90/89 %
<u>Online services</u>			
Real-time	1,346	1,545	14.8
Retrospective	967	1,068	10.5
Other online	20	24	20.0
Total EC online	2,333	2,638	13.1
<u>Offline products and services</u>			
Magnetic media	31	35	12.9
Optical media	23	31	30.9
Document delivery	12	13	8.1
Consultancy	115	119	3.3
Other offline	117	119	1.5
Total EC offline	466	491	5.4
TOTAL EC REVENUES	2,799	3,149	12.5

Source: CEC / European Information Industry Association, 1992.

EC

MECU and percentages

Table 12
Professional hosts and information providers in the EC; turnover by subject interest, 1989/90.

	1989 turnover MECU	Share of total %	1990 turnover MECU	Share of total %	Growth 90/89 %
Finance	1,674	68.5	1,929	70.7	15.2
Business	666	27.3	689	25.2	3.4
STM	49	2.0	52	1.9	5.3
Government	38	1.5	43	1.6	14.1
Other	15	0.6	17	0.6	8.6
EC SUB-TOTAL(a)	2,442	100.0	2,728	100.0	

Representing of survey total	87.2% 2,799 MECU	86.6% 3,149 MECU
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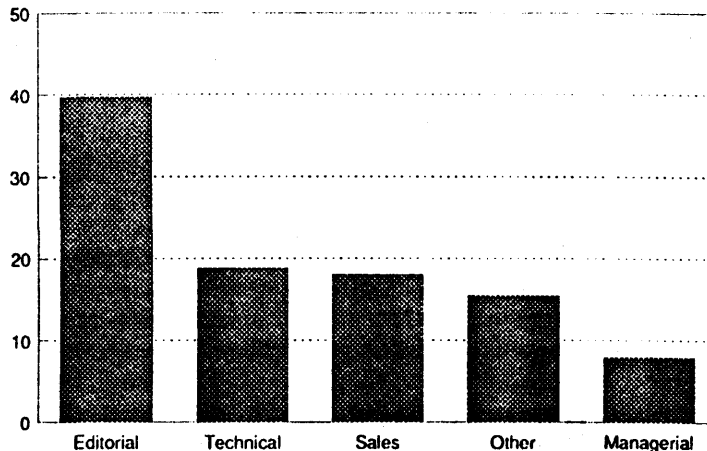
(a) This sub-total relates only to those survey respondents who were able to provide a breakdown of turnover by subject.

Source: CEC / European Information Industry Association, 1992.

4.1.2 Trends in supply-side growth

One of the most interesting findings of the *CEC/EIIA* survey is an indication that the growth in turnover for host organisations is showing signs of slowing down, confirming the demand-side evidence presented in the previous section. In 1990, the total turnover of EC-based host organisations was 3,149 MECU, representing a growth of 12.5 per cent over the 1989 figure of 2,799 MECU. While still higher than the growth in the economy as a whole, this is a significantly lower rate of growth than attributed to previous years, for which estimates in the region of 20-30 per cent are frequently cited. A number of factors may account for this apparent slackening of growth, not least the generally difficult trading conditions in the second half of 1990 (especially in the United Kingdom). New industries, especially those in technology-related areas, have typically shown very high initial growth rates from a small base, followed sooner or later by an inevitable slowing down as the demand base becomes established. Whatever the explanation, there is evidence to suggest that this slowdown is a global phenomenon. For example, a questionnaire survey conducted by the *Japanese Database Promotion Centre (DPC)* in September 1990 indicated that the Japanese information industry players had scaled down its own estimates of annual growth over the next five years from more than 30 per cent to between 10 and 20 per cent.

Database distribution; EC, 1990
Staffing by function (%)



CEC/EIIA, 1992.

In 1989, the EC-based electronic information services industry provided employment for a total of more than 21,000 people in the database dissemination sector. In 1990, this figure had risen to almost 22,000. It is difficult to estimate how many additional staff are employed in 'pure' database creation activities, but these probably account for a further 10,000 jobs. The chart shows

human resources in 1990 by function and confirms that database creation constitutes an important part of the activities of multi-functional, composite information industry organisations. Although the numbers employed in the sector grew by only 3.5 per cent between 1989 and 1990, it should be noted that there were considerable productivity gains. Average turnover per employee in the database dissemination sector rose by 8.9 per cent over the period, from ECU 138,262 in 1989 to ECU 150,573 in 1990.

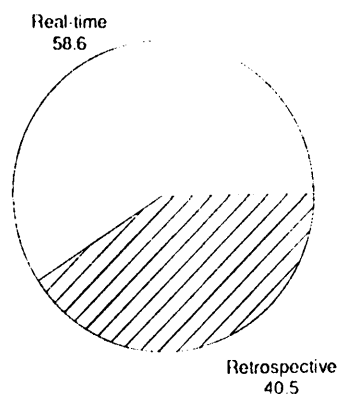
A further interesting feature of database distribution activity as indicated by the *CEC/EIIA* survey was the small, almost insignificant part of the whole, played by gateway services. These remain something of a specialist feature of the electronic information services industry, accounting for turnover worth only 9.5 MECU in 1990. At the same time, the survey indicated that gateway activities enjoyed a 21.8 per cent rate of growth between 1989 and 1990.

4.2 Online ASCII database services

The biggest sector of European value added data services, online ASCII databases, is more than 20 years old. The origins of the online ASCII database sector can be traced back to the 1960s when publishers of printed abstracting and indexing services began to rationalise their production methods by adopting the new technology of computer typesetting. A by-product of these activities were copies of the parallel printed publications on magnetic tape. These were destined to become the first online databases as suitable hardware platforms and retrieval software were developed to provide remote interactive access to text-based information. At the same time the number of personal computers and networked terminals has increased, and hence the market potential for online services across Europe and throughout the world.

The market for online ASCII database services divides into two very different sectors, real-time and retrospective databases. Real-time databases provide instant access to continuously updated information. Traditionally, the main commercial applications for real-time database services has been within the financial sector for monitoring fluctuations in international currency and equity markets. The added value of real-time database services is derived from the timeliness of the information delivered as much as its quality. Retrospective databases are those for which the real-time updating constraint is not applicable. The pie chart shows the relative proportions of real-time and retrospective services within the European online services industry in 1990. Evidence from the *CEC/EIIA* co-ordinated surveys suggests that there has been very little change in these relative proportions since 1988. If anything, real-time services are slowly gaining market share at a rate of about one percentage point per annum.

ASCII databases; EC-based supply 1990 revenues by type (%)



Source: CEC/IIA, 1992.

EC

MECU and percentages

Table 13
Online ASCII databases; geographic distribution of turnover(a), 1989/90.

	1989 turnover MECU	Share of total %	1990 turnover MECU	Share of total %	Growth 90/89 %
National	454.9	25.9	524.3	25.9	15.3
Intra-EC	616.1	35.1	777.1	38.3	26.1
EC sales(b)	1,071.0	61.0	1,301.4	64.2	21.5
North America	289.6	16.5	294.2	14.5	1.6
Rest of World	395.3	22.5	431.6	21.3	9.2
Export sales(b)	684.9	39.0	725.8	35.8	6.0
Sub-total(b)	1,755.9		2,027.2		15.5
Representing of survey total	62.7% 2,799 MECU		64.4% 3,149 MECU		

(a) Online delivery only, offline products/services excluded.

(b) These figures relates only to those survey respondents who were able to provide a breakdown of turnover by geographic area.

Source: CEC / European Information Industry Association, 1992.

Table 13 breaks down European revenues from the sale of online ASCII database services by geographic region. In 1990, nearly two-thirds of all revenue (64.2 per cent) came from national sales (25.9 per cent) or from 'trade' with other EC countries (38.3 per cent). The remaining sales were in the form of exports, to markets in North America (14.5 per cent) or other parts of the world (21.3 per cent).

These results confirm that national demand continues to be an important source of revenue for European online distributors. However, when the results for 1990 and 1989 are compared, it can be seen that the most striking growth (21.6 per cent) has come from a greater level of trade with other EC countries. The results suggest relatively little growth in export earnings, especially to North America (up 1.6 per cent), but to some extent, this may be partly attributable to fluctuations in the ECU-dollar exchange rate (figures from EUROSTAT show that the relative value of the ECU fluctuated considerably over the period of the survey, from a low of US\$1.074 to a high point of US\$1.367).

4.3 Videotex

Public videotex systems began to appear in Europe in the second half of the 1970s. With the entry of Eire and Greece into the marketplace, videotex services now exist in all the Member States of the European Community. In almost every case, the services are provided by the national telecommunications operator. In early 1991 there were 6.6 million terminals in the European marketplace and the penetration of users in the Community's professional sector was of the order of 3.120 million. However, the European videotex market is still very much dominated by France, with nearly 87 per cent of all videotex terminals and 80 per cent of service provider revenues, although there are now efforts by other Member States, to match the mass dissemination of videotex terminals as achieved by *France Telecom*. The success of *France Telecom's Télétel* network is in part due to the wide and free distribution of Minitel terminals.

One of the key trends in the European videotex market has been the growth in demand in the professional and business sectors. A major stimulus to videotex market development has been the creation of access and billing facilities through premium rate access points. These 'kiosk' facilities have stimulated the use of information and transactional services, both by professionals (notably in SMEs) and by consumers. The diversity of tariffs and the ability to charge higher rates for value added services (ECU 20 to 70 per hour), have both had a direct effect on the variety of services, especially in the supply of professional information services. Such kiosk facilities, available in France since 1986, are operational or planned for 1992 in Belgium, Ireland, Italy, Luxembourg, Portugal and Spain.

The extent of cross-border traffic within Europe in respect of videotex information services remains very modest. To a large extent, this is because the European videotex market has been characterised by separate national approaches to service development. This applies to standards, transmission networks,

policies for the distribution of terminals, as well as the procedures for billing customers. An agreement has not been reached among the twelve EC Member States on a common European videotex standard. Currently, three different videotex standards are in operation within the EC:

- o CEPT1, derived from the German *Bildschirmtext (Btx)* specifications;
- o CEPT2, derived from the French *Télétext* specifications;
- o CEPT3, derived from the British *Prestel* specifications.

One approach to overcoming these standards barriers has been to develop gateways between national services. As Table 14 shows, only most national videotex networks had adopted multi-standard services by 1991 (including Belgium, Denmark, Ireland, Italy, Luxembourg, The Netherlands and Portugal).

Table 14
International videotex standards; EC Member States, 1991.

	Service	CEPT1	CEPT2	CEPT3	ASCII
Belgium	RTT VIDEOTEX	Y	Y	Y	Y
Denmark	TELEDATA	Y	Y	Y	Y
France	TÉLÉTEL	N	Y	N	Y
Germany	BILDSCHIRMTEXT	Y	N	N	N
Greece(a)	HELLASTEL	n/a	n/a	n/a	n/a
Ireland	MCL	N	Y	Y	Y
Italy	VIDEOTEL	Y	Y	Y	N
Luxembourg	VIDEOTEX	Y	Y	Y	N
Netherlands	VIDEOTEX				
	NEDERLAND	N	Y	Y	Y
Portugal	SVP	Y	Y	Y	Y
Spain	IBERTEX	Y	N	N	N
UK	PRESTEL	N	N	Y	N

(a) The *HELLASTEL* network is due to be launched in 1992.

Source: CEPT, 1991.

By April 1991, there were 26 interconnections of national videotex networks. Of these, 14 corresponded to two-way gateways, notably: France-Italy; France-Belgium; Germany-France; France-Luxembourg; Luxembourg-Germany; Germany-Netherlands; and France-Spain. A further 26 interconnections are planned up to 1993, bringing the total number of agreements to 52. The already

to various online database services, such as the *British Library's BLAISE* service. The European Commission has conducted experiments with Max, a talking 'robot' to provide information on the ECHO Online Service; the exchange rates for the ECU; the programmes and institutions of the European Commission; and technical terms used in information technology.

The market for audiotex services in the European Economic Space (EC plus the EFTA countries) has shown very rapid growth in its early stages. In 1990, the value of the market was estimated at MECU 530, with growth over the previous year of 83 per cent, admittedly from a very low initial base. The United Kingdom, France and The Netherlands are the most highly developed markets, accounting for more than 90 per cent of 1990 revenues. Other European countries, especially Germany, are expected to extend their market share as the processes of telecommunications liberalisation and new service developments begin to have an impact. In comparison, various estimates of the US market for audiotex services (in 1991) have been made, ranging from MECU 400 (*Information Industry Association*) to MECU 720 (*US Department of Commerce*).

The European market for audiotex services is currently dominated by the UK, but this is expected to change quickly as other European countries install lines and develop new services. However, in such a new and emerging area, it is difficult to predict at this early stage whether significant levels of demand will emerge for audiotex services. Neither is it possible to say with confidence whether stable market conditions will prevail, as this will depend on the regulatory environment, such as controls on the types of service allowed in different markets, or restrictions on the length of calls. Audiotex represents the least developed pan-European information market. Future market development is dependent on progress in three main areas:

- o the policies adopted by PTOs in respect of tariffication and billing;
- o the digitalisation of the networks and the availability of DTMF handsets;
- o commercial initiatives.

Perhaps the most important of these issues is the last one. Unless commercial operators come to the audiotex marketplace with an attractive range of services, demand will be limited. This is a classic 'chicken and egg' situation and one where an imaginative operator could make a considerable difference to the way that audiotex services develop in the future. Naturally, the tariff structures which are formulated for Premium Rate Services will have a considerable bearing on market development. The current range of PRS tariffs across different EC countries is shown in Table 15. An important point to note is that PRS tariffs are set by PTOs, who are therefore in an extremely powerful position to control and determine the market for audiotex and other kiosk services.

Table 15
Premium Rate Services; prefixes and tariffs(a), EC, 1 May 1992(b).

	Prefix	Peak rate charge per minute(c)
Belgium	077	0.42
Denmark	901	0.14
	902	0.14 - 0.95
	903	0.14 - 2.84
Spain	903	0.47
France	3665	0.18
	3664	0.11
	3666	0.21
	3667	0.32
	3670	0.53
	0300	0.62
Ireland	0300	0.62
Italy	144	(d)
Netherlands	06	0.22(e)
Portugal	506 TPL/0670 CTT	0.93
UK (British Telecom)	0898	0.58
UK (Mercury)	0839/0660	0.58
	0881	0.47

- (a) Excluding value-added taxes.
 (b) Data for Germany, Greece and Luxembourg unavailable.
 (c) Exchange rates used: *Financial Times* 4 June 1992.
 (d) Tariffs in preparation.
 (e) Base rate only, range of tariffs applicable on 06 number.

Source: *Logica*, 1992.

An important feature of the emerging market for audiotex services lies in the technical possibilities for linking audiotex with other electronic information services. Increasingly, information publishers are employing database creation and retrieval technology which permits individual end users to obtain specific information needed by them or, indeed, which permits the publisher to provide services tailored to the individual user's requirements. Electronic mail, fax, and encrypted satellite broadcasting all permit such customised services to be delivered with security.

In the US, some service providers have created new applications for business-oriented audiotex services. One example of an interesting development in audiotex is that of *Searchcraft*, a service which offers a voice/fax gateway to a series of online databases. By means of a pay-per-call number, a user can call an automated voice response number, choose an online database service

and have the results delivered by fax. Industry analysts see great growth potential in this medium, known as 'audiofax'. The advantages of audiofax are considerable. As well as overcoming the very limited amount of information which can be delivered in a classical audiotex system, the fax medium allows the possibility of transmitting non-ASCII information such as pictures and graphics.

Fax-based information delivery may create new opportunities for existing electronic information services by offering new forms of delivery. There are now more fax machines in the world than there are personal computers. A study by the London-based *Electronic Publishing Services Ltd* projected that 8.5 million fax machines will be installed in Europe by the end of 1992. According to another consultancy, *BIS*, the number of messages transmitted in Europe in 1990 by e-mail was 350 million, compared with 6 billion transmitted by fax. The ease of use of facsimile makes it an important feature of the electronic information landscape, particularly if it is used for the selective filtering of information, including personalised newsletters and services combining fax with audiotex.

4.5 Optical information media

There is some uncertainty over the future use of CD-ROM and multimedia information products in the face of competition from 'electronic books' (handheld devices which store text information, such as dictionaries). A rapid growth in the number of electronic books is forecast over the next five to six years. An early indicator of the market acceptability of electronic books may be seen in the example of *Franklin*, the USA's largest dictionary publisher. *Franklin* sold more than 3 million units in the two years to the end of 1991. Growth in professional multimedia applications using optical media is likely, but there is still much uncertainty over its penetration of home consumer markets. In the next two or three years there is a possibility that CD-ROM may be partially replaced or complemented, either by WORM discs or by discs with added capability, like the CD-ROM eXtended Architecture (CD-ROM/XA) standard. At the same time, there is likely to be an increase in the number of drives used for in-house applications and also for CD-ROMs to be produced in-house for data archival purposes. At the present time, the rate of increase of mastering for publication on optical disc far outstrips the growth of any other publishing sector.

European revenues from the sale of professional information on optical media (predominantly CD-ROM) were of the order of MECU 30.5 in 1990 and seem to be exhibiting fast growth rates, albeit from a low initial base (turnover grew by 30.9 per cent between 1989 and 1990). Whilst in absolute terms, the European professional optical publishing sector is quite small, although it should be pointed out that the figures presented are for the sales of information media only - often figures for the optical publishing marketplace bundle together hardware, search software, in-house, and publicly-available titles.

4.5.1 CD-ROM

CD-ROM offers a particularly attractive medium for professional information. The medium is characterised by high data capacity, durability, and agreed technical standards (notably ISO 9660). The question which remains is largely one of market acceptance and penetration. Worldwide, the production of new 'public' CD-ROM titles is growing at an extraordinary pace. Each month of 1991 saw the addition of around 100 new CD-ROM titles. The most reliable figures available for European CD-ROM title output are probably those produced by London-based *TFPL Publishing*, in the form of their *Annual CD-ROM Directory*. In a booklet entitled *CD-ROM Facts and Figures 1992*, European CD-ROM title output for the period 1989 to 1992 was as follows (Table 16):

EC Numbers

Table 16
CD-ROM titles published by EC-based players, 1989-1992.

1989	1990	1991	1992
89	237	487	698

Source: *CD-ROM Facts and Figures 1992* (TFPL Publishing).

A notable feature of European CD-ROM production has been the continuing entry of new players from outside the 'traditional' online ASCII sector, mostly traditional print publishers. Scale economies now mean that the costs of mastering and duplication are now relatively low, which means low entry costs (of the order of ECU 30,000) to the CD-ROM marketplace. However, CD-ROM market development has been rather slow, possibly due to the initially high prices attached both to CD-ROM disk drives and titles.

Meanwhile, in terms of European sales, CD-ROM is making steady, if not dramatic, progress in a number of vertical markets with law, medicine and business being the dominant application areas. CD-ROM has a substantial foothold in the area of bibliographic services - most of the major commercial providers of bibliographic services have ventured into the medium - and its future as a library reference medium seems pretty well secure. A further stimulus to this market segment has come from various CEC initiatives to develop joint ventures between European national libraries. These have included the publication of a bibliographic CD-ROM by the *British Library* working in collaboration with the French *Bibliothèque Nationale*.

The 1991 installed base of CD-ROM disk drives within the European Community and the countries of EFTA has been estimated, by Link Resources, to be around 176,000 units and to be exhibiting

average annual growth rates of 41 per cent. Table 17 provides a breakdown of the situation in four selected EC Member States.

Thousand units and percentages

Table 17
CD-ROM disk drives; installed base and projections:
selected EC Member States, 1990-1994.

	1990	1991	1992	1993	1994	Annual growth rate (%)
Germany	15	23	35	54	85	54
France	17	27	40	60	95	54
Italy	60	90	115	140	170	30
UK	17	25	37	50	80	47

Source: Link Resources, 1991.

It is not possible to distinguish from Link's figures whether users are acquiring CD-ROM disk drives to access external information or for their own inhouse applications (according to one industry estimate, only 80,000 CD-ROM drives were being used to search 'public titles' in 1991).

4.5.2 Multimedia information products

Multimedia information products which combine text, sound, still and moving images, and comprise a new breed of information products which are more engaging and attractive to the consumer than traditional character-based information products. The significance of multimedia products and services is that they signify a change of attitude to information and the way that it is presented and used. Instead of large amounts of text which must be searched by means of complex query languages, information can be presented and manipulated in ways that relate more directly to users' experience. As used currently, the term multimedia implies that the delivery medium is an optical disc, either a videodisc or a compact disc. This is a purely technical limitation, a feature of the very large amounts of data which are required to deliver sound and graphic information, combined with the low data transfer rates which are available to most users of online and videotex services.

There is a growing number of multimedia titles in areas such as education, health and safety, business and finance. Currently, this is a market segment where traditional online simply cannot compete at present because of current limitations for the average user in data compression, storage requirements, data transfer rates, and display characteristics. The emergence of multimedia titles is an

important trend to monitor because of its potential implications not only on the volume and price characteristics of CD-ROM publishing, but on the impact these factors will have on professional, library and other information markets. In Europe, a number of encyclopedia publishers, including *Esselte Forlag*, have begun to establish large text and image banks which will allow parallel output either as print and optical disc output. The entry of large traditional publishers into the multimedia arena could well mean that print archives, previously unavailable in electronic form, will become transformed and enable previously underdeveloped markets to be exploited.

The potential of multimedia technologies, which perhaps could or should be exploited by the online information industry is not being developed by members of that industry, but rather by members of a parallel information industry comprising computer hardware, software and peripherals companies, the television and film industries, and the music industry. The traditional information industry, more often than not, is not even involved at the design stage. Multimedia applications will evolve with the introduction of: capture and authoring tools, more powerful and less expensive microcomputers capable of supporting the more demanding applications, content which is not a direct transfer from existing applications, but is newly created or has a significant value-added over existing collections; and distribution channels which introduce and integrate CD-ROM and related CD-based products into the mass market.

The trend towards international information content and markets is being accelerated by the emergence of multimedia. Linguistic differentiation in particular will be reduced for information products which are more graphical in nature and subject and less textual. The setting of international standards will play a continuing role in making available tools, technologies and platforms which have a common nature across national boundaries. In multimedia today, standards are working for market growth in some respects and against it in others. Compressed image standards are a positive factor, including CCITT Group 3 and 4 facsimile page image compression standards and ISO JPEG (Joint Photographic Expert Group) and MPEG (Motion Picture Expert Group) colour still and motion picture compression standards. Interestingly, these standards are being developed more for telecommunications applications than for optical publishing. However, the different formats, platforms and systems with which optical publishers may soon deliver multimedia to the customer (CD-ROM for the PC, Apple and Commodore systems, CD-ROM/XA, CD-ROM/Multimedia Windows, DVI, CD-I and CDTV) are numerous and not likely to be addressed by any standards body except by the market itself over a period of time. Before CD-I or DVI can achieve any level of success, however, questions of price and the availability of development systems and the cost, timescale and ease of application development must be answered, as well as the availability and price of end-user systems.

Interplays will continue between consumer electronics products and professional workstations, between institutional and private

education and training applications, between analogue video-based and digital computer-based entertainment and leisure time applications and between retail sales and represented sales. Such phenomena have already been observed in the extension of CD-Audio to CD-ROM, and in the base represented by professional CD-ROM products in the US and mass markets in Japan, and will likely be observed in the next few years between local (interactive) multimedia and online multimedia over broadband networks.

4.5.3 Geographic information systems

Geographical information systems (GIS) first appeared over a decade ago and have exhibited dramatic growth ever since. They were conceived for numerous purposes: natural resource management, management and prevention of natural disasters, urban planning, land management, the development of public sector projects, such as hospitals. Geographic information systems can be used as a new access mode to other statistical and factual databases. Geographic interfaces represent a powerful and universal language. By combining geographical and other databases it becomes possible to develop radical new applications: tourist-oriented databases providing information about routes, restaurants, hotels and sites of interest; marketing databases combining demographic data, consumer behavioural data, and address files.

The point emphasised here is that of the role of catalyst that GIS developments are likely to play for the wider information services market.

5. DYNAMICS OF THE EUROPEAN INFORMATION INDUSTRIES

To fully understand the dynamics of the European information industries, it is important to realise that the electronic information services marketplace is formed at the point where intellectual property (information) telecommunications services, hardware, and software meet. This means that the electronic information services marketplace is open to many external influences and pressures, especially in the form of technological change.

5.1 Structural change in the information industries

The information services sector in Europe is characterised by continuing growth at rates generally faster than those in the economy as a whole. At the same time, driven by the challenge of North American and, increasingly, Japanese competition the sector is subject to processes of industrial change and restructuring.

The traditional publishing sector in Europe is highly fragmented, consisting mainly of small competitors, many of whom face the same commercial problems, including shorter runs per title, decreasing margins, and under-investment. As a result, most publishing, even by the year 2000, will continue to be in printed form - even today, only a small proportion of the larger European publishers are actively involved in electronic publishing. However, print media will increasingly be processed and produced by electronic means, creating new opportunities for 'traditional' publishers to become involved in the provision of electronic information services. The key issues facing publishers will be the extent to which the new opportunities represent: a 'natural' replacement of their existing business; a logical product line extension; or simply an opportunity to diversify.

Compared with the computer services sector as a whole, turnover in the electronic information services market is currently at a relatively low level. However, there is evidence of a significant and growing market for electronic information within and across the Community. Intra-EC 'trade' in online ASCII databases, for example, accounted for 38.3 per cent of all revenues to EC-based hosts and distributors in 1990. By comparison, distribution within the 'domestic' markets of the Member States accounted for only 25.9 per cent of all EC revenues.

5.2 Concentration of ownership: mergers and acquisitions

The structure of the electronic information services sector is highly dynamic and is characterised by intense mergers and acquisition activity, coupled with a tendency towards diversification. These forces are leading to an increasing concentration of ownership in the hands of a few major players. Mergers and acquisition are spread across all-functional areas of the information services marketplace: database production; distribution; and network operations. Notable European acquisitions in 1991 included the purchase of *Pergamon Press* by *Elsevier* and the

acquisition of interests in both the French and Italian markets (through the purchase of information providers in the legal and taxation areas) by *Wolters Kluwer*. Typically, information providers have sought to strengthen their role in distribution (either by means of self-hosting or publishing their data on optical media) against a background of increasingly fierce competition, while network operators are tending to move increasingly into information service provision through the acquisition of information providers.

The best estimate of the number of local EC-based firms active in the European electronic information marketplace in 1991 is about 7,000 (EIIA figures). While this is a large number, many European vendors continue to operate primarily at national level, with, at best, a limited involvement in two or three adjacent countries. Europe has probably less than one hundred indigenous pan-European operators, although to this figure should be added a significant number of US providers who maintain a presence at European level. Typically, the average European company is smaller, less vertically integrated, and more nationally-oriented than its US counterparts, although this is slowly changing.

Analysis by Link Resources indicates that takeover and mergers activity in the European market during the period 1990-91 was less intense than had been anticipated. Contributory factors appear to have been the unfavourable economic climate and the possibility that companies were taking a longer-term view (in which 1992 was not necessarily a key date). Another factor is that cross-border cooperation has never been a common feature of the European publishing sector. The EIIA has projected that the number of vendors active in the European market is declining and will probably drop to no more than 5,500 by 1995. This is likely to be as the result of a growing emphasis on takeovers and mergers rather than company failures or withdrawal from the marketplace.

While the European information services marketplace is dominated by larger players, especially by large information conglomerates, like *Bertelsmann*, there appears to be a fairly stable two-layer industry structure with small- and medium-sized enterprises (SMEs) existing alongside the industry giants. These smaller operators are exploiting niche markets, as packagers and providers of specialised information services. If what has happened in the computer services sector is a pointer to future developments in the information services sector, then mergers and acquisition activity may lead to the greatest competitive pressures being felt amongst medium-sized players in regional markets.

5.3 Corporate strategies in the information business

From a single act of database creation, it is possible to derive a wide range of complementary products; from printed media to videotex services and online ASCII databases. This characteristic of database publishing enables producers to develop multiple commodities, and so create larger but more segmented markets. In Europe, corporate strategies are evolving to exploit these opportunities for product diversification, while developments in marketing and pricing policies, delivery systems and advances in retrieval software are being introduced in an attempt to create and

stimulate greater demand for electronic information.

5.3.1 Diversification and cross-media ownership

Database creation and maintenance are highly labour-intensive and therefore expensive operations. However, a peculiar economic feature of information is that subsequent reproduction costs are very low. The low marginal costs of generating information products have encouraged this process of product diversification. The contents of many national newspapers are often published electronically, as online information services or CD-ROMs, as well as traditional printed copy, making it possible for the newspaper to position different delivery systems and formats for different market segments. At the same time, advances in telecommunications are extending the geographical reach of information markets, permitting information goods and services to be distributed in different regional markets at insignificant marginal costs. These developments are stimulating the creation of a pan-European information marketplace in which there is potential for a range of parallel information products and services to co-exist. The high first copy costs of information products, combined with low reproduction costs, creates a strong incentive for sales maximisation so as to minimise unit costs. This economic logic tends to especially favour large publishers and media companies, where advertising revenues and competitive positioning are determined by circulation and audience share. As a result, information business monopolies are emerging in specific information markets, a process which tends to exclude smaller producers.

Diversification is a key feature of the information marketplace. It is motivated by defensive strategies to protect market share and the realisation of scope economies through the joint production of information commodities (thus spreading costs over several different products). The privatisation of the audiovisual industry in Europe, in particular, has led to higher levels of cross-media ownership. For example, newspaper and magazine publishers have emerged as dominant players in the German audiovisual industry, similar patterns of cross-media ownership are evident in Italy and France where broadcasting has been progressively deregulated. The expansion of the pan-European marketplace is also beginning to create 'transnational' information products, whereby the same television programme, for example, is broadcast simultaneously to national and regional audiences in several countries. While this development is aimed at maximising audiences and reducing programming costs, there is a danger that, left unchecked, it might eventually undermine Europe's rich cultural diversity.

5.3.2 Broadening the professional user base

The major costs of electronic publishing lie in sales and distribution, largely because there are few established channels for electronic publications in the same way that there are retail bookshops for printed media. Furthermore, consumers tend to need a high level of support and after-sales service because of the complexity of many electronic information products and services.

In order to begin to recover these costs, the stimulation of greater levels of demand is essential to the future development of the marketplace for professional electronic information in Europe. In the second phase of the IMPACT programme, beginning in 1991, the European Commission has accordingly shifted the emphasis from the supply to the demand side of the market, adopting 'INFO EURO ACCESS' as its central strategic theme. INFO EURO ACCESS is concerned with improving the accessibility of information at the European level for all interested parties. A variety of corporate and industry level initiatives, running concurrently with the Commission's IMPACT programme, are attempting to establish the information business as a mass production and distribution sector.

There are signs that European firms are beginning to place more emphasis on improving the balance between technological development and market development, the latter being more directly oriented towards the requirements of users. As part of this greater marketing effort, there is increasing attention to promotional activities and improvements to training, customer services, and support documentation. A further welcome development is the restructuring of pricing structures in online ASCII database markets, the result of not only more intense market competition but also of new and cheaper telecommunications options which have become available. Traditional online pricing practices, based on charging for time spent connected, are being redefined and firms are seeking to define new pricing formulae which more satisfactorily reflect the effective market demands of users, information providers, and service operators. For example, both *ESA/IRS* and *Maxwell Online* began experimenting with new pricing mechanisms in 1991, signalling a shift away from connect time to charging for the information actually delivered (using a mix of print pricing, command-based pricing, and fixed fee or subscription arrangements).

Finally, the stimulation of the demand-side will be encouraged by the creation of more user-friendly access systems and innovative value-adding features by the host services. Recent examples of these innovations include: intelligent interfaces and gateways; multi-file searching; ; post-processing of search results by means of text processing, personal database, spreadsheet, statistical and graphical tools.

5.4 Completing the internal market: challenges and opportunities

On the whole, European companies have been less successful than North American and Japanese companies in converting their research and technological development (RTD) activities into inventions and their inventions into market shares and profits. From the mid-1980s, European industry has become less competitive globally. As indicated in earlier sections of this Report, the EC has a significant trade deficit with the USA in the electronic information services sector, and the challenge from the Japanese is expected to intensify through the latter half of the 1990s. Therefore, there is a need for considerable effort in applying market-driven approaches to research and technological development (RTD) in the information services sector. This may involve balancing the needs for priority technological research with more intensive and

proactive measures toward demand-stimulation, matching user acceptance with product design, and reducing some of the legal and regulatory barriers to market growth and development.

In this latter area, the Commission has made an important contribution through IMPACT and the activities of the Legal Advisory Board (LAB). The lack of a comprehensive legal framework relating to the electronic information services sector presents many difficult issues for the industry, not least in the area of intellectual property rights. Traditional literature and published written information have long benefitted from copyright protection as a safeguard against copying and re-use, thereby protecting the time, expense, and intellectual effort invested in their creation. Yet in the database domain, piracy is particularly easy as some or all of the contents can be downloaded and reproduced quickly and at low cost using modern communication networks. Similar problems emerge in relation to the protection of computer software. Without adequate protection, European companies are reluctant to invest in new database technologies if action is not taken to provide a secure and stable legal framework. The LAB contributed to this debate by its preparatory work. In May 1991, on the basis of a study providing an overall view on the legal status of protection for 'informational compilations', the LAB's majority opinion suggested to the Commission that a mere *droit d'auteur* protection would not be sufficient and that additional means of protection should be sought. Similarly, the LAB has recognised the diversity of approaches to personal data protection in Member States as a significant obstacle to the free flow of data within the Community and contributed to a draft Directive on this issue, proposed by the Commission in 1990.

As well as facing up to some of the legal and administrative problems already mentioned, there is a further challenge in the form of the linguistic and cultural differences which constrain information market development at European level. These barriers lead to market fragmentation and mean that the creation of a single internal market based on economies of scale is difficult to achieve. This places the Community at a strategic disadvantage compared with North America, whose domestic markets are very largely monolingual. The challenge ahead is therefore to develop a co-ordinated and balanced approach to developing the electronic information sector, reconciling the conflicting goals of increasing global competitiveness while maintaining national and cultural diversity.

The major impetus to the electronic information marketplace will, of course, come from the general expansion of cross-border business activity after the Single European Market is consolidated over the next few years. As businesses in all sectors adjust to the new realities of pan-European market competition and regulation, they will require a great variety of information to function effectively and efficiently, and a greater share of this information will need to be accessible across national borders. Clearly, the markets for electronic information services will play a central role in these major transformations of the European Economic Area, by providing the technologies and services needed for integration and competitiveness at the level of firms and industries.

CONCLUSIONS

The Information Market Observatory has continued to make progress in the collection and analysis of indicators relating to the European electronic information services marketplace. The estimates which follow represent possibly the most accurate measures of industry value so far available:

- In 1990, turnover by EC-based producers and distributors of electronic information services was around BECU 3.1, providing employment for an estimated 32,000 people (full-time equivalents) in 7,000 firms. These figures place the sector on a roughly equivalent basis with two other strategically important sectors: market research (BECU 1.9) and management consultancy (BECU 3.5).

This third Annual Report of the IMO underlines four significant trends and structural features of the European electronic information services marketplace identified in the previous Report:

- The United States continues to dominate international markets for professional electronic information services. US industry value in 1990 was around BECU 6.9, more than twice the size of total EC-based activity (BECU 3.1). Typically, the average European company is smaller, less vertically integrated, and more nationally-oriented than its US counterparts. Disparities continue to exist between the US and the Community in terms of database production and total industry value.

- Significant differences exist between the Member States in relation to information market development. Particular problems are faced in the Community's 'less favoured' regions in relation to demand, local supply, and the telecommunications infrastructure. These problems are being ameliorated by Community actions, notably under the Télématique and IMPACT programmes.

- Most information providers operate on a predominantly national basis, delivering professional information services to their own national communities.

- Technical, linguistic, administrative, and legal obstacles continue to hamper the development of a common market in information services. Despite the opportunities presented by the SEM, few truly pan-European information services have been brought to the marketplace. This reinforces the need for market broadening and awareness raising activities, as supported by the INFO EURO ACCESS central strategic concept of the IMPACT programme.

Since the publication of the previous IMO Annual Report, three important new trends and developments have become apparent:

- Evidence from both supply- and demand-side indicators collected by the IMO points to a slowdown in the rate of growth of international markets for online information, beginning in the second half of 1990 and continuing throughout 1991. Recessionary pressures in the global economy appear to have depressed demand in EC, North American, and Japanese markets.

- Intra-EC 'trade' in online ASCII databases was the fastest growing market segment between 1989 and 1990 with an growth rate of 26.1 per cent (in absolute terms) while exports to destinations outside the Community grew by only 6.0 per cent.

- Merger and acquisition activity is a significant force in the European information market as industry actors seek to integrate information production and distribution activities. The number of vendors active in the European market is gradually declining and is predicted to fall from 7,000 firms in 1991 to no more than 5,500 by 1995.

Annex I: Definitions

AUDIOTEX. Audiotex is a new electronic information medium with applications both in consumer (home user) and business markets. Audiotex services are directly accessible by means of a suitable (Dial Tone Multi-Frequency or DTMF) telephone handset.

BROADCAST SERVICES. Services where no interactivity is possible on the part of the customer in selecting what is sent by the service provider.

DATABASE PRODUCER. An organisation which holds the intellectual property rights relating to the content of electronic information products and services and which licences host services or distributors to use that content which those hosts/distributors make available in electronically usable form. Usually the database producers perform the editorial tasks of collection and organisation of the information contained in electronic information services.

DISTRIBUTOR. An organisation which performs a function similar in nature to that of a host service, but in relation to unitized electronic information products (such as magnetic tapes or disks, or CD-ROMS) rather than information services delivered via telecommunications.

DOCUMENT DELIVERY. Primary documents ordered as a direct result of using electronic information services.

GATEWAY SERVICE. A gateway operator provides specialised telecommunications links to online information services provided by third parties. 'Pure' gateway services are not hosts in their own right.

HOST SERVICE. An organisation which offers its customers direct access to computer-held information via a telecommunications link. This definition includes services delivered in videotex mode.

INFORMATION SERVICES INDUSTRIES. The term 'information services industries' embraces a range of commercial and non-commercial activities relating to the creation; publication; and distribution of information goods and services. In the context of this Report, the term carries a rather more precise meaning, relating solely to a subset of those industries which delivers information services to professional (ie non-consumer) markets on a commercial basis across a range of information media, from print-on-paper to optical disk.

MAGNETIC MEDIA. Tapes and disks of various sizes and formats (including diskettes for personal computers) which use magnetic storage technology.

ONLINE ASCII DATABASES. The term 'online' is deemed to cover all interactive information services delivered by hosts (directly or through gateways) via telecommunications links. Services delivered character by character, rather than page by page or screen-full by screen-full, are distinguished by reference to the internationally recognised ASCII convention for character coding.

OPTICAL MEDIA. Various types of disk which use optical storage technology, the most common format being CD-ROM.

REAL-TIME INFORMATION SERVICES. Online services which are updated immediately as new data becomes available.

RETROSPECTIVE DATABASE SERVICES. Online services which are not updated in real time.

TRANSACTION SERVICES. Services where the principal objective is a transaction rather than the delivery of information, such as EDI services.

VIDEOTEK. Online services delivered page by page or screen-full by screen-full, rather than character by character.

Annex II: Acronyms and abbreviations

ASCII	American Standard Code for Information Interchange
AT&T	Atlantic Telephone & Telegraph
BLAISE	British Library Automated Information Service
BT	British Telecom
Btx	Bildschirmtext
CAS	Chemical Abstracts Service
CCITT	Comité Consultatif International Télégraphique et Téléphonique
CD-I	Compact Disk - Interactive
CD-ROM	Compact Disk - Read Only Memory
CD-ROM/XA	Compact Disk - Read Only Memory/eXtended Architecture
CDTV	Commodore Dynamic Television
CEC	Commission of the European Communities
CEPT	Conférence Européenne des Postes et Télécommunications
CIT	Communications & Information Technology Research
CMEA	Council for Mutual Economic Assistance
DG-XIII	CEC Directorate-General for Information Technologies and Industries, and Telecommunications
DG-XVI	CEC Directorate-General for Regional Development
DPC	Database Promotion Centre (Japan)
DTMF	Dial Tone Multi-Frequency
DVI	Digital Video Interactive
EC	European Community
ECU	European Currency Unit
ECHO	European Commission Host Organisation
EFTA	European Free Trade Association
EIIA	European Information Industry Association
ESA/IRS	European Space Agency / Information Retrieval Service
EUROLUG	EUROpean OnLine User Group
Eusidic	European Association of Information Services
GIS	Geographical Information Systems
IBC	Integrated Broadband Communications
IBM	International Business Machines
ICT	Information and Communication Technologies
IIA	Information Industries Association (US)
IMO	Information Market Observatory
IMPACT	Information Market Policy ACTions
INSPEC	INformation Services for the Physics and Engineering Communities
ISDN	Integrated Services Digital Network
ISO	International Standards Organisation
JAPIO	JApan Patent Information Office
JICST	JApan Information Centre for Science and Technology
JPEG	JOint Photographic Expert Group (ISO)
LAB	Legal Advisory Board
LAN	Local Area Network
LFR	Less Favoured Regions
MCC	Maxwell Communication Corporation
MDC	Mead Data Central
MITI	Ministry of International Trade and Industry (Japan)
MPEG	Motion Picture Expert Group (ISO)

NSF	National Science Foundation (US)
OECD	Organisation for Economic Co-operation and Development
ONP	Open Network Provision
PC	Personal Computer
PRS	Premium Rate Services
PSTN	Public Service Telephone Network
PTO	Public Telephone Operators
RACE	Research & development in Advanced Communications in Europe
RBOC	Regional Bell Operating Company
RTD	Research and technological development
SDI	Selective Dissemination of Information
SEM	Single European Market
SME	Small and Medium Enterprises
STAR	Special Telecommunications Action for Regional development
STM	Science, Technology and Medicine
TFPL	Task Force Pro Libra Ltd (UK)
VADS	Value Added Data Services
VANS	Value Added Network Services
WORM	Write Once Read Many (optical disk standard)

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