

NETWORK SERVICES

WESTERN EUROPEAN MARKET OPPORTUNITIES

1988 - 1993

INPUT

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WESTERN EUROPEAN MARKET OPPORTUNITIES 1988-1993

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1280 Villa Street
Mountain View, CA 94041-1194
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**Software and Services Programme—Europe
(SSPE)**

Network Services

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Abstract

This report examines the development of network services across Western Europe. Issues affecting service providers and users are highlighted with an overview of the European network services environment.

Market forecasts are provided for the period 1988-1993 and recommendations are made for both existing and future service providers, with respect to the market opportunities available.

This report contains 186 pages, including 81 exhibits.

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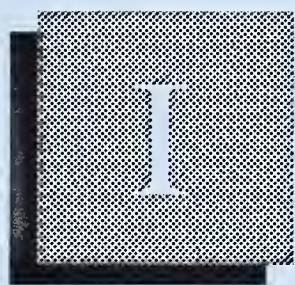
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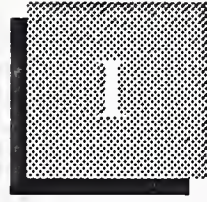
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Introduction





Introduction

This report has been written as part of INPUT's Software and Services Programme—Europe. Other special interest topics to be covered during 1988 include commercial systems integration markets, education and training, key application software opportunities and the status of the market for application development tools.

A

Scope and Objectives

The development of network services continues to provide major opportunities for information service vendors in the increasingly liberalised Western European telecommunications environments and especially within the perspective of 1992. Throughout Western Europe, network service vendors, the Post, Telephone and Telegraph companies (PTTs), equipment suppliers, software vendors, and governments and professional services organisations are applying themselves to the development of these strategically important markets for economic growth.

INPUT's objective in conducting this research programme and preparing this report has been to:

- Establish an overall view of the market for network and related services.
- Provide a definition of network services. By breaking network services down into distinct categories, the report enables information services vendors to assess levels of risk associated with potential market opportunities.
- Analyse key trends and issues that are likely to affect the network services market's development.
- Examine growth in several key industry sectors.

- Address the strategic and tactical marketing issues that must be considered by vendors and provide recommendations for future development.

This report covers the markets of France, U.K., West Germany, Benelux, Italy and Scandinavia. The term Western Europe is used throughout the report to imply these six individual markets as a group.

Network services have developed across a broad range of industry sectors in the U.S.A.. U.S. experience is relevant and constructive to participants in Western Europe. A number of INPUT's U.S. reports on subjects related to this area are listed in Appendix D.

Enquiries and comments are invited by INPUT regarding this report and any related topics of interest.

B

Methodology

Field research was obtained from a structured interview programme based on a review of the European network services market. This programme was conducted during May to August 1988 and consisted of:

- Corporate Interviews
 - Structured interviews were conducted with senior personnel, equally divided between information systems and end-user departments of a cross-section of companies. These interviews were part of INPUT's bi-annual user research survey and addressed levels of awareness, usage and attitude towards identified network services applications and the development of telecommunications networks.
 - The questionnaire used as the basis of these interviews is included in Appendix C.
- Vendor Interviews
 - In-depth interviews (nearly all face-to-face discussions) were conducted with 50 senior personnel amongst network service vendors, telecommunications operators, professional services companies and software suppliers.
- Other Studies
 - INPUT's continuing research programmes on information services markets have been used where appropriate to further understanding of the issues and markets discussed.

- Public Domain Sources

- Company press releases, press articles and reports have been used where appropriate to obtain background data on market developments.

An analysis of the research sample is included as Appendix B.

For convenience of comparison between markets, local currencies have been converted to U.S. dollars on the basis of average exchange rates applying on July 1, 1988 (see Exhibit III-2). Owing to the volatility of international exchange rates anticipated for the forecast period 1988-1993, INPUT has not attempted to forecast future exchange rates. Currency conversions for the period 1988-1993 have been made at average 1987 rates.

C

Report Structure

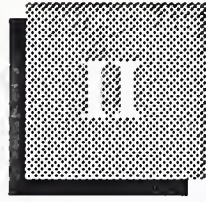
The remaining chapters of this report are organised in the following way:

- Chapter II is an Executive Overview providing a précis of the report's major conclusions.
- Chapter III gives INPUT's definition of the information and the network services markets and assessments of market size and expected growth.
- Chapter IV provides a market sector analysis of the network services market and of the adjacent processing services and electronic information services markets.
- Chapter V provides a country market analysis, assessing the factors influencing size and growth and forecasts for each country.
- Chapter VI covers the market opportunity, analysing the key issues that impact market development, and reviewing related technologies and emerging applications.
- Chapter VII analyses users' attitudes and needs in relation to network services and reviews potential areas of market opportunity.
- Chapter VIII provides INPUT's conclusions and recommendations for vendors participating or planning to participate in network services markets.
- The appendixes contain a list of definitions, an analysis of the research sample, the relevant questions from the user survey questionnaire and a list of related reports.



Executive Overview





Executive Overview

A

Network Definition

INPUT's definition of the network services market comprises four sectors:

- Network Management
- Enhanced Services
- Application Services
- Electronic Information Services

This is illustrated by Exhibit II-1.

Network Management is defined as any third-party services, such as performance or fault management, concerned with the management of the physical network.

Enhanced Services represent the first level concerned with traffic that is transmitted across the network, of which value is added through the provision of such services as protocol conversion and error correction. These services are specifically defined as VANs in the United States.

Application Services consist of all those services provided on a network concerned with the provision of a user application, such as electronic mail (E-mail), electronic data interchange (EDI) and electronic funds transfer (EFT).

Electronic Information Services, such as online databases and remote computer services, which are often included in "VANS/VADS" market estimates, do not form part of INPUT's Network Services forecasts as set out in this report.

EXHIBIT II-1

NETWORK SERVICES MARKET STRUCTURE

Network Services					
Managed Network Services		Application Services			Electronic Information Services
Network Management Services	Enhanced Services	E-Mail	EDI	Other	

Included in Forecast
 Excluded from Forecast

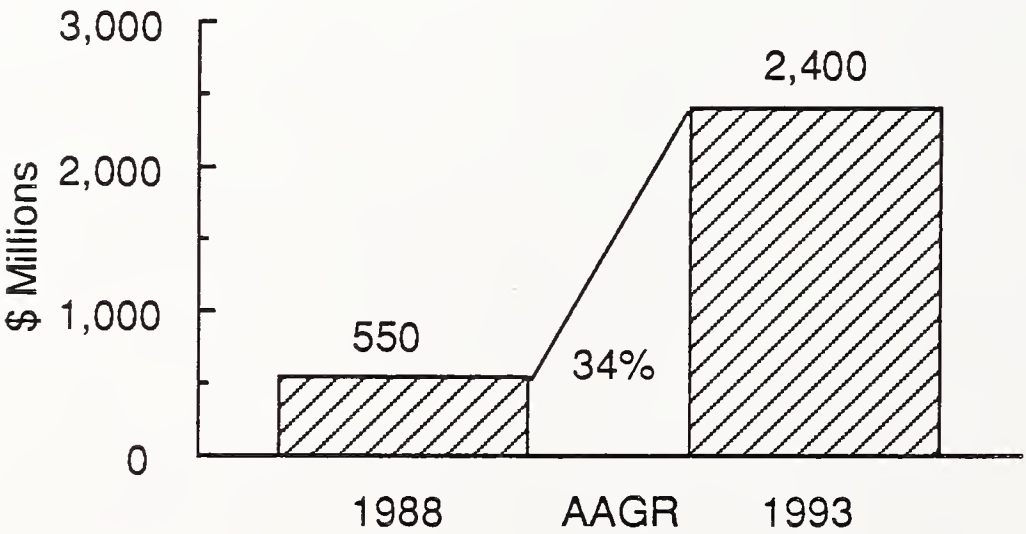
B

Market Growth

INPUT estimates that the market for network services in Western Europe will reach over \$550 million in 1988. As illustrated in Exhibit II-2, this market is expected to grow at an average annual growth rate (AAGR) of 34%, to around \$2.4 billion by 1993.

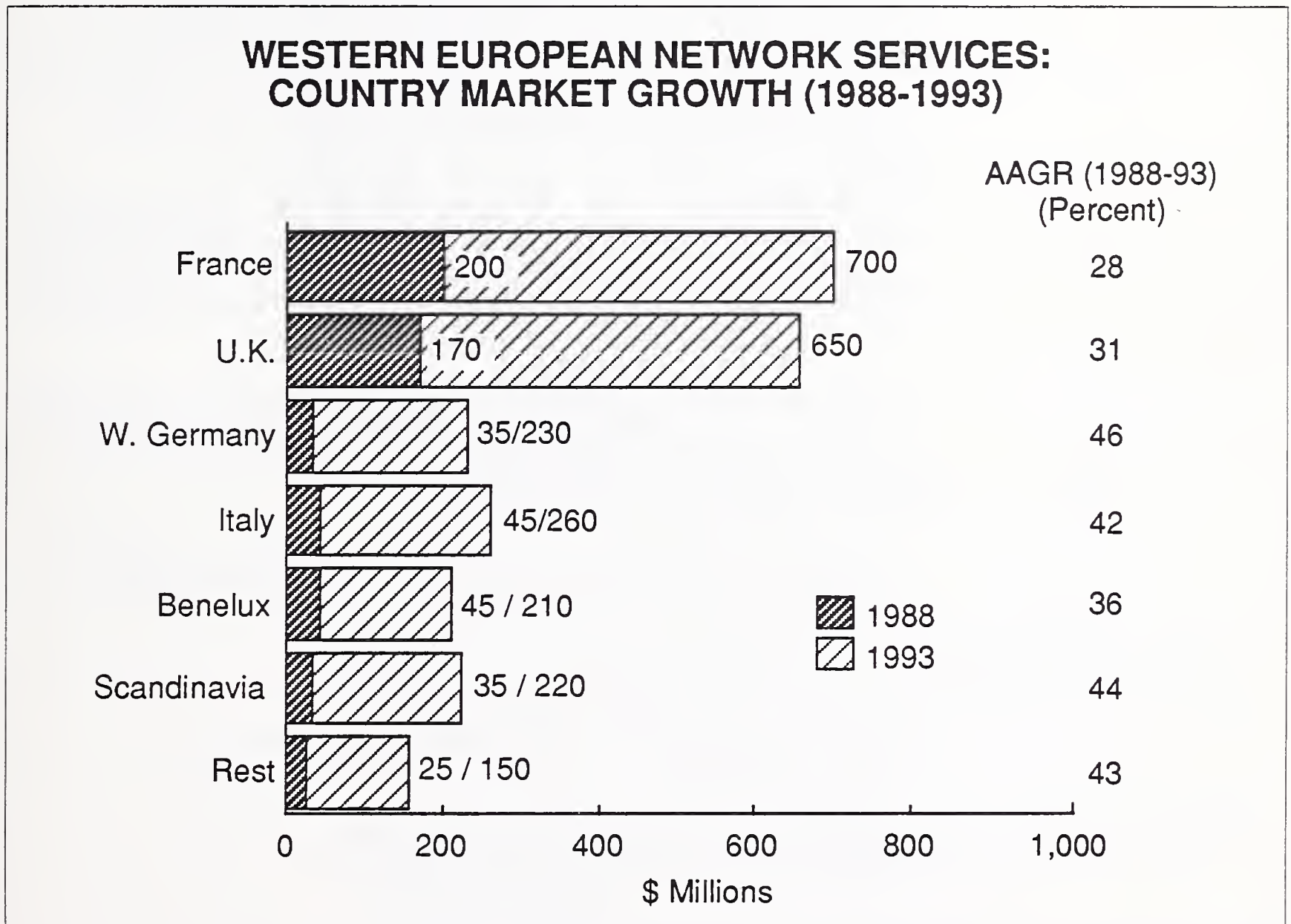
EXHIBIT II-2

WESTERN EUROPEAN NETWORK SERVICES MARKET SIZE AND GROWTH



France (\$200 million) and the U.K. (\$170 million) are the most significant markets, with over 50% of the market divided between them in 1988. As a result, other West European markets will experience rapid growth from a low base. In particular, high growth rates will be experienced in the West German (46%), Italian (42%) and Scandinavian (44%) markets in the period 1988 - 1993. This is illustrated in Exhibit II-3.

EXHIBIT II-3



Growth is being driven by the following factors:

- Deregulation. European countries, driven by the European Commission, are following the U.K.'s lead in opening up their telecommunications markets.
- Government and trade/industry association initiatives geared towards achieving critical mass within a sector, using awareness campaigns, seminars and software products.

- The shortage of skilled telecommunications staff in organisations, resulting in users turning more to third party service providers for their network services requirements, as well as for software and support services.
- The industry has seen a high proportion of mergers and joint ventures, providing vendors with the means and expertise to offer integrated solutions.
- Interlinking and interworking between competing networks. The development of critical mass in particular industry sectors has led to the interworking of the INS and Istel networks in the U.K. Since there is an element of "brand loyalty" in user organisations, interworking is a critical requirement for continued growth in the network services market.
- The convergence between applications. Electronic mail is being used as a precursor to Electronic data interchange, whilst interface software for EDI in vertical markets and the growing awareness of the potential of EDI linking with EFT continues the blurring of distinction between the applications.
- The development of standards, (X.400, EDIFACT), providing a potentially more stable operating environment for vendors, has received a boost with consistent support from the European Commission and leading vendor and user organisations.
- Organisations looking for clear commercial benefits, i.e. reduction in inventory, costs, improved cash flow and enhanced productivity.

Market inhibitors remain:

- The pace of deregulation
- Lack of awareness of the benefits amongst potential users
- Cost and complexity
- Security
- The slow pace of the standards making procedure
- Different protocols in different countries

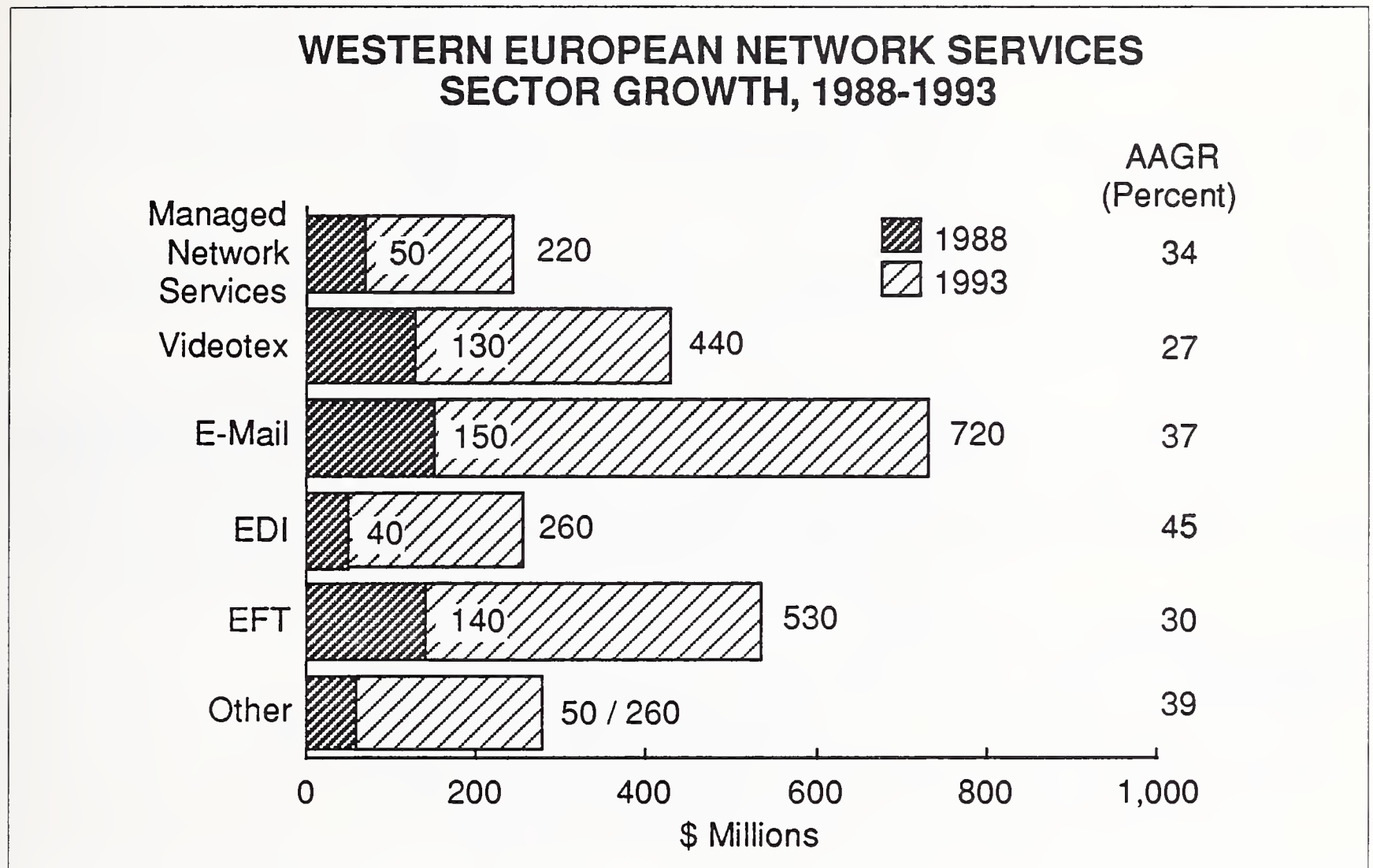
C

Convergence

The boundaries between various applications are collapsing: E-mail is being linked to industry specific databases and used as a form of EDI, whilst EFT is linking with EDI.

As a result of this increasing convergence, not only in applications, but also in trade between sectors (distribution and retail, for example), there is a need for standards at an international and at a document level.

EXHIBIT II-4



The X.400 electronic messaging standard, the West European commitment to OSI as well as widespread agreement on common document standards (EDIFACT), will contribute to a more stable environment for network services.

In the interim, (the standards process being a slow one), vendors should be looking to offer integrated solutions, network management, hardware and software as well as support services (training, consultancy, and project management).

IBM, for example, offers a complete package of services such as Screen-mail, Information exchange and EDIlink, whilst GEIS are marketing Quik-Comm, not just as an electronic mail system, but as an application tool within closed user groups.

In the financial sector, the creation of new products and services through the repackaging of online databases is taking place. The advent of CD-ROM will hasten the convergence between applications. Exhibit II-4 illustrates the growth of each sector of the network services market.

D**Connectivity**

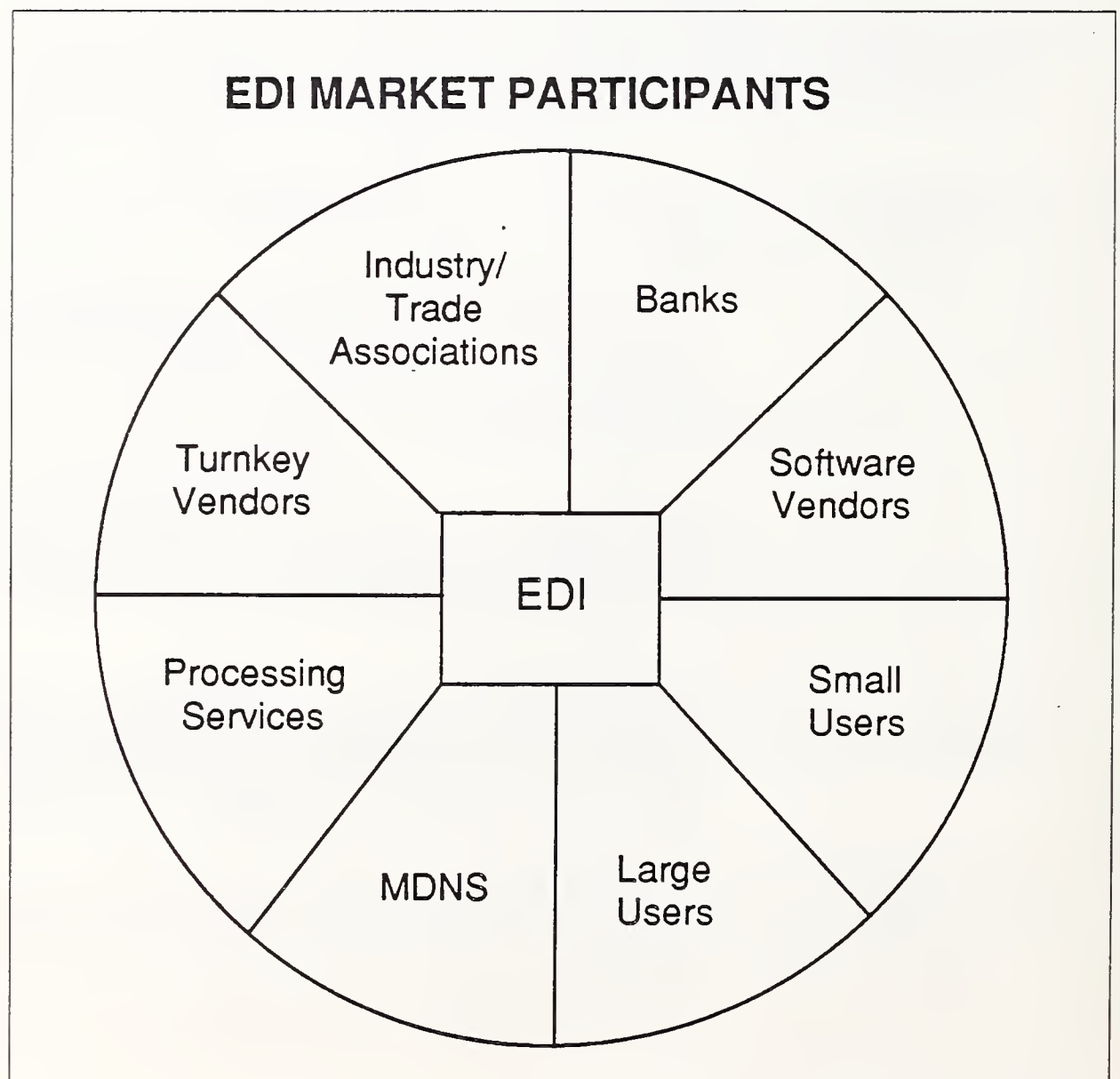
Connectivity and ease of operation is being enhanced by network interworking and the availability of software solutions. Market growth will increase once vendors resolve the issue of network interworking between competing services. The issue is a commercial, not a technical problem: vendors are reluctant because of the resultant loss of control over the customer base and the problems of charging.

Interface software provided by organisations like Sitpro (U.K.) and Simpro (France) will encourage small users to adopt network services.

E**EDI: Trading Clusters**

EDI, the application sector which INPUT expects to experience the highest rate of growth (50%+ over the next five years), requires critical mass in order to succeed. In many sectors of U.K. and French industry, particularly in transport, retail, manufacturing, and distribution, trade and industry associations, in tandem with leading players, have been instrumental in developing this critical mass required for successful EDI implementation.

EXHIBIT II-5



Profitability is achieved once a significant number of participants are attracted to the service. The key for vendors is to encourage volume usage from existing customers. This can be achieved by offering service enhancements.

Trading clusters are important in the start up of EDI and are key to the development of a buoyant market. Leading players, who are already using EDI, should be looking to bring their trading partners into the picture by demonstrating the benefits such as improved supply logistics, reductions in inventory costs by using JIT (Just-in-Time) Inventory, as well as dramatically reducing the cost of processing orders. In short, "competitive edge". EDI market participants are shown in Exhibit II-5.

F

EFTPoS

Retailers in some European countries, notably Belgium, are already looking to reduce administrative overheads substantially, as well as looking to improve their risk resilience by reducing the incidence of fraud and improving cash flow through faster payment

Reduction of staff on clerical functions will lead to redeployment in areas such as customer service. The development of the EFTPoS sector of the network services market is enhanced when it is retailer driven. There is little indication that the different European countries will agree international EFTPoS standards between themselves, so the prospect of a European cashless shopping system is unlikely in the immediate future.

G

Competitive Environment

1. The Players

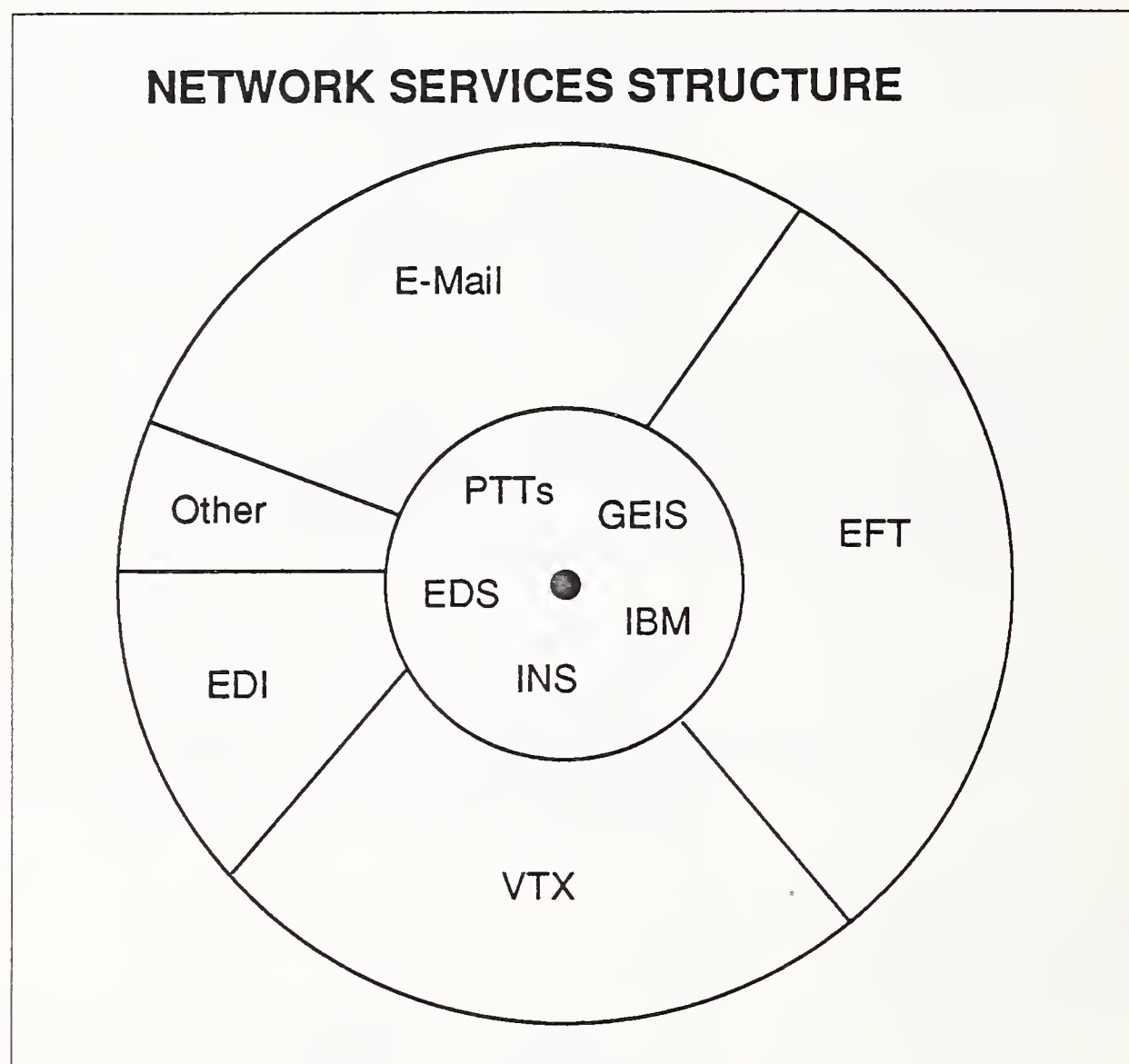
The vast financial resources required to build a major network have determined the industry structure (see Exhibit II-6). The role of the PTTs will be crucial in shaping the network services market into the 1990s. Their success lies in their ability to offer general purpose, horizontal network services, such as general electronic mail. The continued growth of E-mail however, will depend on marketing expertise.

The PTTs' ability to offer one-stop shopping for small and medium sized organisations will prove significant: with an international network infrastructure potentially available, the X.400 message standard will enable the PTTs to monopolise the electronic mail sector as well as using that customer base as a launch-pad for more application-specific services

PTT support for X.400 and Computer Sciences Corporation (CSC)'s agreement to sell 70% of its Infonet network to various European PTTs, enabling the proposed 18 PTT, pan-European MDNS to be operational much earlier than anticipated, will lead to the major players strengthening their links with the PTTs. Agreements also exist between the five Scandi-

navian PTTS, between France Telecom and the Deutsche Bundespost. In the U.K., British Telecom have acquired Dialcom.

EXHIBIT II-6

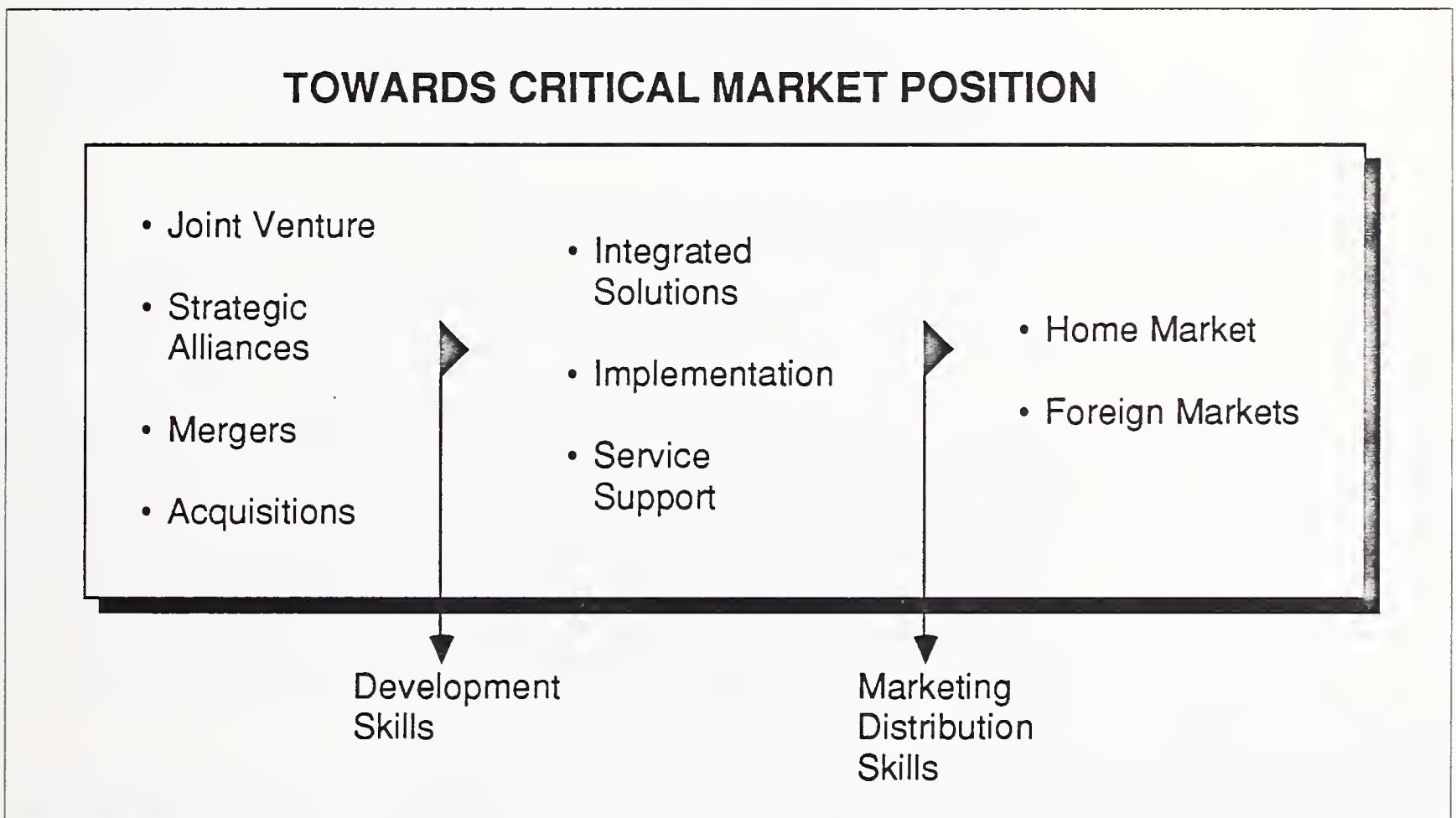


2. Joint Ventures

Whilst the PTTs and the large, multinational corporations are best positioned in the network services market, INPUT anticipates that joint ventures, strategic alliances and mergers will continue to occur in Western Europe during the build-up to the single European market as vendors strive to achieve critical market position.

Network services vendors, hardware manufacturers, systems and software houses, financial institutions and the PTTs have recognised the benefits to be gained from working in partnership. IBM has joint ventures in several European countries whilst ICL and GEIS formed INS in the U.K. Vendors will be striving to obtain competitive advantage by providing a comprehensive range of implementation and service support not offered by their competitors in order to achieve critical market position. This is illustrated in Exhibit II-7.

EXHIBIT II-7



Furthermore, vendors are increasingly looking to gain access to foreign markets. Joint ventures or commercial agreements with a company from a different country can help overcome the difficulties of customer resistance and reaching critical mass in unfamiliar markets with different business cultures and practices.

The combination of the strong marketing and distribution skills of the network services providers with software houses such as Systems Designers or Sema Metra who can provide the requisite development skills in specific vertical markets is a powerful one. For example, British Telecom International is currently seeking suitable software company acquisitions that can provide it with valuable network services applications.

3. Financial Players

Internationalism and increased competitiveness has led to the financial sector developing in a highly opportunistic manner with the major suppliers playing to their strengths. Developments in this sector provide a possible guide to the network services market, with Reuters addressing the online financial information market, GEIS the market for cash management services and the PTTs, significantly, focusing on electronic messaging services.

With the exception of the Midland Bank in the U.K., European banks have not developed a strong market position with regard to network services. The U.S. and Japanese banks have reacted much more: Citibank, for example, has over 25,000 internal users of electronic mail and are looking to interconnect external users.

4. Specific Service Vendors

Successful product differentiation, i.e. achieving market dominance by establishing a critical mass for a specific service, has proved a successful strategy for specific service vendors such as GSI and Digital.

There remains a requirement, at this most fragmented level of the network services market, for industry-specific application services which can be used on the general purpose networks, as well as for software development and consultancy in the EDI and EFTPoS markets. Outwith the U.K., there are opportunities for niche operators to enter this section of the market, such as Seres, the joint venture between Bull and Sesa in France, are doing, using the Transpac and Interpac X.25 networks. Network Services market development is illustrated in Exhibit II-6.

H

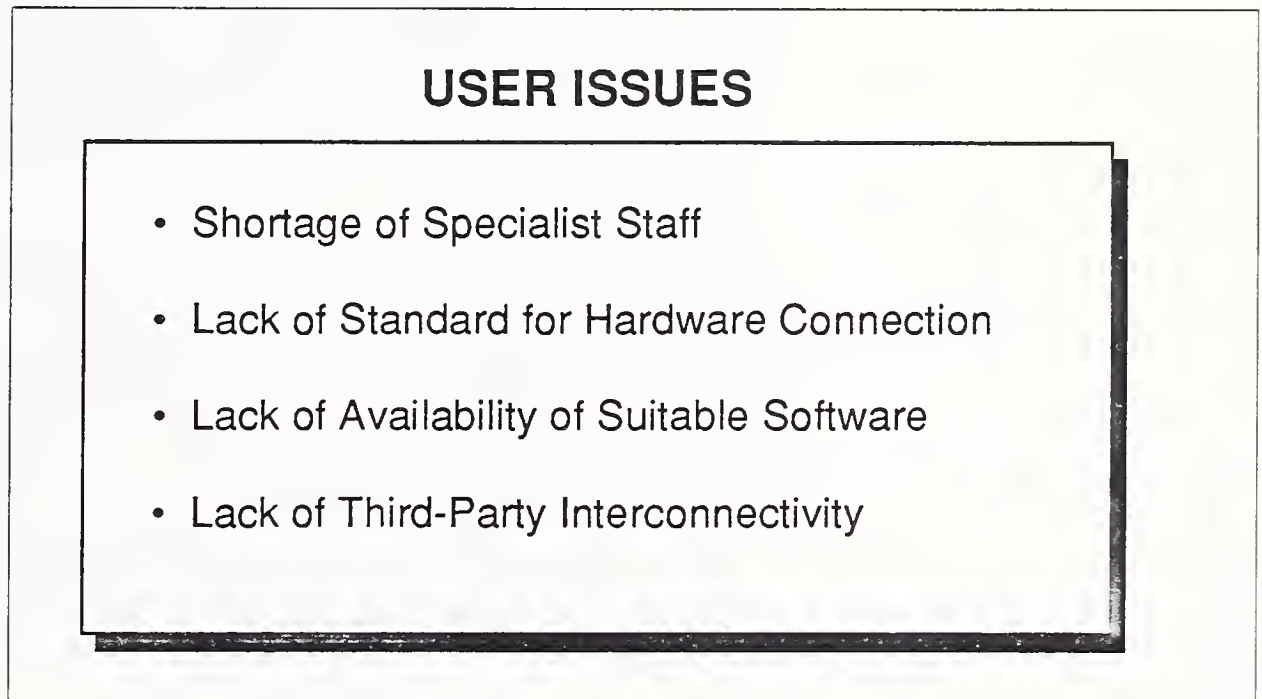
User Issues

Network services providing direct communications links are viewed by users as a commodity. The network is perceived as the essential requirement to carry out the user's needs and applications.

A shortage of skilled telecommunications staff is leading user organisations to turn to network services providers to implement their networks, and increasingly to develop complete business solutions for their needs. This user requirement, highlighted by INPUT's survey of 200 European organisations, for integrated solutions—network management, application mix, training and post-installation service support—is being reflected by current third-party service provider strategy.

The user requirement for interconnectivity has been illustrated by the recent agreement by INS and Istel in the U.K. to provide a link between their competing services as a result of industry association pressure. The

problems encountered by users with network services are listed in Exhibit II-8.

EXHIBIT II-8

I**The Network
Services Opportunity****1. Convergence and Concentration**

The convergence of computing and communications technologies continues to open up new commercial opportunities in terms of system capability. The network services market in Western Europe is currently fragmented with a number of players chasing after customer base.

The high investment costs are limiting the number of major network players and there is a possibility that this number will decrease as the smaller service providers fail to bring in sufficient revenue from the higher added value applications. This facet of the market's development coupled with the PTTs' decision to elevate their level of involvement in order to counter the threat of competition for high margin segments of their data communications business, will lead to a consolidation of the market.

The market is likely to be dominated by the players with large financial resources who successfully consolidate via joint ventures or strategic partnerships. This is the strategy being adopted by the U.S. network service vendors such as GTE Telenet with Plessey and more recently Hoskyns, or ADP with Mercantile Credit, IBM with Bank Paribas, Sema Metra and Credit Agricole. By 1993, very considerable concentration of supply will have taken place with full-service suppliers achieving a much stronger market position.

2. Internationalism and ISDN

Network services are successful and profitable where they offer substantial benefits to organisations with a clear set of business and strategic goals and objectives. With the number of competing networks, market growth will not necessarily result in profitability: potentially only companies who are able to offer international links will be able to compete.

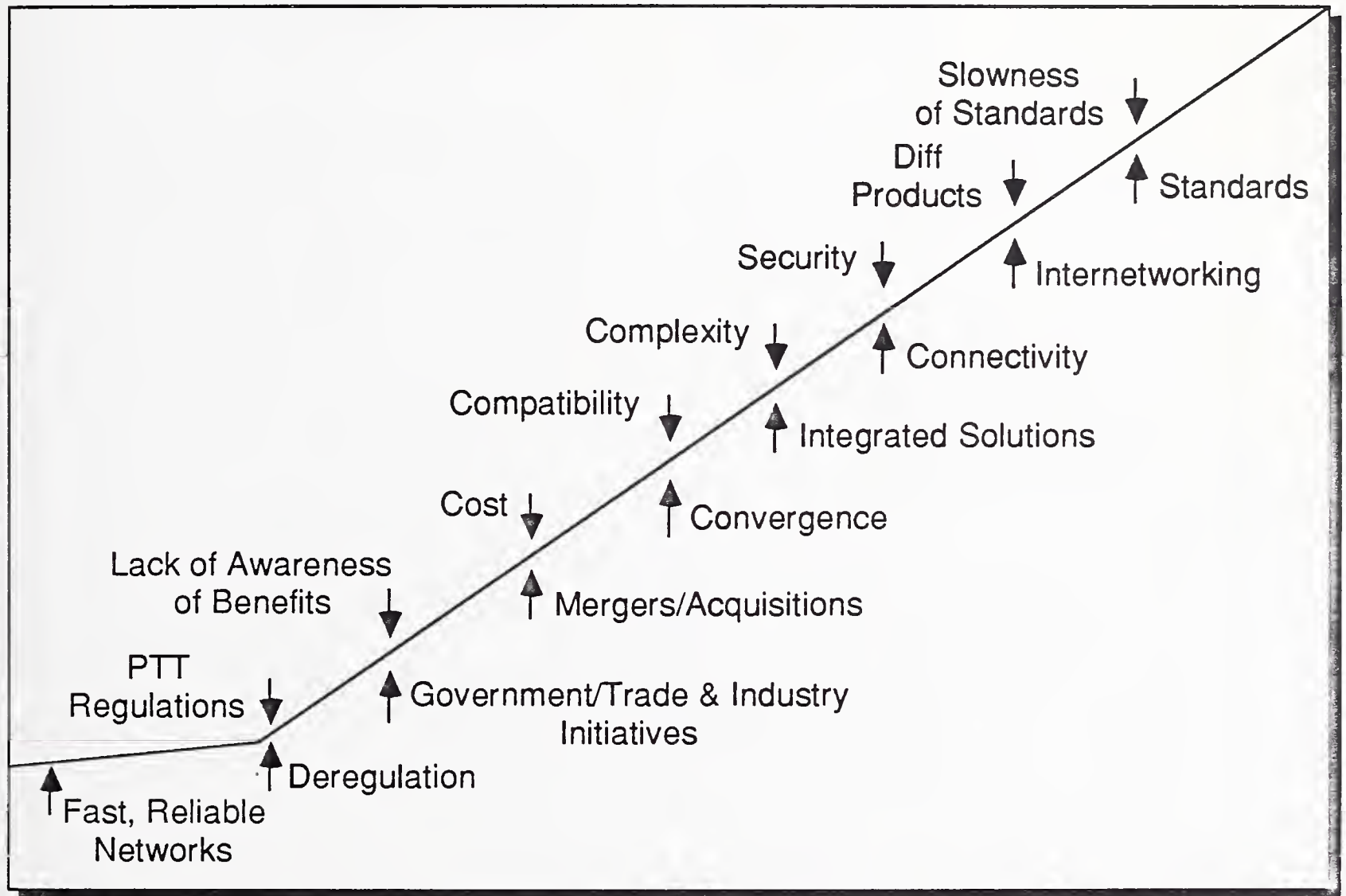
The large U.S. multinationals, such as IBM and GEIS, are offering services in both general services and application specific services, focusing on the international nature of the service. International trade will be a key area of opportunity owing to the high administration cost savings available and the time critical nature of multi-participant operations.

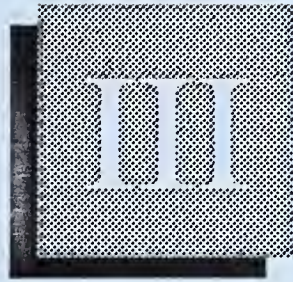
The general-purpose network services face strong price competition. Services which are perceived to be integral and necessary to function as a business, such as real-time financial information systems, are the most profitable.

Vendors should also remain aware of the potential of the new adaptive technologies such as ISDN and optical storage techniques. The technical obstacles to the creation of a single European market are disappearing with each country agreeing to adopt ISDN: Not only does this provide a threat to the current X.25 networks, but also provides service providers with a new delivery mechanism for a wide range of new application services. The factors affecting the extent of the network services opportunity are shown in Exhibit II-9.

EXHIBIT II-9

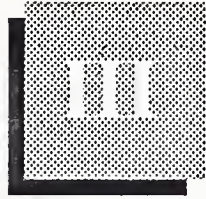
THE NETWORK SERVICES OPPORTUNITY





Market Analysis and Forecast





Market Analysis and Forecast

A

Market Definition

1. Introduction

The rapid progress of computer and communications technology and the impetus towards deregulation of PTT monopoly positions in order to stimulate economic development has created a chaotic and confused environment.

This section defines these emerging markets with the aim of identifying the opportunities for third-party network services. INPUT's assessment of this market opportunity specifically excludes the operation of network services and associated applications by organisations for internal use. These networks would be classified as part of the "captive revenue" sector. Thus, a bank that provides banking services to its customers based on its own network does not qualify for inclusion. Only where that bank buys those network services from a third party service organisation do these revenues contribute to the "non-captive" market size.

INPUT's 1987 report, *Value Added Network and Data Services —European Market Directions* as well as previous reports have used the term VANS. In this report, INPUT utilises the term *Network Services* rather than the widely used terms VADS or VANS since definitions vary from country to country. A detailed definition is described in sub-section 3 below.

The difficulties inherent in arriving at acceptable and understandable definitions in the industry are well illustrated by the U.K. experience, where deregulation has been the most pronounced.

When the first VANS Licence was granted in 1982 in the U.K., there was a great deal of confusion about what constituted a "value-added" service. In the period following the issue of the Licence, the problems of defini-

tion were seen to be hindering the market's development. In the area of managed data networks, for example, whilst service providers accepted that "added value" was provided in the management of the network, error correction, and protocol conversion functions, there was a lack of differentiation between these services and a network transportation service which was not allowed within the Licence.

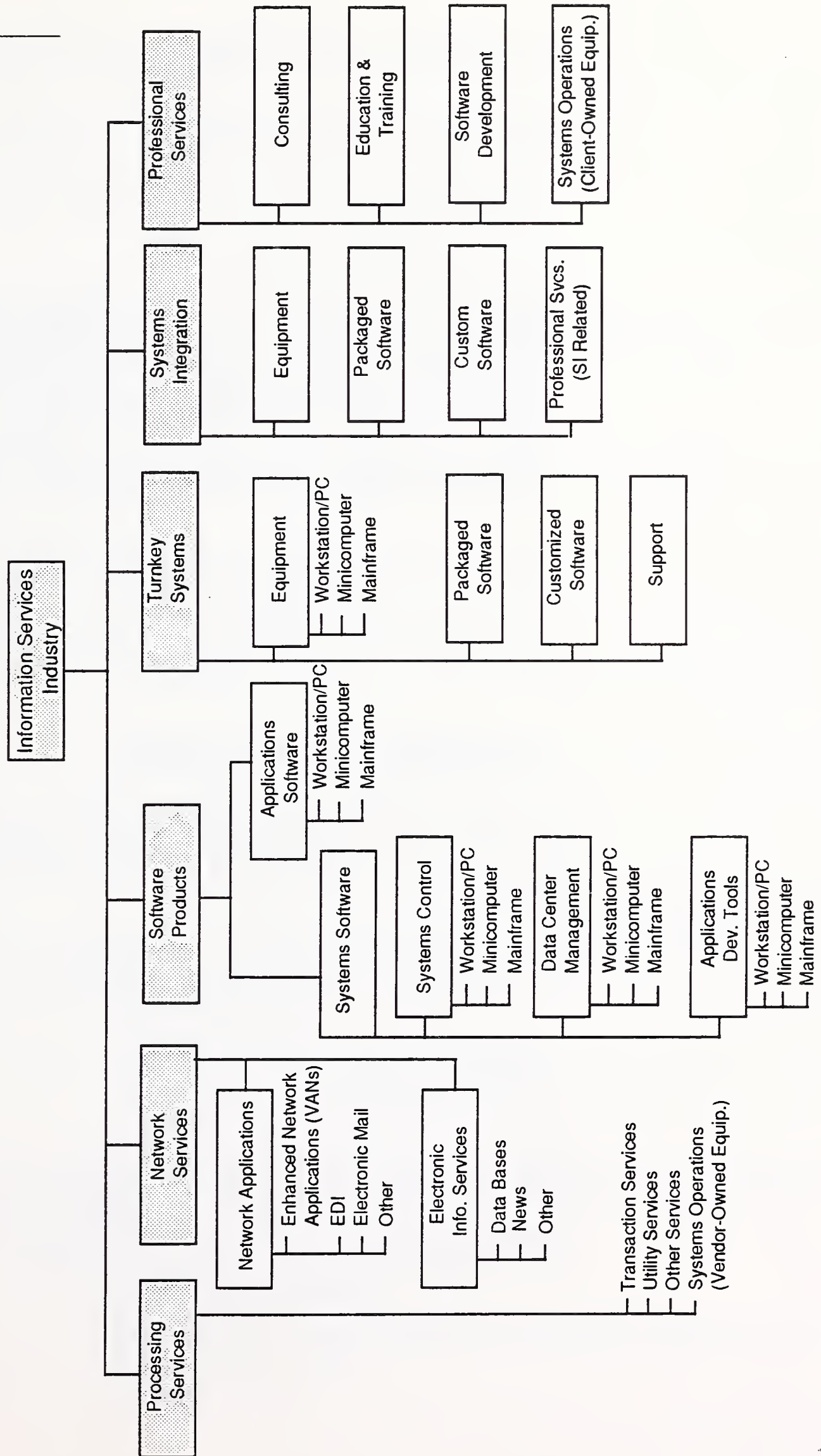
The rapid development and take-up of these services in the years subsequent to the U.K. VANS Licence (by 1985 there were 150 registered VANS providers offering 600 services, although not all were active), coupled with the considerable problems of definition experienced by vendors, service providers and professional services organisations, led to the Department of Trade and Industry issuing a new VADS Licence in 1987. To reduce the problems of definition, the new licence considerably simplified the process by concentrating on the technical delivery method used to provide the value added service rather than on the specific service itself. Whilst the non-public network suppliers were also permitted by the new Licence to provide basic data communications, the terms of the new Licence did however, impose some restrictions. It specified that VADS operations should not be cross-subsidised from elsewhere within the organisation and where OSI recommendations exist, service providers should utilise these open standards. These restraints have subsequently been adopted in other European countries. A working definition would be that VADS are services which "add value" to the basic communications networks, thereby offering a more cost-effective service.

However, the regulatory environment in the U.K. is not mirrored in other European countries where it has been the practice of the PTTs to issue special licences for specialised networks — for example, for closed user groups, such as SWIFT for the banking community and SITA in the airline industry. Thus, there have been considerable difficulties in meaningfully defining and subsequently sizing the market in Western Europe with criticism from vendors over optimistic forecasts which have been partly due to a lack of accepted definitions in the industry and partly due to the increasing convergence among applications.

2. Software and Services Industry Market Structure

The network services market, as already indicated above, is one part of a much more widely defined market, namely Software and Services. Exhibit III-I provides a graphic overview of INPUT's definition of the Software and Services Industry structure. Detailed definitions are given in Appendix A.

SOFTWARE AND SERVICES INDUSTRY STRUCTURE 1988



At a general level INPUT identifies three distinct categories of computer communications network processing services, that are often confused:

- Processing Services (e.g. computer bureau services) are fundamentally concerned with the provision of computer processing power based on time, workload, and capacity parameters. Its use of communications networks to deliver the service is subsidiary to the transaction or other computer processing capability provided.
- Electronic Information Services are primarily concerned with the delivery of "information" to clients via an online database or other electronic means. These services utilise both computers and communications networks but they are the enabling technologies that allow the vendor to provide the information service in a timely and practical way.
- Network Services are defined by INPUT as those services in which the network communication aspect is the significant element.

The next section provides a detailed definition of the network services market as used in this report. For the purposes of gaining as wide an understanding as possible of the network services market, some discussion of relevant adjacent markets are included in other chapters of this report.

3. Network Services Market Definition

In analysing the market for network services it is important to make the distinction between services related to the management of the physical network and those related to the traffic that is transmitted across the network.

INPUT makes this distinction by analysing the total market for Network Services into three levels, as shown in Exhibit III-2:

- Network Management
- Enhanced Services
- Application Services

Network Management is defined as comprising any third-party services concerned with the management of the physical network. The terms *Managed Network Service (MNS)* and *Managed Data Network Services (MDNS)* are frequently used but have sometimes implied services concerned with the movement of traffic on the network.

EXHIBIT III-2

NETWORK SERVICES MARKET STRUCTURE

Network Services					
Managed Network Services		Application Services			Electronic Information Services
Network Management Services	Enhanced Services	E-Mail	EDI	Other	

- ☒ Included in Forecast
☐ Excluded from Forecast

The broad types of service provided as part of the physical network management comprise:

- Configuration and Name Management
- Accounting and Commercial Management
- Performance Management
- Fault Management
- Security Management

Enhanced Services represent the basic level concerned with traffic that is transmitted across the network. This class of service comprises:

- Protocol Conversion
- Error Correction
- System Management
- Store and Forward
- Packet Switching

Application Services consist of all those services provided on a network concerned with the provision of a user application. Typical examples being:

- Electronic Mail (E-mail)
- EDI (Electronic Data Interchange)
- EFT (Electronic Funds Transfer and including for example EFTPoS, EFT at the Point of Sale)
- Videotex

The problems of definition of the Network Services market are highlighted by the position of videotex, a protocol which covers a whole gamut of application services implemented on a conventional network. Consequently, Videotex falls within INPUT's definition of a network application service. Some definitions of a VANS market have included such "applications" as online database and remote computer services. It is important to understand that these are both specifically excluded from INPUT's definition of network services as can be clearly seen in Exhibit III-3.

EXHIBIT III-3

NETWORK SERVICES MARKET DEFINITION

Network Services			
Network Management	Enhanced Services	Application Services	Electronic* Information Services
<ul style="list-style-type: none"> • Configuration and Name Management • Accounting and Commercial Management • Performance Management • Fault Management • Security Management 	<ul style="list-style-type: none"> • Protocol Conversion • Error Correction • System Management • Store and Forward • Packet Switching 	<ul style="list-style-type: none"> • E-Mail • EDI • Other Services • EFT • EFTPoS • Videotex 	<ul style="list-style-type: none"> • Online Databases • News • Videotex • Others

*Not Included in Market Forecasts

B

Market Forecast

1. Forecast Definition

The market assessment and forecast growth were developed from analysis and critical assessment of current and projected activities within the market definition provided in the preceding section.

The forecast has been broken down into the distinct areas of managed network services (combining both the network management and the

enhanced services sectors), electronic mail, electronic data interchange, electronic funds transfer and videotex.

The forecast is based on actual data for 1987 and covers the period 1988 to 1993. Forecasts are for user expenditures and are made in local currency and converted into U.S. dollars for aggregation and comparative purposes. The rates applying on July 1, 1988 have been used for conversion purposes and these are shown in Exhibit III-4.

EXHIBIT III-4

U.S. DOLLAR AVERAGE EXCHANGE RATES

Country	Currency	Dollar Exchange Rate
France	FF	6.13
U.K.	£	0.59
West Germany	DM	1.82
Italy	It. L	1351
Netherlands	DFL	2.05
Belgium	BF	38.1
Sweden	SK	6.29

Source: Swiss Bank Corporation (1 July 1988 rates)

In addition, the forecasts have been expressed in actual monetary terms. The latest inflation rates in Western European countries i.e. percent change in consumer price index from June 1987 to June 1988 are as follows:

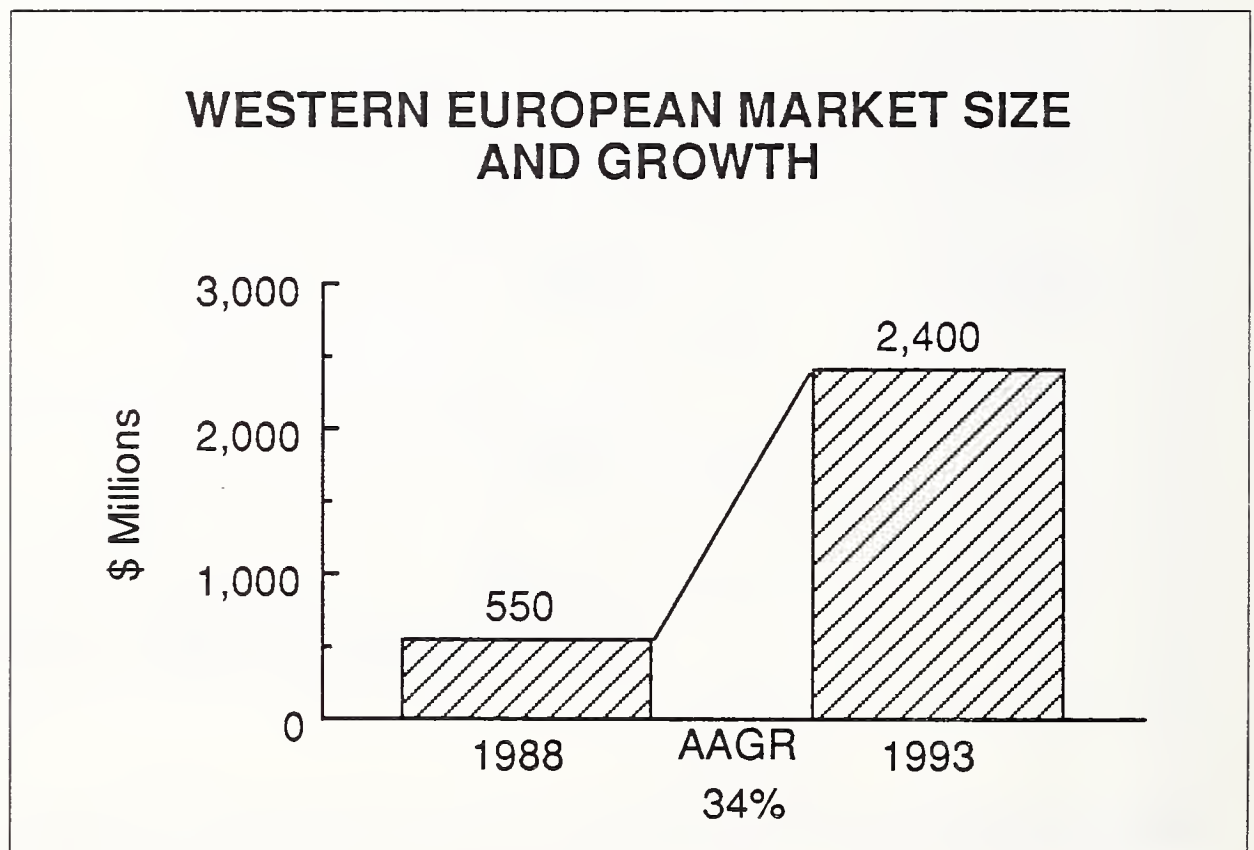
- France +2.6%
- U.K. +4.6%
- Italy +4.9%
- Belgium +1.0%
- W. Germany +1.0%
- Sweden +6.9%
- Holland +0.7%

Of more relevance to network services vendors is the relationship between salary inflation (typically 50% of costs) and service price inflation. In the computer services industry, salary inflation is at least several percentage points ahead of consumer price inflation due to skills shortages. Network services prices have tended to remain stable as vendors attempt to achieve critical mass utilising the twin bodies of low entry level pricing and "missionary marketing". Consequently, inflation is considered to have a minimal effect upon INPUT's market forecast.

2. Western European Market Forecast

The network services markets are at different stages of development depending on which country and application market is examined. INPUT forecasts that the market for network services in Western Europe will grow from \$550 million in 1988 to \$2.4 billion in 1993, (see Exhibit III-5).

EXHIBIT III-5



The network services market is potentially huge and one which INPUT expects to grow at an annual rate of 34%, with France and the U.K. continuing to have over 50% of the total market share, (see Exhibits III-6 and III-7). By the same token, France and the U.K. will experience the slowest rates of growth on account of their large market shares compared to other countries.

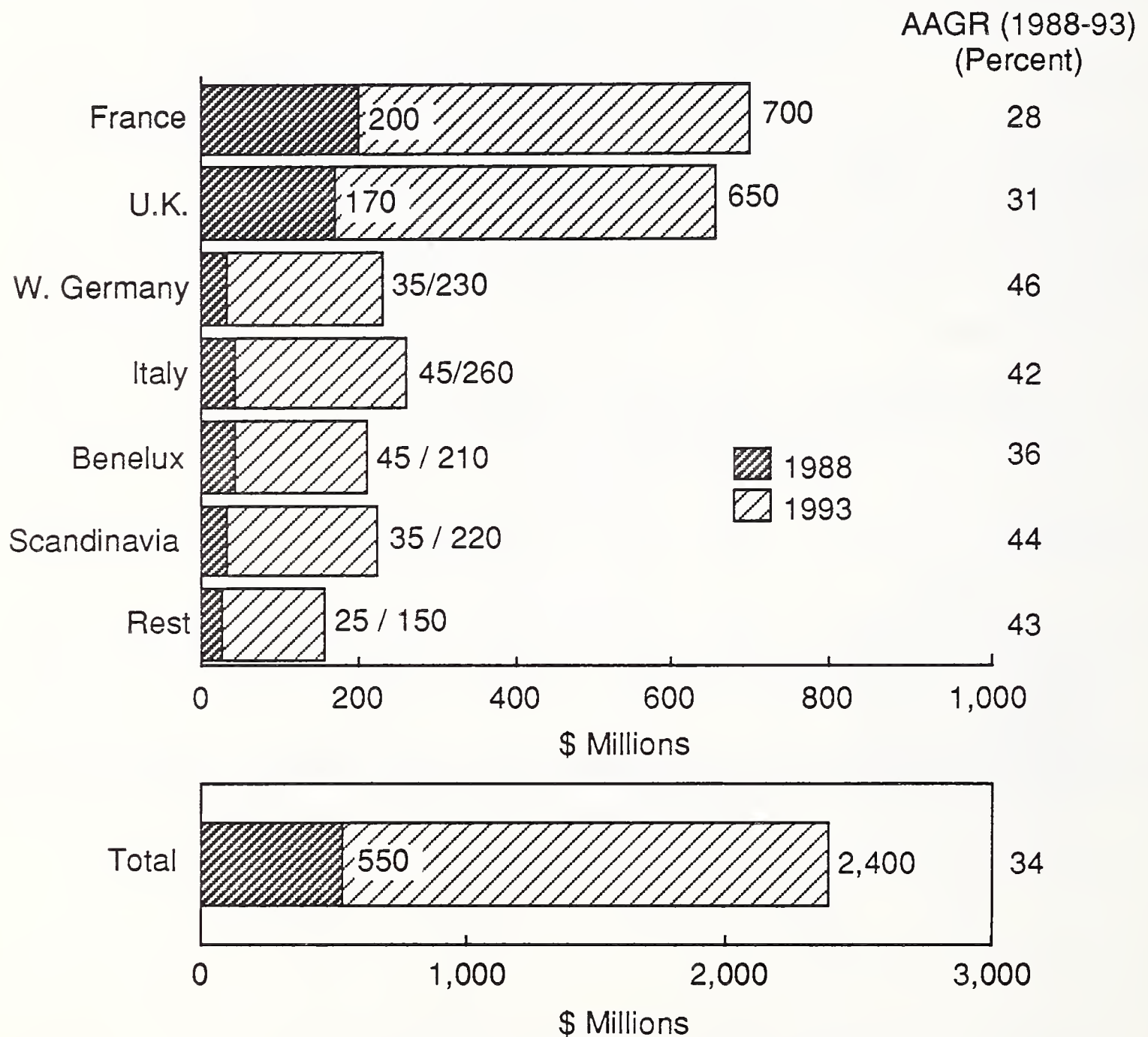
EXHIBIT III-6

NETWORK SERVICES MARKET FORECAST (TOTAL WESTERN EUROPE)

Country	\$ Millions			AAGR 1987-1990 (Percent)	\$ Millions 1993	AAGR 1990-1993 (Percent)	AAGR 1988-1993 (Percent)
	1987	1988	1990				
France	140	200	350	36	700	26	28
U.K.	109	170	300	40	665	29	31
West Germany	20	35	85	62	230	39	46
Italy	20	45	120	80	260	29	42
Benelux	28	45	85	45	210	35	36
Scandinavia	22	35	85	57	220	37	44
Rest	17	25	65	56	150	32	43
TOTAL (rounded)	360	550	1,100	45	2,400	30	34

EXHIBIT III-7

WESTERN EUROPEAN NETWORK SERVICES: COUNTRY MARKET GROWTH (1988-1993)



Furthermore, the forecast has been broken down according to INPUT's market definition into the distinct areas of:

- Network Management (Managed Network Services)
- Enhanced Services
- Applications.

Exhibit III-8 shows how network services comprise part of the total Network, Processing and Electronic Information Services market as defined by INPUT. It is worth noting that Network services currently represent only 7% of this total market.

EXHIBIT III-8

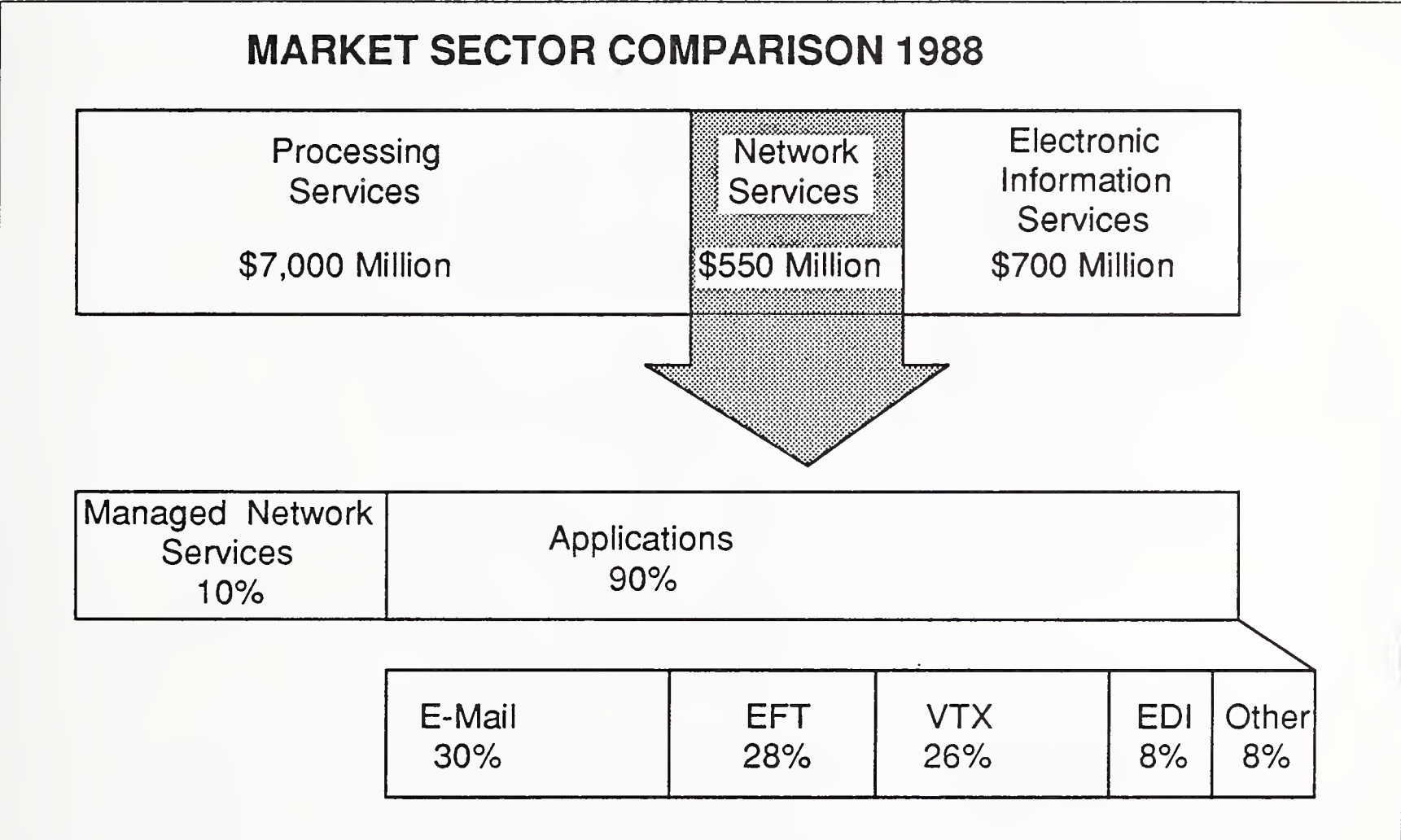
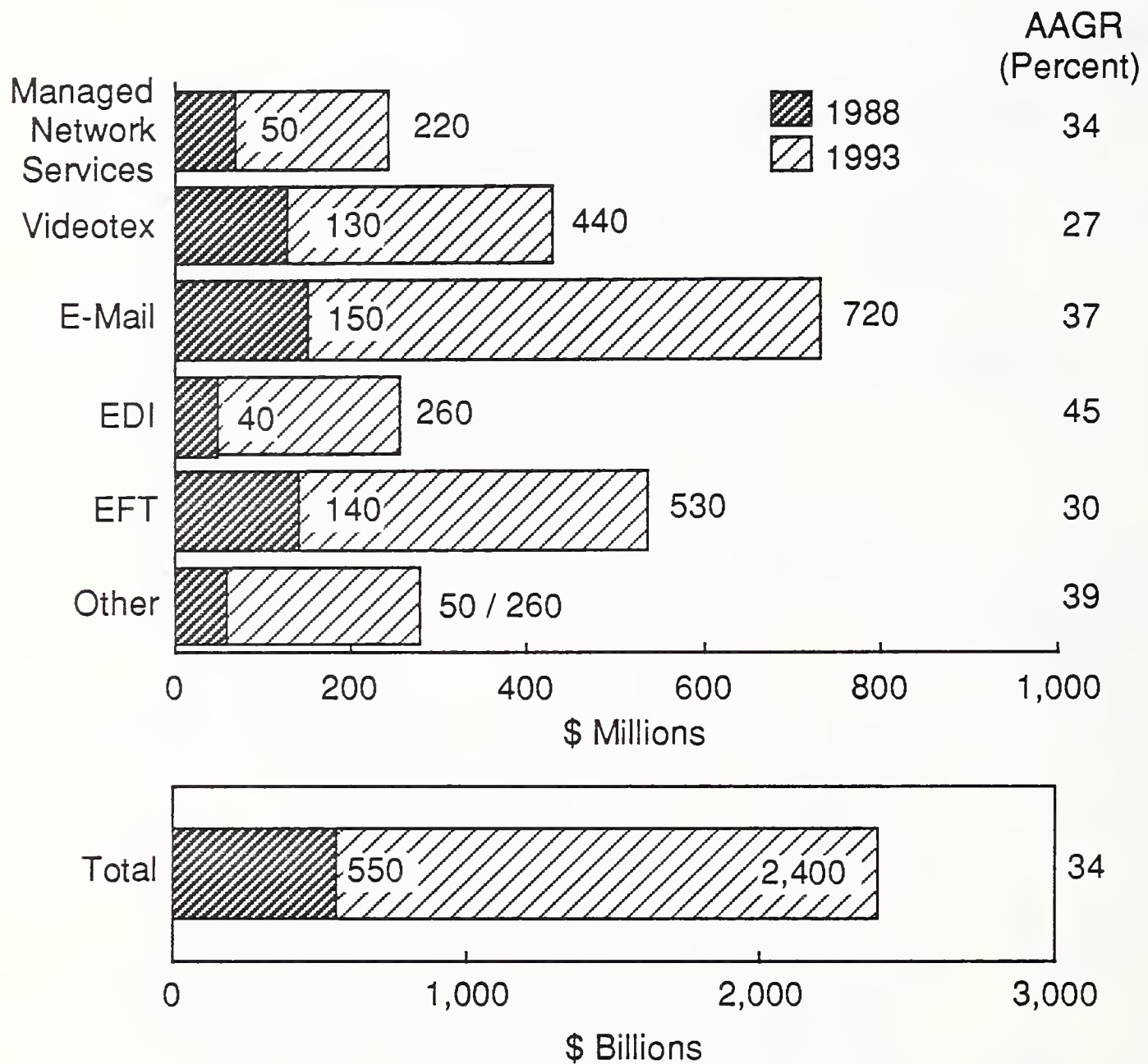


Exhibit III-9 shows the growth expected in the various sectors of the network services market. There are several major factors helping growth opportunities across Western Europe. These include:

- Liberalisation in PTT regulations
- Cost-effective telecommunications
- Increased awareness of commercial benefits
- Connectivity standards
- Joint ventures between leading vendors
- Critical mass for services
- Focus on the functional rather than the technological requirement

EXHIBIT III-9

WESTERN EUROPEAN NETWORK SERVICES SECTOR GROWTH, 1988-1993



C

Competitive
Environment

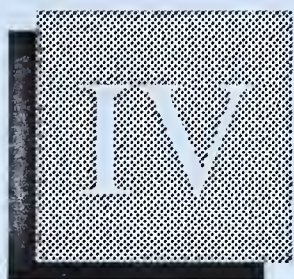
The continued development of the market for network services is likely to be international rather than national, vertical rather than horizontal. The major international service vendors, such as IBM, GEIS, Digital and EDS are best placed to exploit the opportunities afforded as they are able to satisfy specific user requirements on an international level as well as developing national services in niche markets as the need arises.

These large players are able to offer horizontal services, such as E-mail which do not require customisation for individual markets, whilst at the same time attacking vertical markets by providing generic EDI software packages or by creating an EDI service which caters to the needs of one specific market sector, and includes other services, such as E-mail, as part of the package.

The market for general-purpose, horizontal services, such as electronic massaging, is likely to be shared out between the PTTs (via their national dominance and the prospective pan-European MDNS based on CSC's Infonet network) and the large, international corporations because of the high cost of entry and the low margins involved.

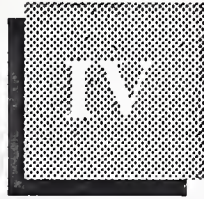
There are opportunities in application and customer-specific services in vertical markets and in particular in the following areas:

- Network upgrading and interlinking
- Market-specific and industry-specific software
- Integration with existing systems
- Consultancy
- Project management



Market Sector Commentary





Market Sector Commentary

This chapter provides an outline description of the various categories of network services, together with examples of the type of service. Strategic issues affecting market development and key trends are discussed in subsequent chapters.

This chapter also includes a commentary on the related and adjacent markets for computer processing services and electronic information services.

A

Managed Network Services

1. Network Management

Network management is the set of functions concerned with the control of the network itself and not the traffic that is transmitted over it. There are three important network management service categories which can be identified:

- Network Services (Communications FM)
- Systems Integration for Communications Networks.
- Professional Services associated with Communications Networks - for example, consultancy or software development.

Within INPUT's definition, it is the Network Services sector, the actual network management sector with which we are concerned.

2. Enhanced Services

The economics of network operation are such that a large initial investment is required with a long pay back period. With the high fixed costs of building a network set against the low marginal cost of carrying additional traffic, the network operator is concerned about maximising the volume of traffic. Thus, the essential requirement for a successful enhanced network service is volume.

However, with the uncertainty as to the performance of certain networks, the low added value relative to the high costs of takeup, and the moves by certain major companies to develop internal networks, this area will inevitably come to be dominated by the PTTs and pan-national groups like IBM or GEIS who are able to achieve sufficient economies of scale.

In the U.K., British Telecom is currently undertaking a major modernisation of its network, whilst Mercury has gone for a more technologically advanced system providing digital access and optical fibre links. The European PTTs will, in 1989, be offering a managed data network on a pan-European basis in competition with existing online network service operators such as GEIS and IBM's evolving network services.

Within the area of network services, there are four categories:

- Private Networks
- Closed User Group Networks
- Enhanced Services Networks (PTTs)
- Independent Vendor Networks

a. Private Networks

A company developing an internal network solely for its own voice and data communications clearly does not fit into INPUT's market definition. However, some intra-company networks can be included because they are also used to provide services to third parties (e.g., Fastrak operating on the Midland bank network is being marketed as a vehicle for a whole range of services in the finance, travel and distribution sectors).

Private networks are also relevant because they can be linked to other private networks by an intermediary and may reduce the potential market for suppliers of network services.

The increased recognition of the need to establish effective communications links coupled with the complexity associated with the development of high-speed, high-capacity networks has opened up opportunities to third parties—often professional services vendors. A prime example is the £100 million contract won by Racal for the Government Data Network which includes significant project and facilities management components.

b. Closed User Groups

These are networks which have been established by particular communities of users to meet mutually agreed communications needs.

Since these services are not generally marketed outside the user group but are simply made available on a subscription basis to members, revenues are not included in the market definition.

Examples of this type of network are :

- SWIFT, a system set up in the 70s to provide standardised funds transfer between banks.
- The Cedel and Euroclear settlement systems for the Eurobond market which handles over 50,000 trades a day via the GEIS international network.
- The SITA airline/airport network, which is illustrated in Exhibit IV-1.

c. Public Networks

Enhanced services networks are provided by the respective PTTs in each European country.

Liberalisation, especially in the U.K., and the strategic thrust of the PTTs towards the provision of high value-added and specific application services, in addition to ISDN technology, is leading to an intensification of competition between services provided over public and independent commercial networks.

With the process of deregulation taking place outside the U.K., it is noticeable that vendors are adopting different positions with regard to using the public networks. In France, Axone, the venture between IBM, Bank Paribas, Sema Metra and Credit Agricole will be using the IBM network whilst Seres, the venture between Bull and Sesa have chosen to use the Transpac network.

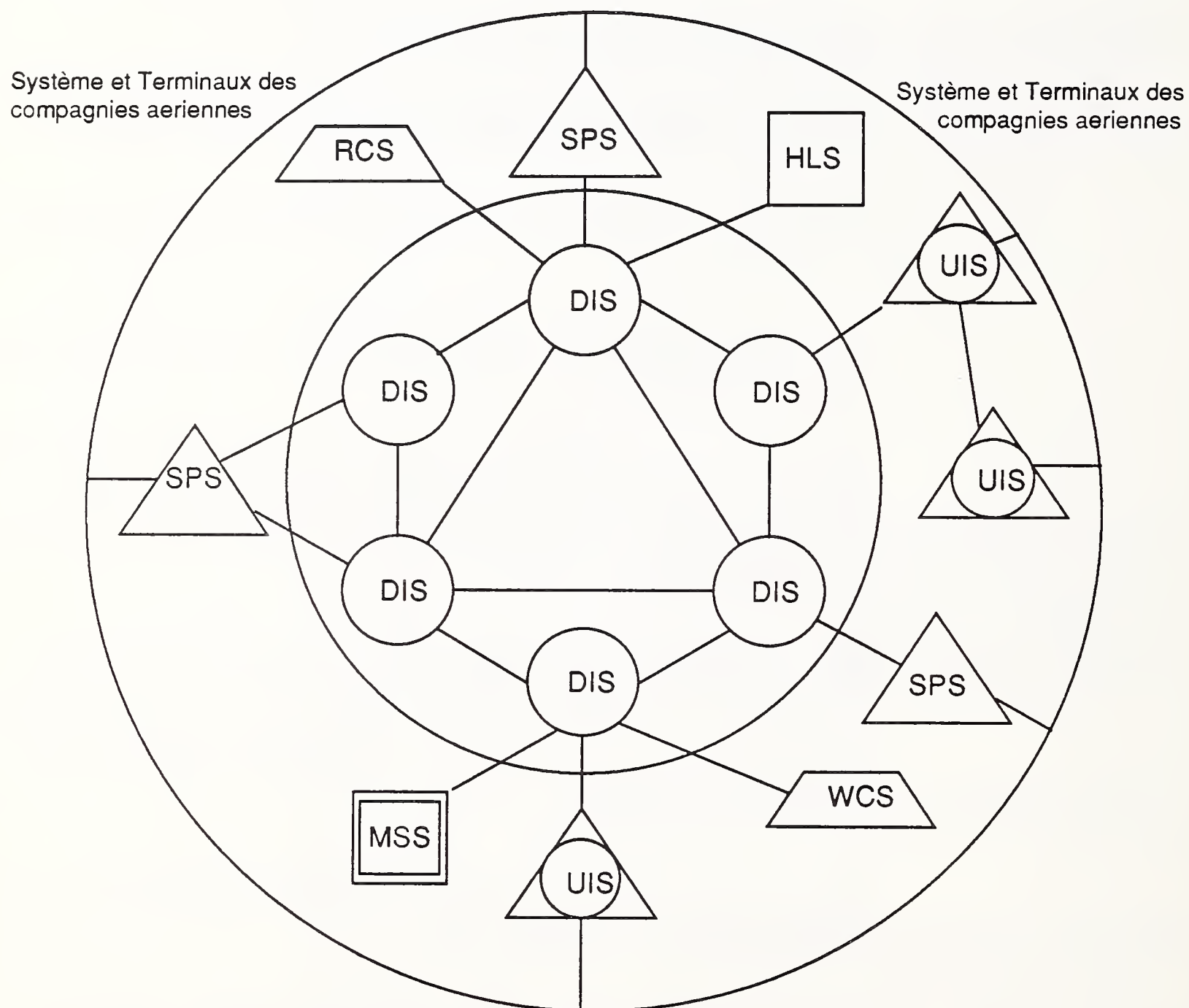
Revenues from the specific applications measured in terms of value added to the end user over and above the cost of the bearer service have been included in INPUT's definition.

With the alliances between PTTs and private operators as well as the moves toward deregulation, services on these networks will become a very competitive market for independent information services companies.

EXHIBIT IV-1

THE SPECIALISED SITA NETWORK

'Réseau Avancé Sitá'



DIS: Système de commutation de données
et d'interface
(Data switching and interface system)

HLS: Système haut niveau
(High-level system)

MCS: Système principal de controle
(Main control system)

MSS: Système de stockage et de gestion
des messages
(Message storage and handling system)

RCS: Système de regional de contole
(Regional control system)

SPS: Système processeur satellite
(Satellite processor system)

UIS: Système d' interface utilisateurs
(User interface system)

Source: SITA

Principal services in the markets studied are:

France	Transpac -Atlas X.400
U.K.	PSS - Multistream, Linkline, Prestel
WG	Datex-P - Bildschirmtext
Italy	Itapac - Videotel
Belgium	DCS - DCS Mail
Holland	Datanet - Viditel
Scandinavia	Datapac

Furthermore, the public switched telephone network (PSTN) is also being used by commercial application service vendors, particularly in the field of EFTPoS, such as the Valitel credit authorisation service operated by Sligos and the Macatel service in West Germany, as well as the IBM/Fiat joint venture, Intesa in Italy. PSTN can prove most cost effective for small volumes of high-value transactions.

d. Independent Vendor Networks

Whilst the European telecommunications environment moves gradually towards deregulation, a number of independent vendors operate network services either under special licence agreements or under negotiated agreements with the PTTs for the provision of specific services, e.g., GEIS' MARK III Net, McDonnell Douglas' TYMNET and CSC's INFONET.

The strategy for these vendors has been to leverage their investment by providing high value added services in three areas:

- Development and facilities management of private communications networks for large multinationals
- Development of customised business application services
- Development of generic application services in joint ventures with dominant national players

The liberalised U.K. environment has fostered the development of independent commercial networks, offering a total communications service to the customer. Examples include the joint ICL/GEIS venture, INS, Istel with Infotrac, IBM with Information Exchange and Midland Bank's Fastrak network.

In France, Axone have chosen to follow the U.K. route and differentiate themselves from the PTTs offering on the basis of service, ie implementation, support, range of facilities and security whilst the joint venture between Sesa and Bull (Seres) is offering specific services using Transpac's X.25 network.

The strategic focus of these international vendors is to operate with available domestic distributors and joint venture partners to enter new country markets: GEIS positions itself very much as an international carrier focussing on high-value, premium services such as international networking and services to the banking and finance community.

IBM, meanwhile, in addition to Axone in France has concluded joint ventures with a variety of partners across Europe. IBM's first attempt at a joint venture was with British Telecom and the ill-fated Jove project that was blocked by the British Government as being anti-competitive. This has led to a situation where the players likeliest to succeed in the provision of managed network services are the PTTs under the banner of CEPT and the joint Europe-wide network.

A two-tier approach to managed data networks could be a second line of defence for the PTT monopolies since competition among service providers will be permitted whilst the operators of the underlying network will be highly regulated on the grounds that they carry a "universal" and thus a public service.

With the network services market being divided in this way, the PTTs, by banding together and leaning on their network experience and monopolies, might be able to run a European managed data network. However, such a move could restrict competition, as the dissenters to the Witte Commission's findings in West Germany have argued.

In the five Scandanavian countries, the telecommunications authorities have gone into the managed data network business together with a service covering the entire region which offers one-stop shopping for organisations that are setting up internal networks which cross international borders.

Doubts over the PTTs' ability to exploit the market must remain, however. It is more likely that the multi-nationals, capable of offering a European-wide data service, will continue to dominate the market.

The network services market and its various stages of development in represented in Exhibit IV-2.

There are three distinct phases of development: the growth stage, where private networks requiring a large initial investment looked to set the high fixed costs of building the network against the low marginal cost of carrying additional traffic; the formative stage, where networks were established by closed user groups, the PTTs, and the independent vendors; and thus, the realization phase—the growth of these networks leading to a demand by users for network interworking.

EXHIBIT IV-2

THREE STAGES OF NETWORK MARKET DEVELOPMENT

Stage	Network	Status
Formative	<ul style="list-style-type: none"> • Private • Closed user groups 	<ul style="list-style-type: none"> • Respond to a community of users' needs • Little risk • Specific use
Growth	<ul style="list-style-type: none"> • Private • Closed user groups • Public • Independent 	<ul style="list-style-type: none"> • Closed-type/open-type networks coexist • Become more used to serving users' different needs • More risk
Realisation	<ul style="list-style-type: none"> • Network interlinking/interworking 	<ul style="list-style-type: none"> • Open-type networks form core of market • Joint ventures/interlinking follows

B**Application Services****1. Electronic Mail**

Electronic mail's development is in two directions: firstly, through the rapid increase in the number of subscribers and secondly, through its development as a common access medium in a range of services including online databases, bulletin boards and interfaces with both telex and fax.

The PTTs provide these services as do independent vendors, GEIS with Quick-Com, Istel with Comet, IBM with Screenmail and Mercury with

Link 7500. Some electronic mail services are provided through videotex systems such as MISSIVE and S-TEL in France.

Whilst E-mail is a relatively mature market, its development has been piecemeal, with bureau services being constrained by regulation and national boundaries and effective interworking being inhibited by political, commercial and technical factors.

With the advent of the the X.400 electronic mail standard enabling subscriber electronic mail services to be interconnected using X.400 protocols, private networks are in a position to provide links between incompatible office systems.

Cost and customer service are the key issues and whilst we have assessed the E-mail sector separately, there is increasing integration between E-mail and other services like EDI and online databases. Consequently, vendors who are active in other services will gain considerable competitive advantage.

However, the more generic the service, the least value added or application dependent the service is, and it is likely that the PTTs or the large network operators will win out through economies of scale or marketing presence.

Electronic mail will continue to experience high rates of growth throughout Europe as users become aware of its advantages over fax and telex. Additionally, as the convergence between applications increases and interconnection between rival services such as Telecom Gold and Mercury 7500 are offered, then the product itself becomes more attractive to users.

The marketing of electronic mail as a gateway to online information services (BT is actively promoting such services via Telecom Gold) and the acceptance of the X.400 standard across Europe will contribute to electronic mail's continued growth.

2. Electronic Data Interchange

INPUT has been careful to define EDI as the electronic transfer of structured business data (electronic invoices, purchase orders, delivery notes, bills of lading) between the computers of independent trading partners via a telecommunications network.

EDI services revenues in the U.S. reached approximately \$131 million in 1987 (including software, professional services, and processing and network services). INPUT forecasts this to grow at an AAGR of over 50% to reach \$1.2 billion by 1992.

In Western Europe, EDI has received a boost via-backing as a strategically important application by the EEC (the TEDIS programme) and by national governments (the VANGUARD programme in the U.K.).

The U.K. is the most mature market in Europe in the use of EDI. The U.K. market, with 65% of all European EDI, and in excess of 1,500 users, benefits from the most cost-effective range of services for a wide range of users in different industries and is supplied in a fiercely contested market by INS, Istel, and IBM.

Apart from cost savings, EDI has become a prerequisite for competitiveness in some industry sectors simply because EDI connections are being required as a condition of trading. Whilst this is good business for the clearing houses and for large companies, the advantages are not so clearcut for smaller companies; although a basic off-the-peg EDI system can be bought for 3,000, converting existing systems to meet EDI can take as long as two years before any cost savings are realised.

This situation will continue until either X.400 services can provide a cheap public service alternative or low cost EDI start-up kits using specially tailored plug-in PC boards become more widespread. Significantly, some of the larger EDI proponents, such as British Coal in the U.K., are helping their smaller suppliers with the start-up costs. EDI consultancy and support organisations are also springing up.

Despite having benefitted from telecommunications liberalisation, support of OSI developments and the development of document standards for a wide cross section of industries, INPUT estimates that the U.K. EDI market is still no more than 30% developed.

Indications are that the market wants one network service, regardless of where trading partners are located. However, 80% of the trade transactions are currently at a national level, and whilst the development of common standards is more advanced in Europe than in the U.S., EDI suppliers have plenty of spare network capacity, making it difficult for them to find a common interest which would justify the cost of network connection.

However, after many months of concerted user pressure, links between the U.K.'s two rival services - Tradanet and Edict - are likely to come about in the second half of 1988. This development emphasises the importance of trading clusters and industry associations.

Although there is scope for organisations to enter the EDI market, it is likely to be dominated by a limited number of suppliers because of the high levels of investment required and the need to offer a network service which can communicate with a substantial number of participants.

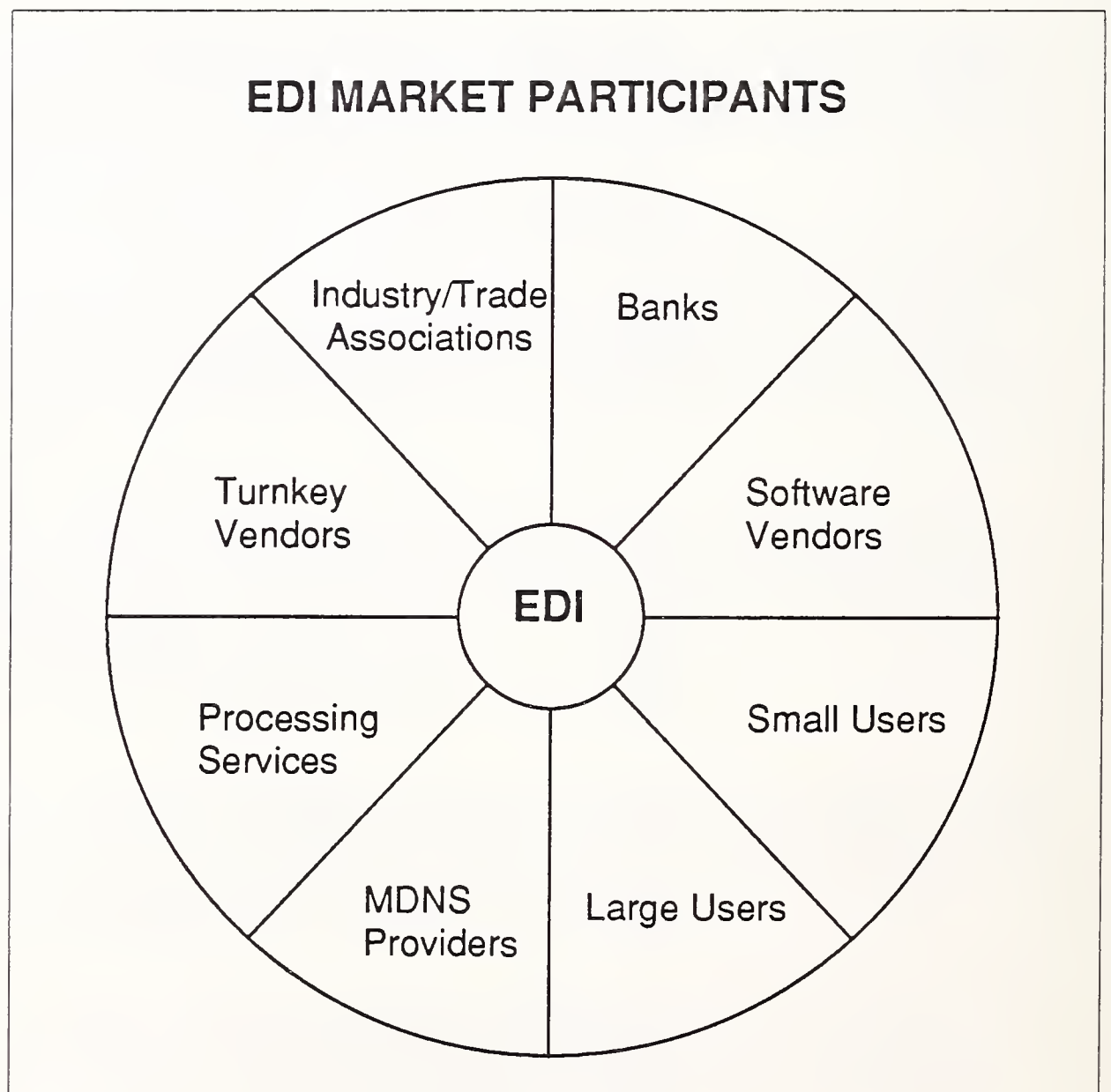
Additionally, wide acceptance and usage of the UNECE/GTDI standard, the emerging threat of public ISDN networks and growing user sophistication will mean that vendors will find the market increasingly competitive and differentiation more difficult.

Profitability is a key issue and as standards are established the need for third-party services will diminish. Consequently, unless vendors continue to develop new value-added features they are likely to experience some erosion of their revenues.

Key to the development of EDI is the identification and exploitation of trading clusters organised on vertical market lines. Commitment of service to the customer is a vital vendor characteristic involving such requirements as manned 24-hour help desks to support clients. Service factors will be the key vendor differentiators.

Exhibit IV-3 represents the participants in the EDI market.

EXHIBIT IV-3



EDI across Europe is gaining momentum. If the U.K.'s growth is mirrored in other European markets, there is no question that EDI will be the component in the network services market which will experience fastest growth.

EDI is discussed further in Section VI-C of the report.

3. Electronic Funds Transfer

Electronic Funds Transfer (EFT) is the most immature of network services applications. Growth of EFT and EFTPoS is inhibited by conflicts of commercial interest between the banks, credit card companies and retailers.

In the U.K., although the large banks have declared their commitment to national EFTPoS, they have also continued to develop and expand their own autonomous EFTPoS networks.

However, whilst development in the U.K. has been slow, in other European countries such as Belgium, France and Scandinavia, developments have been very successful. This is due to EFT growth being driven by retailers and associations.

EFTPoS is an area of key opportunity for network services vendors and especially for software products and professional services. There are varying degrees of penetration in different countries across Western Europe and the reasons for this variance will be more fully analysed in Section VI-B of the report where EFTPoS developments in individual country markets are discussed.

For example, potentially widespread acceptance of EFTPoS services will change the market position of credit cards, which in the U.K. have been a major contributory factor (i.e. the easy credit available) to the consumer boom in addition to being a profitable activity for the banks.

C

Other Services

1. Videotex

Videotex's ease of use and common standard provided the basis for a significant proportion of early network services development with the original emphasis on videotex applications being on public systems for domestic usage—i.e. Prestel (U.K.), Minitel, Teletel (France), Bildschimtext (West Germany), Videotel (Italy).

Only France has managed to develop a sizeable consumer market, by subsidising the distribution of the Minitel terminal, developing the electronic telephone directory, utilising an innovative three-tier pricing structure and allowing access across the Transpac X.25 network. There

are over 3.5 million Minitel terminals currently used in France, and whilst only 35% of systems usage is for business applications, there is increased emphasis on industry specific commercial application services rather than generic domestic applications such as E-mail.

Videotex combines cost-effective transaction processing with ease of use. The market developed from the travel industry (i.e. airline reservation systems) into insurance, finance, distribution and transport.

There has been a change in marketing strategy by both private and public service operations to offer integrated seamless solutions (i.e. E-mail, messaging, online databases) packaged for specific vertical markets which is attracting a growing number of commercial users who do not require application-specific unintelligent terminals.

2. Banking and Financial Services

For banks and financial institutions, the use of network services to speed the transmission of messages and processing of transactions has been an important development in their efforts to gain competitive advantage.

Electronic banking has developed in response to the demand internationally for better funds management and transfer facilities in the corporate sector: SWIFT (Society for Worldwide Interbank Financial Telecommunications) was established in 1973 to provide a number of specialised services relating to interbank financial transactions.

Citicorp competes with SWIFT in international funds transfer with its own network, and provides online facilities for customers to access its network and transfer funds.

Due to the optimistic growth forecasts for electronic banking products, large-scale networks were developed by several U.S. institutions (as well as non-banking players such as GEIS and IP Sharp) resulting in network overcapacity.

INPUT has noted continuing evidence of users being reluctant to pay high prices for totally integrated services that force them to buy features that they do not actually need.

The European clearing banks have been slower in developing networks to give customers electronic access to their services. However in the next five years, it is expected that six of the U.K.'s leading banks and building societies will spend around £4 billion automating their businesses.

Clearing systems such as CHIPS in London are closely linked into SWIFT, developing SWIFT message and security standards. Midland Bank accounts for over 40% of the volume cleared through CHIPS.

Euroclear, a clearing house for bank transfers, was set up in 1982 and Cedel, an international clearing house, was added for securities transactions with 136 banks connected. Banking and financial services are discussed further in Section VI-A of the report.

D

Adjacent Markets

1. Online Databases

INPUT has broken this area down into three distinct segments:

- Information crucial to decision making, i.e. real-time financial information systems (Reuters, Telerate, Quotron, ADP)
- Information valuable to decision making, i.e. industry- or profession-specific databases
- Information useful to decision making, i.e. news, full text, bibliographic

The market is dominated by large corporations as the convergence of banking and computer services intensifies. The non-financial online sector will inevitably shake out due to problems of profitability.

A key strategic trend is the offering of comprehensive services to niche markets. In the U.K., Telerate and Reuters dominate the credit and banking sectors, Topic the auxiliary banking and Topic and Datastream the investment and insurance sectors with limited head to head confrontation.

The demand for stock market information in banking and financial services is a major growth area for online services. However, virtually all the professions - medical, legal, market research and management - are avid users of electronic information. One of the biggest online service vendors, Dialog, estimates that 80% of new business in 1987 came from these professions.

The range and content of online databases is swelling daily. In the U.K. there are already some 300 available with a further 3000 worldwide. As telecommunications links become cheaper and easier, these are becoming increasingly available to the ordinary PC user.

The type of information on these services is growing as well: Apart from the news clipping and business database services, improvements in electronic typesetting have boosted the growth of full text databases of all kinds, including a number of new electronic magazines.

The high profits to be made from the provision of online financial information have led to a need to introduce innovative products and services. The lack of profitability in areas such as news databases has led to con-

solidation as vendors seek critical mass. This area is likely to need several more years of high growth before some payback can be achieved.

Of necessity many of these markets are vertically orientated and are marketed accordingly. Nearly all services are aimed at the business sector where the highest preparedness to pay for information relevant to a profit making enterprise exists.

As with any online service, particularly for critical applications like trading, the provision of a very high level of service to the end user is of the utmost importance - consequently, organisations like Reuters provide a high level of maintenance and service support.

CD ROM could prove to be an important development in the way the online database market develops since it provides an ideal way of distributing large databases to users. A PC fitted with a CD ROM facility is relatively inexpensive, access to the data would be faster, easier to use and more convenient. However, since such a system would cut out the host operator, it is down to the information publishers to exploit this development.

2. Transaction Processing

a. Insurance

In the continual search for competitive advantage, players in the insurance market are looking at network services to provide new services, new products and to deliver existing services more cost effectively.

In the U.K., where the personal financial services market has undergone a boom period thanks to the regulatory reforms and tax incentives brought in by the government, the big names of the computing industry are all involved and systems have been available for several years, which means that a high level of sophistication already exists. The range of network services available go from a simple link to a range of insurance companies on a network to systems that provide comparative quotes in response to a customer's particular requirements.

In the U.K., the greatest market penetration has occurred in the larger building societies and significantly, although there are both Viewdata and personal computer-based services on offer, 80% of building societies have a Viewdata terminal. At this stage in the market's development, the lower cost and ease of use of Viewdata wins out over the wider range of applications and greater flexibility of a PC.

Some of the figures indicate the size of the market: Istel's Inview in the U.K., the accepted market leader, in its first month of operation in 1985, provided 1300 product illustrations. Today that figure stands at a staggering 400,000 illustrations per month.

The U.K. leads the way for insurance network services: For them to be sold to the majority of brokers and intermediaries in the insurance industry, the marketing approach should concentrate on stressing the benefits of lower costs, more business and greater profits for the user of the system. Marketing strategy should avoid the technology, which should be invisible to the user.

It is unlikely that network services will lead to growth in the insurance market where the product (motor insurance) is determined by levels of ownership (vehicles).

The key to growth in this sector will be the arrival of the major insurance industry players on the networks. Once this critical mass has been effected, there will be scope for the vendors to develop new products.

b. Reservations/Bookings

The travel industry serves as the best example of how network services can effect the nature of an industry. There are two distinct sectors: Retail and Business.

The retail travel industry had the problem of an extensive network of third parties through which products were sold and which needed to make online reservations. The successful introduction and widespread acceptance of network services can be attributed to effective marketing which demonstrated to agents and consumers the potential benefits of the system and that the system exploited existing Viewdata technology which was inexpensive and easy to use.

Two agents in particular, Thomas Cook, who made use of the Midland Bank network to link all its branches and thus provide direct access to the various reservation systems available, and Pickfords, who subscribe to Istel's Infotrac network and paid Thomson to put TOPS onto its network so that its branches had dial-in access, have used their activities in business travel to spread the cost of a network.

A survey by Istel of travel agents indicated that whilst 60% of holidays are booked over Videotex, unnecessary long distance call charges still wasted over £8 million last year. However, the use of Videotex has led to the expansion of the retail holiday market and the proactive selling of holidays.

In the business sector it was the airline companies who developed a worldwide online reservation system. The major difference to the retail sector is the increased flexibility and number of applications that a PC-based network system can offer when compared to Viewdata with dial-in access. Of course the high value of the business sector and the levels of

service demanded have driven the development of sophisticated systems. The retail sector is now reaching this point.

c. Utility Services

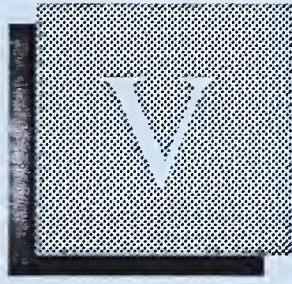
This section concerns primarily the market historically referred to as computer bureaux but now referred to as utility services. This does not include network services (e.g. EFT, EDI) separately defined elsewhere. INPUT would expect to see little or no growth in this sector overall as applications migrate into other delivery modes, for example EDI.

This sector has seen a major reaction towards the migration of applications to low cost in-house systems. Vendors have had to seek innovative service opportunities in order to maintain or develop their business base.

There will continue to be specialist opportunities for services vendors to provide processing services which are related to other types of service (e.g. credit factoring) or which offer a significant opportunity to solve a service problem (i.e. payroll processing).

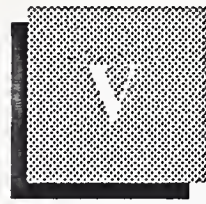
There will be extensive opportunity for vendors with large communications capability and large dispersed organisational infrastructures to compete with internal IS departments on an equal status and meet the challenges of security, loss of control and the need to optimise company wide investments.

The key issue for vendors is the selection of profitable and viable niches. Sound marketing arguments for the service must be found, often these will not relate to DP as such but will be for a clear business purpose and the data processing element will be incidental. All the vendors in this area (IBM, GEIS, Istel, CMG etc.) are all involved in other areas of network, electronic information and processing services.



European Market Analysis





European Market Analysis

A

Telecommunications Environment

The application of software-controlled digital technology within the telecommunications industry has irrevocably changed the nature, structure and economic possibilities of the market. Fundamental issues raised by this development that concern the European telecommunications environment in 1988, and discussed in this section, are:

- Deregulation
- The role of the European Commission
- Tariff structures
- Competition and joint ventures

1. Deregulation

Technological development in the telecommunications business has led to a reassessment of the economic possibilities in providing telecommunications-based services. The potential benefits of telecommunications competition through deregulation are clear:

- Lowering of costs
- Faster introduction of new technology
- Wider range of services

However, despite the attractiveness of these benefits and their economic potential, some European PTTs, notably the Deutsche Bundespost (DBP) in West Germany, are responding very slowly to this challenge and continue to favour the monopolistic position. They put forward the arguments that:

- Their ability to offer cross-subsidisation is socially useful as a part of the national infrastructure.

- Competition forces the vendors involved to place too much emphasis on the immediate future at the expense of longer-term considerations.
- Monopoly provision leads to important economies of scale.

Major changes to the regulatory frameworks for telecommunications and moves towards a competitive environment have been most marked in Japan, the U.S. and the U.K. This trend is being echoed throughout the rest of Europe, particularly in France, the Netherlands and Scandinavia.

2. The European Commission

During 1988 the European Commission has started a number of initiatives designed to address the issues of transmission and interconnection standards and tariff structures. Thus, not only has it been a participant in the process of fostering competition, it is now fulfilling a regulatory role as well. The European Commission's Green Paper on Telecommunications (published in June 1987) made a number of important recommendations:

- That all sectors of telecommunications should be open to competition (with the exception of the basic bearer service)
- That there should be provision for cross-border services within the EEC
- That there should be access to the various PTT networks on fair terms to competitors that offer rival services with the threat of prosecution under the EEC's anticompetition laws for PTTs or multinationals that use their size unfairly to edge out competition
- That a new organisation be formed to control telecommunications standards specifically reliant on input provided to it from both users and vendors

In January 1988, CEPT (the Conference of Posts and Telecommunications Administrations), which represents the national PTTs and up until then the only pan-European standards maker for telecommunications, agreed to loosen its grip on the standards-making process by setting up ETSI (European Telecommunications Standards Institute) specifically to get input from users and manufacturers.

The 18 PTTs involved in the CEPT project announced in June 1988 that this venture would take the form of a jointly owned company with the organisation providing and selling network services in the same way as GEIS and IBM, either directly to the customer or back to national PTTs, depending on the regulations in individual countries.

The company would be expected to compete for leased lines and the sale of services with the independent vendors. Target customers would be small companies not in a position to set up their own networks. The service will run on the X.25 networks already installed by most European PTTs with support for de facto standards such as IBM's SNA available from the outset.

Problems could arise with incompatibility between the various existing PTT networks due to a lack of standardisation in implementation of the network layer protocol, as well as differences in network management architectures and data formats. This would make overall network management a real problem.

However, the idea is to offer simpler data communications to business users, with all maintenance and billing being done through one centre in whatever currency the customer required. The new company will attempt to overcome the cumbersome billing procedures that require customers to sign separate agreements with each national telecommunications supplier. Vendors like EDS, IBM and GEIS have been able to use this problem as a key sales argument for utilisation of their network services.

Plans for the project include the establishment of a separate data-handling company in which all the network operators would have an appropriate share stake. The organisation will be run on an arms-length basis to avoid the concerns over collusion or cross-subsidisation, and will negotiate leased lines from the network operating groups on the same basis as private companies.

Critics of the Green Paper noted that the Commission failed to draw a clear line between basic and competitive services. For example, it did not state whether PTT monopolies could be extended to cover electronic mail.

Presumably, the thinking behind the Green Paper is that if Europe is to remain competitive in a world telecommunications market, its principal players must learn to compete in their national markets. Additionally, if Europe's macro-economic infrastructure is not to fall behind those of its main rivals (the U.S. and Japan), then its strategic business communications services must be more comprehensive, of better quality and more competitively priced.

Running parallel to the Commission's moves is the current round of negotiations under the procedures of the General Agreement on Tariffs and Trade (GATT). The negotiations are at an early stage and are expected to last until 1990. GATT is a legal contract into which 92 countries—primarily OECD (Organisation for Economic Cooperation and Development)—have entered. Representatives from these countries meet periodically to decide upon the rules for international trade.

Any changes within GATT will imply changes in national and EEC laws that could affect trade in telecommunications services. It is for this reason that the Green Paper proposed details of a common position on the international regulatory environment. The GATT negotiators will represent individual governments and organisations, such as the EEC. It is from the U.S. that most pressure for the introduction of trade in services is likely to come.

This is because of the U.S.'s competitive telecommunications industry, whose service providers, AT&T and the Regional Bell Operating Companies (RBOCs), have viewed the European telecommunications service markets as relatively closed in the past. They now see huge commercial, strategic and political benefits in gaining access to the European markets.

Furthermore, European and Japanese governments recognise the importance of freer trade in telecommunications services. Large companies have more to gain from having freer access to foreign service and equipment markets than they have to lose from carefully opening their own markets. Moreover, concern is mounting that restrictions on the telecommunications industry, in West Germany for example, discourage investment in related industries. (The experience of "Big Bang" in the U.K. demonstrates that the liberalisation of telecommunications markets goes hand-in-hand with the expansion of financial markets.)

Whilst the Green Paper is the most important document on telecommunications to come out of Europe for some time, two major sticking points remain:

- The harmonisation of tariff structures (discussed in the following subsection)
- Definition of a basic/enhanced service

No agreement exists between the member states on what differentiates a basic from an enhanced service. Furthermore, most administrations have been unwilling to discuss whether telex or X.400 messaging will, in the future, remain under monopoly control. As these services converge with network services, this position becomes untenable.

In INPUT's view the definition of a basic service is bound to become increasingly narrow with only voice and point-to-point data ultimately remaining the provision of the PTTs.

3. Tariff Structures

One of the expected major benefits of telecommunications deregulation is the prospective reduction of costs to the consumer. In the European environment, where the process of deregulation varies considerably from

country to country, there is still a strong debate on the nature of tariff structures. The independent operators generally prefer the existing system of a tariff structure based on line capacity and point-to-point distance covered. Telekom (the Deutsche Bundespost), however, is in favour of volume charging.

The divergent rates of charging currently in place in Europe reflect political considerations as to the preferred level of service in each country.

However, digitisation and fibre optics have reduced the cost of long-distance service to a far greater degree than for local service, and as a consequence, the trend towards cost-based pricing has led many PTTs to devise ways of protecting their investment in the basic infrastructure.

In particular, this concerns safeguards with regard to leased lines. Different means are used in different countries. All PTTs ban simple resale of voice traffic on leased circuits (voice accounts for 87% of all telecommunications revenues), the concern being that third-party providers could make their leased lines available for the pure resale of voice capacity with low value added.

West Germany's intention is to institute a system of volume tariffs on leased lines, whilst other countries plan a combination of flat-rate and volume-based tariffs. However, there are considerable problems to overcome in implementation since volume-based tariffs increase the relative costs of a leased line to large users, thus stifling the development of competitive services. Within a pan-European context, volume tariffs could lead to a bypass of these countries that choose to implement them.

The Green Paper proposes the existence of volume-based and flat-rate charges—something which will hinder the prospects of ONP (Open Network Provision). It may well be that ISDN (Integrated Services Digital Network) will provide the best opportunity for tariff harmonisation in Europe. (ISDN services—including voice—will be less dependent on distance.)

4. Competition and Joint Ventures

An indication of the concern of the PTTs in the area of network services is in the work of a branch of CEPT called CAC (Commercial Action Committee), which has been charged by the PTTs to look for ways to use existing services to counter the threat of competition. Proposals include:

- Upgrading of the European X.25 packet-switching network to the 1984 version of the CCIT standards.

- Establishment of a pan-European video-conferencing service.
- Introduction of the one-stop stopping concept.
- The design and introduction at a European level of a Managed Data Network Service including joint venture agreements between the PTTs and possibly involving other partners scheduled to begin operation in 1989.

The proposed pan-European MDNS has the most significant ramifications for network services vendors.

PTT thinking is that the reason for the growth in leased lines is the existing incompatibility between the national public packet switched data networks. Offerings under the proposed MDNS will range from the provision of extended networking capabilities to the provision of a physical network offering application-to-application level functionality, in accordance with the OSI reference model as defined by CCITT X.200, thus enabling "one-stop shopping".

CEPT defines the proposed MDNS as "foundation services which make accessible to customers information processing facilities via a public telecommunication discipline by means of communication processing", whilst value added services are "application-orientated services provided to individual organisations".

The proposed MDNS may prove to be a rearguard action by the PTTs to fight off the threat of private competition as well as an indication of the real ambitions of the PTTs with regard to ISDN. Certainly, there can be no doubt that this two-tier approach to network services implicit in the MDNS proposal will give the PTTs a second line of defence against competition from private providers.

It seems ironic that whilst the U.K. government blocked the proposed two-tier venture between IBM and BT as anticompetitive, both BT and Mercury were initially participating in the CEPT MDNS project (BT subsequently withdrew). If a pan-European PTT-offered MDNS is not anti-competitive and does not restrict competition, then users who naturally welcome one-stop stopping should ultimately be offered such a service not just for managed data network services but for basic leased circuits as well.

The ability of the PTTs to exploit the market must come under question because of their commitment to existing services and the marketing skills of the large multinationals such as GEIS and IBM, which are already managing a complete European service for their customers.

Complicating the picture still further, joint ventures between PTTs and multinationals are already in place—CSC in France and Scandinavia (with others to follow), IBM in Italy and Scandinavia and EDS in Spain. Such ventures are not assured of success, and it is worth recalling the failure of BT's joint venture (Edinet) with McDonnell-Douglas.

The question as to whether the PTTs or the multinationals are better equipped to compete in this sector will remain a difficult one. Whilst the PTTs boast strength in basic transmission and switching technology, companies like IBM have the expertise in network management and software support. Furthermore, IBM's cooperative accords with the public network operators and suppliers could be interpreted as a strategy to ultimately wrest control from the PTTs.

Certainly, IBM welcomed the Green Paper, although it expressed concern over the unresolved issues of tariffs, and in particular saw ONP (Open Network Provision), which will provide standardised access points for network service providers, as being essential in creating a liberal market and setting standards of conduct for the PTTs.

IBM's commitment to network services can be seen by the number of strategic agreements and partnerships it has set up: In France, Axone (with Paribas, Credit Agricole and Sema Metra); in Italy, Intesa (with Fiat) and agreement with STET; in Spain agreement with Telefonica and Sema Metra; in Denmark with KTAS (largest of Denmark's independent telephone companies); in addition to ISS (Intercontinental Information Services) linking IBM users in the U.S., Europe and Japan, and INS (Information Network Services) in Europe, offering information exchange for multinational SNA users and EDI for trade transport companies.

IBM's goal is to foster partnerships with the aim of increasing sector knowledge and provide easier entry into key industry sectors, aiming at vertical markets that require specialised knowledge.

It could be argued that CEPT's MDNS project is in response to IBM's dominance in network services and a recognition that it has to address the SNA environment. The challenge for CEPT will be to offer something that provides the kind of added value that the service industries want, the initial point being the definition of the services rather than the network itself—something that organisations like IBM and Digital have realised in the U.K.

The announcement, in May 1988, of the joint venture between the Deutsche Bundespost and France Telecom to offer pan-European network services marked a growing Paris-Bonn axis on telecomms after the DBP had dropped its resistance to the Minitel viewdata service being offered in Germany in November 1987. Since then, the two state bodies

have announced plans for a fibre optic link to carry ISDN traffic between Mulhouse in France and Karlsruhe in West Germany.

British Telecom followed the France Telecom/DBP announcement by confirming that it intended to offer a solution in a new sector covering all kinds of data access and EDI as part of the total business of intercommunication whilst pulling out of the MDNS project (possibly because of its existing collaboration with AT&T and Japan's KDD).

The CSC (Computer Sciences Corporation) agreement to sell 70% of its Infonet global packet-switching network to 12 of the 18 PTTs involved in the MDNS project only weeks subsequent to the announcement of the Franco-German collaborative venture indicated that this venture may well have been a ploy by the French and German administrations to pressure other administrations to join with them in order to combat the encroachments of the U.S. multinationals.

This acquisition of a worldwide packet-switched network business (which accounted for \$80 million of CSC's \$1,150 million turnover) is a significant move by the PTTs with regard to the CEPT project. Whilst CSC still retains a 30% shareholding, the new Infonet shareholders (see Exhibit V-1) are likely to push for the adoption of the 31-country CSC network as the foundation for the 18-PTT MDNS project in order to connect national networks to the rest of the world.

With Infonet as the infrastructure of the MDNS (with ten of the PTTs' Infonet shareholders, this was the foregone conclusion of the outcome of the CEPT-MDNS commitment meeting), the project is likely to start in 1989; otherwise it would have taken the PTTs at least a couple of years to build an international network themselves.

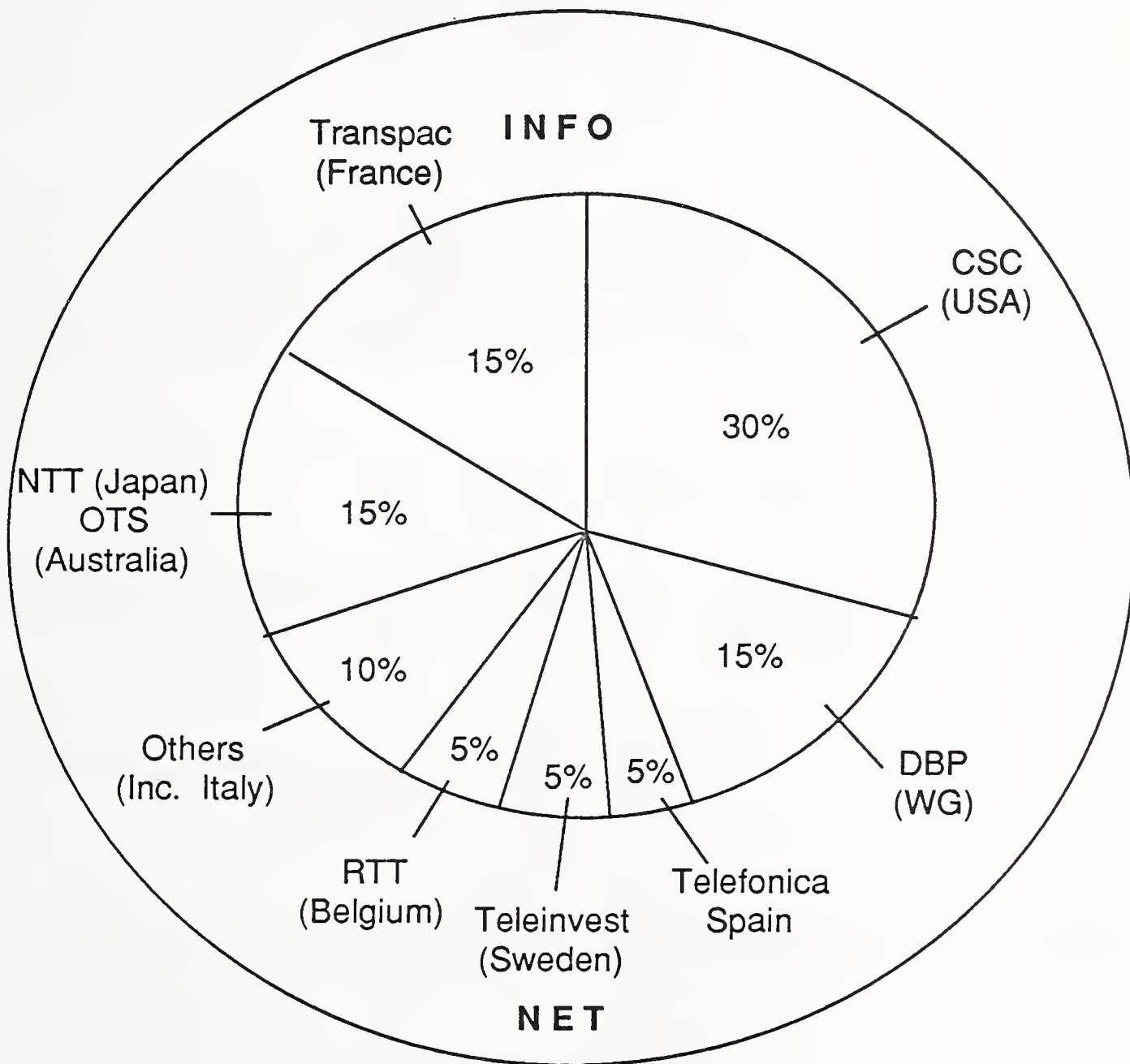
A Europe-only operation would not have been of interest to major international corporations since currently only 20% of existing cross-border traffic stays within Europe. A service without intercontinental links would be a non-starter.

Of concern to the independent vendors is that the French stake is being acquired by Transpac "on behalf of France Telecom", whilst Transpac is nominally independent of France Telecom. Transpac, for example, is negotiating a deal with EDS whereby Transpac will carry EDS' General Motors traffic in France, thereby making it unnecessary for EDS to develop a French network. Such a network may well have resulted in the erosion of substantial Transpac business.

The agreement with CSC will enable the PTTs to offer worldwide end-to-end data communications services, as well as enabling them to fulfill their objective of offering their customers one-stop shopping for international data communications, with one invoice for all international traffic.

EXHIBIT V-1

THE NEW OWNERSHIP OF THE INFONET GLOBAL PACKET SWITCHING NETWORK



A true pan-European network would be a breakthrough: INS commented that the only reason private networks were instituted in the first place was because of the lack of quality of networks set up by the PTTs. Indeed, the multinationals argue that they are not direct competitors and that they may become major MDNS customers since the PTTs are going to be tailoring and running networks—the low-value end of the business.

IBM is collaborating with the PTTs whilst GEIS has a 50/50 joint venture with STET, the holding company for the Italian government's telecommunications interests. However, GEIS' policy seems to be to persuade the PTTs to support their operations rather than offering any equity.

Telenet, Tymnet and the RBOCs will have to act quickly if they are not to miss out on the network services market. The MDNS can be seen as a necessary precursor to the introduction of a full ISDN service and a vital stage in the European Community's move towards OSI.

Given the poor overall quality of existing X.25 networks and with some countries such as France, with its Transpac network, further advanced along the road to X.25 implementation than others, immense input would have been required to meet live MDNS operation by the end of 1989. The CSC option appears to have overcome that particular problem.

With the individual country PTTs likely to enhance the basic MDNS offerings and to set their own tariffs, any extension of the monopoly powers of the PTTs would seriously endanger the competitive climate. Proposals with regard to the PTTs will be submitted at the World Administration Telecomms and Telephone Conference in Melbourne in November.

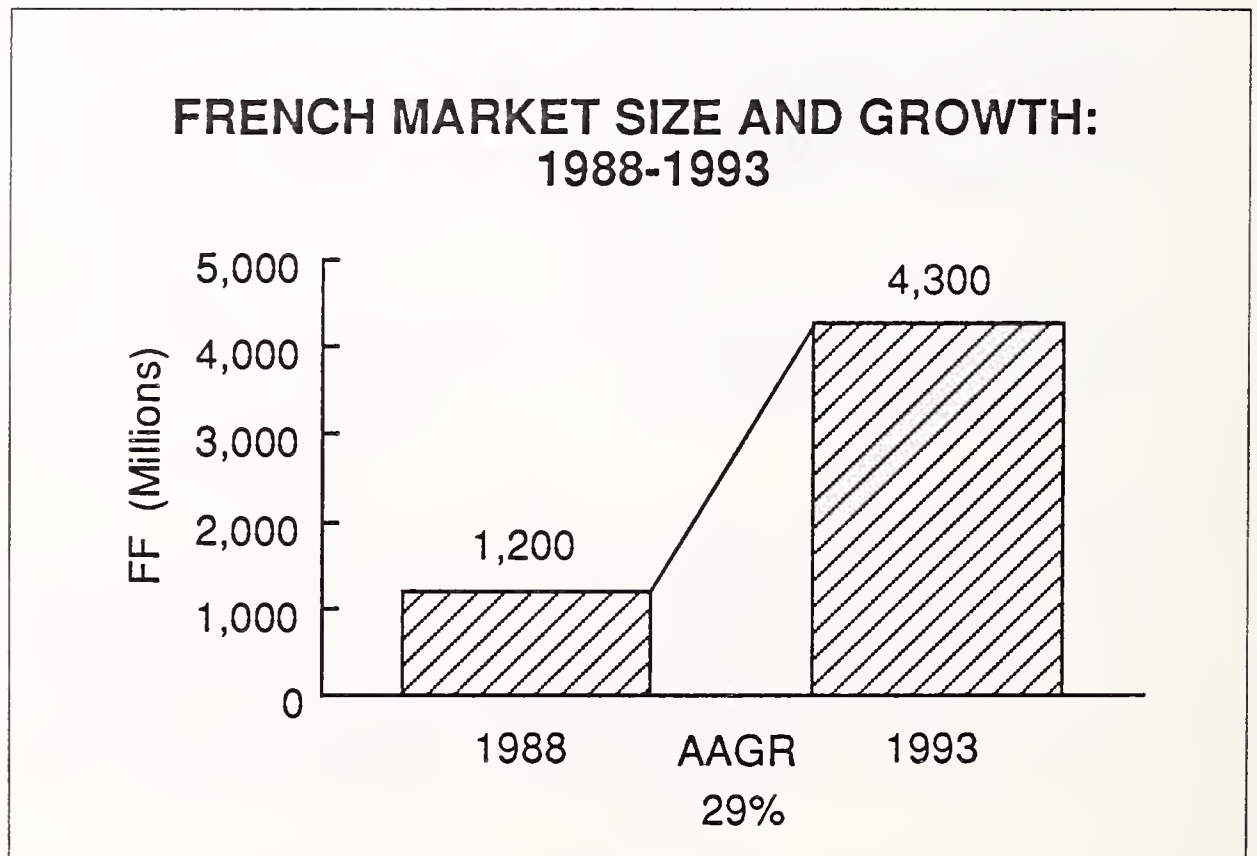
B

France

1. Market Forecast

France is one of the two most mature markets for network services along with the U.K., due largely to the sophistication of its telecommunications environment.

EXHIBIT V-2



The French market will show continued growth (29%) over the period 1988-1993, as shown in Exhibit V-2) although due to the maturity of the

market, this will be slower than most other country markets during this forecast period. Growth in EDI will be the most pronounced, as shown in Exhibit V-3.

EFT and EFTPoS are also well developed in the French market and combined with videotex account for nearly 80% of the whole French network services market in 1988.

EXHIBIT V-3

FRENCH MARKET FORECAST

	FF Millions			AAGR (Percent) 1987-90	FF Millions 1993	AAGR (Percent) 1990-93	AAGR (Percent) 1988-93
	1987	1988	1990				
Managed Network Services	50	80	165	48	380	32	36
E-Mail	120	200	407	49	890	29	34
EDI	10	50	98	70	350	53	48
EFT	330	430	681	27	1,200	21	23
Videotex	310	410	659	29	1,130	20	22
Other	38	54	136	53	340	36	44
TOTAL (rounded)	850	1,200	2,150	36	4,300	26	29

2. Growth Factors

a. Videotex

Videotex is further advanced in France than anywhere else in Europe due to substantial government subsidy. The French public videotex network is the largest worldwide network service, with over 2,000 providers. The French service and software companies (SSIIs), the banks, the airlines etc. all use the public network, whilst the 3.5 million Minutels in circulation indicate substantial consumer satisfaction, with an additional million a year planned.

The costs of the free terminals were recovered within a year from the additional telecommunications revenue generated. Current usage rates are: 90 minutes/month/terminal (Teletel) and 20 minutes/month (electronic directory). These figures exclude closed user group services.

In 1987, income to France Telecom and its subsidiaries from videotex services before payment to the videotex providers totalled 300 million FF, with this figure doubling when the traffic and charges generated by direct billing of business and professional videotex services by others are included.

France Telecom paid out 130 million FF to over 7,000 service providers. The Telecom budget bill, which increased the VAT payable by such services from 18.6% to 33%, should stem the flood of "messagerie rose" on the network.

At a national level, services such as Intergateau (patisserie) and Le Figaro's property advertising service (six-level search that can zero into a local outline map, rooms price bracket, address of a local estate agent, etc.) are extremely successful.

Many new users access Minitel using PCs. France has 90% of the Min-itels in the world. However, having been initially pushed by the DGT, the videotex market now needs to stand on its own dynamic and find a second wind. From a pan-European perspective, this second phase will be slowed by the variety of standards in existence. The standards in force and the approximate number of users are indicated below in Exhibit V-4.

EXHIBIT V-4

COMPARISON OF VIDEOTEX STANDARDS AND USERS

Country	Standard	Number of Users
France	Teletel	3,500,000
U.K.	Prestel	105,000
W. Germany	Cept3	90,000
Holland	Prestel	32,000
U.S.A.	Naplps	600,00

Videotex in France is geared towards public domain applications, however, with only 30% of usage being for business applications compared to the U.K.'s 55%.

b. Networks

Prior to the September 1987 ruling on network services, organisations whose needs and requirements were clear had already set up private networks and services. Esterel, for example, experienced rapid growth with two-thirds of France's 3,000 travel agents using its services (tying in airlines, travel agents, hotels and car rentals). The Esterpac network was the first private network built and linked to Transpac for the benefit of third parties.

Networks were developed for organisations' internal requirements, such as those for Air France, BNP, and Credit Agricole. Then there developed closed user groups such as Swift internationally, or in France four companies—Sligos, Sodinfor, Segin and SG2—monitored CB movements on behalf of the banks.

The more recent SIT (Système National de Télécommunication Interbancaire) is Carte Bancaire's system for transfer between organisations and banks as well as for inter-bank transfers. The objective is to modernise and nationalise payments on a computerised network that is designed to replace traditional channels of inter-bank transfers (over 5 billion per annum).

SIT also meets the needs created by the modernisation of the French Stock Exchange. Among its objectives is the rationalisation of the settlement and delivery system, which generates high administrative costs and cash flow losses due to the absence of any regulatory time limit for settlement after trading and an excessive number of outstanding transactions. Like the banks, the Stock Exchange will use SIT to transmit orders. Nine banks are currently testing the network, with the intention of linking all French banks in 1989.

This network for inter-bank exchanges fits into the worldwide trend to automatise financial transfers (as Swift). However, this is a strategic option, a major reform of banking practices rather than just a question of the technical replacement of the transaction tool.

Whilst 71% of French banks are connected to an inter-bank teleclearance system, there is the possibility of a return to the bureau-type offerings—inter-professional services along the lines of GSIT. However, these service bureaux will have the added network dimension. An example of this would be EDS, for whom the world of finance is a priority for its FM offerings.

c. Deregulation

The clamour for deregulation in France was sated in September 1987 by “decret No 8775”, permitting traffic capacity on leased lines to be resold by the lessor to third parties—i.e., independent service vendors and online database providers. Transport costs are not permitted to exceed 15% of the total turnover generated by the leased line. This means that the remaining 85% must be generated by services, ensuring a high added value for the leased line.

There are two categories with a variable threshold between the two depending on whether the network is specialised or aimed at the more general user. Ministerial authorisation is required for the larger networks. For the larger, Category 2 networks, the traffic costs must be distinct from the processing costs. The proposals for the two categories are set out in Exhibit V-5.

EXHIBIT V-5

FRENCH PROPOSALS ON LEASED LINE USAGE

Category 1	Category 2
Leased lines used internally or for a closed user group	Network service to a third party
Specific applications	Value added: 85%
100 submissions	10 submissions

There is an obligation to use OSI exclusively within two years. Furthermore, it is conceivable that X.400 for E-mail, FTAM for file transfer and X.25 (packet) and X.21 (circuit) switching norms will be made obligatory in the future.

Whilst France has mirrored the U.K. approach towards OSI, the French initiatives could be more readily compared with Japan in the continued support of the PTT and the decision to highlight two categories of network services:

Network submissions had to be in within six months of the September decree. IBM, Bull, GSI, Sligos, Axone, SG2 and Segin were some of those that submitted a declaration, whilst certain large network operators, like Telesystemes, did not have to make a submission since they use the Transpac network.

With 35% of the networks that submitted a declaration not commercialising their services, there is considerable market potential to be tapped. Financial transactions, reservations, product ordering, databases, logistics and transport were the major vertical markets with a predictably high number of videotex operators on operator sites.

Of the hundred submissions, services open to external users (suppliers, distributors, customers) represented 63% of the total, with the freight/transport sector particularly prominent. Twenty-five percent of the network submissions received were from foreign subsidiaries of IBM, CDC, TWA and McDonnell Douglas. Banks accounted for 20% of the networks (BNP, Credit Lyonnais, Banques Populaires etc.), 10% were from the manufacturing sector (Peugeot), 9% from the IT sector (Bull, CDC, IBM), 8% from the airlines (TWA, Air France), 7% from education and training, and 4% from the energy sector (EDF).

The size of the networks was generally smaller than had been anticipated, with two-thirds of them carrying less than 100 Kbits of traffic when the DGT had set the bar at 3.5 Mbits for the general networks. However, a DGT spokesman commented that since the networks submitting declarations were those that had opened commercially as a result of events, it was reasonable to expect, given the forecast growth of network services, that many of these networks would pass the 3.5 Mbit threshold within the year.

A breakdown of the companies, by sector, that submitted a network declaration is illustrated in Exhibit V-6. It is important to note that Transpac does not require authorisation for network services provision.

The stated objectives of the ruling were to open up competition, protect France Telecom and establish a policy of normalisation. Subsequently, in April 1988, the *Journal Officiel* clarified the sticking points on the guidelines for third-party network services.

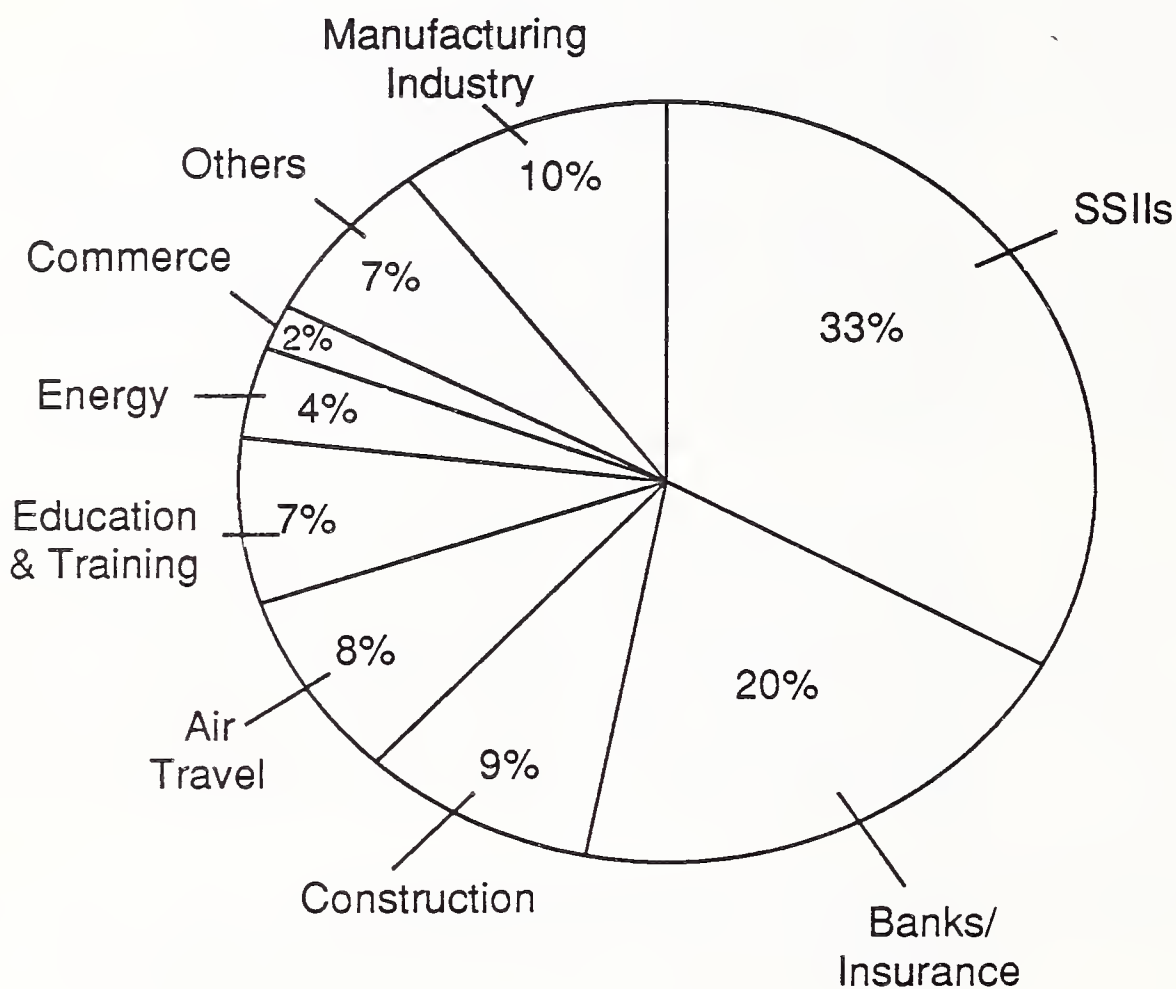
Firstly, the network type has to be identified and use at least one specialised line, directly or indirectly connected or connectable, to the public switched networks.

The opening of the network on at least two points on the switched public networks (phone, Transpac, telex, Transcom) is therefore the key criteria. If there is no convergence with the switched public networks, the network must have at least one specialised line that can transport traffic between two third parties linked by two nodes from remote networks.

Since the announcement of these ground rules for network service providers, there have been a flurry of agreements. These new regulations, liberalising 40% of the French telecommunications monopoly, have not only opened up the market for network services, but also for radio telephone services, cable and satellite.

EXHIBIT V-6

NETWORK DECLARATIONS BY SECTOR



Source: DGT

d. The Players

i. Transpac

The bureaucratic mouthful Direction Generale des Telecommunications (DGT) has been renamed France Telecom, and the French telecommunications industry itself has been caught up in a frenzy of alliances and mergers to help it achieve the necessary international scale in preparation for 1992. The French retain a fundamental belief that a public telecommunications network is a natural monopoly and is loath to undermine the four million francs annual revenues from its business services.

Revenues generated from Transpac and other public services will be protected, possibly by volume tariffs on leased lines. More significantly,

Transpac receives special tariffs whilst being able to move into the domain regarded as the sole province of service vendors—i.e., the development of private dedicated networks for client applications such as Esterel.

The present evolution of the French X.25 network market reveals an apparent contradiction: The development of Transpac, which expects to connect 60,000+ subscribers over the next two years (currently at 50,000); suggests a significant market for private X.25 networks. Once users are used to X.25, they may develop their own.

Whilst 55% of the private networks are relatively small- and medium-sized organisations see private X.25 networks as economically advantageous, it is the larger organisations that are looking to give themselves autonomy with regard to Transpac and choice of equipment.

Considerable cost savings would be achieved by these organizations. As a public service network, Transpac applies a standard subscription rate, which is independent of distance, thereby prejudicing those networks that are concentrated in one area. Transpac has reacted to these moves by proposing a new private offer: A private network sheltered by the public network.

The market coverage of Transpac and the coverage of Interpac, which offers a personalised, private service of packet-switched data transmission at an international level based on CSC's Infonet network—added to the increase in private X.25 network solutions—forms a wide-ranging market for suppliers.

1987 marked an important diversification for Transpac—namely, the pilot phase of Atlas X.400 E-mail service. This pilot looked at companies interested in linking, especially the interconnection of different X.400 protocols by the private message providers such as the vendors and the SSIs.

By the end of the year, Transpac noted that out of 45 contracts, there were 9 private clearing houses, (including Bull, Digital, IBM, Hewlett-Packard and Telesystemes) for Atlas X.400 access and 78 individual subscribers with a volume of 600 messages per day.

Among the subscribers are professional groups such as Galia (automotive) or Edoni (distribution), which uses Atlas X.400 for EDI. Such a situation could create difficulties for the independent vendors, given Transpac's monopoly position, as Atlas X.400 enters de facto into the network services market place, enabling businesses to transfer messages between non-compatible systems.

The French market highlights the two possible approaches for network services vendors: The product approach, as exemplified by Axone, and the market approach—i.e., developing individual specialist client applications, such as GEIS with the MSEBS projects or SERES with the ALLEGRO project.

ii. Axone

Axone has started by offering back-up services, IBM network, Profs, Screenmail, EDI, videotex applications and protocol conversion. The company is capitalised at 29 million FF (45% IBM, 26% Paribas, 25% Credit Agricole, 5% Sema Metra, 4% Credit du Nord), with an investment of 600 million FF planned over five years.

Axone is targeting 30% of the market in several directions: Its objectives are to resolve the problems of non-compatibility, to offer database access and information provision, as well as E-mail, EDI and an overall “business” service.

Axone is the first French “reseau à valeur ajoutée”. It uses IBM’s network, which gives a nationwide SNA covered base. Axone believes that it will be able to reduce the cost of a transaction from 7 FF to 2 FF, and will be aiming its services at the insurance and automotive sector, initially selling back-up teleprocessing services that were previously offered by IBM France through INS.

As all network services providers will have to conform to OSI standards within two years, Axone is offering access to OSI protocols “as they are available”.

iii. Bull

Bull has signed an agreement with Gencod to set up the Allegro network for EDI in distribution.

Gencod is an organization with 8,000 affiliated members, 7,600 from the manufacturing sector and 400 from the distribution sector, which currently exchange stock and order information on tape and disk. Allegro will enable them to exchange invoices, orders and messages of various kinds between micros.

Users will be able to access the Allegro (Automisation des Liaisons du Langage Gencod par Reseau d’Ordinateurs) service via MS-DOS, using the public networks (accessed in X.25/X.32) to communicate between themselves or through a server. Some 3,500 million individual transactions are expected to transit through this network by 1990.

Allegro will not offer direct mainframe-mainframe links as yet. Disks will still be prepared, but rather than being sent, their contents will go MS-DOS/PC on X.25/X.32 networks.

October 1988 to March 1989 will mark the start of the pilot phase involving three large distributors and 20 manufacturers. After completion of this phase, a total of 20 distributors and 400 manufacturers will be involved for a further two years. Traffic is expected to reach 30,000 documents a day, rising to 70,000 documents a day by 1991.

Bull's stated intention is not to develop prototypes but to get operational quickly, especially since the structure of the Gencod language is very similar to Edifact. Bull's position is that they will conform only when standards are agreed, unlike Galia, which is using Edifact but carrying out very few transactions.

iv. Seres

The creation of Seres (Societe d'Exploitation de Services et de Reseaux), which will be owned 49% by Bull and 51% by Sesa, was capitalised at 250,000 FF (the legal minimum in France). The choice of Sesa as Bull's partner was considered a surprise, GEIS being widely anticipated to partner Bull because of their past joint ventures.

The stated objective of Seres is to develop and exploit the various available network services, enabling data to be transferred electronically and information to be exchanged between companies or between companies and public services.

Bull provides the network and systems offerings, with Sesa providing the experience in developing and implementing data transmission networks and large multi-user data interchange systems. Sesa provided the DPS 25, which forms the basis of the Transpac network. Sesa also developed the electronic directory with Cap Gemini Sogeti.

Sesa and Bull have worked together before, notably on the development and installation of the SIT network, whilst Bull Ingenierie was a Bull 51%, Sesa 49% venture in systems integration. Seres is clearly Bull's reply to the threat of IBM and Axone.

Interestingly, Sesa are a subsidiary of Cap Gemini Sogeti. Cap's lack of activity since the decree has contrasted markedly with the activity of GSI, Sligos etc. This agreement with Bull, came only a few days after a joint venture between CGS and IBM in systems integration.

For Bull, it was vital to enter fully into the network services market as its various projects, G.SIT in banking, ESTEREL in tourism and ALLEGRO in distribution, provides it with a significant entry point into the key EDI market.

With the arrival of Seres, a new group of network service operators is forming based on alliances between SSIs and manufacturers.

v. IBM

IBM has been, and continues to be, a major lobbyist for liberalisation in France. Whilst other service vendors (Seres, GSI) will seek to capitalise on niche opportunities and the development of private networks for small- to medium-sized organisations faced with problems of cost, complexity and skills shortages, IBM should be able to do well in banking services with a major customer base of installed mainframes.

IBM is also in a strong position in videotex, with IBM's International Business Services system having been operational for some time, with users like Holland-based TRANSPOTEL for international information exchange between forwarding agents and transportation companies in eight European countries and ESAB, a Swedish welding company, for coordinating inventory on an international basis.

e. Market Activity

Niche markets are likely to succeed in France: For example, GSI's value-added activity rests essentially on the infrastructure of its network, which already links more than 5,000 customers in the world, as well as its areas of specialisation recognised in automotive, transport, tourism etc.

At this stage, vertical markets will experience greatest growth with information services in general evolving at the rhythm of European integration. Banks and distributors are progressively providing themselves with communication infrastructures, that enable them to effectively manage their production outfit and their commercial networks, as well as their financial facilities.

Only groups of a European dimension with complementary resources in information processing will be able to respond to the demand of the large manufacturing groups with scattered branches all around Europe—EDS, for example, with a worldwide telecommunications network of over 40,000 terminals, has declared an interest in the network services market in France, especially with its Pechiney subsidiary, SPI.

The CGE is also looking for a private partner, having sold its 51% holding in Sesa to Cap Gemini Sogeti in July 1987. Further examples of the shuffling for market position via joint venture and strategic alliance are Sligos, which has taken 53.5% of the capital of CMG, which after Cap Gemini Sogeti is the second biggest SSI in France, CGI and CR2A, Sema Metra and Cerci, as well as Olivetti/Telesystemes/Suez: Telesystemes, as a subsidiary of DGT, is also looking for a new partner.

The SNCF signed with GSI-Transports for all dealings with its 40,000 freight customers. Whilst EDI represents a large part of the network services market, the stakes are such that different professions use ad hoc commercial structures rather than those offered by the traditional service providers, hence the existence of networks such as GIE Carte Bancaire, SIT, Swift, Odette, Galia, Amadeus and Galileo.

Part of the market goes to interface software packages developed by organisations like Sitpro. Compatibility between machines, applications and organisations will provide the network services market with the greatest opportunity for growth.

The standards-making process continues to progress slowly, and there remains some way to go in France before businesses can communicate effectively. Unlike the U.S., where industry is the driving force behind EDI, it is the government agencies that are playing a key supporting role for the technology in France. These include Simpro (the French equivalent of Sitpro), the Customs service, external trade bureaucracies and agencies focussing on fiscal matters.

The French government is using two main tools to push EDI: Free computer programmes and alliances with industry associations. One hundred firms are using the government's standardised official software package with all programmes being run by the Edifact board, whilst Simpro is working through three French industry associations—Galia (automotive), UIC (chemical), GFT (freight forwarders/customs brokers)—in order to promote the use of EDI.

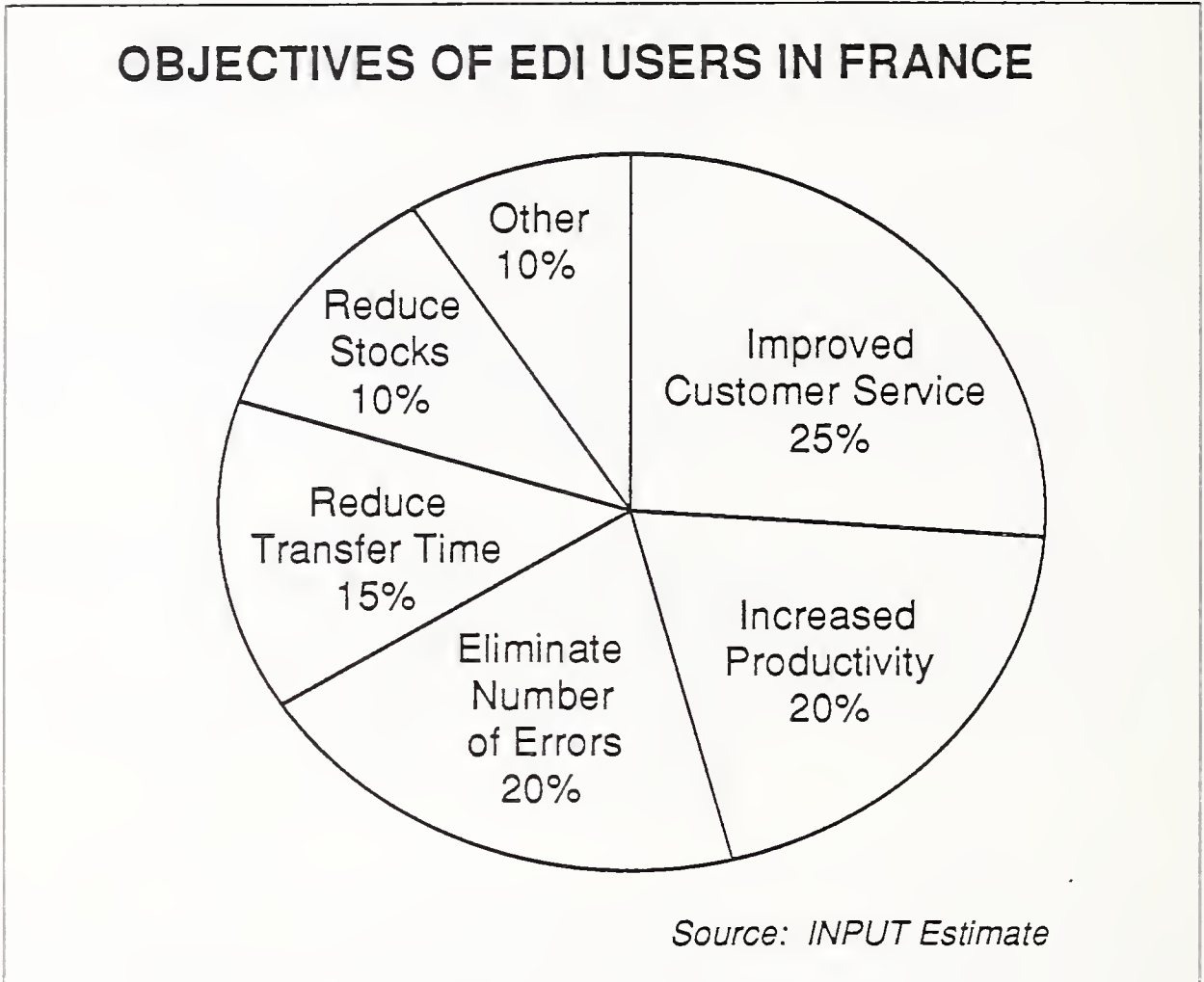
A breakdown of the objectives of EDI in France amongst potential users is shown in Exhibit V-7.

GSI has installed a network linking the French government's foreign-based export offices called EDUTEL, which combines internal E-mail with a videotex service centre in order to transmit news and data. This is one of the world's largest videotex service centres.

In face of this burgeoning EDI development, Transpac is determined to promote Atlas X.400, believing that a total service offering is the key to the EDI market in France. Transpac is watching efforts by organisations like Simpro to promote Edifact, but unlike the development of the U.K. market, it intends to offer decentralised solutions for translations and conversions.

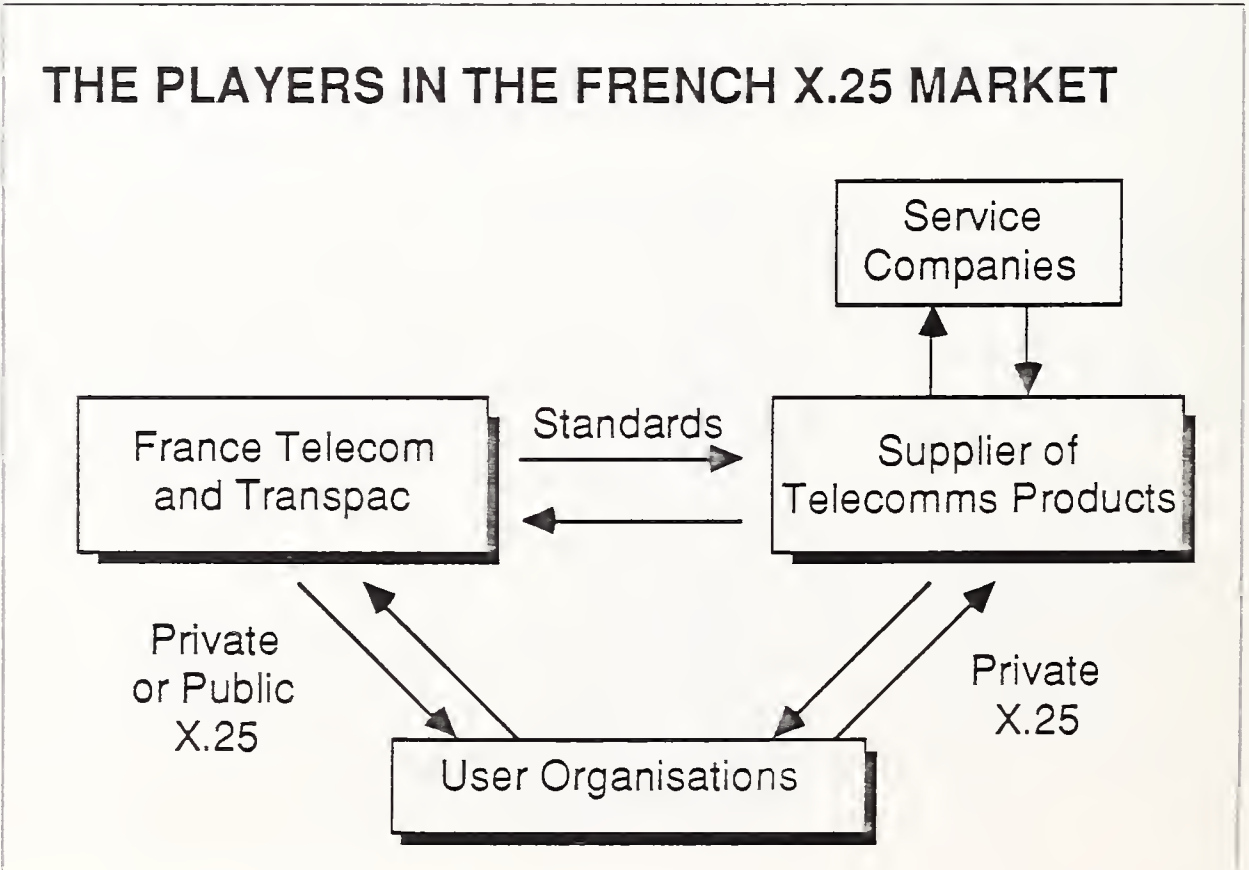
Whilst Transpac accepts that it is entering the EDI market behind the U.K., it argues that France benefits from a normalised X.25 environment, thus emphasizing the benefits of standards. Might the French tortoise yet overtake the U.K. hare? The players in the French X.25 market are shown in Exhibit V-8. Currently, the only really profitable network

EXHIBIT V-7



services are those that offer productivity gains in terms of integration, in the financial sector or in transport, and are offered by service providers allied with companies with private operational networks, enabling them to get started without having to wait for uncertain European deregulation.

EXHIBIT V-8



This is a reaction to the danger that more advanced groups—from the U.S.—will cream the market unless alliances are made. Hewlett-Packard, like IBM, is consolidating its European network infrastructure, whilst Digital too intends becoming a leading player in network services.

The emergence of a large interior market has encouraged the large U.S. players. The relative weakness of the dollar in relation to the Ecu makes their implantation more expensive, but they are attracted by the prospects offered by the European market.

France's cable programme has taken off with nearly 500,000 houses cabled, with a million expected by the end of 1988. The cable programme is seen as contributing major additional potential for telecommunications services as well as television programming. Cable is likely to encourage even further the already strong development of videotex and other interactive voice and data services.

France has long been at the forefront of new voice and data telecommunications technologies. Minitel continues to grow rapidly—over 3.5 million Minitels have been installed in France (14% of telephone subscribers). Not surprisingly, France hopes to export its Minitel technology and system elsewhere in Europe as well as its electronic directory system.

Cogecom, subsidiary of France Telecom, and the DBP have created a joint venture, causing a break in the DBP monopoly. The nature of the venture is vague ("provision of value added services"), and covers applications like EDI down to packet-switching (Transpac). International E-mail will probably be the initial service.

West Germany has also agreed to a gateway between its videotex service and the French service, with the EEC commission expected to publish common standards and specifications in July to cover modems in Europe.

France Telecom expects to have 300 subscribers connected to its initial commercial ISDN operation in the Brittany region, which will be the world's first. Early customers include local Chambers of Commerce, local administration services, Ouest-France, Electricite de France, Credit Agricole as well as business and retailers.

The schedule is September 1988 for Paris and suburbs, 1989 for large cities and primary rate access and interconnection to ISDN in the U.K., Italy and West Germany, with 1990 seeing the world's first national ISDN coverage.

C

U.K.

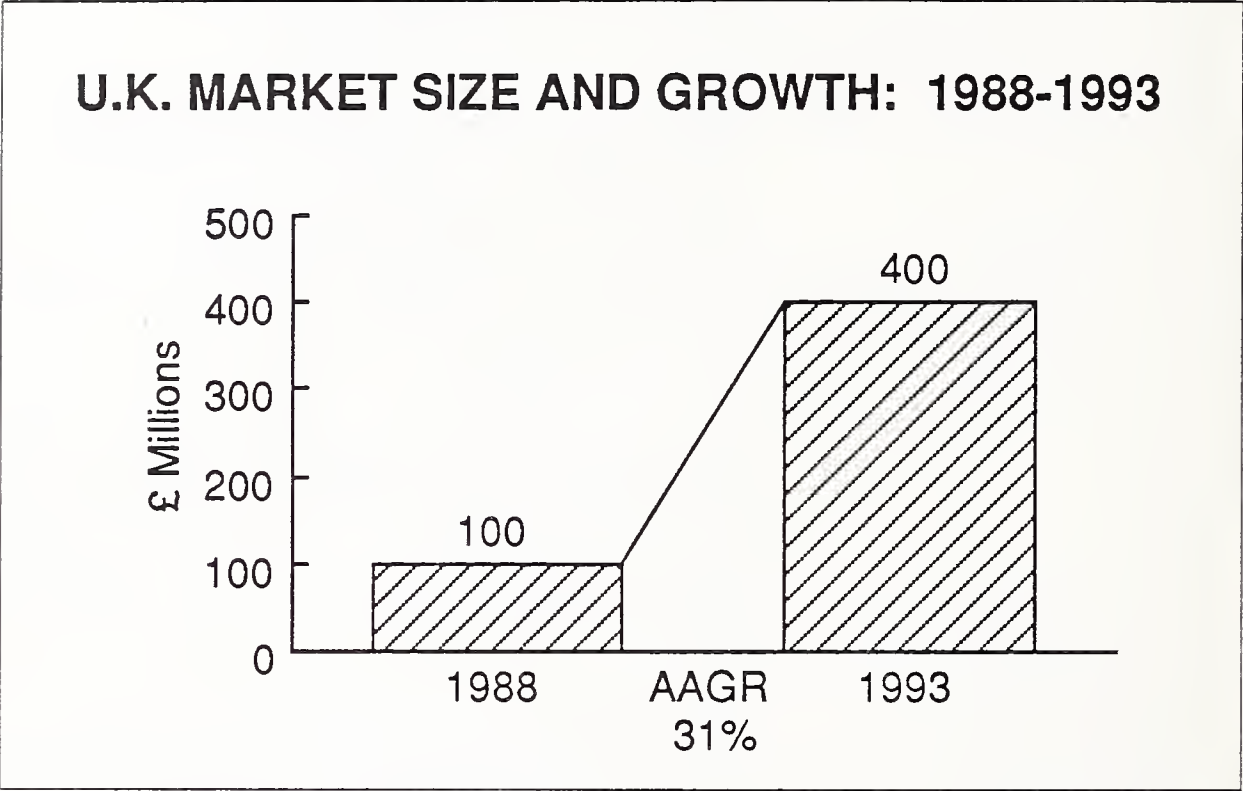
1. Market Forecast

The U.K., along with France, is the most developed market for network services in Western Europe, a reflection of liberalisation, government-

sponsored initiatives such as VANGUARD, and the growing sophistication of its telecommunications environment.

The U.K. market is expected to maintain buoyant rates of growth (31%) over the forecast period (1988-1993), as shown in Exhibit V-9, and, together with France, will constitute over 50% of the total market by the end of the forecast period.

EXHIBIT V-9



EDI is the area where the highest rates of growth are expected, as shown in Exhibit V-10. Vendors in the U.K. are currently experiencing growth rates of 200-300% per annum.

E-mail is still the largest value-added application area in the U.K. and will account for nearly 45% of network services revenues by the end of the forecast period.

The proposed national EFTPoS scheme offers significant growth opportunities for vendors of software products and professional services.

EXHIBIT V-10

U.K. MARKET FORECAST

	£ Millions			AAGR (Percent) 1987-90	£ Millions 1993	AAGR (Percent) 1990-93	AAGR (Percent) 1988-93
	1987	1988	1990				
Managed Network Services	9	12	19	28	33	20	22
E-Mail	26	38	71	39	160	31	33
EDI	5	9	17	50	60	52	46
EFT	9	15	28	46	49	21	27
Videotex	9	13	20	30	33	18	20
Other	6	13	22	54	51	32	31
TOTAL (rounded)	65	100	200	40	400	30	32

2. Growth Factors

The leading vendors in the U.K. are those that comprise the DTI' Vanguard initiative: British Telecom, INS, IBM, Istel and Fastrak. Digital has more recently launched itself into the arena.

The U.K., thanks to early liberalisation, has stolen a march on the rest of Europe in the network services market. The retail sector in particular has embraced EDI with gusto—over 75% of invoices submitted to Boots and Woolworth, for example, are transmitted via EDI, whilst the automotive industry employs at least one of the EDI services. Telecom Gold has a subscriber base of over 105,000 users.

BT adds value to its networks via the Telecom Gold electronic mail service and the Prestel videotex service. IBM and INS are particularly involved in EDI, whilst Istel and Fastrak are examples of private networks going public with a range of network services.

a. British Telecom

BT's value-added services division has restructured its data services activities in an enlarged Dialcom Group, employing more than 900 people and with a turnover of about \$100 million. The move to concentrate E-mail and network services business is seen as BT's international strategy.

Dialcom intends to establish intelligent network links to form the backbone of its worldwide infrastructure for network services. Offerings are Dialcom's existing E-mail, messaging and information services and X.400 software and BT's U.K.-based services for electronic messaging and Prestel.

The move reflects the growing convergence between Prestel and Telecom Gold. Both offer E-mail and database facilities that can be accessed from videotex or ASCII terminals. BT intends to pool the computer and network resources of its existing services. A key market for the new group is likely to be EDI.

BT and BS Mantzos Holdings have invested £2 million in a joint venture—Holiday Designers Ltd—which will sell a one-stop reservation system to travel agents, from which a do-it-yourself holiday can be put together. The system went live in the summer, offering chartered and scheduled flights, insurance, accommodation, car hire and transfers, and reaches travel agents via the British Telecom Travel service on Prestel.

McDonnell Douglas subsidiary Tymnet has signed an agreement with British Telecom International to offer a direct communications link between the two companies' packet switched networks.

b. Mercury

MERCURY reduced the cost of its Mercury Link 7500 dial-up E-mail and telex service by 50%. Mercury Link 7500 E-mail service provides low-volume telex users, who would not require a dedicated installation, access to a telex service. The system offers a facility to convert and deliver text messages to fax machines and access a number of online information services.

c. INS

INS, an ICL/GEIS company, established the Tradanet network to support companies employing the Tradacoms standards established by the ANA in 1982, updated this year. Over 800 companies in the U.K. have now adopted these standards, which define formats for orders, invoices, delivery notes, picking lists and stock holdings. Although the retail trade is a major user, many other industries are using them.

Whilst only a few suppliers in the U.K. have had a major presence in EDI and have tended to let each other specialise in a particular sector of the market, finding it easier to develop a new market than attack a competitor with a headstart, there are sectors, such as the NHS, which is the largest employer in Europe, where all of the suppliers are vying for a chunk of the business.

INS' link of its U.K. EDI service to GEIS' worldwide EDI*Express service makes it the world's largest EDI community. From March 1988, INS was able to offer an application-application link with full accountability, audit control and security across the bridge. This agreement brings together two-thirds of the total EDI user base (2,500 users worldwide).

A secure international bridge has been something that groups like DISH (Data Interchange for Shipping) have been looking for for a while, and one of the first bodies to use the new bridge was the CEFIC group of European chemical manufacturers in their EDI trial on exchanging invoices, orders and shipping documents throughout Europe—particularly significant with the liberalisation of Customs barriers in 1992.

INS made a breakthrough in the potentially lucrative market in the convergence of EDI and EFT with a contract with the U.K.'s banks' cheque clearing service, BACS, for a electronic funds transfer trial, BACSNET, which will allow INS EDI users to transfer orders, picking lists and invoices (classic EDI), but also to transmit payments and direct debits to BACS.

INS offerings include the Bulletin Message system on the Mercury data network, Business-Talk on the GEIS Mark III Net, Brokernet, Motornet, Bacsnet, Pharmnet and Tradanet. The National Freight Consortium's Distribution Group is one of Tradanet's largest 800+ members; with its manufacturers, distributors and retailers, it is the largest road distribution specialist in Europe.

d. Istel

Istel has built on its strong base in manufacturing, providing Edict-based services to automate links between manufacturers and their suppliers—enabling JIT techniques to be used.

Istel has also penetrated the travel industry, with eight of the top ten U.K. tour operators using Istel services. Edict has been specially adapted to distribute late availability bargains, for example. Edict is also being used by the U.K.'s finance houses, providing HP and loan services to increase efficiency and eliminate fraud.

Istel is also competing with INS for the potentially enormous NHS market. Three Regional Health authorities—Wessex, Trent and NW

Thames—are using Istel's Edict to communicate with a number of their suppliers.

The best known of Istel's services is Edict for the motor trade, now endorsed by the SMMT, which runs against INS' Motonet. This is a key market since the major suppliers to the automotive industry also supply other sectors—aerospace manufacturers, for example. Istel's offerings include Comet (E-mail), Edict (EDI) as well as a range of services to the insurance, travel and financial services industries, all on the Infotrac network.

e. IBM

IBM's Managed Network Service (MNS) is a national service with strong international links, supporting a range of business applications that are either wholly user applications or utilise IBM's own application offerings—like EDI, E-mail, enquiry systems, videotex, computer to computer communications—through its Business Network Services (BNS).

IBM's appointment of agents (Systems Designers and Software Connection) to sell EDIlink, the interface software for the IBM Information Exchange service, is a step towards their goal of dominating the market for intercompany network services.

IBM's BNS offerings are not geared to increasing hardware sales although obviously some customers do buy services as part of a systems integration bid—as with National Westminster Bank's share dealing service (Shade)—but IBM believes that the ability of customers to keep their hardware migration options open is one of the most important criteria for selecting a service supplier.

The Managed Network Service—the IBM network infrastructure that supports all the generic and specific services offered by BNS—is its support for multiple protocols and protection against technology change. Managing change in the current unpredictable telecomms environment is complex and risk-prone. IBM believes that most users need not own/run their own networks, and offers supplier accountability with MNS, positioning the service as a “utility” in which the customer is isolated from the day-to-day running of the network.

EFT, the Building Societies' consortium, approached IBM in 1984 to set up a network for shared transactions (Matrix). At the same time the rival Link consortium was setting up its own funds transfer network. IBM delivered ahead of Link and was able to act as honest broker between the societies.

Six hundred customers are attached to the MNS, with more than 1,000 applications using it as the delivery mechanism, some from IBM, others from third parties. (Datasolve uses it for a network disaster-recovery service on behalf of Citibank and to offer its World Reporter financial services database). The network supports 6,000 terminals and 250 hosts and is configured for 10,000. The next challenge is to address the market for international services, although telecomms regulation prohibits anything like the MNS outside the U.K. IBM has little confidence in the ability of governments or the EEC to create the environment that an international services business will need to develop, seeing the change driven by industries that use electronic trading to compete.

IBM's two key contracts are the development of a network and a wide range of services for the London Insurance Market and the contract for RINET, which was set up by eight of the leading players in the European reinsurance market, with Mercantile and General Reinsurance as the U.K. representative. IBM's offering stresses the connectivity through its international network service: EDI using IBM Information Exchange and EDIlink, Screenmail and a PC-based workstation with inbuilt reinsurance applications. Live service is planned for next year.

f. Fastrak

Fastrak, Midland Bank's network, expects traffic growth to continue at 300%, with revenues already over £1 million. Midland intends on investing a further £10 million in Fastrak over the next two years, the majority of which is earmarked for its fast-growing portfolio, such as Electronic Arcade.

Fastrak's emphasis is on new users and new kinds of access methods; the travel trade accounted for 60-70% of Fastrak traffic in 1986, whereas now it only accounts for 30-35%, with financial services growing fast at 35%, motor trade at 20% and public authorities and others at 10-15%. Fastrak's expansion is likely to come from wider access methods: Whilst videotex is likely to remain popular, asynchronous connections are increasingly in demand.

Electronic Arcade offers one-stop shopping for the financial market—access to credit checking, insurance and mortgage quotations, share information, travellers' cheques and foreign money ordering services through a local call to the Fastrak network. Fastrak does not charge a subscription fee (unique), with users being billed by the service provider. Both PCs and videotex terminals can access the network.

Fastrak and International Leisure Group have formed a joint venture company to bring faster network services to the travel industry. Called Intalink, the new service will give U.K. travel agents viewdata access to tour operators' systems over Fastrak's X.25 packet-switched network.

This is similar to the "Fast" network developed by Thomas Cook in conjunction with Fastrak which is used to link 50% of Cook's branch offices.

Subscribers are routed by on-site communications controllers directly to BT/Mercury leased lines and can therefore sidestep the method of dial-up access. Intalink cuts the time travel agents spend on making bookings by up to 35% and cut communications costs by 30%. Fastrak beat Istel and BT to the contract mainly because of its delivery of service. Any viedata terminal with a V.24 interface can connect to the service.

Fastrak already hosts 75% of the tour operators on its network, but IL says that it has now signed up 50% of the U.K. operators onto its dedicated service. Those that don't join will lose out on the numbers of accesses made to operators' databases. The aim is to contact 3,500 outlets over the next five years, whilst the expectation that the raft of financial services, including home banking, will act as an incentive.

g. Digital

Digital intends to branch into network services on a pan-European scale; in the U.K. it will target its EDI network to large corporations operating in multiple industries. Digital's strategy departs from the way existing EDI players have so far addressed the market. INS and Istel have focused on vertical markets.

It has chosen financial services due to April's Financial Services Act, which requires that brokers—from major banks to one-man businesses—register either as independent brokers selling many companies' financial services or as brokers promoting one product. It will also require brokers to keep precise, long-term records of customer details and transactions.

Digital intends to capitalise on opportunities presented by these market shifts to provide an interactive, point-to-point service for online access to a variety of financial companies' databases. The Financial Services Act will initiate an increased need for communications efficiency and a new need for communications between organisations that previously had no dealings with one another, creating a flux of new intermediaries. Companies that previously only acted as brokers for motor insurance will break into new services like life insurance.

Digital is currently running its EDI and financial services separately, but these will merge as developments mature. For example, DEC and public service consultancy Cipfa Services launched a network service to speed up the house buying process. From June, the scheme will link local authority computer systems to give online access to land charge information, cutting search times from weeks to a few days.

h. Market Activity

The second phase of Vanguard, which received £1 million backing from industry and government, has looked at ten industry sectors in order to analyse the benefits of network services to each. The sectors selected were: Aerospace, brewing, agrochemicals, construction (EDIcon), educational supplies, pharmaceuticals, textiles, transport, electricals (EDIfice) and wholesale food distribution.

MCP (Maritime Cargo Processing), a joint venture company established by the Felixstowe Dock and Railway Company and port users in Felixstowe and Harwich to administer the development and marketing of systems for the port industry, last year signed a joint venture agreement with the European electronic freighting information service, Transpotel, whereby MCP's 450 subscribers will have access to the 1,000 Transpotel users and intends to provide EDI facilities for port users operated through the IBM international network.

The new EDI service will allow freight forwarders and Customs brokers to transmit electronically the Single Administrative Document (SAD) that was introduced in the EEC at the start of the year, replacing more than 100 different customs forms previously used.

The NHS has an open mind as to who will supply its EDI network, due to start in March 1989. By 1991, it plans to have a state-of-the-art EDI network linking districts and regions with suppliers. The contract may go to one firm, several, a consortium, U.K. or abroad. Currently, four health authorities are operating a pilot EDI service using Edict, whilst one of them (NW Thames) is running a parallel trial of INS Tradanet service. INS has also been running a national pilot trial linking regional pharmaceutical supplies centres in two regions.

Price Waterhouse wants to set up an EDI club for the offshore construction industry, with BP and Shell showing keen interest. A major offshore construction project can involve over a million drawings, and the club will look at ways of replacing the paper mountain with electronic documents. This feasibility study will include all the activities in the supply chain, from design to commissioning to handover.

Racal won the £300 million government contract for its data network, expected to be the largest of its kind in Western Europe, linking about 240,000 computer terminals in four departments—Health and Social Security, Inland Revenue, Customs and Excise and the Home Office—by 1995.

Cheap PC-based software starter kits for EDI, sponsored by leading suppliers to the automotive industry, including Lucas, Unipart and Turner & Newell, are sponsoring a £50,000 EDI software development project

being put together by Odette. The package for creating, sending, receiving or printing any EDI message that conforms to Odette standards should be available by the end of the year. Many small/medium businesses without systems support to implement EDI could make use of the PC via proprietary or third-party networks such as Edict or Tradanet.

Some of the larger manufacturers will use the package as a basis for the development of specially tailored plug-in PC boards, which would be offered free to their preferred supplier, who could then hook directly into any EDI network without the problems of systems development. Ford has already met with considerable success in coaxing a good many of its suppliers onto Fordnet, its corporate EDI network, by offering free EDI software and free message transmission. This trend is likely to continue as EDI achieves critical mass.

D

West Germany

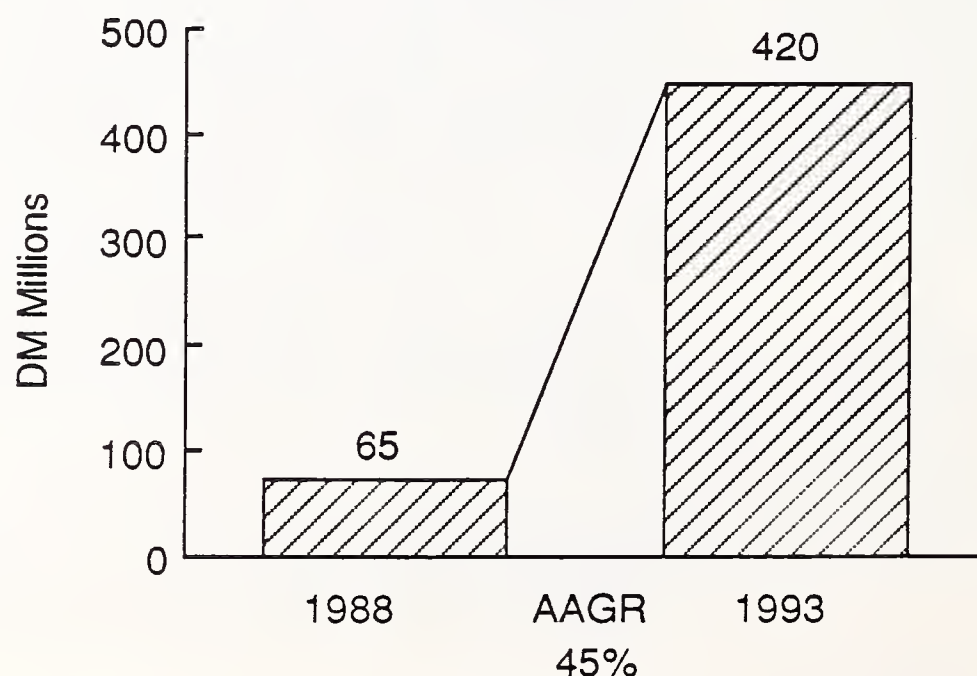
1. Market Forecast

The West German market has only recently begun to embrace the spirit of liberalisation, due to the entrenched monopoly position of the Deutsche Bundespost.

The West German market will experience growth of 45% between 1988 and 1993, (as shown in Exhibit V-11) with high rates of growth are anticipated in all sectors, (as shown in Exhibit V-12), with the exception of managed network services, where the DBP's influence should continue for some time. However, many network applications, especially in the financial and insurance areas, will be required as West Germany attempts to catch up with France and the U.K.

EXHIBIT V-11

WEST GERMAN MARKET SIZE AND GROWTH: 1988-1993



The status of the market is less clear due to the monopoly position of the DBP. However, with the Witte Commission's recommendations and the clear path towards liberalisation with regard to third party vendors, high rates of growth (45%) are predicted for the forecast period (1988-1993).

EXHIBIT V-12

WEST GERMAN MARKET FORECAST

	DM Millions			AAGR (Percent) 1987-90	DM Millions 1993	AAGR (Percent) 1990-93	AAGR (Percent) 1988-93
	1987	1988	1990				
Managed Network Services	-	-	2	-	20	154	-
E-Mail	10	20	38	56	130	54	45
EDI	3	5	19	85	40	28	38
EFT	5	11	24	67	70	46	45
Videotex	13	18	34	38	65	25	29
Other	5	9	38	96	95	36	60
TOTAL (rounded)	40	65	150	62	420	42	45

2. Growth Factors**a. Network Services Environment**

Much network-services-type activity in West Germany takes place within the strictures of private networks and closed user groups, which fall outside INPUT's market definition. However, West Germany, which is regarded as the most conservative country in telecomms, merits particular attention because of its potential importance.

The main problem with the opening up of network services to competition is that the regulations on Bundespost/Telekom cross-subsidisation are unclear. No sensible business is going to commit capital to competing against such a giant (500,000+ employees) until it is confident that it has at least a chance of making some money. Financial services businesses

are aware, for example, that, whereas in the past all their main competitors suffered from the same high tariffs so there was no competitive advantage to be lost, the situation will be markedly different after 1992.

In the area of telecomms services in West Germany it is difficult to identify the volume of market share held by the Deutsche Bundespost (DBP) and the private sector because the public services are provided exclusively by the DBP. Service proceeds for 1986 are included in Exhibit V-13. Private companies and local authorities are free to lease fixed connections from the DBP and provide services for their own requirements, and to a lesser extent for third parties, on privately operated networks.

EXHIBIT V-13

DBP SERVICE PROCEEDS (1986)

Telephone	30,887 *
Telex	984
Teletex	76
Telegram	148
Broadcasting/cable	853
Switched data circuits:	
Datex L	120
Datex P	148
Fixed data connections	783
Telegraph circuits/internationally leased lines	190
BTX	14
Other Services	300
	<hr/>
	34,503 DM

*DBP Monopoly

Source: DBP

In viewing the German market, however, it is important to note that public authorities, transport companies, the Bundesbahn, shipping and road traffic authorities as well as private electricity, gas and mineral oil suppliers have all set up their own networks and, although not for use by third parties, have developed a number of services (network, electric information and processing) on these networks.

b. The Witte Commission

Vendor criticism of the DBP monopoly has been that the regulations are too restrictive, tariffs on dedicated lines are too high, waiting times too long and that the national leased lines are overpriced in comparison with the U.K., for example.

More significantly, the lack of diversity in the provision of new services (network management, mailbox services and application-orientated services tailored to the needs of specific user groups) by the DBP, as well as the usage restrictions and tariff structures preventing many intra-company applications being sold as services to third parties, has put pressure on the government to open up the network services market.

To this end, the Witte Commission has recommended the creation of Telekom, which although it will retain its network monopoly for at least three years (the government will review the development of competition after this time), will have to offer private leased lines on fair and competitive condition.

Three distinct types of services have been outlined.

- Monopoly Services
- Regulated Services
- Unregulated Services

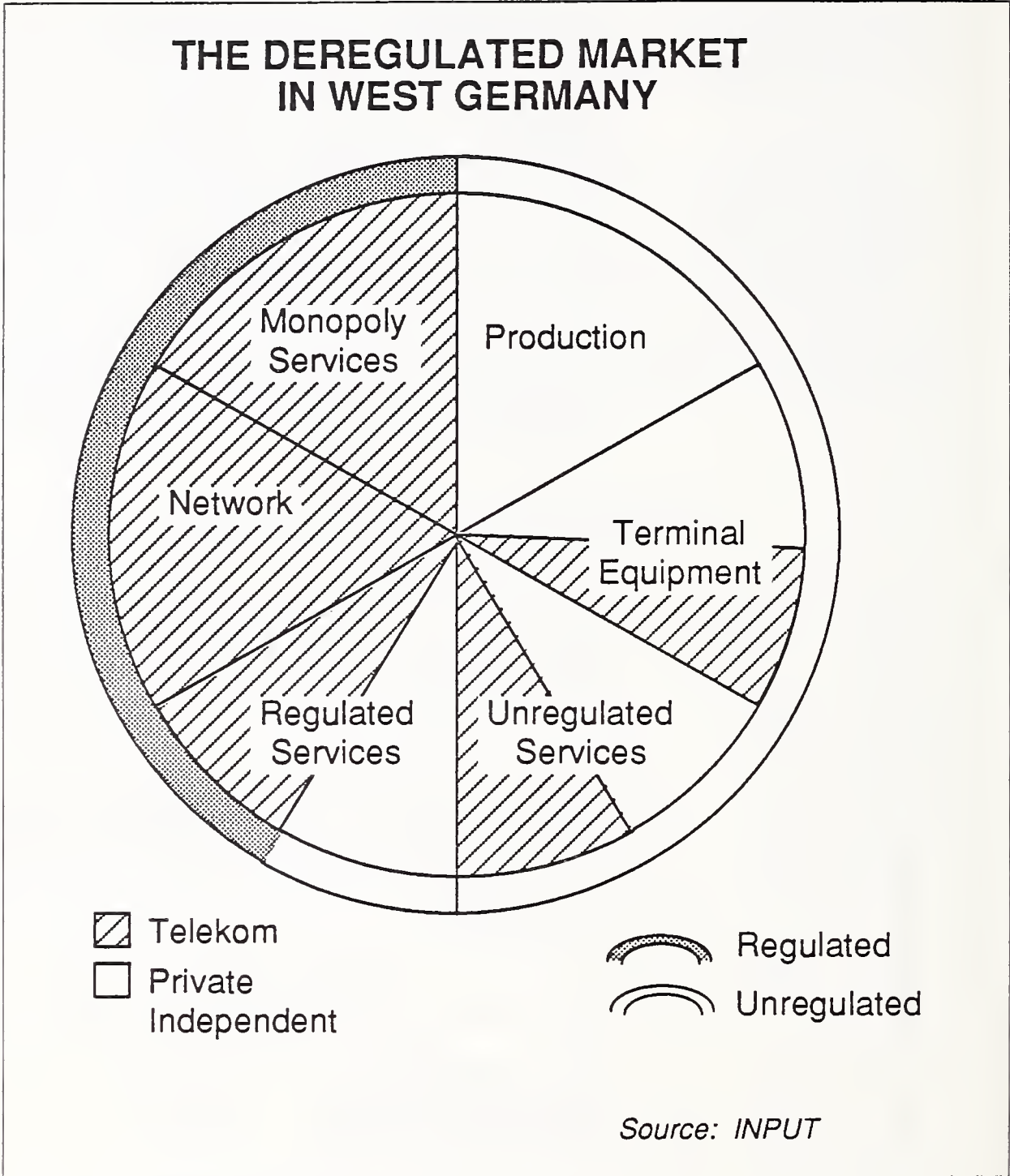
Monopoly services: Telekom will retain its monopoly of the telephone services (i.e., voice). Tariff distortions will be eliminated.

Regulated services: These are services that Telekom will be obliged to offer as a public service. Private companies may offer competitive services if they choose.

Unregulated services: These services will not be subject to any regulation and can be offered by Telekom and private companies.

This is illustrated in Exhibit V-14.

EXHIBIT V-14



c. Market Activity

As Telekom will retain the network monopoly, private companies will only be able to offer their services on fixed and switched connections provided by Telekom, with private service suppliers able to interconnect any combination of fixed and switched connections.

Additionally, usage-sensitive tariffs on fixed connections will be reduced to increase competition, whilst Telekom will be prevented from transferring profits from the network monopoly to the competitive sector since cross-subsidisation would give Telekom unfair advantages. It is arguable that this will actually disadvantage the DBP Telekom against large multinationals who will be able to subsidise their investment in service provision.

Part of the government's reluctance to offer network competition at this stage stems from its view of the U.K., which is that essentially the new network operators (e.g., Mercury) are primarily interested in providing mass telecommunication services like the telephone and the transmission of text and data to amortise their investments, whilst the combined telecomms/data processing services (i.e., network services) are being offered by operations like INS, Istel and IBM leasing fixed connections rather than by competing network operators. In other words, the DBP's view is that BT is being forced to compete at two levels.

However, the DBP recognises that the telephone monopoly will gradually cease to exist as voice communication merges with network services and retains as its primary objective the expansion of existing networks and their development into an integrated universal network with a comprehensive broadband network ultimately envisaged. To this end, the DBP believes that ensuring the success of OSI and early standardisation are essential. In particular, it is looking for regulated services to be standardised at the international level.

Whilst the level of network services offered in West Germany is significantly higher than much market analysis suggests, the restriction of third-party use to 50% (fixed data connections) and 25% (international leased lines), as well as the prohibition of message forwarding agencies and clearing houses, has prevented a market for third-party services from developing.

Whilst network services have evolved from applications of large companies with the necessary software capacity to develop services for themselves and for customers, cooperatives have been formed such as START (travel agencies and tour operators) and DATEV (tax consultants) in order to qualify as large users and subsequently develop their own networks. It has been the unorganised small users who have been disadvantaged because they have to rely on the services offered by the DBP (invariably BTX) and those offered by large enterprises for third-party use.

Once deregulation has taken place, new service suppliers will no longer be restricted by regulations prohibiting the resale of line capacity, which should improve service, satisfy demand, and open up the market for software, professional services and integrated solutions. However, with the deregulatory recommendations likely to pass into law in 1989, the German network services market is still some way from taking off.

In the area of electronic mail, several private companies offer a mailbox service, but there are only 10,000 mailboxes in West Germany, 10% of which are supplied by the DBP. It is the high tariffs set on its leased lines that have acted as a deterrent to private operators, and the DBP has already acted in abolishing the volume-related charges, which should result in a large rise in leased line usage.

Datex-P, the packet-switched network, has over 30,000 customers and is growing at 50% per year. The DBP anticipates that the retail sector, which is only just starting to see the growth of credit card purchases which sparked the development of online card authorisation services in France and the U.K., should experience rapid growth in the next two years.

The DBP has an excellent infrastructure with which to support competing services: Although no alliances exist between the DBP and the private sector for service delivery, its willingness to cooperate with other bodies, including PTTs and private companies, has been shown by its agreement to acquire the German portion of CSC's Infonet network.

Despite this, however, many vendors believe that at least one additional private network should be licensed because the resultant competitive pressure would be the only means of ensuring that leased lines will be offered on favourable conditions and specific needs satisfied by means of specialised networks. The arguments for and against the retention of the network monopoly are summarised in Exhibit V-15.

EXHIBIT V-15

<p>THE ARGUMENTS FOR AND AGAINST RETENTION OF THE NETWORK MONOPOLY</p>	
For: DBP	Against: Vendors
<p>Impossible to handle comms efficiently (lack of compatibility).</p> <p>Investment plans of DBP:</p> <ul style="list-style-type: none"> - ISDN - Optical Fibre - Cable for radio/TV <p>Monopoly profits needed to finance the further development of the network.</p> <p>Network competition would lead to non-uniform charges.</p>	<p>Standards can be maintained under competitive conditions (nationally and internationally).</p> <p>U.K. shows infrastructure can be improved with competition/private investment</p> <ul style="list-style-type: none"> - Competition closes gap between supply/ demand in specialised services/applications. <p>Financial problems likely to arise if network development exceeds demand of national economy.</p> <p>Effective competition will result in even non-uniform tariffs being below the current level.</p>

The DBP has already begun work on its new information service in the undeveloped field of intelligent home technology—in buildings and homes where electrical systems can respond to instructions delivered remotely.

The DBP is investing in a technology that is based on the country's telephone infrastructure, thereby enabling a wide variety of services—such as remote meter checking, safety checks on buildings/lifts, checks on street/traffic lights—to be offered to commercial and public institutions as well as private customers.

A £10 million contract was signed with Racal, the U.K. group, as network supplier, whilst the operational software will be provided by the Dr Neuthaus group and the data switches by DTW. This will be an early test for the different style of development chosen for the West German market by the DBP, being in stark contrast to the more liberalised markets of the U.S. and the U.K., where the development of telephone-based information and data services is being driven by entrepreneurial newcomers rather than public telephone operators who target specialised, niche markets with a fast return.

The DBP, however—social considerations to the fore—is choosing to invest heavily in a system that will need wide uptake to be effective. The DBP has also agreed to start operating an international switched service with Mercury, which until now has had to switch calls for W. Germany originating in the U.K. onto the BT network.

With the new laws expected to come into effect in mid-1989, vendors are still concerned by the vagueness of the rules on cross-subsidisation, feeling that the rebalancing of tariffs between local and long-distance will not do enough to reduce their costs. International leased-line charges are to be cut, and restrictions on traffic volume on domestic and international leased lines were lifted in July.

This crippling leased-line charge affected the financial community in Frankfurt, which has invested heavily in new technology, particularly the KIS (Kurs Information und Service System), which provides share information and DAX (Deutscher Aktienindex), the new real-time index of 30 leading West German blue chips that was inaugurated on July 1 and is scheduled to form the basis of a new stock index futures contract on the planned new West German Options and Futures Exchange.

Another example of the effect of these changes came earlier this year, with the Paris headquarters of EARN (European Academic and Research Network), of which the German user group is the largest dropping four of its five leased lines on account of cost, which it claimed were between 15 and 20 times higher than the rest of Europe.

The West German network services market, \$80 million currently, \$2 billion in 1990, offers much scope. With the changes envisaged practically identical to those required of all 12 of the EC's members, IBM, Digital and the Baby Bells will finally be able to offer services in competition.

d. Videotex

With approximately 120,000 BTX subscribers (more than the U.K., whose service has been running longer), 180,000 telex subscribers, 20,000 teletext subscribers and a total of 50,000 subscribers to Datex-L and 23,000 to Datex-P, in addition to the 250 online databases and the closed-user group networks already in existence, the German market offers rich pickings for vendors.

The 120,000 subscribers to BTX is far below the 1 million the DBP wanted by 1986. Additionally, 80% of BTX users are corporate users who use BTX for low-volume applications as a cheap substitute for existing DBP services.

The initial cost of terminals, approximately £500, was too high. DBP's other mistake was to implement the CEPT videotex standard in autumn 1983, when the market was still immature. This is in contrast to the Minitel and Prestel videotex terminals, which use their own national standards which are much cheaper to implement.

For example, BMW has equipped 90 of its dealers with BTX-compatible PCs to access BMW's databases and also place orders and receive and send messages. BTX allows information providers to store and then send messages on "limited access" pages.

The BMW head office stores some information for its dealers at the DBP's central BTX computer, leasing ten lines connecting to the Datex-P packet-switched network. Dealers dial up and are routed via the network to the central computer. In this way, BMW is using 45 different BTX applications in two-way communications with dealers, a total of one million transactions per month, representing 50,000 DM per month.

Other examples are AEG, an electrical appliance and electronics firm with 1,400 service centres that use BTX to order spare parts, whilst BP stations use a BTX link to their central accounting office.

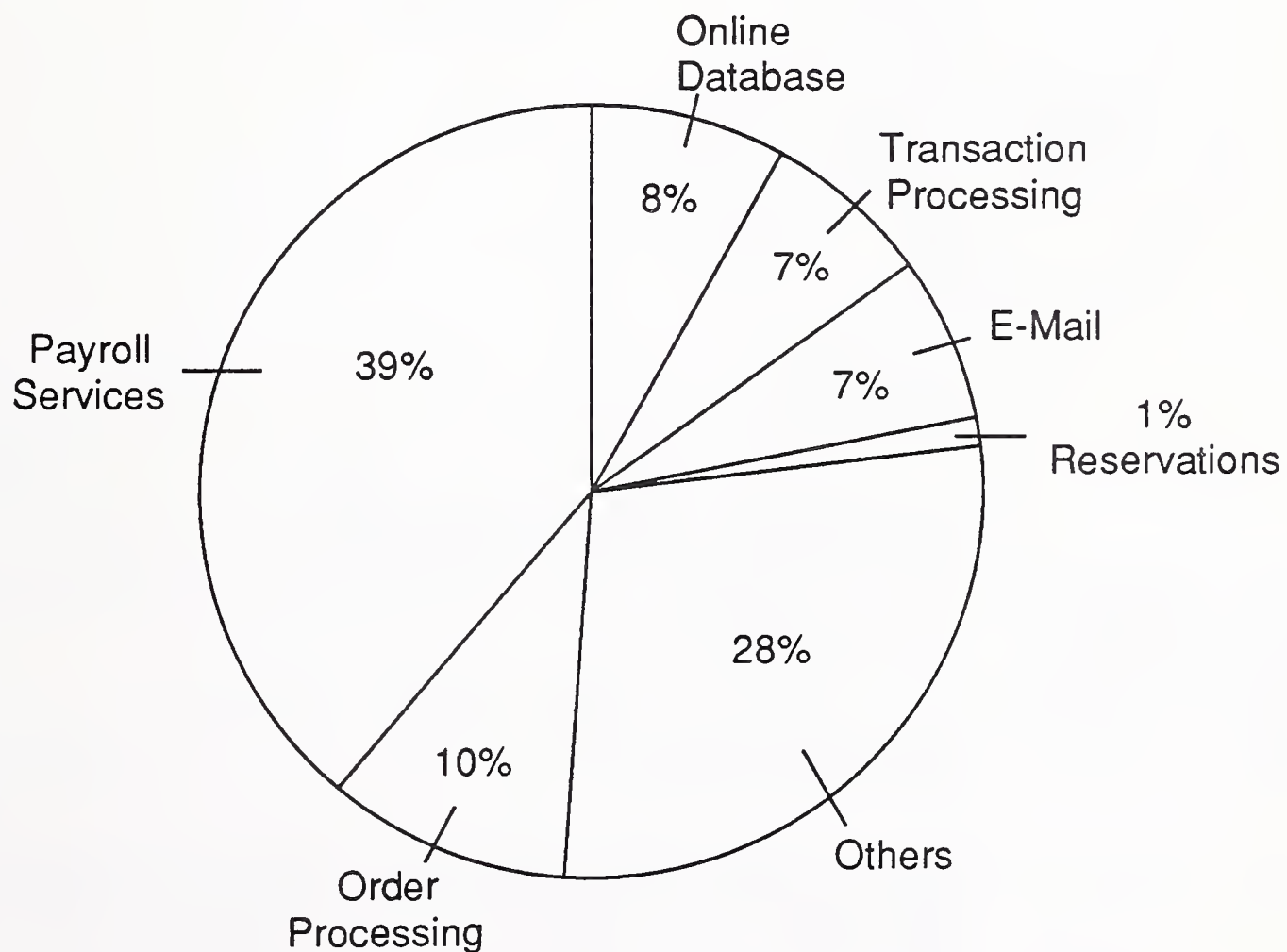
However, BTX is not fast enough to send large amounts of data. It tends to be restricted to only allowing users to store messages, call them up and send telexes. Consequently, corporate customers are not likely to grow.

Conversely, in applications such as EDI, considerable growth should follow over the next two years as currently only 10% of workstations are adapted for network services type applications. INPUT's 20-30% growth prediction could even be considered pessimistic.

In view of the differences in definition of network services between West Germany and other markets, INPUT has included two exhibits (Exhibits V-16, -17) used by Arnulf Heuremann, Diplomvolkswirt, WIK, in his presentation to Sicob 1988, where he criticised market analysts for underestimating the amount of network services activity in West Germany. These are included to highlight the differences in definition.

EXHIBIT V-16

NETWORK SERVICES IN WEST GERMANY (1986)

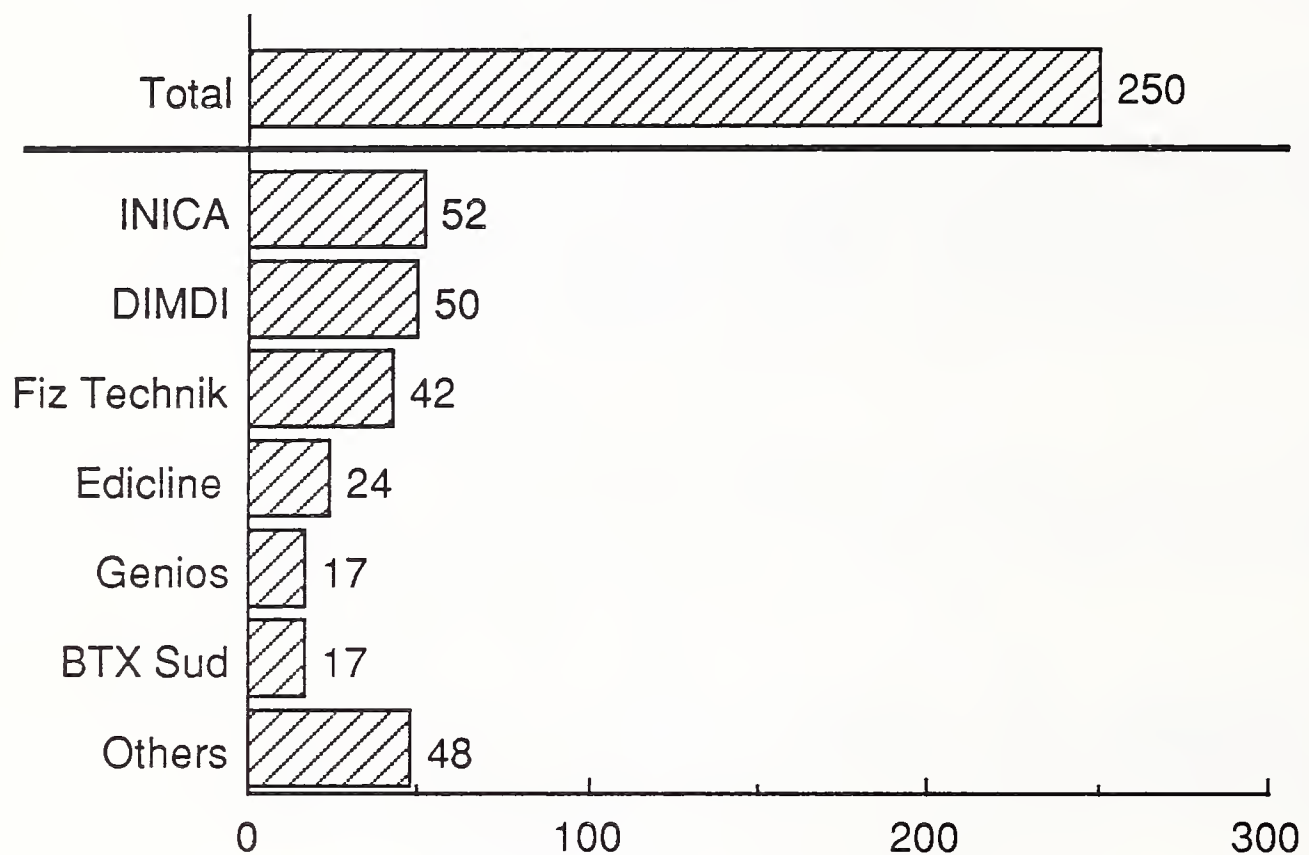


Total Number of
Significant "VANs" = 335

Source: SCS, *Das Angebot von Mehrwertdiensten in der Bundesrepublik Deutschland*, Studie in Auftrag des WIK, Bonn, Dec 86

EXHIBIT V-17

ONLINE DATABASE PROVIDERS: NUMBER OF SERVICES



Source: On-line Daten bankdienste in der Bundesrepublik Deutschland - WIK

E

Benelux

1. Market Forecast

Benelux countries are expected to show significant rates of growth (37% during the 1988-1993 forecast period as illustrated in Exhibit V-18) as they rapidly adopt a range of application services and with the Belgian EFTPoS initiatives as well as Philips involvement in EDI. EDI is the sector that will experience largest growth over the next two years (as shown in Exhibit V-19).

EXHIBIT V-18

BENELUX MARKET SIZE AND GROWTH: 1988-1993

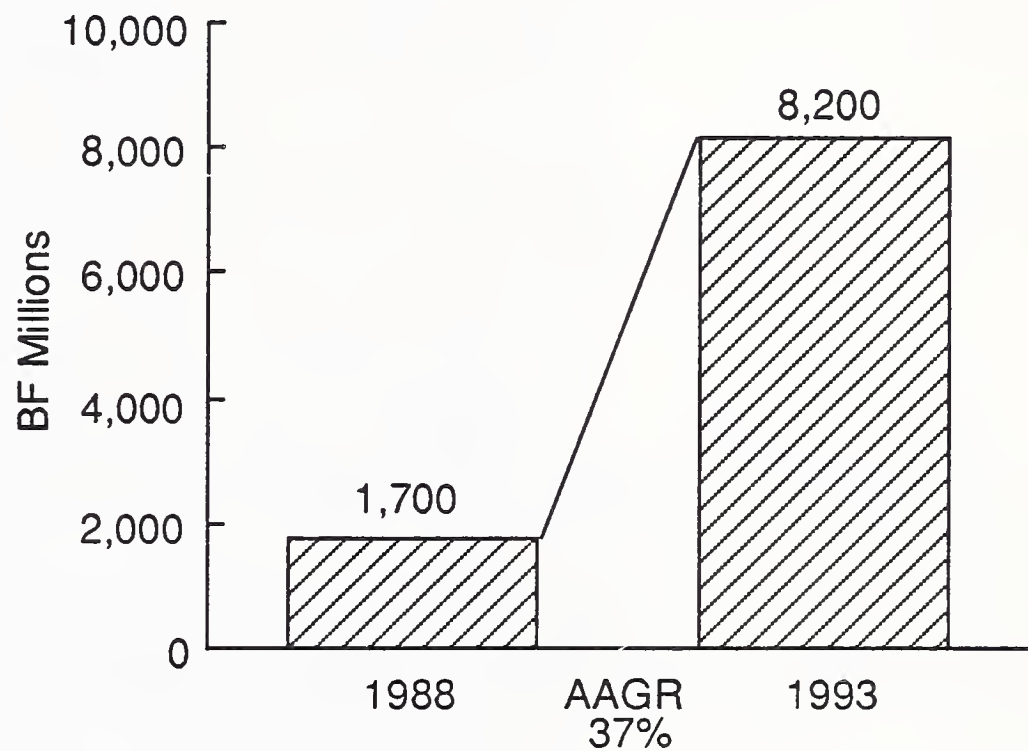


EXHIBIT V-19

BENELUX MARKET FORECAST

	BF Millions			AAGR (Percent) 1987-90	BF Millions 1993	AAGR (Percent) 1990-93	AAGR (Percent) 1988-93
	1987	1988	1990				
Managed Network Services	62	100	190	45	400	28	32
E-Mail	169	300	650	57	1,500	32	38
EDI	22	140	350	52	900	37	45
EFT	435	600	1,200	40	3,000	36	38
Videotex	341	530	800	33	2,000	36	30
Other	38	70	150	58	400	39	42
TOTAL (rounded)	1,100	1,700	3,300	44	8,200	35	37

2. Growth Factors

a. Deregulation

In January 1989, the Dutch PTT will be spun off into a private company, whose shares will be held by the state and compete with the private sector. Currently, the Netherlands has the most highly regulated telecomm industry in the EEC, with the PTT wielding a monopoly over more products than in any other country, despite companies like Philips pushing hard for liberalisation and more free telecomm markets. When the Dutch PTT agency is spun off into NV PTT Nederland next year, it will be split into two subsidiaries, one for postal services and the other for telecommunications. The PTT telecommunications will retain its monopoly on the infrastructure, but will lose its monopoly on equipment and services and will have to compete with the private sector.

The area of competitive pricing could prove troublesome as the government has demanded at least £5 billion on dividends a year after privatisation. Whilst competition will take time before entering the fray, ultimately the PTT Telecommunication uneasy alliance of monopoly and free-enterprise functions threaten the most problems. Within the next five years, these two functions are to be legally separated into distinct units to avoid cross-subsidisation.

Looking at the Cabinet guidelines for pricing policy and the dividends that must flow into government coffers in coming years, it is doubtful that the PTT has been given the independence it needs to compete successfully.

Belgium's telecommunications industry is currently undergoing radical changes. Previously tightly regulated, Belgium is now under pressure to defend its networks against the threat posed by large telecomm operators in France and West Germany, fearing that they might take a big share of Belgian network services traffic. Deregulation will mean an end to the privileges enjoyed by the two-company monopoly that has traditionally supplied Belgium's telecommunications equipment and networks: Antwerp-based Bell Telephone and Stea, the local offshoot of the joint venture between Siemens and GTE of the U.S.

The PTT ministry is, however, cautious over the extent to which it is prepared to liberalise services, recommending that the RTT (Regie des Telephones et Telegraphes) should be turned into an independent, state-owned company and keep a monopoly control over the basic telephone network and essential network services. This is an approach similar to that of the Netherlands. The feeling in the Ministry is that private networks competing with the RTT will cream off the lucrative network services business, thus affecting the basic infrastructure.

Vendors are pushing for the establishment of a separate independent body to monitor the RTT's behaviour-control-type approval, currently the RTT's preserve. This organisation—to be called the NAT standards and authorisation institute—would also issue licences for private companies to provide network services on leased lines and exercise a certain amount of control over tariffs.

Final details of how the system would work—and the exact conditions for competing private services—have yet to be decided after further talks between the PTT, users and the telecommunications industry.

b. Market Activity

Philips is to market a range of EDI products and services, targetting Netherlands-based transportation companies such as the shipping line Nedlloyd and the international airline KLM as well as Dutch banks and trucking firms. Philips, with outlets in more than 60 countries and \$500 million worth of goods moving between Philips sites at any one time, is a pioneer in electronic messaging, sending data between computer systems in the early 70s. It has been closely involved in the design of structured message formats, including EDIFACT.

North American Philips Corporation is one of the U.S. leaders in EDI and Philips Europe plans to offer a range of EDI hardware and software products commercially under the tradename of PHAME (Philips Advanced Means for EDI). Philips is well placed to meet all of a company's EDI needs, provide a complement of computer systems, design software packages, encode and decode a customer's own message design to and from standard formats and to install networks. However, the company does not intend to start offering network facilities to EDI users. Its initial focus will be on establishing bridges between internal EDI systems and other communities such as INTIS, the EDI network for the Port of Rotterdam, and Transpotel, the network of European freight companies.

ECT (European Container Terminals), the Rotterdam-based container handling company, is offering advisory services to trading partners wanting to install computer-to-computer communication systems. ECT was one of the first companies in Rotterdam to spot its potential.

ECT and the port authorities consider EDI vital if Rotterdam is to stay ahead of its rivals. The terminal operators have been heavily involved in the establishment of INTIS, the EDI network for the Port of Rotterdam. ECT is one of the biggest container handling companies in the world with an annual throughput of around one million units. It has so far concentrated on advance information about a ship's loading and unloading requirements.

F
Italy

1. Market Forecast

Italy, the least developed market, will grow at a rate of 42% from a very low base over the 1988-1993 forecast period, as shown in Exhibit V-20. This growth will be over 50% in all areas between 1987 and 1990 and over 80% in a key application area such as EDI. This is shown in Exhibit V-21.

EXHIBIT V-20

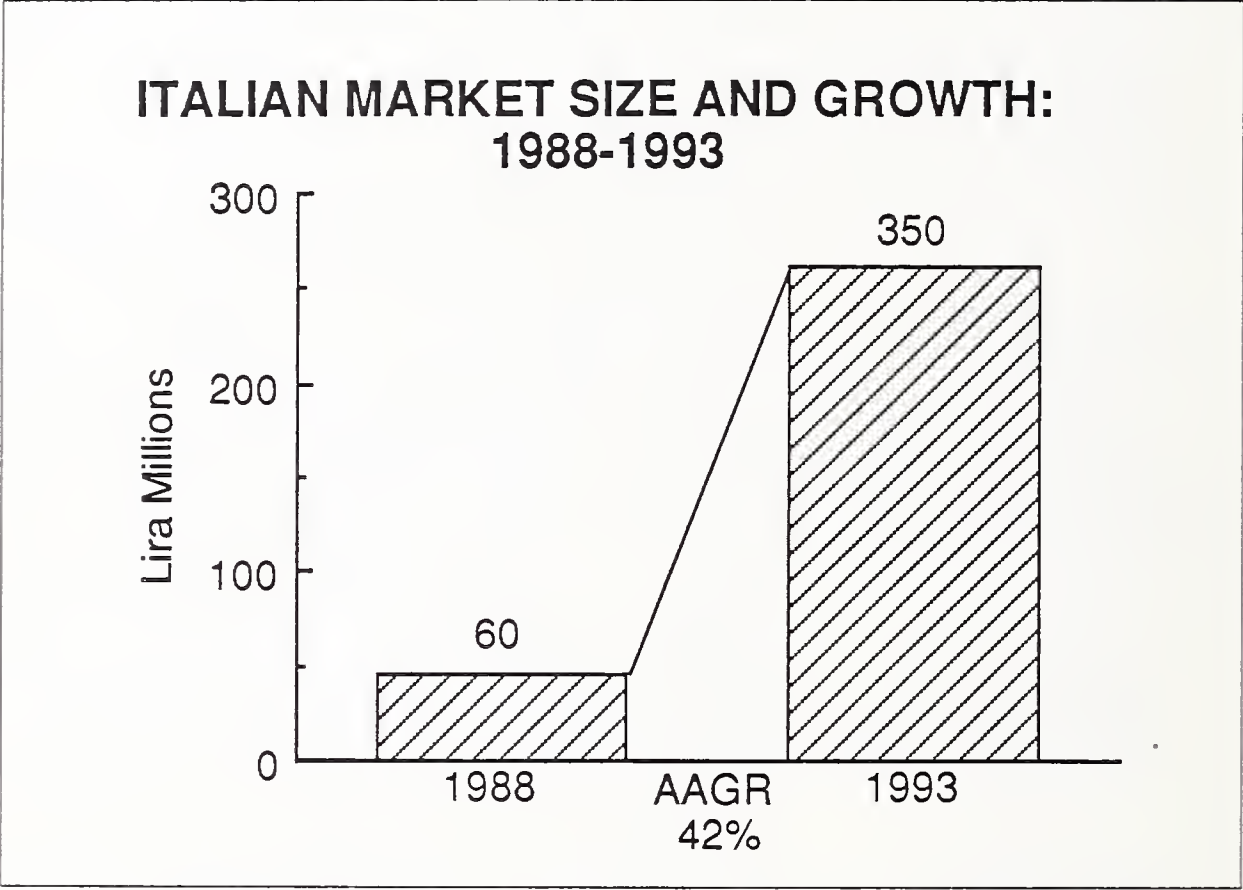


EXHIBIT V-21

ITALIAN MARKET FORECAST

	LIR Millions			AAGR (Percent) 1987-90	LIR Millions 1993	AAGR (Percent) 1990-93	AAGR (Percent) 1988-93
	1987	1988	1990				
Managed Network Services	4	10	30	95	60	26	43
E-Mail	10	17	40	59	100	36	43
EDI	2	5	10	71	30	15	58
EFT	5	10	25	71	60	34	43
Videotex	3	8	20	88	50	36	44
Other	5	9	30	82	50	19	41
TOTAL (rounded)	30	60	160	75	350	30	42

2. Strategic Alliances

The development of the Italian network services market has been hampered by the fragmented nature of the telecommunications environment and the lack of initiative by government and dominant commercial users.

1988 has been a crucial year for the Italian telecommunications industry as it reorganises and rationalises its services in order to be more competitive in the European market. Italy is one of the least developed markets in Europe, and therefore much interest to companies looking for a foothold.

Plans to merge the state-owned Italtel (the biggest telecomm equipment manufacturer and leading producer of public switching systems) with Telettra (Fiat's data transmission subsidiary) to create TELIT foundered when Fiat pulled out. Now, both seek alliances with foreign companies: Italtel is negotiating with Alcatel, AT&T (which has a 22% equity stake in Olivetti), Ericsson and Siemens, whilst Telettra is more than likely to wait to see what the stakeout produces in terms of strategic partnerships.

Furthermore, a major restructuring of the state-owned STET telecommunications holding group is underway with a plan to transform STET into an operating company that brings together the SIP national phone service, Italtel, plus the satellite and international carrier units. To do this, the IRI group, which controls STET, has put forward plans to create an Italian version of British Telecom. A key element of the new Super-STET would be the alliance with a foreign telecomms manufacturer—a link with Italtel.

The advantages for foreign companies is the state company's dominance in public switching and its access to orders from SIP. Last year SIP accounted for 76% of Italtel's resources. For Italtel, a foreign partner will enable international marketing of the Linea VT public switching system (currently representing 28% of total turnover).

The collapse of the proposed merger of Italtel and Telettra has adversely affected the long overdue restructuring of the Italian telecommunications infrastructure. However, the plan is to turn STET, previously only a holding company, into the national telecomm carrier by merging it with its three present telecommunications operator subsidiaries:

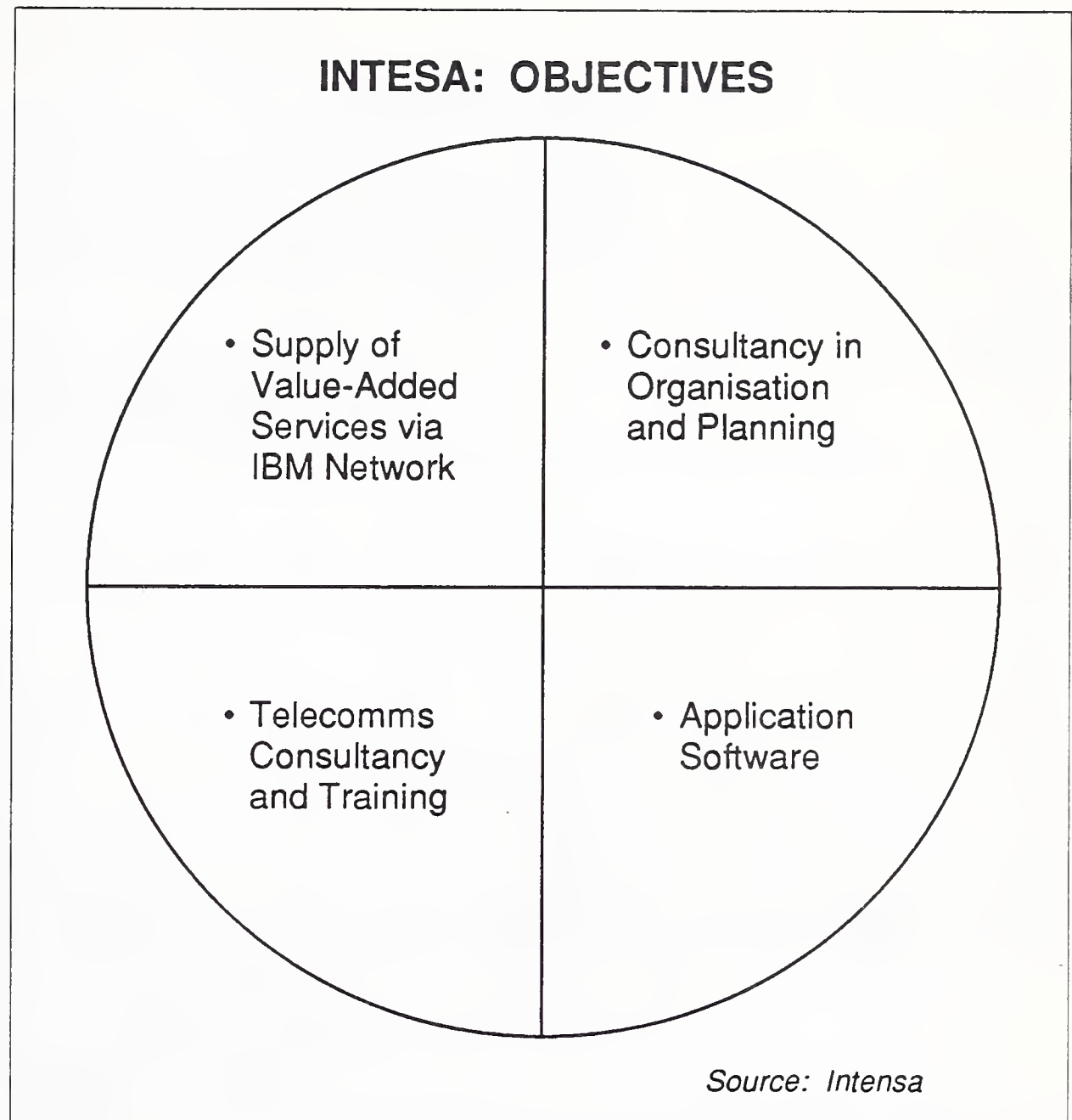
SIP (Societa Italiana per l'Esercizio delle Telecomunicazioni), the national internal phone company; ITALCABLE, the international carrier; and Societa per Azioni per le Comunicazioni spaziale, satellite communications. The two manufacturing companies Italtel and Sirti will remain majority-owned subsidiaries of STET but will not be merged into it. The downside of this plan is that it will need Parliamentary approval and may take several years to implement.

Further examples of strategic initiatives being taken by dominant companies are the joint venture between IBM and Fiat (INTESA). In addition, other large conglomerates are proactively driving change, e.g., IRI, in concert with government. The INTESA venture plans to build a significant network services market in Italy, with the initial targets being the manufacturing and distribution sectors. Its approach is to concentrate on four areas: the supply of services via the IBM network, consultancy in organisation and planning, applications software and consultancy and training in telecommunications. These are highlighted in Exhibit V-22.

Radiocor, Olivetti's subsidiary and a leading provider of financial information in Italy, has bought out Telerate's Italian Spa subsidiary; whilst Telerate, majority owned by Dow Jones, takes a 46% share in Radiocor through a capital increase at Radiocor with Telerate putting up \$5.4 million.

Olivetti and AT&T will each take a stake in Italtel in return for STET taking over Compagnia Industriale Reunite's Olivetti shares. STET needs a foreign firm to inject technology into Italtel and AT&T wants to expand into Europe.

EXHIBIT V-22



SEAT (a division of STET) has been appointed the franchise in Italy of TRANSPOTEL, the European online freighting information exchange system that matches supply and demand in the freight market.

There are now 12 European countries on the Transpotel network, which is accessed through videotex or a PC. In Italy the system will use the asynchronous SEAT network, which connects more than 30,000 subscribers to many network and electronic information services including the Electronic Yellow Pages.

Of the largest players, IBM and Fiat's joint venture, INTESA, has been running since March 1987, whilst at around the same time EDS signed an agreement with Olivetti.

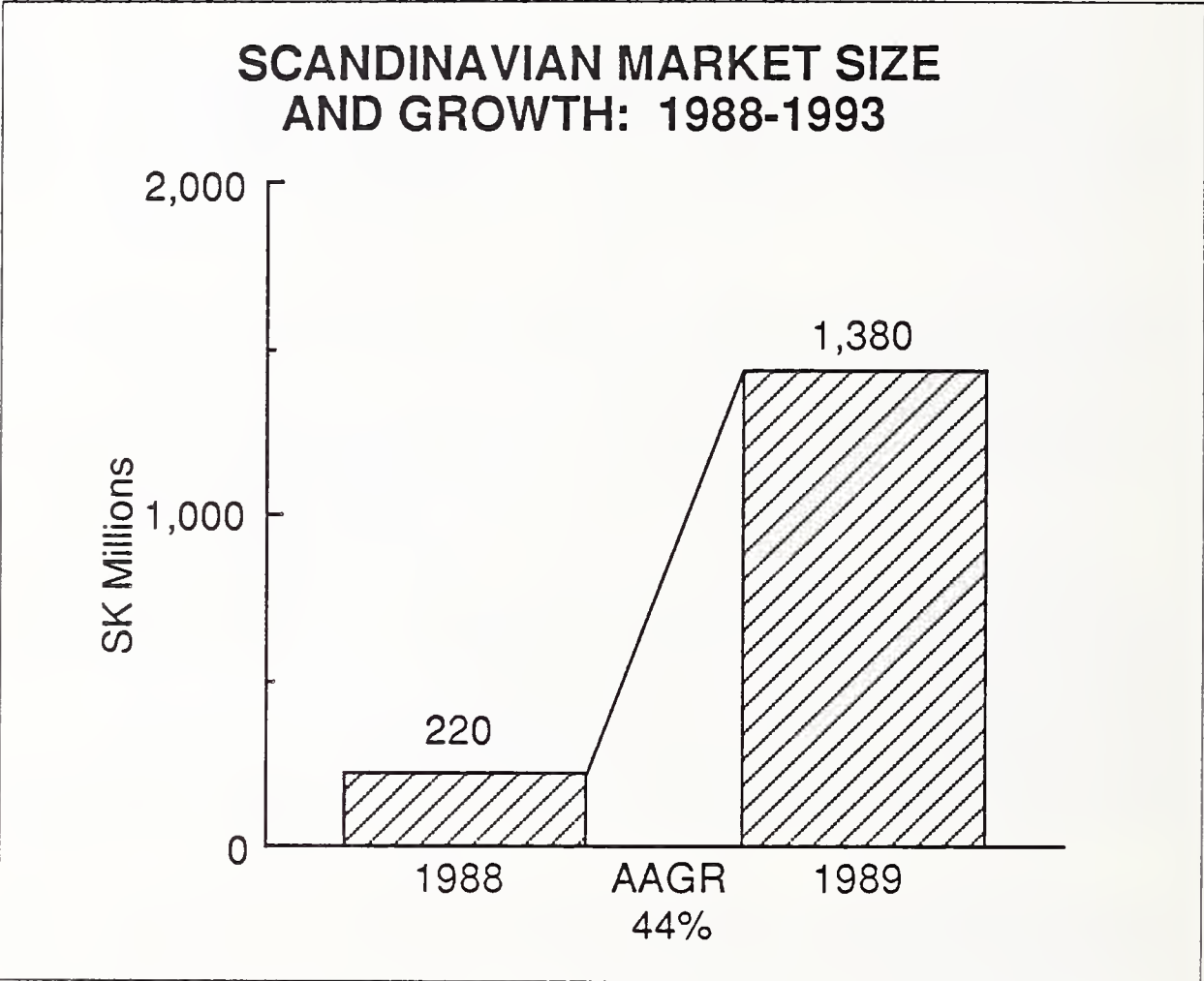
G

Scandinavia

1. Market Forecast

The network services markets in Scandinavia are undergoing rapid development, fostered by government and PTT initiatives as well as the upgrading of the telecommunications infrastructure.

EXHIBIT V-23



High rates of growth (45% for the forecast period 1988-1993) are anticipated for the Scaninavian countries, as shown in Exhibit V-23. The Scandinavian market for network should more than double in all application areas over the next two years as well as being strong in the managed network services area, (as shown in Exhibit V-24)

EXHIBIT V-24

SCANDINAVIAN MARKET FORECAST

	SK Millions			AAGR (Percent) 1987-90	SK Millions 1993	AAGR (Percent) 1990-93	AAGR (Percent) 1988-93
	1987	1988	1990				
Managed Network Services	15	24	55	54	160	43	46
E-Mail	41	63	160	57	420	38	46
EDI	8	21	55	90	140	37	46
EFT	40	61	150	55	380	36	44
Videotex	21	33	75	53	200	39	43
Other	13	18	40	45	80	26	35
TOTAL	140	220	550	57	1,380	37	44

2. Market Activity

The Scandinavian countries benefit from similar demographic challenges and are expected to experience significant rates of growth. In particular, videotex and E-mail are growing rapidly, fostered by government and PTT initiatives and the upgrading of the telecommunications infrastructure.

The strategic importance of network in the Scandinavian market is reflected by the high usage of MDNS for international traffic and network services applications in the transport and trading communities. Within Scandinavia, there has been much cooperation between administrations.

In Sweden, Televerket differs from the other PTTs in Europe in that it has never been integrated into the postal administration. In August 1987, the telecommunications authorities in the five Scandinavian countries set up a company—Scandinavian Telecommunications Services (Scantel)—which offers one-stop shopping for organisations setting up internal networks crossing international borders.

Scantel presaged the CEPT-led MDNS and is jointly owned by the PTT administrations of Sweden (48%), Finland (16%), Norway (16%), Denmark (16%) and Iceland (4%). Among the many network services offered by Scantel are X.400 message handling and store-and-forward facsimile. The services that had been provided by Televerket's Teleinvest subsidiary, including videotex, electronic mail, card evaluation, computer office automation and the Volvo-Televerket-Gothenburg Harbour Authorities data network, will be subsumed within the Scantel organisation.

In April 1987, Ericsson, Volvo Data Systems and Scandinavian Airlines created a \$3.2 million company to deliver value-added data services to Scandinavia's IBM user community. Scandinavian Infolink AB started up in September 1987, providing links between the Memo E-mail systems of large Scandinavian firms. Memo is sold to 80% of large IBM mainframe users by Veremation, the Volvo/Ericsson joint venture. Thus Infolink has been able to exploit the 100-strong user base to branch out into information retrieval, EFT and purchase-and-order transfer services.

In March 1988 Televerket announced plans to integrate its private and public networks and become the first carrier in the world to combine the use of its local exchanges as public telephone switches and as leased-line cross-connects. One of the potential problems Sweden is facing is the problem of standardisation of documentation to EDIFACT, since many organisations, especially shipping lines, forwarders, importers and exporters have been trading electronically using locally developed message standards since the early 1980s.

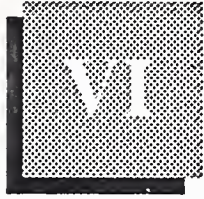
Since most Swedish companies already have highly sophisticated information networks and since Sweden is such a high export-orientated country with multinationals such as ASEA/Brown Boveri, Electrolux, Volvo and Saab, there is a dual need to keep abreast of EDI applications and solutions whilst at the same time encouraging industry to embrace EDI and either accept EDIFACT or adapt existing systems.

Sweden is currently one of the most active European countries in EDI, and the work of Swepro (Swedish Trade Procedures Council) has been to actively persuade the smaller concerns to become involved in EDI, discouraging work on local projects, whilst stressing the need for any message designs to be fully international. This is very much in line with the EEC ruling, although Sweden is of course not a member of this august body. Swepro, a government agency funded by industry, works closely with EC organisations that are engaged in EDI projects as well as with Swedish Customs that plans to fully computerise export procedures by 1991 and have an imports computer system installed by 1993.



The Market Opportunity





The Market Opportunity

A

Financial Services

The Financial Services sector is the largest market in the world for network services and has developed in a highly opportunistic manner with major suppliers focusing on their areas of expertise.

Whilst U.S. and Japanese banks have been quick to respond to the demand for network services (Citibank has 25,000 internal users of E-mail and is looking to interconnect customers as well), European banks have been slower to recognise their importance, which is surprising considering their position as both consumers and suppliers of network services.

However, with the emphasis on London as a clearing centre, the U.K. has undoubtedly benefitted from major involvement by U.S. banks, which already have extensive global communications networks and cash management systems. The most advanced of these systems is at Citicorp, which stole a march on its competitors in the early 1970s.

The European banks are having to change their orientation from being only between the payee and payer, to becoming actively involved in the entire process between the buyer and seller—from ordering to invoicing to payment to advice of payment to reconciliation—as a result of the convergence of EFT/EDI.

For example, the ATP (Accelerated Trade Payments) system of First Chicago, running on SITPRO software over GEIS international network, can slice a month off the time taken to make presentations and thus receive money as an exporter. Trade clusters (exporter, trader and bank) are being actively encouraged to exploit this development.

Not surprisingly, it is the securities industry that has responded to the electronic banking technology with the most alacrity because of its need to respond quickly to market situations. With the prospect of global 24-

hour trading, the concept of a single clearing centre to service whole regions is now a real possibility.

With EDI experiencing sharp growth in the corporate sector and across different industries, the banks will be expecting EDI users to turn to them to look after office money transfer transactions.

Whilst banks' ties with the information services industry are strong, with the traditional hardware suppliers (IBM, Digital, ICL) viewing the banks not only as a large hardware market, but also as being actively involved in network services themselves, most European banks do not have the resources or the marketing clout to keep pace with the network service providers.

Companies like GSI can offer their network, software and computer centres as part of a network service to the banks and customers, for example, providing software allowing PCs to interface with a bank for receiving and manipulating financial data over the Interpac network. Reuters too, with its worldwide network, capitalising on its vast databases of financial information, provides analytical software tools for the corporate market as well as its FX online dealing system.

Another example is GEIS' processing network, covering 750 cities in 50 countries, which is used by the medium and small European banks along with city based global traders. GEIS, via its links with INS, is strongly positioned to provide the EDI service between customers themselves as well as between the banks and its customers. A recent collaboration by the Natwest, INS, P & O Containers and Rothmans Export has used Tradanet to test electronic transmission of letters of credit, providing a saving of up to three or four days.

Network services providers have an important role to play in promoting cooperation between the banks as independent and impartial. Traditionally, the development of software that the banks can then sell under their own label has great growth potential.

The important market for integrating funds' transfer networks with users' systems is between BACS (Bankers Automated Clearing System) and corporate users' financial accounting systems to update ledgers online, having an immediate impact on companies' bank reconciliation procedures and charges.

Although European banks have suffered from inherent conservatism, a lack of marketing flair and secrecy about developments, INPUT anticipates that by the early 1990s the vast majority of regular payments such as salaries, pensions, insurance premiums and mortgage repayments will be made directly. The major clearing banks with BACS positioned as the largest EFT service in the world (as well as offering services) see this as a major source of business.

Currently 50% of the daily files that BACS handles come on tape or disk with the rest on the Bacstel Service (over BT or Mercury communications links). Bacstel is predominantly used by small businesses and only represents 10% of the volume of transactions because of the cost of transmitting large volumes of data over public telecomm lines.

BACS' trial with INS to offer BACS services is an important development, as are plans by Matrix, the U.K. building-society-owned ATM shared network, to become a member of BACS this year. Its recent tie-up with Link, the rival ATM, makes it a powerful market participant in the market.

Forecasts for the financial business market range to up to 20 times growth. With the announcement of the Financial Services Act in the U.K., this has meant vendors linking offerings under one umbrella. Fastrak, for example, has launched Electronic Arcade, a service that enables one-stop shopping to a range of services via local call access from Fastrak's X.25 network. Services include credit checking, telebanking, insurance and mortgage quotations, stocks and shares information, travellers cheques and currency ordering and signing deals with service providers Datasolve, Pont Advantage and Infocheck.

Digital meanwhile has entered the network services market with products aimed at the financial services community; its initial launch was a life assurance quotation system for the use of insurance brokers. Digital intends to expand into quotations for other retail financial products (savings and personal pension plans). In the last quarter of 1988, Digital plans to add a transaction service that will enable clients to fill out a proposal form electronically and receive confirmation on-the-spot.

Istel, along with BT, is the market leader in insurance quotations having 17,000 registered users in the insurance field, with over 750,000 individual quotations offered by all the insurance companies on its service.

U.K. network services forecasts have been optimistic. A predicted \$314 million market in 1986 turned out to be worth less than \$100 million. However, in the banking sector, forecasts may have been pessimistic. Sales of facilities on these networks to third parties offer a means of subsidising high costs. Networking is by far the highest growth area of spending for U.S. banks at 25-40%, twice that for DP or information systems. Network services subsidise network expansion by allowing the banks to spread the network development costs over a wider income-generating base as well as offering an entry into a growth area.

The U.K., again by virtue of its extensive telecommunications liberalisation, is the leading innovator in network services in general, and bank-based services in particular. However, this drive to innovate has not always been successful. Barclays was the first to be involved with Baric,

a joint venture between the bank and ICL, which offered computer bureau services and support for viewdata-based information services. Barclays eventually withdrew, unsure as to the viability of network services. Fastrak, which operates on the Midland Bank network, has still not broken into the black, although it hopes to do so this year on the back of the increased business via the Financial Services Act.

Reuters' purchase of financial systems house Instinet (and thereby the Instinet equity trading system, with prices on 8,000 U.S. stocks, best price and automatic execution of small trades and anonymous placing of block trades) gives it an equity trading system to compete with the Stock Exchange's dealing desk product when SAEF is crafted onto SEAQ. Thusfar the Stock Exchange has blocked Reuters from taking share prices off SEAQ (November 1987). However, the gateway to SEAQ level 2 will give them the ability to build an electronic market place in Exchange quoted shares.

IDIS (Interhouse Data Information System) represents an agreement between the Stock Exchanges in EC member states to transmit continuous prices between themselves and ultimately to include settlement. The European exchanges want to regulate the growing interbank trading in their financial centres by attracting the majority of trade onto their trading floors or through the electronic channels of quote systems as in London.

Whether IDIS will prove to be a rival to SEAQ International is of no concern to U.S.-London-based trading houses that would prefer to be regulated by a pan-European body rather than an individual Exchange-like SEAQ international. The Frankfurt exchange, which sits on a potential \$70 billion worth of bond-buying West German savings, has taken a back seat in the IDIS project as it works to get the experience of continuous prices. The Germans are doubtful that with the many information systems in operation such as Reuters, there is a need for another one.

Further, settlement is the key and there must be a doubt over whether the European stock exchanges can bury their traditional rivalries at a time when international gateways are being built into their separate exchanges. Europe is in the middle of a battle between the stock exchanges getting together, the banks getting together and the information providers developing services and products.

Britain's eight largest commercial banks sacrificed £100 million in lost profits during 1987 because of a rise in their ratio of overheads to income from 66.3% to 66.9%. To contain costs, the banks are investing heavily in computers, which means increased cost in the short term. In the longer term, the aim of the investment in computers is to reduce the numbers employed on clerical activities, and, as the TSB Group's £78 million investment in computers indicates, the goal is to give staff more time to sell financial products.

In two key areas, standards and security, the banks are heavily involved. Standards mean potential savings and the U.S. banks, in particular, are active with standards bodies such as the JEDI (Joint Electronic Data Interchange) committee in the U.S. working with exporters and shippers to standardise invoicing information. On the all-important question of security, although there has been a tightening up in this area, organisations are still at risk from disenchanted employees. A new industry—computer security consultancy—has grown out of the fears of banks who publicly declare that their systems are 100% secure.

B**EFTPoS****1. Introduction**

EFTPoS is emerging as an area of opportunity for vendors of enhanced services, software products and professional services. In-store terminals can potentially offer banks, retailers etc. the opportunity to sell financial services, as well as the opportunity to develop home banking to market a broader range of products and services.

Retailers have reached a stage where they believe that the benefits of EFTPoS (faster, more accurate sales information and reduced data levels) have been realised, thus the take-up of EFTPoS is likely to accelerate.

However, EFTPoS is developing in different ways across Western Europe. This section focuses on the U.K. but also covers other European markets highlighting the key factors impacting development and future trends.

The bank networks will need considerable capacity to cope with the resulting volumes of network traffic as a result of EFTPoS, potentially the greatest major change to happen in retail. With the presence of both international and national public X.25 networks, the global market beckons.

2. U.K.

The U.K. development of EFTPoS has been hampered by the big banks that, on the one hand, have declared their commitment to EFTPoS, but on the other hand, have developed their own autonomous EFTPoS networks to protect their market shares.

EFTPoS (U.K.) was created by the U.K. banks to manage the development of a national EFTPoS network with an open and competitive membership framework with a wide card base, acceptable through a single retail terminal at the point of sale. However, the tight schedule for meeting EFTPoS U.K.'s membership requirements, plus £250,000, has proved prohibitive to the smaller banks and building societies gaining full membership.

EFTPoS U.K.'s inaugural service is scheduled to go live in 1989 at three test sites, ostensibly paving the way for the eventual devolvment of the national network into a competitive national system. This will lead to two approaches by the financial institutions: For those with existing EFTPoS pilots and that intend being terminal sponsors, their main thrust will be to achieve high retailer acceptance of their particular systems; whilst for those that have not, their goal will be to achieve as wide a card acceptance as possible through the adoption of EFTPoS U.K. standards. The banks will approach attracting EFTPoS business through network services.

a. The Midland Bank

The Midland Bank has invested £25 million in its Midland Transact EFTPoS schemes with the most varied portfolio of the big four. Current pilots include Speedline, an agreement with Compower in its Midnight Express project as well as a Smart card trial at Loughborough. Speedline was launched in February 1986 in Milton Keynes and accepts debit and credit cards from Midland, its subsidiaries and those of NatWest and is established with 15 retailers. The partnership with Compower means that Midland will have access to over 1,000 petrol retailers and a stake in the off-line, high-volume small payment sector.

Meritcard, Midland's Smart card in its joint venture with GEC, will be trialled at the beginning of the 1988 academic year. Not only does the card carry information on financial transactions in the form of electronic impulses, enabling retailers to transfer electronic cash takings from their stores to the bank, but it can also be used to call up Midland MFile Viewdata information service, thereby giving the Meritcard holder access to Prestel's 300,000 pages of information as well as the Thomas Cook Travel Information Bank.

b. Barclays Bank

Barclays' introduction of the Connect debit card in June 1987 sparked the first major disagreement between retailers and the banks. Barclays was forced to abolish straight percentage transaction fees for retailers.

Barclays also runs PDQ, an online data capture and authorisation network, installing over 100 terminals a week. The importance of the retailer in the equation can be seen by Barclays developing a range of PDQ terminals to suit the varying needs of retailers. However, Barclays is not yet convinced by the cost effectiveness of the Smart card.

c. National Westminster Bank

NatWest's principal EFTPoS experiments are off-line, including its PISCES petrol retailing pilot, which offers credit card data collection,

validation and reporting through the bank's computer service subsidiary, Centrefile.

Streamline, its debit card, was launched in collaboration with Edicom, Texaco and Mobil at a total of 25 petrol stations. It has since moved into food retailing. NatWest's approach is to work with customers to design a system, sharing the costs of the experiment with the equipment manufacturers and the costs of training and promotion with the customers.

d. Lloyds Bank

Lloyd's pilot scheme, Cardpoint, has been running since March 1987 and incorporates 54 terminals in 42 outlets spread over a wide retail base. Although the customers do not pay for the card, the retailers pay a transaction-based fee and a hardware rental charge. Significantly, the growing retail base indicates that the retailers are satisfied with the finance case.

With the U.K.-wide network set to devolve into a competitive free-for-all after the initial trials, competition will be fierce and, in the absence of a pricing standard, a price war is a possibility.

e. Building Societies

The relative position of the banks and building societies is interesting. The building societies—with the exception of the Halifax—are using Matrix and Link (their ATM networks) to develop an EFTPoS capability for themselves. However, they do not have the capacity to introduce a nationwide system on their own. The tie-up between the two, scheduled for the latter half of 1988, may provide them with the muscle to do so.

f. Retailers

Additionally, there is a possibility that retailers could develop their own systems in order to enter the financial services market. Marks and Spencer, Sears and Debenhams actively offer their own label financial services and securities. Retailers are operating a valuable cash collection service for the banks and feel that they should be able to charge for this service.

A large percentage of retailers intend spending on networking and network management systems, displaying caution about allowing third parties to provide networking facilities, so whilst building and maintaining networks is a significant investment, this is the route that retailers prefer.

Four retailers—Burton, House of Fraser, Next and Marks & Spencer—are to set up a common technical standard for cashless shopping. The alliance follows growing concerns that moves towards widespread

EFTPoS are being dominated by the banks that have the most to gain from the system. Both Marks & Spencer and Texas Homecare have developed Epos networks that perform Epos applications, electronic messaging, local stock takes and ordering and goods receipts.

One of the big questions surrounding EFTPoS (U.K.) has always been who will pay for the terminal. However, retailers, such as Sainsbury and Burtons, are developing their own systems. The Burton Group, for example, recently spent £350,000 on CAP's Base 24 EFTPoS software, giving Burtons the ability to process more than 3 million in-store card-holders transactions.

Girobank pulled out of EFTPoS U.K. earlier in the year, feeling that progress was slow and preferring to concentrate on schemes with Sainsburys and BP.

There are also problems with secure transmission of data via telephone lines because although the larger retailers are equipped to use BT's Packet Switchstream Service for sending data, the smaller retailers have to connect their EPOS to the analogue PSTN network, unsuitable for sending secure financial data.

These outlets need a second phone link to BT's Cardway system. Although BT has announced plans for a new digital local telecomms network to allow retail terminals to connect directly to the PSS system, this network is not likely to be operating until the 1990s.

g. Switch Cards

The Switch cards from Midland, NatWest and Royal Bank of Scotland are a further positive move towards EFTPoS. The year-long trial is likely to begin next year with £13 million worth of contracts for the inaugural 2000 terminal scheme going to Omron and Ericsson (Terminals), CAP and Applied Communications (software), Tandem (computing back-up) and Plessey Crypto (Security systems).

h. Conclusion

EFTPoS is not likely to be a great financial operation for the banks in what is bound to be a highly competitive marketplace.

The role of EFTPoS U.K. is to set basic standards on cards, software and communications leaving the banks the freedom to use technology to suit their own particular needs. The U.K. Banks Network picture is shown in Exhibit VI-1.

EXHIBIT VI-1

THE U.K. BANKS NETWORK PICTURE

The major U.K. clearing banks are at different stages of development in their networks; however, using digital circuit-switching for voice and digital packet-switching for data, they are maximising the use of the lines installed.

LLOYDS Branch Information Technology Project (£570 million) is a network of over 28,000 terminals linking branches to one of 22 communications centres. The network will use X.25 to interface to BACS.

NAT WEST has also recognised that a combined voice and data network based on digital transmission was necessary to support growth. The DIN (Digital Integrated Network) was developed in two phases. It has chosen packet-switching technology for data.

MIDLAND's Midnet is the most comprehensive network in the U.K. and is exclusively X.25. Its reliability and coverage is such that Fastrack enjoys success as a third-party network service.

BARCLAYS is committed to constructing a single U.K. data network to handle all the necessary X.25 traffic since its existing BINS (Barclays Integrated Network System) has access to BT's public X.25 service Packet Switch stream. It also intends to build a global Barclays network.

The relative failure of EFTPoS to achieve the degree of penetration in the U.K. that it has in France can be explained by a failure of marketing to sell the benefits of EFTPoS and to create a demand to match the available supply of services.

For these reasons, INPUT feels that national EFTPoS, a complete link between authorisation and payment systems, is unlikely until the mid 1990s. Smart cards, despite the benefits of off-line validation, are likely to stall because of the high investment in magnetic strip technology.

Vendor opportunities will rest in the offering of additional services, e.g., linking EFTPoS with inventory control, sales analysis, E-mail and EDI.

Furthermore, the level of user confusion and emphasis on network developments offers significant project management, consultancy and custom development/systems integration opportunities for companies such as CAP and other large software and systems houses.

3. Belgium

The successful take-up of EFTPoS in Belgium can be attributed to the systems being primarily retailer-driven. Additionally—and as the electronic processing business market matures, this can be regarded as key—compatibility and standards were established between participant organisations with regard to cards and terminals at an early stage.

Cooperation between the banks has led to the setting up of an electronic clearing house for cheque and transfer operations. There are two successful networks: Master Cash (900 petrol stations, 6,300 retail terminals, 349 ATMs) and Bancocontact (1,600 petrol stations, 3,400 retail and 383 ATMs). Belgium's advance over the rest of Western Europe has led CIG—Belgium's biggest software house—to build a sales network outside Benelux and France, including the U.K. This network sells software for EFT applications that will lead to CIG recovering the investments made in the Master Cash networks into markets where ATM and EFTPoS networks are taking off. Products include an expert system to monitor X.25 networks and, with S/88 tools, to increase productivity of software that makes up the standard access and message handling facilities.

Furthermore, CIG's Positive product, which incorporates support for a broad range of PoS terminals—from the simplest card authorisation telephone terminal through integrated cash register clusters to the most advanced fully automated self-service petrol station terminals—means that its undertaking not bid against Intersys, a rival software house under the same Societe Generale ownership, won't cause it sleepless nights.

Interestingly, Bancocontract claims 47 million transactions split evenly between EFTPoS and ATMs; whilst Master Cash has more than twice as many ATM transactions, 28 million, many more for EFTPoS. This may signify, given Bancocontract's high number of petrol stations, that petrol stations are the key EFTPoS market.

4. West Germany

West German retailers do not perceive a high requirement for EFTPoS, regarding it as only cost-justified as a replacement for credit card payment. This attitude, coupled with a lack of consensus as to the most

appropriate development route for a national scheme and conflicts of interest between the different banking groups (private, savings and cooperative), has led to credit card organisations, post offices, building societies and retailers entering the EFTPoS field.

However, West Germany is likely to adopt smart cards in the same way as in France. Smart card standards have been established by the ISO and the costs have been significantly reduced. The deregulation of German banking and the Witte Commission's recommendations, will stimulate growth as the non-retail banks with considerable investments in technology will take the opportunity to develop their own credit cards and financial services. However, West Germany is still linked to Euro-cheques and its ATM network of 2,500 is considerably behind France and the U.K. in numbers per head of population. The estimated number of ATMs and EFTPoS terminals in Western Europe is included as Exhibit VI-2.

EXHIBIT VI-2

**ESTIMATED NUMBER OF ATMs & EFTPOS
TERMINALS IN WESTERN EUROPE
SEPTEMBER 1988**

	ATMs	EFTPoS Terminals
Belgium	750	7,000
Denmark	250	900
W. Germany	2,000	30
France	10,000	65,000
Italy	2,000	60
Holland	30	100
U.K.	7,000	700

Source: INPUT

5. Netherlands

Dutch EFTPoS developments also have been hindered by a lack of cooperation between the commercial banks. Plans for a national scheme

have been slowed by the Postbank's initiatives for competitive advantage. However, private sector Dutch banks have signed an agreement with Postbank on a common infrastructure for EFTPoS.

This agreement introduced common specifications for terminals and included a plan to open by 1989 all EFTPoS terminals to cards from all banks by linking computer authorisation. The location of a central computer switch to route authorisations to rival card systems is likely to be Postbank's Breda EFTPoS computer. Datatraffic, the Dutch service bureau and systems house recently taken over by some private banks is another candidate.

The two banking groups are to continue separate use of the magnetic stripe cards on the future EFTPoS network, which covers 300 Shell petrol stations and 100 terminals in the Eindhoven region.

The private banks have opted to follow the Eurocheque standard and allow cards to be used internationally in growing cross-border ATM use and for international EFTPoS. A Eurocheque pilot with Belgium, Portugal and Spain is planned.

Postbank is not a member of Eurocheque and is expected to introduce a separate card for overseas use. Additionally, the two groups are pressing for changes in telecomm tariffs from the PTT to limit the fixed costs of rental and line connection.

6. France

France is significantly the most advanced Western European country in terms of EFTPoS. It gained its lead in 1984 when three different networks, Carte Bleue, Credit Agricole and Credit Mutuel joined forces under the CB banner. This united network created a national payment system with a neutral card using technically compatible PoS terminals and standardised procedures. Development was further enhanced by the policy of not charging retailers the communication costs for authorisation networks and only levying a flexible transaction charge.

EFTPoS development in France has grown around these factors and France is now moving into a new electronic payments area. Government direction has led the French towards the smart card and this year, mixed technology terminals are being installed in parts of the country where the first smart cards are being distributed. These terminals can read both smart and magnetic strip cards.

Currently the banks provide most of the electronic payment terminals in France—about 50,000 of the 70,000 installed. Only certain outlets, those with a large percentage of card transactions, have devices integrated with their cash registers (sales outlet terminals).

French banks intend to design cash registers that accept bank cards to ensure the safety of the overall payment system. Banks have ordered 17 million Smart cards for French electronic money transfers from Bull and TRT-T1, a Phillips subsidiary. For the shops, 50,000 terminals are being delivered by companies such as Electrocheque CKD that are also supplying 30,000 certifiers.

Small French retailers and petrol stations have adopted off-line solutions whilst the larger retailers have adopted online solutions with zero-floor limits. Sligos—which has 50% of the EFTPoS market—has over 1,000 terminals connected to the valised service for retailers with low-volume/high-value transactions which facilitates interface switching for multiple cards and uses the Minitel network.

In such a fast-growing market, exceptional opportunities in software development and consultancy exist in the private sector as well as project management, systems integration and specialist support opportunities in the retail area.

7. Scandinavia

Scandinavian EFTPoS has been retailer-driven, partly due to the existing entrenched Giro credit systems, which are used to pay most bills, thus providing the banks with no large cheque traffic. EFTPoS selections have been installed by large retailers to reduce their back-office costs as part of an integrated automation strategy.

The savings banks' strategy is to grab a bigger share of the retail banking market on the back of the EFTPoS developments. However, the network of 731 branches owned by 31 individual commercial banks will also be supplying terminals.

Norway's banks have specialised sales staff whose sole function is to promote the use of EFTPoS systems by retailers. Progress towards a nationwide EFTPoS scheme in Norway has been helped by an inter-bank agreement to accept all cards in all terminals. The affiliation of 192 savings banks totalling 1,511 branches and their data processing affiliate, Fellesdata, last year placed an order for 4,000 online terminals from Ericsson.

Security is a big issue in Scandinavia. The Ericsson equipment ordered has algorithms, encryption methods, key management and PIN verification methods programmed into its system. Unauthorised tampering with the unit automatically erases the secret encryption keys and the complete security programme that controls their use.

Denmark, like Belgium, went electronic early on but persuaded the 180 banks to link together to set up one system. This mass transaction system

has extended rapidly following trials in 1986 with large stores, post offices and petrol stations.

One of the benefits to the banks is that EFTPoS provides a complete picture of customers' finances, facilitating analysis of spending patterns and transaction details as well as being able to calculate the potential for financial services and products.

C

Smart Cards

The French and Japanese are acknowledged leaders in the Smart card market, with many banks issuing them in preference to the U.K.-type magnetic stripe cards.

There are different forecasts, but typical figures are that there could be 130 million Smart cards in circulation in Japan by the early 1990s. Around 3.7 million Smart cards are in use in France, with that figure expected to reach 20 million by 1990.

The French Groupement des Cartes Bancaires invested £18 million covering three million cards in 1986 and the plan is for the scheme to go national by the end of 1989. The magnetic strip readers are already being upgraded to read Smart cards so that they can be used for EFTPoS as well as for bank transactions.

In the U.K., only Midland have launched a pilot Smart card scheme - at Loughborough University of Technology. The obvious deterrent for British banks is cost, as the entire ATM and plastic card infrastructure is locked into magnetic stripe technology and standards. Other smart cards could be in the U.K. sooner. As well as BT's Phonecard, cards for car parking, bus or rail tickets are likely. Hotels are already using cards for self-service payments whilst Thomas Cook are considering using them as travellers cheques. In France, for example, they are used as money cards for children.

For retailers however, the Smart card as a store card would eliminate the need for networking which is a problem for retailers with conventional EFTPoS. However, terminals to read and update even simple Smart cards are around £1000-£2000 whereas an ordinary magnetic stripe reader costs £250. The recent launch of Switch - a debit card system launched by Midland, National Westminster and the Royal Bank of Scotland - indicate the continued development of magnetic stripe technology in the U.K.

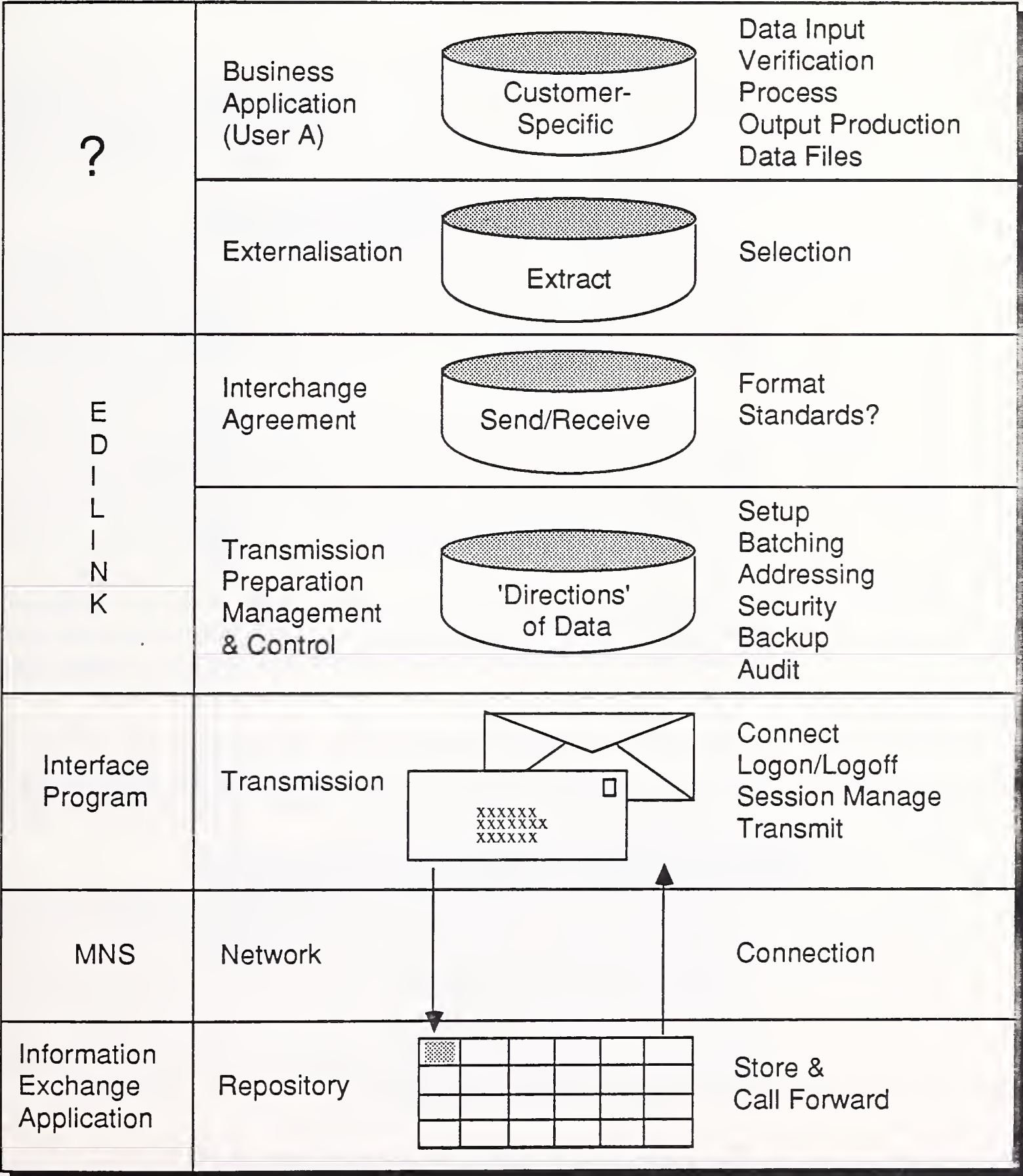
D

EDI

There are approximately 1,500 users of EDI (the transfer of formatted data between computer applications running on different machines and using agreed upon standards to describe and format the data contained in the messages) in Western Europe, with 70% in the U.K. Exhibit VI-3 depicts IBM's Business Network Services' view of EDI.

EXHIBIT VI-3

ELECTRONIC DATA INTERCHANGE



Source: IBM Business Network Services

Whilst the business benefits of EDI are obvious and oft stated (accuracy of data when sending to many organisations, speed of transfer, more-efficient processing of paperwork, improved productivity and better customer service), there are several factors that will precipitate the take-up of EDI:

If the cost benefits are to be fully realised, effective standards need to be agreed upon. This is taking place at several levels. First, there are the various standards-making bodies such as the United Nations Guidelines for Trade Data Interchange (UNGTDI), the American ANSI X.12 standard and the ISO EDIFACT standard.

At the industry level, the industry/trade associations have a vital role to play. In the U.K. this is particularly marked with the ANA's TRADACOM standard, the ODETTE standards for the motor industry, the DISH standards relating to international trade and transport, the EDI-CON group in the construction industry and CEFIC in chemicals.

Furthermore, there is a need to build an EDI interface into computer applications in order to process these standard messages, which can be a difficult and expensive task. Getting into EDI requires new applications modules to be built that can create and receive batch input to interface with existing application databases.

The acceptance of EDI and the ease with which it can be introduced into organisations requires either that EDI is integrated into existing systems or that one of the primary considerations in delivering customer-specific applications is ease of use.

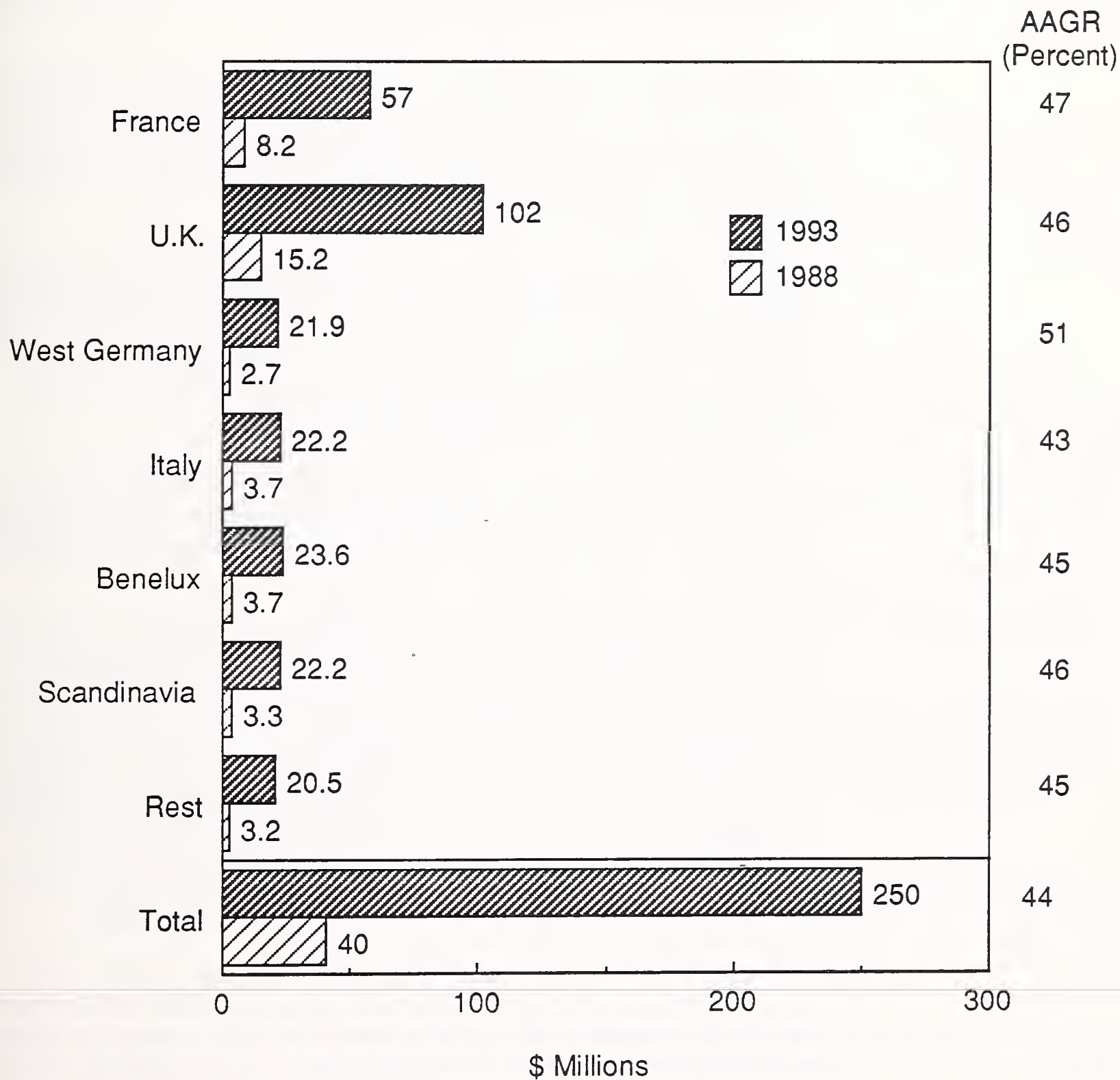
Pilot systems are using the first implementations of the international EDIFACT standard whilst the European Commission is sponsoring several EDI projects, including COST 306 for the transportation sector and the CD project in the customs area.

Additionally, there are several closed user group services offering the benefits of security as well as circumventing difficulties in PTT interrelationships. Examples are the Swiss-based L'Association des Services Transports Informatiques (ASTI) with services to 150 companies in freight forwarding and WEX, which links over 100 wine buyers and sellers in Western Europe and North America. The EDI market in Western Europe is currently worth \$40 million and is expected to grow at a rate of 44%, as shown in Exhibit VI-4.

EDI's strategic importance is reflected in the very high levels of interest and commitment to its development shown by government bodies and commercial associations representing a broad industry cross-section. The EEC is sponsoring the TEDIS (Trade Electronic Data Interchange Systems) programme to promote a standardised approach to EDI by all

EXHIBIT VI-4

THE EDI MARKET IN W. EUROPE, 1988-1993



potential industry and government users and to examine legal, technical and implementation issues.

In France, despite the presence of an automated customs system for transborder trade, the market is still relatively immature in EDI, due to

the late start reflected in a lack of standards agreement and a lack of a government-sponsored initiative to promote EDI development.

The U.K. is especially important in international EDI development, serving as a principal hub and gateway for data between Western Europe and the U.S.

Despite a highly export-orientated manufacturing economy, West Germany's ability to participate in transborder electronic trading has been inhibited by its bureaucracy. Nevertheless, EDI within West Germany is a generic method of business communications implemented via leased lines and the Datex-P network.

In the Benelux countries, despite regulated telecommunications environments, several retail distributors are using the GEIS EDI network whilst Rotterdam harbour is being automated by a joint venture of the PTT, the Ministry of Economic Affairs and several private shippers. Links between a customs/import computerised system called Sagitta and the INTIS ports system are being developed.

The market for EDI services in Belgium is influenced by its position as a European economic centre and as the headquarters for various government bodies, multinational corporations and financial institutions such as SWIFT.

The Scandinavian countries are excellent EDI markets due to high labour costs and their dependence on international trade. In Finland, EDI is being used in the forest products industry with 15 companies actively trading with nearly 100 international partners. Swedish distributors use EDI under the Dakom standards, with 50 wholesalers and 72 suppliers involved with the larger companies using direct links and smaller firms using public and commercial data networks. Transport Data Link (TDL) offers EDI services to approximately 15 companies in Scandinavia, England and Belgium. Industries represented are transportation services, auto manufacturers, financial services and insurance companies.

IBM and KTAS have formed the Dannet joint venture for EDI applications in Denmark which goes operational in January 1989, whilst Scantel (the five Scandinavian PTTs joint venture) will offer a variety of value-added services to Scandinavia-based multinational corporations, competing with other European international carriers.

EDI software is available from third-party services, Sitpro in the U.K. (Interbridge and Spex), Simpro (France), GLI (West Germany), Sime (Italy) as well as and large user organisations such as Philips and Volkswagen.

The view that EDI services tend to have a vertical market orientation is being questioned by the success of INS' Tradanet, which boasts over 700 companies in various market sectors. This success suggests that trade between such organisations knows no boundaries with petrol stations selling confectionary, DIY shops selling motorcar spares, etc. INS terms this process, the effective collapse of the vertical market boundaries, as the "domino" effect.

Therefore, it is clear that a generic market position will provide suppliers with opportunities to move their services up the value chain and provide specific application products in vertical markets across a generally available service base of basic EDI services. Given that the product is a low-technology offering, the quality of the customer base will become a key differentiator in the selection of service and may well lead to a market in which few can operate profitably.

Ultimately, every vertical market is a component in the international market place and particularly so with the advent of 1992. The high investment required to offer international services is beyond the reach of most companies and consequently the past few months have seen a spate of joint ventures and international alliances where strong national partners link with international carriers to provide worldwide EDI services.

INS, with its Tradanet International Service (which has linked the U.K. INS service with GEIS' EDI*Express) and IBM, with its Information Exchange, are two organisations that can offer pan-European services.

The intracompany, national EDI market is expected to expand tenfold in the next five years, but this will account for less than half of the total available EDI market. In order to flourish, vendors will need to operate within a critical mass of customers that can be defended against the disintegration of vertical market boundaries.

This situation will lead to a progressive gathering of strength among a relatively small number of suppliers that will be required to offer international connectivity and service and a wide range of standards as well as service interconnection.

INS offers Brokernet (insurance), Motornet (automotive), Pharmnet (pharmaceutical), Tradanet (food, clothing, chemicals, mail order, stores, pharmaceutical, white goods, electronics, public utilities and authorities, distribution, DIY, brewing, leisure, oil, etc.), as well as Tradanet International (Dish pilot).

Istel offers Edict, a full EDI service for manufacturing, distribution, health, finance, travel and mining industries.

IBM offers Information Exchange, and has Lloyds of London, as well as eight reinsurance companies, forming Rinet. IBM has forged a series of joint ventures across Europe: In Denmark, it has teamed up with telephone company KTAS, in Italy it formed INTESA with Fiat, in France Axone whilst Bell Atlantic, Siemens of West Germany and Ericsson of Sweden are also working with IBM to develop improved network equipment.

By 1991, IBM expects 40% of its network business to be EDI, whilst revenues from the network is rising faster than from other services. IBM snatched a potentially lucrative EDI deal from INS, the £10 million Lloyds of London project which could grow to be worth £100 million in future business. IBM followed this with a deal to provide eight large European reinsurance companies with the means to exchange documents with brokers via a service called Rinet. The network will probably interface with the Lloyds network.

New products include EDIlink's interface to IBM's EDI service. It is produced for IBM by Systems Designers as part of a pilot scheme called Shipnet, which links 40 companies in the shipping, distribution and freight industries. In addition to supplying software, Systems Designers and a company called the Software Connection are the first companies to join a scheme under which they will sell EDIlink and sign up new subscribers to IBM network services.

Systems Designers is playing a key role in EDI, developing software that sits between in-house systems and an EDI service. For example, on the EDICON project, EDI for the construction industry in the U.K. draws on contractors, suppliers, manufacturers, architects, quantity surveyors and builders merchants.

The outlook for EDI is rosy since the EEC sees EDI as a powerful ally in its bid to lower trade barriers in the EEC by 1992, when potentially 80% of European retailers will be conducting business via EDI links. Also by 1992, the European Commission will have set up an EDI agency called TEDIS to promote the technology.

IBM is targetting shipping, construction and insurance markets for its EDI push. Vendors need to adopt this vertical market approach, tailoring applications to user groups. Network traffic is growing at a monthly rate of 50%, with mailbox usage increasing by 20% a month. The heart of IBM's EDI service, which is still in its infancy, is the U.S.-designed Information Exchange, a store-and-forward system for electronic messages. This basic infrastructure provides the managed network service, which is either served straight or mixed with applications provided by Business Network services. Between 6,000 and 7,000 terminals are now connected to the network with an unknown number hiding behind the 250 host machines. IBM has 1,200 customers for the service.

In the U.K., IBM has identified 40 industry sectors that are potential users of EDI at a rate of 5 to 6 per year. Aerospace companies are likely to be a target with the application of transferring drawings between companies and their subcontractors.

Digital's Value Added Network Services hope to provide an electronic market in life insurance. It has 20,000 potential users and is backed by a budget of \$40 million for software alone. Digital announced its first U.K. EDI product, Vax/EDI, which enables Vax/VMS users to exchange data over the INS Tradinet value-added network. Vax/EDI translates and transfers data to and from application programs such as a purchase ledger via a mailbox on the Tradinet VAN and delivers/retrieves data from the relevant mailboxes. Vax/EDI connects to Tradinet across X.25 links and includes verification test software for use with Tradinet.

Although there is considerable scope for organisations to enter the EDI market, it is likely to become dominated by a limited number of suppliers because of the high levels of investment required and the need to offer a network service that can communicate with a substantial number of participants. Indications from the U.K. are that the market wants one network service regardless of where trading partners are located; however, 85% of the trade transactions are made at national level and consequently the driving force to establish universal standards is not as powerful as it might be.

There is a real danger that lack of network interworking could lock out smaller companies who cannot afford to subscribe to more than one network. Consequently, the bridge between the U.K.'s two leading EDI networks, Tradinet and Edict, augurs well for the continued sharp growth in the U.K.

E

Standards

The creation of ETSI (European Telecommunications Standards Institute), which held its first meeting in June 1988 indicates the European Commission's awareness of the seriousness of the standards issue in Europe. Standards setting until then had, at a regional level, been in the hands of CEPT. Although it brought together the main European telecommunications operators, the operators have been more involved in establishing local rather than regional standards.

As the traditional regulatory authorities in their respective countries, these operators naturally decided how their networks should be run and what sort of equipment can be connected to the system. As a result, Europe's telecommunications system does not use standardised products.

In services, the establishment of local standards has undermined the growth of the market: Two examples of this are in videotex, where each country has gone its own way in the establishment of standards (Prestel in

the U.K., Teletel in France, Cept in West Germany) and in the development of packet-switching. In principle, packet-switching is an efficient way to distribute data, but in practice, the international packet-switched network in Europe has a failure rate of around 30%, mainly because each country has created its own national system with inefficient links to its neighbours.

Within the network services market, the two key standards issues are for hardware and software interconnection and for document standards at an application level. In the course of user research, there was strong concern expressed about hardware connection and document standards development. One of the major problems with any standards-making body is that it tends to be too bureaucratic and slow to keep pace with changes in the services sector. This is reflected by the attitude of vendors towards the standards issue, where the majority of those asked felt that development of standards was not as important as getting users to trade electronically. The responses are shown in Exhibit VI-5.

The aim of ETSI, however, is to create Europe-wide standards, essential for creating a more hospitable environment for service providers and independent vendors alike. In addition to this, the stronger platform provided by an enlarged domestic European market will give participants a better shout in the world market.

There is an open membership policy—to include telecommunications manufacturers—since liberalisation has made it more important for manufacturers to have some say in how standards are defined. This way, specifications are less open to individual interpretation and distortion if suppliers and customers work together.

If ETSI fails, it is unlikely that the Commission will succeed in the central liberalising thrust outlined in the Green Paper. ETSI will also be involved in issues such as the development of a pan-European digital mobile system and the standards for new integrated voice and data networks. However, its most important role will be to preserve the balance between developing standards that make sense at a regional level for Europe, whilst not building a protective barrier around the market.

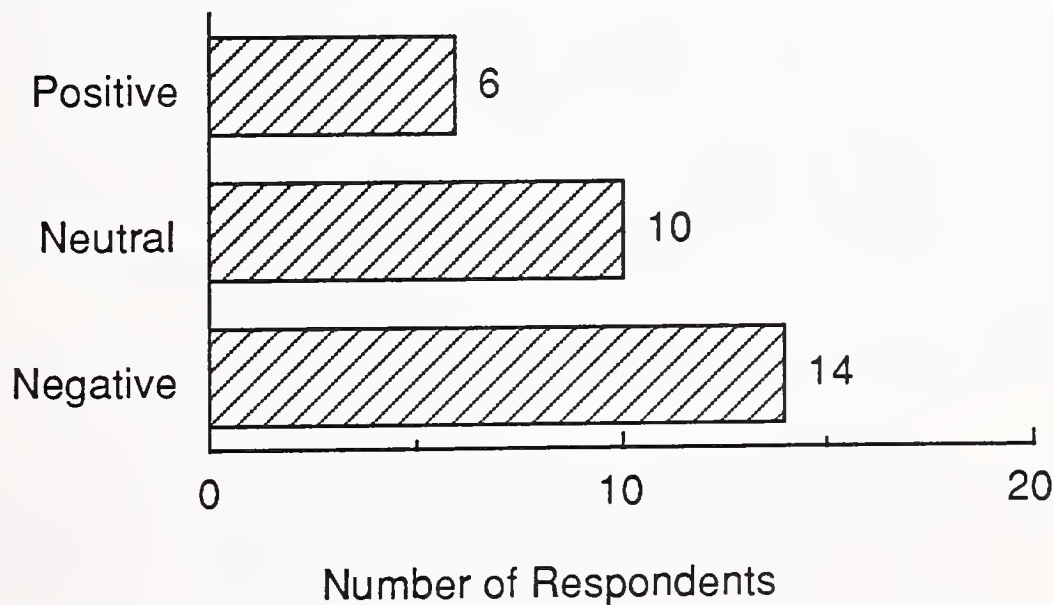
In July 1988, the Council of Ministers of the European Community committed to a progressively common market in telecommunications products and services. The majority (all except the U.K., Holland and Denmark) agreed to maintain the right for the national PTT to retain the monopoly over the PSTN on grounds that uneconomic service to sparsely populated areas must be provided and subsidised. There is also the possibility that an instinctive need to keep strategic central control over the sector was present in the thinking. Competition will be accepted in all value-added services that exploit the convergence of telecommunications and computing. The 12 also agreed to work towards the total

EXHIBIT VI-5

VENDOR ATTITUDES TOWARDS STANDARDS

Positive	Neutral	Negative
<ul style="list-style-type: none"> Standards Are Critical Standards Are Fundamental so as Not to Duplicate Investment There Must Be a Dictate on Standards EDIFACT Is Vital for EDI 	<ul style="list-style-type: none"> Some Standards (X.400, EDIFACT) Are Important Needed to Communicate with Other Networks Success Will Go to Those Who Can Be Flexible with the Technology Only Important in EDI 	<ul style="list-style-type: none"> Standards Are Not Important We Have SNA, Don't Need OSI Standards Can Inhibit Progress: Getting Up and Running Is the Key Without a Trading Community, Not across the Board

Sample Attitude Profile



interconnectivity of public networks across the Community and to "principles of tariff harmonisation" to reduce the enormous variations in phone charges across the Community.

ODETTE (Organisation for Data Exchange by Teletransmission in Europe) has started a transition programme to international EDIFACT syntax, in recognition of the need for automotive EDI users worldwide to have a "common" EDI language. The newly formed EDIFACT board is working on developing and maintaining international EDI messages, and receives support from the European Commission. Also involved in setting up transaction formats are the U.K. EDI Association, a coalition of port associations, and the IDEA (International Data Exchange Association). These organisations will need to synchronise their efforts.

Users' interests appear low on the list. The desire for stronger competition, more-predictable tariffs, harmonised services across Europe, higher-quality and more-straightforward type-approval rules were not being met. Tariffs on international leased lines in particular were especially high with aurality low, a fault proving to be a huge administrative headache to find the problem and correct it.

There is likely to be an increased demand from users for new applications that give a competitive edge, with cost proving to be less of a factor. Thus, the liberalisation and standardisation of international telecommunications services will facilitate the development of electronic trading between companies on an international scale. The complexity of the market place will demand alliances and joint ventures between companies.

The EEC's active support for OSI connectivity development as well as IBM's well-publicised support for OSI will help the development of the network services market. OSI connectivity has been further enhanced by the development of X.400-based message-handling services. Implementation of X.400 will facilitate the development of a global messaging environment, whilst overcoming the problem of incompatibility between subscriber E-mail services and office systems products.

X.400 will facilitate interworking between public and private systems. The growth of X.400 will be driven by commercial need: The X.400 message-handling service includes features such as user-friendly addressing, multiple addressing, nondelivery notification and online subscriber directory. The public services have an advantage over conventional E-mail in that users can send messages to fax, videotex, telex and teletex.

Additionally, X.400 will have a role in the development of EDI since the various services will require some form of common network structure between different EDI capabilities. It is probable that the large senders of

information will need to go point to point as opposed to via a clearing-house. BT's, Gold 400 will next year be capable of receiving fax into a mailbox. Whilst technically possible, delivering it as a reliable volume quality service is a little way off.

More manufacturers, software houses and independent vendors are turning to X.400 as a strategic direction. These developments, whilst beneficial to users, pose a threat to third-party vendors. This highlights the need for these vendors to offer integrated vertical market solutions if they are to stem the inevitable migration towards in-house systems, hybrid solutions and public services.

F

Pricing & Marketing

As the market for network services develops, the pricing of the services becomes a vital marketing decision. Vendors need to evaluate the levels of competition and, more important, the users' perception of value.

Vendors' attitudes towards pricing are shown in Exhibit VI-6.

There is a need to separate the economics of network development, which requires major capital investment and a period of low traffic volumes, and those of services supplied, which will achieve profitability faster in terms of covering their operating costs. The various pricing goals are normally stated in terms of the relationship of the price to the service's marketing strategy—penetration pricing to achieve critical mass, fee-based charging to encourage volume usage, value pricing to reflect that costs are consistent with derived usage of quality, service and high importance to the user.

At the earliest stages of product marketing, price competition is intense, with barriers to entry relatively low and the threat of subsidies and the bargaining power of buyers high. As the product develops, however, barriers to entry are created via the establishment of a 'critical mass' of users, which provides economies of scale and scope. The bargaining power of users drops when products are perceived as essential to the effectiveness of the business and the threat of substitution diminishes owing to the practical difficulties of changing service or supplier. Vendors should look to shift their pricing strategies from market penetration to value-based pricing.

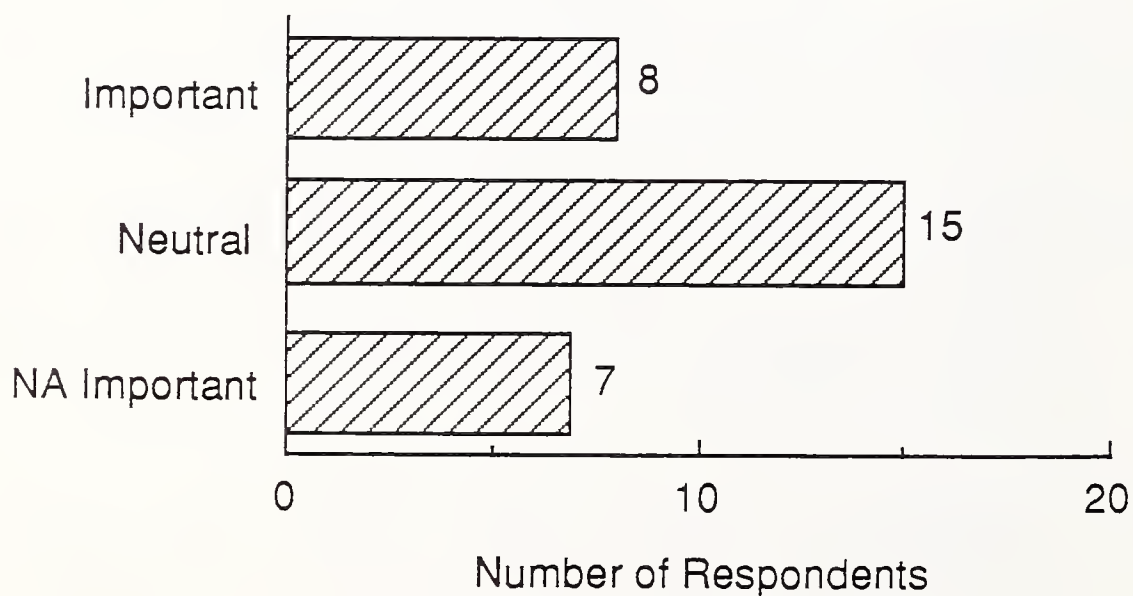
The high costs of developing products and services in this market coupled with the difficulties of achieving rapid market penetration have affected the profitability of most service vendors. However, the reasons for the relatively slow take-up of these services can be attributed to vendors' failure to maximise their marketing effort: Services and products must be seen as responsive to the requirements of different users. A technology-driven sales approach that markets a standard package of supposed benefits to the user will fail by appearing to impose a set of solutions on the customer as opposed to catering to his needs.

EXHIBIT VI-6

VENDOR ATTITUDES TOWARDS PRICING

Important	Neutral	Not Important
<ul style="list-style-type: none"> • Pricing Is Key. • Too High a Price Is a Market Inhibitor. • Pricing (Value) Has To Be Balanced Against Need to Attract Users. 	<ul style="list-style-type: none"> • Pricing Stimulates Use. • Pricing Will Become Important in the Long Term. • "Value" Is More Important. 	<ul style="list-style-type: none"> • Market Is Not Price Sensitive. • Offering the User a Complete Service Is More Important.

Sample Attitude Profile

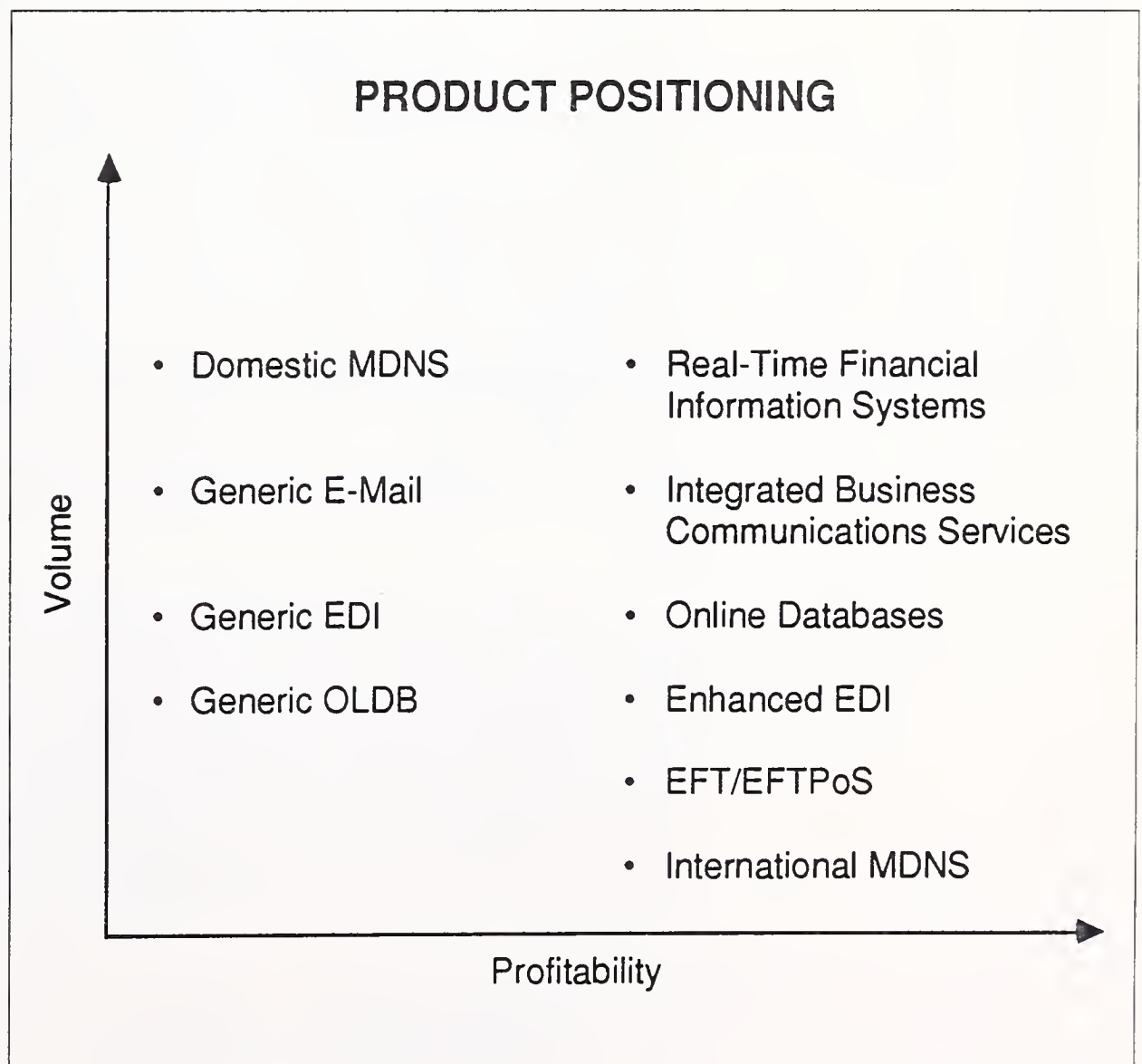


Vendors are faced with the problem of striking a balance between advanced product development in order to gain strategic competitive advantage and ensuring that products do not leave their customers behind.

With the advent of ISDN and OSI standards, vendors are operating in a window of opportunity and should be looking to develop strategies to lock in their current customer base, enhance added value and compete on service and support. Additionally, through industry groups and trade associations, steps could be made with regard to pricing. With the arrival of the PTTs' MDNS, a common agreement to stabilise and agree on a price structure would lead to competition based on non-price issues, with the consequent benefits to the user.

Another vital marketing issue is the positioning of a product in terms of volume and value. Product positioning in these terms is shown in Exhibit VI-7. The more profitable services are those that are most highly differentiated, such as real-time financial information systems. These are aimed at a close-knit community of interest composed of businesses prepared to pay a premium price for access to real-time information that is essential to their trading operations or electronic mail services used by multinational companies.

EXHIBIT VI-7



Weakly differentiated products positioned in competitive markets such as generic public electronic mail and EDI services have to operate penetration pricing strategies and differentiate by driving up the value-added chain in terms of service enhancement. However, the successful development of the network services market will depend on the exploitation of high-volume markets as well as services to niche markets or the closed user groups on which companies such as GSI in France have concentrated.

The economics of network operation are likely to mean that an increasingly varied range of services will need to be provided in order to establish a broader customer base on particular networks. This is already happening in the U.K., and with the provision of international links, it is likely that there will be a shakeout of service vendors. Their position with regard to pricing will be key.

G

Interworking/ Interlinking

The international link established between the INS network in the U.K. and GEIS' international network, which provides a transparent service for users and offers full audit facilities and high-level security, confirms that, from a technical standpoint, the interlinking of networks is feasible.

However, the question of interworking—the connectivity between networks operating in the same market—is more complex. In the U.K., the existence of three vendors offering significant EDI services—INS, Istel and IBM—has led to potential customers having to decide which network to join or indeed whether to join more than one. Companies that join one network are unable to communicate with trading partners not on that network, so they can't obtain the full benefit of network services, and companies that join more than one network face higher subscription costs for multiple network links as well as extra training costs, etc. Some of the smaller firms will not be able to afford the second option, and thus the vendors' strategy is to attract large organisations to their particular network and then use the customer base (hub, honeypot) to attract new users.

Such competition between networks is inhibiting the overall take-up in some sectors. From a vendors' viewpoint the development of counter-clusters could well result in their failure to achieve critical mass and a big increase in the time it takes to achieve profitability. There is a danger that with the potential involvement of the PTTs, links such as the one between Infonet and Transpac in France (Interpac) will become commonplace and with an effective billing and security structure in place, the third-party vendors could lose some of the advance they have made.

Even if the vendors agree to establish connectivity between their networks, as INS and Istel have recently agreed to do, there are still a plethora of commercial issues to resolve, such as responsibility for security,

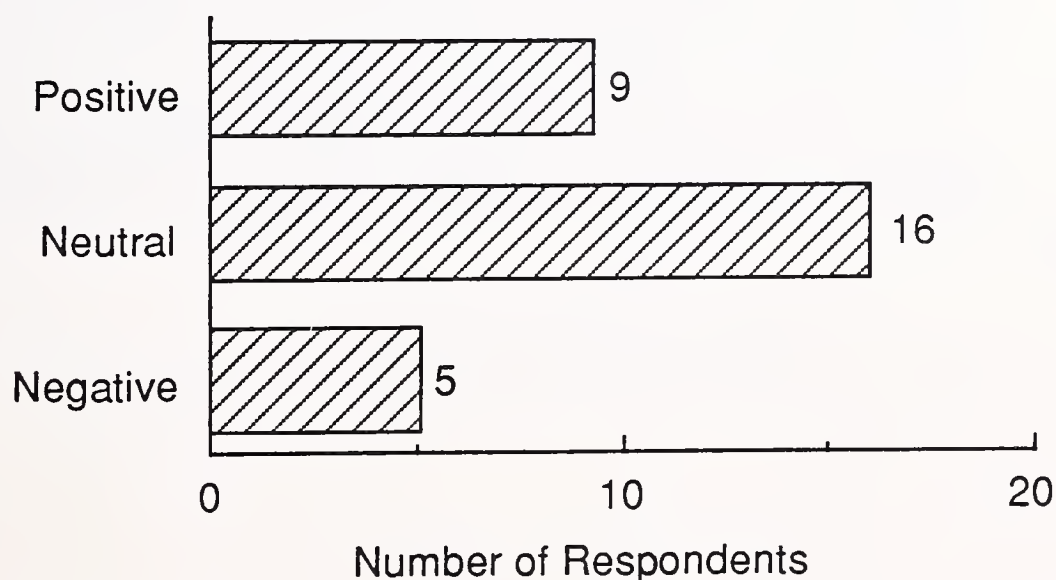
network interchanging, billing and development costs, as well as the critical preservation of a client base. Vendor attitudes towards network interworking are shown in Exhibit VI-8. All of these will crucially involve a cost to the user, and this could result in a restructuring of the supplier picture.

EXHIBIT VI-8

VENDOR ATTITUDES TOWARDS NETWORK INTERWORKING

Positive	Neutral	Negative
<ul style="list-style-type: none"> • Key to Fast Take-Up of EDI • National/International Links Should Be in Place • Need to Interlink to Improve Market Share 	<ul style="list-style-type: none"> • Customer Requirement: Necessary • Majority of Business Is National, Customers Evaluate Services on Offer • Commercial Considerations Are Key 	<ul style="list-style-type: none"> • Large User Can Subscribe to More Than One Service • Hubs Can Provide Subsidies

Sample Attitude Profile



H

Security

Users, vendors and consultants interviewed by INPUT considered security to be of primordial concern. With more companies critically dependent on networks, the lack of security standards could provide a barrier to further development as organisations postpone further development.

Users are concerned about internal breaches of security as well as the vulnerability of information sent via third parties. These problems and concerns with regard to security present opportunities for service companies to offer secure services including encryption facilities, audit trails and electronic signature features especially for transaction-based applications.

Security of public networks is of particular concern—users are not confident that telecomms links can be relied on. Furthermore, many companies lack confidence in the competence and responsiveness of national carriers like BT in the U.K. Additionally, many companies are concerned that without encryption facilities, which are viewed as prohibitively expensive, carriers cannot guarantee confidentiality.

Vendors should lead the way by providing an integrated set of security products, including secure networks, possibly by working through the ECMA (European Computer Manufacturers' Association) to develop multivendor security standards. SWIFT, for example, was recently the innocent carrier of a fraudulent payment message that could have cost Union Bank of Switzerland (UBS) almost \$32 million. This fraud, which relied on the speed and lack of human intervention implicit in automated messaging systems, was only spotted because of a computer breakdown that forced bank staff to make manual checks of payments instructions that would otherwise have been transmitted and remitted automatically.

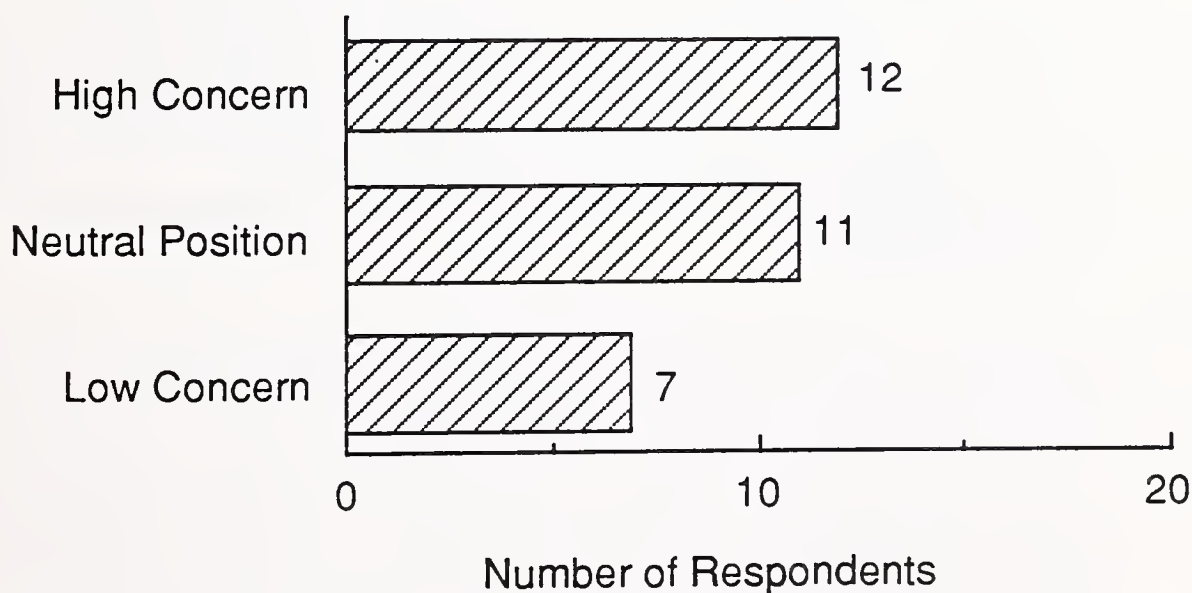
The true level of fraud is higher than appreciated because companies are unwilling to publicise any breach in their security, poorly prepared to defend themselves against fraud and complacent about the risks involved. The chief risk is from an insider; even senior and trusted managers may be prepared to gamble on a single opportunity to "make" a lot of money. Poor computer security can create such an opportunity. Vendor attitudes towards the security issue are summarised in Exhibit VI-9.

EXHIBIT VI-9

VENDOR ATTITUDES TOWARDS SECURITY

High Concern	Neutral Position	Low Concern
<ul style="list-style-type: none"> • Key to Take-Up • Enhances Vendor Credibility • Secure Systems and Procedures Are Essential • Problem of Interworking 	<ul style="list-style-type: none"> • Public Networks Viewed as Insecure • Encryption Facilities Expensive • Security Standards Required 	<ul style="list-style-type: none"> • Electronic Systems Are More Secure Than Other Methods • Immense Work Involved—Security Depends on Users

Sample Attitude Profile



I

ISDN

The EEC's proactive role in developing a technology-federated Europe and a common strategy for the introduction of ISDN has led to the RACE programme, which sets out to build a pan-European framework for an ISDN-based integrated broadband communications network by the early 1990s. The realisation of this, as with the pan-European MDNS, depends on a great deal of goodwill and work from the countries involved, since the lack of common standards is likely to result in the emergence of national and vendor-specific implementations.

ISDN is being driven by the needs of large multinationals who have experienced delays for transborder lines, exorbitant and illogical tariffs and equipment attachment difficulties with the current international network infrastructure. In addition to this, the lack of coordination between the PTTs and the incompatibility of the European X.25 networks have provided these large players with even larger headaches.

As indicated in the Section V-A of the report, these problems have and will continue to present opportunities for third-party service vendors. However, ISDN will pose a particular threat as the PTTs seek to protect their data traffic revenues. Although ISDN will be easier to use and manage by virtue of reducing the requirement for different interfaces, terminals and networks for multiple connection, the current standards for ISDN are incomplete and it is likely that users will be faced with potentially confusing vendor decisions as implementations emerge.

Furthermore, whilst reliability will increase via digital transmission and economies of scale will be realised by service integration, the high costs of attachment equipment and the lack of terminal products able to take advantage of the extended services will prove initially problematic since users are reluctant to commit to long-term investments in a relatively unproven technology. However, when ISDN does become a reality, there is no doubt that the impact will be primarily felt by the existing X.25 networks since ISDN will result in universal data, voice and video communications.

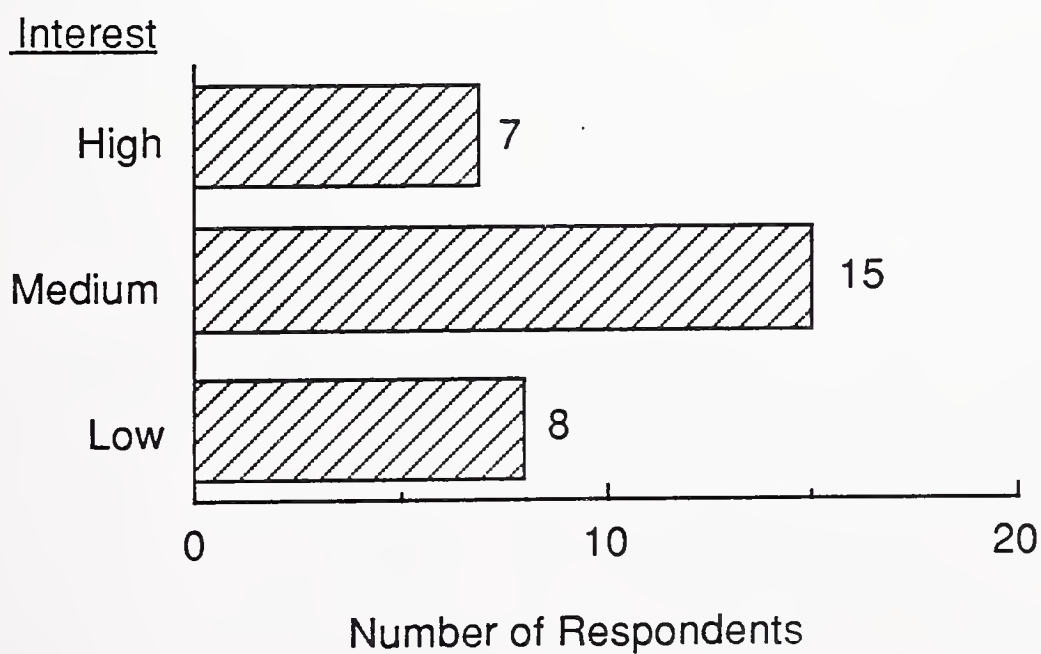
The effect of ISDN will depend on the level of consensus achieved by the PTTs and the effective development of standards. From the vendors' viewpoint, ISDN represents an opportunity to develop new application services and enhance existing services. IBM has realised the potential of adaptive technology and launched a suite of voice/data interconnection products that enable users to transmit voice and data via a single digital link and thereby save leased-line costs. Vendor attitudes towards ISDN are summarised in Exhibit VI-10.

EXHIBIT VI-10

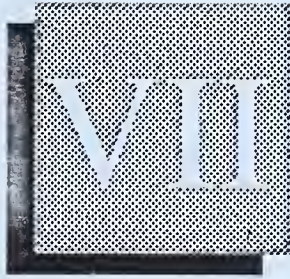
VENDOR ATTITUDES TOWARDS ISDN

High Interest	Medium Interest	Low Interest
<ul style="list-style-type: none"> • A Marvellous Opportunity • The PTTs Will Feel the Pinch 	<ul style="list-style-type: none"> • Wait and See • Not for Large Business • A Long Way Off 	<ul style="list-style-type: none"> • Of No Relevance • Broadband Yes, ISDN—Ambivalent

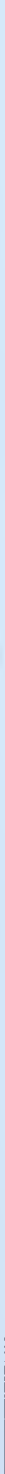
Sample Attitude Profile

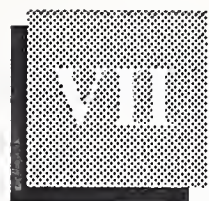


There is a vast array of potential applications if ISDN is extended to smaller business users and residential subscribers when the installation of digital exchanges is complete. In West Germany, the DBP is already working on projects that include remote meter reading, energy management and security functions. ISDN could ultimately provide cost-effective solutions to many users' communications problems. It is not unrealistic to expect that by 1992 the number of primary rate user connections to ISDN will exceed 20,000 in Europe and over 50,000 in the U.S.



The User Environment





The User Environment

A

Introduction

As part of INPUT's user research, 100 senior information services professionals and 103 middle/departmental managers, from marketing, production, finance, personnel and administration, were interviewed by telephone. An analysis of the research sample is given in Appendix B. This chapter offers a detailed analysis of this user research in the network, processing and electronic information markets, highlighting areas of business development opportunity.

The objective of the survey was to assess levels of awareness, usage and attitudes towards externally provided network processing and information services and whenever possible to highlight changes and trends over the past year by direct comparison with INPUT's 1987 user research.

The following issues were addressed:

- User attitudes towards the telecommunications environment and key telecommunications issues.
- Levels of market penetration and planned utilisation of electronic mail, electronic data interchange, electronic funds transfer and online databases.
- User perceptions of the benefits and problems associated with the use of the above.

B

User Attitudes and Priorities

Users were requested to state their perceived problems with the telecommunications environment in their countries. Exhibit VII-1 summarises comments on this issue. The principle areas commented upon can be broadly identified as:

- Dissatisfaction with the local PTT service. This was widespread and included criticism of both British Telecom and Mercury, the U.K. duopoly. (The role of the PTTs and the issue of telecommunications liberalisation is discussed in Chapter V—European Market Analysis.)
- The cost of network services: Users generally felt that the benefits obtained did not merit the investment.
- The lack of connectivity and the resulting complexity of network service operation. This highlights the need for more standards adherence and also the opportunity for vendors to provide project implementation services.
- A shortage of skilled telecommunications staff was a particular concern for users in all countries, especially where the market has reached an advanced stage due to the sophistication of the applications.

EXHIBIT VII-1

USERS' PERCEIVED PROBLEMS WITH TELECOMMUNICATIONS

FRANCE

- Security of the public data network.
- High cost of the service.
- Slowness of the service.

U.K.

- Shortage of specialist staff.
- Lack of standards.
- Lack of interconnectivity.

WEST GERMANY

- High cost of the service.
- Existence of unprofessional firms.
- Unreliability of the public network.

ITALY

- PTT is unreliable.
- Poor service
- High costs.

BENELUX

- Shortage of skilled staff.
- Slowness of service.

SCANDINAVIA

- Lack of interconnectivity.
- Shortage of skilled staff.
- Lack of standards.

Exhibits VII-2 through VII-5 show the user ratings for the total European sample for each of the issues, by country, by establishment size and by industry sector.

EXHIBIT VII-2

USERS' RATINGS OF TELECOMMUNICATIONS ISSUES—TOTAL WESTERN EUROPE

Issue Number	Issue	Average Rating*
1.	Shortage of Specialist Telecommunications Staff	4.1
2.	Lack of Standards for Hardware Connection	3.8
3.	Lack of Availability of Suitable Software	3.6
4.	Lack of Third Party Interconnectivity	3.3
5.	High Cost of Take-Up	3.0
6.	Keeping Pace with New Technology	2.8
7.	Integrating Voice and Data Networks	2.4
8.	Lack of Training	2.2

Total Sample = 203

Rating: 1 to 5, where 1 = Unimportant and 5 = Extremely Important

Average Standard Error = 0.07.

EXHIBIT VII-3

USERS' RATINGS OF TELECOMMUNICATIONS ISSUES BY COUNTRY

Country	Average Rating by Issue*							
	1	2	3	4	5	6	7	8
France	4.5	4.2	3.4	3.5	3.2	2.7	2.6	2.4
U.K.	4.5	3.4	3.8	3.2	2.8	2.3	2.2	2.4
West Germany	3.7	4.2	4.2	3.1	2.8	3.2	2.4	2.0
Benelux	4.1	3.4	3.8	2.9	3.2	2.9	2.1	2.0
Italy	3.7	3.8	3.4	3.7	3.0	3.3	2.7	2.3
Scandinavia	4.1	3.8	3.0	3.4	3.0	2.4	2.4	2.1
West Europe	4.1	3.8	3.6	3.3	3.0	2.8	2.4	2.2

Issue Table

1. Shortage of specialist telecommunications staff
2. Lack of standards for hardware connection
3. Lack of availability of suitable software
4. Lack of third-party interconnectivity
5. High cost of take-up
6. Keeping pace with new technology
7. Integrating voice and data networks
8. Lack of training

Total Sample: 203.

Rating 1 to 5, where 1 = Unimportant and 5 = Extremely Important

Average Standard Error = 0.07.

EXHIBIT VII-4

USERS' RATINGS OF TELECOMMUNICATIONS ISSUES BY ESTABLISHMENT SIZE

Establishment Size	Average Rating by Issue*							
	1	2	3	4	5	6	7	8
Over 1,000 Employees	3.9	3.6	3.9	3.5	2.6	2.9	2.7	2.2
Under 1,000 Employees	4.3	4.0	3.3	3.1	3.4	2.7	2.1	2.2
All Companies	4.1	3.8	3.6	3.3	3.0	2.8	2.4	2.2

Issue Table

1. Shortage of specialist telecommunications staff
2. Lack of standards for hardware connection
3. Lack of availability of suitable software
4. Lack of third-party interconnectivity
5. High cost of take-up
6. Keeping pace with new technology
7. Integrating voice and data networks
8. Lack of training

Total Sample: 203.

Rating 1 to 5, where 1 = Unimportant and 5 = Extremely Important

Average Standard Error = 0.07.

EXHIBIT VII-5

USERS' RATINGS OF TELECOMMUNICATIONS ISSUES BY INDUSTRY SECTOR

Industry Sector	Average Rating by Issue*							
	1	2	3	4	5	6	7	8
Process Manufacturing	3.5	3.9	3.4	3.1	3.3	3.1	2.6	2.5
Discrete Manufacturing	4.5	4.2	3.8	3.7	3.5	2.8	2.8	2.6
Retail Distribution	3.6	3.6	3.2	3.0	2.2	2.4	2.4	1.4
Banking & Finance	4.2	2.9	3.2	3.2	1.9	1.8	2.2	1.2
Insurance	4.4	2.8	3.7	3.0	2.1	2.0	1.8	1.5
Health Care	4.2	4.6	3.6	3.5	3.6	3.0	2.0	2.6
Government	4.2	4.4	3.9	3.8	3.6	3.3	3.0	3.0
Transport	4.2	3.9	3.6	3.1	3.5	3.5	2.4	2.6
Utilities	4.1	3.9	4.0	3.3	3.3	3.3	2.4	2.4
All Sectors	4.1	3.8	3.6	3.3	3.0	2.8	2.4	2.2

Issue Table

1. Shortage of specialist telecommunications staff
2. Lack of standards for hardware connection
3. Lack of availability of suitable software
4. Lack of third-party interconnectivity
5. High cost of take-up
6. Keeping pace with new technology
7. Integrating voice and data networks
8. Lack of training

Total Sample: 203.

Rating 1 to 5, where 1 = Unimportant and 5 = Extremely Important

Average Standard Error = 0.07.

The research revealed that the shortage of skilled specialist telecommunications staff is the key concern for users, and its importance can be gauged in the high ratings in most industry sectors and establishment sizes. This shortage is being experienced particularly acutely in the U.K. and France where the strong growth in network services is putting pressure on organisations to find the skilled people necessary to maintain and support systems.

Whilst there exists considerable concern amongst users over the extent of this skills shortage, there are commercial reasons why vendors play down the perception of such a shortage: There is substantial commercial gain to be made in offering solutions such as managed data networks, network services and applications with service and support functions.

It is no longer the media, but the application, that matters. The services companies have recognised training as key, and are spending more on every aspect of training than traditional companies, with the direct result that they are better equipped to manage networks. This recognition by vendors is reflected in the low ratings accorded to training in our survey.

The perceived skills shortage and the relative shift of costs against the advantages of private networks will inevitably push users towards network service vendors. Once tied to a third-party network, users can be retained by the provision of new applications.

Another key finding is that the lack of a universal hardware connection standard still remains of considerable concern to users. Only in the U.K. and Benelux was this issue rated slightly less highly (i.e., 3.4 against 3.8 for the total sample). This may well reflect the work being undertaken by the respective governments and vendors towards standards. Nonetheless, the slowness of the standards-making process is undoubtedly one of the most significant market inhibitors.

Lack of suitable software is a concern particularly in West Germany and also in the government sector in Western Europe. This reflects the lack of competition that exists in the West German market.

The third-party interconnectivity issue received lower ratings in countries where the market is still in its early stages of development, but higher in the more developed markets. The high costs of take-up were a factor with smaller organisations and the public sector in the health care, government and discrete manufacturing sectors.

Whilst the low degree of importance attached to the issue of integrating voice and data communications reflects the immaturity of the technical developments and the limited latent demand, the low ratings on the issues of new technology and training should be viewed as an indication that vendors, software suppliers and professional services companies are

succeeding in educating users and providing sufficient training. There remain areas of opportunity in this sector.

C

Market Sectors

Exhibits VII-6 through VII-22 indicate the levels of existing and planned usage of three key network applications: electronic mail, electronic data interchange and electronic funds transfer. In order to provide a direct comparison with our 1987 research, online database usage has also been monitored.

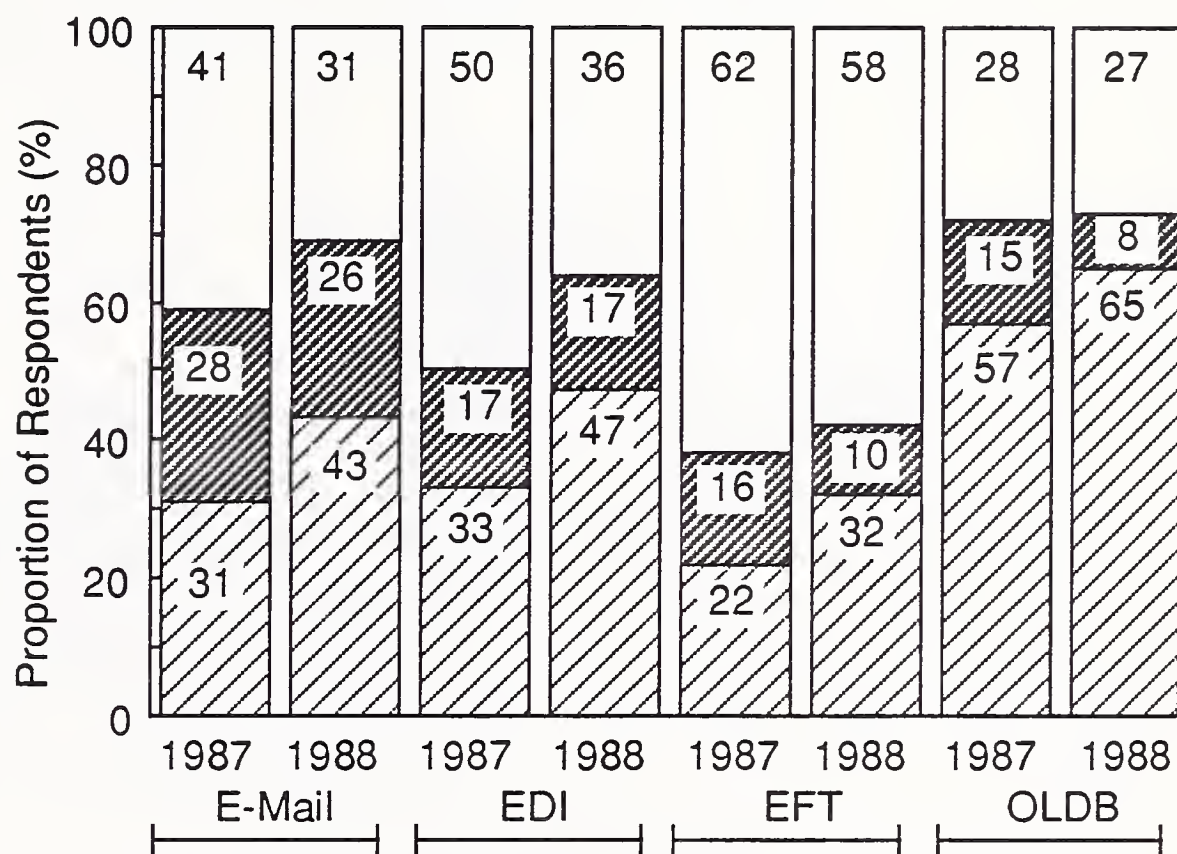
INPUT has analysed the research by country, establishment size and then by individual industry sector with a view to aiding vendors in targeting potential and underdeveloped opportunities.

It should be emphasised that the sample includes users who have developed network applications that call upon internal resources in addition to the use of external providers. As a result, the figures for electronic mail and in particular EDI are inflated because they include in-house processing and/or use closed-user or private networks, which are not included in our market definition. It should be noted, however, that these in-house applications must offer opportunities not only for software product vendors and professional services but also for project management and specialist skills.

INPUT also includes comparisons—by country market and by market sector—of user research in 1987 and 1988 to indicate levels of planned take-up against actuals.

EXHIBIT VII-6

COMPARISON OF MARKET OPPORTUNITIES BY APPLICATION (1987-1988): WESTERN EUROPE

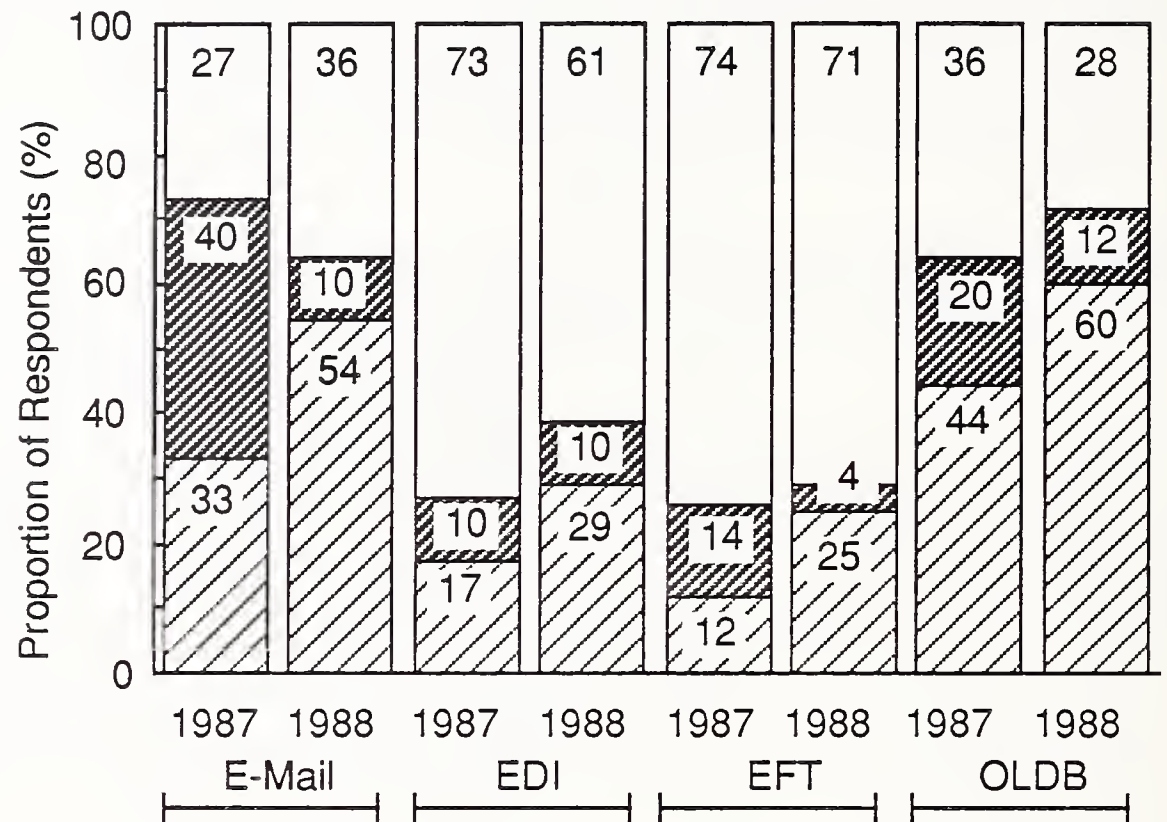


1988 includes Scandinavia

Total Sample Size: 203

EXHIBIT VII-7

COMPARISON OF MARKET OPPORTUNITIES (1987-1988): FRANCE



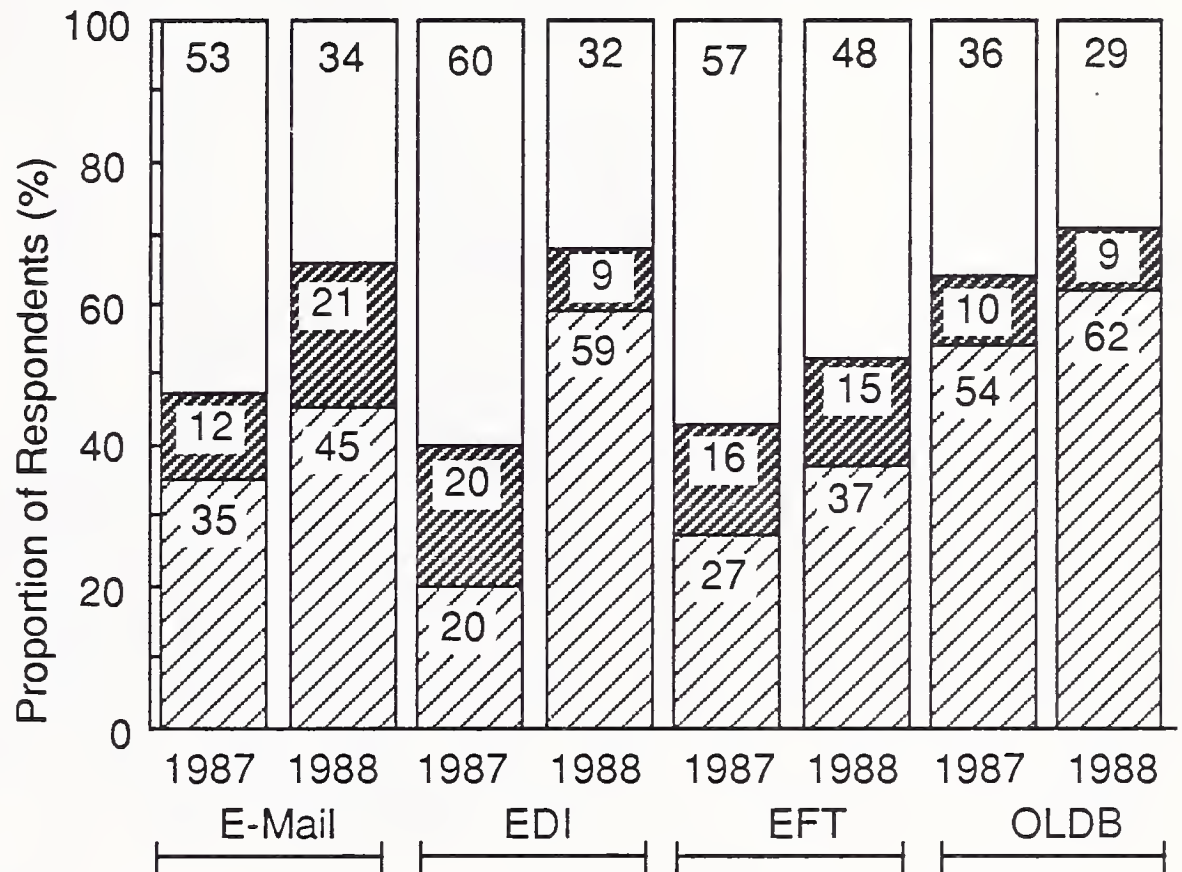
- Use
- Plan to Use within 12 Months
- Don't Use




Sample Size 1987: 46
Sample Size 1988: 45

EXHIBIT VII-8

EXHIBIT VII-8

**COMPARISON OF MARKET OPPORTUNITIES
(1987-1988): U.K.**



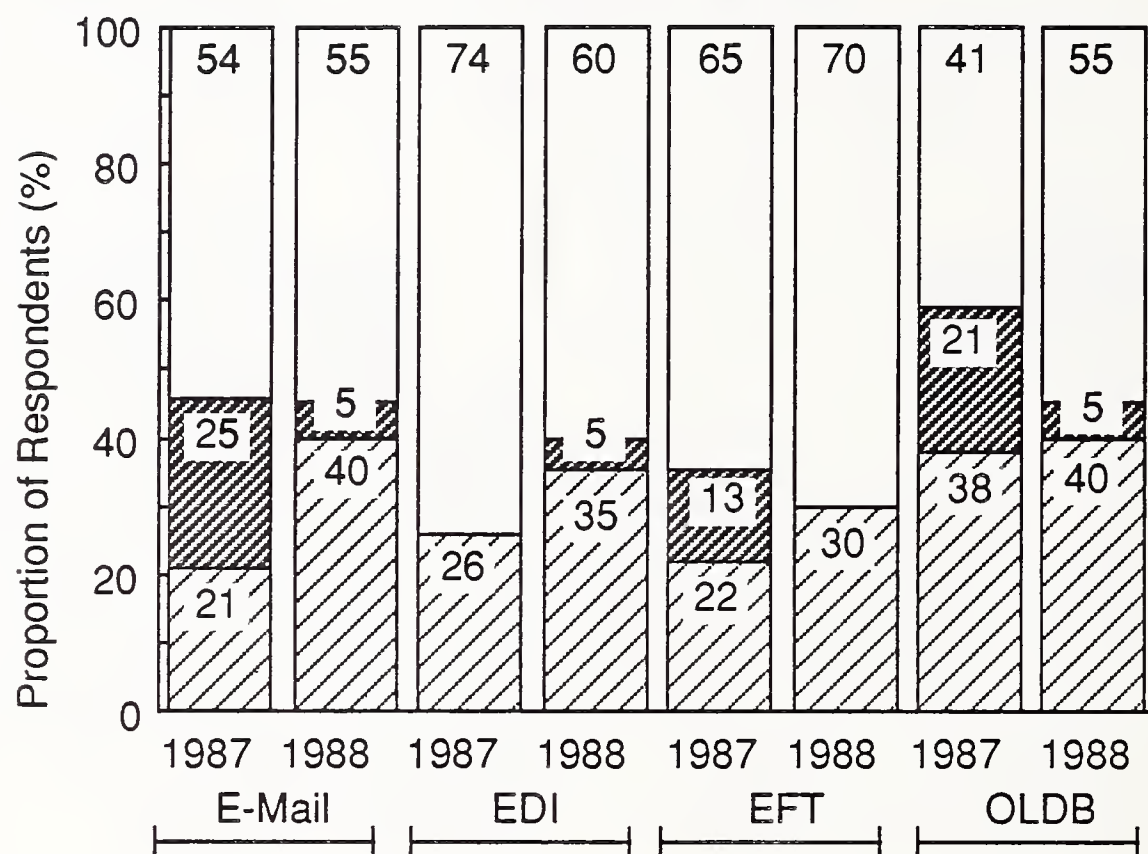
-  Use
-  Plan to Use within 12 Months
-  Don't Use




Sample Size 1987: 52

Sample Size 1988: 49

EXHIBIT VII-9

COMPARISON OF MARKET OPPORTUNITIES (1987-1988): ITALY



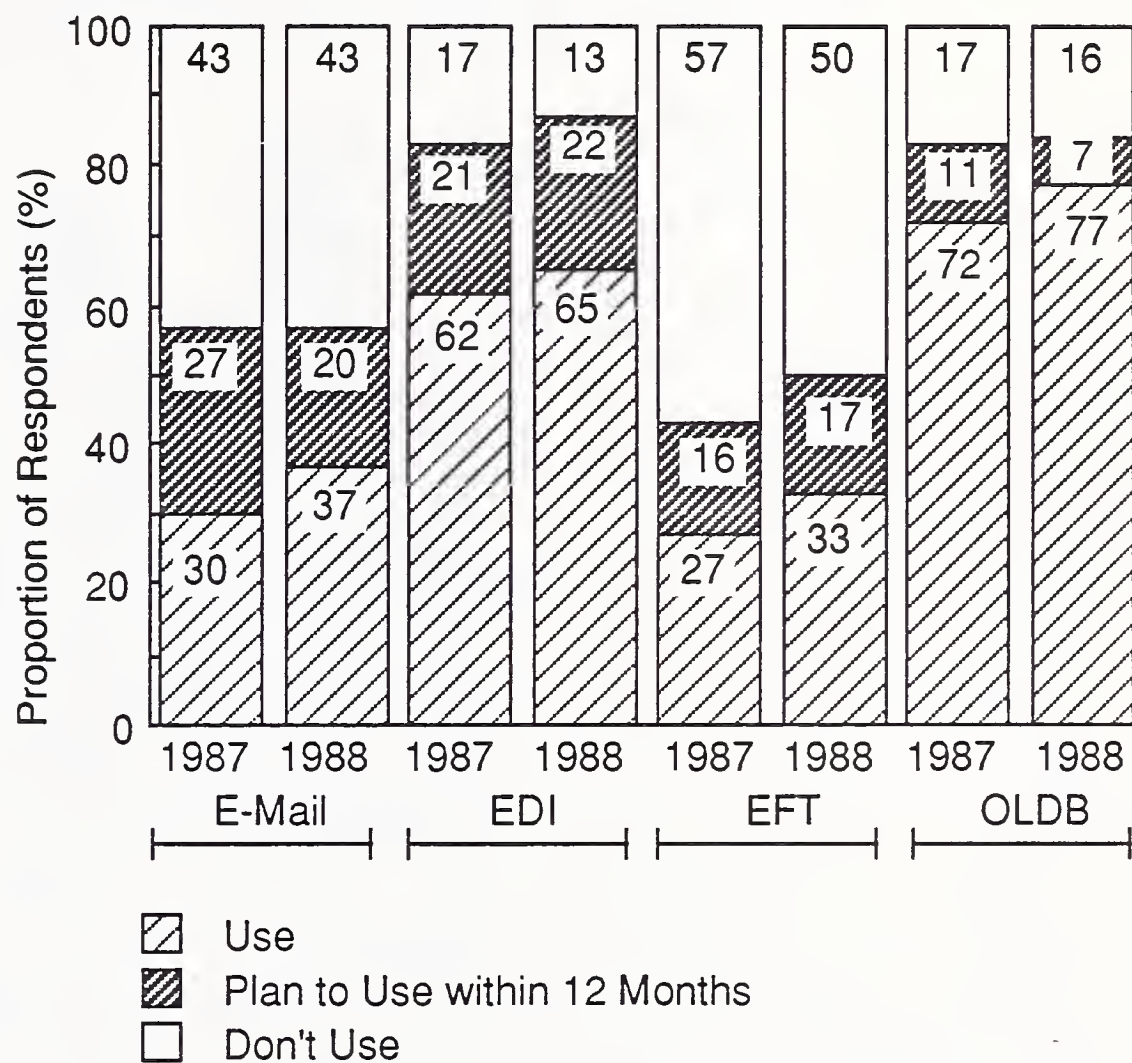
-  Use
-  Plan to Use within 12 Months
-  Don't Use

Sample Size 1987: 24

Sample Size 1988: 25

EXHIBIT VII-10

COMPARISON OF MARKET OPPORTUNITIES (1987-1988): WEST GERMANY

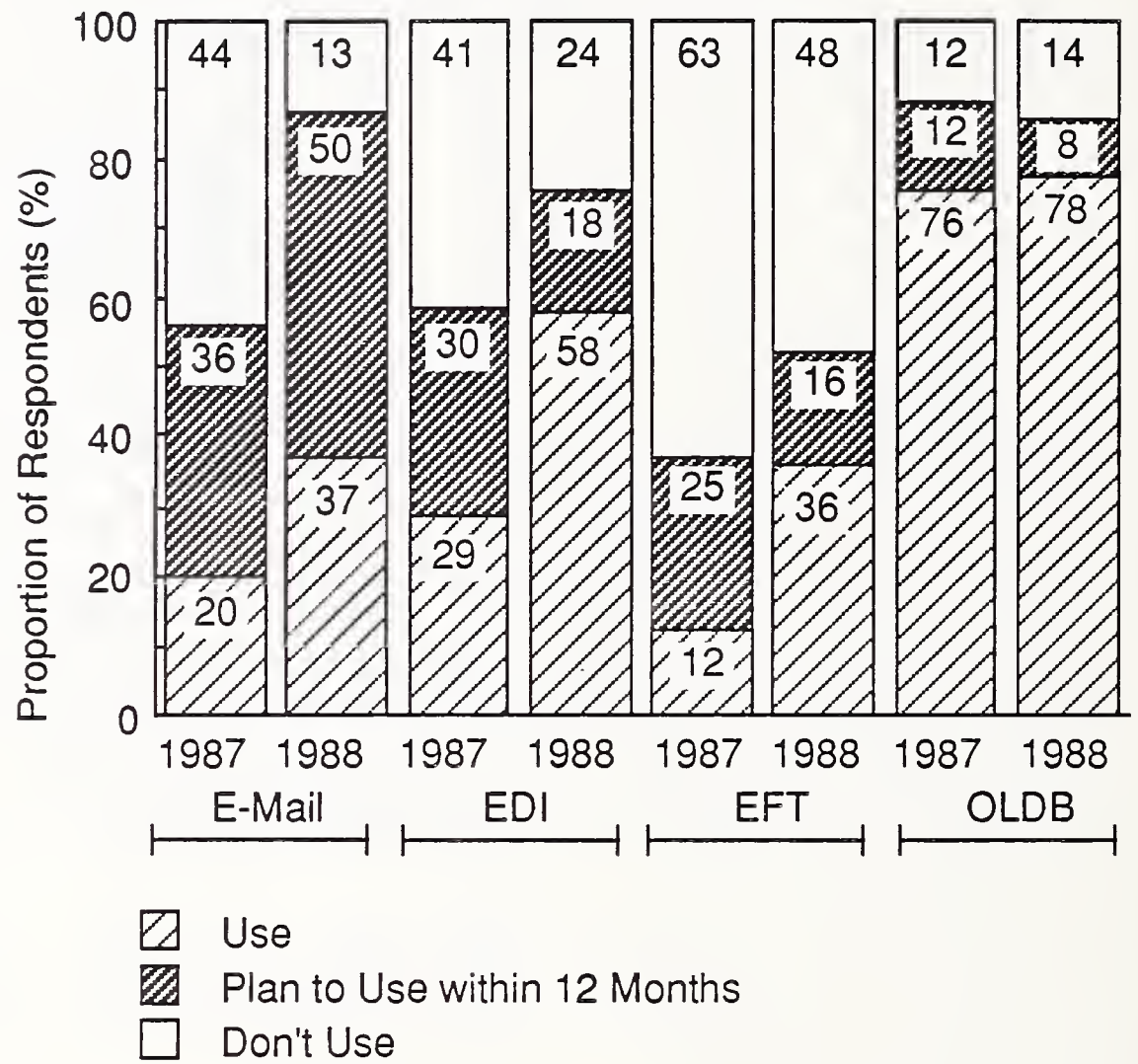


Sample Size 1987: 49

Sample Size 1988: 41

EXHIBIT VII-11

COMPARISON OF MARKET OPPORTUNITIES (1987-1988): BENELUX



Sample Size 1987: 25

Sample Size 1988: 23

EXHIBIT VII-12

MARKET OPPORTUNITIES BY COUNTRY AND ESTABLISHMENT SIZE

Country	Use of Network Applications (Percent of Respondents)											
	E-Mail			EDI			EFT			OLDB		
	U	P	D	U	P	D	U	P	D	U	P	D
France	54	10	36	29	10	61	25	4	71	60	12	28
U.K.	45	21	34	59	9	32	37	15	48	62	9	29
West Germany	37	20	43	65	22	13	33	17	50	77	7	16
Italy	40	5	55	35	5	60	30	0	70	40	5	55
Benelux	37	50	13	58	18	24	36	16	48	78	8	14
Scandinavia	45	50	5	35	35	30	30	5	65	71	9	20
W. Europe	43	26	31	47	17	36	32	10	58	65	8	27
Establishment Size	E-Mail			EDI			EFT			OLDB		
	U	P	D	U	P	D	U	P	D	U	P	D
> 1,000 Employees	47	23	30	60	10	30	35	10	55	71	10	19
< 1,000 Employees	39	29	32	34	24	42	29	10	61	59	6	35
All Companies	43	26	31	47	17	36	32	10	58	65	8	27

Use (U) Plan to Use (P) Don't Use (D)

1. Electronic Mail

E-mail continues to benefit from consistent growth. Exhibit VII-6 shows that with a user base of 43% and with a further 26% of respondents planning to utilise an E-mail service within the next 12 months, this represents a growth market of 60% between 1988 and 1989.

The French and Italian markets have undergone significant growth in the past year (the French market has benefited from Transpac's development of the Atlas X.400 messaging service, which provides OSI connectivity for E-mail service users and operators) and as a consequence present the least opportunity for growth.

With all markets studied approaching 50% penetration (with the exception of the French market, which is already 54%), growth is expected to slow, but this does not mean that there are not some opportunities, especially in vertical markets (such as financial services, banking and insurance) and in companies and organisations that have large numbers of outlets.

In particular, Belgium, the Netherlands and Scandinavia represent significant growth opportunities, and the emphasis should be placed on the growing potential enhancements to E-mail services, which offer integrated solutions such as the concept of one-stopping (an area that the MDNS to be offered by the PTTs will address).

Companies such as British Telecom and Fastrak in the U.K. are already adopting this strategy—BT offers gateway access to Telecom Gold for Prestel mailbox users, and Fartrak offers local call access using either videotex or asynchronous terminals to Telecom Gold in a package that also includes telex, forms processing and database access.

Mercury Link 7500 (formerly Easylink) prefers the term electronic messaging to E-mail, recognising that companies are increasingly requiring a flexible service that incorporates E-mail, telex, fax and even a form of EDI. For all these types of messaging, 7500 offers multiple addressing concerning a mixture of messaging media (E-mail, telex, fax, Easylink, alphanumeric message paper).

Various vertical market applications can be hooked onto the back of E-mail in banking, electronic publishing and retail. Companies can use E-mail as low-cost telex, but also for stock ordering, whereby orders can be batched from disposable outlets and appropriately converted before being sent out to suppliers.

Gateways to online databases are likely to increase as electronic mail and messaging services increase in sophistication—tailor-made services to the owner's exact requirements will increase as the market becomes more competitive.

2. Online Databases

Exhibit VII-6 indicates that 65% of all respondents use at least one online database, with only 8% planning to use a service in the next 12 months.

Online database services are the most mature of the applications studied—but market growth (12% per annum) is expected, making it the area with the least expected annual growth.

Banking, financial services and insurance are heavy users, as well as Government departments. However, whilst this is not surprising, there do exist considerable opportunities for vendors (pace Digital in the U.K., Seres in France) to increase revenues within a customer base with enhanced services. The key is to offer transaction services that enable integration with other in-house information services and systems.

In Europe, Italy offers the most significant growth opportunities, whilst it is in the finance and banking sectors, as liberalisation takes place in the various European markets, that there will be the greatest opportunity, particularly in the Reuters type of real-time financial information systems.

With the software that manipulates the database practically self-explanatory, the hosts are now the area for market opportunity. Currently host operators such as Reuters, Dialog and Mead all offer a selection of databases, thus encouraging users to subscribe to as few hosts as possible.

Developments being pursued by the information publishers rather than the hosts include CD-ROM, which could prove an ideal way to distribute large databases to interested parties. However, this would effectively cut out the host. This may not prove to be a way forward.

However, the key for vendors should be to develop software that facilitates the customisation of information for specific customers and transacted services for infrequent dial-up users.

3. Electronic Funds Transfer

User research indicates that electronic funds transfer (EFT) is the least mature of the applications studied. Market penetration is at 32% across Western Europe and considerably lower in non-financial areas such as insurance, transport and utilities. France is the most mature market in Europe in so far as the adoption of authorisation systems is concerned, and their linking authorisation with payments systems with the Smart card will inevitably result in this market continuing to experience sharp growth as the various problems associated with networking and security are removed.

In the countries where EFT lags behind the others—West Germany and Italy—the conflicts of interest between the banks and the retailers have been the inhibiting factor. This area presents enormous growth opportunities, however, and the successful implementation of EFTPoS in particular is more likely to occur in markets where the initiative is retailer driven, rather than waiting for agreed standards to emerge.

In the process manufacturing sector there is still much scope, especially in linking authorisation with payments systems for the petrochemical companies in their retail outlets, which should result in burgeoning growth in off-line EFTPoS. In the transport (import/export) sector, the public sector and the retail and manufacturing sectors, the key opportunity as we approach 1992 is to tie EFT in with other interactive, transaction-based applications, such as EDI. The development of online ATMs across Europe, agreements between banks and retailers and an awareness of the benefits of EFT should see rapid take-up in the next year.

Whilst the retail sector does not mirror the amount of publicity EFTPoS receives, there can be no question that there is a significant area of opportunity here for vendors of software products and professional services. Whilst retailers' concerns, in the U.K. at least, have been to install EPOS prior to EFTPoS and focus on developments to automate stock control, accounting and management information systems, the rapid take-up of EDI and the INS link with BACS (Banks Automated Clearing Service) indicate that retail will benefit from significant developments in EFT.

Users' concerns over EFT were expressed as follows:

- High cost of terminals/networking
- Preference for deferred payment by consumers
- Security doubts
- Lack of standards
- Too many different pilot schemes

A more detailed discussion of EFT and EFTPoS can be found, by country, in Section VI-B of this report.

4. EDI

The overall penetration of EDI in Western Europe (47%) is highly confusing and somewhat misleading because it includes EDI implementations on private networks (especially in West Germany, where the resultant figure shows a staggering 65% of users using EDI) and in-house developments by large users.

INPUT considers the market to be penetrated more in the region of 35% in Western Europe. In West Germany, EDI is almost a generic method of

business communication, but using the leased lines and the Datex-P network.

Not surprisingly, all European markets are expected to experience sharp growth over the next 12 months, aping the U.K.'s phenomenal growth rates of well over 100% in the past year.

European countries, particularly France, have learnt from the U.K. experience and are racing to open their markets from a strong base and already well documented standards that will lend themselves to EDI applications.

There will be major growth opportunities in the small and medium-sized organisations as the larger organisations, already involved in EDI, seek to haul their key suppliers into a trading cluster whilst extolling the benefits that EDI can bring to smaller organisations, such as competitive advantage.

EDI, having started life in the automotive and retail sectors, is now very much a cross-industry success story. Its crossover mirrors the natural development of trading links in the economy. There are opportunities in all sectors, and the key to successful EDI take-up is to target specific industries and trade associations to develop critical mass.

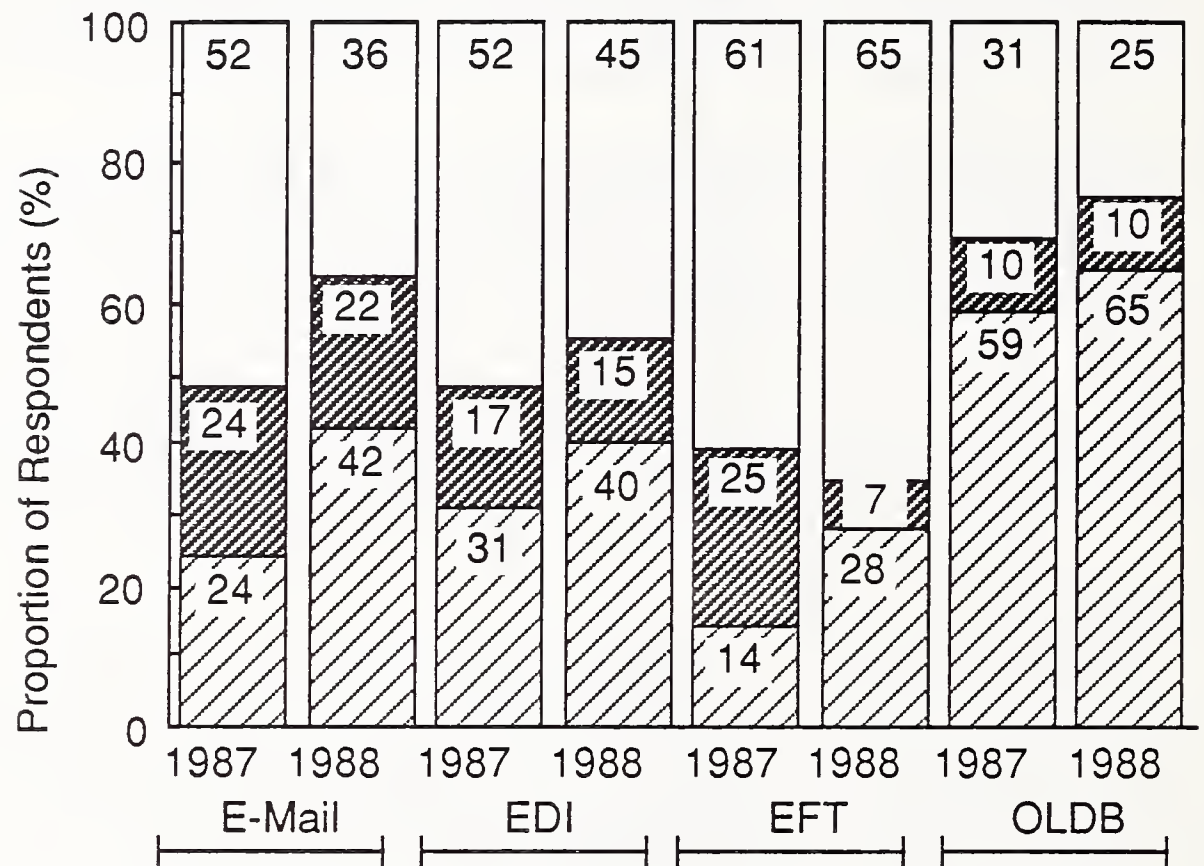
Marketing and commercial departments in organisations should be looking to be the instigators of EDI take-up, and increasingly EDI vendors are holding seminars, courses and promotional events to explain and encourage the wide use of EDI. There are two distinct development phases in EDI:

- Develop critical mass ("hub", "honeypot")
- Develop hub profitability, using the EDI application as the launchpad to offering interactive database services and meeting additional requirements for information dissemination

Exhibits VII-13 through VII-22 provide a comprehensive breakdown across all industry sectors.

EXHIBIT VII-13

COMPARISON OF MARKET OPPORTUNITIES (1987-1988): PROCESS MANUFACTURING



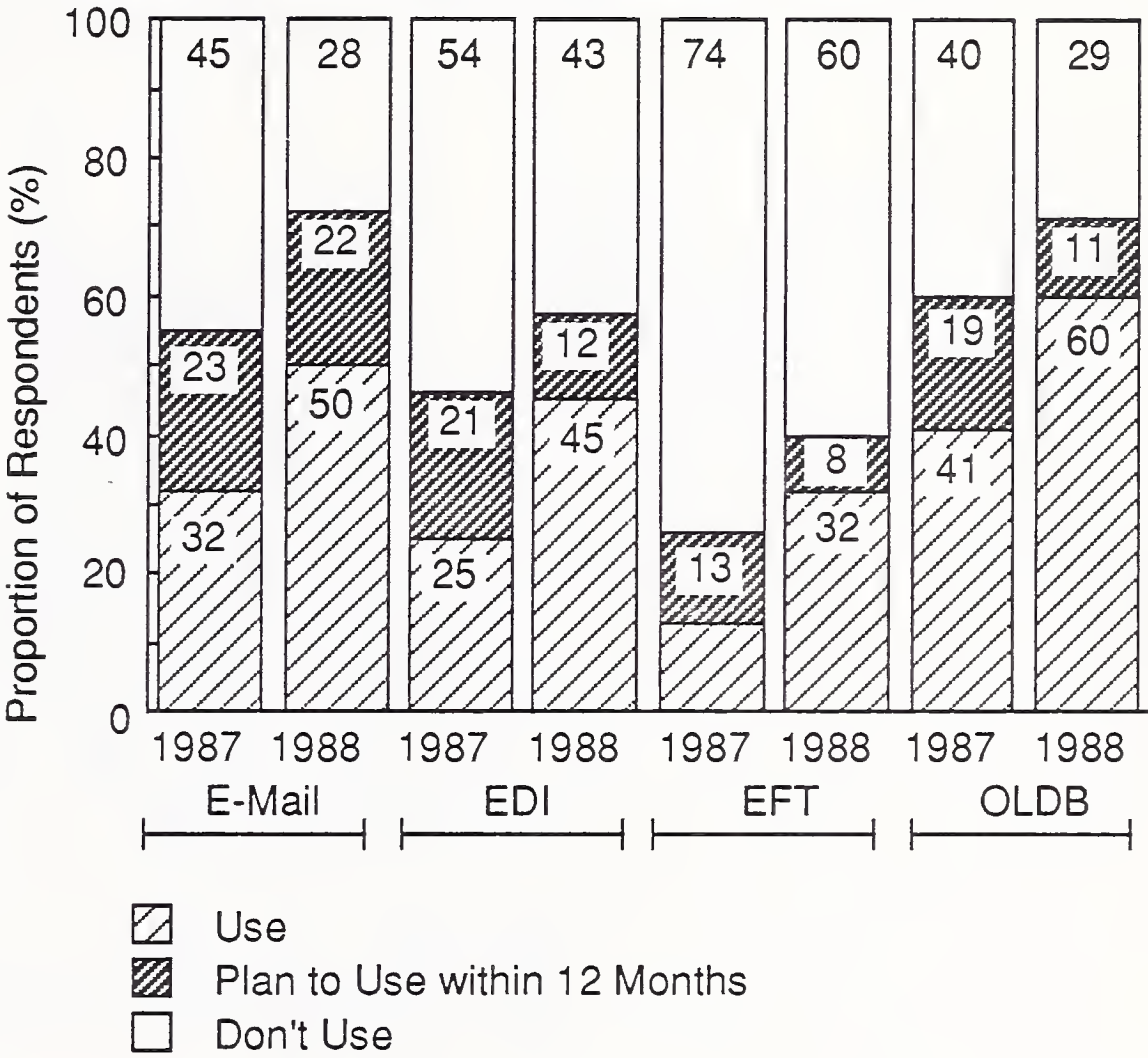
- Use
- Plan to Use within 12 Months
- Don't Use

Sample Size 1987: 29

Sample Size 1988: 27

EXHIBIT VII-14

COMPARISON OF MARKET OPPORTUNITIES
(1987-1988): DISCRETE MANUFACTURING



Sample Size 1987: 30
Sample Size 1988: 31

EXHIBIT VII-15

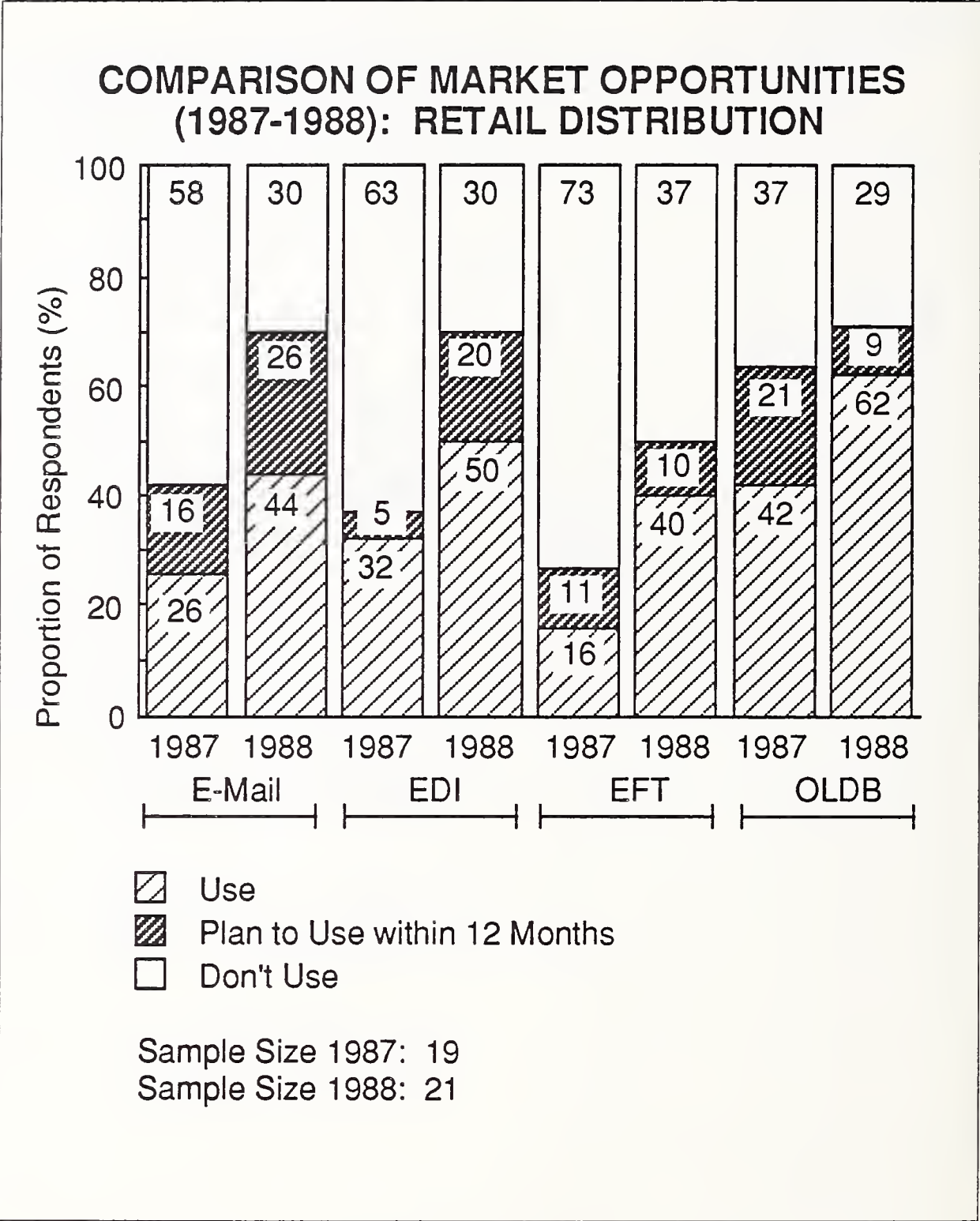
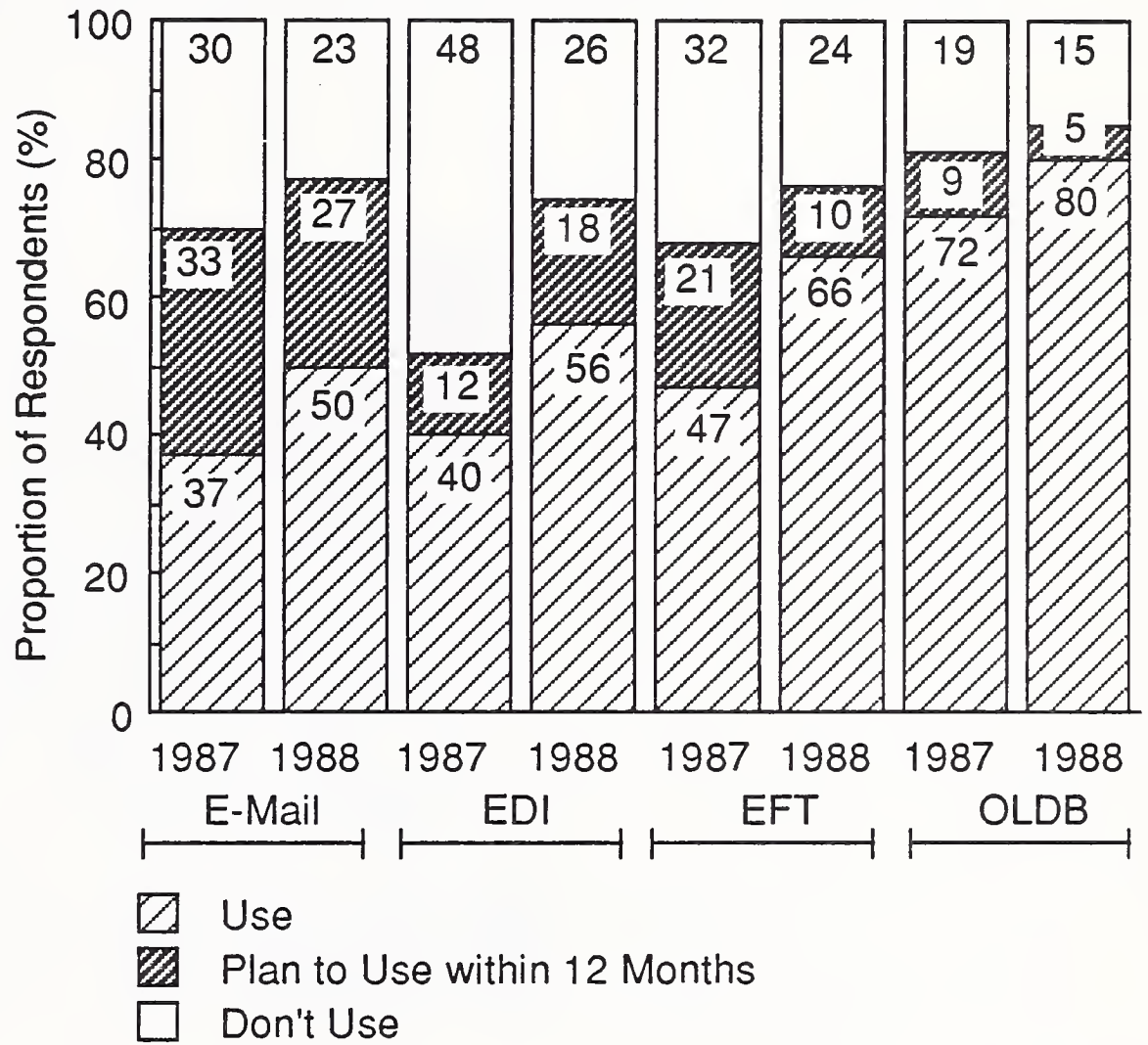


EXHIBIT VII-16

COMPARISON OF MARKET OPPORTUNITIES (1987-1988): BANKING & FINANCE



Sample Size 1987: 45

Sample Size 1988: 44

EXHIBIT VII-17

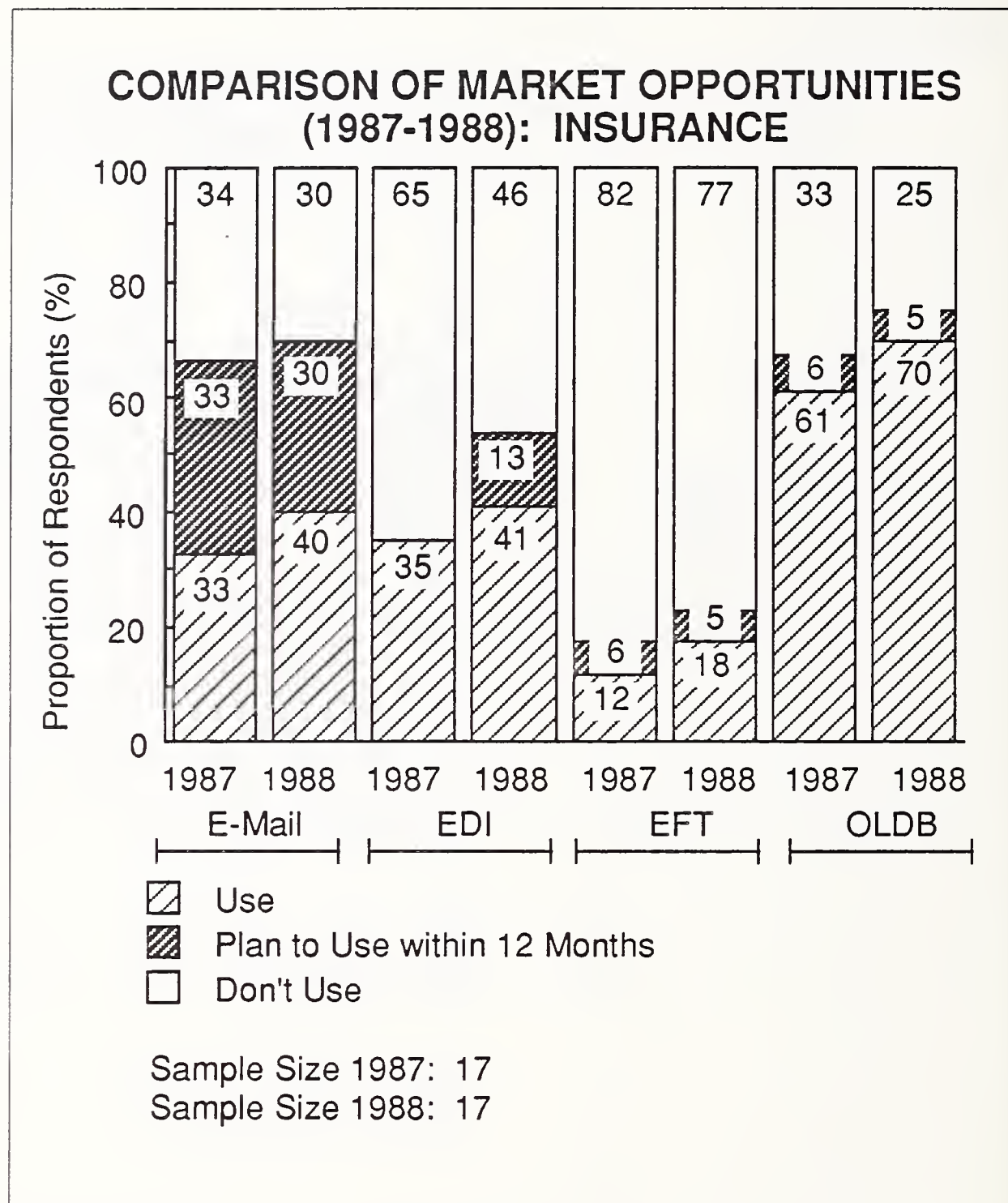
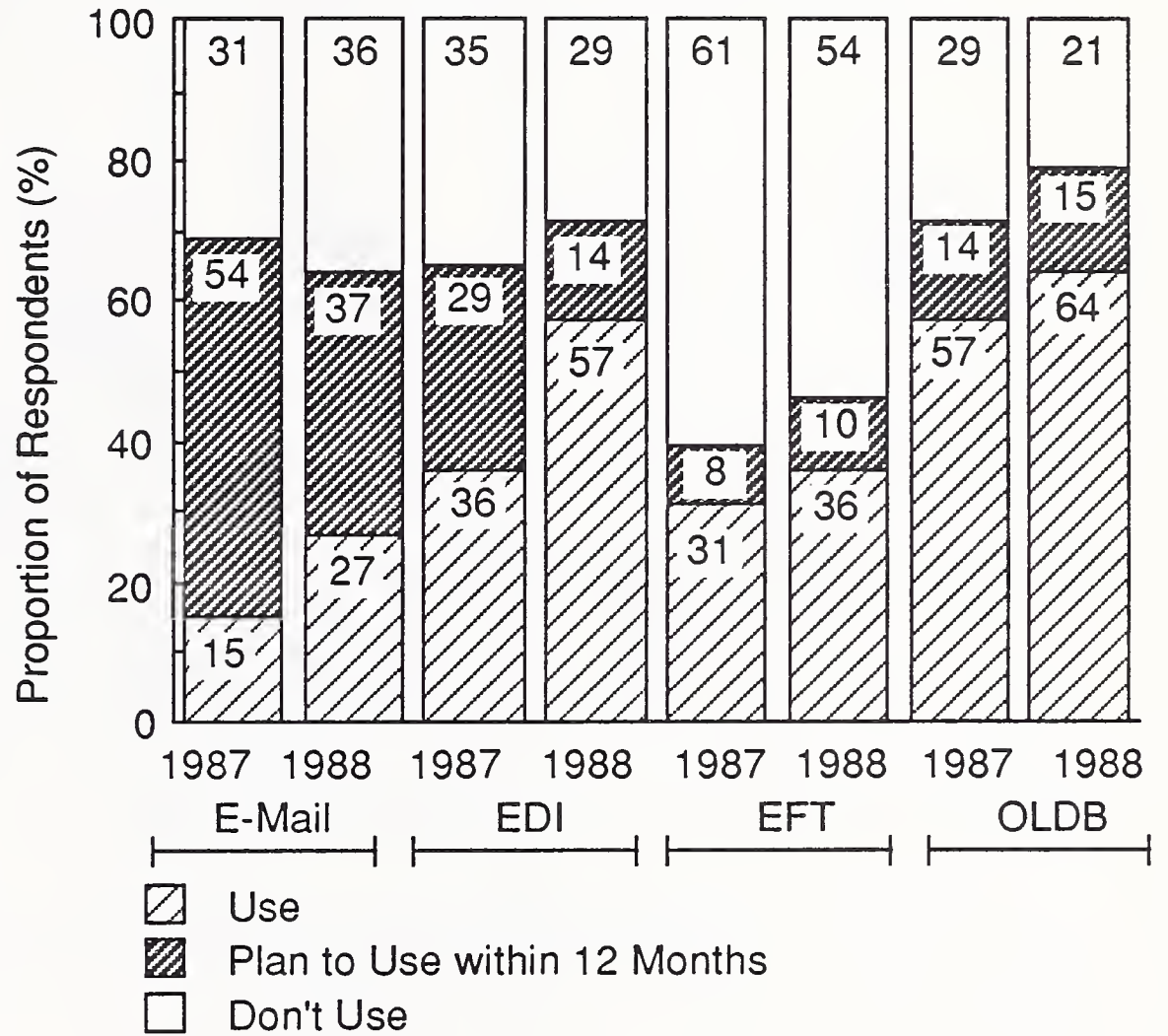


EXHIBIT VII-18

COMPARISON OF MARKET OPPORTUNITIES (1987-1988): HEALTH CARE



Sample Size 1987: 14

Sample Size 1988: 15

EXHIBIT VII-19

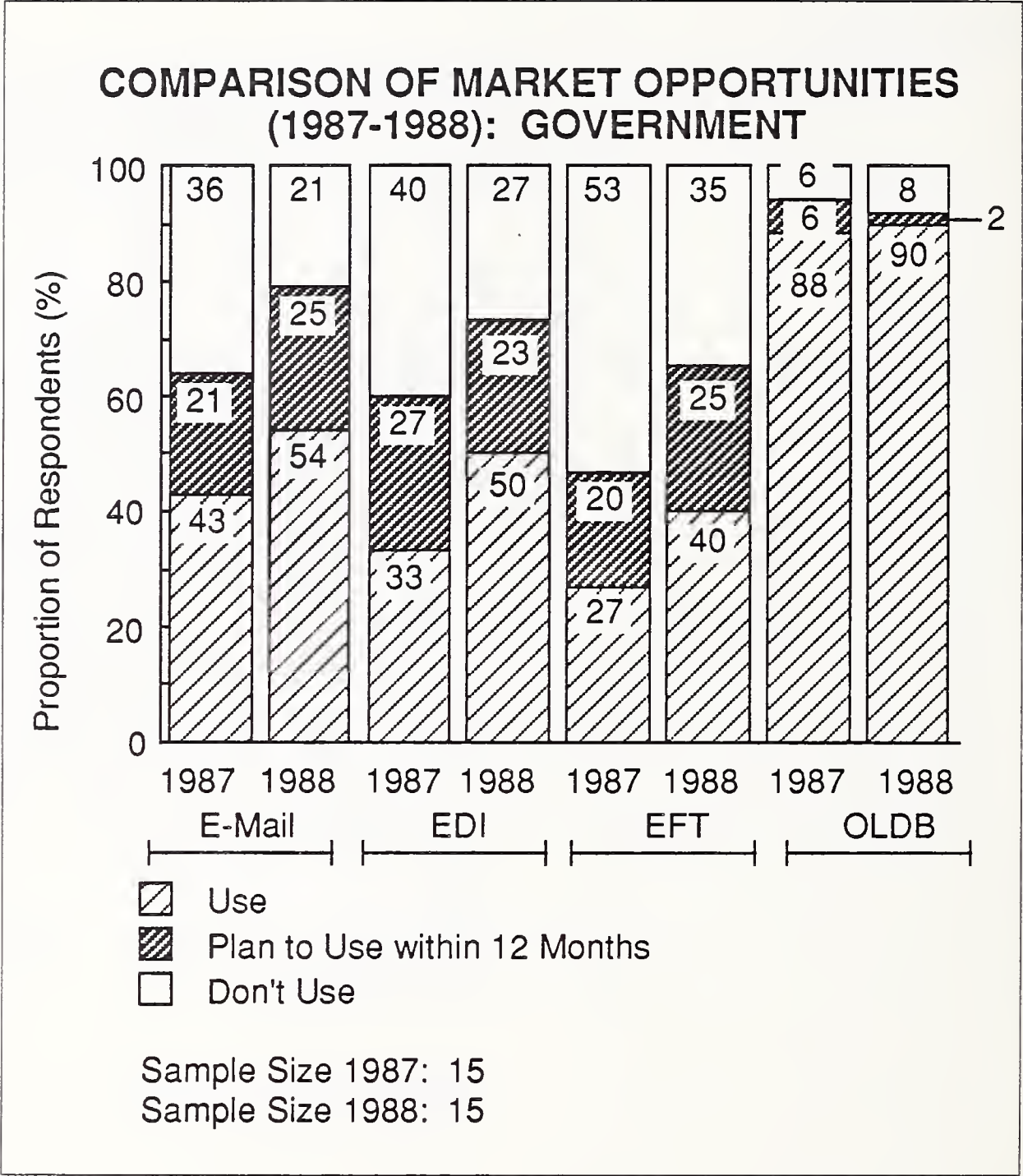


EXHIBIT VII-20

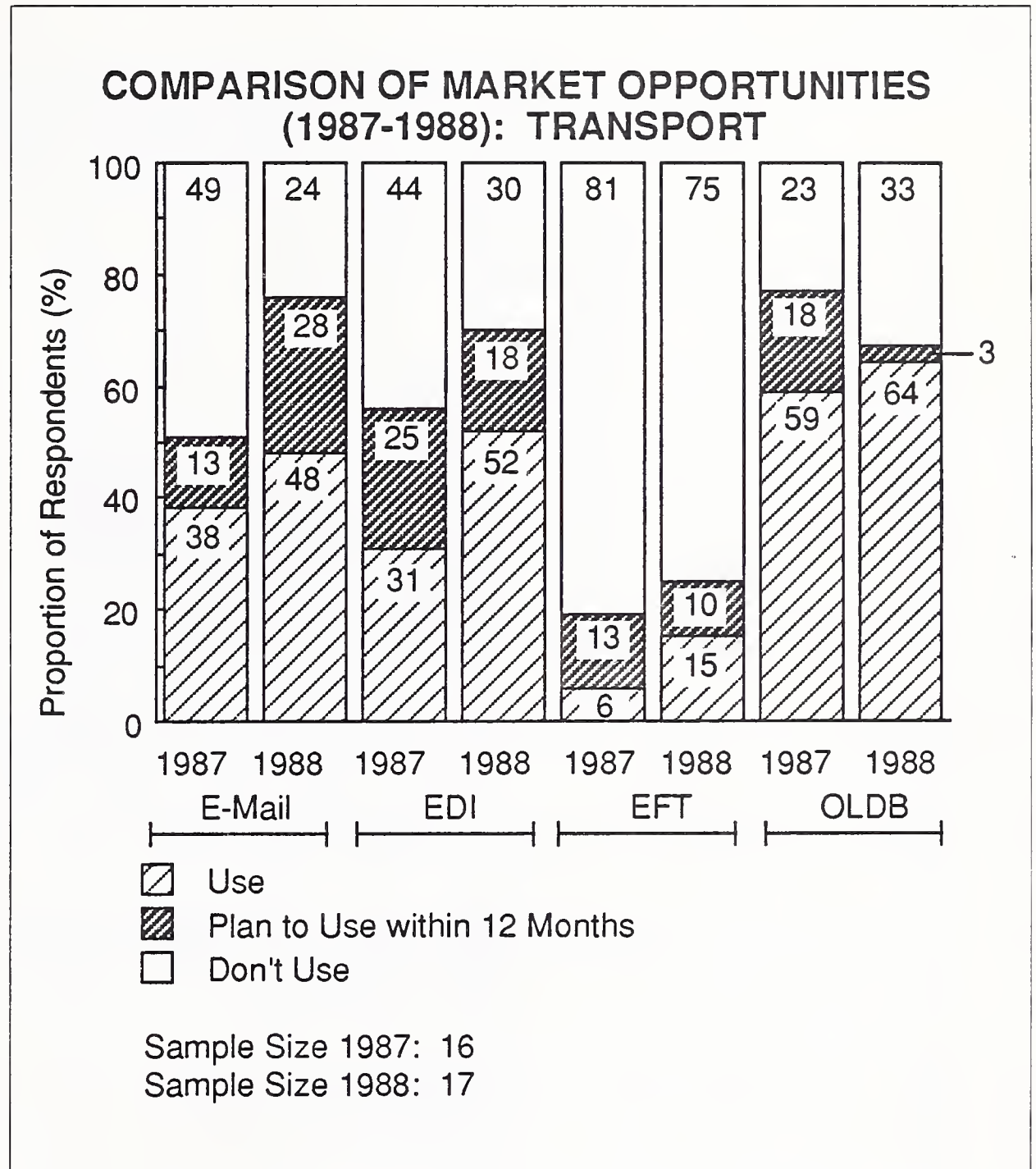


EXHIBIT VII-21

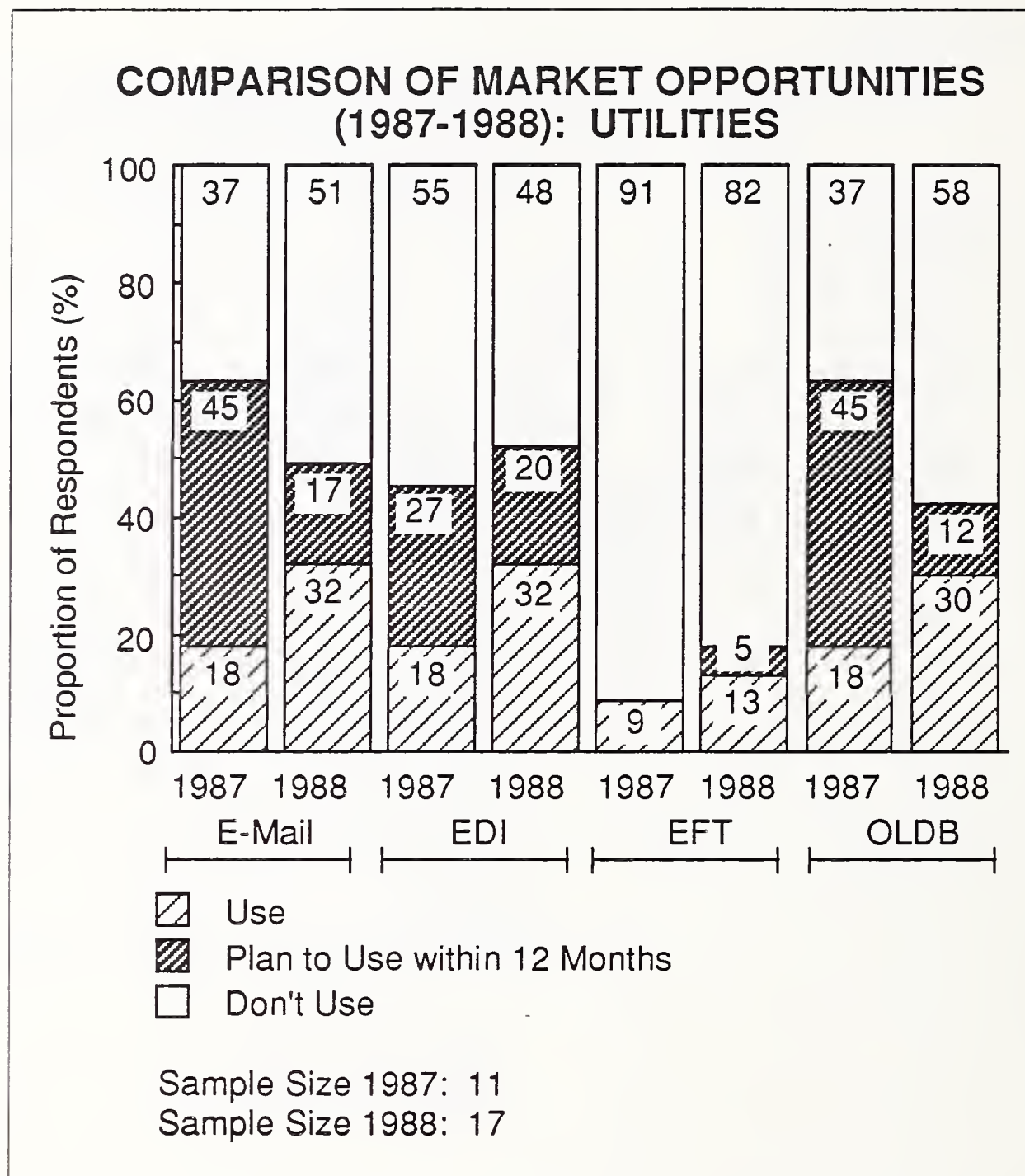


EXHIBIT VII-22

MARKET OPPORTUNITIES BY INDUSTRY SECTOR

Industry Sector	Use of Network Applications (Percent of Respondents)											
	E-Mail			EDI			EFT			OLDB		
	U	P	D	U	P	D	U	P	D	U	P	D
Process Manufacturing	42	22	36	40	15	45	28	7	65	65	10	25
Discrete Manufacturing	50	22	28	45	12	43	32	8	60	60	11	29
Retail Distribution	44	26	30	50	20	30	40	10	50	62	9	29
Banking and Finance	50	27	23	56	18	26	66	10	24	80	5	15
Insurance	40	30	30	41	13	46	18	5	77	70	5	25
Health Care	27	37	36	57	14	29	36	10	54	64	15	21
Government	54	25	21	50	23	27	40	25	35	90	2	8
Transport	48	28	24	52	18	30	15	10	75	64	3	33
Utilities	32	17	51	32	20	48	13	5	82	30	12	58
All Sectors	43	26	31	47	17	36	32	10	58	65	6	27

Use (U) Plan to Use (P) Don't Use (D)

D**Benefits—The User's View**

User perceptions of the benefits of third-party network services are shown in Exhibit VII-23.

EXHIBIT VII-23

USER PERCEPTIONS OF THE BENEFITS OF NETWORK SERVICES

- Improved Customer Service
- Improved Service Delivery
- Administrative Cost Savings
- Speed/Accuracy of Information
- Improved Productivity
- Quality of Information
- Closer Communication with Trading Partners
- Faster Information Access
- Critical Mass
- Experience of "New" Technology

Whilst the potential benefits of using such services have been widely disseminated in the industry by government initiatives, trade associations and leading industry players, perhaps the most significant benefit—gaining competitive edge—is rarely cited.

The users represented in our research fall into the following categories:

- 1) Market leaders in an industry sector that have adopted network services such as EDI as an element of the need to maintain competitive advantage
- 2) Market followers in an industry sector that have adopted network services in order to maintain a competitive position

- 3) Opportunist organisations that see network services as a means of gaining experience and evaluating alternative options for developing business communications facilities

As vendors in the U.K. have clearly noted, users place far more emphasis on the commercial/business benefits than on cost savings. This is understandable, since users have already gained most of the savings from information technology or are sceptical about them.

Whilst the administrative cost savings cannot be disputed, the business benefit (competitive edge) that accrues from improved speed and accuracy of information, allied with better access, can bring considerable savings in its own right.

Perhaps the greatest difficulty, particularly in nascent markets, is the establishment of a "critical mass". Even if potential users can see the advantages of a network service such as EDI, the number of trading partners with whom it is possible to communicate becomes the key issue.

The quality of the customer base will prove to be the crucial differentiator in the selection of the service, and in this instance it may well result in a market in which only a small number of players can operate effectively.

Network services are likely to be effective and profitable in areas where their application is seen as being critical to an organisation's method of working. However, the strategic implications of using third-party services also need to be considered, so that users are familiar with the benefits of the application to meet strategic management objectives. Limiting the decision-making process within one function (i.e., marketing or purchasing) may limit the uses of the application in other areas.

Vendors should stress the burgeoning number of applications available, and thus the strategic importance of taking the plunge early.

E

Drawbacks—The User's View

There are still a wide range of factors that are impeding the take-up of network services as rapidly as might be anticipated. Exhibit VII-24 illustrates the users' responses:

The concern expressed over "ease of use" is a familiar one in the software and services industry. In the specific area of network services, this is highlighted by the relatively high penetration of Viewdata services in spite of their limited capabilities. Vendors need to concentrate on the business benefits of their products, leaving the technology aside. Simple interfaces between electronic mail and online databases, comprehensive installation, support and project management as well as training in EDI will help to increase the user's understanding.

EXHIBIT VII-24

DRAWBACKS OF NETWORK SERVICES: USER VIEW

- | | |
|-----------------|-------------------------|
| • Security | • Ease of Use |
| • Complexity | • Dependence |
| • Compatibility | • Lack of Critical Mass |
| • Cost | • Not a Priority |
| • Connectivity | • Reliability |

Security and reliability remain high areas of concern. Vendors need to stress that the levels of security imposed on electronic trading are far higher than for manual methods, whilst stressing the resilience of the systems, the audit trails available and the confidentiality of the data.

Complexity, to an extent, can be attributed to a failure by vendors to respond to customers' differing requirements. A technology-based marketing approach in presenting a standard package can be interpreted by potential users as an attempt to impose solutions rather than to respond to their needs.

Lack of connectivity in the areas of EDI and E-mail were cited as bug-bears. This lack of connectivity between networks in the U.K. is seen by some users as an impediment to the effective development of EDI and by others as a source of considerable concern that they are compelled to join more than one network.

Whilst vendors are being pressed by trade associations and users to provide links between networks, and whilst they admit to this being technically possible, the establishment of such links will involve a cost to users (already a concern), have different pricing systems which will exacerbate the cost calculations and cloud the responsibilities for security (another concern).

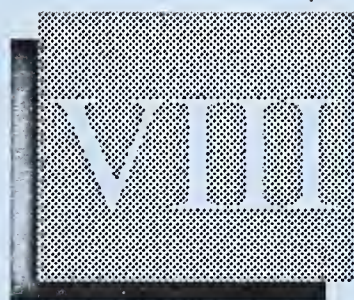
Network competition is inevitable, and the erosion of classic vertical market structures by the penetration of EDI within and across various trading groups will result in the situation remaining for some time.

The progress in the development of the EDIFACT standard should result in continued growth in EDI as companies perceive the "compatibility" issue as resolved. Vendors, however, will be keen to promote their own "trading clusters", and the emphasis will be more and more on customer references, seminars and promotions.

In the area of E-mail, the worldwide X.400 electronic messaging standard provides opportunities for gateways to be established between private and public messaging E-mail systems and should stimulate further growth in this area, since E-mail will become much more attractive to companies that have thusfar considered that it offers too little added value compared to existing services such as fax and telex.

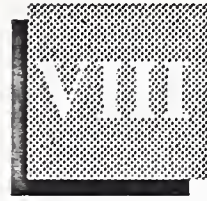
The reluctance to depend on a third-party supplier and a preference to develop an in-house network system for intra-company communications and for links to trading partners has led organisations to using their own DP departments to develop in-house systems. This move is naturally encouraged by computer mainframe producers seeking to persuade companies in order to boost hardware sales.

The existence of most of these companies (IBM, ICL, Digital, Bull) in the network services business may lead to a shakeout in this area. In part, this lack of take-up in certain organisations may be due to the lack of any central decision-making authority, since managers of DP/IT departments may not be in a position to grasp the strategic significance of third-party services and may well experience a conflict of interest. It goes without saying that vendors are continually seeking to find the right point of entry into a company's management structure in order to make an effective presentation.



Conclusions and Recommendations





Conclusions and Recommendations

The Western European network services market is experiencing continued growth and subsequent profit potential. The overall growth indicated by INPUT in its market forecasts does not, however, reflect a market where entry and profit are easily achieved.

The continued growth and expansion of the market will come about as a result of new service suppliers as well as the continuation of joint ventures and strategic partnerships within an increasingly deregulated European telecommunications environment. The role of the PTTs and their ability to offer general-purpose horizontal network services, such as electronic messaging, and the concept of “one-stop shopping” will be increasingly high-profile.

The likelihood of a pan-European MDNS, unilateral and bilateral agreements the development of X.25 public networks will all result in the PTTs monopolising this area as well as positioning themselves to offer application-specific services. However, vendors should look to exploit opportunities in this area since the PTTs’ lack of marketing expertise may well provide vendors with competitive advantage.

In addition to application-specific services, there exists considerable scope for software houses and professional services vendors to offer industry-specific applications, interface software, integration with existing systems as well as filling the void in specialist communications skills. Increasingly, users are turning to third parties for these services, from development through to implementation, training and support.

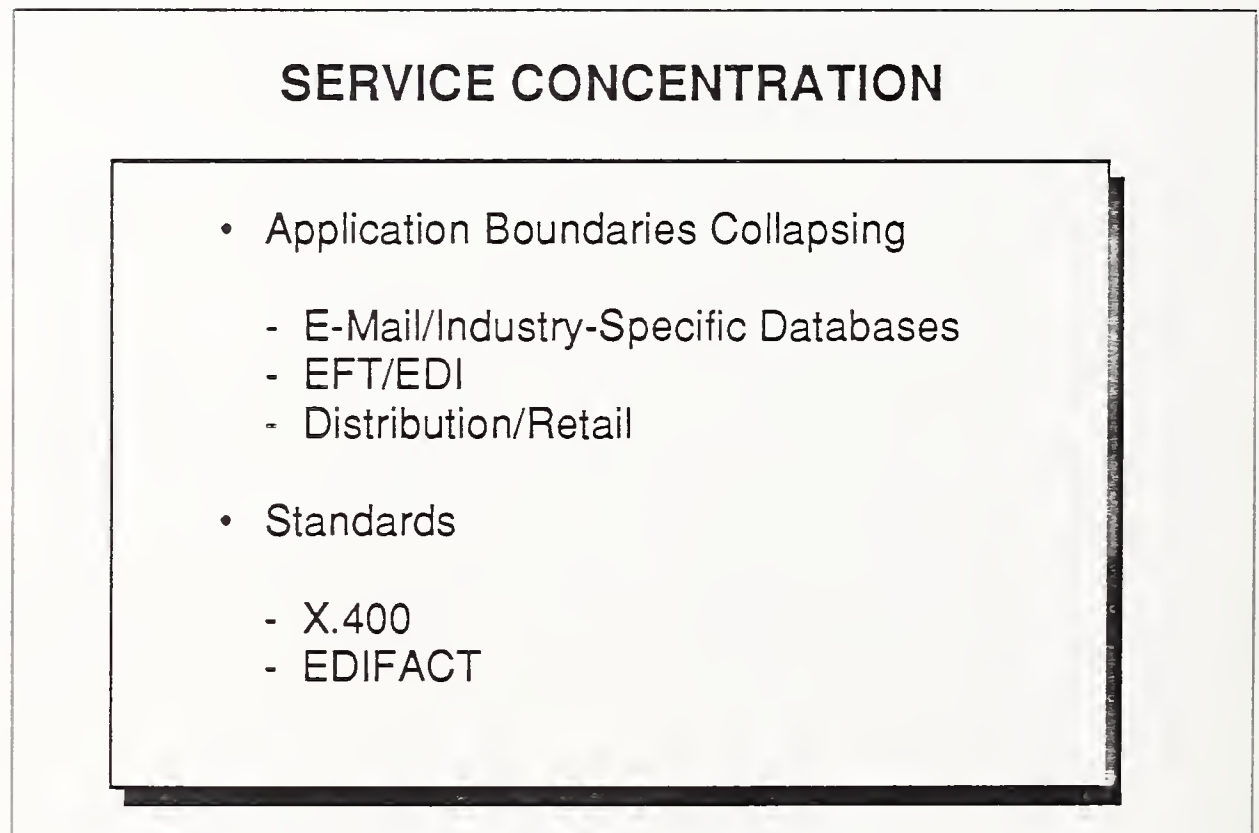
Financial institutions are in a unique position to challenge the current status quo; as yet their attempts have been notably unsuccessful; the U.S.

and Japanese banks are well positioned, however, and the Japanese strength in graphics may well provide them with an entry point.

The increasing convergence not only of applications such as E-mail and EDI and online databases with E-mail but also of network interlinking and the blurring of boundaries between hitherto strongly delineated vertical markets offers opportunities for vendors in providing integrated solutions to users. The key to success will be ensuring a selected niche in the market-network-application mix.

Opportunities exist predominantly in the industry-specific applications, especially where an industry/trade association is acting as a driver. Vendor strategy should be to resolve the business problem. Network services are increasingly user driven: Therefore vendors should be looking to retain their customer base with an ongoing programme of product upgrades as well as post-implementation support and training. Service will increasingly become the differentiator. This "Service Concentration" is illustrated in Exhibit VIII-1.

EXHIBIT VIII-1



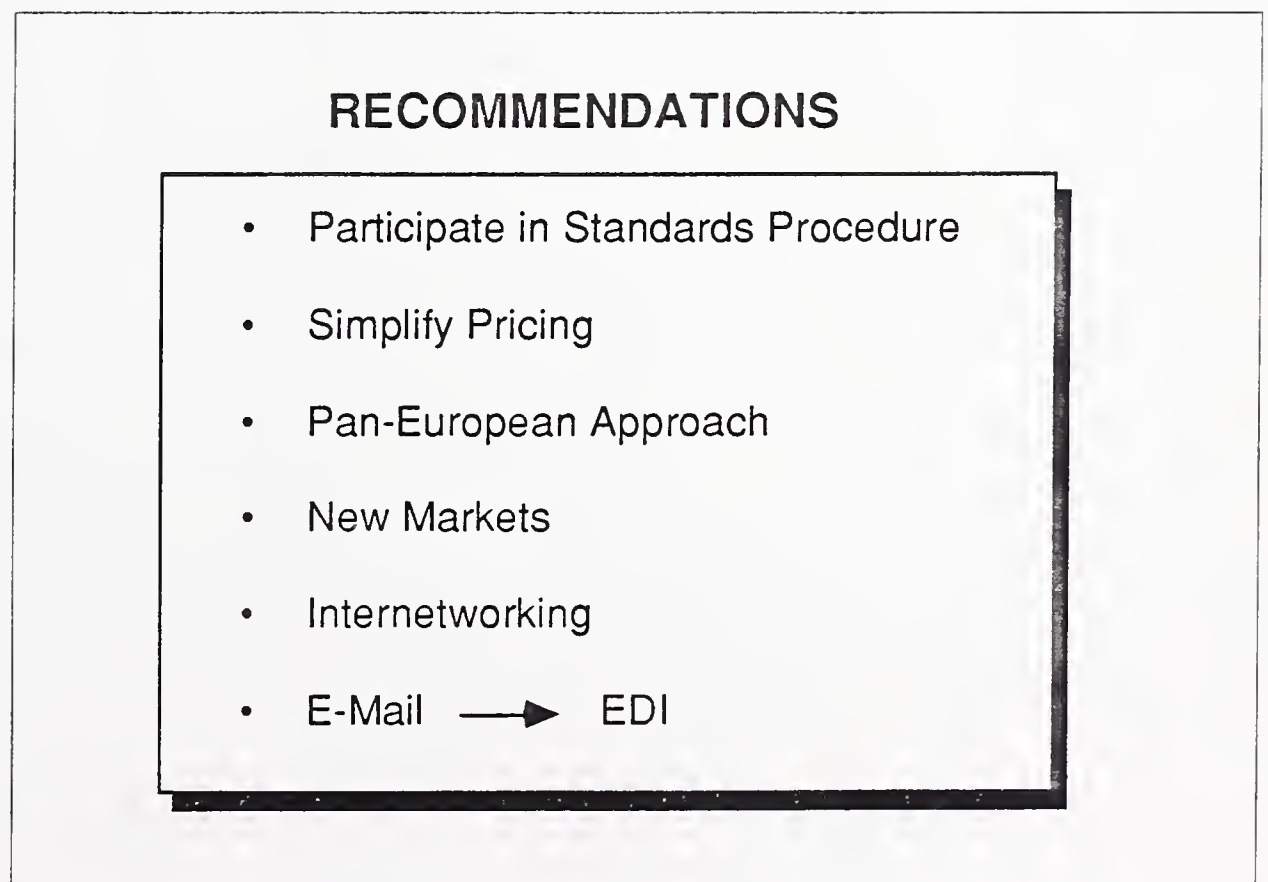
Product/market positioning will become increasingly crucial as the single European market develops. Vendors should consider strategic partnerships at an early stage in order to penetrate key market areas. International trade will be a key area of opportunity. Vendors should look to the development of the new adaptive technologies, such as ISDN. Vendors should move away from selling just hardware or software and look to offer a full service to users.

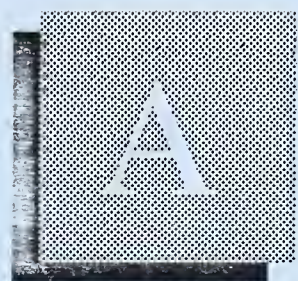
Finally, INPUT's recommendations to vendors would be to:

- Participate in the standards-making procedure to provide impetus and to show commitment towards resolving the issue.
- Simplify pricing in order to attract users deterred by the apparent complexity of the levels of service available.
- Adopt a pan-European approach: The European Market is only (four) years away and many organisations are looking for links now.
- Target new markets. Follow the U.K. approach and adopt a consultative method of assessing and analysing the requirements of a particular sector.
- Resolve the issue of interworking as it is unlikely in the future that one single network will be able to meet one user's needs.
- Target more companies that are using E-mail in order to bring them over to EDI.

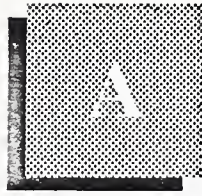
INPUT's recommendations are summarised in Exhibit VIII-2.

EXHIBIT VIII-2





Appendix: Definitions



Appendix: Definitions

Appendix A contains the definitions used by INPUT to describe the Information Services Industry.

Software Services —Computer-related services involving one or more of the following:

- Processing of computer-based applications using vendor computers (called “processing services”).
- Network-oriented services of functions such as value-added networks, electronic mail, electronic document interchange, (called “network services” also includes on-line data bases, news data bases, videotex).
- Services that assist users in performing functions on their own computers or vendor computer (called “software products” or “professional services”).
- Services that utilize a combination of hardware and software, integrated into a total system (called “turnkey systems” and/or “systems integration”).

A

User Expenditures

All user expenditures reported are “available” (i.e., noncaptive, as defined below).

Noncaptive Software and Services User Expenditures—Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user.

Captive Software Services User Expenditures—Expenditures received from users who are part of the same parent corporation as the vendor.

B

Telecommunications

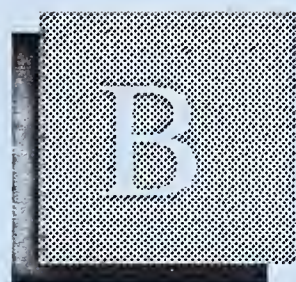
Networks —Electronic interconnection between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways.

- *Common Carrier Network* —A public access network consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud.
- *Local Area Network (LAN)* —Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Uses one of two signaling methods.
 - *Baseband* —Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.
 - *Broadband* —Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:
 - ° Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).
 - ° Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).
 - ° High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).

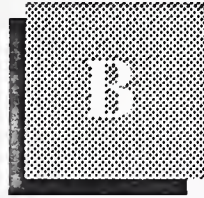
Transmission Facilities— Includes wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network.

- *Mode*—may be either:
 - *Analog* —Transmission or signal with continuous-waveform representation, typified by most telephone operating company distribution systems.

- *Digital* —Transmission or signal using discontinuous, discrete quantities to represent data, which may be voice, data, record, video, or text, in binary form.
- *Media*- May be any of the following:
 - *Wire* —Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair), to four-wire full- duplex balanced lines.
 - *Carrier* —A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity.
 - *Coaxial Cable* —A cable used in HF (high-frequency) and VHF (very high frequency), single-frequency, or carrier-based systems; requires frequent reamplification (repeaters) to carry the signal any distance.
 - *Microwave* —UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.
 - *Optical Fiber* —Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications.
 - *Communications Satellites*—Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.
 - *Cellular Radio* —Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units. Each radio serves a small area called a cell. The computer switches service connections to the mobile unit from cell to cell.



Appendix: Analysis of Research Sample



Appendix: Analysis of Research Sample

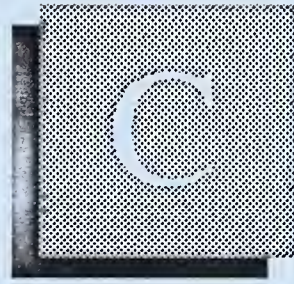
In-depth, face-to-face interviews were conducted amongst network services vendors, PTT organisations, trade and industry associations and vendors of specific applications.

Telephone interviews were also conducted amongst a wide cross-section of user organisations in France, the U.K., West Germany, Benelux, Italy and Scandinavia. This survey addressed levels of awareness, usage and attitude towards identified segments of the network services market, such as electronic mail, EDI and EFT. This research was conducted as part of INPUT's extensive annual market survey.

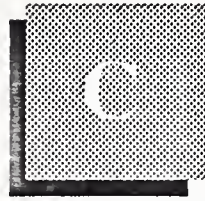
Exhibit B-1 shows the analysis of survey respondents by category and country.

EXHIBIT B-1

Country	Network Services Vendors	Telephone Survey of Users	Total
France	12	40	52
U.K.	12	40	52
West Germany	2	40	42
Benelux	3	20	23
Italy	2	20	22
Scandinavia	2	20	22



Appendix: User Questionnaire



Appendix: User Questionnaire

Bi-Annual INPUT Survey of European Information Services Markets (Questions regarding Network Services)

Q9. What business communications services are you currently providing or planning to provide in the near future? Can you also please indicate whether this service is provided in-house or by an outside service (e.g., GEIS)? Please give the name of provider where possible. (Please circle as appropriate.)

Applications	Provide	Plan to Provide	Provided In-House	External Service (Name)
E-Mail	1	2	3	_____
EDI	1	2	3	_____
EFT	1	2	3	_____
OLDB				
(in which areas)	1	2	3	_____
	1	2	3	_____
VTX				
(what applications)	1	2	3	_____
	1	2	3	_____
Other				
(what specific application)	1	2	3	_____
	1	2	3	_____
	1	2	3	_____

Network Services

Packet-Switched Network

Store & Forward

Protocol Translation

Error Correction

Guaranteed Delivery

Secure Transmission

Other (please state)

Managed Network Services

(May be provided as part of other services, e.g., a packet-switched network)

Network FM or Specific
Functions

Accounting/Commercial
Management

Fault Management

Performance Management

Security Management

Configuration Management

(Only ask Q10 dependent upon answer given to Q9 on Applications)

Q10a. You have just said that you use (plan to) services for ____ (i), ____ (ii), ____ (iii) etc. Can you please give me some more details about the applications they are used for?

What is the specific application:

(i)

(ii)

(iii)

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

External to the Company

- with suppliers	1	2	3
- with customers	1	2	3
- other (please state)			
_____	1	2	3
_____	1	2	3

Internal to the Company

Is the application -domestic	1	2	3
-international	1	2	3

Any other application details, e.g.,

Number of documents	1	2	3
messages	1	2	3
transactions	1	2	3
terminals	1	2	3
	_____	_____	_____
	_____	_____	_____

Q10b. What percentage of your data traffic would estimate is accounted for overall by (today, in five years time)?

	%	%
	Today	5 Years
Internal to the organisation	_____	_____
External to the organisation	_____	_____
Domestic	_____	_____
International	_____	_____

Comments:

Q11. Will any new planned telecommunications services for your organisation require "integration" of functions other than data?

VOICE

IMAGE (full speed or slow scan TV)

GRAPHICS (fax or scanner input)

with

DATA (text or numbers)

Comments:

Q12. What do you see as the specific benefits to your organisation of providing communications systems and/or services? (e.g., Cost savings, time savings, new applications, improved quality, improved services, tactical and strategic advantages)

Q13. Is there an overall telecommunications strategy within your organisation?

Yes

Comments:

No

Don't Know

Q14. Do you think that telecomms services should be driven by business application needs or should they be supplied within an overall strategic plan?

Meet Business Needs Directly:

Strategic Plan:

Comments:

Q15a. What do you see as the most difficult problems to overcome when developing/implementing or operating communications networks and services?

Shortage of Specialist Staff
 Lack of Standards for Hardware Connection
 Lack of Availability of Suitable Software
 Keeping Pace with New Technology
 Lack of Third-Party Interconnectivity
 Other (please define)

Comments: _____

Q15b. Deficiencies in the communications products, networks and services available?

Q15c. Are there any particular communications standards (OSI, X.25, MAP, TOP etc) that are helpful to your development plans?

Comments: _____

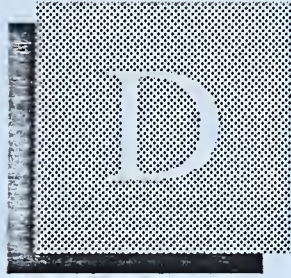
Q16. In which areas does your organisation most need help and support in developing, implementing or operating communications networks and services? (This could be from both in-house or external sources.)

e.g., consultancy services (analyse capacity requirements, systems analysis, systems development, implementation, installation/maintenance)

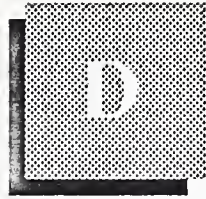
Q17. Finally, would you prefer to:

- a) Use services provided by a central systems service
- b) Utilise services provided by third-party providers
- c) Other

Why _____



Appendix: Related INPUT Reports



Appendix: Related INPUT Reports

- *The Western European Market for Software & Services—1988-1993*
- *International EDI Services*
- *U.S. EDI Services, 1987-1992*
- *EDI Service Profiles*
- *EDI Software Issues, Markets, Trends*
- *EDI and Professional Services*
- *EDI Vertical Potentials*
- *X.400 Products and Services*

