

VALUE - ADDED NETWORK AND DATA SERVICES

EUROPEAN MARKET DIRECTIONS

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VALUE-ADDED NETWORK AND
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EUROPEAN MARKET DIRECTIONS

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VALUE-ADDED NETWORK AND DATA SERVICES (VADS) EUROPEAN MARKET DIRECTIONS

ABSTRACT

The strategic importance of VADS is reflected in the high levels of commitment and development priority shown by government bodies, telecommunications operators, third-party service operators, software houses, and professional services vendors. The continued convergence of computing and telecommunications is driving user requirements for integrated solutions to the problems of business communications.

This report examines the growth opportunities for VADS as well as the development of application services. Emergent markets such as EFT/POS, related markets such as on-line databases, and related technologies such as mobile communications, satellite, cable, datacasting, optical storage media, audio conferencing, and ISDN networks are reviewed.

In addition, key issues affecting both vendors and users are discussed, together with an analysis of the European telecommunications environment. Market sizes and forecasts are provided for the period 1986-1992 along with recommendations for existing and future participants.

This report contains 197 pages, including 57 exhibits.



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VALUE-ADDED NETWORK AND DATA SERVICES EUROPEAN MARKET DIRECTIONS

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I INTRODUCTION

I INTRODUCTION

- This report has been written as part of INPUT's Information Services Programme - Europe (ISP-E). Other special interest topics to be covered during 1987 include professional services opportunities, software pricing and support, and systems development productivity.

A. SCOPE AND OBJECTIVES

- The development of value-added network and data services (VADS) is providing major new opportunities for information services vendors in the increasingly liberalised Western European telecommunications environments.
- Network service vendors, telecommunications operators, equipment suppliers, software houses, and governments are concerned about the development of these strategically important markets and their impetus to economic growth and business efficiency.
- INPUT's particular objective in conducting this research programme and preparing this report has been to:
 - Establish an overall view of the market for VADS and related services in an attempt to allow information services vendors to assess levels of risk associated with potential market opportunities.

- Analyse perceptions of the key trends and issues that are likely to affect its development.
 - Examine how VADS are being implemented in several key growth industry sectors.
 - Address the strategic and tactical marketing issues that must be considered by VADS vendors and provide recommendations for future development.
- This report covers the country markets of France, Italy, the United Kingdom, West Germany, Benelux, and Scandinavia. The term Western Europe is used throughout the report to imply these six individual markets as a group.
 - The study excludes private (i.e., intracompany) and closed user group VADS services from the market analysis and forecast.
 - Although the European market for EDI services is currently at an early stage of development, it has emerged as an area of key opportunity for major network services and software vendors. Its importance in Western Europe was considered justification for a separate report which has been produced in 1986, entitled Electronic Data Interchange - European Market Opportunities.
 - VADS are developing across a broad range of industry sectors in the U.S. In consequence, U.S. experience is relevant and of interest 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.

- INPUT expresses its thanks to all those individuals and companies that participated in the research programme upon which this report is based.

B. METHODOLOGY

- Field research for this report was obtained from an interview programme that was conducted during the period of January through March 1987 which consisted of:
 - Corporate interviews.
 - Structured interviews were conducted with senior personnel in both the data processing and end-user departments (ratio 50:50) of a wide cross-section of companies.
 - The interviews were conducted as part of INPUT's general bi-annual user research survey and addressed levels of awareness, usage, and attitude towards identified VADS applications and the development of telecommunications networks.
 - Vendor interviews.
 - In-depth interviews (nearly all face-to-face discussions) were conducted with 45 senior personnel amongst network service vendors, telecommunications operators, and software suppliers.
 - The questionnaire used as the basis of these interviews is included as Appendix C.

- Other studies.
 - . INPUT's continuing research programmes on the information services markets has been used where appropriate to further understanding of the issues and markets discussed.
- Other 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 for 1986 (see Exhibit III-2). Owing to the volatility of international exchange rates anticipated for the forecast period 1987-1992, INPUT has not attempted to forecast future exchange rates. Currency conversions for the period 1987-1992 has been made at average 1986 rates.

C. REPORT STRUCTURE

- The remaining chapters of this report are organised in the following way:
 - Chapter II is an Executive Overview providing a summary of the contents of the entire report.
 - Chapter III describes INPUT's definition of the VADS market structure, including INPUT's assessments of market size and expected growth.

- Chapter IV analyses the key issues that impact market development.
- Chapter V analyses user attitudes and needs in relation to VADS, and potential areas of market opportunity are reviewed.
- Chapter VI contains a review of related technologies that impact the VADS market.
- Chapter VII contains an analysis of key strategic trends and market influences in emerging applications such as EFT/POS and reviews the related market for on-line databases (OLDB).
- Chapter VIII provides INPUT's conclusions and recommendations for vendors participating or planning to participate in VADS markets.
- The appendices contain a list of definitions of terms, an analysis of the research sample, the relevant questions from the user survey questionnaire, and a list of related reports.

II EXECUTIVE OVERVIEW

II EXECUTIVE OVERVIEW

- This Executive Overview is designed in presentation format to help the reader quickly review key research findings and recommendations. It will also provide an executive presentation complete with script to facilitate group communications.
- The key points of the entire report are summarised in Exhibits II-1 through II-8. On the left-hand page facing each exhibit is a script explaining its contents.

A. KEY NETWORK APPLICATIONS

- INPUT's research revealed that data and image traffic will grow from 13% of network usage in 1986 to 30% by 1992.
- Network services providing pure communications links and generic messaging facilities are largely viewed by users as a commodity. It is important for vendors to adopt a niche view which sees the network as fitting specific user needs and applications.
- Important applications that are driving changes in the mix are:
 - Electronic Information Exchange (EIE), the exchange of structured and unstructured business documents between trading partners, particularly as universal access standards are implemented.
 - Electronic Graphics Exchange (EGE); for example, linked CAD and CAE workstations.
 - Interactive, transaction-based applications such as EFT/POS and order entry.
 - New business and consumer applications such as teleconferencing, security systems, meter reading, and remote equipment fault diagnostics.
 - Industry-specific applications such as insurance quotations, travel reservations, and building society branch reporting.
- If vendors are to avoid price competition as a means of growing market share, it is critical to adopt strategies for dominating their selected niche in the application mix.

KEY NETWORK APPLICATIONS

- **Electronic Information Exchange (EIE)**
 - **Electronic Graphics Exchange (EGE)**
 - **Interactive, Transaction-Based Applications**
 - **EFT/POS**
 - **New Business and Consumer Applications**
 - **Teleconferencing**
 - **Security Systems**
 - **Industry-Specific Applications**
-

B. VADS APPLICATION CONVERGENCE

- The distinct boundaries that represented the various application segments of the VADS market are increasingly blurring.
- Increasing user sophistication and demands for integrated solutions and enhanced services have led to a convergence between applications.
- E-mail growth is being fostered by its repositioning as an integrated business expansion facility linked to industry-specific databases. Enhanced application interface technologies such as videotex and artificial intelligence will combat the problem of ease of use. E-mail can also be used as a poor man's EDI, for example, in freight forwarding as a telex replacement.
- EFT is becoming increasingly linked with EDI as users seek to extend the electronic transaction loop from physical to monetary exchange.
- EDI services are being enhanced with access to trading cluster-specific databases. These databases could well be created from information contained in EDI transactions, such as sales analysis. EDI is also becoming an integral part of general electronic information exchange (EIE) as users seek to transfer a wider range of document types.
- Videotex-based applications are becoming increasingly integrated with traditional data processing, for example, access to videotex services from ASCII terminals and linking early videotex systems, such as travel reservations, with back-office accounting systems.
- The key for vendor success is to offer seamless solutions in a multibrand environment.

VADS APPLICATION CONVERGENCE

- VIDEOTEX —————> CONVENTIONAL DP
- E-MAIL <-----> OLDB/VIDEOTEX/EDI
- EFT <-----> EDI
- EDI —————> OLDB
— EIE

C. THE CATALYST TO GROWTH - STRATEGIC MANAGEMENT OBJECTIVES

- In general, VADS are successful and profitable in those areas where the application is seen as being critical to an organisation's 'modus operandi'.
- It is possible to highlight a number of strategic management objectives which are leading organisations to utilise VADS:
 - Market/network positioning; i.e., linking participants in a distribution chain, such as records, fashion, computers, or health care.
 - Product differentiation; for example, the ability of banks to offer new and comprehensive services.
 - Enhanced efficiency; e.g., the ability of EDI participants to move towards 'just-in-time' inventory.
 - Supplier trade-off/optimisation; for example, continuous supply assurance from key suppliers with EDI.
 - Risk resilience; e.g., retailers reducing administrative overhead and fraud via EFT/POS.

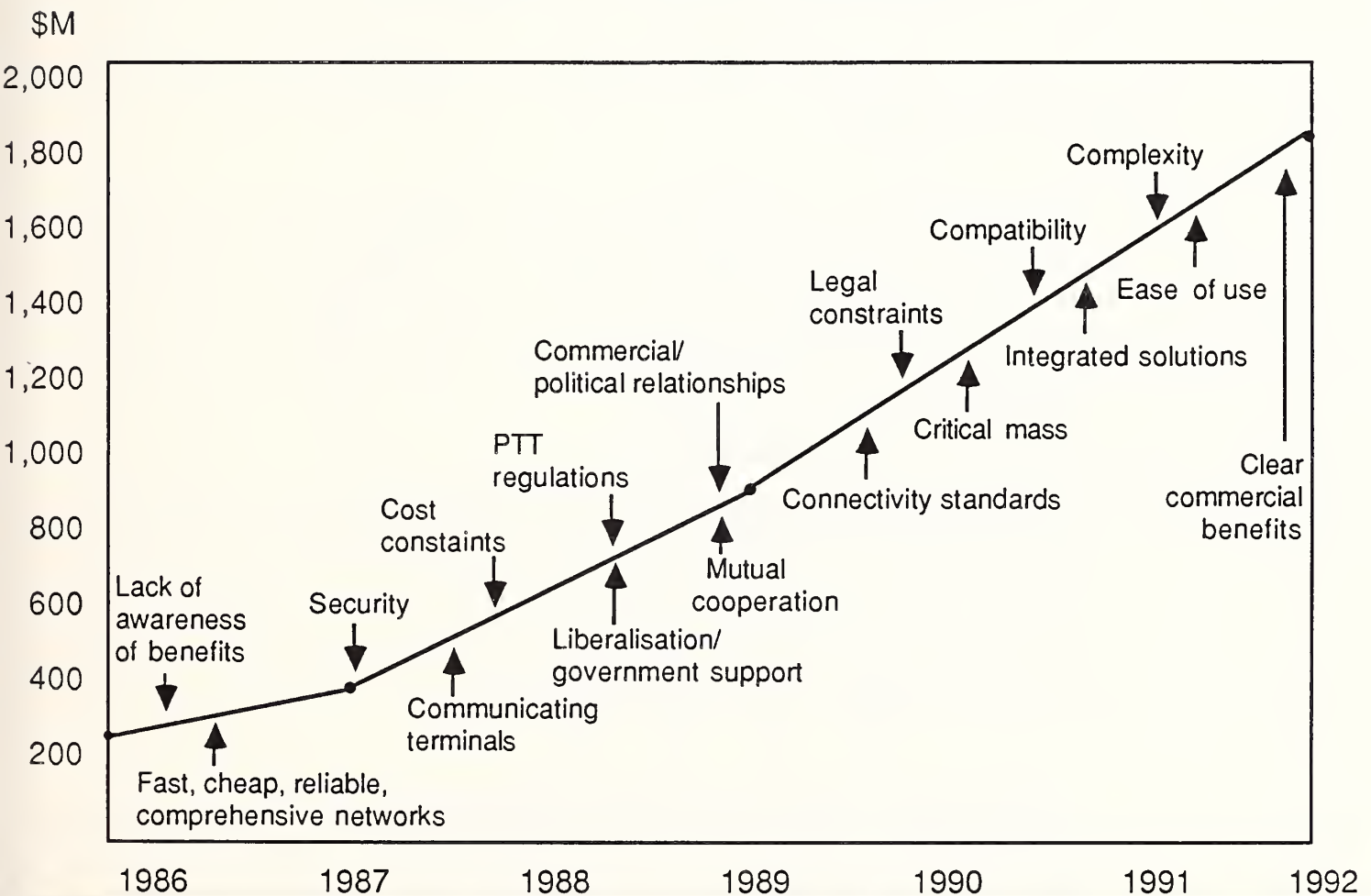
STRATEGIC MANAGEMENT OBJECTIVES

- **Market Positioning**
- **Product Differentiation**
- **Enhanced Efficiency**
- **Supplier Optimisation**
- **Risk Resilience**

D. STEADY GROWTH - A \$1.8 BILLION MARKET BY 1992

- The European market for VADS is forecast by INPUT to grow from around \$325 million in 1987 to around \$670 million in 1989 and will potentially reach \$1.8 billion by 1992.
- INPUT's median (or most likely) projection of annual average growth of 40% is being driven by:
 - Increased awareness of benefits by small- and medium-sized companies.
 - Enhanced connectivity standards.
 - PTT liberalisation and government support.
 - Consensus among protagonists in project development.
 - Increasing sophistication and cost reduction in telecommunications.
- France and the United Kingdom are the most significant markets, achieving \$130 million (40% market share) and \$95 million (29% market share), respectively, in 1987.
- INPUT forecasts that the highest rates of growth will be experienced in the Benelux countries (50%), Scandinavia (55%), and Italy (65%). The West German market is the least certain but is expected to grow at an annual average rate of 50% over the forecast period.

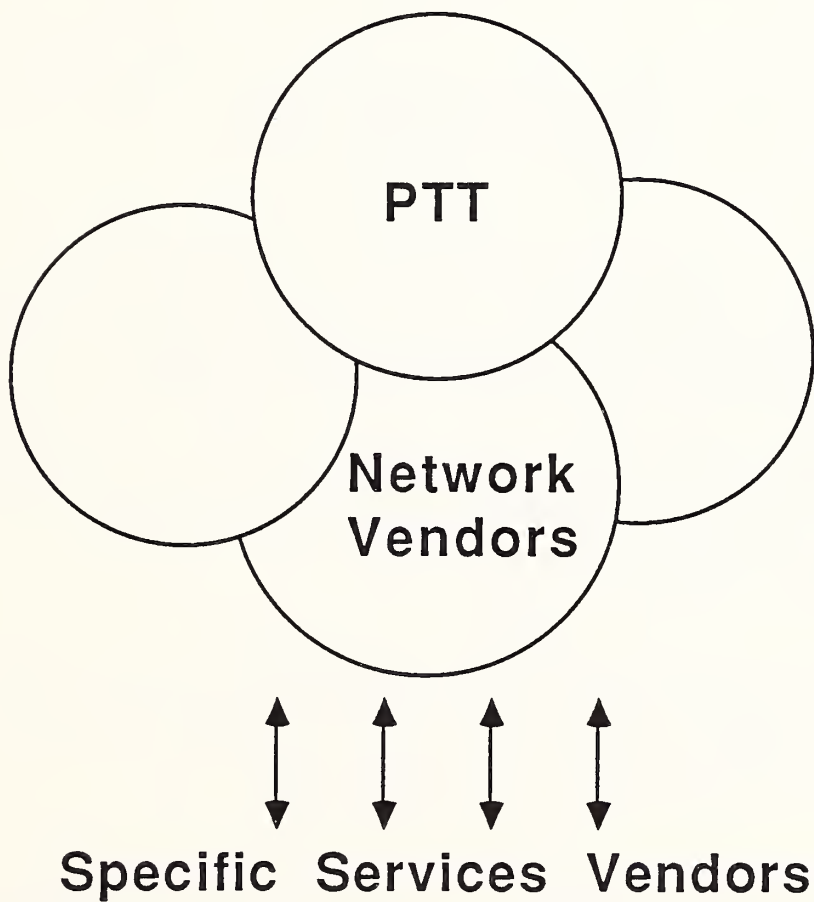
STEADY VADS GROWTH



E. STRATEGIC DIRECTIONS

- At an application level, there are two broad categories of VADS--general-purpose horizontal VADS, (message handling systems, EDI, and E-mail) and application-specific vertical VADS (insurance quotation systems, EFT/POS, and travel reservation systems).
- Within Western Europe, the particular role of the PTTs and fast financial resources required to build a major network determine the industry structure for the exploitation of these opportunities. Fundamentally, this can be viewed at three levels:
 - The development of intelligent public networks and X.400 message handling services is allowing the PTTs to monopolise the development of general-purpose horizontal VADS and has created an infrastructure for application-specific vertical VADS. The PTTs are also exploiting opportunities in this category.
 - At the next level, deep-pocket U.S. multinationals such as IBM, EDS, GEISCO, and McDonnell Douglas are offering services in both categories with an increasing focus on specific vertical applications. Only IBM has the muscle to launch general product services rather than focus on specific individual client applications.
 - At the third level, there are specific service vendors such as GSI in France and Travinet in the U.K. This level is far more fragmented, and there are opportunities for niche parochial operators to enter the market and develop industry-specific application services using the general-purpose networks of the first and second level vendors, for example, TRANSPOTEL.
- However, INPUT does not anticipate a vast increase in the numbers of industry players as the PTTs and deep pocket corporations increasingly dominate the third level of the market; for example, the recent entry of DEC to exploit financial services opportunities.

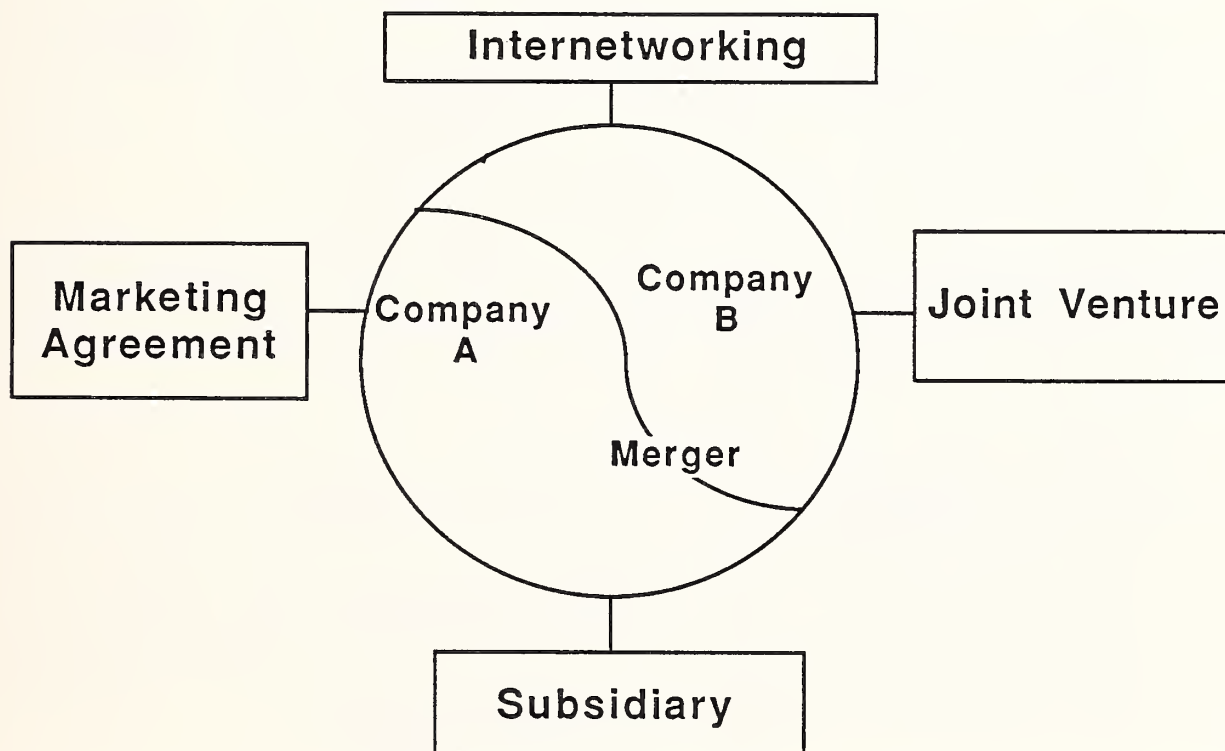
STRATEGIC DIRECTIONS



F. THE MARKET IS CONSOLIDATING

- Whereas the intent of divestiture and deregulation is to encourage competition, leading to cost and technological innovation benefits for users, it now appears that the costs and risks of competition to vendors is leading to a different environment.
- Examples of consolidation include the acquisition by British Telecom of Dialcom and Cresta Communications, the purchase of I.P. Sharp and Finsbury Data Services by Reuters, the collapse of the McDonnell Douglas/BT joint venture--EDI-NET, and the collapse of electronic mail vendor IRCS in Germany.
- Joint ventures, including agreements and network interlinking, are central to vendors' strategic thrust to achieve critical market position in terms of resources, numbers of participants, and credibility.
- Examples include joint ventures between IBM and Fiat (INTESA) in Italy and Bank Paribas in France, ICL with GEISCO (INS) in the U.K., and ADP with Mercantile Credit.
- There has also been significant moves to link networks and services especially among electronic mail vendors; for example, Mercury Link 7500 and Paris-based RCI Calvacom.
- Marketing presence (and trends towards oligopoly) has also been enhanced via agreements between software houses and processing services companies to provide turnkey solutions; for example, ISTEEL and SYSTEMS DESIGNERS in the EDI field.

THE MARKET IS CONSOLIDATING

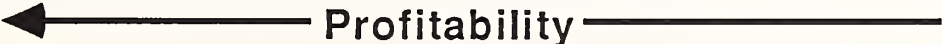


G. PROFITABILITY - THE KEY ISSUE

- The key to success in VADS marketing is effective product differentiation which can be achieved via:
 - Market dominance either of a selected niche or through establishing critical mass for a specific service.
 - Comprehensive implementation and support services.
- Weakly differentiated general-purpose horizontal VADS face strong price competition and are going through a long phase of operating losses. For example, in France significant VADS penetration has only been achieved via government subsidy and direction.
- The most profitable VADS services are those that are perceived by the users as integral and necessary to the conduct of their commercial activities, for example, real-time financial information services.
- Another example is EDI after a significant number of participants are attracted to the service, for example, retailing in the U.K. The strategy for future profitability is not to increase the customer base but to encourage volume usage from existing participants and drive up the value-added chain in terms of service enhancements; i.e., 80/20 marketing.
- Potential participants should be aware of the costs and competitive risks in VADS markets. Market growth does not necessarily open up easily addressable business opportunities.

PROFITABILITY - THE KEY ISSUE

		High	Low
Volume	High	<ul style="list-style-type: none"> • Real time Financial Information/ Trading Systems • Integrated Business Communications Services 	<ul style="list-style-type: none"> • Domestic MDNS • Generic E-mail
	Low	<ul style="list-style-type: none"> • Niche On-Line Database • Enhanced EDI/ EIE • EFT/EFT-POS • International MDNS 	<ul style="list-style-type: none"> • Generic EDI • Generic On-line Database


Profitability

H. BUSINESS DEVELOPMENT OPPORTUNITIES

- The convergence of computing and communications which has facilitated the development of VADS has opened up opportunities not only for processing services companies but also for vendors of software and professional services.
- In emergent markets such as EDI and EFT/POS, there are good opportunities not only for industry-specific application products but also for software development and consultancy. VADS applications have to be integrated with other applications to achieve their full benefit.
- Deregulation, increased competitiveness, and internationalism are not only opening up opportunities for new services to the financial sector but also extending the life of existing ones. Financial institutions are currently investing up to 15% of non-interest costs on IT to hone competitive edge and provide continuing opportunities for VADS vendors.
- Distribution is another market sector with strong potential, and it satisfies the VADS market selection criteria of organisations that need to disseminate and collect information rapidly from a large number of locations. Retailing is another key opportunity linked to EFT/POS developments.
- International trade is a key area of opportunity owing to the high costs of administration and time-critical nature of multiparticipant operations.
- Vendors should also consider the potential of new adaptive technologies such as the ISDN and optical storage techniques. ISDN is not only a threat to X.25 network service vendors but also a potential opportunity as a delivery mechanism for a wide range of new application services.

BUSINESS DEVELOPMENT OPPORTUNITIES

- **Software and Professional Services**
 - **Financial Services**
 - **Retailing/Distribution/Leisure Industries**
 - **International Trade/Transportation**
 - **Adaptive Technologies**
-

III MARKET OVERVIEW AND FORECAST

III MARKET OVERVIEW AND FORECAST

A. MARKET DEFINITION


- Following the issue of the new licence for value-added network services by the DTI, which became operational at the end of March 1987, VANS are now being called VADS--value-added network and data services in the U.K.
- This redefinition, however, has increased confusion about the boundaries of the market as the VADS market now covers four broad categories:
 - Voice, e.g., teleconferencing and voice mail.
 - Data, i.e., managed data network services and specific application services.
 - Text, i.e., electronic messaging.
 - Image, e.g., videoconferencing.
- In light of the confusion within the industry as to a precise definition of the market, INPUT has been careful to develop a market definition which allows vendors to identify areas of opportunity at an application level.

- Consequently, INPUT's forecast excludes some existing services such as on-line data base and real-time financial information systems as well as voice- and image-related services from the main forecast.
- The main forecast places emphasis on such major growth markets as electronic mail (E-mail), electronic data interchange (EDI), and electronic funds transfer (EFT).
- Exhibit III-1 provides a representation of the structure of the VADS market in Western Europe, as defined by INPUT. The VADS market is considered as a sum of those subsegments surrounded by the thick black line.
- Major difficulties encountered in sizing and forecasting this market included the lack of accepted definitions in the industry and the convergence between the various subsegments, e.g., electronic mail with videotex and EDI.
- In addition, INPUT has attempted to forecast end-user revenues split between processing services, software products, and professional services. Definitions of these terms are included in Appendix A of the report.
- This split recognises that there are opportunities in this area for a wide range of computer services organisations and highlights the need for existing and potential participants to offer total integrated solutions to users' problems with business communications by offering a range of implementation and support services in addition to enhanced processing and communications facilities.
- In general, the overall state of the VADS market can be summarised as entering into a phase of steady growth and profit potential. This is particularly true in the liberalised environment of the U.K. which has undergone a phase of pioneering developments and industry restructuring in recent markets such as EFT and EDI.

EXHIBIT III-1

VADS MARKET STRUCTURE IN EUROPE

BEARER SERVICES				
Networks	PTT-Operated	Vendor-Operated	Closed User Group	Private
Services	Videotex			
	Electronic Mail			
	EDI			
	EFT			
	Insurance and Other (Financial)			
	Remote Computing Services Including On-Line Database			
	Voice- and Image-Related Services			

 Boundary of INPUT's European VADS Market Definition

S-ANE

- However, existing and potential vendors of VADS-related products and services should be aware that overall growth does not necessarily present an easily addressable business development opportunity.
- At an application level, there are two broad categories of VADS:
 - General-purpose horizontal VADS, e.g., message handling services, E-mail.
 - Application-specific vertical VADS, e.g., insurance quotation systems, EFT/POS, travel reservation systems.
- The market for general-purpose VADS is concentrating via acquisition, mergers, joint ventures, network interlinking, and commercial agreements. It is increasingly becoming the sole province of the PTTs and large deep-pocket international corporations. Entry costs and risks are high and margins low, owing to difficulties in differentiation.
- Opportunities exist for application-specific VADS in the new liberalised marketplace for both existing players and new small parochial operators. A good example of a niche application is the anonymous trading of diamonds and precious stones on the French TELETEL system. Currently, there are 100,000 transactions per month.
- In addition, there are significant opportunities for software houses and professional services organisations in the communications field. Specifically, there is a demand for network upgrading and interlinking, industry-specific applications software, integration with existing systems, project management, and consultancy to resolve the problem of user confusion in immature markets, e.g., EFT/POS.
- Outline descriptions of each component of the VADS market, as defined by INPUT, and some adjacent markets not included in the definition but relevant

to an overall undertaking of the market are included below. Strategic issues affecting market development and key trends are discussed in more detail in subsequent chapters.

I. NETWORK SERVICES

- The convergence between computing and telecommunications which has facilitated the development of value-added network and data services built upon the bearer services for bit transmission provided by the PTTs or, in the U.K., British Telecom, Mercury, or the City of Hull is well established and understood.
- However, to a varying degree across Europe, this technological development has outpaced the regulatory authority's ability to define or control the services that can be offered.
- This has resulted in considerable public debate with regard to the approaches towards regulation of the competitive environment and the exploitation of commercial opportunities. An analysis of the European telecommunications environment and approaches towards deregulation are given in Chapter IV.
- Capabilities provided on networks which are generally considered to elevate it to VADS status are:
 - Deferred transmission.
 - Multiaddress routing.
 - Protocol conversion.
 - Secure delivery service.
 - Speed and code conversion.

- The broad area of network services can be defined as consisting of:
 - Private networks.
 - Closed user group networks.
 - Enhanced service networks supplied by the PTT.
 - Independent vendors' network services.
- a. Private Networks
- Although excluded from INPUT's VADS market definition, these networks are of interest since they can be used as a basis for generating noncaptive user revenues.
- For example, the FASTRAK network operated by Travinet Ltd., originally on behalf of Thomas Cook and the Midland Bank Group in the U.K., is being marketed aggressively as a vehicle for videotex, E-mail, and other managed data network services in the finance, travel, and distribution sectors.
- The earliest commercial examples of private networks came in the airline industry with its very high need for realtime seat reservation systems.
- Technological developments, falling costs, and increased recognition of the need to establish effective intra- and inter-company communications links has caused large organisations to establish private voice and data networks.
- In some cases, the complexity associated with the development of high-speed, high-capacity, multi-drop networks is opening up opportunities to third parties, often professional services vendors.

- Examples include the 35 million pound contract for the provision of a cross-European voice and data network for Ford and the 100 million pound contract for the U.K. government data network which includes significant project and facilities management components.

b. Closed User Group Networks

- These networks have been set up by particular communities of users to meet mutually agreed upon 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 overall market size.
- Nevertheless, these networks provide opportunities to vendors of 'badge engineered' managed data network services.
- Two examples of this type of network are:
 - SWIFT, a system for the interchange of financial transactions between banks which utilises the I.P. Sharp/Reuters network.
 - The Cedel and Euroclear settlement systems for the Eurobond market which handle over 40,000 trades per day via the GEISCO international network.

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 have led to an intensification of competition between services provided over public and independent commercial networks.

- In the regulated environments outside the U.K., public networks are the primary vehicle for VADS development.
- Revenues from these services have not been included in INPUT's definition since, although potentially available, they do not represent a realistic competitive market for independent information services companies.
- Principal services in each of the country markets studied are:
 - France - TRANSPAC/ATLAS X.400/ISDN (1990).
 - Italy - ITAPAC/VIDEOTEL/ISDN (1988).
 - U.K. - PSS/Multistream/Linkline/Prestel/ISDN (1988)/VASSCOM.
 - West Germany - DATEX-P/Bildschirmtext (BTX)/ISDN (1988) TELEBOX.
 - Belgium - DCS/DCS MAIL.
 - Holland - DATANET/VIDITEL/MEMOCOM.
 - Scandinavia - DATAPAK.
- In addition, it is also important to note that commercial application service vendors are utilising the basic bearer services such as the public switched telephone network (PSTN).
- For example, the EFT/POS bureau service operated by CRESTA Communications (a wholly owned subsidiary of British Telecom) in the U.K. utilises

dedicated leased lines for the benefit of security at the expense of service profitability.

- Another example in the EFT/POS field is the VALITEL credit authorisation service operated by SLIGOS in France. PSTN is a more cost-effective solution for retailers with a small volume of high-value transactions. Over 1,000 MINITEL terminals are connected to the service, which provides interface switching to multiple credit and debit card authorisation networks.
- The MACATEL EFT/POS service in West Germany utilises PSTN rather than DATEX-P for similar reasons of cost.
- It is interesting to note that the recently formed (early March 1987) 50:50 joint venture between IBM and Fiat to exploit Italian VADS opportunities called INTESA will use the public-switched network RFD (La Rete Foria-Dati) rather than the X.25 packet-switched network, INTAPAC.
- Revenues from specific application services which utilise public networks have been included within INPUT's forecast measured in terms of the value added to the end user over and above the cost of the bearer or public network service.

d. Mobile Communications Networks

- Mobile communications is the most rapidly expanding sector of the telecommunications market. For example, in the U.K. the current user base of cellular users of 150,000 is expected to be more than 500,000 by 1990.
- The European telecommunications authorities are currently drawing up specifications for a pan-European digital cellular radio network for implementation by 1991.

- Cellular networks provide a vehicle for access to VADS services outside the static domestic and office environments. For example, in the U.K. Racal-Vodafone has linked its cellular network to Istel's nationwide circuit-switched network, Infotrac, to provide access to E-mail and videotex applications.
- Revenues generated from these networks have been excluded from INPUT's definition and forecast. However, they are analyzed in more detail in a subsequent chapter on related markets and technologies.
- Other related networks and technologies include satellite, fibre optics, cable, video, and broadcast data communications.

e. Independent Vendor Networks

- Despite the highly regulated nature of the European telecommunications environment, with the exception of the U.K., 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.
- The most common are the European operations of North American-owned multinationals such as GEISCO's Mark III Net, McDonnell Douglas's Tynnet, CSC's Infonet, and EDS.
- The strategy for these vendors is to leverage their investments by entering the area of provision of high value-added services in three areas:
 - Development and facilities management of private and hybrid communications networks for large multinational companies.
 - Development of customised business application services.

- Development of generic application services frequently in joint ventures with dominant national players.
- For example, GEISCO has recently set up a 40:60 joint venture, INS, with ICL to offer a comprehensive range of services to the rapidly expanding European EDI community.
- The strategic focus of these vendors is to operate with available domestic distributors and joint venture partners in order to enter new application/country markets.
- For example, GEISCO positions itself as an international carrier focusing on high-value, premium services such as international networking and services to the banking and finance community which can be easily differentiated on the basis of quality, reliability, and security.
- Other examples include ADP, which has gained significant presence in the provision of real time financial information systems in partnership with securities house, Merrill-Lynch.
- IBM, despite having experienced severe difficulties in operating and managing joint venture relationships, is planning to offer services to the French and Italian markets in joint venture with Bank Paribas and Fiat, respectively. IBM is also concluding strategic partnering agreements in Scandinavia.
- The liberalised U.K. environment has fostered the development of independent commercial networks for VADS.
- Examples include VANCO, which offers a range of messaging, on-line databases, and EFT-related services primarily targetted at small- to medium-sized companies in the retail and financial services sectors.

- Mercury (the Cable and Wireless subsidiary) is poised to capture a significant share of the most profitable elements (e.g., the City) of British Telecom's voice, data, messaging, and value-added services business.
- Revenues from these networks have been included in INPUT's VADS market definition, as depicted in Exhibit III-1.
- The key opportunity for these vendors is to offer a total communications service to users and differentiate themselves from PTT offerings on the basis of service, i.e., implementation, support, range of facilities, and security.
- A good example is the FASTRAK network, which differentiates itself from the competition on the basis of technical performance, i.e., 99% of calls connected first time as against only 65% on PSS and enhanced security on a virtual X.25 network as against the circuit-switched technology of Istel's INFOTRAC. Such technical value added is, however, often irrelevant to users' business needs.

2. SPECIFIC SERVICES

- The second major component of INPUT's VADS definition are those services that are based upon a network service.
- As stated already, INPUT has attempted to formulate a definition which excludes established markets like on-line database services and real time financial information systems from the core VADS market, and this report only includes them as part of a consideration of related markets.
- Services included within the definition are:
 - Videotex services.
 - Electronic mail.

- EDI.
- EFT and credit authorisation services.
- Insurance.
- Additionally, allowance has been made for certain other data services, e.g., electronic graphics exchange, which are described below.

a. Videotex

- Although videotex is not in itself an application but a network interface technology, its ease of use and common standard have provided the basis for a significant proportion of pioneering VADS developments.
- The original emphasis on videotex applications was on public systems for domestic usage, e.g., Prestel in the U.K., Teletel and Minitel in France, Bildschirmtext (BTX) in West Germany, and Videotel in Italy.
- However, only France has managed to develop a consumer market through subsidising the distribution of the Minitel terminal, developing the electronic telephone directory, utilising an innovative three-tier pricing structure, and allowing access across the highly sophisticated Transpac network. It is expected that Minitel will be used by 30% of French telephone subscribers by 1990.
- However, even in France where only 35% of system usage is for business applications, there is increased emphasis on industry-specific commercial application services rather than generic domestic applications such as E-mail, e.g., 'Les Messageries Rose'.

- The U.K. has fostered a vigorous private videotex industry with over 600 services. Videotex has solved commercial user needs for cost-effective transaction processing coupled with ease of use.
- The market has developed from the travel industry (i.e., reservation systems) into insurance, the motor trade, finance, distribution, and manufacturing.
- Although the largest future opportunities are in finance, distribution, and transport, there are still opportunities in more mature markets such as travel owing to the convergence of videotex and conventional data processing. For example, linking reservation systems to back-office accounting systems.
- Increased user sophistication has led to the integration of videotex-based services with more conventional data processing applications instead of being run as standalone mini- or even micro-based systems.
- Network architectures and protocol support are also changing. Access to videotex services from ASCII and 3270 terminals is required along standard data networks. For example, the BT VASSCOM network permits videotex access to the main packet-switched networks. The French are also providing ASCII access into the Teletel services.
- This trend is not so much a general increase in computer literacy as a change in marketing strategy by both public and private service operations to offer integrated seamless solutions (i.e., E-mail, messaging, on-line databases) packaged for specific vertical markets which is attracting a growing number of commercial users who do not require application-specific unintelligent terminals.
- The subject of videotex is dealt with in more depth in INPUT's report, European Videotex Market Opportunities.

b. Electronic Mail

- Electronic mail has emerged as the second largest segment of the VADS market as it is going through a phase of significant growth.
- E-mail is developing in two directions. First is the rapid increase in the number of subscribers. For example, in the U.K. there is now a total mailbox user base of 150,000 (excluding Prestel) and the service is almost reaching the stage where growth is self-perpetuating as a generic means of communication.
- Secondly, E-mail is developing as a common access medium for a range of services including on-line databases, bulletin boards, and interfaces with both telex and facsimile.
- The PTTs provide these services, e.g., Deutsche Bundespost's Telebox, as do independent vendors, for example, Mercury with Link 7500, GEISCO with Quick-Com, Pacific Telesis with One-to-One, Istel with Comet, and IBM with Screenmail.
- Some electronic mail services are provided through videotex systems such as MISSIVE and S.TEL in France. Where this is the case, end-user revenues are counted within the videotex market sector.

c. Electronic Data Interchange

- The term electronic data interchange (EDI) has often been interpreted by information system vendors as encompassing a wide variety of applications such as ATM networks, point-of-sale (POS), travel reservations, on-line databases, credit authorization, and videotex networks.
- A precise definition has yet to be established in the industry and it is one of the objectives of the newly formed Electronic Data Interchange Association (IDEA) launched in Brussels in May.

- INPUT has been careful to define EDI as the electronic transfer of structured business documents between the computers of independent trading partners via a telecommunications network.
- Typical applications are the transfer of electronic invoices, purchase orders, delivery notes, bills of lading, and a myriad of other documents which would otherwise be sent by mail, telex, or even telephone.
- For market analysis purposes, INPUT's forecast focuses on opportunities available for vendors of third-party clearinghouse services and vendors of EDI network interface and message handling software as well as professional services opportunities for integrating EDI with in-house applications and working practices.
- EDI has now accrued considerable importance in the U.S. with third-party network services revenues of approximately \$50 million in 1986. INPUT forecasts this to grow at an AAGR of over 100% to reach \$2 billion by 1991.
- EDI is assuming considerable importance in Western Europe as it has received considerable backing as a strategically important application by national governments (for example, the VANGUARD programme in the U.K.) and the E.E.C. (for example, the TEDIS programme).
- EDI is essentially about complex cross-industry, transnational trading relationships and vendors of clearinghouse services that have been able to offer users solutions to the problems of disparate document and communications standards; the need to communicate with a critical mass of trading partners; the need to adopt EDI without upsetting existing in-house systems; and the need to cost-effectively experiment and gain experience of the commercial benefits and implications.

- The U.K. is the most mature of the European markets for EDI in terms of usage of third-party services. INPUT estimates (March 1987) that there are about 1,000 users of European clearinghouse services--70% of them in the U.K.
- There are three competing services in the U.K.--the ICL/GEISCO joint venture, INS, which offers three EDI services, i.e., Tradanet (commercial), Motornet (automotive), and Brokernet (insurance); Istel with Edict; and IBM BNS with Shipnet and Information Exchange. Their U.K. market shares are 65%, 27%, and 8%, respectively.
- The U.K. market has been fostered by telecommunications liberalisation, progressive support of OSI developments, and the rapid development of document standards for a wide cross-section of industries.
- However, to an extent these developments are a threat as well as an opportunity for clearinghouse vendors. Wide acceptance and usage of the UNECE/GTDL standard, the emerging threat of public ISDN networks, and growing user sophistication will mean that vendors will find the market increasingly competitive and differentiation increasingly difficult.
- The development of common standards is more rapidly advanced in Europe than in the U.S., and there are already projects utilising the international EDIFACT standard (which harmonises the UN/GTDL and ANSI X.12 nomenclatures), for example, the UNICORN initiative in the transport/trading sector. UNICORN is also the first on-line, real time European application.
- EDI has also created opportunities for closed user group services which offer the benefits of security and confidentiality as well as circumventing difficulties in PTT regulations and interrelationships. Examples of these closed user group EDI services include the Swiss network ASTI (L'Association des Service Transport Informatique) which has 150 members in the freight forwarding community and the WEX service which links over 100 wine buyers and sellers across Western Europe and North America.

- The issues and developments impacting upon the growth of EDI are dealt with comprehensively in a companion volume to this report, European Electronic Data Interchange Market Opportunities.
- In summary, it is worthwhile to highlight several key trends:
 - Market concentration via joint venture, shakeout, and network inter-linking.
 - Industry dominance by a small number of key European/international players, i.e., IBM, GEISCO, and GSI.
 - Increasing convergence of EDI with other applications such as EFT and on-line databases.
 - Significant growth opportunities amongst organisations involved in international trade, i.e., shippers, carriers, insurers, freight forwarders, and organisations in the travel distribution chain.
 - Other growth opportunities with airlines, electronic components, and petrochemicals.

d. Electronic Funds Transfer

- A very significant opportunity for VADS will be for networks and services concerned with providing electronic funds transfer (EFT).
- This area can be considered as consisting of two broad areas--retail and non-retail.
- In the non-retail sector, a number of private and closed user group networks exist, for example, the enhanced SWIFT II network and CHAPS.

- EFT services are also becoming increasingly linked with corporate cash and treasury management systems which have become a key target high value-added opportunity for services vendors.
- For example, GEISCO derives over 50% of its international revenues (70% in France) from this area. Electronic settlement and cash management systems are increasingly being offered on a 'badge engineered' basis with the convergence of banking and computer services.
- The banking and finance community is investing up to 15% of their non-interest costs in information technology and see it as a critical weapon in honing competitive edge and enhancing customer service in an increasingly complex, competitive, and international environment.
- For example, in the U.K., Barlays has extended its electronic cash management service, BARCOM, to create an electronic stock transfer service (EST) which is aimed at reducing the high telex traffic associated with international securities trading. EST will shortly be linked with a complimentary EFT service. EST uses GEISCO's comprehensive and secure international network and GEISCO-developed software.
- However, there is a tendency for larger financial institutions and consortia to develop their own networks, for example, the LINK and MATRIX ATM networks in the U.K.
- Nevertheless, opportunities exist to meet the needs of smaller banks, building societies, etc., as a consequence of financial deregulation and the need for correspondent banking services.
- Significant opportunities exist for public service VADS, for example, the decision by the participants in the U.K. National EFT/POS scheme to utilise British Telecom's PSS service. In addition, there are major opportunities for

vendors of application-specific software products (for example, CAP's BASE 24 product) linked with comprehensive, international customisation, support, and consultancy services.

- The retail sector is emerging as a major opportunity as EPOS systems are being linked with EFT systems. This area includes a number of separate but related service developments, such as:
 - On-line automated teller machines (ATM).
 - Point-of-sale services.
 - Credit card authorisation.
 - Direct debit (via Smart Card).
 - Home banking.
 - Home shopping.
- Home banking and shopping are examples of videotex-based applications. There are now a significant number of services, especially in France where growth has been fostered via subsidised Minitel penetration.
- Home banking has led to significant opportunities for professional services vendors, for example, CMG in the U.K. for the development of the new Lloyds home banking service.

e. Insurance

- With increasing competitiveness and the need for insurance companies to communicate with large numbers of intermediary brokers, there has been considerable growth in the use of VADS by insurance companies.

- Innovative users of VADS technology were organisations in the life/pension sector of the industry. Usage is now expanding into the general insurance sector.
- VADS specifically aimed at the insurance market were launched by two vendors in 1985, MEDIAT from British Telecom and UNIDEX from IBM.
- IBM's UNIDEX service is currently used by 19 major insurance companies and a whole myriad of intermediary brokers and sales outlets. The success of these services has encouraged other players into the market, for example, Istel with INVIEW, DELEGATE on BT's Prestel service, and QUOTEL from GSI. These later services are videotex-based.
- A key development and trend is the link between insurance quotation systems and EDI, for example, INS' BROKERNET service which is currently in a pilot phase with Lloyds. Common standards are being established for the change of proposal forms, claims, cover notes, mid-term adjustments, proof of no claims, discounts, and renewals initially targeted at the motor sector.
- Further trends include network/service interlinking and the development from information retrieval to transaction-based applications; for example, sealing contracts on-line with common interactive access to both the MEDIAT, INVIEW, and UNIDEX services.

f. Other Value-Added Data Services

- In addition to the services identified above, it is expected that other services will emerge. A common theme will be the need to exploit the synergy benefits of secure, rapid communications between distributed user communities.

B. MARKET FORECAST

I. FORECAST DEFINITION

- The market assessment and forecast growth that follow were developed from assessment of current and projected activities within the market definition described above.
- This report also includes a summary forecast of related but mature markets, such as on-line database (OLDB). The OLDB market is reviewed in Chapter VII.
- The forecast covers the period 1987 to 1992 (including 1986 actuals) and assesses end-user expenditures. Forecasts are made in local currency and converted into U.S. dollars for aggregation and comparative purposes.
- Owing to the volatility of international exchange rates anticipated for the forecast period, the U.S. dollar conversion rates used have been taken as the average rate for 1986.
- Exhibit III-2 sets out the average U.S. dollar exchange rates for 1986 for a range of Western European currencies.
- In addition, the forecasts have been expressed in actual monetary terms. The largest inflation rates in Western European countries (i.e., percent change in consumer price index from May 1986 to May 1987) are as follows:
 - United States - +3.8%.
 - France - +3.3%.
 - United Kingdom - +4.2%.

EXHIBIT III-2

U.S. DOLLAR AVERAGE EXCHANGE RATE, 1986

COUNTRY	CURRENCY	AVERAGE EXCHANGE RATE 1986
France	FF/\$	6.86
West Germany	DM/\$	2.14
United Kingdom	\$/£	1.47
Italy	It.L/\$	1,473.5
Netherlands	DFL/\$	2.43
Belgium	BF/\$	44.59
Sweden	SK/\$	7.08

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- Italy - +4.2%.
 - Belgium - +1.4%.
 - West Germany - -0.1%.
 - Netherlands - -1.1%.
- Of more relevance to VADS 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 skill shortages. VADS services prices have tended to remain stable as vendors attempt to create a critical mass via missionary marketing. Consequently, inflation has a minimal impact upon INPUT's market forecast.

2. FACTORS INFLUENCING SIZE AND GROWTH

- There are a wide range of factors--commercial, technical, institutional, economic, and psychological--that are impacting the development of the VADS market.
- VADS markets are at different stages of maturity depending on which application and country market is examined. Overall, however, there is a confluence of factors that are facilitating growth opportunities in this sector at rates in excess of those experienced by the computer services industry in general.
- These factors include cost-effective telecommunications, liberalisation in PTT regulations, growing awareness of commercial benefits of VADS, connectivity standards, and the emergence of critical mass for vendor services.

- The factors that are driving or inhibiting the growth of VADS are shown in Exhibit III-3.
- In assessing these factors, INPUT considers it important to stress the tentative nature of the forecasts developed for these markets through 1992. In consequence, the summary forecast (see Exhibit III-4) has been presented in the form of a low (pessimistic), medium, and high (optimistic) forecast for each component of INPUT's VADS market definition.
- This approach is considered to represent the most meaningful representation of INPUT's market assessments, given the uncertainty that exists with regard to the major factors that will determine the market's size and growth.
- In addition, the detailed forecasts (see Exhibits III-5 through III-8) for each major country market have been presented by delivery mode as well as application service. This presentation is intended to indicate that there are VADS opportunities for vendors of software products, professional services, and standard turnkey systems as well as processing services.

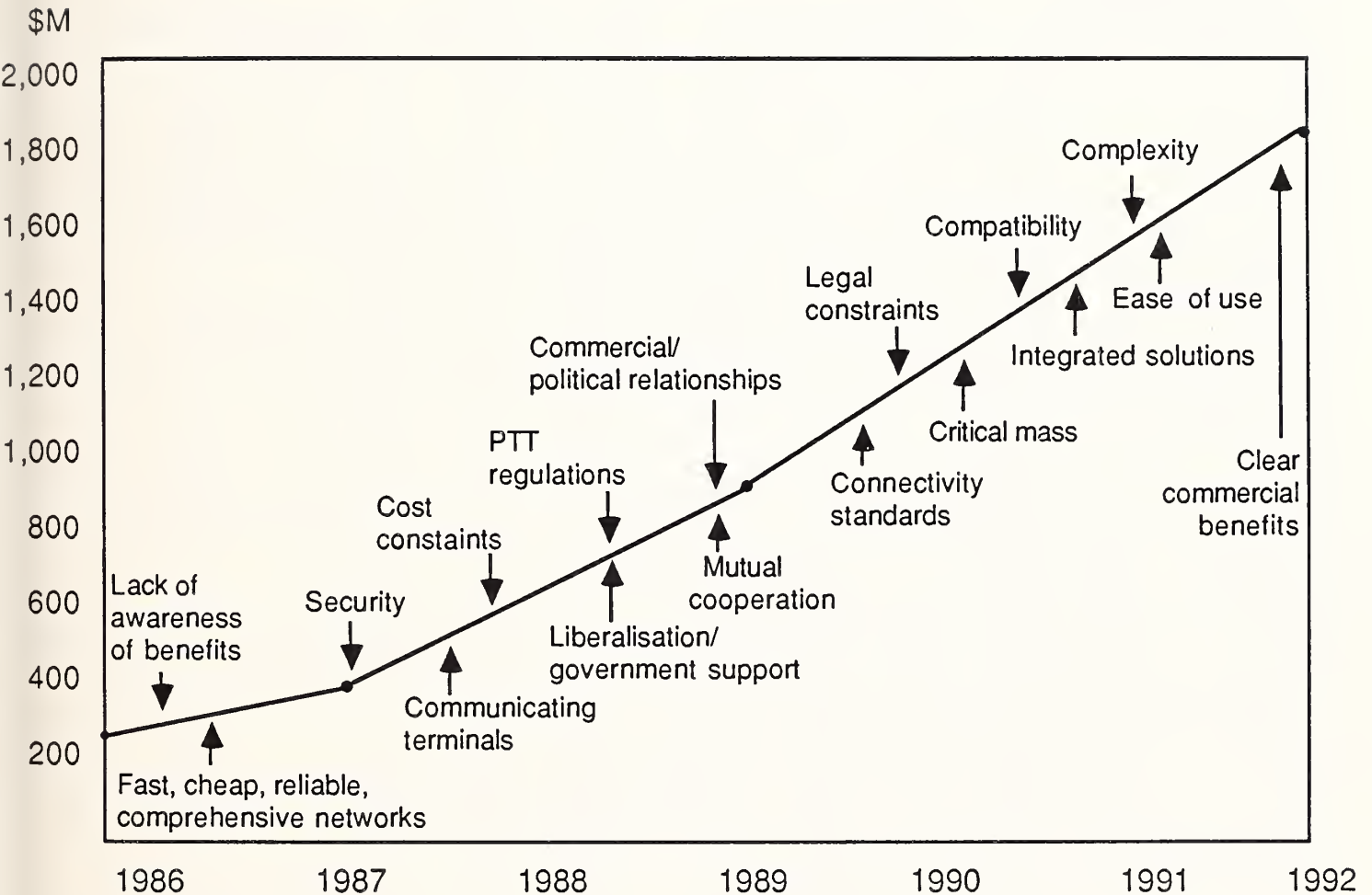
3. MARKET FORECAST

a. Overall Growth

- INPUT forecasts that the market for VADS in Western Europe will grow from around \$325 million in 1987 to around \$670 million in 1989 and will potentially reach \$1.8 billion by 1992.
- This market forecast represents an annual average growth of 43% for the period 1987 to 1989 and 40% for the period 1989-1992. This growth rate represents the median (or most likely) scenario. The optimistic scenario predicts annual average growth of 50% to reach a market size of around \$800 million in 1989 and \$2.7 billion by 1992. The pessimistic scenario predicts annual average growth of 33% to reach a market size of \$550 million by 1989 and \$1.2 billion by 1992.

EXHIBIT III-3

FACTORS AFFECTING MARKET GROWTH



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EXHIBIT III-4

**COMPARISON OF VALUE-ADDED NETWORK AND
DATA SERVICES MARKETS BY COUNTRY, 1986-1992
(TOTAL WESTERN EUROPE)**

MARKET SUBSECTOR*		\$ Millions			AAGR 1986- 1989 (Percent)	\$ Millions 1992	AAGR 1989- 1992 (Percent)
		1986	1987	1989			
France	Low	-	120	185	25	320	20
	Median	96	130	225	33	450	26
	High	-	140	260	40	580	31
United Kingdom	Low	-	85	170	40	375	30
	Median	62	95	195	47	515	38
	High	-	105	220	53	660	44
West Germany	Low	-	15	37	50	100	40
	Median	11	17	50	65	180	56
	High	-	19	60	76	300	71
Italy	Low	-	12	30	62	100	49
	Median	7	16	48	90	205	62
	High	-	18	65	110	400	83
Benelux	Low	-	25	50	40	135	39
	Median	18	28	60	50	200	50
	High	-	30	75	60	300	59
Scandinavia	Low	-	29	60	44	160	39
	Median	20	32	75	55	250	50
	High	-	35	90	65	350	57
Rest of Europe	Low	-	8	16	40	40	35
	Median	6	9	20	50	65	50
	High	-	10	25	61	100	59
Total Western Europe	Low	-	294	548	36	1,230	31
	Median	220	327	673	45	1,865	40
	High	-	357	795	53	2,690	50

*Forecast includes processing services revenues.

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EXHIBIT III-5

**MARKET FORECAST FOR VALUE-ADDED NETWORK AND
DATA SERVICES IN FRANCE, 1987-1992
(BY APPLICATION AND DELIVERY MODE)**

MARKET SUBSECTOR*		FF Millions			AAGR 1986- 1989 (Percent)	FF Millions	AAGR 1989- 1992 (Percent)
		1986	1987	1989		1992	
Managed Data Network Services	PS	40	60	110	40	220	26
	SW	-	-	-	-	-	-
	PFS	7	11	22	46	48	30
Videotex	PS	300	375	590	25	1,025	20
	SW	40	55	90	30	160	20
	PFS	340	430	670	25	1,160	20
Electronic Mail	PS	50	100	200	59	450	30
	SW	8	10	13	18	20	15
	PFS	4	6	8	26	14	20
EDI	PS	-	<1	10	-	100	115
	SW	-	5	15	-	120	100
	PFS	-	5	15	-	90	80
EFT	PS	250	330	540	30	1,000	23
	SW	75	110	190	35	350	23
	PFS	100	140	240	35	470	23
Insurance	PS	10	20	45	65	170	55
	SW	3	5	14	70	50	55
	PFS	1	2	6	80	25	60
Other Data Services	PS	10	18	40	60	120	45
	SW	2	4	10	70	35	50
	PFS	3	6	15	70	50	50
Total	PS	660	903	1,535	32	3,085	26
	SW	128	189	332	37	735	30
	PFS	455	600	976	29	1,857	24

*PS = Processing Services, SW = Software Products, PFS = Professional Services.

EXHIBIT III-6

**MARKET FORECAST FOR VALUE-ADDED NETWORK AND
DATA SERVICES IN THE UNITED KINGDOM, 1987-1992
(BY APPLICATION AND DELIVERY MODE)**

MARKET SUBSECTOR*		£ Millions			AAGR 1986- 1989 (Percent)	£ Millions	AAGR 1989- 1992 (Percent)
		1986	1987	1989		1992	
Managed Data Network Services	PS	8	10	15	23	25	20
	SW	-	-	-	-	-	-
	PFS	1	2	4	60	10	35
Videotex	PS	10	12	16	17	25	16
	SW	5	6	10	25	17	19
	PFS	14	18	28	25	50	21
Electronic Mail	PS	12	23	55	65	150	40
	SW	3	4	5	19	8	17
	PFS	1	2	3	44	7	33
EDI	PS	1	3	12	100	55	66
	SW	<1	1	3	-	16	70
	PFS	<1	1	3	-	12	60
EFT	PS	8	11	20	35	45	30
	SW	3	5	12	60	35	43
	PFS	1	2	6	80	20	50
Insurance	PS	2	4	10	70	30	44
	SW	1	2	4	60	12	45
	PFS	<1	1	2	-	6	45
Other Data Services	PS	1	2	6	80	20	50
	SW	<1	1	3	-	12	60
	PFS	<1	2	6	-	25	60
Total	PS	42	65	134	47	350	38
	SW	12	19	37	46	100	39
	PFS	18	28	52	42	130	36

*PS = Processing Services, SW = Software Products, PFS = Professional Services.

EXHIBIT III-7

**MARKET FORECAST FOR VALUE-ADDED NETWORK AND
DATA SERVICES IN WEST GERMANY, 1987-1992
(BY APPLICATION AND DELIVERY MODE)**

MARKET SUBSECTOR*		DM Millions			AAGR 1986- 1989 (Percent)	DM Millions	AAGR 1989- 1992 (Percent)
		1986	1987	1989		1992	
Managed Data Network Services	PS	-	-	-	-	-	-
	SW	-	-	-	-	-	-
	PFS	-	-	-	-	-	-
Videotex	PS	11	14	22	25	40	22
	SW	10	16	35	50	80	32
	PFS	25	35	55	30	100	22
Electronic Mail	PS	5	10	35	90	150	60
	SW	<1	2	5	-	10	26
	PFS	<1	1	3	-	6	26
EDI	PS	1	2	7	80	25	60
	SW	3	6	18	80	80	65
	PFS	2	4	10	70	40	60
EFT	PS	3	5	15	70	60	60
	SW	2	4	13	85	60	65
	PFS	1	2	7	90	35	70
Insurance	PS	2	4	13	85	65	70
	SW	<1	1	3	-	13	65
	PFS	1	2	6	80	25	60
Other Data Services	PS	1	2	8	100	45	80
	SW	<1	<1	2	-	12	80
	PFS	<1	1	4	-	22	80
Total	PS	23	37	100	63	385	57
	SW	16	29	76	68	255	50
	PFS	30	45	85	42	228	39

*PS = Processing Services, SW = Software Products, PFS = Professional Services.

EXHIBIT III-8

**MARKET FORECAST FOR VALUE-ADDED NETWORK AND
DATA SERVICES IN ITALY, 1987-1992
(BY APPLICATION AND DELIVERY MODE)**

MARKET SUBSECTOR*		Lira Billions			AAGR 1986- 1989 (Percent)	Lira Billions	AAGR 1989- 1992 (Percent)
		1986	1987	1989		1992	
Managed Data Network Services	PS	2	4	8	60	30	55
	SW	-	-	-	-	-	-
	PFS	<1	1	2	60	8	60
Videotex	PS	1	2	6	75	20	50
	SW	<1	1	2	100	8	60
	PFS	2	4	10	50	25	36
Electronic Mail	PS	4	8	28	90	120	62
	SW	<1	2	6	60	15	35
	PFS	<1	1	3	44	10	50
EDI	PS	-	<1	2	-	15	95
	SW	-	<1	1	-	10	115
	PFS	-	<1	1	-	8	100
EFT	PS	3	5	12	60	35	45
	SW	1	2	6	80	25	60
	PFS	<1	1	3	-	12	60
Insurance	PS	<1	2	8	-	50	80
	SW	<1	<1	2	-	12	85
	PFS	<1	1	3	-	16	75
Other Data Services	PS	<1	2	6	-	30	70
	SW	<1	<1	2	-	10	70
	PFS	<1	1	3	-	15	70
Total	PS	11	23	70	85	300	62
	SW	3	6	19	85	80	62
	PFS	4	9	25	85	94	55

*PS = Processing Services, SW = Software Products, PFS = Professional Services.

- These forecasts and those for each country market segment (shown in U.S. dollars) are summarised in Exhibit III-4.

b. Country Market Growth

- The two most mature VADS markets are France and the United Kingdom, which is largely a reflection of liberalisation, government-sponsored VADS initiatives, and the relative sophistication of the telecommunications environment.
- The French market is expected to show the lowest annual average growth rate (22-32%). The United Kingdom, however, is expected to maintain buoyant rates of growth (35-44%) and will emerge as the largest individual country market towards the end of the forecast period.
- The least developed market, Italy, emerges as a strategic market opportunity and is expected to experience very high growth rates (53-86%) from a very low base. Italian VADS development has currently been hampered by the fragmented nature of the telecommunications environment and the lack of initiative by government and dominant commercial users. However, there are signs of strategic initiatives being taken by dominant companies, for example, the joint venture between IBM and Fiat-INTESA and other large conglomerates are proactively driving change (e.g., IRI) in concert with the government.
- The West German market is less clear owing to the monopoly position of the DBP. However, there are already signs of liberalisation via changes in tariff policies for third-party vendors, and INPUT expects a gradual liberalisation after the review committee reports in Autumn 1987. Consequently, relatively high rates of growth (46-74%) are predicted for the forecast period.
- Benelux and the Nordic countries are also expected to show significant rates of growth (40-58%) and are rapidly adopting a range of VADS application services.

- In Scandinavia, videotex and E-mail are growing rapidly fostered by government/PTT initiatives and upgrading of the telecommunications infrastructure. The Nordic countries are already heavily involved in European EDI initiatives such as DEDIST and COST 306.
- VADS are strategically important in these markets because of their high dependence and involvement in the international trading community. Consequently, there is a relatively high usage of MDNS for complex international traffic and application VADS in the transport and trading communities.
- Exhibits III-5 through III-8 show market forecasts for each of the four major country markets--France, the United Kingdom, West Germany, and Italy.

c. Application Growth

- Videotex development is being driven by two major factors. Firstly, is the need to provide user-friendly application interfaces. Secondly, is the emergence of consumer/domestically-based applications, for example, sales order entry, travel, insurance, teleshopping, and telebanking.
- Videotex is more well developed in the French market fostered by government subsidy and in general is the most well developed and understood of the VADS markets. Videotex is assuming increasing importance for the development of private VADS applications as there is a trend towards convergence with traditional data processing applications.
- EFT and EFT/POS are also well developed within the French market and combined with VTX accounts for nearly 80% of the French market in 1987.
- It should be noted that there are significant opportunities for vendors of software products and professional services in these areas.

- The highest rates of growth are anticipated in the area of EDI. In the United Kingdom, the most developed market, vendors are experiencing growth rates of over 100% per annum.
- Electronic mail services are also going through a period of significant growth after a long development phase with problems of terminal connectivity, ease of use, and user population density. Electronic mail is currently the largest VADS application in the U.K. and will account for nearly 45% of processing revenues by the end of the forecast period.
- EFT developments (and the finance and banking sector in general) offer significant growth opportunities for vendors of software products and professional services; for example, the proposed national EFT/POS scheme in the U.K. and plans for redevelopment of French credit authorization and payment settlement systems.
- The next chapter reviews the key strategic issues that are impacting market development.

IV MARKET DEVELOPMENT-THE ISSUES

IV MARKET DEVELOPMENT - THE ISSUES

A. PTT REGULATIONS/TELECOMMUNICATIONS ENVIRONMENT

- Liberalisation of the Western European telecommunications environment is creating a technologically federated European market for VADS services.
- Multinational operators have already set up joint venture and marketing agreements with domestic operators in France, Italy, and West Germany as liberalisation gradually evolves across Europe.
- For example, in France consultation with computer service computers and deregulation initiatives has led to the creation of joint ventures between IBM and Bank Paribas and Olivetti linked to Compagnie Financière de Suez with a view to offering VADS services initially targeted at the deregulating and buoyant financial services sector.
- Other agreements include a link between Mercury and the French company RCI-Calvacom with a view to creating a cross-European E-mail service. GEISCO plans to enter the European markets in partnership with major domestic operators, for example, Bull in France and Nixdorf in Germany.
- The IBM/Fiat joint venture, INTESA, plans to build a significant VADS market in Italy. The initial targets are the manufacturing and distribution sectors.

- The issue of liberalisation has been the subject of much public debate throughout Europe, and, undoubtedly, concern over standards and regulations has greatly inhibited VADS.
- Liberalisation is essentially a reflection that telecommunications only exists to meet the needs of the user and is a result of a shift in strategic emphasis in telecommunications supply from technology to market orientation in the U.K., France, the Netherlands, Finland, Denmark, and Belgium.
- However, liberalisation serves to intensify competition and poses a threat as well as an opportunity to existing and potential VADS players as the PTTs seek to protect profitable segments of the business communications market.
- For example, the telecommunications authorities in all major European countries are planning to collaborate in providing international MDNS for large companies in competition with multinationals such as IBM and EDS. This pan-European VADS cartel will meet user requirements for one-stop shopping and one-stop billing.
- Levels of liberalisation in PTT regulations in Western Europe measured in terms of types of telecommunications services and as an overall country index are presented in Exhibit IV-1.
- Inevitably, liberalisation will emerge as a consequence of user pressure, but the development is not without its opponents who argue that liberalisation has led to wastage of scarce resources through price competition in a free market and has damaged the world status and future of the European electronics industry.
- In addition, although competition has led to falling prices for U.K. users, it is not anticipated that costs will fall in Continental Europe following liberalisation. PTTs are seeking to protect their data communications revenues via incentive pricing (i.e., volume-based leased line tariffs) which, although fostering public service VADS, has little user benefits.

EXHIBIT IV-1

LIBERALISATION - THE EUROPEAN SCENE

COUNTRY	CARRIER SERVICES	VALUE-ADDED NETWORKS	COMMUNICATIONS SERVICES	APPLICATIONS SERVICES	TERMINAL SUPPLY	TREND
Spain	None	None	None	Medium	Low	Low
Switzerland	None	None	None	Medium	Low	Low
Sweden	None	None	None	Medium	Medium	Low
Ireland	None	None	None	Low	High	Low
West Germany	None	None	Low	High	Low	Low
Portugal	None	Low	None	Low	High	Low
Italy	None	None	Low	Medium	High	Low
Norway	None	None	Low	Medium	High	Low
France	None	None	None	Medium	High	High
Netherlands	None	None	Low	Medium	Medium	High
Belgium	None	Low	Low	Medium	High	Medium
Denmark	None	None	Low	High	High	High
Finland	None	Medium	Medium	High	High	Medium
Iceland	None	High	High	Low	High	High
United Kingdom	Strong	High	High	High	High	High

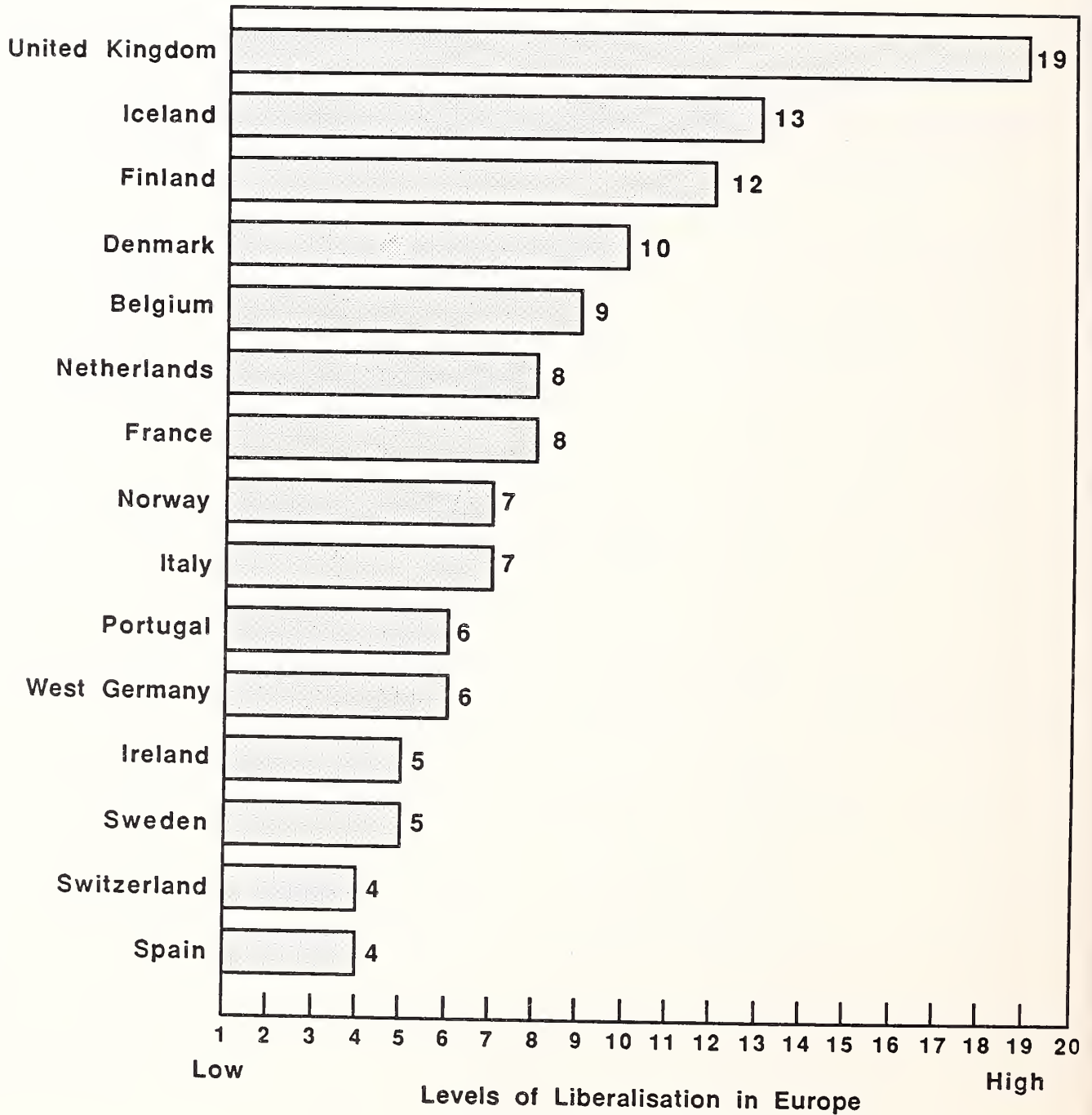
(Continued)

Rating: None = 0, Low = 1, Medium = 2, High = 3, Strong = 4.

S-ANE

EXHIBIT IV-1 (Cont.)

LIBERALISATION - THE EUROPEAN SCENE



S-ANE

- Liberalisation has also led to anticompetitive moves in the form of market concentration via acquisition and joint venture. It has opened up major opportunities for the former PTTs. For example, British Telecom has become a major manufacturer of digital communications switches by acquiring Mitel and of public E-mail through acquisition of former ITT subsidiary Dialcom.
- The 'Baby Bells' are now making significant inroads into the European market; for example, Nynex acquiring software house BIS and Bell South taking stakes in Aircall and National Radiophone.
- A crucial benefit of liberalisation and competition is enhanced efficiency and customer service.
- British Telecom's attempts to cope with the threat of Cable and Wireless subsidiary, Mercury, are hampered by its service record. A survey of 200 of the U.K.'s largest companies revealed that 39% of respondents felt that BT's service had deteriorated since privatisation. It is not surprising that another survey among a similar sample revealed that 27% of users would give Mercury more than 10% of their business within the next 12 months, and 89% expected to give Mercury 10% by 1991.
- British Telecom is combatting competition by increasing local telephone call tariffs and introducing new services such as a fast bypass (optic fibre) network for the City of London.
- A European league table of call tariffs is given in Exhibit IV-2.
- It is interesting to note that British Telecom is considerably less efficiently managed than the PTTs and other private organisations in the field.
- Exhibit IV-3 illustrates the efficiency of telecommunications operators measured in terms of lines per employee.

EXHIBIT IV-2

EUROPEAN LEAGUE TABLE - CALL TARIFFS

RANK	COUNTRY	1986 PRICE RULING	COUNTRY	1987 PRICE RULING	PERCENT INCREASE	PERCENT R.P.I.
LOCAL TELEPHONE CALL LEAGUE TABLE						
1	U.K.	.088	U.K.	.110	25	3.7
2	Belgium	.085	Belgium	.085	Nil	0.53
3	France	.083	Germany	.082	Nil	0
4	Germany	.082	France	.080	(-3.6)	2.1
5	Italy	.062	Italy	.064	3.2	6.1
6	U.S.A.	.053	U.S.A.	.053	Nil	3.5
7	Canada	Nil	Canada	Nil	Nil	4
TRUNK TELEPHONE CALL (OVER 200 MILES) LEAGUE TABLE						
1	Germany	1.23	Germany	1.23	Nil	0
2	France	1.21	France	1.19	(-1.7)	2.1
3	Canada	0.94	Canada	0.94	Nil	4
4	Italy	0.85	Italy	0.88	3.5	6.1
5	U.S.A.	0.81	U.S.A.	0.59	(-27.2)	3.5
6	U.K.	0.41	Belgium	0.38	Nil	0.53
7	Belgium	0.38	U.K.	0.35	(-14.6)	3.7
INTERNATIONAL TELEPHONE CALL LEAGUE TABLE						
1	Germany	7.86	Belgium	6.15	Nil	0.53
2	Belgium	6.15	Italy	5.85	1.6	6.1
3	Italy	5.76	Germany	3.93	(-50)	0
4	France	4.84	France	3.15	(-34.9)	2.1
5	Canada	2.86	Canada	2.86	Nil	4
6	U.S.A.	2.42	U.S.A.	2.42	Nil	3.5
7	U.K.	1.86	U.K.	1.85	(-0.5)	3.7

All prices are in pounds/pence sterling. All calls are for a standard 3 minute duration; trunk calls are over 200 miles; international calls are between New York and the listed capital.

EXHIBIT IV-3

TELECOMMUNICATIONS OPERATOR EFFICIENCY

COUNTRY/ ORGANISATION	LINES PER EMPLOYEE
Netherlands - PTT	200
Bell Canada	185
Nynex	150
DGT (France)	138
DBP (West Germany)	127
Televerket (Sweden)	110
British Telecom	89

I. FRANCE

- Following the planned issue of new regulations in Autumn 1987, 40% of the French telecommunications monopoly will be liberalised. Competition will be opened up in the fields of VADS, radio telephone services, cable, and satellite.
- In terms of opportunities for computer services companies, this can be summed up in the words of one services vendor as 'much ado about nothing'.
- The French have retained the basic belief that a public telecommunications network is a natural monopoly and the DGT is ensuring that the profitability of its business services will not be threatened, which accounts for four billion French francs in annual revenues.
- It is anticipated that revenues generated from TRANSPAC and other public services will be protected via moves towards the CEPT recommendations in terms of volume-based charging on leased liens which will have significant impact on the finance and banking community. It is estimated that costs for leased lines could increase by as much as 400%.
- The DGT are also protecting their interests by offering special tariffs to their TRANSPAC subsidiary and moving into the domain once regarded as the sole province of service vendors; i.e., the development of private dedicated networks for individual client applications, e.g., Estorelle.
- Essentially, there are two approaches for VADS vendors--the product approach as exemplified by IBM, and the market approach, i.e., developing individual specialist client applications, for example, GEISCO with the Messegarie Securised Enterprise Bank (MSEB) project.
- It is interesting to note that IBM is a major protagonist lobbying for liberalisation in France, whilst other service vendors are seeking to capitalise on niche

opportunities and the development of private networks; for example, McDonnell Douglas in the banking and airline sectors.

- Opportunities for private networks include small- to medium-sized organisations faced with the problems of cost, complexity, and shortening technology cycle and one-stop shopping services for major projects such as the pan-European reservation system planned by a consortium of the major airlines.
- DGT proposals for deregulation are currently still subject to review and consultation. Essentially, the DGT proposals set conditions for usage of leased lines as follows:
 - First category - leased lines used internally or for a closed user group.
 - The company has to declare specific applications.
 - Second category - VADS to third party.
 - The vendor can obtain authorisation based upon two conditions, i.e., firstly, that the network must provide VADS with a significant element of value added and, secondly, a special tariff based on usage is obtained.

2. UNITED KINGDOM

- The process of liberalisation in the U.K. is now almost total with the issuing of new regulations and VADS class license by the Department of Trade and Industry in March 1987.
- There are about 800 licensed and 300 active services. A summary of the basic provisions of the new regulations is as follows:

- Companies above an annual turnover from communications of less than one million pounds and annual turnover of less than 50 million pounds can offer VADS without conditions.
 - Companies without these cutoff points will have to assure OFTEL that VADS are not being cross-subsidised from other activities.
 - British Telecom and Mercury will need to obtain OFTEL approval before undertaking joint ventures with companies that have turnover in excess of one billion pounds per annum.
 - Companies are now able to route external calls anywhere within their leased line network. This means a caller will be charged local rates if they dial a local company office and the call is then transferred long-distance internally.
 - Companies can do their own wiring internally up to 200 metres from any of their buildings, as opposed to 50 metres at present.
 - Single line apparatus, for example, dealerboards will no longer need BT approval when attached to the public network.
 - Service vendors have to conform to established standards for OSI connectivity.
- The new licencing regulations have had the benefits of removing considerable uncertainty amongst vendors and creating a climate of confidence for investors.
 - It is hoped that deregulation will encourage a number of new entrants into the market. However, it should be noted that VADS market entry entails considerable investment and risk. Market development phases for new products and services have been long and cash hungry. Consequently, the major opportunities are only addressable by deep pocket corporations.

- Nevertheless, small niche parochical operators may well be encouraged into the market, for example, Applied Property Research which offers an OLDB service called LORA (London Offices Research Analysis).
- In addition, banks, building societies, and airlines may well leverage their investment in networks and resell spare capacity.
- The government is also reviewing deliberalising the British Telecom and MERCURY duopoly for the transmission of specialised business services by satellite.
- The central issue of the DTI review is whether to totally deliberalise satellite services or restrict the liberalisation to closed user group services.
- The Stock exchange, faced with capacity problems after 'Big Bang', is currently evaluating the use of satellite technology for service distribution. Liberalisation could well increase the options and/or joint venture opportunities.

3. WEST GERMANY

- West Germany is the most highly regulated of the major Western European markets, and the monopoly position of the Bundespost is anchored in articles 73 and 77 of the constitution. Any change would need broad political consent.
- Nevertheless, there is considerable pressure for liberalisation from users and VADS vendors. In early 1987, Deutsche telecom, the user group representing 150 companies and VADS operators such as Lydiastar, planned to challenge the monopoly status in the courts.
- The DBP may possibly introduce a VADS licensing system after the Witte Commission reports in Autumn 1987, but there will not be a second carrier or privatisation.

- The Bundespost defends its position by arguing that demand for VADS-type services is adequately covered by PTT services and sees its role as a technological innovator. For example, it will be offering narrowband ISDN-based services in 1988. It is arguable that X.25-based VADS are not required when ISDN is available.
- The DBP has also been innovative in the field of teletex. There are nominally 16,000 teletex subscribers in West Germany as compared to 4,000 in all other European countries. However, only 6,000 are actually connected, and the service is not aggressively promoted.
- The large demand for internal, external, and international messaging is only partially being met by the X.400-based TELEBOX service. As a result, public E-mail provider Deutsche Mailbox FE is one of Germany's fastest growing companies.
- The Bundespost pioneered by CEPT recommendation for usage-based tariffs on private networks in August 1986. This lead is expected to be followed across Europe.
- The new tariffs specify that 75% of all traffic on a leased line must belong to the owner of the network whilst the remainder can come from third parties. Network operators arriving on the market after the new rules were announced have to make a volume-related payment which consists of a fixed fee and a percentage for use above a stated limit, whilst existing network operators have the option of choosing the tariff they want to abide to.
- Gradual liberalisation in West Germany is inevitable, and the terminal equipment, modem, and PABX markets are already liberalised.
- To an extent, the issue is not a critical concern. The DBP commented to INPUT that the term value-added services is not used in West Germany but

that a survey revealed that there were over 1,000 services in West Germany that correspond to the international interpretation of a value-added service. Under the present regulations, it is possible to offer any form of value-added service other than the straight resale of bit transmission. These existing VADS are mainly closed user groups in INPUT's definition.

- VADS development has to a certain extent been hindered by high user costs of the public VAN Datex-P. However, to meet strong user demand the DBP plan to invest more than \$250 million between 1988 and 1994 which will quadruple the network capacity and enhance availability.
- The Witte Commission report is expected to recommend that the telecommunications division of the Bundespost be separated from the Posts and Telecommunications Ministry and split into two parts--a monopoly switching and transmission business called Telenetz and a value-added services company, Teledienst.
- A decision to establish a competing service for Telenetz was apparently narrowly rejected, although the operation will be subject to three-year reviews and will face the removal of its monopoly if it is not found to lease lines to private companies at competitive rates.

B. STANDARDS

- For the VADS marketplace, there are basically two broad classifications of standards that are of importance:
 - Standards for telecommunications and computer software and hardware interconnection.
 - Document format standards at an application level.

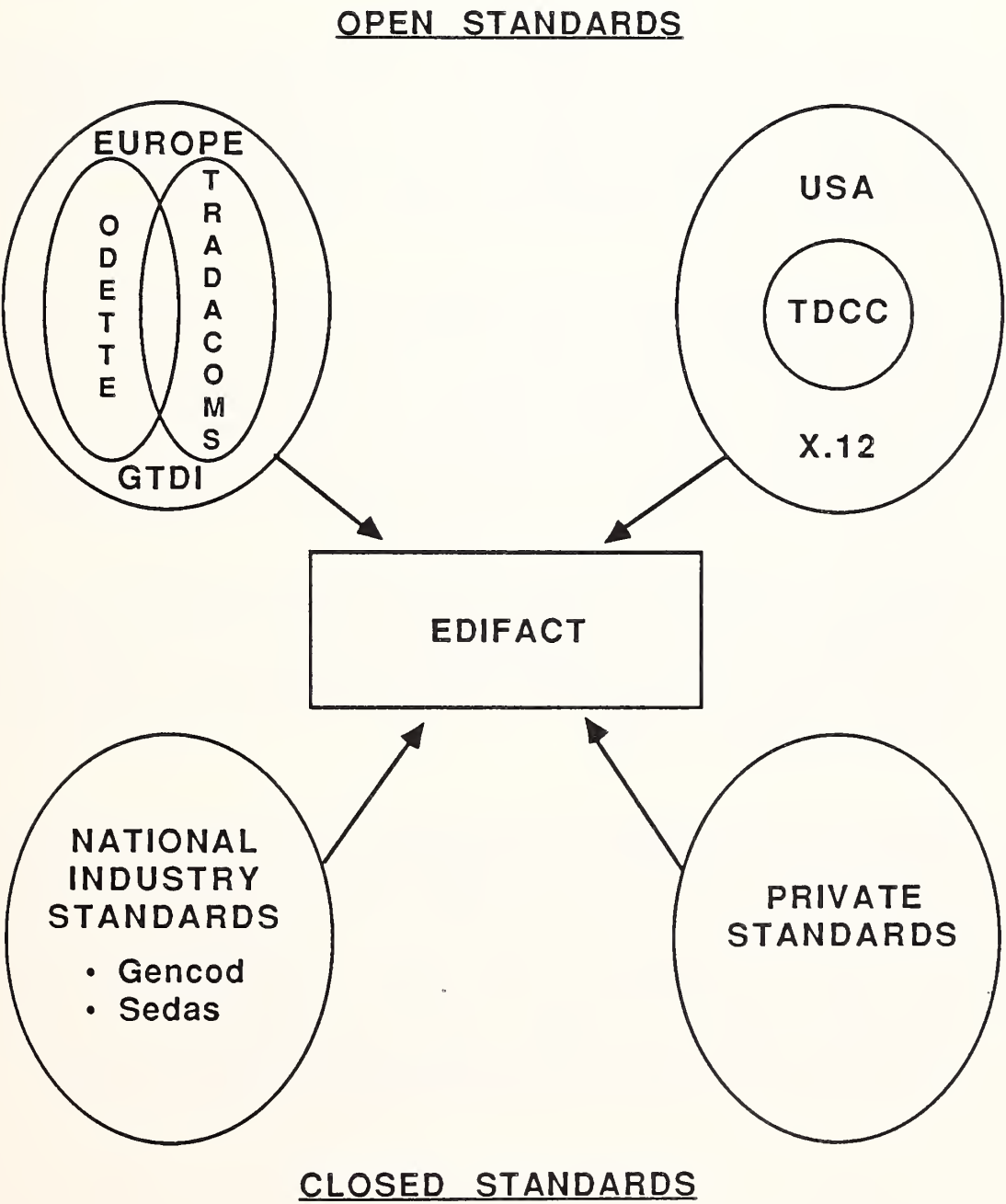
- Standards are clearly an important factor in the VADS marketplace and to an extent present vendors with both a threat and an opportunity. Whilst standards are clearly a necessary platform upon which services and products are based, there is also a commercial opportunity to be found amongst the multiplicity of standards and variations of levels within standards.
- In general, vendors were ambivalent about the standards issue except in the area of EDI where, unlike the U.S., service development has been inhibited by users' priorities in first establishing universal document standards. To an extent, there has been a preoccupation with standards development rather than experiencing the benefits of implementation.
- It is interesting to note that the most developed of the VADS marketplaces, videotex, does not have internationally accepted standards. However, the two most common standards, CEPT3 and PRESTEL (I200/75), have provided a common focus for service providers.
- INPUT's user research revealed strong concern about hardware connection and document standards development, and there is much confusion as to the likely outcome of standards development.
- The essential problem is that the standards-making process is too bureaucratic and slow to keep pace with changes in the IT sector.
- INPUT recommends that the standards-making process should be conducted as a commercial project. Users and vendors who ask for a standard would have the incentive to fund it because they would control on-time delivery.
- VADS development has been facilitated by moves by the world's computer manufacturers and telecommunications operators to unite behind the development of OSI connectivity. IBM disclosed to INPUT that it had invested \$100 million in OSI development in Europe, and the future environment will be one of SNA and OSI not SNA or OSI.

- The major problem is that users cannot wait for the ISO to develop a full Management Information Standard (MIS), which is unlikely to emerge before 1990.
- Consequently, cooperation has been fragmented by individual manufacturers developing their own OSI architectures; for example, ICL's OPENWAY which provides customised added value features over and above those in the current ISO standard FTAM. These developments are, however, likely to metamorphose to ISO compatibility when new standards are available.
- The EEC is actively supporting developments by undertaking conformance testing for OSI protocol implementations.
- OSI connectivity has also been enhanced by the development of X.400-based message handling services in the U.K., France, and West Germany.
- X.400 implementation will facilitate the development of a global electronic messaging environment and solves the problem of incompatibility between subscriber E-mail services and office systems products, for example, IBM's PROFS and DISCOSS and DEC's All-In-One provided on private networks.
- X.400 will facilitate interworking between public and private systems, and 14 international vendors demonstrated this capability at the Hannover Fair in March 1987. However, the development of a global messaging system will depend on mutual cooperation between the manufacturers and the resolution of commercial issues in linking international services.
- The new X.400 public message handling system will act as a central clearing-house for on-line services. Value will be added at two levels. At the first level, PTTs are offering integrated messaging services, and at the second level, VADS vendors are able to use the underlying VAN for industry-specific applications.

- The X.400 MHS includes features such as user-friendly addressing, multiple addressing, nondelivery notification, and on-line subscriber directory. The public services have an advantage over conventional E-mail in that users can send messages to telematics services; for example, facsimile, videotex, telex, and teletex.
- In addition, a consortium of manufacturers, i.e., ICL, Bull, Siemens, and Olivetti, are developing an enhanced open document architecture standard--T.400. The ODA product will be available for E-mail services based on X.400 by the end of 1988. It resolves the problem of X.400's inability to handle message formats. IBM has also developed software which allows direct connection between DISCOSS and any other manufacturer under X.400 rules.
- These developments, although beneficial to users, pose a threat to third-party vendors who will need to offer comprehensive solutions targeted at specific vertical markets if they are to stem the inevitable migration to in-house systems, hybrid solutions, and public services.
- The development of document standards has also progressed apace in the field of EDI. The new international EDI standard, EDIFACT, is currently under review by the ISO and being demonstrated in the UNICORN project which links together the German service company, Starts, with the hapless Townsend Thorosen, North Sea Ferries, Sealink, and the AA. The project is the first ever interactive EDI implementation. On-line access was previously only though suitable for small companies.
- Exhibit IV-4 illustrates the development of EDI standards.
- The standards issue is a major concern in the EFT/POS area, and it is a key objective of participants in the National Scheme in the U.K. to establish standards for network interconnection and messaging.

EXHIBIT IV-4

EDI STANDARDS DEVELOPMENT



C. AWARENESS

- INPUT's user research amongst general management, i.e., functional heads in marketing, finance, and production, revealed that VADS technology is becoming an everyday assumption of generic business life.
- Levels of awareness of applications such as E-mail and on-line database are high in large user organisations even at a senior management level.
- However, levels of awareness of both the existence and especially the benefits of VADS are lower in medium-sized and smaller establishments. In addition, levels of awareness of more current applications such as EDI, EFT, and Electronic Graphics Exchange (EGE) were relatively lower.
- Levels of awareness also vary depending upon corporate structure. Large centralised companies are aware of the benefits of VADS and have adopted the technology. However, the trend towards decentralisation and organisation into operating companies and divisions leads to low levels of awareness amongst the autonomous units of even the largest organisations.
- In the U.K., VADS vendors have perceived that this factor is a major inhibitor to market growth. The solution was to launch the Vanguard programme in October 1986 which was aimed at demonstrating the potential advantages of VADS to British industry.
- The DTI's Vanguard initiative was based on an awareness survey that revealed that 40% of senior management had no idea of what VANS were. To an extent, this reveals the DTI's naivety as also exemplified by their surveys of IT awareness. Businessmen buy solutions to business problems and not technology such as IT or VADS. VADS technology is a cost item and possibly unnecessary. Efficient inventory control is a commercial reality.

- The 1.25 million pound programme is funded by the government (one million pounds) and by five participant vendors, i.e., British Telecom, IBM, INS, Istel, and Midland Bank (50,000 pounds each). Surprisingly, response to the initiative has been high, 12-15% on a mail shot of 15,000 top companies. Fifty-two percent of respondents were in the manufacturing sector, and, interestingly, 43% from companies between 5 and 20 million pounds turnover. Awareness sessions have been arranged for over 1,000 of these respondents to introduce their personnel to the benefits of VADS. Six monthly awareness studies will test the results.
- VADS-related conferences and seminars have also proved successful as missionary marketing initiatives. For example, in the field of EDI two ANA sponsored conferences held in November/December 1986 attracted 400 delegates at a cost of 200 pounds per day (the budget was for 360).
- In more nascent VADS markets such as Italy, the need for such missionary marketing initiatives is critical to development. Government involvement is also very important to generate awareness, availability, and the impetus for change. The development of VADS in France is a good example of this phenomenon.
- In general, it is important for vendors to stress the business development benefits that can add value to a customer organisation, which in turn is likely to break down user resistance to new communications-oriented methods of doing business.
- Consequently, potential benefits such as those listed below should be of key importance when marketing VADS:
 - Improved profitability.
 - Increased management control.

- Improved customer service.
- Competitive advantage.

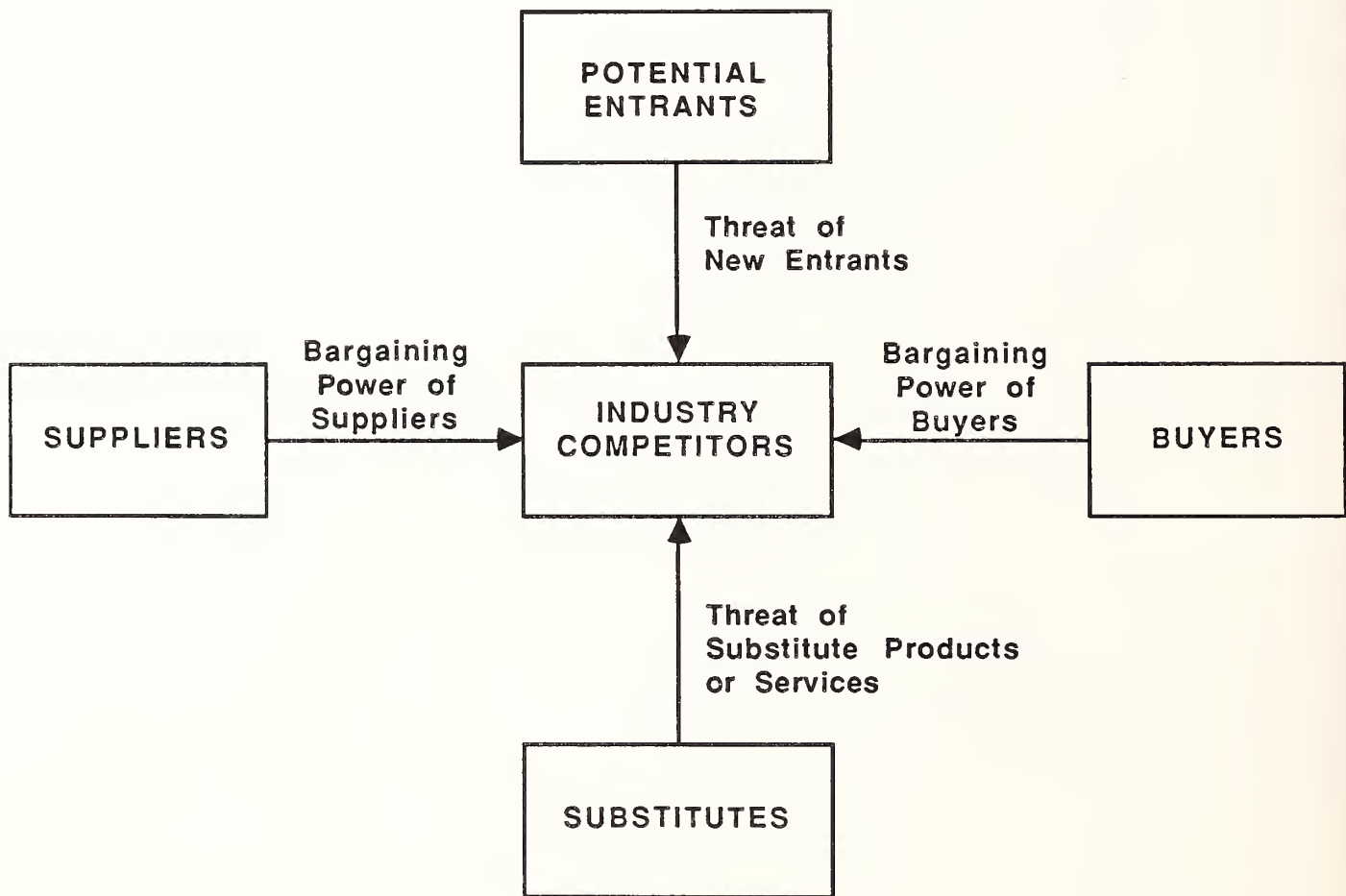
D. PRICING AND MARKETING

- Pricing is always a key marketing decision, and pricing strategies for a VADS needs to take into account the stage in a product's life cycle, capacity, levels of competition, and user's perception of value.
- A further concern for VADS vendors is to comply with the conditions of the regulatory bodies, especially with regard to cross subsidisation. It is very attractive for deep pocket players such as IBM or British Telecom to cross-subsidise VADS services to achieve the marketing objectives of market penetration and/or as a loss leader for other profitable areas such as software and hardware.
- Pricing goals for VADS vendors (and indeed for a variety of service industries) are normally stated in terms of the relationship of price to the service's marketing strategy; for example, penetration pricing to achieve critical mass, fee-based charging to encourage volume usage, and value/prestige pricing to reflect that costs are consistent with derived usage of quality, service, and high importance to the user.
- A key concept when establishing pricing strategy is elasticity of demand which depends upon three factors:
 - Are acceptable substitutes available?
 - Is cost a significant element in a buyer's budget?
 - Is the service perceived as an expendable luxury by the buyer?

- The sensitivity of these factors can vary through the phases of a product life cycle. For example, many weakly differentiated on-line database services are highly price elastic throughout their product life. However, transaction-based services such as EFT and EDI, although they may be fairly price-elastic in the introductory phase, become more price-inelastic in the mature phases.
- In addition, VADS vendors can stimulate demand by the use of creative pricing and a variety of promotional 'deals'. For example, an E-mail vendor could offer free service subscriptions alongside the sale of modems, communications software, or personal computers.
- Levels of competition are a key factor determining VADS pricing. INPUT has illustrated Michael Porter's model of the forces driving industry competition in Exhibit IV-5, which can be used as an 'aide memoire' when determining pricing strategy.
- With regard to the model, the structure of the VADS industry is largely oligopolistic with the exception of larger numbers of niche parochial players at the bottom end of the market.
- At the earlier stages of product marketing, price competition is intense--barriers to entry are relatively low and the threat of substitutes and bargaining power of buyers is high.
- However, at later stages barriers to entry are created via establishing critical mass which gives economies of scale and product differentiation via customer loyalty. The bargaining power of buyers falls as it is perceived as an essential business communications tool, and the threat of substitution diminishes owing to the practical difficulties in changing operations.
- Consequently, it is recommended that EFT, EDI, and E-mail vendors gradually shift their pricing strategies from market penetration to value-based pricing.

EXHIBIT IV-5

FORCES DRIVING INDUSTRY COMPETITION



Source: Michael E. Porter

- Another important factor in pricing is cost, especially as many VADS products have not yet reached breakeven. Potential VADS participants must be aware of the financial implications of high capital investment and initial marketing costs in relation to the longer term potential returns.
- Capacity-related pricing is also important to VADS vendors, with such policies as special tariffs to encourage off-peak usage.
- Technology-related pricing is a further phenomenon in the VADS field. For example, it is recommended that owing to faster access speeds E-mail vendors migrate from time- to transaction-based charging.
- Initial implementation fees are also important, and it is recommended that on-line database services adopt this strategy in order to cover the administration costs of large numbers of infrequent users and refocus marketing strategy in terms of product and service rather than price differentiation.
- In general, when deciding pricing and other elements of the marketing mix, vendors should always be wary of potential substitutes. To an extent, VADS vendors are operating in a window of opportunity before the development and adoption of wideband ISDN networks and OSI standards. In addition, network interlinking, although increasing critical mass, reduces possibilities for product differentiation, and it is essential that vendors develop strategies to lock in their existing customer base, enhance added value, and compete on service and support.
- Industry groups and associations such as the European Electronic Mail and Electronic Data Interchange Associations could have an important role to play in relation to pricing. Common agreement to stabilize and rationalise price would then focus competition on non-price tactics.
- Another key marketing issue which impacts upon pricing is product positioning. A key concept here is positioning of a product in terms of volume and

value. Product positioning measured in these terms is illustrated in Exhibit IV-6.

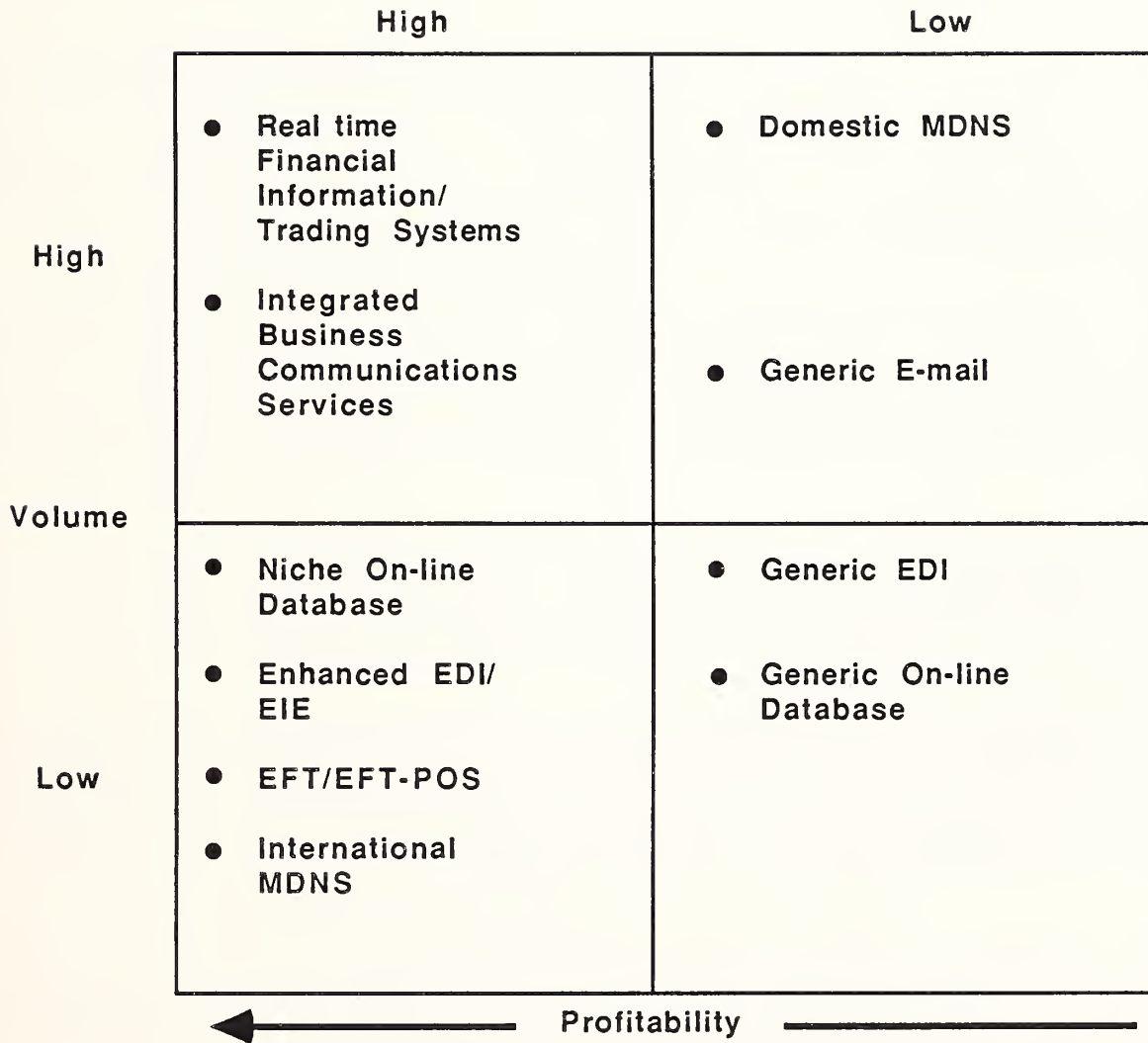
- In general terms, the more profitable services are those that are mostly highly differentiated; for example, real time financial information systems or electronic mail services used internally by multinational companies. Vendors of these services are able to charge premium prices to reflect the perception of high value added. 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.

E. NETWORK INTERLINKING

- Another solution to problems of connectivity, user confusion and compatibility has been network interlinking.
- The establishment of the ICL/GEISCO joint venture, INS, has led to full functional integration between GEISCO's international network and the ICL/Mercury U.K. network. A high-level X.400 service bridge has been established at a development cost of approximately 0.3 million pounds. The link provides a transparent service for users and offers full audit facilities and high level security--a blueprint for other developments. It is anticipated that there will be significant volumes of international traffic by 1989.
- In the EDI area, development in the automotive sector has been hindered by user confusion with having to potentially make three separate connections, i.e., to Istel's EDICT service, INS' Motornet, and Fordnet. However, a bridge between INS and INFOTRAC is envisaged during 1987.

EXHIBIT IV-6

PRODUCT POSITIONING - PROFITABILITY



- In addition, network interlinking for the exchange of messages on INS' DISH project with IBM's Shipnet service in the international trade area has been demonstrated.
- E-mail vendor One-to-One has also established links with BT Gold, COMET, and LINK 7500.
- FASTRAK has also been linked with BT GOLD and the ICL/Mercury network.
- Vendors have expressed interest in connecting with the public and private networks in recognition that a service catchment area is limited by reliance on one network, for example, the X.75 link between CSC Infonet and TRANSPAC.
- Nevertheless, there are a variety of commercial issues for vendors to resolve, i.e., responsibility for security, network interchanging, billing, development costs, and, most significantly, jealous protection of an existing client base.

F. SECURITY

- Users and vendors interviewed by INPUT uniformly rated security as of high concern. The issue is especially important for vendors targeting services in the finance/banking community and EFT areas.
- Users are concerned about internal breaches of security as well as the vulnerability of information sent to and through third parties. Corruption of data is often as big a concern as loss.
- A recent survey in the U.K. amongst 200 companies revealed that losses from computer fraud of all kinds totals at least five billion pounds annually.

- This presents an opportunity for service companies to offer highly secure services including encryption facilities, audit trails, and electronic signature features. These are essentially for transaction-based applications where 'my byte is my bond'.
- In the EFT/POS area, fraud could be even further reduced by offering fingerprint authorisation attached to terminals.

G. TERMINALS AND INTERFACE SOFTWARE

- A key inhibitor to the development of VADS is the lack of communicating terminals/front-end user processors.
- This problem has been exacerbated by the falling costs and increasing sophistication of videotex terminals, modems, microcomputers, and laptop terminals.
- In addition there has been a proliferation of communications software packages developed for the micro, for example, CROSSTALK.
- EDI development has been partially hindered by the lack of vertical market-oriented commercial packages for file handling and network interfacing. In addition, there is a development gap between software packages and requirements for messages in a dynamic standards environment.
- This provides opportunities for vendors to provide full implementation support services, 'starter-kits', and turnkey solutions in collaboration with specialist software houses.
- In general, an increasing proportion of value added is being created by enhanced micro-based software packages, for example, in the on-line database

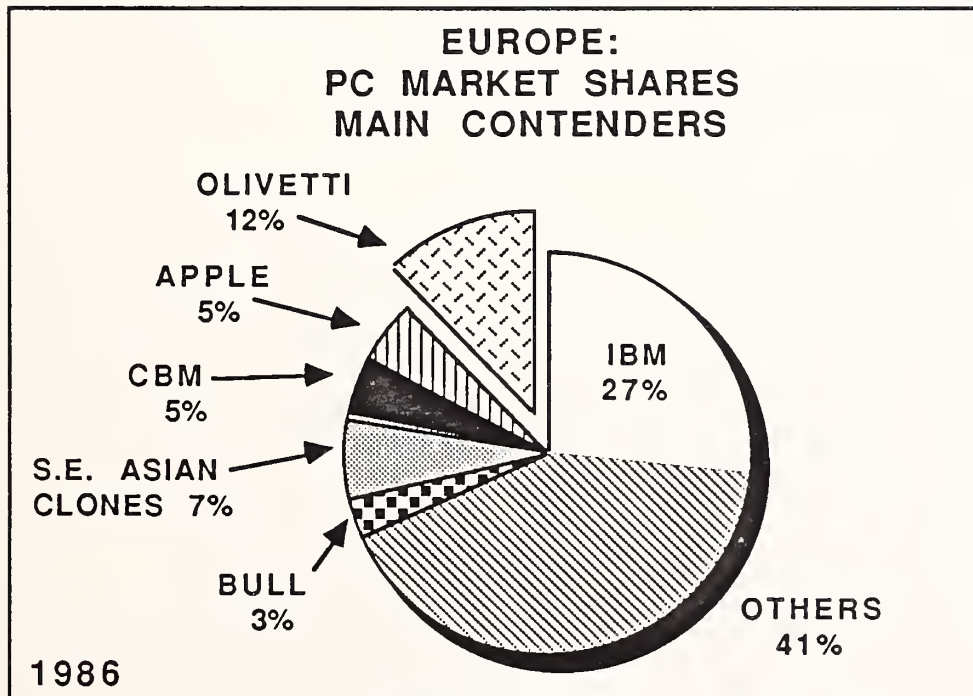
area, to facilitate local modeling and decision support capabilities. It is essential that VADS vendors foster relationships with software houses not only for development but also for service and support.

- A European market forecast for microcomputer sales for the period 1987-1990 and manufacturers' market shares for 1986 are illustrated in Exhibit IV-7.
- The forecast reveals an overall annual average growth rate of 18%, which should be more than adequate to sustain an effective VADS infrastructure. Falling prices and margins (the market is only growing by 13% in terms of value) are creating a shakeout effect amongst value-added resellers (VARs). Service vendors should be cautious of levels of marketing effort and support provided by VARs, and, generally, they do not provide a cost-effective distribution channel.
- The business microcomputer market is assuming increasing importance as established videotex services migrate towards ASCII access and converge with traditional data processing applications.
- The next chapter reviews user attitudes revealed in INPUT's research programme and highlights available opportunities for players in the VADS market.

EXHIBIT IV-7

**BUSINESS MICROCOMPUTER SALES
EUROPEAN MARKET FORECAST (1987-1990)
AND MARKET SHARES (1986)**

Country	(000's Units)	
	1987	1990
U.K.	350	570
W. Germany	400	650
France	350	570
Italy	220	380
Benelux	140	240
Scandinavia	150	270
Rest of Europe	180	300
Total	1,790	2,980



V USER ATTITUDES AND MARKET OPPORTUNITIES

V USER ATTITUDES AND MARKET OPPORTUNITIES

- This chapter provides a summary and analysis of INPUT's user research and highlights areas of business development opportunity for vendors of VADS services.

A. GENERAL ANALYSIS OF USER PRIORITIES AND CONCERNS

- As part of INPUT's information services programme research, a sample of 102 senior data processing professionals and 100 middle/general managers (spread across marketing, production, finance, and administration) were interviewed by telephone. An analysis of the research sample is given as Appendix B.
- The purpose of this survey was to access levels of awareness, usage, and attitude towards external computer services and to highlight changes and trends across the population.
- With respect to VADS, the major areas covered were:
 - User attitudes towards the telecommunications environment.
 - User attitudes towards some key telecommunications issues.
 - Levels of awareness of VADS.

- Levels of penetration and planned utilisation of VADS.
- Perceptions of benefits and drawbacks associated with the use of VADS.

1. TELECOMMUNICATIONS ENVIRONMENT

- Exhibit V-1 illustrates some users' comments on the telecommunications environment.
- INPUT's research revealed a dissatisfaction with the services provided by the national PTTs. It is interesting to note here that liberalisation in the U.K., which has created the duopoly of Mercury and British Telecom, has not led to an improvement in levels of customer service. A recent survey revealed that 40% of British Telecom's business users felt that service had deteriorated after privatisation.
- The issue of liberalisation in PTT regulations is discussed in more detail in Chapter IV.
- The other major finding relates to the need to establish firmer standards at both domestic and international levels in order to facilitate effective and efficient communications.

2. GENERAL TELECOMMUNICATIONS ISSUES

- User ratings of the importance of various issues relating to developing effective business communications (analysed by country, establishment size, industry sector, and total sample) are illustrated in Exhibits V-2 through V-5.
- The research revealed that the need for universal hardware connection standards still remains a key concern for users. The importance of this issue

**USERS' COMMENTS ON THE
TELECOMMUNICATIONS ENVIRONMENT**

- **UNITED KINGDOM**
 - There is little conformity (of equipment standards) between manufacturers.
 - There is a shortage of skilled people with an understanding of the telecommunications.
 - Better domestic standards are needed.
 - There is a lack of international standards.
- **FRANCE**
 - The level and quality of service is inadequate.
 - We have doubts about the security of data on PTT lines.
 - The service is too expensive.
- **GERMANY**
 - The DATEX/packet switched network is unsatisfactory.
- **ITALY**
 - The PTT is disorganised, inefficient, and unreliable.
 - The costs are too high.
 - There is a lack of communications standards.

EXHIBIT V-2

USERS' RATINGS OF IMPORTANCE OF
TELECOMMUNICATIONS ISSUES
(TOTAL WESTERN EUROPE)

ISSUE NUMBER	ISSUES	AVERAGE RATING*
1	Developing Communications Networks	2.8
2	Lack of Telecommunications Expertise	3.0
3	Developing Micro-to-Mainframe Links	3.8
4	Developing Local Area Networks	3.6
5	Developing Departmental Computer-to-Mainframe Links	3.3
6	Integrating Voice and Data Networks	2.3
7	Utilising Mobile Communications	2.3
8	Universal Hardware Connection Standards	4.1

Total Sample = 102 - All MIS/DP Managers.

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

*Average Standard Error = 0.13.

EXHIBIT V-3

USERS' RATINGS OF TELECOMMUNICATIONS ISSUES (ANALYSED BY COUNTRY)

COUNTRY	AVERAGE RATING BY ISSUE*							
	1	2	3	4	5	6	7	8
West Germany	2.4	2.7	3.9	4.0	3.6	2.3	2.9	4.5
Italy	3.9	3.5	3.8	3.7	3.4	2.7	2.3	4.1
United Kingdom	2.5	2.9	3.7	3.4	3.4	2.1	1.8	3.6
Benelux	2.8	3.3	3.4	3.7	2.9	1.7	1.9	3.6
France	2.8	3.2	4.1	3.1	3.3	2.6	2.3	4.5
Western Europe	2.8	3.0	3.8	3.6	3.3	2.3	2.3	4.1

Total Sample = 102 - All MIS/DP Managers.

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

*Average Standard Error = 0.13. The eight issues are the same as those listed in Exhibit V-1.

EXHIBIT V-4

USERS' RATINGS OF TELECOMMUNICATIONS ISSUES (ANALYSED BY ESTABLISHMENT SIZE)

ESTABLISHMENT SIZE	AVERAGE RATING BY ISSUE*							
	1	2	3	4	5	6	7	8
>1,000 Employees	3.1	3.2	4.0	3.9	3.4	2.6	2.6	4.2
500-1,000 Employees	2.8	2.9	4.1	3.3	3.3	2.0	2.0	4.2
<500 Employees	2.5	2.9	3.5	3.3	2.7	1.9	2.0	3.8
All Companies	2.8	3.0	3.8	3.6	3.3	2.3	2.3	4.1

Total Sample = 102 - All MIS/DP Managers.

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

*Average Standard Error = 0.13. The eight issues are the same as those listed in Exhibit V-1.

EXHIBIT V-5

USERS' RATINGS OF TELECOMMUNICATIONS ISSUES
(ANALYSED BY INDUSTRY SECTOR)

INDUSTRY SECTOR	AVERAGE RATING BY ISSUE*							
	1	2	3	4	5	6	7	8
Process Manufacturing	2.7	2.5	4.2	3.5	3.4	2.4	2.6	4.2
Discrete Manufacturing	3.4	4.0	4.4	3.6	3.3	2.8	2.5	4.4
Retail Distribution	2.6	2.7	3.6	2.7	3.0	2.3	2.5	3.8
Banking and Finance	2.8	3.2	3.6	3.4	3.2	2.2	1.8	4.1
Insurance	2.6	3.6	3.8	4.2	3.8	1.8	1.8	3.0
Health Care	3.2	3.0	2.5	3.6	3.2	2.0	2.2	4.8
Government	3.5	3.0	3.0	4.0	4.5	3.3	1.8	4.3
Transport	2.6	3.1	3.8	4.4	2.5	2.3	2.4	4.3
Utilities	2.3	2.8	3.5	3.2	3.2	1.5	2.3	4.2
All Sectors	2.8	3.0	3.8	3.6	3.3	2.3	2.3	4.1

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

*Average Standard Error = 0.13. The eight issues are the same as those listed in Exhibit V-1

is reflected in the almost uniformly high ratings across all industry sectors and establishment sizes.

- In the U.K. and Benelux, this issue was rated with slightly less importance (i.e., 3.6 as against 4.1 for the total sample). To an extent this reflects high levels of commitment by government bodies and manufacturers towards OSI connectivity.
- The generic issue of developing communications networks would appear to be significant in the Italian market only, largely due to the fragmented and relatively immature nature of the telecommunications infrastructure.
- Lack of telecommunications expertise is also most acute for Italian users and, interestingly enough, user organisations in the discrete manufacturing sector. Salary levels in the service sector may well be a factor enabling them to attract and retain scarce telecommunications professionals.
- Developing micro-to-mainframe links remains a relatively serious issue for users in all country markets, especially in larger organisations in the manufacturing sector.
- Developing local area networks is also a key priority for large organisations, especially in Italy and West Germany. It is also interesting to note that both developing local area networks and departmental computer-to-mainframe links were rated highly by users in the government (central and local) and insurance sectors.
- The research also revealed the relatively low degree of importance users place on the issues of integrating voice and data networks and utilising mobile communications. To an extent, this reflects on the immaturity of these technical developments (except perhaps mobile communications in Scandinavia) but also indicates that there is limited latent demand for their use.

B. MARKET PENETRATION AND OPPORTUNITIES

- Exhibits V-6 through V-9 illustrate levels of existing and planned usage of four VADS applications--electronic mail, on-line data base services, electronic funds transfer, and electronic data interchange. The results of INPUT's research have been analysed by country, establishment size, industry sector, and respondent job function in order to reveal potential opportunities for vendors.
- It should be noted, however, that the sample includes users who have developed or are planning to develop VADS applications using in-house as well as external resources. Consequently, statistics of market penetration for E-mail and especially EDI applications are slightly misleading in that they include developments which utilise in-house processing and private and public networks which fall outside INPUT's definition of the VADS market.
- Nevertheless, in-house applications offer significant opportunities for vendors of software products, professional services, and turnkey solutions.

I. ELECTRONIC MAIL

- INPUT's research revealed that E-mail is going through a phase of significant growth. Exhibit V-6 illustrates that 28% of all respondents were planning to utilise an E-mail service within the next 12 months. With a user base of 31%, this represents a growth market of 90% per annum between 1987 and 1988.
- Exhibit V-7 illustrates that although the U.K. is the most mature market in terms of business E-mail (there are currently approximately 150,000 users of independent network services excluding Prestel), it presents the least opportunity for growth.

EXHIBIT V-6

VALUE-ADDED NETWORK AND DATA SERVICES MARKET OPPORTUNITIES (TOTAL SAMPLE - DP AND GENERAL MANAGEMENT)

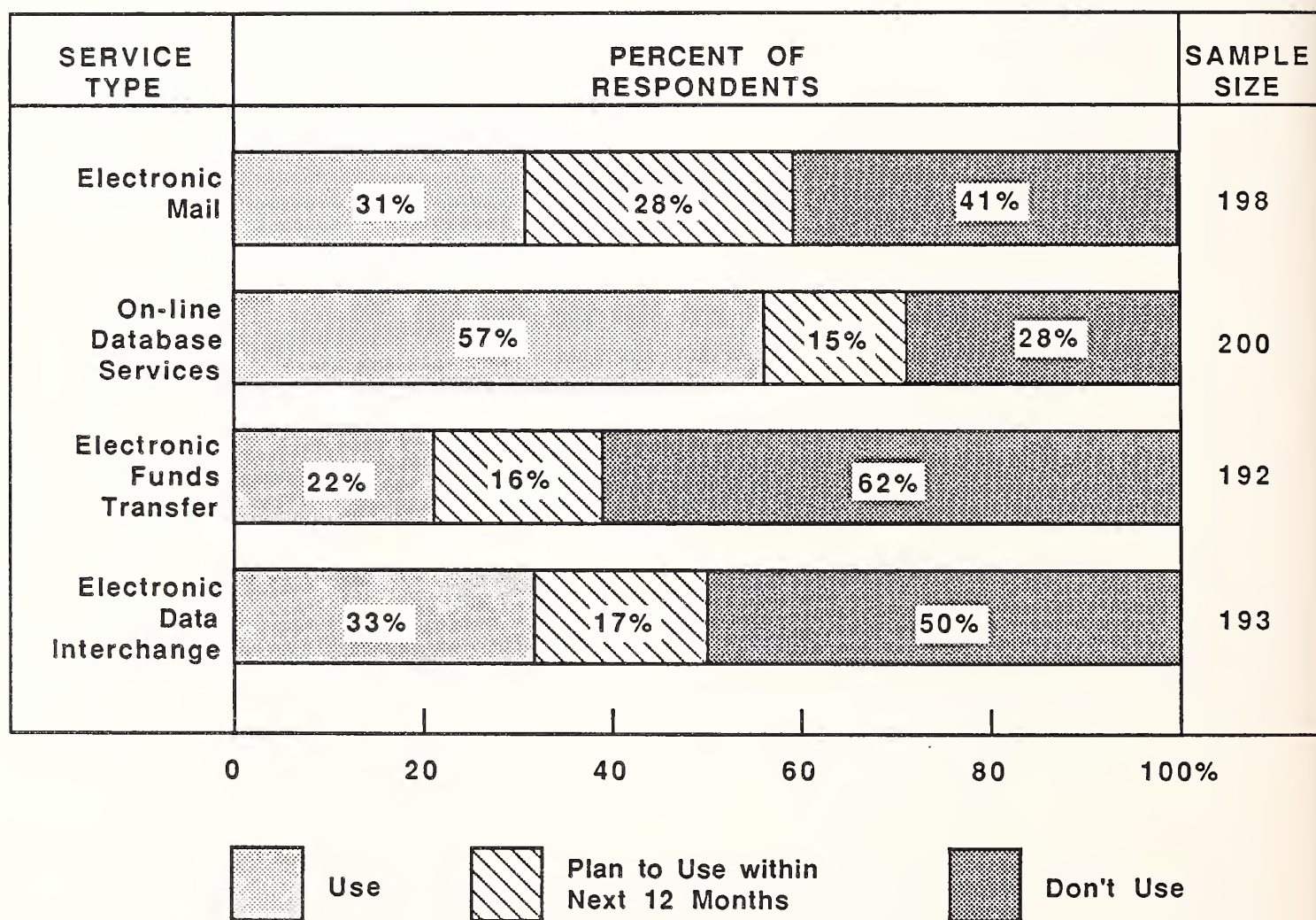


EXHIBIT V-7

**VALUE-ADDED NETWORK AND DATA SERVICES
MARKET OPPORTUNITIES
(ANALYSED BY COUNTRY AND ESTABLISHMENT SIZE)**

CATEGORY OF ANALYSIS	AVERAGE SAMPLE SIZE	Percentage Split - Use, Plan to Use, Do Not Use - for Each VADS Service Type											
		E-MAIL			ON-LINE DATABASE			EFT			EDI		
		U*	P*	D*	U	P	D	U	P	D	U	P	D
<u>Analysis by Country</u>													
France	46	33	40	27	44	20	36	12	14	74	17	10	73
Italy	24	21	25	54	38	21	41	22	13	65	26	0	74
United Kingdom	52	35	12	53	54	10	36	27	16	57	20	20	60
West Germany	49	30	27	43	72	11	17	27	16	57	62	21	17
Benelux	25	20	36	44	76	12	12	12	25	63	29	30	41
Western Europe	196	31	28	41	57	15	28	22	16	62	33	17	50
<u>Analysis by Establishment Size</u>													
>1,000 Employees	84	36	27	37	65	13	22	38	20	42	44	12	44
500-1,000 Employees	52	27	35	38	56	19	25	20	12	68	32	20	48
<500 Employees	60	23	25	52	48	12	40	21	14	65	18	20	62
All Companies	196	31	28	41	57	15	28	22	16	62	33	17	50

*U = Currently Use, P = Plan to Use within 12 Months, D = Do Not Use.

EXHIBIT V-8

VALUE-ADDED NETWORK AND DATA SERVICES
MARKET OPPORTUNITIES
(ANALYSED BY INDUSTRY SECTOR)

INDUSTRY SECTOR	AVERAGE SAMPLE SIZE	Percentage Split - Use, Plan to Use, Do Not Use - for Each VADS Service Type											
		E-MAIL			ON-LINE DATABASE			EFT			EDI		
		U*	P*	D*	U	P	D	U	P	D	U	P	D
Process Manufacturing	29	24	24	52	59	10	31	14	25	61	31	17	52
Discrete Manufacturing	30	32	23	45	41	19	40	13	13	74	25	21	54
Retail Distribution	19	26	16	58	42	21	37	16	11	73	32	5	63
Banking and Finance	45	37	33	30	72	9	19	47	21	32	40	12	48
Insurance	17	33	33	34	61	6	33	12	6	82	35	0	65
Health Care	14	15	54	31	57	14	29	31	8	61	36	29	35
Government	15	43	21	36	88	6	6	27	20	53	33	27	40
Transportation	16	38	13	49	59	18	23	6	13	81	31	25	44
Utilities	11	18	45	37	18	45	37	0	9	91	18	27	55
All Sectors	196	31	28	41	57	15	28	22	16	62	33	17	50

*U = Currently Use, P = Plan to Use within 12 Months, D = Do Not Use.

EXHIBIT V-9

VALUE-ADDED NETWORK AND DATA SERVICES
MARKET OPPORTUNITIES
(ANALYSED BY JOB FUNCTION)

JOB FUNCTION	AVGE SAMPLE SIZE	Percentage split - use, plan to use, do not use - for each VADS service type											
		E-mail			On-line Database			EFT			EDI		
		U*	P*	D*	U	P	D	U	P	D	U	P	D
Production Management	16	24	12	64	66	6	28	7	7	86	53	13	34
Marketing Management	27	32	32	36	56	7	37	22	11	67	15	26	59
Financial Management	26	31	19	50	62	15	23	44	8	48	35	8	57
Senior/General Management	13	31	46	23	62	23	15	31	8	61	54	0	46
Other Middle Management, e.g., Admin. & P.R.	13	25	42	33	92	0	8	17	17	66	31	38	31
Total General Management	95	29	28	43	65	10	25	26	10	64	34	17	49
Data Processing MIS Management	101	32	27	41	50	18	32	18	22	60	31	16	53
All Respondents	196	31	28	41	57	15	28	22	16	62	33	17	50

* U = Currently Use, P = Plan to Use within next 12 months, D = Do Not Use

- Nevertheless, there are significant opportunities to enhance existing E-mail services to offer integrated user solutions, i.e., one-stop shopping for VADS.
- In the U.K. this opportunity is being seized by British Telecom, which is offering gateway access to Telecom Gold for Prestel Mailbox users. Common access to innovative database services such as Hotline, which is targeted at marketing professionals, financial analysts, and small businesses, is a significant development towards this approach as well as creating a 'critical mass' user population.
- Our research indicates that E-mail is poised for significant growth (i.e., 120%) in both France and Italy.
- French market development has been greatly facilitated by the development of the Atlas X.400 messaging service which provides OSI connectivity for E-mail service users and operators.
- INPUT's research also revealed significant growth opportunities in medium-sized establishments with between 500 and 1,000 employees.
- Small establishments also offer significant opportunities for telex substitution. However, this market is becoming increasingly threatened by facsimile owing to falling equipment costs and rising quality.
- Teletex is also becoming more important especially in France and Germany as it is more applicable to structured message formats. Teletex has the additional advantage of being potentially integratable with existing office automation systems.
- INPUT's user research revealed that the financial services sector (i.e., finance, banking, and insurance) still presents significant growth opportunities for E-mail services.

- A further interesting finding was the high rate of planned uptake by organisations in the health care sector (i.e., pharmaceutical companies, chemists, private and public health organisations) where 45% of respondents indicated they would subscribe to an E-mail service in the next 12 months.
- Health care is a typical target E-mail sector where organisations have a strong need to make information quickly available to a large number of outlets. Examples of this include U.K. chemists involved in the UNICEM cycle. The pharmaceutical sector is also a strong target sector. Overall, the sector accounts for 4% of all cash transactions in the world.
- Other examples of key E-mail market opportunities include:
 - Computer dealers and supply companies.
 - Freight forwarding/import and export sector.
 - PR agencies/media/advertising.
 - Journalists.
 - Printing and publishing.
 - Marketing managers.
- Exhibit V-9 illustrates the increasing importance of targeting E-mail services at specific end-user markets packaged alongside industry-specific and role-specific databases.
- INPUT's research revealed significant growth opportunities amongst senior and middle managers in marketing and public relations. It also revealed very significant levels of planned uptake amongst senior and general managers. Forty-six percent of general managers indicated that they intend to use an E-mail service in the next 12 months.

2. ON-LINE DATABASE SERVICES

- INPUT's user research revealed that on-line database is the most mature of the applications covered, and the dynamics affecting its development are the best understood in the industry. Exhibit V-6 illustrates that 57% of all respondents already use on-line database with only 15% planning to use a service. This research confirms industry expectations of market growth of approximately 25% per annum.
- Exhibit V-7 illustrates that France and Italy offer the most significant growth opportunities. A significant factor here will be liberalisation in the finance and banking sectors which will offer significant opportunities for vendors of real-time financial information systems.
- The research also reveals significant planned uptake of on-line database services in medium-sized organisations and establishments.
- Exhibit V-8 illustrates that financial services is the most saturated market for on-line database services. Nevertheless, they still provide strong growth opportunities for vendors to leverage revenue from an existing customer base by offering enhanced services. A key element here is to offer transaction services, e.g., the Reuters Monitor Order Entry Service, and interactive services which permit local modeling and integration with other in-house management information systems and information services.
- Exhibit V-8 reveals that there are significant growth opportunities for on-line database in the retail distribution, health care, and transportation sectors.
- The critical success factor in on-line database marketing is that the packaging is more important than the content. For the retail distribution sector there are opportunities for integrated databases of market research data linked to decision support systems for brand performance modeling and forecasting.

- In the health care sector there are opportunities for specific databases which can be used for marketing initiatives, e.g., the CAS database.
- Exhibit V-9 also indicates high levels of planned uptake by senior/general managers. For this target audience, the key requirement is easy access to specific information on an ad hoc basis, i.e., low volume/high value, export markets, companies, and people.
- Strategic directions for on-line database services are covered in more detail in Chapter VII of this report.

3. ELECTRONIC FUNDS TRANSFER

- INPUT's user research revealed that EFT is the most immature of the VADS applications surveyed. Exhibit V-6 illustrates that market penetration is low at 22% and significantly less outside the finance and banking sectors.
- Nevertheless, the area presents significant growth opportunities, and, overall, the research reveals market growth of approximately 75% per annum.
- Exhibit V-7 illustrates that France and the Benelux countries are the strongest growth markets. France is the most mature market in Europe in terms of adoption of authorisation systems and is rapidly entering the phase of linking authorisation with payment systems via the issue of the GIE Carte a Memoire (Smart Card) which removes some of the problems of expensive networking and security. Two million GIE cards will be distributed in 1987.
- In the United Kingdom and West Germany, the growth of EFT and EFT/POS is inhibited by conflicts of commercial interest between the retail banks, credit card companies, and retailers; essentially, 'the battle for power at the point of sale'.

- It is interesting to note that EFT/POS has been more rapidly developed in Belgium and the U.S. where projects have been retailer driven.
- Exhibit V-8 illustrates significant growth opportunities for EFT in the process manufacturing, transportation and, interestingly, in the public sector.
- In process manufacturing, the key opportunity is linking authorisation with payment systems for the petrochemical companies in their retail outlets. This will lead to significant growth in offline EFT/POS services.
- The transportation sector, especially the import/export sector, has a great deal to gain from EFT implementation. The major opportunity is to link EFT with other interactive, transaction-based applications such as EDI.
- Sectoral growth predictions are also heavily influenced by the usage of interbank settlement systems such as SWIFT II and the development of on-line ATM networks, for example, the joint Barclays, Lloyds, Bank of Scotland, and Royal Bank of Scotland network in the U.K.
- Also in the U.K., there is considerable uptake in usage of the Banks Automated Clearing Service (BACS) which handles transactions totaling in excess of \$2 billion per day.
- It is interesting to note that the response from organisations in the retail sector does not indicate the explosive growth in EFT/POS as would appear from the considerable hype the area has been given in the press.
- For example, in the U.K. market development is inhibited by the following factors:
 - Less than 2,000 operational EFT/POS terminals.
 - High cost of terminals and networking.

- Consumer preference for cash/cheques and deferred payment.
 - Retailers' priorities to install EPOS prior to EFT/POS and focus on developments to automate stock control, accounting, and management information systems.
 - Concern over security.
 - Lack of agreed standards for messaging and network interfacing.
 - User confusion with fragmented development of services and pilot schemes.
- However, INPUT believes that this is an area of significant opportunity especially for vendors of software products and professional services.
 - Developments in EFT and EFT/POS are discussed in more detail in Chapter VII of this report.

4. ELECTRONIC DATA INTERCHANGE (EDI)

- Exhibit V-6 illustrates that EDI is also a relatively immature market. The overall penetration rate of 33% is somewhat misleading in that it includes EDI implementations on private networks and in-house developments by large innovative users. The market penetration rate for vendors of third-party VADS clearinghouse services is closer to 25%.
- With reference to Exhibit V-8, this phenomenon is most pronounced in the highly regulated West German environment where EDI has become a virtually generic method of business communications implemented via leased lines, PSTN, and the DATEX-P network.

- INPUT's research indicates that the U.K. and the Benelux countries are poised for significant growth, i.e., approximately 100% per annum.
- France is the least mature of the European markets for EDI, and it is anticipated that significant growth will not appear before 1988. The immaturity of the French market is a consequence of several factors:
 - Lack of user awareness of benefits of EDI.
 - Lack of agreement over document standards.
 - Fragmented structure of French industry, e.g., retailing and distribution.
 - Lack of strong government initiative to promote its development.
- INPUT's research also reveals significant growth opportunities in medium- and small-sized establishments. To an extent, this is a reflection of large organisations linking all their key suppliers into a trading cluster. Also, it is a reflection of smaller organisations seizing the competitive advantage opportunities which EDI offers.
- Exhibit V-8 illustrates that EDI has developed from its roots in the automotive and retailing sectors as a cross-industry phenomenon. This development is inevitable as EDI development follows the complex, natural trading links in an economy.
- Consequently, there are considerable opportunities across all sectors. Areas of particular focus are:
 - Pharmaceuticals and health care.
 - Petrochemicals.

- White goods.
 - DIY retailers.
 - Mail order.
 - Leisure industry (e.g., records and sports goods).
 - Distribution.
 - Local government.
 - Public utilities.
 - Electronic components.
 - Financial services.
 - Transportation, especially international trade.
- Exhibit V-9 illustrates a high proportion of senior marketing managers whose organisations are planning to implement EDI. This research finding illustrates that marketing departments are a key element driving the development of EDI internally and must be a key focus for vendor promotional initiatives.
 - As EDI has significant repercussions in terms of how a company manages its operations, it is vital that all commercial departments are aware of its benefits and implications.
 - Market opportunities for EDI services emerge in terms of two development phases:

- Phase I - develop critical mass of participants in a trade cluster to ensure adequate differentiation and self-perpetuating growth.
- Phase II - Develop profitability of trade cluster, i.e., develop up the value-added chain from offering a commodity EDI service such as offering interactive database services and meeting additional requirements for information dissemination.
- INPUT's report European EDI Market Opportunities and EDI Planning Service (EDIPS) give a continuous review of market developments as well as strategic directions for participants.

C. BENEFITS OF VADS - USER NEEDS

- Exhibits V-10 and V-11 illustrate the most frequently mentioned user responses relating to their perception of the benefits of externally sourced VADS services.
- The research measures attitudes in terms of two perspectives; the data processing perspective and the general/commercial management perspective.
- It is interesting to note that there are marked similarities between the results. To some degree, this reflects the evolution of data processing as a mission critical corporate function within many organisations and increasing awareness amongst data processing professional of meeting commercial objectives.
- However, two points are worth noting. Firstly, our general managers placed more emphasis on commercial benefits such as efficiency and customer service rather than cost, and it should be these benefits that are central to any vendor's promotional campaigns. Secondly, strong emphasis was placed on

EXHIBIT V-10

**MIS/DP MANAGERMENTS' PERCEPTION OF
BENEFITS OF EXTERNAL NETWORK SERVICES***

- **Faster Information Access**
- **Cost Savings**
- **Up-to-date Information**
- **Improved Customer Service**
- **Critical Mass of Participants**
- **Reliability**
- **Delegation of Responsibility**
- **Faster Service for Users**
- **Ease of Use**
- **Improved Geographical Coverage**

*The ten most frequently mentioned responses
ranked in order of number of mentions.

EXHIBIT V-11

**GENERAL/MIDDLE MANAGERMENTS' PERCEPTION
OF BENEFITS OF EXTERNAL NETWORK SERVICES***

- **Fast Information Access**
- **Quality of Information**
- **Better Customer Service**
- **Enhanced Efficiency**
- **Closer Communications
with Trading Partners**
- **Large Number of Participants**
- **Cost-Effective**
- **Gaining Experience**
- **Reduction of Paperwork**
- **Ease of Use**

*The ten most frequently mentioned responses
ranked in order of number of mentions.

the importance of critical mass and information quality. This highlights a strong need for vendors to build market share via organic growth, interlinking, and joint venture. It also points to the need to offer integrated seamless VADS solutions for messaging and information requirements.

1. STRUCTURE OF VADS USERS

- Users of VADS technology can be broadly classified into three groups:
 - Strategic Innovators--these organisations are market leaders in an industry sector and adopt VADS technology as an element of their thrust to obtain long-term competitive advantage, for example, ICI and Philips.
 - Operational Followers--these organisations are market followers in an industry sector and adopt VADS technology as a means of survival, i.e., maintaining competitive position, for example, organisations directly linked to EDI cluster controllers.
 - Opportunistic Followers--these organisations have adopted VADS technology as a means of gaining experience and evaluating alternative options for developing business communications facilities. These organisations are generally highly cost conscious, for example, Trusthouse Forte in the EFT/POS field.
- All three of these groups were represented in INPUT's research, and the stratification is reflected in our summary responses.

2. SUCCESSFUL APPLICATION OF VADS

- In general, VADS are successful and profitable in those areas where their application is seen as being critical to an organisation's *modus operandi*.

- However, it is possible to highlight several strategic management objectives which have led organisations to utilise VADS:
 - Market/network positioning, i.e., linking participants in a distribution chain, for example, records, fashion, computers, and agriculture.
 - Product differentiation/stability, i.e., the ability of travel operators to offer special deals and comprehensive services.
 - Customer penetration/capture, i.e., the ability of EDI participants to move towards Just-in-Time inventory.
 - Supplier tradeoff/optimisation, e.g., continuous supply assurance from key suppliers with EDI.
 - Risk Resilience/efficiency, e.g., retailers reducing administrative overhead and fraud via EFT/POS.
- For the VADS market to prosper it is essential that users are familiar with the benefits of their application to meet strategic management objectives. In too many organisations, computer services are perceived as an unacceptable risk and cost item. It is vital that VADS vendors position their services as business efficiency and expansion facilities emphasising the strategic implications of their use.

D. DRAWBACKS OF VADS - USER CONCERNS

- Exhibits V-12 and V-13 illustrate the most frequently mentioned user responses relating to their perception of the drawbacks associated with externally sourced VADS.

EXHIBIT V-12

**MIS/DP MANAGERMENTS' PERCEPTION OF
DRAWBACKS OF EXTERNAL NETWORK SERVICES***

- Security
- Cost
- Connectivity/Lack of Standards
- Dependency
- Complexity
- Compatability
- Insufficient Number of Participants
- Reliability
- Control Risk
- Implementation Support

*The ten most frequently mentioned responses
ranked in order of number of mentions.

EXHIBIT V-13

GENERAL/MIDDLE MANAGERMENTS' PERCEPTION
OF DRAWBACKS OF EXTERNAL NETWORK SERVICES*

- Ease of Use
- Cost
- Implementation Support
- Lack of Critical Mass of Participants
- Reliability
- Security
- Accuracy
- Dependency
- Control
- Compatibility

*The ten most frequently mentioned responses
ranked in order of number of mentions.

- To an extent the responses mirror those given as benefits, and vendors familiar with the perennial 'make or buy' decision will be aware of a standard pattern of response.
- Although there is a high degree of similarity in the responses given by MIS/DP managers and general managers, there are some marked differences in emphasis which are worth noting.
- Two of the general managers' principal concerns were ease of use and implementation support. This points to the need for product evaluation by VADS vendors and the need to differentiate on the basis of service.
- For on-line database and E-mail vendors, this means enhancing facilities for the end user to include cost-effective expert system interfaces--simple keyword access, voice controlled system interfaces, training, and installation support.
- For EDI and EFT vendors, this means offering turnkey solutions and comprehensive installation, support, authorization, and consultancy services.
- Security and reliability also emerged as strong user concerns. These issues are particularly critical in EFT and EDI applications where transactions are completed on the basis of 'my byte is my bond'. Successful vendors are offering encryption, audit trails, electronic signature features, and fingerprint authorisation facilities in order to reassure users over this concern.
- However, there is a tradeoff between the adoption of these enhanced VADS features (which are technically available and not difficult to implement) and users' concerns over cost.
- The issue of price was rated highly by both MIS/DP managers and general managers. This similarity reflects the trend towards managing data processing departments under the same financial controls and budget constraints as other commercial departments.

- Markets for E-mail, on-line database, and EDI services are highly price competitive which emphasises the need to compete on the basis of quality and service.
- Other user comments highlighted the fragility of immature, weakly differentiated VADS offerings:
 - 'It is not relevant to our needs in terms of providing information that is critical to manage the business'.
 - 'The service is bought for prestige reasons; there is no relation between cost and benefits'.
- Dependency was a further significant drawback cited by respondents. In the words of one user 'your life is in their hands'. To an extent, this problem is ameliorated by allowing users to experience the benefits of VADS in pilot schemes which allow an assessment of service resilience as well as the benefits and implications to established working practices.
- Connectivity and critical mass are also key user concerns. For example, potential EDI users in the U.K. automotive industry have potentially three networks to choose from, i.e., Istel's EDICT service, INS's MOTONET service, and FORDNET.
- Similarly, E-mail development has been hampered by national boundaries, regulations, and the proliferation of vendor services.
- Problems in connectivity can be summed up in the words of one user, '...one key requirement is a service that provides a single interface with any external contact regardless of route which is robust, secure, and offers high functionality'.

- To an extent these problems are being ameliorated via network interlinking, for example, in the U.K. between Telecom Gold and Fastrak and between INS's DISH project and IBM's Shipnet service customers.
- In addition, common acceptance of X.400 electronic messaging standards is providing opportunities for gateways between private and public messaging and E-mail systems.
- In the EDI arena, growth has been severely hampered by the lack of agreed standards at a document level. However, moves towards common acceptance of the EDI FACT international standards will greatly ameliorate this problem.
- Nevertheless, connectivity and compatibility are likely to remain as serious user issues not the least because vendors are keen to maintain the exclusivity of their users and the high costs of network connection.
- The next chapter reviews the impact of related VADS technologies such as ISDN, mobile communications, and satellite.

VI IMPACT OF RELATED TECHNOLOGIES

VI IMPACT OF RELATED TECHNOLOGIES

A. INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

I. OVERVIEW

- The criticality in the development of technology and applications between the computer and communications industries is perhaps best shown in the development of the integrated services digital network (ISDN) which is evolving from the public-switched telephone network (PSTN) and a step towards the achievement of a universal information services network (UISN).
- ISDN is initially targeted towards large high-volume users and will allow access to a broad spectrum of voice, data, text, and image communications services over a single network connection.
- Initial commercial services planned for 1988 will use the CCITT-defined primary rate access method. It provides 2Mbps transmission in Europe (1.5Mbps in North America) with a bandwidth split into either 23 or 30 user channels of 64 Kbps plus a single 64Kbps signalling and user packet data channel.
- Basic access uses ordinary twisted pair PSTN circuits to carry two 64 Kbps user channels and a 16Kbps signalling and user packet data channel.

- There are already extensive trials taking place in West Germany, the U.K., Japan, and the U.S. Basic trials have been conducted in Italy, and the French (who have an advanced telecommunications infrastructure) will start trials with Project Renan in 1988. The U.S.-based satellite organisation, INTELSTAT, is planning to use satellites to bring ISDN to the rest of the world by 1995.

- Exhibit VI-1 illustrates a timetable for the introduction of ISDN.

2. EUROPEAN CONSENSUS?

- The EEC has taken a proactive role in developing a technology-federated Europe and a common strategy for introducing ISDN. The Research and Development in Advanced Communications Technologies in Europe (RACE) programme intends to build a pan-European framework for an ISDN-based integrated broadband communications network by the early 1990s.
- There is awareness amongst the 12 EEC states for common implementation of ISDN, but the realisation of this goal depends on a great deal of goodwill. At the very least, the lack of common standards will lead to the emergence of country and vendor-specific implementations.
- Nevertheless, the consensus is being driven by the needs of large multinational companies who have experienced the following problems with international networking:
 - Long delays for transborder leased lines.
 - Exorbitant and illogical tariffs.
 - Equipment attachment difficulties.
 - Poor coordination between PTTs.
 - Incompatibility of European X.25 networks.

EXHIBIT VI-1

INTRODUCING ISDN

COUNTRY/ OPERATOR	TRIALS	COMMERCIAL SERVICE
France	1988 - 1990	1990
United Kingdom	1985 - 1986	1987
West Germany	1986 - 1988	1988
Italy	1981 - 1987	1988
Japan	1984 - 1987	1988
U.S.		
- Local RBOCs	1986-1988	1988
- AT&T	None	1987
- MCI	None	1987

- Although these problems present an opportunity for third-party service vendors, they also pose a threat as the major public telecommunications operators seek to jealously protect their data traffic revenues via ISDN implementation.

3. WHY ISDN?

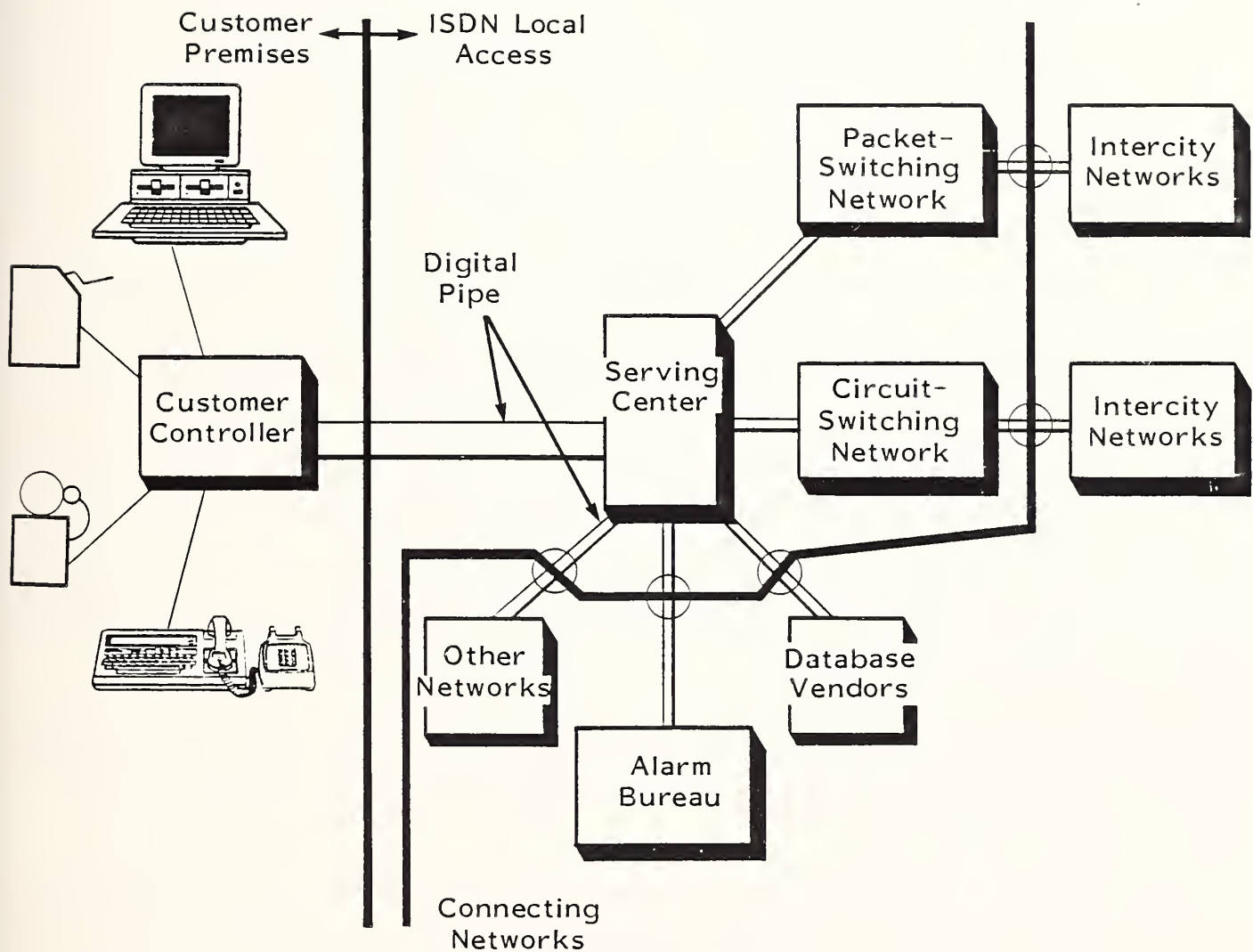
a. Benefits

- Currently, users employ a variety of networks for voice and data requirements each having different access schemes and problems associated with managing multiple links.
- ISDN will be easier to use and manage, the requirement for different interfaces, terminals, and networks for multiple connection reduced, reliability increased via digital transmission and scale economies realised by service integration.
- Exhibit VI-2 illustrates the concept of an ISDN network where users will have a digital pipe and may select a variety of services and bandwidths.

b. Problems

- The current standards for ISDN are incomplete and users will be faced with confusing vendor selection decisions as vendor/country implementations emerge. It is envisaged that a public networking standard will emerge by 1988 and a private standard by 1995.
- Other problems include the high costs of attachment equipment and the general lack of terminal products able to take advantage of the extended services.

CONCEPT ILLUSTRATION OF AN ISDN NETWORK



- A major factor inhibiting development is users' reluctance to commit to long-term investments in a relatively unproven technology.

c. Forecast

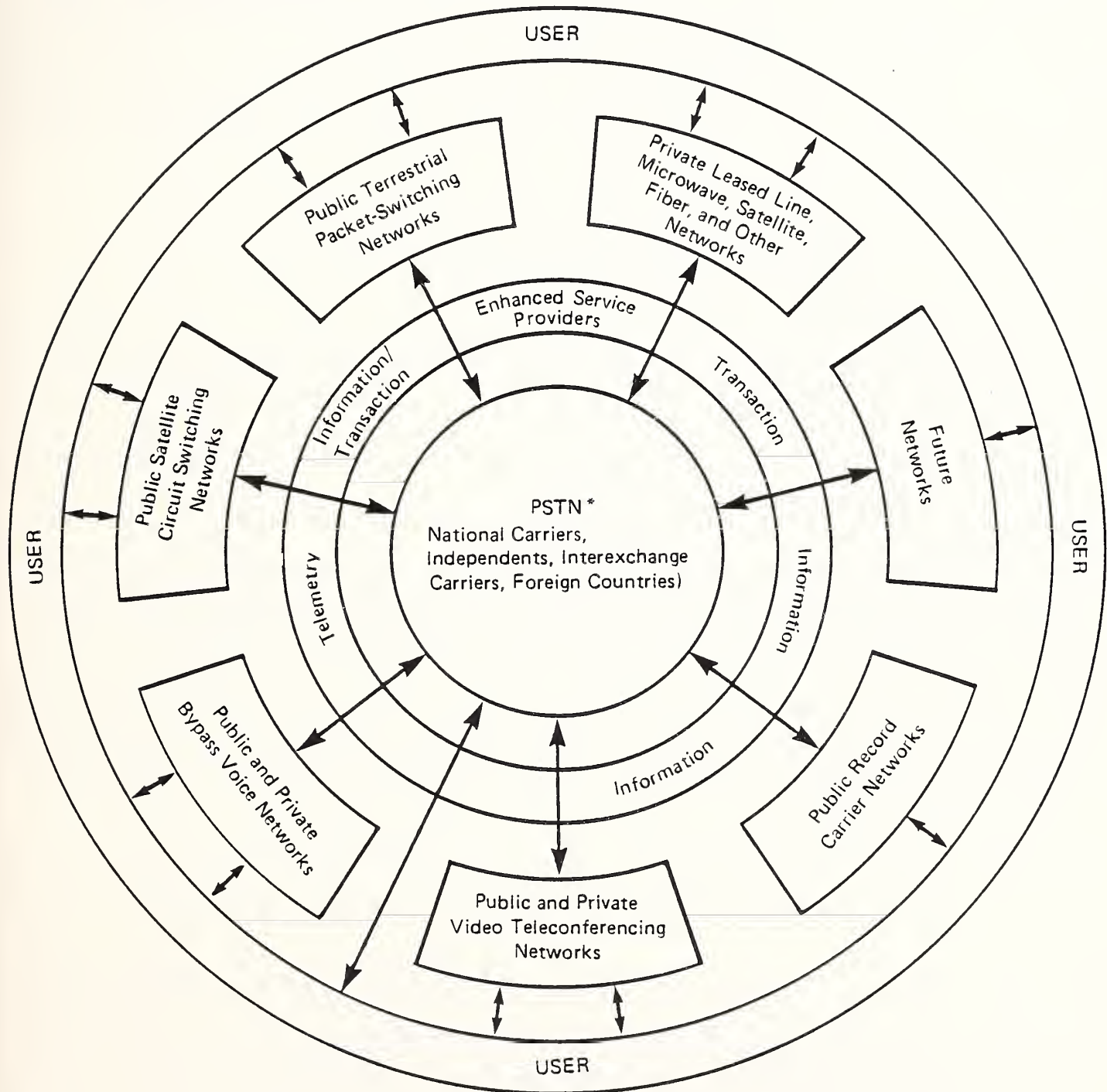
- Despite the problems highlighted above, INPUT believes that ISDN provides cost-effective solutions to many users' communications problems. INPUT forecasts that by 1991 the number of primary rate user connections to ISDN will have grown to 15,000 in Europe and to over 40,000 in the U.S., which amounts to 50% of businesses with large PBXs supporting over 100 extensions.

4. ISDN APPLICATIONS AND OPPORTUNITIES

- Exhibit VI-3 depicts a likely scenario for the distribution of ISDN services.
- The centre ring is the PSTN through which most ISDN traffic will be routed.
- The second ring represents the enhanced services providers who will typically use the basic service carriers to transmit value-added services to users.
- The third ring incorporates basic service suppliers delivering subscribed information to users.
- Finally, the user is shown encompassing the entire ISDN. Users have the purchasing power to determine the viability of all other elements.
- The Groupe d'Analyse et de Prevision (GAP) recommendations highlighted two phases in the development of ISDN applications. During Phase I (until 1989), four basic applications will be made available on a 64 KBts/s circuit-switched B channel. These are 3.1 KHZ telephony (voice), CCITT Group IV facsimile transmission, teletex (2.4 KBts/s version), and mixed mode teletex and facsimile transmission service capability.

EXHIBIT VI-3

ISDN DISTRIBUTION SERVICES



* PSTN = Public Switched Telephone Network

- During Phase II (1989-1993) there will be a packet bearer service on the 16KBts/s ISDN D channel and further services on the B channel. These are 8 KHZ telephony, audio conferencing, alpha-geometric videotex, and image transmission.
- There are a wide range of potential applications especially when ISDN is extended to smaller business users and residential subscribers when the installation of digital exchanges is complete. Other applications could indicate telemetry for remote meter reading, energy management, and security functions.

5. VENDOR STRATEGIES AND IMPLICATIONS

- When ISDN becomes a reality, the impact will be felt by the existing X.25 networks. ISDN implies universal data, voice, and video communications.
- The full impact of this change is, however, exacerbated by the stalling factors of lack of standards and consensus.
- Nevertheless, it is important for vendors to establish a position with regard to ISDN and develop services which can utilise the new adaptive technology.
- It is recommended that vendors coopt rather than resist the technology and develop enhanced VADS directed towards specific needs and vertical market applications.
- ISDN presents many organisations, large and small, with the opportunity to develop new application services and enhance existing services.
- IBM, for example, has realised the potential of adaptive technology and launched a suite of voice/data interconnection products. Data compression techniques are used to enable users to transmit voice and data via a single 64 KBts/s digital link, thus saving leased line costs. However, this potential

ISDN alternative is seen as a measure to protect their vested interest in SNA architecture.

B. PERSONAL/MOBILE COMMUNICATIONS

1. MARKET OVERVIEW AND FORECAST

- Exhibits VI-4 and VI-5 provide a breakdown of the installed base of European cellular phone users and a forecast of the overall cellular market which encompasses wide area paging, private mobile radio, and cellular.
- Mobile communications is the fastest growing element of the telecommunications sector. Use of all forms of mobile communications in Western Europe is growing by 40% per annum.
- The installed base of cellular phones is currently about 0.5 million and growing at a rate of about 30% per annum. Penetration is highest amongst users of the Nordic mobile telephone network, closely followed by the U.K. whose users are serviced by the duopoly of CELLNET (BT and Secorior) and Racal Vodaphone.
- Wide area paging is also growing at about 25% per annum. Private mobile radio (PMR) will show much lower growth, about 5% per annum. Because of the high installed base (approximately three million), there is little scope for expansion.

2. MARKET DEVELOPMENT

- The market potential for mobile communications is vast. For example, a survey revealed that British executives spend an average 7.7 hours a week moving about on business. The total market has been estimated at 15% of the working population.

EXHIBIT VI-4

CELLULAR PHONE USERS IN EUROPE, 1986

COUNTRY	TOTAL NUMBER OF USERS (Thousands)	NUMBER OF USERS PER 1,000 INHABITANTS
Norway	96	22.9
Sweden	124	14.8
Denmark	63	12.1
Finland	54	11.3
Austria	20	2.6
United Kingdom	146	2.6
Netherlands	15	1.0
West Germany	25	0.4
France*	13	0.2
Spain	2	0.1

*Quasi-Cellular

EXHIBIT VI-5

EUROPEAN CELLULAR MARKET FORECAST, 1986-1995

MARKET	INSTALLED BASE (Thousands)			
	1986	1988	1990	1995
Wide Area Paging	1,035	1,530	2,075	3,265
Private Mobile Radio	3,120	3,415	3,725	4,490
Cellular (and Radio Phone)	605	1,085	1,670	3,310

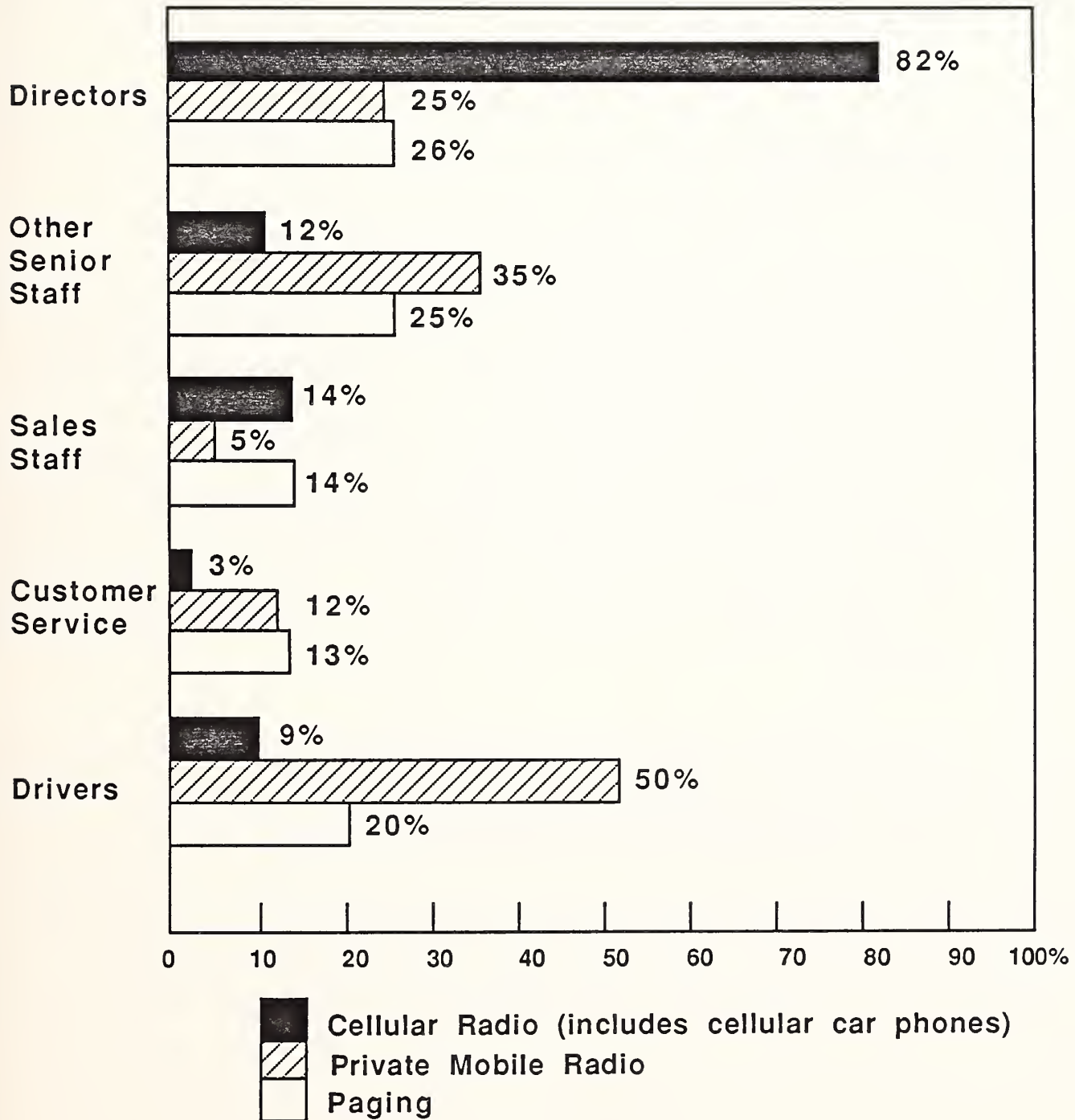
- Exhibit VI-6 illustrates the penetration of mobile communications services by type of worker among existing users.
- Cellular use is spreading from self-employed businessmen and board members to middle managers, sales, maintenance, and distribution operatives.
- The market amongst larger organisations is also expanding; for example, VODAPHONE's current user base is split 70:30 between small and large companies. In 1990 the ratio will be 20:80.
- A common theme among mobile communications companies is that value-added services will be their most profitable growth area in the future with such services as the voice mailbox service VOICEBANK linked to the BT CELLNET service.
- Other opportunities include linking to services provided on VADS vendor networks such as diagnostics databases or videotex applications such as sales order entry.

3. NETWORK DEVELOPMENT

- The EEC's objective of creating a pan-European digital cellular system by 1991 has been temporarily thwarted by the lack of an agreement on a common interface standard.
- France and West Germany have opted for a wideband solution while the U.K. and the other 12 countries involved in CEPT's GSM Committee prefer a narrowband transitional solution to cope with immediate pressures of rising demand especially for international connectivity and data transmission.
- The French who currently have only a small cellular user base (13,000) are introducing a new analogue system in 1988 and as a consequence want to delay

EXHIBIT VI-6

PENETRATION OF MOBILE COMMUNICATIONS SERVICES BY TYPE OF WORKER*



*Penetration is analyzed in terms of existing user companies only.

its switch over to a European digital service. The U.K., however, is continuing to invest in providing a narrowband network.

- Rising demand has also put pressure on governments to liberate frequencies earmarked for a pan-European service.
- Mobile communications could well prove to be a significant test case for ambitious plans to create a technologically federalised Europe which could have repercussions in other areas, for example, ISDN and managed data networks.

C. DATACASTING

- Datacasting is a development of teletext (sometimes called broadcast videotex). Data is distributed via the vertical blanking interval (VBI), i.e., the unviewed section of a television signal between frames of the visual image.
- In the U.K. the BBC has launched a datacast service and offers some interesting possibilities for such organisations that have to deliver updated information on a continuous basis throughout the day as the Stock Exchange and other financial information providers. Other potential users are commodity dealers, bookmakers, credit card companies, and emergency services.
- A major market inhibitor is the need for a special decoder attached to the receiver and charging on a prepaid subscription basis. This may well prevent growth of applications such as telesoftware distribution.

D. SATELLITE COMMUNICATIONS

- Satellites can be regarded not so much as a delivery vehicle but as a component part of a delivery vehicle.
- The main development interest in Europe is to generate revenues from new TV channels heavily subsidised by advertising. With this aim the French plan to launch a PBS satellite TDF-1 and the Germans a TV-SAT during 1987.
- Luxembourg's Societe Europeenne des Satellites (SES) plans to launch the satellite ASTRA in 1988 which could be received by 47% of homes in France, the U.K., and West Germany with a 60 CM dish. Technological developments have meant that the satellite only uses 45 watts of power.
- The development of satellite services has effectively provided operators and franchise holders with a licence to lose money. The viability of the delayed U.K. DBS project depends on the availability of low-cost receiving equipment and rapid market penetration, i.e., 10% of homes within five years. Quality of programmes and services is the critical success factor.

E. OPTIC FIBRE

- Delays in the development of satellite technology which still means that international satellite voice traffic is plagued with echoes and delays would potentially lead to them being superceded by optic fibre.
- The first transatlantic optic fibre cable will be layed in 1988 and four additional cables will be in operation by 1992. The benefit of optic fibre is that voice and data can be transmitted at much greater levels of security.

- Satellite systems are more efficient for broadcast or multipoint applications, e.g., audioconferencing. However, with rapidly falling costs optic fibre poses a real challenge.

F. CABLE

- This technology is designed for the delivery of sophisticated multimedia services accessible in both broadcast and interactive modes. Originally, it was cast in the role of the chief delivery vehicle of future interactive services at a local level. However, development has been slow and unprofitable.
- For example, Westminster Cable has only 4,000 subscribers towards the 15,000 it needs to break even, and interactive services such as 'dinner at your door' are still only experimental. Other proposed interactive services include access to interactive videodisk.
- Cable and satellite companies are competing head on against high-quality broadcast services at a higher price for viewers and at substantial risks for operators. The cultural climate is changing in Europe towards the use of interactive consumer services, but the cost/need equation requires careful monitoring.

G. FACSIMILE (FAX)

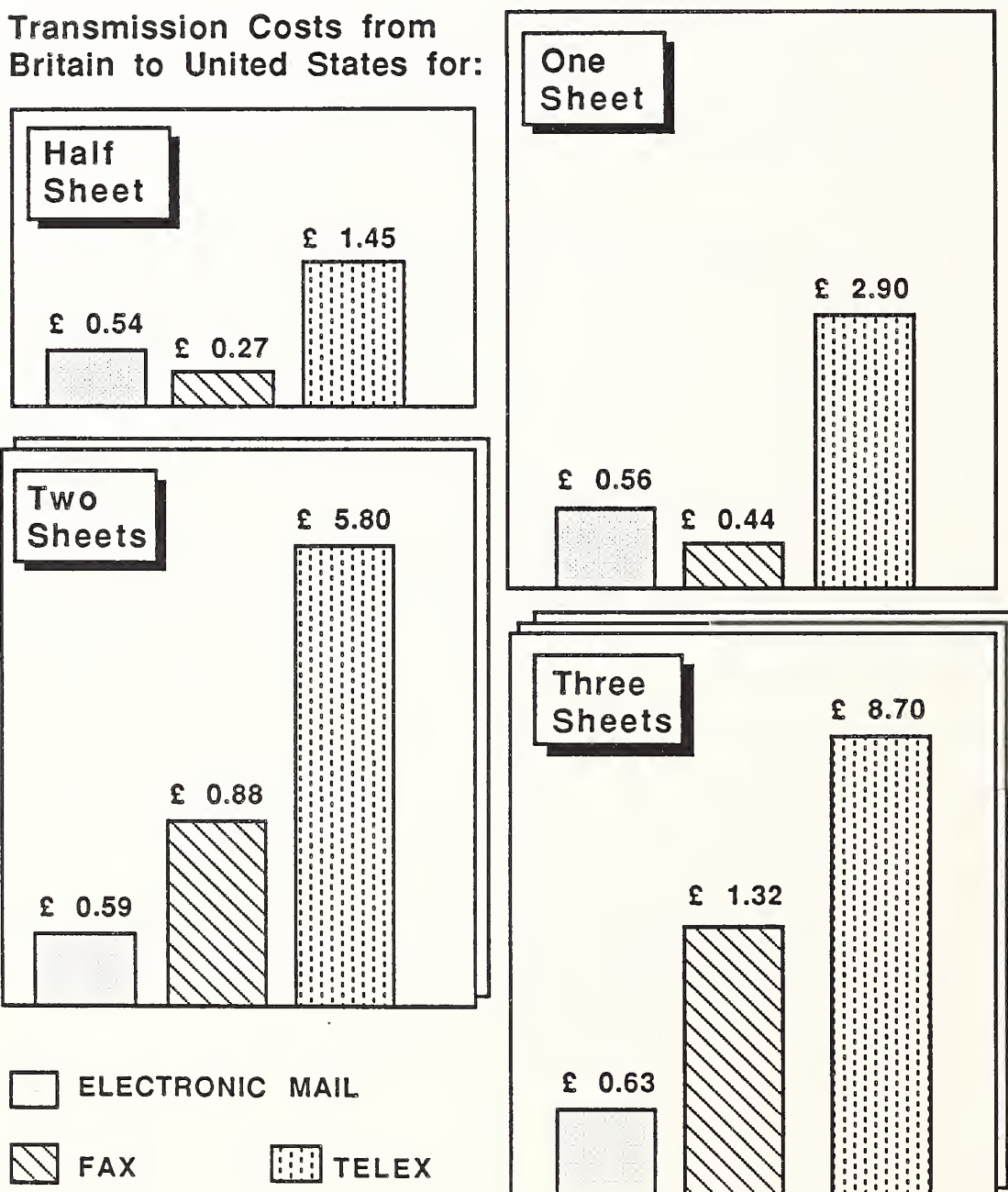
- Facsimile (FAX) and E-mail are racing each other to replace telex. About 1.5 million FAX machines are installed worldwide with about 270,000 in Western Europe. It is anticipated that this growth will continue with European FAX shipments doubling from approximately 100,000 per annum in 1986 to over 200,000 in 1991.

- The telex market, although initially stimulated by E-mail growth is anticipated to grow slowly at 3% per annum from approximately 700,000 systems in 1986 to 850,000 by 1992. Facsimile will have superseded telex by the end of the forecast period.
- Facsimile is the simplest and fastest of all electronic media and has the advantage of being able to handle a wide variety of documents--text, graphics, and signatures. The market is also being driven by the establishment of standards and rapidly falling equipment costs with enhanced features such as error correction and auto retransmission.
- The advent of the ISDN will mean that FAX transmission will be high resolution and error free. Colour images would also be transmitted.
- Exhibit VI-7 illustrates that electronic mail is cheaper than FAX if more than one sheet of information is sent via a packet-switching network. E-mail also has the advantage of being able to be edited directly.
- This difficulty has, however, been negated by the development of PC-based OCR scanners which are currently mainly used as part of desktop publishing systems.
- Ingenious technologists may well develop a machine that combines telephone, FAX, printers, scanner, and photocopier--a Japanese pipe dream, perhaps.
- There is, however, an opportunity for European suppliers to develop a workstation which offers multifunctional distributed FAX and mixed mode teletex transmission facilities.

EXHIBIT VI-7

COMPARISON OF TRANSMISSION COSTS FAX, TELEX, AND ELECTRONIC MAIL

Transmission Costs from
Britain to United States for:



Source: British Telecom

H. VIDEO CONFERENCING

- Videoconferencing (meetings by TV) is an increasingly attractive solution to the problems of time consuming, expensive, and physically demanding travel which can halt production lines and stall product development.
- For large development projects in the computer services industry, videoconferencing is an ideal way of monitoring project schedules and specification changes.
- Uptake of videoconferencing in Europe has been inhibited by high costs as it requires high-capacity data links and studios with expensive hardware.
- In addition, managers fear the loss of one of their jealously guarded perks.
- However, the market is being developed by the use of timesharing services such as CONFRAVISION and INTERNET in the U.K. In addition, low cost turnkey systems have been developed for internal use, for example, Datapoint's MINX.
- Videoconferencing is not dissimilar to FAX which was unsuccessful for the first five years of its product life. By 1995, videoconferencing will be commonplace in medium-sized and small companies.

I. OPTICAL STORAGE MEDIA

- The main optical storage medium to impact upon the services industry is CD ROM. CD ROM will have the impact of making possible personal, distributed storage systems in the same way that the PC has made personal distributed processing a reality.

- The main impact of CD ROM has been felt by the electronic publishing industry. However, its impact has been as much to create opportunities as well as to pose a threat; for example, storage costs for data archives are greatly reduced and opportunities are opened for the creation of new CD ROM disk-based information services.
- Barriers to effective market penetration include lack of standards for hardware and software and inevitably high costs associated with a new technology.
- CD ROM is most suited to applications that require multimedia information dissemination; i.e., combining CD ROM's audio and visual storage capabilities as well as plain text/data storage capabilities.
- To isolate CD ROM application opportunities, a number of criteria can be applied that pertain to characteristics of information to be processed. Firstly, the application must be largely dependent on the content of the information and its comprehensiveness. Secondly, the application should not be time sensitive.
- An application that fits these general guidelines would be the currently paper-based EXTEL card index system for financial information on companies. Telesoftware distribution is also a possibility.
- CD ROM is an exciting marketing and communications tool and provides real opportunities for organisations that are required to disseminate large volumes of semipermanent information to large numbers of users; for example, drug manufacturers.
- The technology is also advancing from the first generation CD ROM systems which are read only based on PCs to a new generation CD-I (compact disk interactive) which allow interaction between sound, text, and pictures.

- Optical storage is also becoming portable. For example, British Telecom is trialling the Recall Card under an agreement with Dexler in the U.S. The Recall Card can hold 800 pages of text on a credit card-sized piece of encoded plastic. Health care, financial services, and security are potential application areas.
- The next chapter reviews application trends in VADS-related markets such as on-line database and emerging markets as exemplified by electronic funds transfer at the point of sale (EFT/POS).

VII APPLICATIONS DEVELOPMENT TRENDS

VII APPLICATIONS DEVELOPMENT TRENDS

A. EMERGING MARKETS - EFT/POS

- Many of the issues impacting the development of EFT/POS have been discussed in previous chapters of this report--cooperation between banks and retailers, standards, security, legal, and technological.
- However, INPUT believes that EFT/POS is emerging as an area of key opportunity for vendors of value-added networks and especially software products and professional services.
- EFT/POS is developing in different ways at different rates across the countries of Europe, and the following sections highlight the key factors impacting development and future trends.

I. UNITED KINGDOM

- EFT/POS in the U.K. is currently receiving a great deal of publicity, but there is only limited evidence to suggest that it has taken off to any significant degree.
- EFT/POS is going through a long, slow, piloting phase, and its future growth is uncertain owing to the continued political debate between the protagonists, banks, retailers, credit card companies, and financial consortia, who are meant to be supporting the development of EFT/POS.

- Overall, there are still less than 2,000 terminals which authorise card payments, and capture transaction data operative in the U.K. and short-term initiatives to establish market leadership in the field have led to fragmentation and user confusion.
- The pilot EFT/POS services currently running in the U.K. are listed in Exhibit VII-1.
- Essentially, there have been three approaches or philosophies towards EFT/POS development in the U.K. as follows:
 - The bureau approach which establishes a one-on-one relationship with the retailer using intelligent transactions acquisition terminals; for example, the Pisces project operated by Centrefile which is linked to 1,200 terminals in gas stations, the Midnight Express service operated by Compower, and the Teletran network operated by the BT subsidiary, Cresta Communications.
 - The credit card company approach which establishes a one-to-many relationship with the retailer having a multifile acquirer switch at the point-of-sale; for example, the PDQ system operated by Barclays.
 - The national scheme approach which is based on a one-on-one relationship with the retailer having a central system switch.
- The credit card company approach causes two inherent problems for the retailer. Firstly, it does not cater for a large number of credit, debit, charge, and private label cards. Secondly, there is a problem of end-of-day reconciliation and accounting.
- The future of credit card company projects has, however, been boosted by Barclays' tactical ploy to introduce a debit card, CONNECT, under the VISA

EXHIBIT VII-1

EFT/POS DEVELOPMENTS IN THE U.K.

VENDOR/ FINANCIAL INSTITUTION	NAME	DATE	TERMINAL SUPPLIER	CARD TYPE	NETWORK FUNCTIONS			RETAILERS PARTICIPATING
					AUTHORISATION & VERIFICATION	DATA CAPTURE	SETTLE- MENT	
Clydesdale Bank	Counterplus	1982	Fortronic	Debit	On-line -PIN	On-line	Batch	BP/Morco
Centrefile	PICES	1984	Edacom - Fortronic	Credit	Off-line -Signature	Off-line	Batch	Nine petrol com- panies, 1200 terminals
BT - Vass	Teletan CARDPAY	1985	Cresta	Credit	Off-line -Signature	On-line	Batch BACS	150 retailers, 400 terminals
Anglia Building Society	Paypoint	1985	ICL - Fortronic	Debit	On-line -PIN	On-line	Batch	BHS, C&A, var- ious in North- hampton
Midland Bank	Speedline	1986	Nixdorf	Debit + Credit	On-line -PIN	On-line	Batch	Various, Milton Keynes
National West- minster Bank	Streamline	1986	Fortronic	Debit + Credit	On-line-PIN Off-line -Signature	Off-line	Batch	Texaco & Mobil petrol stations
Barlaycard/ Access	DARTS/ Accept	1986	Racal	Credit	On-line -Signature	On-line	Batch	Various, Brent Cross & Southend
FTS/LINK	—	1986	Fortronic	Debit + Credit	On-line -PIN + Signature	On-line debit, Off-line credit	Batch	BP
EFTPOS Development National Scheme	—	1988 ?	?	Debit + Credit?	On-line -PIN	On-line	Real time	Many various, Southampton, Leeds, Edinburgh
Lloyds	—	1987	Fortronic	Debit + Credit	On-line -PIN	On-line	Batch BACS	Various, Peterborough
Comfower	Midnight Express	1986	Fortronic	Credit	Off-line -Signature	Off-line	Batch	Gas stations

brand name which can be used with traditional emprinters and eventually electronic terminals when the national EFT/POS scheme is established by the end of 1989.

- Barclays is seeking to expand their existing 40% share of the credit card market, and this initiative pushes EFT/POS down a development path in direct conflict with the retailers best interests.
- The powerful U.K. retail consortium has reacted badly to Barclays' proposals to retain the existing 2% commission charges that apply to credit cards for the debit card and argue that debit card charges should be the same as for cheques. In the short term, however, retailers may be forced to accept the new payment medium.
- As one vendor suggested, the development of EFT/POS hinges on 'the battle for power at the point-of-sale'.
- The convergence between banking and retailing has only served to intensify this struggle; for example, Marks and Spencer, and Sears and Debenhams are actively offering their own label financial services and securities. Retailers are operating a valuable cash collection service for the banks and rightly feel that they should be able to charge for this service such as J.C. Penney does in the U.S.
- Exhibit VII-2, which illustrates point-of-sale payment times and costs for various methods of payment, clearly indicates that there are substantial cost advantages for EFT/POS based on debit cards which justify its introduction.
- Exhibit VII-3 lists the most common attitudes towards EFT/POS amongst food retailers. It is clear that retailers see the benefits for EFT/POS exclusively in terms of cost reduction, and they are planning for EFT/POS not as a technology in isolation but in the context of broader retail automation strategies. The pattern of development is first to consider inventory, distribution, and accounting systems, then EPOS, and finally EFT/POS.

EXHIBIT VII-2

**POINT-OF-SALE PAYMENT TIMES AND COSTS
(£20 SALE)**

PAYMENT METHOD	1 POS PAY- MENT TIMES	2 POS PAY- MENT COSTS	3 BANK OFFICE COSTS	4 FRAUD THEFT INTRST. ETC.	5 BANK & CARD ISSUER COSTS	6 EFT TERMINAL COST	7 TOTAL
CASH	30 SECS	1.7P	1.0P	10.0P	8.0P		20.7P
CHEQUE	90 SECS	5.0P	0.5P	2.0P	14.0P		21.5P
RETAIL CARD	60 SECS	3.3P	6.0P	45.0P			54.3P
CREDIT CARD	75 SECS	4.2P	0.5P	1.5P	50.0P		56.2P
T&E CARD	75 SECS	4.2P	0.5P	5.0P	80.0P		89.7P
EFT DEBIT CARD	15 SECS	0.8P	0.2P*		10.0P*	3.0P*	14.0P*
EFT RETAIL CARD	15 SECS	0.8P	0.2P*	45.0P		3.0P*	49.0P*
EFT CREDIT CARD	15 SECS	0.8P	0.2P*		40.0P*	3.0P*	44.0P*

*Estimated
Note: Figures exclude 'Communications Cost'

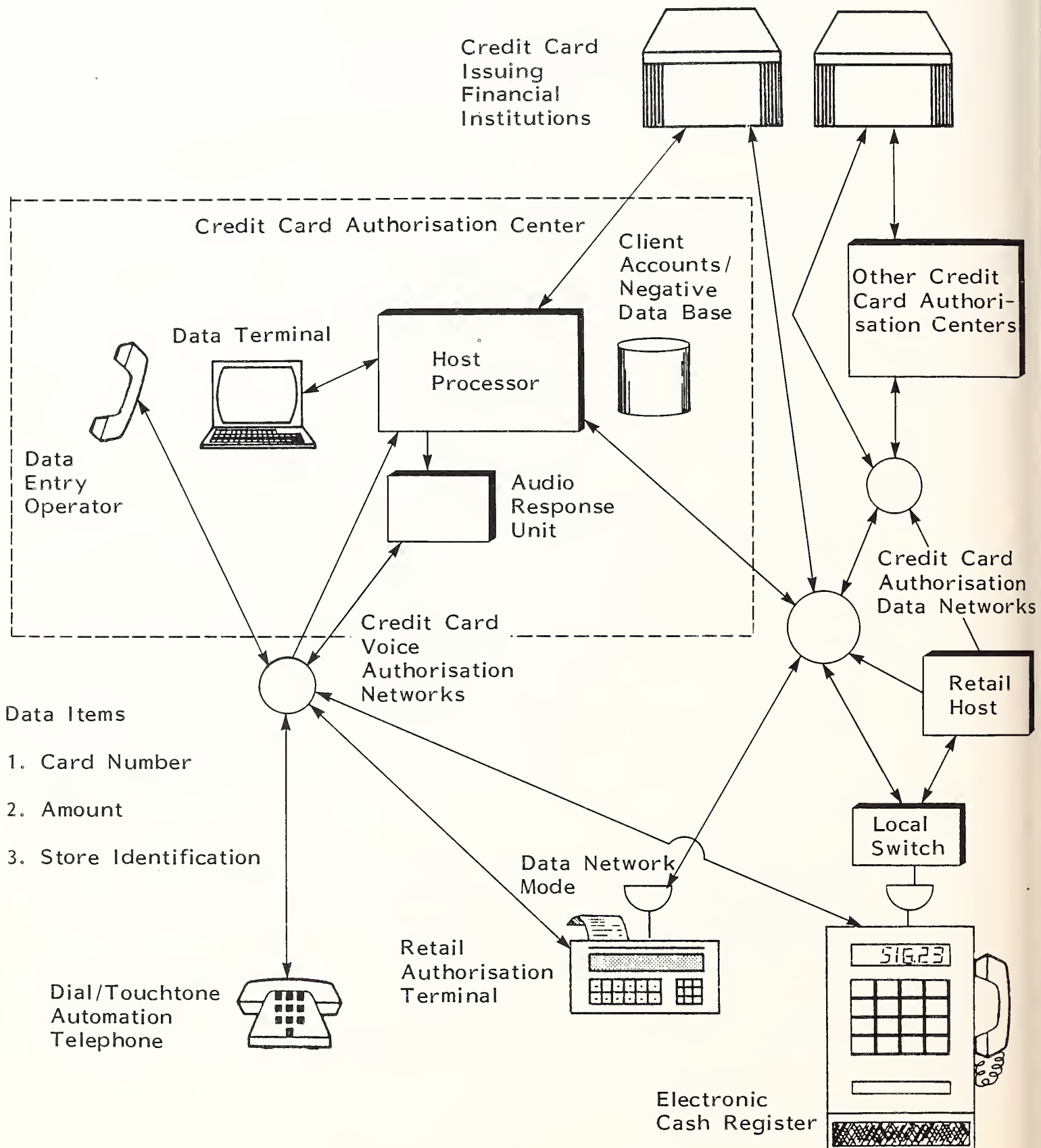
EXHIBIT VII-3

**CURRENT ATTITUDES TOWARDS
EFT AMONG FOOD RETAILERS**

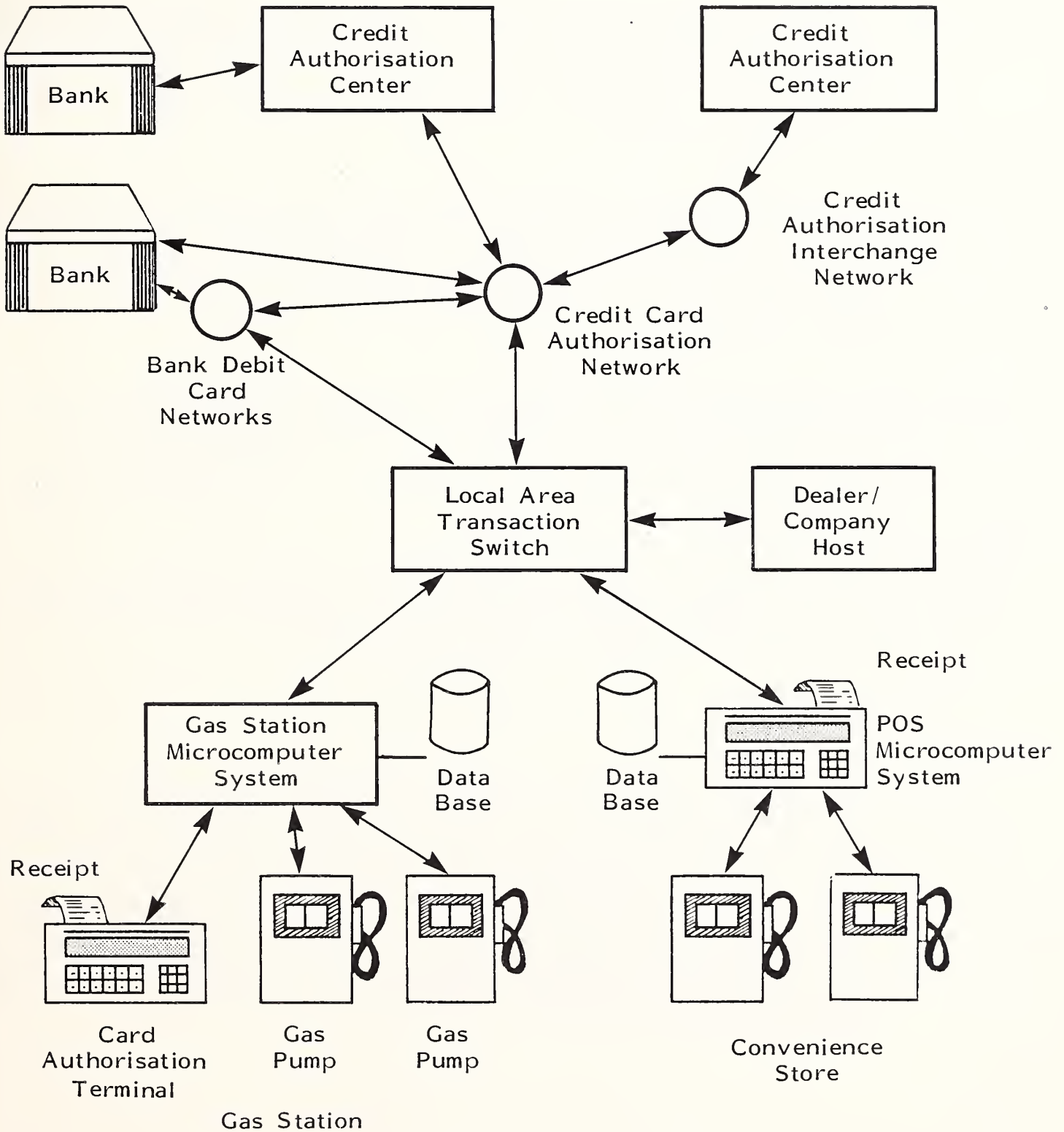
- **Customers Do Not Want Their Account Immediately Debited**
- **EFT Is Only for High-Value Items**
- **We Will Wait to See What the Banks Come Up With**
- **We Do Not Place Priority on EFT**
- **The Banks Have the Most to Gain**

- It is likely that the U.K. will remain a credit-based society for some time to come. Growth in numbers of credit cards is approximately 30% per annum. The installed base in 1986 was 20 million bank issued credit cards, 5 million store cards, and 1.5 million travel/entertainment charge and credit cards. Growth in numbers of private label cards is opening up significant vendor opportunities.
- Exhibit VII-4 and VII-5 illustrate the modus operandi of credit/debit card authorisation systems for retail establishments and gas stations, respectively.
- The consumer test of the attraction of debit cards for spending is currently being undertaken by the building societies on their shared LINK and MATRIX on-line ATM networks. If successful, this project will be a very significant alternative to the planned national scheme being undertaken by the APACS banking consortium.
- The national EFT/POS scheme plans to establish a network of 2,000 terminals by the end of 1988, and a key objective is to establish standards for future development. Participants in the scheme can then choose to continue to collaborate or develop their own systems within the constraints of established standards.
- EFT/POS development's national scheme will also supply gateway and settlement systems between the transaction acquisition networks that are emerging.
- INPUT predicts that the majority of the networks will not be providing real time settlement systems and that there will still be a gap between authorisation and payment systems until the mid-1990s.
- The introduction of smart cards into the U.K. is also likely to be delayed. The banks have a heavy commitment to supporting an installed base of magnetic

CREDIT CARD AUTHORISATION SYSTEMS FOR RETAIL ESTABLISHMENTS



CREDIT/DEBIT CARD AUTHORISATION SYSTEMS FOR RETAIL GASOLINE SERVICE STATIONS



stripe credit and ATM debit cards. There are problems of perishability, and the costs are still too high despite the benefits of off-line validation.

- Although EFT/POS in the U.K. is a significant growth opportunity, vendors should be cautious about the pace and direction of development.
- A clear requirement for vendors is to offer turnkey solutions in the form of hardware, software, networking, and professional services. Vendors should actively pursue commercial partnership in this area in order to achieve critical market position.
- The opportunities for the service bureau are to offer additional value-added services, i.e., linking EFT/POS with inventory control, sales analysis, electronic mail, electronic data interchange (EDI), and credit checking (e.g., CCN, UAPT services).
- A small number of major players will have opportunities to develop individual bank schemes, and user confusion is opening up significant consultancy and custom development opportunities for specialist players such as the Canadian company DMR.
- Systems integrators such as CAP and LOGICA will have much to benefit from both U.K. and international EFT/POS developments.

2. BELGIUM

- The development of EFT/POS in Belgium has been rapid and successful largely due to three factors. Firstly, EFT/POS schemes have been mainly retailer driven. Secondly, compatibility and standardisation has been established between participant organisations regarding cards, terminals, etc. Thirdly, cooperation has been fostered between the banks; for example, the Belgians quickly adopted an electronic clearinghouse for 'truncated' cheque and transfer operations.

- Future strategy includes increasing compatibility with other European systems and using the networks to provide greater added value for both retailer and bank customers; for example, stock ordering for gas stations and fleet management information systems.
- Exhibit VII-6 illustrates the success of Belgium's EFT/POS schemes.

3. WEST GERMANY

- The entry of new competitors into the traditional banking field, i.e., the credit card organisations, the post office, building societies, loan associations, and department stores, is causing German banks to pay close attention to marketing and the opportunities of technology, including EFT/POS.
- However, EFT/POS development has been slow to emerge, and there is a lack of consensus as to the most appropriate development route for a national scheme.
- Successful trials of a PIN verification/on-line authorisation system among 60 retailers in Berlin and Munich using the payment medium of Eurocheque (there are 20 million cards issued to German bank customers) has seen the number of installed EFT/POS terminals rise to over 200.
- Conflict of interest has arisen as retailers do not perceive an urgent requirement. They argue that EFT/POS is only cost-justified for substituting credit card payment which is less than 3% of transactions over 5DM. The percentage of money held as cash is also relatively high in West Germany, i.e., 34% compared with 21% in the U.K. and 19% in France.
- The development of a national scheme has been hindered by conflicts of interest between private, savings, and cooperative banking groups.

EXHIBIT VII-6

BELGIUM - AN EFT/POS SUCCESS STORY

	MISTER CASH	BANCONTACT	POSTMAT
NUMBER OF CARDS	1.1 MILLION	1.4 MILLION	0.1 MILLION
NUMBER OF PARTICIPATING ORGANISATIONS	29	26	1
TRANSACTIONS/MONTH			
- ATMs	2 MILLION	1.7 MILLION	0.12 MILLION
- POS	0.6 MILLION	1.4 MILLION	---
POS			
- PETROL STATIONS	700	1,200	---
- RETAIL OUTLETS	3,000	900	---

- In addition, there is much debate as to which is the most appropriate technology--Smart Card or Eurocheque. However, it is likely that Germany will eventually leapfrog the intermediate technology of magnetic cards and adopt smart cards. Smart card standards have now been established by the ISO, and costs have significantly reduced but still amount to about 8DM per card for the Bull CP-8.
- Deregulation of German banking and the end of interbank agreements will stimulate market growth as nonretail banks will seize opportunities to introduce their own credit cards and financial investments.

4. SCANDINAVIA

- The Scandinavian banking community is very advanced in introducing electronic customer services; for example, there are 150 on-line real time ATMs per million population.
- EFT/POS development has been retailer driven as EFT/POS does not benefit the banks (unlike France) because of the efficiency of existing Giro credit systems which are used to pay virtually all bills. Consequently, the banking system has not been overloaded with cheques.
- EFT/POS systems have been installed by large retailers to reduce their back-office costs as part of an integrated automation strategy.
- EFT/POS development has gained significant momentum to cut cash risks at gas stations and has been widely adopted by the petrochemical majors in Scandinavia.
- Norway has recently ordered 500,000 Smart Cards and is rapidly implementing a national scheme following the successful Lillestrom trial. Smart card technology is highly appropriate for Norway because of high communications costs.

5. NETHERLANDS

- The Dutch retail banking sector is relatively backward and only savings banks have on-line ATMs. There is also a well-established giro structure.
- Dutch EFT/POS developments have also been hindered by a lack of cooperation between the commercial banks, and plans for a national scheme have been practised by the Postbank's initiative's for competitive advantage.
- However, there has been significant development of off-line projects with car leasing and oil companies for private label cards. On-line debit card authorisation experiments have been delayed by technical difficulties in message switching.
- It is anticipated that the Dutch will opt for a debit card-based national scheme. Smart cards are being trialled during 1987.

6. FAR EAST

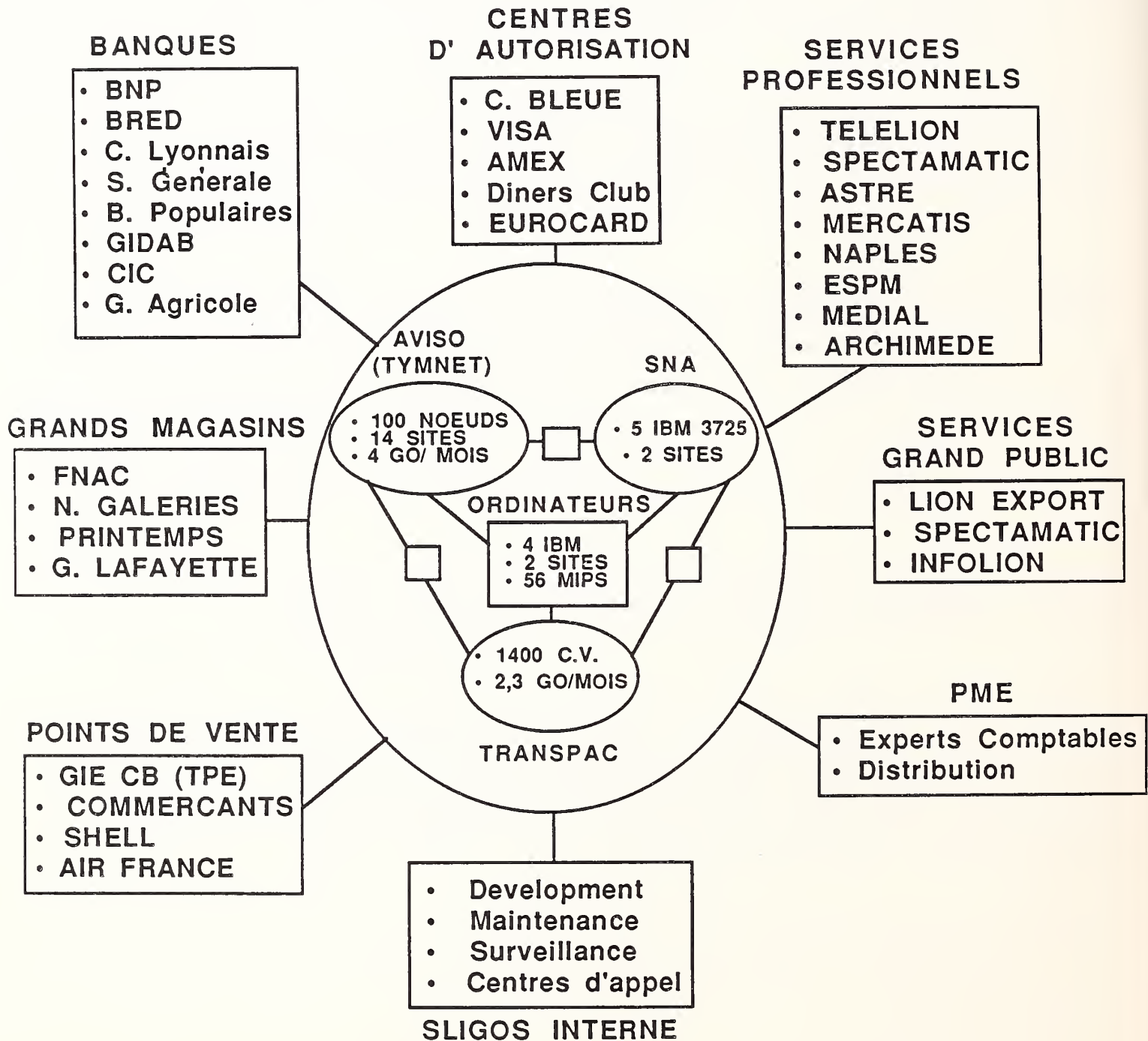
- EFT/POS has been successfully developed in the Far East for two reasons:
 - Shoppers traditionally prefer to pay for goods with cash rather than credit. Consequently, there is no consumer resistance to instant account debiting.
 - National schemes such as NETS (Singapore) and Easypay (Hong Kong) have received powerful government backing. Governments have played a pivotal role in gaining widespread support amongst retailers; for example, NETS handled \$40 million in cashless transactions during 1986.

7. FRANCE

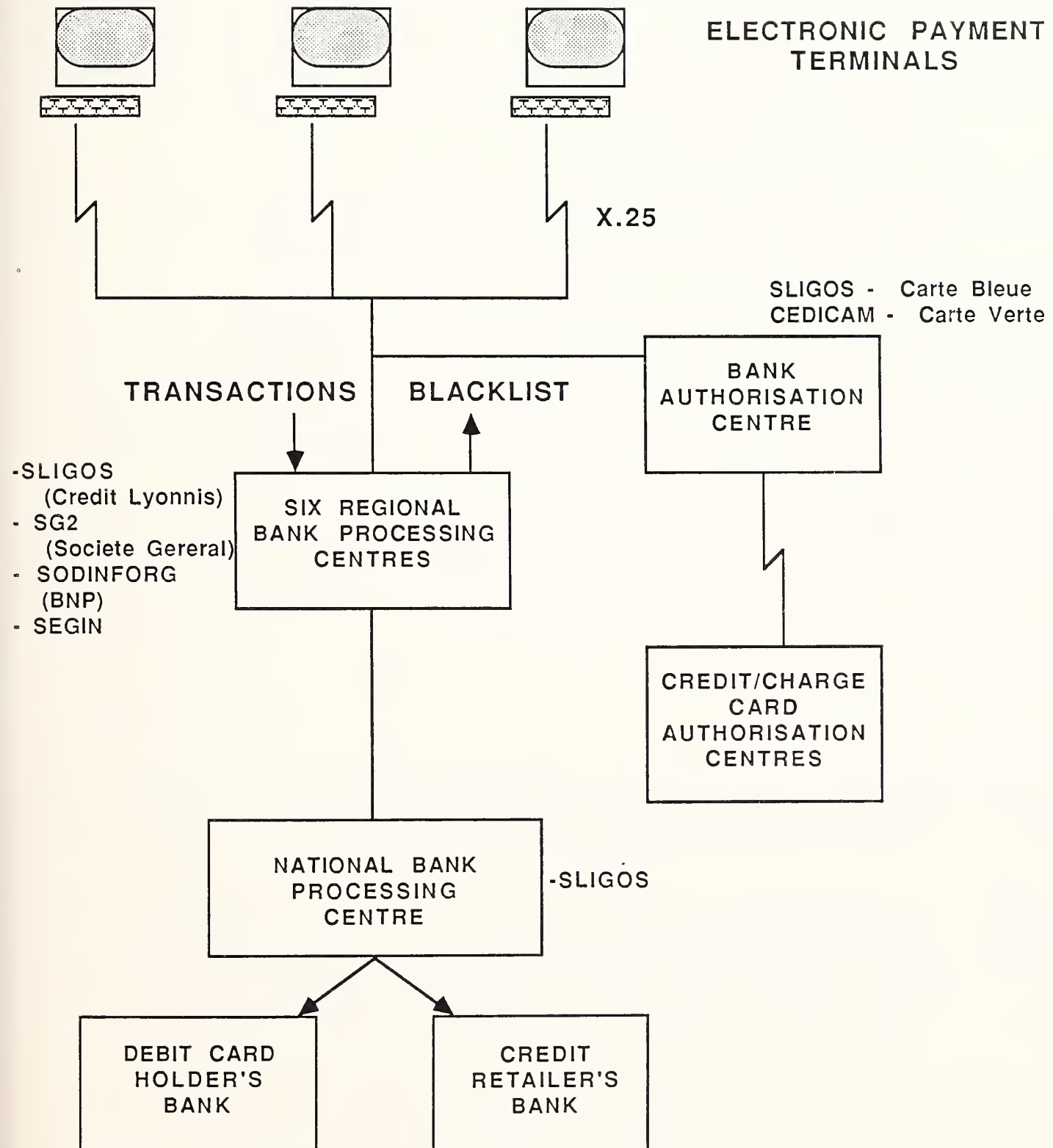
- France is the most advanced of the Western European countries in terms of EFT/POS development, and like the Far East growth has been divested via government initiative through ownership of the major banks.
- Government direction has guided the French down the smart card route in terms of future EFT/POS development. The French banks have already spent \$50 million on smart cards from Bull and Philips and plan to issue 20 million cards by 1992.
- French EFT/POS development has also been facilitated by the policy of not charging retailers the communication costs for authorisation networks and only levying a flexible transaction charge.
- French EFT/POS development faced a minor setback in February 1987 when the banks' proposal to introduce incentive pricing to encourage credit card usage (rather than cheques) was declared illegal. It is interesting to note that the share price of leading monetique vendor Sligos fell from 1,600FF to 1,300FF (after being initially floated at 450FF in December 1986) on the basis of the decision.
- Sligos has a 50% share of the French EFT/POS market, and a schematic illustrating their network configuration is given in Exhibit VII-7.
- Exhibit VII-8 provides a schematic of transaction processing for the Carte Bleu issued by BNP, Cedit Lyonnais, and Societe General, and the Carte Verte issued by Credit Agricole and Credit Mutuel. In addition, gateways are provided to other credit/charge card authorisation centres for multiple card sites.
- EFT/POS development in France is growing around three axes. EFT/POS terminals are becoming more intelligent, cheaper, and less intrusive on

EXHIBIT VII-7

THE SLIGOS HYBRID NETWORK FOR
MONETICS AND TELEMATICS



FRENCH EFT/POS NETWORK



valuable space at the point-of-sale. French banks have bought 10,000 for use with smart cards and expect to give 50% of them away to retailers. Credit card usage is expanding by approximately 35% per annum and is growing in retailer acceptance (e.g., 250,000 retailers offer the Carte Bankere). In addition, there is rapid growth in private label cards. Large retailers such as Auchan issue their own cards, and smaller retailers such as Cetelem are subcontracting the issue of private cards to finance houses.

- The precise modus operandi for implementing EFT/POS by French retailers is essentially determined by their view of a matrix combination of transaction risk, volume, and value.
- Small retailers and gas stations have adopted off-line solutions. Large retailers have adopted on-line solutions with zero floor limits.
- In addition, Sligos has over 1,000 terminals connected to the Valitel service for retailers with small-volume/high-value transactions; for example, Galeries Lafayette. This facilitates interfacing switching for multiple cards (i.e., Hertz, Amex, Diners Club, and Carte Banker) and users the Mintel network.
- Clearly, there are opportunities for vendors to expand their presence in the French market. SG2 has gained significant revenues from EFT-related software development and consultancy and are targetting the profitable private label sector, i.e., hotels and car hire.
- There are also opportunities for vendors who can demonstrate specialist skills and experience in the field. Critical market entry requirements are project management skills, MIS system integration capabilities, specialist support and maintenance skills, and retail consultancy experience.
- For example, Scicon subsidiary GFI is leveraging their experience in retail automation with B.P. France and offering systems integration capabilities for large projects. They have an additional advantage of being totally independent of any bank.

B. RELATED MARKETS - ON-LINE DATABASE (OLDB)

I. MARKET OVERVIEW AND FORECAST

- The market for on-line database services can essentially be segmented into three areas on the basis of user need:
 - Information crucial to decision making, i.e., real-time financial information systems such as Reuters, Quotron, Telerate, Topic, ADP.
 - Information valuable to decision-making, i.e., industry- or profession-specific databases such as legal, medical, wine, advertising.
 - Information useful but peripheral to decision-making, i.e., full text, bibliographic, unfocused textual databases.
- The most profitable and expanding services within the on-line database market are those that address the first two areas of need. In terms of subjects it is commercial information rather than scientific and technical. In terms of customers it is end users, for example, stockbrokers, and not information intermediaries, i.e., librarians.
- As one vendor suggested, 'Information about money is almost as valuable as money itself'.
- INPUT forecasts that the total market for on-line database services will grow from approximately \$850 million in 1987 to about \$2.8 billion in 1992. This represents annual average growth between 25% and 30%.
- Deregulation, increasing competitiveness, and internationalism is driving significant levels of growth in the financial services sector and, particularly, demand for numeric databases.

- INPUT forecasts that the market for numeric databases will increase from approximately \$730 million in 1987 to about \$2.5 billion by 1992.
- Although the cultural and technological climate for the use of on-line databases outside the financial services sector is becoming increasingly favourable, growth in other sectors will largely be for numeric information, for example, corporate treasurers.
- Consequently, INPUT forecasts relatively low levels of growth for textual databases, i.e., 20% over the forecast period.
- Nevertheless, there are continuing opportunities for industry-specific and 'boutique' services in the field of textual databases, and much of the growth will come from links with transaction-based services such as EDI and widened distribution via electronic mail.
- Exhibit VII-9 illustrates INPUT's forecast of the Western European on-line services market.
- Exhibit VII-10 illustrates INPUT's forecast of the numeric database market compared by country.

2. KEY TRENDS AND STRATEGIC DIRECTIONS

a. Industry Structure

- The on-line database market is currently undergoing a phase of consolidation and shakeout.
- The industry is becoming increasingly dominated by large deep-pocket corporations; for example, Reuters acquiring I.P. Sharp, Instinet, and Finsbury Data Services, and Pergammon acquiring U.S. host Orbit.

EXHIBIT VII-9

WESTERN EUROPEAN ON-LINE DATABASE
MARKET FORECAST, 1986-1992
(CONSOLIDATED PROJECTION)

MARKET SEGMENT	\$ MILLIONS					
	1986	1987	1989	AAGR 1986-89	1992	AAGR 1986-89
FINANCIAL/ NUMERIC	550	735	1,260	32%	2,520	26%
TEXTUAL/ BIBLIOGRAPHIC	100	125	180	22%	320	21%
TOTAL MARKET	650	860	1,440	30%	2,840	25%

EXHIBIT VII-10

WESTERN EUROPEAN FINANCIAL
SERVICES/NUMERIC DATABASE
MARKET FORECAST, 1986-1992
(COMPARISON OF COUNTRY MARKETS)

COUNTRY	\$ MILLIONS					
	1986	1987	1989	AAGR 1986-89	1992	AAGR 1986-89
UNITED KINGDOM	280	370	620	30%	1,200	25%
FRANCE	60	85	150	36%	300	26%
WEST GERMANY	55	75	140	37%	300	29%
ITALY	25	35	60	34%	130	29%
NORDIC	25	35	65	38%	150	32%
BENELUX	45	60	100	30%	200	26%
SWITZERLAND	40	50	80	26%	140	20%
REST OF EUROPE	20	25	45	31%	100	30%
TOTAL	550	735	1,260	32%	2,520	26%

- The increasing convergence of banking and computer services has led to the acquisition of Quotron by Citicorp and a joint venture between Mercantile Credit and ADP. New services have been launched by existing players, for example, Reuters with Equity 2000, but also by financial institutions, for example, the Schrimgoeur Kemp Gee DOGFOX service. However, competitive and administrative pressures may well lead the banks to 'stick to the knitting' and leave opportunities to be exploited by service companies.
- The nonfinancial on-line sector will inevitably shakeout owing to problems of profitability.

b. Financial Information Services

- The keys to success in the financial on-line markets are the flexibility and resources to cope with an environment of rapidly changing customers and technology.
- Deregulation in the U.K. has extended the life cycle for information services of even the most mature market segments, for example, stockbrokers, and created a ripple effect into other sectors such as corporate treasurers.
- There are ample opportunities for new services in a changing environment especially as 24-hour global trading puts pressure on the requirement for comprehensive integrated international information sources.
- The key strategic trend is to offer comprehensive services to niche markets; for example, 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. Overall, the market is subtle, and there is limited head-to-head competition.

- This requirement has led to an increase in value added through software in terms of service enhancements. Users' demands for ease of use, modeling/decision support facilities, and integration of multiple information sources has led to the development of PC-based packages for interactive training using basic artificial intelligence and analysis tools interfacing with real-time data.
- A key opportunity is to develop software which facilitates customisation of information for specific customers and truncated services for infrequent dial-up users.
- Brand engineering has emerged as a key marketing strategy owing to increased flexibility in distribution; for example, the larger financial institutions require integrated digital data feeds which are then used to distribute own label client services.
- Pricing and discount policies need frequent and careful review as the number of terminals spreads within institutions, especially in France and Germany.
- A further aspect of customer closeness is the need to compete on service and offer comprehensive implementation and support services.
- INPUT's recommendations for vendors of financial information systems are summarised in Exhibit VII-II.

c. Textual Information Services

- The key opportunity for vendors of textual information services is to develop and package new services which appeal to segments of the end-user market.
- The on-line industry is developing from the 'supermarket' approach, originally adopted by vendors such as Dialog, of hosting large, comprehensive, complex, and largely unstructured text databases, to the 'boutique' approach of packaging industry- and user-specific information products.

EXHIBIT VII-II

RECOMMENDATIONS FOR VENDORS OF
FINANCIAL INFORMATION SERVICES

- Exploit Opportunities of New Adaptive Technology
- Dominate Selected Niche Via Comprehensive Service and Strategic Partnering
- Develop Relationships with Software Houses
- Establish Effective Brand Engineering
- Differentiate Via Service, Implementation and Support
- Develop Customized Services
- Customer Closeness

- A possible scenario for the future of largely unprofitable database hosts is that they will become intermediary computer services companies, and the information providers will take responsibility for the administration and marketing of on-line products.
- A major need is to offer intelligent interface facilities for on-line services that provide transparent access to a range/menu of services. Intelligent access has been provided on some new services, for example, the 18 keyword searching on British Telecom's Hotline service, but there is not a common standard across all on-line services and this inhibits market development.
- Electronic mail vendors are continuing to offer gateways to a wide range of on-line database services. However, what is required is the development of individually packaged solutions for target vertical segments.
- E-mail and on-line database should be marketed as an integrated business expansion facility for sectors such as shipping and freight forwarding.

VIII CONCLUSIONS AND RECOMMENDATIONS

VIII CONCLUSIONS AND RECOMMENDATIONS

A. KEY MARKET TRENDS

- In general, the overall state of the VADS market can be summarised as entering into a phase of steady growth and profit potential.
- However, existing and potential vendors of VADS-related products and services should be aware that overall growth does not necessarily present an easily addressable business development opportunity.
- The market for general-purpose horizontal VADS is concentrating via acquisition, mergers, joint ventures, bankruptcy, network interlinking, and commercial agreement. It is becoming the sole province of the PTTs and deep-pocket international corporations. Entry costs and risks are high and margins low owing to difficulties in differentiation.
- Opportunities exist for application-specific vertical VADS in the new liberalised marketplace for both existing players and new small parochial operators.
- In addition, there are significant opportunities for software houses and professional services vendors. Specifically, there is a demand for systems integration skills for new large projects, for example, national EFT/POS schemes. In addition, there are requirements for industry-specific VADS applications software, integration with existing systems, and consultancy to resolve problems of user confusion, especially with communications technology.

- Increasing user sophistication and demands for enhanced integrated services has led to a convergence between applications--EDI with EFT, videotex with conventional processing, E-mail and EDI with on-line database.
- In summary, the key trends in the VADS market are:
 - Increased emphasis on profitability.
 - Increased focus on industry-specific application services.
 - Convergence between generic application services to provide integrated business expansion facilities.
 - Increased levels of competition.
- VADS technology has already started to revolutionise business practice and personal communications and will remain a key strategic issue for government bodies and private institutions to ensure its effective implementation.
- The factors that are driving the growth of the VADS market are given in Exhibit VIII-1.

B. RECOMMENDATIONS FOR VENDORS

- Difficulties arise in specifying recommendations to vendors as appropriate strategies differ depending on the type of application service, stage in product life cycle, and competitive and country market environment. Consequently, INPUT has devised some generic recommendations for VADS vendors which will apply to most organisations.

EXHIBIT VIII-1

MARKET GROWTH FACTORS

- **Connectivity Standards**
- **Ease of Use**
- **Growing Awareness
of Benefits**
- **Mutual Cooperation of User
and Vendor Participants**
- **PTT Liberalisation**

- Vendors should seriously consider their position with respect to new adaptive technologies such as the ISDN. Although a number of technical and market issues remain to be resolved, ISDNs are a potential long-term threat offering a full range of communications services.
- Existing vendors should monitor ISDN development and plan their responses. It may well be desirable to initiate or demonstrate services which offer what ISDNs now only promise, including integrated voice, data, and image communications.
- As future VADS opportunities lie in industry-specific applications, vendors need to evaluate their corporate strengths in servicing particular vertical markets and explore how VADS may meet current business problems in those sectors.
- It is vital that vendors consider joint ventures and strategic alliances in order to penetrate new market areas; for example, innovative distribution arrangements with industry specialist software houses.
- Vendors must develop strategies to lock-in the existing VADS customer base through:
 - Product enhancement.
 - Post-implementation support.
 - Training.
 - Newsletters.
 - Sponsored seminars addressing common issues.
 - Network interlinking.

- Missionary marketing initiatives are also critical during the early stages of application development, for example, electronics graphics exchange.
- Vendors should differentiate their services on the basis of service and should provide full implementation support services, including professional services.
- Vendors should also carefully consider product/market positioning before developing new services or entering new markets. New VADS services have been characterised by long, slow, cash-hungry take-off phases, and it is necessary to consider the consequences of being 'in for the long haul'.
- INPUT's recommendations for VADS vendors are summarised in Exhibit VIII-2.

EXHIBIT VIII-2

RECOMMENDATIONS FOR VENDORS

- **Differentiate Via Implementation and Support Services**
- **Enhance Existing Services**
- **Focus Corporate Strengths**
- **Consider Strategic Allowances**
- **Offer Professional Services**
- **Target Vertical Markets**
- **Develop Strategies to Lock-In Customer Base**
- **Evaluate Opportunities of New Technology**
- **In for the Long Haul**

APPENDIX A: DEFINITIONS

APPENDIX A: DEFINITIONS

- INFORMATION SERVICES - The provision of:
 - Data processing functions using vendor computers (processing services).
 - The provision of database access where computers perform an essential role in the processing or conveyance of data.
 - Services that assist users to perform functions on their own computers (software products and/or professional services).
 - A combination of hardware and software, integrated into a total system (integrated systems).

A. REVENUE

- All revenue and user expenditures reported are available (i.e., noncaptive) revenue, as defined below.
- NONCAPTIVE INFORMATION SERVICES REVENUE - Revenue received for information services provided within the four Western European country markets of France, Italy, the U.K., and West Germany from users who are not part of the same parent corporation as the vendor.

- CAPTIVE INFORMATION SERVICES REVENUE - Revenue received from users who are part of the same parent corporation as the vendors.
- OTHER REVENUE - Revenue derived from lines of business other than those defined above.

B. SERVICE MODES

- PROCESSING SERVICES - Remote computing services, batch services, and processing facilities management.
 - REMOTE COMPUTING SERVICES (RCS) - Provision of data processing to a user by means of terminals at the user's site(s) connected by a data communications network to the vendor's central computer. There are four submodes of RCS:
 - INTERACTIVE (timesharing) - Characterised by the interaction of the user with the system, primarily for problem-solving timesharing but also for data entry and transaction processing; the user is on-line to the program/files.
 - REMOTE BATCH - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resources requirements.
 - DATABASE - Characterised by the retrieval and processing of information from a vendor-provided database. The database may be owned by the vendor or a third party.

- USER SITE HARDWARE SERVICES (USHS) - These offerings provided by RCS vendors place programmable hardware on the user's site (rather than in the EDP center). USHS offers:
 - Access to a communications network.
 - Access through the network to the RCS vendor's larger computers.
 - Significant software as part of the service.
 - BATCH SERVICES - This includes data processing performed at vendors' sites of user programs and/or data that are physically transported (as opposed to electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.
 - PROCESSING FACILITIES MANAGEMENT (PFM) (Also referred to as 'resource management' or 'systems management') - The management of all or a major part of a user's data processing functions under a long-term contract (more than one year). This would include both remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.
- Processing services are further differentiated as follows:
- Function-specific services are the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but cut across industry lines. Most general edger, accounts receivable,

payroll, and personnel applications fall into this category. Function-specific data base services where the vendor supplies the database and controls access to it (although it may be owned by a third party) are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific.

- Industry-specific services provide processing for particular functions or problems unique to an industry or industry group. The software is provided by the vendor either as a complete package or as an applications 'tool' that the user employs to produce a unique solution. Specialty applications can be either business or scientific in orientation. Industry-specific database services, where the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specific applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.
- Utility services are those where the vendor provides access to a computer and/or communications network with basic software that enables users to develop their own problem solutions or processing systems. These basic tools include terminal-handling software, sorts, language compilers, database management systems, information retrieval software, scientific library routines, and other systems software.
- SOFTWARE PRODUCTS - This category includes users' purchases of applications and systems packages for use on in-house computer systems. Included are lease and purchase expenditures, as well as fees for work performed by the vendor to implement and maintain the package at the users' sites. Fees

for work performed by organisations other than the package vendor are counted in professional services. There are several subcategories of software products.

- APPLICATIONS PRODUCTS - Software that performs processing to service user functions. They consist of:
 - CROSS-INDUSTRY PRODUCTS - Used in multiple-user industry sectors. Examples are payroll, inventory control, and financial planning.
 - INDUSTRY-SPECIFIC PRODUCTS - Used in a specific industry sector such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting and airline scheduling.
- SYSTEMS PRODUCTS - Software that enables the computer/communications systems to perform basic function. They consist of:
 - SYSTEMS CONTROL PRODUCTS - Function during applications program execution to manage the computer system resource. Examples include operating systems, communication monitors, emulators, and spoolers.
 - DATA CENTER MANAGEMENT PRODUCTS - Used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.
 - APPLICATION DEVELOPMENT PRODUCTS - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include

languages, sorts, productivity aids, data dictionaries, data base management systems, report writers, project control systems, and retrieval systems.

- PROFESSIONAL SERVICES - Made up of services in the following categories:
 - EDUCATION SERVICES - EDP products and/or services - related to corporations, not individuals.
 - CONSULTING SERVICES - EDP management consulting and feasibility studies, for example.
 - CONTRACT STAFF - User-managed temporary EDP staff supplied by service organisation.
 - SOFTWARE DEVELOPMENT - Including system design, contract programming, and 'body shopping'.
 - PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM) - The counterpart to processing facilities management, except that in this case the computers are owned by the client, not the vendors; the vendor provides people to operate and manage the client facility.
- STANDARD TURNKEY SYSTEMS - An integration of systems and applications software with hardware, packaged as a single entity. The value added by the vendor is primarily in the software. Most CAD/CAM systems and many small business systems are integrated systems. This does not include specialised hardware systems such as word processors, cash registers, and process control systems.
- Integrated systems revenue in this report is divided into two categories.

- INDUSTRY-SPECIFIC systems; i.e., systems that serve a specific function for a given industry sector such as seismic processing systems, automobile dealer parts inventory, CAD/CAM systems, discrete manufacturing control systems, etc.
- CROSS-INDUSTRY systems; i.e., systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, personnel management systems, etc.
- Revenue includes hardware, software, and support functions.
- SYSTEMS INTEGRATION - Services associated with systems design, integration of computing components, installation, and acceptance of computer/communications systems. Systems integration can include one or more of the major information services delivery modes--professional services, turnkey systems, and software products. System components may be furnished by separate vendors (not as an integrated system by one vendor, called the prime contractor); services may be furnished by a vendor or by a not-for-profit organisation. Integration services may be provided with related engineering activities, such as SE&I (Systems Engineering and Integration) or SETA (Systems Engineering and Technical Assistance).

C. HARDWARE/HARDWARE SYSTEMS

- HARDWARE - Includes all computer communications equipment that can be separately acquired, with or without installation by the vendor, and not acquired as part of a system.
- PERIPHERALS - Includes all input, output, communications, and storage devices, other than main memory, that can be locally

connected to the main processor and generally cannot be included in other categories, such as terminals.

- INPUT DEVICES - Includes keyboards, numeric pads, card records, barcode readers, lightpens and trackballs, tape readers, position and motion sensors, and A-to-D (analog-to-dialog) converters.
- OUTPUT DEVICES - Includes printers, CRTs, projection television screens, microfilm processors, digital graphics, and plotters.
- COMMUNICATION DEVICES - Modems, encryption equipment, special interfaces, and error control.
- STORAGE DEVICES -Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.
- TERMINALS - There are three types of terminals:
 - USER PROGRAMMABLE (Also called 'intelligent terminals'):
 - Single-station or standalone.
 - Multistation-shared processor.
 - Teleprinter.
 - Remote batch.
 - USER NONPROGRAMMABLE:
 - Single-station.

- . Multistation-shared processor.
- . Teleprinter.
- LIMITED FUNCTION - Originally developed for specific needs, such as POS (point of sale), inventory data collection, controlled access, etc.
- HARDWARE SYSTEMS - Includes all processors, from microcomputers to super (scientific) computers. Hardware systems require type- or model-unique operating software to be functional, but the category excludes applications software and peripheral devices, other than main memory and processor or CPUs, not provided as part of an integrated (turnkey) systems.
- MICROCOMPUTER (or personal computer or PC) - Combines all of the CPU, memory, and peripheral functions of an 8- or 16-bit computer on a chip, in the form of:
 - . Integrated circuit package.
 - . Plug-in board with more memory and peripheral circuits.
 - . Console--including keyboard and interfacing connectors.
 - . Personal computer with at least one external storage device directly addressable by CPU.
- MINICOMPUTER - Usually a 12-, 16-, or 32-bit computer which may be provided with limited applications software and support and may represent a portion of a complete large system.
 - . Personal business computer.
 - . Small laboratory computer.

- Nodal computer in a distributed data network, remote data collection network, connected to remote microcomputers.
- MAINFRAME - Typically a 32- or 64-bit computer, with extensive applications software and a number of peripherals in standalone or multiple CPU configurations for business (administrative, personnel, and logistics) applications; also called a general-purpose computer.
 - Large computer mainframes are presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors (CPUs) or parallel processors; they are intended for structured mathematical and signal processing and are generally used with general purpose von-Neumann-type processors for system control.
 - Supercomputer mainframes are high-powered processors with numerical processing throughout that is significantly greater than the largest general-purpose computers, with capacities in the 10-50 MFLOPS (million floating point operations per second) range, in two categories:
- REAL TIME - Generally used for signal processing.
- NONREAL TIME - For scientific use, with maximum burst-mode (but sustained speed) capacities of up to 100 MFLOPS, in one of three configurations:
 - Parallel processors.
 - Pipeline processors.
 - Vector processors.

- Newer supercomputers--with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class--are also becoming more common.
- EMBEDDED COMPUTER - Dedicated computer system designed and implemented as an integral part of a weapon or weapon system, or platform that is critical to a military or intelligence mission, such as command and control, cryptological activities, or intelligence activities. Characterised by MIL SPEC (military specifications) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from microcomputers to parallel-processor computer systems. Information services forecasts in this report do not include applications for this type of computer.

D. TELECOMMUNICATIONS

- NETWORKS - Interconnection services between computing resources, provided on a leased basis by a vendor to move data and/or textual information from one or more locations to one or more locations.
 - COMMON CARRIER NETWORK (CCN) - Provided via conventional voice-grade circuits and through regular switching facilities (dial-up calling) with leased or user-owned modems (to convert digital information to voice-grade tones) for transfer rates between 150 and 1,200 baud.
 - LOCAL-AREA NETWORK (LAN) - Restricted 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. One of the two types:

- . BASEBAND - Voice bandwidth at voice frequencies (same as telephone, teletype system) limited to a single sender at any given moment and limited to speeds of 75 to 1,200 baud, in serial mode.
- . BROADBAND - Employs multiplexing techniques to 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 MEDIA - Varies with the supplier (vendor) and with the distribution of the network and its access mode to the individual computing resource location.
 - MODE - may be either:
 - . ANALOG - Typified by the predominantly voice-grade network of AT&T's DDD (Direct Distance Dialing) and by operating telephone company distribution systems.
 - . DIGITAL - Where voice, data, and/or text are digitised into a binary stream.
 - MEDIA varies with distance, availability, and connectivity:

- WIRE - Varies from earlier single-line teletype networks to two-wire standard telephone (twisted pair) and balanced line to four-wire full-duplex balanced lines.
- CARRIER - Multiplexed signals on two-wire and four-wire networks to increase capacity by FDM.
- COAXIAL CABLE - HF (High Frequency) and VHF (Very High Frequency), single frequency, or carrier-based system that 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 with TDM for multichannel applications.
- 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 connection to the mobile unit from cell to cell as the unit moves among the cells.

E. OTHER CONSIDERATIONS

- When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorised according to what users perceive they are buying.

APPENDIX B: ANALYSIS OF RESEARCH SAMPLE

APENDIX B: ANALYSIS OF RESEARCH SAMPLE

- In-depth interviews (nearly all face-to-face) were conducted amongst major network services vendors, PTT organisations, and vendors of specific application services.
- Telephone interviews were also conducted amongst a wide cross-section of user organisations in France, West Germany, Italy, Belgium, the Netherlands, and the U.K. This general survey addressed levels of awareness, usage, and attitude towards identified VADS market segments, i.e., electronic mail, EDI, and EFT. This research was conducted as a subsegment of INPUT's extensive annual market survey.
- Exhibit B-1 shows the analysis of the survey respondents by category and country.

EXHIBIT B-1

ANALYSIS OF INTERVIEWS

COUNTRY	INFORMATION NETWORK SERVICES VENDORS (INCLUDING PTTS)	GENERAL TELEPHONE SURVEY OF USERS	TOTAL
UNITED KINGDOM	25	50	75
WEST GERMANY	8	50	58
FRANCE	8	50	58
ITALY	---	25	25
BENELUX	4	25	29
TOTAL	45	200	245

APPENDIX C: USER QUESTIONNAIRE

APPENDIX C: User Questionnaire

BI-ANNUAL INPUT SURVEY OF EUROPEAN INFORMATION SERVICES MARKETS

(Relevant Questions to Value-Added Network
and Data Services Only)

QU: 2* I am now going to read out a variety of issues concerning data processing which have been experienced by other companies. For each one could you please rate the seriousness of the issue to your organisation on scale of 1 to 5 (with 5 being very serious)?

Issue	Rating
Budget Restrictions	_____
Developing Interactive Systems	_____
Lack of Coherent IT Strategy	_____
Developing Communications Networks	_____
Lack of Telecommunications Expertise	_____
Supporting Micro-based Systems	_____
Lack of Special Programmers	_____
Lack of Systems/Business Analysts	_____
Lack of Project Management Expertise	_____
Training DP Staff	_____
Training End-User Staff	_____
Meeting Deadlines for Applications Development	_____
Keeping Pace with Technological Change	_____

BUSINESS COMMUNICATIONS

QU: 6* I am now going to read out a list of issues concerning telecommunications. For each one could you please rate the degree of importance to your organisation on a scale of 1 to 5 (with 5 being very important)?

Issue	Rating
Developing Micro to Mainframe Link	_____
Developing Local Area Networks	_____
Development Departmental Computer to Mainframe Links	_____
Integrating Voice and Data Networks	_____
Utilising Mobile Communication Facilities	_____
Universal Hardware Connection Standards	_____

QU: 7* I am now going to read out a list of business communications services provided over a network. For each one could you please tell me if your company uses an externally provided service, or if not, whether it plans to use an external service within the next two years?

Service	Don't Use	Use	Plan to Use	Name of Vendor
Electronic Mail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
On-Line Information Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Electronic Funds Transfer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Electronic Data Interchange	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

NB: Read out Brand Names if necessary.

QU: 8a What do you think are the three most important benefits to your organisation of using external network services?

1. _____

What else 2. _____

What else 3. _____

QU: 8b What do you think are the three most serious problems associated with using external network services?

1. _____

What else 2. _____

What else 3. _____

Prompt

- Cost Justification
- Ease of Use
- Critical Mass of Participants
- Implementation Support
- Security
- Reliability

APPENDIX D: LIST OF RELATED INPUT REPORTS

APPENDIX D: LIST OF RELATED INPUT REPORTS

- Electronic Data Interchange - European Market Opportunities, 1986.
- Major Western European Markets for Information Services, 1986-1991.
- Network Services Directions, 1986 (U.S.).
- Impact of CD ROM on Information Services, 1986 (U.S.).
- European Videotex Market Opportunities, 1985.
- Check Guarantee and Credit Card Authorization Services, 1985 (U.S.).
- Banking and Financial Services, Volumes I-III, 1986 (U.S.).
- U.S. Information Services Cross-Industry Markets - Value-Added Networks Sector, 1986-1991, (U.S.).
- EDI Planning Service (EDIPS)--global coverage of EDI developments including a monthly newsletter (The EDI Reporter), a series of in-depth reports, hotline service, and seminars.

