The Western European EDI Market

1991-1996

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JANUARY 1992

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Network Services Programme - Europe

The Western European EDI Market,
1991-1996

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NE-ED1 - 1991

Abstract

Electronic Data Interchange (EDI) is defined as the electronic transfer of business information between trading parties and partners by means of the interchange of data between the computer-based applications of the sending and receiving parties. The information is subject to a structured format conforming to one of a range of agreed standards. Standard may be agreed at a number of levels - industry sector, national, regional (ie covering a group of countries) or international.

EDI has emerged as an important focus for the attention of management throughout Western Europe. The market for EDI has proved to be recession-proof, even in those countries in Europe such as the UK and France where recession has so far been deepest.

This study provides an assessment of the current Western European EDI market, including sizes and growth rates by individual country market together with five-year forecasts to 1996 broken out by Network Services, Software Products and Professional Services. **INPUT**'s analysis includes assessments of the major forces that are shaping the sector and driving market growth.

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Table of Contents

 Copyright 1991 INPUT. Reproduction Prohibited.

V Analysis of Country Markets

Appendices

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List of Exhibits

Chapter II

Chapter III

Chapter IV

Chapter V

Appendices

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I Introduction

A Background

This study, produced as part of INPUT's Network Services and Electronic Data Interchange Programmes, examines the Western European EDI market, providing an analysis of European developments during 1991 in what is a rapidly growing market.

INPUT defines EDI as the inter-organisational electronic transfer of business information between applications in a structured format conforming to a public or a de facto standard. The information can represent standard business documents, such as invoices, purchase orders and logistical information. EDI can also include inter-divisional or intercompany trading between different units of one group organisation, where each division or subsidiary company trades as an autonomous profit centre.

This report focuses however on the third-party EDI service and software markets and excludes consumer applications such as electronic shopping, electronic banking, automatic teller networks (ATMs), point of sale (POS) terminals, airline reservation systems, credit authorisation systems and other "captive" networks which are used for transactions between two parties. Although these systems use electronic "forms" to transfer information, the applications generally use specialised terminal devices to communicate with dedicated computers. They tend to use proprietary data formats rather than public standards.

EDI involves the transmission of data in one of several standard formats, with EDIFACT (Electronic Data Interchange For Administration, Commerce and Trade) emerging as the most likely "international" standard. In most instances, data from installed applications are translated to the standard in use prior to transmission. Alternatively a third-party service provider may carry out on-network translation. It is usually necessary for the data to be translated back again into formats recognised by a trading partner's computer applications. One of the major values of EDIFACT to Western Europe is its ability to support communication across industry sector borders thus creating a market for additional interchange applications both within and between industry sectors.

The majority of users in Western Europe are still at an early stage with EDI. However, some organisations are already adding new transactions to those they already handle electronically, whilst a few are looking to integrate EDI functionality more fully with internal applications. The benefits of EDI, when integrated into an organisation's overall business philosophy, are vast and in many cases still totally unexplored. At this early stage in its development in Western Europe, EDI is, however, already changing the way companies are doing business, with the consequent improvements in an organisation's overall efficiency.

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EDI transmission can be configured in a number of ways:

- Point-to-point, ie. directly between trading partners.
- On private networks among autonomous parts of a group.
- Through third parties - the Network Services' vendors. These firms serve as collection and switching services that perform store-and-forward tasks and other processing (ie: issuing reports, providing audit trails etc).

In addition to these firms, EDI is providing new lines of business for software vendors and professional service companies as well as helping to shape the future forms of the pan-European trade and industry associations in many vertical industries. With so many parties interested in the outcome, the European EDI market is a very competitive environment. The falling cost of telecommunications across Europe is helping to maintain the pace of change throughout this sector.

Users will ultimately benefit from industry competition through the variety of choices offered, more competitive pricing and the enhancement of features, but at present many only perceive the additional costs of implementing new systems and methods. Profitability for vendors, therefore, remains elusive and is likely to remain so for some time, due to the need to hand-hold and support the host of only semi-convinced "adherents to the new faith".

This study is designed to assist vendors in:

- Identifying new markets and product opportunities
- Gaining insights into future market developments
- Allocating research development, and operational resources to new product initiatives.

The report describes and measures the EDI software and services market in Western Europe in 1991 and presents a forecast through to 1996.

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B
Methodology

The research for this study consisted of:

- User interviews with information services and telecommunications managers in over 100 companies throughout Europe.
- Discussions with other industry bodies, such as representatives of industry associations, PTOs and common user groups.
- Attendance at seminars in Copenhagen (Denmark) and Birmingham (UK).

INPUT also collected and analysed information on EDI software products and training services and reviewed secondary research sources.

C
Report Structure

Our report is structured as follows and addresses the following topics:

- Chapter II is an Executive Overview of the entire study.
- Chapter III describes the development of EDI within the wider context of Electronic Commerce (or Electronic Trading as it is sometimes known).
- Chapter IV contains INPUT's 1991 market analysis and forecasts at the level of the whole of Western Europe.
- Chapter V contains the summary findings on the state of the EDI country markets in Western Europe in 1991 with forecasts through to 1996 and leading vendor lists. Some of the smaller countries are treated as groups.

Definitions of EDI-related terms can be found in Appendix A. The exchange rates and inflation assumptions used in the forecasts can be found in Section A of your Network Services Programme Binder, as can INPUT's market sector definitions.

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II Executive Overview

A
European EDI Moves to its Second Generation

EDI is set to impact all types and sizes of business and public sector organisations in Western (and increasingly Eastern) Europe during the rest of the current decade. Its implementation has the power to enable organisations to seize and retain a competitive advantage vis-a-vis their rivals. Failure to implement EDI could well mean the opposite - businesses and organisations which ignore or reject EDI could be disabled from continuing their activities in the sectors in which they operate.

There are difficulties in defining the boundaries of EDI. In the strictest definition as used by **INPUT**, EDI is the computer-to-computer exchange of information between applications belonging to two different autonomous organisations, who wish to communicate with each other. It, therefore, implies that both the organisations involved in the exchange are computerised. In practice, however, EDI operations may be involved between companies which are not fully in this happy state:

- Business procedure changes may be forced on a reluctant but weaker business trading partner who is not computerised by a client company stronger than himself.
- Manual intervention may therefore (or for other reasons) need to take place at one or more points in the chain of communications.

B
Western European EDI Market

The market in Western Europe for EDI software and services is anticipated to be $100 million in 1991 and this figure is split between:

- Network Services expenditures
- Software Products expenditures
- Professional Services expenditures.

EDI highlights the well-known fact of the heterogeneity of European markets, which appears in so many software and services sectors:

- One country market (the UK) provides a much more favourable climate for the development of an active and open EDI market than any of the others. The UK had just over 55% of the 1991 EDI sector expenditures and this is due to the competing clearing-house service providers.

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- A second country (the Netherlands) has now followed the same path starting with the liberation of its telecommunications regime. The newly privatised PTT Telecom is now competing in EDI services with the two international vendors, GEIS and IBM. A critical mass of almost 3,000 users is starting to coalesce and the Dutch market is now growing faster than the UK's.

- A truly open, regional market across Europe requires a uniform and clear-cut vision of a separate market segment and this is by no means the case with EDI in Europe. Different countries for reasons of business culture and different infrastructures are developing along slowly converging paths into EDI.

  - UK has adopted the independent clearing-house approach.

  - Germany is penetrated with a considerable number of direct, partner-to-partner, communications links run over the private networks of the "senior" partner in the hub of each community. These systems increase the software and professional services components of the market at the expense of the network services portion, much of which remains in-house (or captive). This situation is slowly changing as DBP Telekom and the independent network providers launch more services.

  - EDI, which is in the final analysis essentially cross-industry in its final implementation and penetration throughout an economy, is now impacting the French industry-based vertical sector communities in which many proprietary network and processing services have a long established track record of success. French EDI planning is extending into the areas of public service and the professions.

- In some of the smaller countries of Europe and among smaller users throughout the region the exchange of unstructured or semi-structured business information between applications is blurring the boundary between EDI and electronic messaging in a more general sense. Hence the interest among many users and industry associations in the development of the X.435 message handling standard to allow for the more particular needs of EDI messages. Exhibit II-1 summarises the key factors of the European EDI market in 1991. Exhibit II-2 shows the growth of the European Software and Services Market in Western Europe broken down by service/product group. The fivefold increase in the market over the next five years indicates a CAGR of 38% per annum.

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Exhibit II-1

EDI - The Business Enabler rides the Recession

Key Features in Western Europe 1991
· A $100 million market growing at 38% pa · EDI Gateway systems being installed · European fragmentation: - Differing market sizes - Different approaches - Different environments · Country growth varies from 26% to 80% per annum · Banks close the EDI loop · TEDIS II Programme plans for the homogeneous future

C
Country Markets for EDI

For all of the above reasons there is a very variable rate of growth of EDI forecast by INPUT across the different countries reviewed in this report:

- At the low end of the scale, the UK market will grow between 1991 and 1996 at a CAGR of 26% per annum.

- At the top end of the scale, the Spanish and Rest of Europe (Austria, Switzerland, Portugal, Greece and Ireland) markets are forecast to grow, admittedly from their existing very low bases, at 80% and 72% respectively per annum.

- Growths in between these extremes are found spread across the range.

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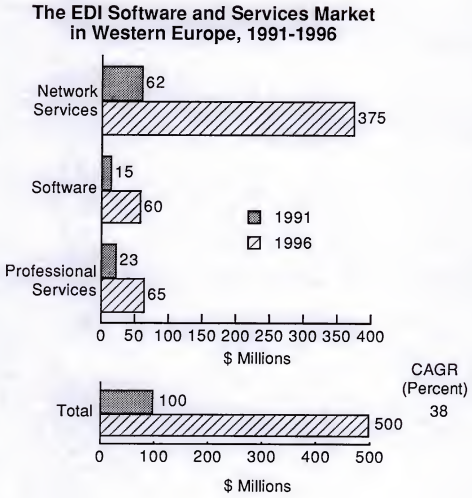
Exhibit II-2



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Recession continues to affect most European economies. It is most marked in the UK and France and is, as forecast in our previous EDI report, affecting countries progressively worse as one looks across the region from west to east. The overall effects of recession have been taken into account in **INPUT**'s forward forecasts.

The growing awareness of users that EDI helps to cut costs is helping to make this sector one of the most recession-proof in the information services industry. Exhibit II-3 contains INPUT's market forecasts by individual country.

D
EDI Countries in Industry Sector Markets

Exhibit II-4 shows the vertical sector forecasts for the EDI software and services market in Western Europe. The manufacturing sector is by far the largest, accounting for 47% of the total market, of which Discrete Manufacturing accounts for 36%.

The retail and distribution sector and the business services sector (13% and 11% of market respectively) are also key markets for EDI. The penetration of EDI in these sectors reflects:

- The reach of the large multi-national third-party networks.
- The drive towards improving pan-European communications, evidenced by the number of projects being implemented throughout Europe in the areas of transport, customs and distribution.

The banking and finance sector is forecast to show the highest average rate of growth over the forecast period. Many companies are already turning their attention to the problem of completing the EDI loop using electronic payments. Many banks and SWIFT, the international EFT clearing-house, have moved, or have announced their intention to move, into the market for general and specific EDI-based services - as anticipated in our previous report.

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E
EDI Vendor Recommendations

INPUT finds that the EDI market in Western Europe is likely to go on suffering from a high degree of variability in terms of:

- Infrastructure for networking
- User sophistication in the use of EDI
- Current national market size and growth rates.

For this reason we cannot yet speak of a truly homogeneous regional market for EDI in Europe, although EDI is a key enabler in the creation of the Single European market.

The user experience of EDI brings him to a realisation of his requirements for a series or range of services.

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Exhibit II-3

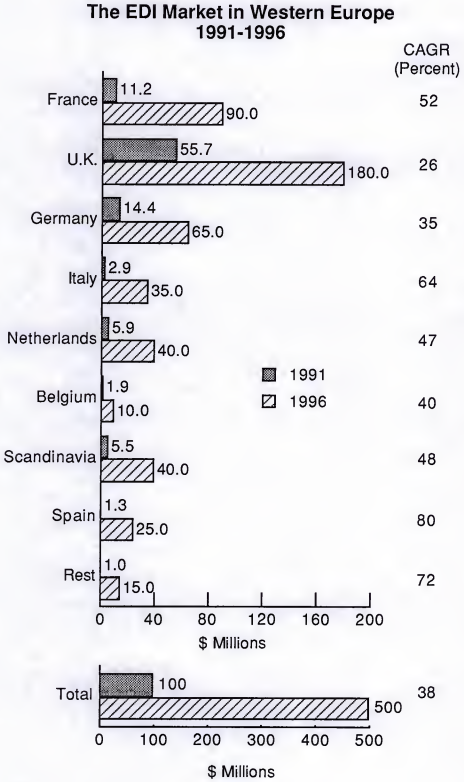

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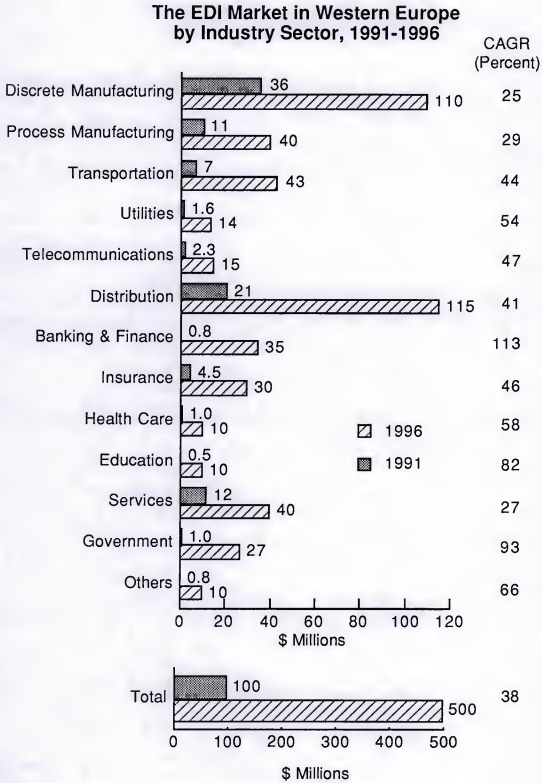
Exhibit II-4



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The vendors therefore have a choice to select to provide from a whole range of service approaches:

- Project evaluation and consultancy
- Application integration studies
- Specific software evaluation and procurement assignments
- Application developments with EDI a key integral capability
- Systems operations and systems integration projects.

Vendors operating in the EDI market will broadly speaking, be able to provide one or two of the three groups of service:

- Network Services, including start-up software facilities
- Software products and their maintenance
- Consultancy, training and project integration assignments.

Vendors must focus their offerings by three dimensions:

- Services type
- Industry sector or sectors
- Target country markets.

Vendor background and size will normally limit their degree of freedom in the first and last of these dimensions:

- Only large vendors will be able to offer the whole range of services.
- Only the larger vendors will be able to pick and choose their country markets; for the smaller vendors the domestic market is everything but they must also watch the competition from entrants from overseas markets if they are not going to be swamped on their home ground.

Vendors should keep their EDI services under constant review by recycling through the following steps:

- Determine their services focus.
- Decide on which industry sector to target, focus using the **INPUT** EDI Matrix (see Exhibit V-1).

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- Determine the level of sophistication of each target country market. This will influence the appropriate service portfolio to be marketed, network services, software products and support, or professional services - and their mix.

- Re-assess service focus options by country - if this is possible, ie. this applies to major vendor companies only, companies who can attack more than one market at a time.

- If the chosen service focus does not match requirements or is unnecessarily restricted, select other industries or countries until a suitable fit is achieved.

INPUT's recommendations are summarised in Exhibit II-5.

Exhibit II-5

Vendor Recommendations

- Recognise market variability
- Understand the cycle of user maturity
- Decide on service focus:
  - Services type
  - Sector
  - Country

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III EDI and Electronic Commerce

As business moves from being conducted in a paper-based to an electronic-based environment, profit opportunities change. Electronic systems - based on a combination of computer and telecommunication systems-particularly where software, services and intellectual property play a large value-adding role-bring about new distributions of costs, revenues and competition within an organisation, within an industry, and within an entire economy.

Electronic systems allow for the introduction of new products and services to business and consumer markets. Furthermore, users and vendors of information services and technologies are finding that their respective business operations and strategies are becoming increasingly intertwined, with the user relying on the vendor for maintenance and upgrades and the vendor relying on the user to increase its market share and enhance its on-going technical competence.

Moreover, because information systems are often equivalent or even identical to the value-adding function of the user's business itself, the user of information technologies may opt to sell its system (particularly software and services) and, in a way, replicate its business or a portion of its business for a profit. In this way, an information service user becomes an information service vendor.

The shifting profit opportunities and the intertwined, dual identities of market participants makes for a very dynamic competitive environment, one in which it is increasingly difficult for executives, managers and entrepreneurs to make strategic decisions about how to apply information technologies and where to look for new commercial opportunities and risks.

Besides the difficulty in assessing competitive opportunities and risks, the emerging electronic environment in which commerce is conducted is changing the nature of the economy. According to some estimates, "information work" accounts for as much as 70% of the GNP of the USA. Since information work is the domain of electronic, information technologies, applying these technologies to economic activity portends a major reconfiguration of work, business organisation, and productive resources.

A
Electronic Commerce

To describe this fluid technological/business environment, INPUT proposes the term "Electronic Commerce." While this term has been used casually by others in the information services industry, INPUT has decided to make it a formal and distinct market classification and the basis for a commercial product: one of INPUT's market research and strategic planning services.

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Examples of electronic commerce technologies can be found across all industries; for example:

- Retailing: point-of-sale (POS) and on-line purchasing systems to manage stock levels and pricing

- Distribution: electronic data interchange (EDI) and trade management systems that handle letters of credit, trade documentation, payments, shipping, and so forth to reduce delays and paperwork

- Banking: ATMs and cash management systems to facilitate fast, cheap, reliable payment and to reduce the costs of brick and mortar branches

- Insurance: sales force automation and image technology for the management of paperwork and policy issues

- Airlines: reservation systems and on-line yield management and pricing systems that manage seat inventory to maximise yield and facilitate access by travel agents

- Manufacturing: purchasing systems, computer-integrated manufacturing, and electronic data interchange to track unit costs and quality and to manage just-in-time inventories

- Magazine and newspaper publishing: satellite distribution to ensure timeliness

Many electronic commerce technologies can be utilised within a single company, Electronic commerce technologies might include:

- On the income side:

  - Consumer electronic bill payment

  - The collection of rent payments from commercial tenants

  - Direct debit of insurance premiums

  - Direct debit of maintenance agreement fees

- On the operations side:

  - Cash concentration

  - Direct deposit of payroll

  - Direct deposit of travel expense compensation

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- On the expense side:

  - Credit line fee payments
  - Real estate rent payments
  - Utility payments
  - Payment of pension benefits
  - Annuity payments
  - Tax payments
  - Financial EDI to merchandise sources

Whether from an industry or an individual company viewpoint, electronic commerce is how corporations and consumers participate in market exchange using electronic communication technologies.

Commerce, by definition, is an act of communication between two or more human beings. Electronic commerce is the augmentation of human communication with electronic information technologies. In this context, INPUT's definition of electronic commerce is as follows:

- Electronic Commerce is the electronic networked-based coordination of material, people and processes that facilitates commercial exchange.

The market for electronic commerce services is measured by counting all expenditures by consumers or corporations for products or services that facilitate a commercial exchange transaction where the product or service is delivered or conducted electronically, possibly but not exclusively over an electronic network. For example, the telephone charge for the person ordering pizza from the local pizzeria is counted as an electronic commerce service expenditure, but the value of the purchase is not. The charge to use an airline reservation system is an electronic commerce charge, but the cost of the tickets is not.

INPUT measures the annual cumulative transaction costs for market participants (buyers and sellers) to use electronic commerce as measured by how much electronic commerce vendors collect in revenues. INPUT is not yet willing to measure how much of the total value of trade within the economy (what portion of GDP or GNP) is conducted via electronic commerce. This second measurement would give an indication of how much information technologies are worth. The reason for this hesitation to make such a measurement is because the value is measured in opportunity cost, as assessment of which calls for a multitude of assumptions. For example, how much would it cost for someone to make an airline reservation without a computerised airline reservation system? Many assumptions about possible technical scenarios would have to be sorted through, a very time-consuming and ultimately inconclusive (because there are so many variables) enterprise.

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It is important to note that commerce, as communication among people, happens among employees of the same organisation as well as among employees of different organisations. In a generalised concept, all enterprises are chains of customers. Within a single enterprise, for example, the shipping department's customers the manufacturing sections; manufacturing has customers in sales, and so on. The chain of customers within a corporation connects the corporation's suppliers to the corporation's customers-a connection that is part of a vertical industry "value chain" of customers that ultimately delivers a product to a final consumer.

Characterising organisations in this way, we can say that electronic technologies are enabling electronic commerce to happen within as well as among firms. The inclusion of intra-organisational activity as commerce is important, because automating an organisation often leads to outsourcing an operation that was formerly performed by in-house staff. To be the most comprehensive in identifying the opportunities and possibilities that information technology generates, INPUT chooses to characterise commercial activity as occurring within companies as well as among them.

B
Technologies of Electronic Commerce

Electronic commerce facilitates the co-ordination and communication that occurs between suppliers and their customers throughout chains of value-adding activities and processes. The emerging electronic infrastructure that supports this communication allows for a wide spectrum of technologies and applications that go by a variety of names today.

A more descriptive but not exhaustive list of electronic commerce technologies is shown in Exhibit III-1.

A possible classification scheme for these technologies is shown in Exhibit III-2.

INPUT estimates that users of electronic commerce services and systems in Western Europe spens $68 billion for these services in 1991. This figure does not include hardware expenses. Almost 80% of this amount ($53.6) billion) was expenditure on voice telephone services (calls for business purposes, free phone services, data communications changes and video communication charges). The remaining 21% (approximately $14 billion) was expenditures on transaction processing services (such as airlines reservation services, credit card authorisation services, payroll processing, etc.), information services (economic and financial data bases, credit data bases, news data bases), value-added network application services (electronic data interchange, electronic mail etc - over and above the basic transport charges which are accounted for in the voice-based data service portion), and systems operations (data centre operations by an independent third party).

A breakdown of expenditures on electronic commerce by users is presented in Exhibit III-3.

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Exhibit III-1

Technologies of Electronic Commerce (Constitutive and Enabling)

- Data Network Services
  - Electronic data interchange (EDI)
  - Electronic mail (E-Mail)
  - Data base and on-line information services including: price, financial, and statistical data bibliographic, news, and archival full-text data, credit card authorisation data and credit history, product catalogues, directory services
    - Automatic vehicle location
    - Computer-aided dispatch
    - Electronic order entry
    - Electronic buy-sell bulletin boards
    - Electronic funds transfer
    - Home banking
    - Cash management
    - ATM and POS networks
- Image Network Services
  - Facsimile, including auto fax generation and group broadcast
  - Document transmission
  - Cheque clearing
  - Credit card processing
- Voice Network Services
  - Voice mail networks
  - Interactive voice response
  - Third-party telemarketing
  - Third-party customer support
- Transaction Processing
  - Credit card processing
  - Reservation systems
  - Payroll processing
  - Freight-bill processing
  - Electronic securities trading
- Other Processing
  - Laser printing
  - Field sales support services
  - Microfiche publishing
  - Disaster recovery and back-up
  - Data entry
- Data Capture
  - Point-of-sale data capture
  - EDI transaction data bases
  - Smart cards
  - Debit cards
  - Automatic identification (bar coding, radio transponders, etc.)

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Exhibit III-2

Technology Positioning for Electronic Commerce

	Real time	Store and Forward
One-to-many	Stock quotes Directories Credit card data	Bulletin boards News Credit profiles Bibliographic data bases Legal data bases (Broadcast messaging)
One-to-one	Interactive EDI OLTP	Batch EDI Messaging E-mail Fax Voice mail

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Exhibit III-3

Western European Market Size

for Electronic Commerce

	1991 Expenditures ($ Billions)
Data Services	
Transaction Processing Services	6.5
· Industry specific (includes bank/financial processing, airline reservation systems, credit card authorisation ,etc)	
· Cross Industry (includes payroll processing, accounting etc)	1.9
Information Services (financial and economic data bases, etc)	3.3
Network Applications (EDI, E-Mail, VAN services, etc.)	1.1
Systems Operations	1.5
Total Data Services	14.3
Voice Services	
Local, Long-distance and International Business Calls (Carrier Revenues in Western Europe)*	35.0
Data Comminications Leased	8.6
Total Voice Services	53.6

* *Includes charges for data transmissions and video transmissions.*

Source: INPUT

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C
Impact of Electronic Commerce

The networked economy is producing new commercial phenomena such as global manufacturing, global financial markets, and frequent buyer programs. There are many ways of bringing some kind of cognitive order/classification to the multifarious phenomena. We can look at how electronic commerce helps companies compete on cost and product differentiation (Porter's distinctions); how it helps markets clear and efficiently allocates resources (traditional economics approach); how it changes the business game-the playing field, the players, the rules, the strategies (a game theory approach).

To keep it simple INPUT will examine the phenomenon of electronic commerce in terms of how it:

- Redefines organisational and industrial structures and the roles of employees
- Allows organisations to make new offers in the marketplace
- Helps organisations reach new customers and block competition
- Helps organisations satisfy existing customers.

1. Industrial and Organisational Restructuring

Incorporating electronic and automated procedures in a value chain or chain of customers allows for the removal of many intermediaries within the chain. Within a single organisation, back-office systems handle much rote, repetitive data processing that formerly required armies of clerks. Within a value chain (for example, the textile/apparel manufacturing/retail chain) whole businesses can be eliminated (for example, certain warehousing functions) because communication and co-ordination between the key value-adding agents is better:

- Many retailers that have reduced reliance on distribution intermediaries and have direct deliveries made to stores from manufacturers. EDI has been responsible for this more efficient communication.
- A specific example of how electronic commerce can fundamentally restructure an industry is the library subscription business.

Another way electronic commerce reshapes an industry is that it allows companies-even competitors-to share market information where all participants benefit. For example, many pharmaceutical distributors and hospital buying agents have formed EDI consortia. A consortium contracts with a network processor to create aggregate sales reports from EDI traffic that flows through the network. The consortium is better able to manage its sales and hospital buying contracts.

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Electronic commerce allows companies to restructure functional groups such as accounting or purchasing within the business. Many multi-divisional companies, for example Hewlett-Packard, use EDI to centralise their purchasing. Centralised purchasing is desirable because of potential volume discounts, more leverage with vendors and reduced company purchasing department costs through the elimination of unnecessary organisational redundancy.

Small customs brokering houses and transportation companies are becoming information clearing-houses, software system resellers and integrators, rather than just offering their original services. For example, AT&T is now a credit card/finance company.

2. Reduced Transactions

Another way of looking at the industrial and organisational restructuring that takes place as a result of electronic commerce is how it reduces the number of transactions associated with a commercial exchange. Transactions arise as a result of one person (or agency) transferring to another person or agency part of the work that goes into the delivery of the product or service. Costs are directly proportional to number of transactions. Whether it is taking out a mortgage, purchasing supplies, or transporting freight to a foreign destination, electronic technologies can reduce the number of transfers, and thereby, transaction costs.

As pointed out above, reducing transactions can fundamentally alter the way work is accomplished not only in organisations but also in whole industries or value chains. Some industries (for example, agenting and distribution) exist merely to handle differentials in transaction costs. With electronics, these industries, as collections of people, have no need to exist.

Eliminating the superfluous, secondary exchanges of a targeted commercial transaction is one of the goals of electronic commerce systems.

3. Redistributed Resource Usage

Telecommuting-people working at home using a computer connected to a network-illustrates how electronic commerce shifts resource use. The potential implications of telecommuting on traffic, the automotive industry, office property prices, city tax bases, urban and rural land usage, etc. are vast.

4. Variable-Cost Manufacturing versus Fixed-Cost Manufacturing

The industrial apparatus and economic system is becoming more and more reliant on network technologies. We are seeing the corporation's cost structure (and industry cost structure) become more and more one of fixed overhead costs rather than variable, labor-based costs as companies invest in more capital-intensive, technology-based systems. Electronic commerce is intrinsically a highly capital-intensive organisation of the economy.

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Information technology eliminates the many intermediaries within organisations, and within value-chains, goods and services can be moved from producer to consumer with fewer transactions. Fewer people are needed to accomplish the same results. Like agriculture's transition from being the principal employer at the turn of the century, many of today's industries are providing greater output with far fewer people (particularly, for example, in banking).

Consolidation is occurring in one industry after another-banking, airlines, autos, oil, retail, utilities. Information technology is spurring this consolidation because it allows a company to increase the scale of operations without necessarily increasing its labor component. With companies increasing their volume of service, the market soon has a production overcapacity. The surviving companies of an industry consolidation resemble utilities, or administrative monopolies. The cost structures of utilities are carefully regulated and optimised. Investments in the utility infrastructure are recouped by setting consumer prices based on fair rates of return. This same kind of product pricing may apply to companies advanced in EDI or other electronic commerce markets.

5. Changing Employee Roles

One of the chief impacts of information technology is the reduction of clerical labor. Also, the portion of managers' and professionals' work that is devoted to clerical functions can be greatly reduced.

Sales representatives and procurement officers - the two sides of the commercial transaction between typical large companies - are freed of the bureaucratic chores of paperwork and can concentrate on relationship building.

D
New Product Offerings

In addition to allowing a company to spin off entirely new products, electronic commerce allows a company to "fine tune" its offerings of existing products through product-feature and price differentiation.

1. Product Differentiation

Electronic commerce systems support flexible, customised manufacturing because of the better co-ordination of productive resources that EC engenders. For example, the National Bicycle Company of Japan can make a bicycle for a customer in literally millions of different product configurations, options, colours, etc. This capability will appear shortly in the automotive industry. Thus, electronic commerce supports absolutely unique product manufacture: no two products are the same.

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Another aspect of product differentiation is when a company that develops information technology (software or a processing utility) for its own internal purposes decides to commercialise the development and sell it externally. This is another way of characterising the restructuring of business.

2. Price Differentiation

Electronic commerce also supports the "customisation" of price. Frequent buyer programs, first introduced by airlines and now being used in grocery stores for consumer goods, may lead to a situation in which all prices are unique. The customer (who identifies him/herself at the point of sale with an electronic identification card or number) is given price discounts on products depending on how much of the product he/she has purchased in the past.

Frequent buyer (also known as yield management) programs rely heavily on discounting prices, changing them-in the case of the airlines-millions of times per day. In the area of airline yield management systems, the aim is to ensure that (1) when a plane takes off it carries the highest profit, (2) that there are no empty seats that could have been sold at another discount, and (3) no seats are filled by passengers who paid a low fare while full-fare travellers were turned away. Only information technology, where purchasing activity can be monitored and prices can be updated by the second, makes yield management possible.

Frequent buyer/yield management programs are being introduced by credit card companies (namely, Citibank). Thus, purchases of any product entitle the purchaser to certain discounts as long as he/she uses the same credit card or payment facility.

Frequent buyer technology is being applied for corporate purchases. Hospitals have agents purchase pharmaceutical supplies for hospitals. Agent buying allows hospitals to get bulk purchase discounts. Pharmaceutical manufacturers like selling in bulk because it is more reliable and costs less per transaction. Nevertheless, to purchase in this way is information intensive. The administration of complex contracts that spell out which products, over what period of time are available from which suppliers and available to which hospitals must be managed. With electronic commerce they can be. Only electronic commerce systems permit this to happen.

In the commercial transactions between manufacturers and distributors (especially in grocery and pharmaceuticals), the distributor/buyer is often given a 2% (or some percentage) discount if it pays the invoice within 10 (or some other number) of days. Distributors negotiate these terms individually. Often it is these terms and the cash flow/float that derives from the payment timing that is a critical profit maker. A 2% price discount is an important benefit that offsets the foregone interest when a company acquires inventory.

Price differentiation, however, is tricky and companies must be careful to distinguish it from price discrimination, in order not to fall foul of laws dealing with unfair pricing and competition.

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3. Market Clearing (Supply Equalling Demand)

Another way of looking at price differentiation (as mentioned above) is that electronic commercial systems help to clear markets. Whether for computer assisted securities trading or airline reservations, computers can help buyers and sellers agree on price. (Critics argue that programmed trading may introduce greater instability to already reactive marketplaces, and an investigation by the US Securities and Exchange Commission is examining this issue.) San Fransisco-based Marketel International Inc. has software that makes it possible for each airline flight to have an infinite number of fares. The electronic marketplace can be extended to any relatively standard commodity.

E
Reaching New Customers

All markets are confined one way or another by physical constraints. Geographic distance (between buyers and sellers) has traditionally been the leading constraint. The constraint of electronic commerce is the requirement that any participant must have some kind of hardware device that connects him/her to the general commercial network. These devices are listed in Exhibit III-4.

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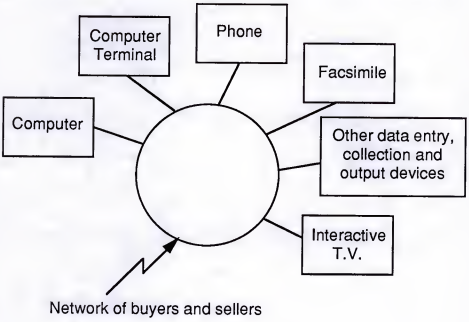
Exhibit III-4

Access Devices to Electronic Commerce Markets



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Investing in hardware, although a necessary condition for participation in an electronic marketplace, is usually not sufficient. Technical compatibility of the devices must be worked out, a process that has competitive consequences. Authorisation and promises to pay access fees to be on the network are other important issues. The technical-political domain of the marketplace-who is permitted to participate-is a central competitive issue. Below are some aspects of this issue.

1. Locking In Customers, Locking Out Competition

Electronic commerce systems, because they rely on a networked, technical platform, usually have some entry costs for the market participants. These costs include system components, terminals, network charges, and the integration of terminals with existing applications. Airline reservations systems and on-line hospital ordering systems for medical supplies are well-known examples.

Also, large network-based markets can be dominated by a single vendor which implements its own standard for communication (often referred to as a proprietary EDI system). Some examples are SWIFT's SWIFT I network, the LACES cargo handling systems for London airport and even the SEDAS distribution sector standard which was implemented in the German speaking countries - all of which could be considered proprietary.

When a company first offers an electronic ordering system, it wants to keep it proprietary, thus preventing its competitors from selling to its customer base. After a certain point, however, the company's customer base wants all of the market's suppliers to be reachable through a single, uniform system. The original vendor of the proprietary system can opt to allow its competitors into its own proprietary pipeline or to migrate its system to a standardised one. Standardised systems, in the end, are less costly for the vendor because the customers and competitors in the market can directly pick up the cost of building and maintaining the equipment and software infrastructure that maintains the electronic market.

2. Access and Flexibility

Electronic commerce systems allow greater flexibility in that they deliver more options to buyers and sellers.

The US federal government (General Services Administration and the Defense Logistics Agency) is devising a system that would broadcast all government request for quotations to a central data base repository. Any vendor throughout the country would be able to access the data base to make a response. By broadcasting the RFQs over a network, more vendors can respond than if it were broadcast by other means. International trade leads, gathered throughout the world by embassy business attaches, are also broadcast over bulletin boards. The European Commission host (ECHO) offers TED (Tenders Electronic Database) as an on-line service to organisations wishing to tender for commission projects.

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3. Standardisation

Integrated, inter-organisational systems of production typically require the co-ordination and operation of many complementary constituent parts. Industries that provide the parts for these systems will adopt standards to allow many vendors to provide compatibility among their respective products and allow users to assemble the necessary systems. Multi-component, multi-agent industries can be called networked industries; historical examples include railroads, electric power utilities, and telephone industries. All such industries utilise increasing-returns technologies that link their users-physically or otherwise-in a network. The dynamics of networked industries, which have strategic competitive implications for both users and vendors of network technologies, are highly relevant to electronic data interchange and other electronic commerce markets.

World commerce is being transformed from a paper standard to an electronic standard for business communication. The standardisation of the new electronic environment has competitive and efficiency implications. Locking in on a certain standard (such as UNIX, or SPARC chips, or X12 rather than EDIFACT) determines the subsequent path of commercial development and opportunity. A standard may prove to be imperfect (such as the QWERTY keyboard) and a better one may be devised (the Dvorak keyboard) but, because the installed base of the sub-optimal standard is large, the costs of retrofitting are too high. In many cases the better standard is never implemented.

Setting standards involves anticipating and designing the future. These undertakings are often bound to fail to some extent. Capturing installed base, making products to accommodate sub-optimal standards, moving from old standards to new ones-all these activities are part of today's competitive electronic commerce environment.

4. Increasing Returns to Scale/Leveraged Recurrence

EDI systems initially cost more (in software, network services, and systems integration) than using traditional paper-based systems. Also, an EDI system will probably never entirely replace a paper-based system. Thus, for an EDI system to pay for itself, it must process a large volume of transactions. This is characteristic of all electronic commerce systems. Electronic commerce has an initial high investment and overhead cost that is justified only by the system being used in a great number of recurrent operations.

Like the telephone specifically, electronic commerce in general requires a certain critical mass of users before it becomes a useful medium. The first telephone subscriber has a useless system on his hands: there is nobody else to call. As the number of subscribers on the network expands, the usefulness of the network expands at an exponential rate.

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There is an industry-wide phenomenon associated with electronic commerce. Electronic payment services among a community of banks operate at the level of effectiveness of the least efficient bank. Because commerce takes place between the companies of all banks, all banks must have a common, standardised electronic payment format that they can all send to each other and process. Today, there are various formats for electronic payments. Only a handful of banks have the capacity to originate and process the most efficient formats. But their ability to do so is not exploitable because very few other banks can use this format. The payment system as a whole is diminished because not all banks have equal capacity. The more banks that can process the more-efficient formats (i.e., the greater the scale of optimal-format processing capacity), the greater the overall economic return of the payment system as a whole.

This can be called a "weakest link" or "lowest common denominator" syndrome/effect.

F
Satisfying Existing Customers

Electronic commerce facilitates the making, negotiating and consummating of commercial exchanges. The goal is to make the operation of a given business not a barrier between the customer request (for service or product) and customer satisfaction. Historically, the time and cost for a company to fulfil a customer request has led to dissatisfaction. Appropriately installed, electronic commerce systems overcome these barriers to customer satisfaction.

The just-in-time (JIT) and quick-response (QR) strategies in manufacturing and distribution are well known. These strategies rely on more than just electronic information technologies. However, computers and telecommunication lines are critical components of the strategies. The objectives of JIT and QR strategies are to improve response time between supplier and customer and to continually reduce price. Examples of these strategies are many and further mention is not necessary.

1. Monetary Redefinition: Electronic Bartering

An interesting phenomenon that might be included in the category of customer satisfaction is how money and finance can be changed by information technology. Money and information technology are both tools that facilitate commercial exchange and, as such, are not different phenomena but different aspects of the same phenomenon. Money, in the words of the chairman of the Citicorp, is "information on the move." As a "medium of exchange," information technology can be identical to money and can itself play the role of money.

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Large companies that buy from each other (e.g., Motorola buys workstations from Digital; Digital buys semiconductors from Motorola) and use EDI to do so are finding that they can revert to "electronic bartering." Computers keep track of the transactions between the two companies. At the end of a period, the net owed amount is determined and a single payment is made. This reduces the costs of raising payments for each individual transaction. Netting systems for banks are another form of electronic bartering.

Widespread use of electronic bartering would reduce the payment-services business that banks provide.

The use of smart cards and debit cards could also potentially erode banks' control of the payment franchise. A Japanese department store, vending machine operators, public transit companies and telephone companies are issuing cards to consumers for prepaid amounts (the consumer pays a specified amount up front; the card is credited with this amount; every time the card is used it is debited). The money that these cards represent is outside of the traditional banking system of a country (there is no central bank control).

Merrill Lynch's cash management account is another example of information technology allowing the creation of a new kind of financial instrument. To savers, the cash account is a high-yield savings account with complete liquidity. But the money is actually invested in a broad variety of financial instruments.

The use of information systems to supplant money creates challenges to government bodies. In addition to encroachments on central bank control, information technologies could potentially make more difficult the collection of taxes by tax authorities if electronic bartering arrangements are established among companies.

Funds represent promises to produce action in the future. In this sense, money is no different than the majority of other communications that constitute electronic commerce. Electronic commerce is people making promises to each other (to deliver goods, services, or cash) over electronic networks. Viewing money as a particular kind of promise is useful in determining how a company should take advantage of electronic commerce possibilities.

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IV Market Analysis and Forecasts

A
Market Growth in Western Europe

The EDI market has been researched and measured as a set of component products and services which have then been aggregated to form the total market size:

- Network services, which include at the basic level:- maintenance of access points, error correction, protocol and speed conversions, service switching, interworking through gateways, and store-and-forward post-box and mail-box services. These services are typically provided by third-party service providers' networks, although private and public (PTO) networks may provide many of these elements during at least part of the message transmission paths.

  Additionally, third-party networks will also provide the associated EDI processing services, such as data field validation, data format translations, standards conversions, as well as directing the transmission of electronic transactions, which have been submitted electronically in batch mode, to their individual destinations, covering also the cases of multi-point transmissions ie: to more than one destination and break-outs into other service media such as E-mail, fax or voice messaging for those users who cannot support a full application to application connection end-to-end.

  In INPUT's estimates of the components, we include user expenditure charged for via a number of different charging mechanisms:

  - Subscriptions for joining a network community
  - On-going message transmission fees, usually a function of the numbers of messages sent and/or the numbers of characters passed/sent/received.
  - Annual renewal charges for subscribing to a network or a network community/service.

- Software for translating data between EDI standards and to handle communications and communications software associated with EDI transmissions. These are part of the software products market, and include substantial pieces of code such as full function enterprise gateways.

- Professional services for systems design, software customisation, equipment selection and acquisition, systems integration, facilities management, education and training, so long as these services can be reliably allocated to their user's EDI projects.

The aggregated market growth forecasts are given in Exhibit IV-1, which shows a 38% compound annual growth rate (CAGR) through to 1996.

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EDI is anticipated to continue with a significant growth rate, based on the fact that the various inhibitor forces (multiple standards, software availability, networking complexity, up-front costs) are being outweighed by the driver forces pushing the industry forward:

- There is an increasing realisation that EDIFACT represents an opportunity to speed up the progress in standardising message formats, while at the same time developing initiatives in specific industry sectors. ODETTE in the automotive industry, CEFIC in chemicals, EDIFICE in electronics, the EEC's Single Administrative Document (SAD) for import/export, have all produced early versions of standards applicable to their sectors. It is now possible using EDIFACT syntax to develop these industry standards in ways which ensure compatibility with the common messages, which are now starting to emerge in substantial numbers from the EDIFACT committees;

- The availability of relatively inexpensive standard software packages for interfacing internal applications to EDI services has opened up the EDI market to smaller companies which would never be able to afford mainframe or mini computers, but are able to perform EDI transactions on a microcomputer. Europe is very well provided for in terms of choice of product, there being of the order of 100 products currently serving this sector.

- Thirdly, the spread of telecomms innovations. Slow liberalisation across Western Europe means that smaller European countries can now benefit from the type of network services which have been available in the UK for over five years - depending upon the policies of the various PTOs.

  Third-party service providers fulfil an important role in the market bringing to bear an ability to interconnect EDI users within and across vertical market sectors. Their role as full-service providers, offering professional services and software as well as purely network/data services, has been enhanced by the currently difficult trading conditions encountered in 1991, which have already caused the demise of certain software houses who had not built up their organisations to be in a position to weather the storm.

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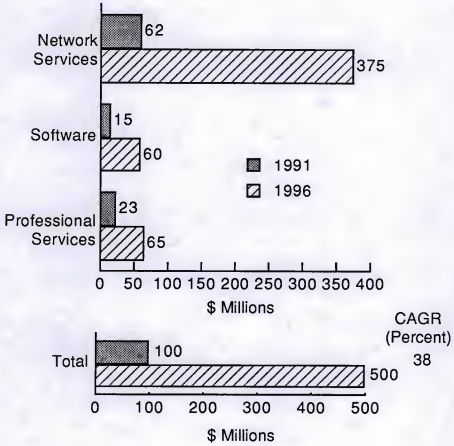
Exhibit IV-1

The EDI Market in Western Europe by Industry Sector, 1991-1996



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B
Forecast Reconciliation

Appendix B shows the differences between the current forecast and INPUT's 1990 EDI forecast in the report entitled, "The Western European EDI Market 1990-1995".

The 1990 market was considerably undervalued in the 1990 report (by 48%). This was due to underestimating the size of the network services component (which is the only element incorporated under the heading EDI in INPUT's Network Services Programme).

The overall future growth rate forecast in this report has been reduced over that used in last year's report due principally to three factors:

- The slow-down exhibited by the world economy during 1990, which INPUT expects to continue as a recession well into 1992.

- The move from a stage where many stand-alone, pilot-type, EDI projects are being implemented to a new phase where many large organisations are turning to full-scale EDI production-level projects, which require careful planning and design at the initial stage.

- The incorporation of much European EDI transmission charged in other market segments (such as E-Mail or fax where X.400 services are used or where end-to-end application-to-application support is not available).

Growth remains high, however, for the following reasons:

- The market is scarcely penetrated to a level above a fraction of one percent of organisations and in some countries is starting from a very low base. INPUT calculates that there are about 200 user communities operating or in a pilot stage throughout Europe and that they are supporting some 20,000 subscribers.

- The large number of pilot projects currently in operation throughout Western Europe is now starting to move on to full EDI implementations with the consequent need to involve software, hardware and professional services vendors in systems integration projects.

- Use will continue to grow in step with user experience. Additional transactions to be implemented by users and uptake of facilities by their trading partners will account for steady transaction volume growth.

- Private EDI implementations will eventually become fully open with integrated gateways opening between private and public services, placing more user expenditures in the available non-captive market.

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- Integrated EDI gateway software from the major mainframe software vendors and EDI add-on modules from independent sources is becoming available, typically from IBM, Digital and Hewlett-Packard.

Towards the end of the forecast period a contrary trend will tend to counter the higher growth tendency:

- User expenditures are expected to moderate even though transaction growth will continue at high rates. This will be as a result of competition between vendors which will lead to price cuts in message transmission costs, so depressing user unit expenditures per transaction.

- Discounting will increase as higher volume transactions occur.

C
Market Forecasts by Major Country or Country Group

The total market for EDI software and services provided by third-party providers, ie the non-captive market within Western Europe is anticipated by INPUT to have reached $100 million in 1991 and to be growing at a compound annual growth rate of 38%,

reaching a total of $500 million by the end of 1996, as illustrated in Exhibit IV-1.

The majority (62%) of the EDI software and services market comprises network services, with 15% of the market attributed to EDI software products and their maintenance and with the balance of 23% held by professional services and systems management projects. This is shown in Exhibit IV-2.

INPUT anticipates that the network services sector will continue to represent the largest slice of the total EDI market throughout the forecast period and will in face increase its share to 75% by 1996. The software and professional services share, will shrink to 12% and 13% respectively as the market stabilises along pan-European lines. The steady growth of EDI over the forecast period is illustrated in Exhibit IV-3.

Exhibit IV-4 shows the overall analysis of the EDI software and services market by individual country or country group markets. A more detailed discussion of these individual country markets is provided in Chapter V of this report. In 1991 the UK held just 56% of the total European market. By the end of the forecast period two-thirds of the market is expected to be held by the three largest economies in Western Europe, UK (36%), France (18%) and West Germany (13%), with The Netherlands and Scandinavia each holding 8% ahead of Italy's 7%.

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Exhibit IV-2

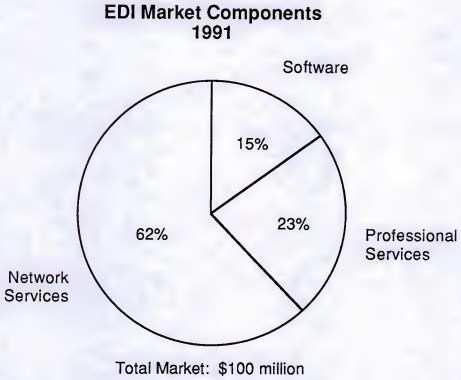

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Exhibit IV-3

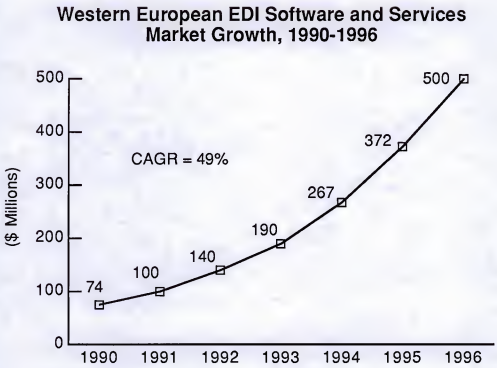

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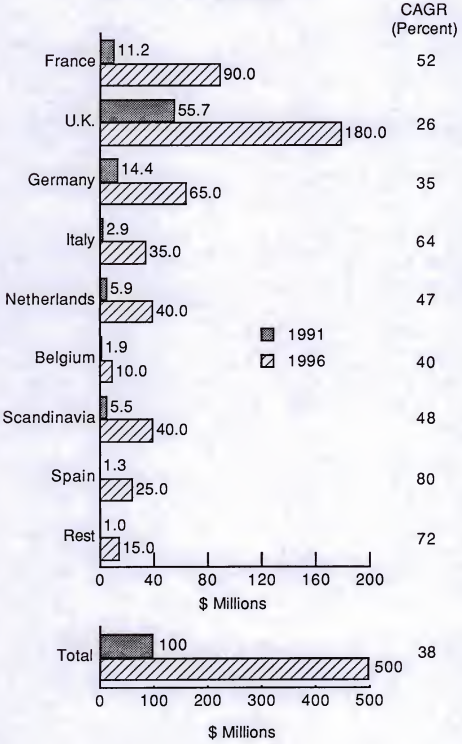
Exhibit IV-4

The EDI Market in Western Europe 1991-1996



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D
Market Forecast by Industry Sector

The comparative vertical or industry sector analysis is shown in Exhibit IV-5. The benefits of EDI in reducing administration costs and in improving stock control and customer service is reflected by its take-up in the manufacturing, retail and wholesale distribution and transportation sectors of the Western European market, where these benefits are most easily realised in the improvement of the costs associated with transactions with external trading partners.

Exhibit IV-5

Western European EDI Expenditure by Industry Sector 1991 ($ Millions)

Vertical Sector	France	UK	Germany	Italy	Belgium	Nether-lands	Scandi-navia	Spain	Rest	Total
Discrete Manufacturing	6.0	13.8	10.0	1.7	0.4	0.9	2.1	0.7	0.4	36.0
Process Manufacturing	0.3	8.7	0.8	0.2	-	0.4	0.5	-	11.0	11.0
Transportation	0.7	2.0	1.0	0.2	0.4	1.9	0.6	0.1	0.1	7.0
Utilities	0.2	0.5	0.4	0.1	0.1	0.2	0.1	-		
Tele-communications	0.5	0.4	0.4	-	0.1	0.5	0.2	0.1	-	2.3
Distribution	2.5	14.0	1.2	0.5	0.3	1.1	1.0	0.2	0.3	21.0
Banking (Financial Services)	0.2	0.2	-	-	-	0.1	0.2	0.1	-	0.8
Insurance	0.3	3.5	0.1	-	0.3	0.2	-	0.1	-	4.5
Health Care	-	0.5	-	-	0.1	0.2	0.2	-	-	1.0
Education	0.1	0.3	-	-	-	0.1	-	-	-	0.5
Services	0.2	11.0	0.3	0.2	0.1	0.2	0.2	0.1	-	12.3
Government	0.1	0.5	-	-	-	0.1	0.2	-	0.2	1.0
Other	0.1	0.2	0.2	-	0.1	-	0.2	-	-	0.8
Total (rounded)	11.2	55.7	14.4	2.9	1.9	5.9	5.5	1.3	1.0	99.8

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Exhibit IV-6 gives the detailed forecasts of the EDI market by industry segment for the period 1991-1996. INPUT forecasts that the highest growth will be experienced in the Banking and Finance sector where penetration is currently very low. Government and Education are the other two high growth sectors, although again they are starting from currently very small market sector sizes. Manufacturing, Distribution and Transportation will remain the sectors where greatest use is made of EDI technology. Steady amounts of growth will also be seen in the Health Care, Insurance and Business Services sectors.

E
Competition

The leading vendors in the EDI software and services market are listed in Exhibit IV-7. This is based on the INPUT estimates of the revenues that were gained by vendors in 1990 and also shows their equivalent market shares.

INS (the ICL/GEIS joint venture) continues as the market leader due to the success of its Tradanet network in the UK. GEIS trading in its own right appears in second place helped by the reach of its network across Europe and its positioning as a service provider offering international and European coverage. In several countries, GEIS is represented by a distributor or through a joint-venture company. AT&T Istel, another UK-based network services provider, is in third place due to its strong presences in the manufacturing and insurance sectors.

The top 10 vendors accounted for 85% of the market.

Caution should be exercised when drawing conclusions from the lower end of the rankings since positioning is highly dependent on the placing of implementation contracts and the position of closed user groups. EDS, for example, is still building the continent-wide EDI network for its parent company General Motors, which is designed to link computer systems in seven countries, using networks such as AT&T Istel's in the UK, Transpac in France, GEIS in West Germany, Italy, Spain and Benelux. Once this network is set up, EDS would like to sell capacity on it to other commercial users.

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Exhibit IV-6

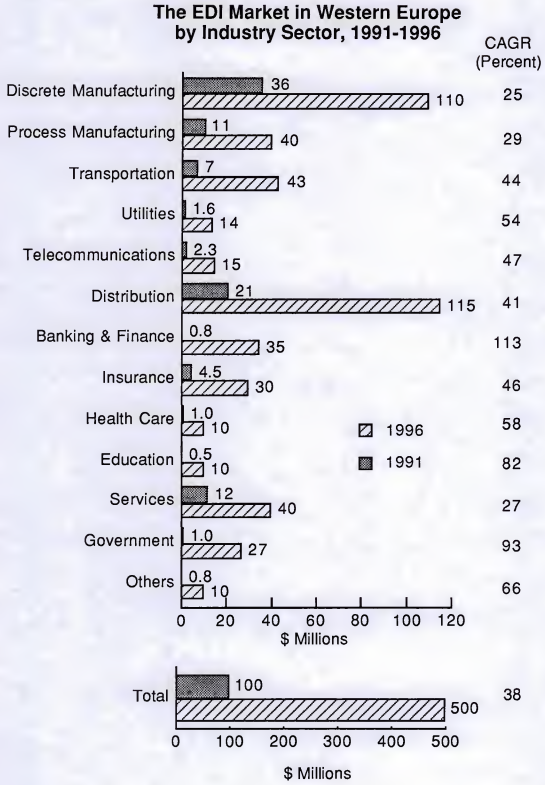

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Exhibit IV-7

Leading EDI Software and Services Vendors,

Western Europe 1990

Rank	Vendor	1990 Estimated EDI Revenues ($ Millions)	Market Share* (Percent)
1	INS	23.7	32
2	GEIS	13.9	19
3	AT&T Istel	9.7	13
4	IBM	5.5	7
5	GSI	2.7	4
6	SD-Scicon	2.6	4
7	EDS	2.1	3
8	Bull	1.1	1
9	Transpac	1.0	1
10	Hewlett-Packard	0.7	1
	Others	11.0	15
	Total Market	74.0	100

* Note: May not add to 100% due to rounding

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V Analysis of Country Markets

A
Overview

Southern Europe has continued as the region in Western Europe providing the most dynamic growth over all in the software and services industry during 1991. Nevertheless, the heart of the European economy still lies in the traditional areas: France, West Germany, the UK and Benelux, where the EDI market has flourished during the last 12 months and all this in spite of the effects of recession.

The UK is still the most penetrated European market in terms of third-party services. INPUT estimates that there were at the end of 1991 approximately 20,000 users or subscribers to European EDI services, with 40% of them, almost 7,000, currently in the UK. However this last year has seen a tremendous increase in the users in other countries, particularly in the Netherlands where there are now over 2,500 subscribers. Exhibit V-1 contains the INPUT EDI matrix for Western Europe, showing the major projects and the numbers (where these are known) of active users in each of 14 sectors and 16 countries.

Projects being launched now are starting to make use of the second round of messages issued (level 1) by the international EDIFACT standards body. This standard will be harmonised in due course with the US ANSI's X12 standard. The European Commission (EC) has sponsored several EDI projects, including COST 306 for the transportation sector and has now launched the second phase of its TEDIS programme.

The 1991 EDI market in Western Europe is estimated to be worth $100 million and is expected to grow at a compound annual growth rate of 38% to reach a $500 million market by 1996. The EDI market components measured remain as:

- Network Services
- Software Products
- Professional Services.

The Network Services component remains the most important.

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B
United Kingdom

The largest individual country market for EDI software and services, the UK is still currently leading the rest of Western Europe. Its market represents just over 55% of the total Western European market due to the development of a third-party clearing-house market in which three vendors are active and a fourth, BT, has now also launched its service in late 1991. The estimated size and growth of the UK sector is shown in Exhibit V-2. This market amounted to £29 million in 1991 and is expected to grow at a slower pace than the rest of Europe due to the more advanced status of EDI within large UK companies.

By 1996, the UK market will be worth £92 million, and will even then represent over 35% of the Western European total. Leading EDI Software and Services vendors are shown in Exhibit V-3. The placing (in revenue terms) among the top four has not altered in the past year, but with the acquisition of SD-Scicon by EDS the US market leader in software and services, a new major player (as well as BT) is now joining the market.

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Exhibit V-1

EDI Users by Country and Sector

Cells contain: • Significant EDI projects
• Estimated numbers of user/subscriber companies

COUNTRIES ↓ / INDUSTRIES →	Discrete Manufacturing	Process Manufacturing	Distribution	Trans-portation	Utilities	Commun-ications	Banking	Insurance	Government	Agriculture	Construction	Education	Health Care	Services
Europe	Odette Edifice	CEFIC	EAN/ EANCOM	EDIS AIR/IMP		ICA	SWIFT EBIC	RINET	EDIS		EDIBUILD		EMEDI AIM	EDIFICAS
U.K.	SMMT 400	Pharmnet	Tradenet 3,000	1,600		EDIPost	(BACS)	LIMNET Brokernet 1,100	CHIEF HEART PURSUIT		EDICON	LEAGS 120	TF2 NHSPLUS ETHOS	AMEDIS
France	Galia 200	EDI PHARM	GENCOD 300	ESCALE PROTIS 100	EDIGED EDILITES		(ETEBAC)	ASSURNET	EDSI DOKANEDI CALS		EDICON-STRUCT			EDIFICAS EDIJUST
Germany	VDA 750	VCI	CGS/SEDAS 2,000	DAKDSY 170		ELFE		GDY			EDI-BAU			
Italy	Odette 700	PUSHED	INDSCOD	COST 306										
Netherlands	Odette 150		SUAC 1,000	INTIS ERTIS 200			(GOO)	ADN 1,000	SAGITTA GBA				IMDF	
Belgium	60		ICODIF 60	SEAGHA				ASSURNET					Hospinet	
Spain	300		AECOM											
Sweden	Odette 170		DAKOM	SWECOM					TDS		DK-BYGG			
Denmark			DVA/OSK	TEDSF						LEC 1,000	EDIBYG EITI			
Finland			100						Customs					
Norway		JIB	NVF	NODI 200			1,500		TVINN				EDINED LASKOM	
Austria	Odette/VDA	EDIPAP	ECODEX 200											
Switzerland			NEANDER	CSS-CH					ZOLL 90					
Rest: - Greece - Portugal - Ireland			ANAI	POLAS ICARNS										

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Exhibit V-2

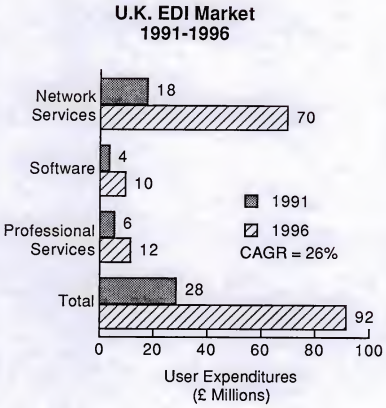

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Exhibit V-3

Leading EDI Software and Services Vendors,

1990 - UK

Rank	Vendor	1990 Estimated EDI Revenues ($ Millions)	Market Share* (Percent)
1	INS	12.2	55
2	AT&T Istel	4.5	20
3	SD-Scicon	1.8	8
4	IBM	1.2	5
5	Telesmart	0.4	2
6	Perwill	0.2	1
7	Digital	0.2	1
8	EDS	0.1	<1
9	Hewlett-Packard	0.1	<1
10	Price Waterhouse	0.1	<1
	Others	1.5	7
	Total Market	22.3	100

* Note: May not add to 100% due to rounding

The process of telecommunications liberalisation in the UK has promoted the development of EDI services, with the UK becoming important for international EDI, serving as a principal hub and gateway for data between Western Europe and the USA. A second factor which has fostered the market has been the adoption of a narrow set of EDI standards for a broad cross-section of industries centred on the wholesale and retail distribution sectors, using the Tradacoms standard.

The majority of UK users are linked with the Article Numbering Association (ANA)'s retail and distribution initiative. The ANA has played a large part in the UK's early adoption of the common Tradacoms standard, which is now used by almost 3,000 firms in the INS Tradanet community. Traffic on the UK's networks has continued to grow during 1991 at a rate of around 3%-4% a month compound.

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C
France

France is the second largest individual country market for EDI software and services. The estimated size and growth of the French market is shown in Exhibit V-4. The market achieved a size of 63 million french francs (FF) in 1991 and is expected to grow at a compound rate of 51% to reach FF500 million by 1996, representing 18% of the Western European EDI market.

The leading French EDI Software and Services vendors are shown in Exhibit V-5. GEIS is the only non-national network services provider with any substantial presence in France, although the AXONE venture which includes participation from IBM is a successful enterprise with growing importance in a number of sectors.

Although France is well ahead of most of the rest of Europe in the implementation of EFT and videotex services, it lags behind the UK in the development of EDI. The retail, distribution, automotive and aerospace sectors are the most advanced. Major studies have been made towards the development of an automated customs system for transporter trade and several port communities are active in the north and the south of the country. Initial moves have been made in the specialist areas associated with the transfer of legal data, accountancy data and construction project information.

The arrival of X.400 services in the market has been one of the major driving force in the EDI market in France. Given the lack of established proprietary EDI services, the emergence of X.400 as a viable standard since 1988, has led France Telecom's free-market subsidiary, Transpac, to position itself in the network services provider business as a provider of EDI and X.400 based services, the one based on the other. Transpac has been well protected by the regulations as the monopoly supplier of the X.25 benefits from national packet-switching network and now special tariff measures as an inducement to move into the domain regarded as one of the natural provinces of the value-added service vendors, ie. the development of private dedicated networks for client applications such as the Esterel network for tourism and travel.

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Exhibit V-4

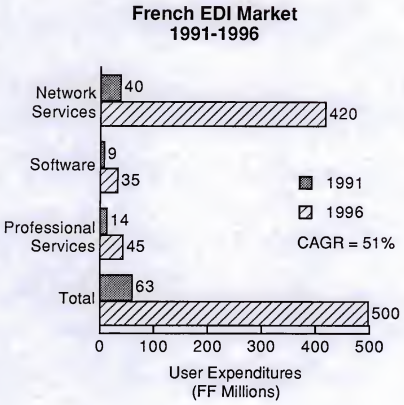

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Exhibit V-5

Leading EDI Software and Services Vendors,

1990 - France

Rank	Vendor	1990 Anticipated EDI Revenues (FF Millions)	Market Share* (Percent)
1	GEIS	20.2	42
2	GSI	11.1	23
3	Transpac	4.8	10
4	Bull	4.6	9
5	Axone/IBM	1.9	4
6	EDS	1.7	4
7	Telesystemes	1.5	3
8	E3X	0.8	2
9	GFI	0.6	1
10	Segin	0.5	1
	Others	0.8	2
	Total Market	48.5	100

Note: May not add to 100% due to rounding

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D
Germany

The German market for EDI software and services is estimated to have reached

24 million deutschmarks (DM) in 1991 and will grow to over DM 100 million by 1996. The estimated size and growth of the German market is shown in Exhibit V-6.

There is a strong bias towards software and professional services associated with EDI, since up to now most German firms active with EDI use their own internal networks for transmission. The leading German EDI Software and Services vendors are included as Exhibit V-7.

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Exhibit V-6

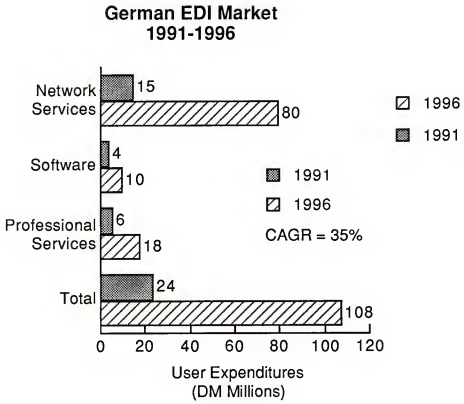

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Exhibit V-7

Leading EDI Software and Services Vendors,

1990 - Germany

Rank	Vendor	1990 Anticipated EDI Revenues (DM Millions)	Market Share* (Percent)
1	GEIS	7.0	42
2	IBM	3.1	19
3	GLI	1.9	11
4	EDS	1.0	6
5	Actis	0.7	4
6	Lion	0.7	4
7=	Softlab	0.5	3
7=	Info AG	0.5	3
9	Meganet	0.3	2
10	Philips	0.3	2
	Others	0.6	4
	Total Market	16.6	100

Note: May not add to 100% due to rounding

The German federal government has always encouraged the use of information systems and in certain key technical areas, such as scientific information and advanced software research, has funded development work. German businesses run some of the most sophisticated networks in Europe, but the business climate has always favoured the in-house or private network solution and this has done little to stimulate the VANS sector. EDI similarly has tended to be run for the benefit of a single large company with direct links to its suppliers. EDI using recognised message standards has therefore lagged behind other major countries such as the UK and France.

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The operation and regulation of national telecommunications services in Germany has historically been entrusted to a federal body, the Deutsche Bundespost (DBP). It has exercised the right to review and approve or reject any networking equipment provided by a third-party for sale on the German market. Under previous regulations, this DBP approval was required for any type of equipment. The process could be rigorous, was generally time consuming, and inevitably worked in favour of local suppliers who "knew the ropes" best.

This restrictive regulatory environment has not held Germany back in terms of technical developments for VANS but has restrained the commercial services from flourishing as true value-added network suppliers. The services provided by the Bundespost itself are generally of a very high technical standard but are low-level in application content and have never included EDI. For example:

- At the basic bearer network level the building of an optic fibre backbone network for broadband services is well advanced.

- The videotex standard adopted by the DBP (CEPT level 4) has the highest graphics quality level found in Europe.

In 1991 the progressive liberation of the German regime and the need to upgrade the infrastructure of the former Eastern Lander has resulted in new third-party services being offered. INPUT predicts that this trend will continue.

E
Italy

The Italian market for EDI software and services in 1991 is anticipated to be worth under 4 billion lire but to be growing to reach over 40 billion lire in 1996. The estimated size and growth of the Italian market is shown in Exhibit V-8 and the leading Italian EDI software and services vendors are included as Exhibit V-9.

Italy's is the third largest economy of the major European countries. Although it is only slightly larger than that of the UK. Because of its relatively backward telecommunications infrastructure, which is now being improved, growth in the Italian market is expected to be high but starting from its low base.

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Exhibit V-8

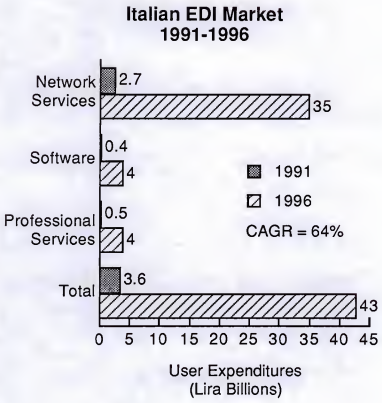

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Exhibit V-9

Leading EDI Software and Services Vendors, 1990 - Italy

Rank	Vendor	1990 Anticipated EDI Revenues (Lira Millions)	Market Share* (Percent)
1	GEIS	1,030	40
2	Intesa	560	22
3	IBM	310	12
4	EDS	180	7
5	Televas	170	7
6	Seva	110	4
7	Bull	50	2
8	Digital	40	2
9	Hewlett-Packard	30	1
10	EDM	30	1
	Others	60	2
	Total	2,570	100

* Note: May not add to 100% due to rounding

In Italy, although telecommunications services are the domain of the PTT ministry alone, most of the public network has been run by private companies with whom the PTT has formed licensing arrangements. Many of these companies are at least partly owned by the state.

This complicated holding structure has contributed to the traditionally high level of inefficiency in the Italian telecommunications environment, and also retarded the growth of VANS. Service quality has been considered to be poor, with the result that take-up of even the basic services has been poor.

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At present there are two key regulatory points affecting EDI and VANS:

- Basic data transport can be provided only through the state's subsidiary companies.
- Commercial VANS can be operated by agreement with the public network providers.

The regulations are not unduly harsh by comparison with some of the other countries' provisions, but VANS generally in Italy have been slow to take off due to the country's relatively low interest in public data services. All this is starting to change now and an example is the fast-growing videotex services market which can boast 300,000 subscribers at the end of 1991.

Commercial VANS (that is VANS supplied by bodies other than the state) present a much better picture. GEIS, for example, has for some time obtained its second largest European revenues from Italy, ahead of France, West Germany and Scandinavia.

F
The Netherlands

The Dutch market for EDI software and services in 1991 is anticipated to be worth 10 million Dutch guilder (Dfl) and, by growing at the fast rate of 47% pa (CAGR), to be set to reach almost 70 million Dfl by 1996. The forecast size and growth rate of this successful market are illustrated in Exhibit V-10. The leading vendors of EDI software and services are listed with their estimated 1990 revenues in Exhibit V-11.

The Netherlands is the main new success story of 1991 in Western European EDI, with participants from both national and international firms sharing in the market growth which has occurred since the telecommunications infrastructure was privatised in 1989. New initiatives in the Netherlands since our last report are in:

- Transportation by road - ERTIS
- Communication
- Health Care
- Banking.

In total the Netherlands market is currently supporting over 60 EDI communities and almost 3,000 user companies.

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Exhibit V-10

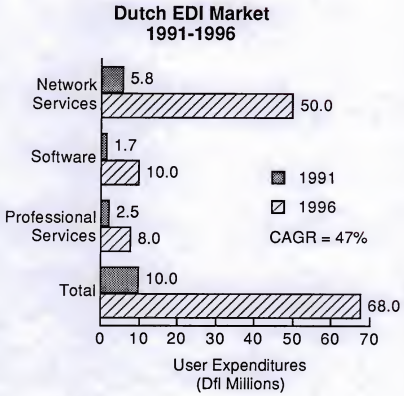

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Exhibit V-11

Leading EDI Software and Services Vendors,

1990 - Netherlands

Rank	Vendor	1990 Anticipated EDI Revenues (Dfl Millions)	Market Share* (Percent)
1	GEIS	1.75	28
2	IBM	0.80	13
3	PTT Telecom	0.70	11
4	INTIS	0.67	11
5	RAET	0.54	9
6	Philips	0.47	8
7	EDS	0.34	5
8	EDITIE	0.27	4
9	Volmac	0.20	3
10	GLI	0.13	2
	Others	0.33	5
	Total	6.20	100

* Note: May not add to 100% due to rounding

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G
Belgium and Luxembourg

The Belgian market for EDI software and services in 1991 (including Luxembourg) is anticipated to be worth 64 million Belgian francs (BF), rising to 350 million BF by 1996. The estimated size and growth rate of 40% for the Belgium market are illustrated in Exhibit V-12. Some leading Belgium EDI Software and Services vendors are shown in Exhibit VI-13.

Telecommunications services in Belgium are provided by the Regie des Telegraphes et Telephones (RTT), which has a monopoly over basic conveyance of voice data. In the area of network services an increasing degree of competition is permitted, with several private companies active in the provision of videotex services. Alongside the private competition, the RTT plays an important role in the provision of value-added services with EFT, EFTPOS, teletex and videotex services all quite well developed.

Besides the Automobile, Distribution and Transportation sectors which have been EDI users for some time, Belgium is noted for its Assurnet insurance industry network which links intermediaries and insurance companies. It is reported to be handling 300,000 messages per month at the end of 1991. The system has been adopted also in France, where it is the widest used insurance industry EDI network.

The market for EDI services in Belgium is influenced by its position as the European economic centre as well as through housing headquarters for various government bodies, multinational corporations and financial institutions including SWIFT, the electronic funds transfer network. SWIFT has not launched its EDI pilot scheme for international interbank messaging using the EDIFACT standard approved banking messages. Up to 70 banks have committed to join this project and 20% of these are currently already taking part.

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Exhibit V-12

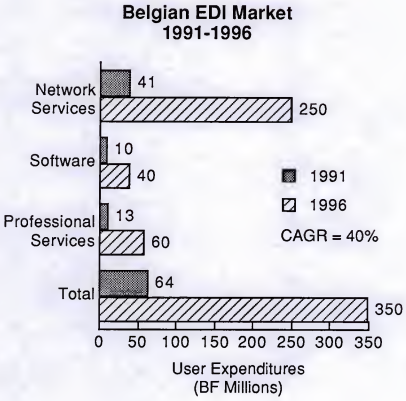

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Exhibit V-13

Leading EDI Software and Services Vendors, 1991 - Belgium

Rank	Vendor	1990 Anticipated EDI Revenues (BF Millions)	Market Share* (Percent)
1	IBM	13.5	31
2	GEIS	8.0	19
3	GSI	5.0	12
4	Banque Generale de Belgique	4.5	10
5	CSC	4.0	9
	Others	8.0	19
	Total	43.0	100

* Note: May not add to 100% due to rounding

H
Scandinavia

The Scandinavian market for EDI software and services reached a value of 31 million SEK (Swedish Krone) in 1991 and is anticipated to grow at 48% per annum to reach 220 million SEK in 1996. The size and growth of the Scandinavian market is illustrated in Exhibit V-14. Some leading Scandinavian EDI Software and Services vendors are shown in Exhibit V-15.

I
Spain

The Spanish market for EDI software and services is anticipated to be worth 120 million pesetas (Ptas) in 1991, rising to over Ptas 2,250 million by 1996. Spain starts from a small base but it is growing faster than any other European EDI market ie: at a CAGR of 80% pa. The estimated size and growth of the Spanish market is shown in Exhibit

V-16. The leading Spanish EDI Software and Services vendors are included as Exhibit V-17.

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Exhibit V-14

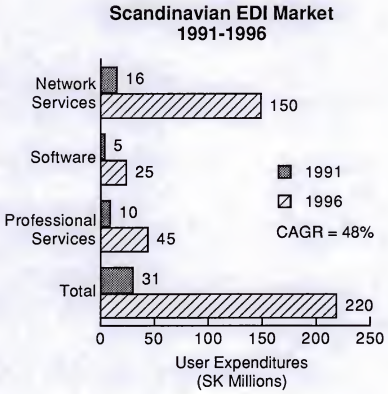

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Exhibit V-15

Leading EDI Software and Services Vendors,

1990 - Scandinavia

Rank	Vendor	1990 Anticipated EDI Revenues (SeK Millions)	Market Share* (Percent)
1	GEIS	7.7	36
2	IBM	5.6	26
3	DanNet	3.4	16
4	NIT-Nett	1.0	5
5	STS	0.9	4
	Others	2.9	13
	Total	21.5	100

* Note: May not add to 100% due to rounding

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Exhibit V-16

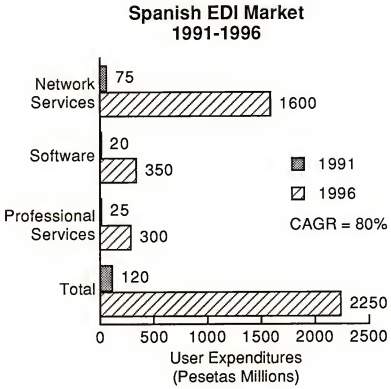

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Exhibit V-17

Leading EDI Software and Services Vendors, 1990 - Spain

Rank	Vendor	1990 Anticipated EDI Revenues (Pta Millions)	Market Share* (Percent)
1	GEIS	27	41
2	IBM	20	31
3=	EDS	4	6
3=	Hewlett-Packard	4	6
5	Digital	3	5
	Others	7	11
	Total	65	100

* Note: May not add to 100% due to rounding

J
Rest of Europe

The market for EDI software and services in 1991 in the rest of Western Europe is estimated to be worth $1.0 million. Growing at a CAGR of 72% per annum this figure will rise to $15 million by 1996. The estimated size and growth of the market is shown in Exhibit VI-18. The top three vendors of EDI Software and Services vendors in the rest of Western Europe are included as Exhibit VI-19.

The main two countries involved in this group are Switzerland and Austria. Ireland, Portugal and Greece are also included, but these are all small markets.

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Exhibit V-18

EDI Market—Rest of Europe
1991-1996

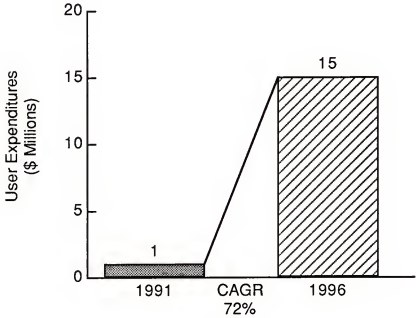

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Exhibit V-19

Leading EDI Software and Services Vendors, 1990 - Rest of Europe

Rank	Vendor	1990 Anticipated EDI Revenues ($ Millions)	Market Share* (Percent)
1	GEIS	0.21	31
2	IBM	0.17	25
3	Digital	0.14	20
	Others	0.16	24
	Total	0.68	100

* Note: May not add to 100% due to rounding

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A Glossary of EDI Terms

ABI	Automated Broker Interface.
ACH	Automated Clearing-house.
ACP 90	Air Cargo Processing in the Nineties.
AECMA	Association Europene des Constructeurs de Matriel Aerospatiale
AGHA	Antwerp Port Community
ANA	Article Numbering Association
ANSI	American National Standards Institute
APACS	Association of Payment and Clearing Services
ASTI	Association des Services Transports Informatiques
ATM	Automatic Teller Machine
BACS	Bankers Automated Clearing Service
BDI	Batch Data Interchange
BEDIS	Booktrade Electronic Data Interchange Standards
CAD/CAM	Computer Aided Design/Computer Aided Manufacturing
CADDIA	Cooperation in the Automation of Data and Documentation for Imports/Exports in Agriculture
CALS	Computer-Aided Acquisition and Logistics System
CASE	Common Application Service Elements
CCITT	Comit Consultatif International Tlgraphique et Tlphonique
CCS	Cargo Community System
CEFIC	Conseil Europen des Fdrations de l'Industrie Chimique
CEPT	Committee of European Postal and Telecommunications Administrations
COMPRO	General term for European boards concerned with simplification of commercial procedures
DEUPRO	The German COMPRO
DIN	Deutsches Institut Fur Normung
DISH	Data Interchange for Shipping
EAN	International Article Numbering Association
EBDI	Electronic Business Data Interchange
ECU	European Currency Unit
EDI	Electronic Data Interchange
EDIA	Electronic Data Interchange Association
EDICON	Electronic Data Interchange in Construction (UK)
EDI Construct	Electronic Data Interchange in Construction (France)
EDIFACT	Electronic Data Interchange for Administration, Commerce and Transport
EDIFICE	Electronic Data Interchange Forum for Companies Interested in Computing and Electronics
EDIMS	Electronic Data Interchange Messaging System
EFT	Electronic Funds Transfer
EFTPOS	Electronic Funds Transfer at Point of Sale
EP	Electronic Publishing
EPOS	Electronic Point of Sale
ERTIS	European Raod Transport Information Services
ETDI	Electronic Trade Data Interchange

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FTAM	File Transfer Access and Management
IGES	International Graphics Exchange Specification
IATA	International Air Transport Association
ICARUS	Irish Community Aircargo Realtime User System
INTIS	International Transport Information System
JEDI	Joint Electronic Data Interchange
JIT	Just-in-Time
LACES	London Airport Cargo EDP System
LDI	Logistics Data Interchange
MARC	Machine Readable Cataloguing (of books)
MDN	Managed Data Network
MDNS	Managed Data Network Service
MCP	Maritime Cargo Processing
MOTIS	Message Orientated Text Interchange System
NAPLP	North American Presentation Layer Protocol
ODETTE	Organisation for Data Exchange by Teletransmission in Europe
OFTEL	Office of Telecommunications (UK)
OFTP	Odette File Transfer Protocol
PACE	Ports Automated Cargo Environment
PDN	Public Data Network
PIDX	Petroleum Industry Data Exchange
PSS	Packet Switch Service
PSTN	Public Switched Telephone Network
PTO	Public Telecommunications Operator
PTT	Postal, Telegraph and Telephone Administration
PVS	Private Videotex System
RINET	Reinsurance and Insurance Network
SEAGHA	Systems Electronic and Adapted Data Interchange in the Port of Antwerp (see AGHA)
SITA	Society of International Airline Telecommunications
SITPRO	Simplification of International Trade Procedures Board
SITPRONETH	Netherlands body for the Simplification of Trade Procedures (Dutch COMPRO)
SMMT	Society of Motor Manufacturers and Traders
SOFI	Systeme d'Ordinateurs pour le traitement de Fret International
SWIFT	Society for World Interbank Financial, Telecommunications
TDCC	Transportation Data Coordinating Committee
TDI	Trade Data Interchange
TDC	Trade Data Convention
TEDIS	Trade Electronic Data Interchange Systems programme
TISSG	Travel Industry System Standards Group
TRADACOMS	Trading Data Communications Standard
TRADANET	The EDI service of INS
TRANSCOM	EDI project of the Dutch article number association (retail sector)
TRANSNET	GEIS EDI application based on EDIFACT
TS	Transaction Services
TUA	Telecommunications Users Association

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UAC	Stichting Uniforme Artikel Codering (Dutch retail trade association)
UNECE	United Nations Economic Commission for Europe
UNGTDI	United Nations Guide-lines for Trade Data Interchange
UNICORN	United Nations Interactive (message) Concept Over Reservation Networks
UNJEDI	United Nations
UNTDED	United Nations Trade Data Elements Directory
UNTDI	United Nations Trade Data Interchange
VADS	Value Added and Data Services
VANS	Value Added Network Services
VDA	German Automotive Trade Associations
X12	Generic EDI standards approved by the American Standards Committee
X.25	International standard formulated by CCITT for assembling and transmitting data in a packet switched network
X.400	International electronic messaging standard recommended by the CCITT

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B Forecast Reconciliation 1990-1991

Exhibit B-1 shows the changes made in this years forecast in comparison to that of the previous year.

Working in US dollars, during the year there was a general appreciation of European currencies against the dollar of around 10%. This varied between 8% and 22% depending upon the country in question.

This year we have revised upwards our estimate of the size of the European EDI market, but marked down our anticipated growth rate over the five-year forward period to 1996. The majority of the upward revision of the current market size has been accounted for within the UK Market.

The lowering of the growth rates takes into account the severity and duration of the current recession.

Exhibit B-1

Reconciliation of EDI Market Forecast
Western Europe 1990-1991

	1990 Market			1995 Market			1990-1995 CAGR Forecast in 1990	1991-1996 CAGR Forecast in 1991
	1990 Report	1991 Report	Variance	1990 Report	1991 Report	Variance		
Network Services	30	46	+53	215	275	+28	48	43
Software Products	10	11	+10	70	45	-36	48	32
Professional Services	10	17	+70	60	52	-13	43	24
Total	50	74	+48	345	372	+8	47	38

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