

The Impact of
ELECTRONIC DATA INTERCHANGE - EDI
on
IRISH FOREIGN TRADE AND TRANSPORT

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BY

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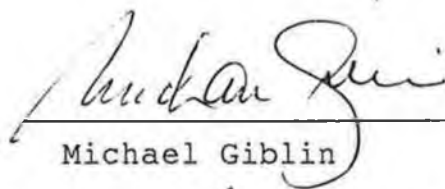
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September 1991

DECLARATION


I declare that this thesis 'The Impact of Electronic Data Interchange, EDI, on Irish Foreign Trade and Transport' is based solely on my own work except where duly noted and acknowledged and I declare that this work has not been submitted previously for the award of a diploma or degree at any academic institution.

The research was carried out under the supervision of Professor Peter M Chisnall, Head of Management Division, Dublin Business School, Dublin City University.

Signed


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Signed


Prof. Peter Chisnall

DEDICATION

To my wife, Eleanor, whose support and help
made this work worthwhile.

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PREFACE

The impact of Electronic Data Interchange - EDI, is a business rather than a technological issue and the objectives of this dissertation are focused accordingly. As the study proceeded it nevertheless became very clear that a knowledge of the technical solutions on which it is based was important, for many reasons. One of the main reasons was to understand why there is a general 'Lack of Awareness' about EDI relating to both its benefits and what it actually is. It can be much easier for business managers to believe that EDI is just another wonder computer facility and therefore something to be left for the technical experts.

In dealing with such a dynamic technology there is an obvious difficulty with the dating of the research, as the pace of change is so rapid even last year's solution can today be out of date. The research findings and the conclusions, particularly on the technical issues but to some extent also, the business matters on which they impact, must be viewed against the volatility of developments in the whole area of telecommunications and computing (telematics) of which EDI is a leading application.

ABSTRACT

EDI is a business technology which permits organisations and their business partners to electronically exchange business data directly between their computers without the need for human intervention. EDI was first developed for its inherent economies such as improved efficiency, error and cost reduction. However, the real benefits emerged in other and far more significant areas, particularly in reduced requirements for stockholding and marketing improvements through better service and stronger customer ties. The improved cost base and the exploitation of the new up-to-date information flows led to competitive edge advantage. This advantage was often temporary until the competition caught up, but it created a new situation where access to the technology became a prerequisite for survival. EDI also creates new business opportunities.

Success came quickly, particularly where dominant organisations made EDI a pre-condition of future business and forced their suppliers/partners to accept their (proprietary) technology. More co-operatively, many industry sectors came together to establish community systems and developed their own industry specific standards. Problems arose when companies wished to electronically communicate across industry boundaries. To solve this problem, two leading countries, US and UK, developed their own national standards. Next, as a solution for all the problems of proprietary, industry specific and national standards, the United Nations approved a universal standard - EDIFACT, but it is estimated that it will be at least the mid 1990s before it has general adoption. In addition, most networks do not interconnect forcing users to join two or more competing services. There are many technical and other issues which impede its growth, these include availability of software packages, security issues, legal considerations, change of

business practice and most of all, lack of awareness among managers.

Growth of EDI is very rapid, annual increases of 80% are common. It has now become a trading norm in many sectors and countries. Most of Ireland's trading and competition countries are in this category. Many Governments have recognised EDI's benefits and have established programs for its promotion. Deregulation of the telecommunications environment is seen as essential. As for a company or an industry sector, EDI can create a national advantage.

Uptake of EDI in Ireland is very low and awareness of it is among the lowest in the EC, despite the fact that there are a number of advanced individual projects and companies. EDI is of critical relevance to Irish foreign trade and transport and it is in these sectors that key cost reductions have been identified. EDI can also help to alleviate the peripheral disadvantages of Ireland's location. While its use is a positive factor its non-use will lead to very serious disadvantages. Ireland's telecommunications infrastructure for EDI is among the best but we have not created the climate for developing value added services of which EDI is a leading one. The role of Government is very unclear and while some good positions have been adopted, some policies are contradictory and some State services are seen as anti-market and protective of existing vested interests.

EDI is already a most important strategic issue at company, industry and national level. It will, however, become even more important as it integrates with the revolutionary developments in the whole area of telecommunications technology on which future economic advancement and job creation opportunities depend. There is a clear need for national coordination and promotion of such an important business tool by both Government and business working together.

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CHAPTER 1

INTRODUCTION

The United Nations in its 'Introduction to UN/EDI-FACT'¹ describes Electronic Data Interchange as;

EDI (Electronic Data Interchange) is the electronic transfer from computer to computer of commercial or administrative transactions using an agreed standard to structure the transaction or message data.

Electronic Data Interchange is not a new technology. It is the application of existing technology to solve business problems. EDI has emerged through telematics, which is the growing integration of the related sciences of computing and telecommunications. It is, like these, an evolving, dynamic and fast growing technique, which is being adopted rapidly by business and is now being called an industry in its own right.

EDI was developed in the first instance to reduce costs from the elimination of paperwork and the rekeying of the data to the computers of the different organisations. This requirement was first identified in international trade due to the amount of paper needed to meet Customs and other formalities, their cost and the delay factor to the merchandise.

The benefits from the widespread use of EDI are now accepted to apply to domestic as well as international trade and also to the transactions of public bodies and financial services, i.e. in every form of commercial and administrative activities, as stated by Lord Young, UK Secretary for Trade and Industry.²;

Electronic Data Interchange (EDI) is an important element of business practice which offers considerable scope for cost saving and improved competitiveness.

It is now recognised that the benefits are not confined to cost reduction. EDI also provides benefits from speed, accuracy, increased productivity and reduced inventory. It is becoming a better way to do business and a strategic marketing tool, as described by Ray Burke, Minister for Justice and Communications, Ireland.³;

The benefits of EDI include : the introduction of just-in-time delivery systems resulting in reduced stock levels and a reduced cost base estimated by the European Commission to be 7% of total cost. EDI is not so much a technology as a best business practice.

1.1 DEFINITION OF EDI

EDI is young and highly dynamic. As it is still evolving, it does not have a universally formally agreed or legalistic definition, indeed several definitions are in use. Apart from the UN, other international and national authorities, regulators, academic, independent and commercial bodies use differing definitions which must be considered. The differences in definition reflect the evolving nature of EDI and that it does have varying applications and differing interpretations.

According to the Commission of the European Communities (CEC) official EDI body TEDIS (Trade EDI Systems)⁴;

Electronic Data Interchange, or the electronic transfer of commercial and administrative data, involves the exchange of information and messages between trading partners and public administrations via electronic means. EDI is carried out either from computer to computer, through the exchange of magnetic media or via telecommunications.

SITPRO (The Simplification of International Trade Procedures Board) the UK Government body active in EDI standards setting and promotion, provides this definition.⁵;

The replacement of the paper documents relative to an administrative, commercial, transport or other business transaction, by an electronic message structured to an agreed standard and passed from one computer to another without manual intervention.

IATAs (International Air Transport Association) definition,⁶;

The computer-to-computer transfer of business information using an agreed standard to structure the information.

Independent business consultants and trade bodies such as the following, have their own varying definitions;

Butler Cox Foundation,⁷;

The transfer of structured information in electronic form between computer systems in separate organisations.

McGraw-Hill Inc.⁸;

Electronic Data Interchange (EDI) is the electronic exchange of common business data in highly standardised formats that allow computers to process the data without human intervention.

The Article Number Association (UK) view is,⁹;

EDI may be defined as the electronic transfer from computer to computer of administrative and commercial or trade-related data in a standard structured format.

Some independent experts take a broader view; Dr Robert M Monczka, Professor of Purchasing and Materials Management and Dr Joseph E Garter, Assistant Professor of Purchasing Management, both of Michigan State University.¹⁰;

Electronic Data Interchange (EDI) is the direct electronic transmission, computer to computer, of standard business forms between two organisations.

Large computer and electronic equipment manufacturers such as;

International Business Machines (IBM).¹¹

The transfer of formatted data between computer applications running on different machines and using agreed standards, to describe and format the data contained in the messages.

Philips Electronics NV.¹²;

EDI provides electronic transfer between partners of commonly agreed, preformatted, structured messages, in place of traditional exchange of paper, such as invoices, orders, payment instruments, Customs entries, stock market information, transport reservations etc. EDI so amounts to a direct exchange of business data between different application systems.

Digital Equipment Corp. (DEC).¹³;

EDI is the computer-to-computer exchange of inter and intra-company business and technical data, based on the use of agreed standards.

The key features common to these definitions are, a) it must be electronic transfer of the data, b) directly from computer to computer, i.e. without human intervention, and c) standard messages, i.e. in a completely standard machine readable form, not in free format (it does not include E-Mail or Fax).

The need for agreed standards for the structure of the data formats of the message, which is the electronic equivalent of the business transaction currently in paper form, is essential. Without this the interchange of business transactions between different computer hardware and software is not possible.

Standards have evolved and developed, reflecting the growth and use of EDI. They are established in a number of ways. They can be imposed by a dominant trader (Proprietary Standards), agreed bilaterally between two or more trading partners, established by those participating in a trading/EDI community, set on an industry wide basis by a trade representative body, institute or association (Industry Standards), approved within a country by a Government Standards Body (National or Generic Standards), or have international acceptance through approval by the United Nations (UN) and/or the International Standards Organisation (ISO).

One of the best explanations and simplest definitions of the use and application of EDI and electronic messaging is provided in the US 'EDI Forum'¹⁴, which provides an overall context to the technical and business issues, under the heading of 'Definition of EDI and other kinds of Electronic Messaging';

BUSINESS APPLICATION: A business application is a computer program that operates on input data to perform a business function. An example of a business application is a purchase order program which receives purchase order data as input and keeps track of pending and filled orders.

Another business application is an accounts receivable system which keeps track of invoices sent and payments received. Both of these applications act upon data received from or sent to a business partner (loosely defined as a firm's supplier, customer or distribution/transportation/financial intermediary). For most firms, data is manually prepared for the business application which is usually supported by computer processing.

ELECTRONIC DATA INTERCHANGE (EDI) DEFINED:

EDI is the movement of business data electronically between or within firms (including their agents or intermediaries) in a structured, computer processable, data format that permits data to be transferred without rekeying from a computer supported business application in one location to a computer supported application in another location. This definition includes the direct transmission of data between firms, transmission using an intermediary such as a value added communication network or bank, and the exchange of computer tapes, disks or other storage devices between locations. The latter method fits the definition since data in one business application is computer readable without rekeying by another application even though the medium on which it is stored must be physically transported to its destination.

PARTIAL EDI: Much of so-called EDI volume may not be completely computer application to computer application but rather the automation of only a portion of the data transfer path. For example, a buyer may send an EDI purchase order to a supplier but the supplier prints out the purchase order and enters the data manually into a purchase order entry system. Sometimes this is called 'door-to-door' EDI. Technically, this does not fall under the strict definition of EDI since the data does not flow without rekeying into the suppliers computer system. Many of the benefits of EDI may, however, be realised even at this partial EDI stage of development.

As well as defining what EDI is, it is also important to say what EDI is not and to clear up any confusion with other forms of electronic messaging and computer-to-computer communications, such as direct computer terminal access to remote databases, Facsimile Reproduction (Fax) and Electronic Mail (E-Mail). The differences with Fax and E-Mail are described in the 'EDI Forum' publication, *ibid*, under the heading 'Relationship of EDI to other Electronic Messaging';

ELECTRONIC MESSAGING: is moving data electronically between two points. The various forms of electronic messaging may be arrayed along a continuum (see Figure 1). On the far left are totally unstructured messages and on the far right are highly structured messages.

EDI IS NOT FACSIMILE TRANSMISSION:

Facsimile transmission on the far left-hand side, represents the transfer of totally unstructured data. Data in almost any format from photographs to purchase orders may be sent by this means. In facsimile transmission, a digitised image is formed of the message and the image is transmitted to the receiver. While mail time delays are avoided, the receiver of a facsimile transmission would not be able to enter the image directly into a business application without, at worst, manually keying in the printed image or, at best, editing a character file produced by some advanced facsimile systems that use scanners.

EDI IS ALSO NOT ELECTRONIC MAIL: Electronic Mail also moves business data electronically but generally uses a free format rather than a structured format. Since the sender may choose any format, it would be difficult to design an application program that would directly accept electronic mail input without significant manual editing.

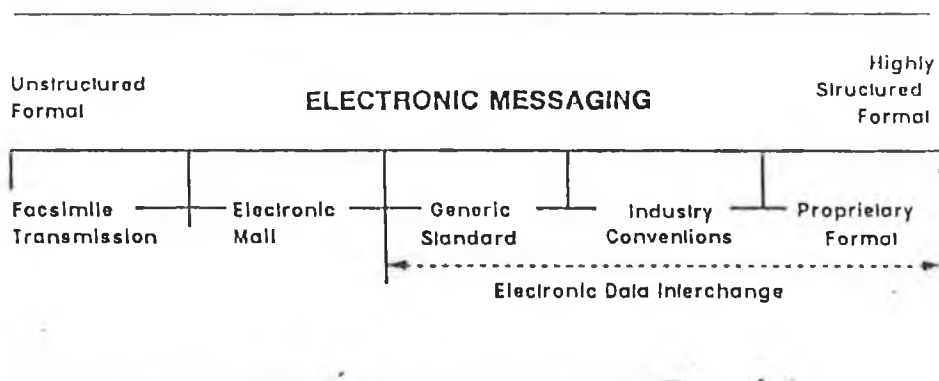


Fig. 1 Electronic Messaging (Source: EDI Forum)

1.2 NATURE AND PURPOSE OF EDI

Traditionally, paper documents have formed the basis for commercial transactions such as: price list, order, confirmation, delivery note, invoice and payment. Most businesses have inhouse computer systems and these documents are produced by the application system of the originating company and usually transmitted by post to the recipient who will then introduce the same data into his system. It is estimated that 70% of the input of one computer represents 30% of the output of another computer.¹⁵

The United Nations ¹⁶states that;

It is designed to facilitate the exchange of business data by electronic means among, for example, manufacturers, wholesalers, distributors, retailers, shippers, consignees, carriers, banks, insurers and government agencies.

In the last century the advent of the telegraph played a major role in improving communications between businesses and later the telex became the key instrument of non verbal business communication. In the last few years the widespread use of facsimile machines brought further speed to the delivery of documents but as with the other methods it too requires that the information be handled and processed manually.

Clearly, such manual processing is time consuming, wasteful of effort, involves duplication and is prone to errors and delays. Further delays in the postal system and again at the rekeying stage are a built-in feature. These delays are significant as they hold up the physical movement of the goods and represent tied-up capital and negative cash flow for that period.

The additional delays and cost of paperwork and customs formalities required for international trade is an even greater burden. This is something which individual governments, through their customs services e.g. UK, USA, France, Germany, Japan and many others have already implemented automated customs control systems, with access and direct input of data by traders.

Many other countries, including Ireland, have now recognised the necessity for Customs systems, on an EDI basis, which they are now developing. The Commission of the European Community (CEC) has carried out many detailed studies on the cost of existing procedures, one of these studies is the Cecchini Report, (Section 4.13.6).

Apart from the actual benefits that will arise from the physical removal of customs barriers after 1992, the CEC also recognise that major cost reductions can be achieved by the introduction of EDI to the existing procedures and that EDI in itself is a prerequisite to the whole concept of a border free single market in all inter-related economic activities, which depend on trade or other data exchange. The Customs Cooperation Council (CCC)¹⁷ says;

International trade moves as much on information as on wheels, wings or water. Every transaction is held together as a documentary paper-chain.

The European Commission (EC) estimates that the costs of paperwork in international trade are between 7% and 8% of the value of the merchandise.¹⁸ It also estimates that the cost of processing an invoice manually is ECU 9.60 (IR£7.33) and that electronic processing of an invoice alone could reduce this by 25%.¹⁹

The CEC in a Communication from the Commission to the Council (of Ministers) to establish Trade Electronic Data Interchange Systems (TEDIS), made the following submission as part of a proposal for a Council Regulation.²⁰

Under the heading of 'The modern economy relies increasingly on the exchange of data between business partners' it goes on:

Commercial operations today, whether national or international, involve numerous exchanges of trade data or information between business partners. The volume of data exchanged in this way is vast, first because the data are transferred to separate documents at each stage and for each operation in a commercial transaction from the request for a quotation up to invoicing and payment, and secondly because there are so many different business partners: manufacturers, suppliers, customers, insurers, bankers, carriers, forwarding agents etc.

The operations involved in the processing and transmission of trade information are often more time consuming than the manufacture or the delivery of the goods (or the provision of services). This applies in particular whenever a business transaction involves operators or partners in different countries, even if these countries are members of the EC.

The flow of information is also tending to increase with the growing internationalisation of economic activity, the greater number of after sales services offered to customers and, further up the production line, market services purchased by companies.

In addition, firms are obliged to provide several national departments, in particular the customs services, with information on their international transactions.

For example, it is quite common for the accounts department of a large firm to handle monthly 10,000 to 20,000 invoices and 1000 to 2000 payment advices amounting to some 10,000 different documents.

The processing is generally done in two successive operations: first the information is processed on paper (the form in which the data is most frequently transmitted) and then the data are encoded for another computer processing. The speed, reliability and relevance of the information flows exchanged are increasingly affecting

the competitiveness of companies both small and large.

The ability to process and exchange trade data as quickly as possible allows stocks to be reduced, helps to cut financial costs and gives companies an additional competitive edge by improving the service offered to their customers: flexibility, speed and a greater ability to respond to their changing needs and desires.

In the view of European motor manufacturers, it is by recognising trade data exchanges with their suppliers along these lines that they will best be able to withstand Japanese competition.

1.2.1 EXAMPLES OF EDI

The following specific samples will illustrate the specific use and general benefits of EDI for business, in practice.

- A motor dealer sends an order for parts, for a car broken down, direct from his Personal Computer (PC) to the car manufacturer in another country for delivery overnight.²¹

- Doctors and hospital administrators complete, transmit and file (in a single, checked and validated transaction) patients claims to their Health Insurance company.²²

- After scanning price quotations from a number of potential suppliers, a purchaser makes his decision and transmits an electronic Purchase Order. The selected supplier confirms the order and price and later sends a Despatch Note followed by an Invoice, all without paperwork on either side.²³

- An importing distributor sends an electronic status request about an urgent consignment to his forwarding agent who in turn sends a similar message to the carriers computer (in this case an airline) which responds immediately. The importer gets the information he needs within seconds. The agent is also able to clear the goods through customs by an electronic customs declaration message and have VAT etc on the goods automatically paid.²⁴

EDI is both a business technique to reduce costs and improve competitiveness and at the same time it is a technical way of solving the problem of companies communicating directly to each others systems, the key business revenue generating transactions, which are their raison d'etre.

1.2.2 IMPACT ON BUSINESS

Whereas many EDI projects started with the prime objective of cost reduction, improvements in customer service soon became apparent. These mainly come through immediate and accurate information on stockholding, speed and reliability of delivery and confidence building stemming from all these factors.

In this way the business relationship between partners becomes more solid and more difficult for competitors. This is known as 'locking-in' the customer and conversely the competitor who cannot transact business through EDI is 'locked-out'.²⁵

This locking-in and out process has also occurred, from a different perspective in many of the larger industries. Car manufacturing is an example where a dominant partner decides that for cost reduction or other reasons, he intends to implement EDI from a certain date and he expects all his suppliers to comply if they wish to continue to do business with him. (This has been, and still is, a very rapid if traumatic way of spreading EDI by ultimatum and there are many dangers for the small supplier particularly if proprietary standards are used, he can end up as a hermit on an electronic island).

Many other unforeseen side-benefits have sprung from the introduction of EDI such as improved quality information available to the marketing departments of the business. With EDI it is possible to have completely up-to-date information on all key functions rather than depend on abstracts from historical records. Additional customer information which was not previously available can also be exploited to develop new products or services.

The creation of a comprehensive customer database is in itself valuable market information which could be resold but could also be used to innovate with a different type of product required by those customers. For example, a Californian pharmacy supplier, McKesson, with a chain of EDI linked customers, took on their third party insurance claims processing, and for a small percentage of the bill, they credit the pharma-

cist and then process the claim themselves.²⁶

EDI also has given companies an opportunity to look at their organisations and restructure to meet the new situation. Obvious functions such as invoicing, other document production, data capture, telephone sales and accounting are areas of prime saving but companies are finding that more fundamental approaches are appropriate. This would include the whole role of the sales force which could now be redefined to a more positive customer support role as now they do not have to depend so much on the traditional sales calls for collecting orders. Other functions such as market research can be reconsidered as all the relevant actual information is available.

Perhaps the most important area of benefit resulting from EDI arises when it is fully integrated into the overall company systems, particularly those of materials re-ordering, purchasing and inventory control. Many companies have developed sophisticated control systems such as MRP (Materials Requirement Planning) and manufacturing systems such as JIT (Just in Time) and CIM (Computer Integrated Manufacturing). These are at present mainly inhouse systems and if they are to be fully utilised with outside suppliers (including subsidiary companies) they must have EDI connections.

In today's competitive world, the difference between a successful and unsuccessful product or service can be very marginal in terms of pricing or customer service. EDI is a tool that can give that extra margin and provide the competitive edge to the successful company. Robinson and Stanton in 'Competing through I.T.'²⁷ say:

It can favourably or unfavourably alter the balance between an organisation and its competitors as well as its customers and suppliers.

When it is used for the building of a more solid business relationship with partners and combined with better quality and more timely information, EDI becomes a very important marketing tool which companies can use strategically to take advantage. While companies may see EDI initially simply as a way to gain competitive edge, this will only provide temporary advantage until the existing or a totally new competitor using the new technology catches up. At that point, EDI becomes not an optional extra but a necessity for business survival itself.

It is for this latter reason that the Board of Trade (UK) developed its slogan to graphically bring home the message to UK businesses through this cryptic anagram;

'EDI or DIE'²⁸

In summary, EDI is an enabling technology for the computers of business partners to communicate transaction data facilitating the elimination of paper and manual processing. Even though it belongs to the field of Information Technology (IT), it may be considered a new business methodology rather than a new technology only. Through this application of IT, it opens up options of a fundamentally different approach to the way business is carried out but it also brings with it new threats and opportunities for all businesses whether they choose to use it or not.

1.3 ORIGIN OF EDI

EDI was not an inspirational or a patentable invention resulting from the efforts of a brilliant individual. While it has emerged quickly, its origins were diverse and the first approaches to it varied greatly. In its early days which were the late 1960s and early 1970s, it consisted of unrelated individual projects in different industries and countries led by farsighted people. These pioneers were confronted by huge technical, organisational and cost challenges but to them the advantages were clear. Some of these case histories are dealt with in outline. It is not possible or appropriate to recount here their full individual histories. (Development of EDI as a technology for business is dealt with in 1.4).

This section reviews the early progress, in general terms, some of the separate activities where it occurred. There are, however, some key implementations which illustrate the overall development of EDI in trading activities. These occurred in specific industries such as banking, aviation, automotive industry, shipping, retailing and distribution. Some of these mark critical milestones in terms of the emerging technology and the recognition of the need for standards. Two of the specific projects are very important case histories; the London Airport Customs EDP System - LACES, which though widely known is not well documented and the story of the American Hospital Supply Corporation, ASAP system, which is a celebrated case.

1.3.1 EARLY DEVELOPMENT

The term EDI was not used in the early days. This only came into use in the mid 1980s. At first, where a term was considered necessary, it was called variously - Trade Data Exchange, Electronic Business Data Interchange (EBBDI), Electronic Trade Data Interchange (ETDI) and Trade Data Interchange (TDI) which probably was the most commonly used term. Each of these terms were accurate at that time but in today's situation are too narrow and specific.

Much of the pioneering work was done within certain company types, particularly in the large multinational companies with many divisions, subsidiaries with a range of products or services, in different locations and countries. While each of these divisions etc operate commercially and independently, they are subject to strong central strategic direction from the parent group which has facilitated EDI development in many such companies, first intra-company and then inter-company, as the benefits were realised.

For example, Philips NV, Eindhoven, the huge Dutch conglomerate with over 300,000 staff and locations in almost every country in the world, started internal data exchange in 1969. This was done by developing their own inhouse standards called COPS (Connection of Processing Systems) by first developing fixed-record messages for transmitting order and price information. Subsequently, in 1980, Philips introduced their own more flexible syntax and designed over 70 messages, gradually using standard elements as these became available.²⁹ Philips is now a strong supporter of the use of international standards to facilitate its communication with other external businesses.

Simultaneously, many small projects were independently underway. These were mainly in specific industries which had a high transaction level, an expectancy of high service standards and where communication of information is important. Transport, Banking, Distribution, Retailing, Car and Aircraft manufacturing and component supply represented other sectors. The banks and airlines, both with massive information processing requirements have been pioneers in many areas of computerisation and were the first large scale commercial users of big mainframe realtime systems. During the 1960s and 1970s both of these groups began connecting key partners to their well developed systems.

1.3.2 **BANKING - SWIFT NETWORK**

Banks have major security considerations and for this reason they developed their own secure networks and their own data standards which are known as Electronic Funds Transfer (EFT). The communications are handled through cooperatively established systems which operate the clearing house and interbank settlements arrangements in the UK and Ireland, such as Bankers Automated Clearing Service (BACS), Clearing House Automated Payments Service (CHAPS).³⁰

Internationally, interbank exchange of financial transactions is handled through the SWIFT network (Society for Worldwide Interbank Financial Telecommunications). The organisation was established in 1973, first as a standards setting body for the banking industry. This was, of course, well before any world standards such as EDIFACT was thought of, so SWIFT developed its own standards which are now regarded as the de facto financial message standards even outside banks. SWIFT then built its own network and now there

are over 2000 banks connected in 71 countries and traffic has grown steadily at 20% per annum, to a level now approximately 1 million messages per day.

Mr J P Chavez, SWIFT ³¹ sets out its background and functions:

SWIFT was started in 1973 as a project to switch banking messages between banks. Initially, the project consisted of message standards for the use of the banks, but it was quickly felt that it would be more desirable to establish a proprietary network. Seed money was provided in the form of loans from around 200 charter member banks in Europe and North America.

A store-and-forward switch was designed which would process messages between banks based on the following principles:

(1) Adherence to published, agreed standards for message content; (2) Provision of the maximum amount of security and confidentiality possible; (3) A standard telecommunications interface protocol; (4) The ability to ensure quick, reliable delivery of all messages entrusted to the system and (5) The ability to handle a wide variety of message resulting from the various aspects of the members wholesale international business.

Organizationally, the company is a cooperative society owned by the member banks. Policy decisions are made at annual general meetings and at meetings of the Board of Directors and of a Board Steering Committee. SWIFT has two subsidiaries : STS which pro-

vides interface systems for connections to the network and SSP which provides services to non-member institutions.

In a presentation on SWIFT entitled 'Electronic Trading - Experience in Banking' Mr Barry O'Brien, Allied Irish Banks ³² the responsible executive dealing with international trade services, provided additional information. The subsidiaries: STS - SWIFT Terminal Services, provides equipment such as terminals, SWIFT related software packages, interfaces to telex and other technical services for banks, and SSP - SWIFT Service Partners, provides value added services and products such as transaction processing to non-bank partners, this includes a special arrangement which allows netting or grouping (consolidation) of up to 20 messages into one.

Charging arrangements are based on a mix of once off membership or connection charges and a transaction charge per message. The membership charge is 1.8 million Belgian Francs (£32,700IR) but the cost of connecting a sub-member such as AIB-London or New York or subsidiaries is much less at BFRS 400,000 (£7,300 IR), the message charges which have 12 variants depending on speed priority and level of service required, such as notification of delivery and notification of non-delivery, cost between approximately 30-80p(IR£).

Security is, of course, a prime consideration and while the technical details have to remain confidential for obvious reasons, it is provided for in the following general ways; firstly, by access control to the network which is restricted, next the physical connection has to be authenticated by a password which is encrypted and has three levels - signature, test key,

authentication. In addition, there are further checks and controls at each stage of the transaction process, the sender (validation), at the regional processor (protocol check), at the operating centre (system checks), again on to the regional processor (protocol check) and then to the receiving bank where there is also validation.

The functions provided by SWIFT for the banks are:

- **Balance Reporting Facility:** (for banks corporate customers.
- **Automatic Reconciliation:** (this provides huge bank savings.
- **Telex Interface:** (provides a backup alternative to SWIFT.
- **Cross Border Connection:** (direct links, e.g. London/Dublin.
- **Customer Database:** (for development and marketing plans).
- **Cash Management Links:** (this provides corporate clients with cash management systems to link their systems to banks to give their instructions for both domestic and international transactions and receive incoming messages via SWIFT.

The first and last facility are the areas which provide direct benefits to bank clients, the others are designed to improve banking services and to provide cost savings such as the following: Increased productivity - there have been volume increases of 200-300% in the last three years without any major change in staff numbers. When the Irish pound broke with Sterling in 1979, the staffing required in the International Services Dept in AIB were doubled, now because of SWIFT they have lower staff numbers than even before the currency break.

SWIFT can be integrated backwards and upwards into the Bank Accounting Systems and the Branch Network systems, thus providing benefits into the overall bank structure. Statements of Account from foreign banks can be received the following day, the system almost completely eliminates payments lag and it is possible to check on transactions due in to the bank. Mr O'Brien also interestingly said that SWIFT is helping to make the new EC currency, the ECU, a reality as there are about 4000 transactions daily in that otherwise little used currency.

Irish international banking traffic at approximately 1 million messages per year represents about 0.3% of the total SWIFT throughput. As voting rights on the SWIFT Board are directly related to traffic levels, Ireland does not have enough volume to justify direct representation. It does, however, combine with the United Kingdom banks to have two Board Directors to represent both countries banking interests.

One of the really successful aspects of SWIFT is its excellent reliability, the system performs at figure of 99.8% uptime. This in a peculiar way is now becoming an issue of concern with the banking authorities, the systems very reliability has come to mean their utter dependence on it, so that in the event of serious technical or other problems, the whole international banking system would collapse, as the alternative telex and manual systems would simply not be able to cope with present demand at a technical level, but even more seriously the staff involved would not be trained or competent to handle the old manual procedures.

Concern about this situation is borne out in many areas of highly developed inhouse computer systems, but it is far more serious in an EDI or networked activity which is supporting many independent parties or in this case an industry. In one case, where there was a huge industry network system failure (ACP80/UKAS cutover, see Section 1.3.4), all of the feared and dreaded consequences of a system crash, came to reality.

For this and other reasons, the banks are going to be forced to look at other networks to provide them with the comfort of real alternative or parallel networks, rather than just backup or duplexing. They have also to consider how to meet their expanding traffic particularly in the growth of allied financial services, outside the narrow traditional banking area and the whole question of how they are going to open their secure systems to their corporate customers and major clients, from whom they are at present under very severe pressure.

Added to this intriguing mix is the whole question of whether and, if so, how the banks will become involved in the world of EDI, through participation in trade data exchange with business generally. This is going to be a very interesting decision area to observe over the coming months and years. In the authors opinion, this is creating a conflict between the conservative and security conscious interests of some, perhaps the larger banks on the one hand, and the more enterprising approach of other and smaller banks who will try and exploit the situation to give them a competitive edge. The likely outcome is that the decision will be made by the market as customers will offer their business to the bank that provides the required service.

SWIFT itself is preparing for the new situation. It has already extended its membership range beyond the banking arena to include other types of financial, fiduciary and insurance institutions. It has also been planning since 1987 the introduction of a new network - SWIFT 11 - on a country by country basis but this is progressing very slowly. The intention is to provide a state-of-the-art network to meet the traffic and customer service demands of the 1990s and at a technical level to add file transfer and interactive facilities to the present 'store and forward' service.

Allied to the technological infrastructure, Mr Chavez³³ says in relation to trade data interchange that SWIFT will have to change to accommodate the requirements of business;

The need to coordinate standards for data presentation and exchange will require that SWIFT exchange information with other bodies engaged in standards development; ISO, the UN/ECE, the ICC, ANSI and European Standards bodies. In some cases, our standards will change, in other cases existing SWIFT standards may be incorporated into standards being developed by other industries.

As banks and their clients begin to perceive the benefits of cross-network integration, it is certain that networks involved in the transmission of data along the trading chain will be forced to integrate and perhaps expand their services and client bases.

Mr Chavez' statement may, however, be an optimistic aspiration of a service provider rather than realistic, as three years later with EDIFACT standards and messages now a reality and with greater trade acceptance, there is still no sign of banks generally adopting them or indeed making any positive moves towards trade data interchange. SWIFT has for its part brought forward EDIFACT messages for a number of functions, namely;

- Payment Order
- Extended Payment Order
- Remittance Advice
- Multiple Payment Advice
- Direct Debit and Drawdown Messages

EFT is an EDI technique but because of the security issue the banks have so far kept it separate to mainstream trade data interchange. SWIFT has become the standard setting body for all financial message development. This special position of SWIFT has been recognised by the United Nations EDIFACT Board who have accepted SWIFT as the secretariat for Message Development Group 4 (MD4) with responsibility for all Finance and Insurance messages even though these are still proprietary standards.

Membership of SWIFT is still restricted to banks and they so far are not interested in using their pre-eminent position, their technical and financial resources to lead the widespread use of EDI across commercial sectors in an open way. On the other hand, banks are now connecting key customers on an individual basis. Banks have also participated very positively in specific community EDI projects in many industries, such as ODETTE (automotive), DISH (shipping) and many others. These, like the connection of key customers are, however, one-off individual arrangements, where they participated in the development of what are

proprietary or closed groups, and where presumably their security concerns were satisfied.

Some bank spokesmen are more confident of change in the future but without a definite timetable. Mr Ken Edwards, National Westminster Bank plc, London ³⁴ outlines their overall position of which this is a summary, as follows:

Their posture as an industry has been, up to quite recently, to keep a close but non-active involvement on the growth of EDI in trade generally, they now feel the time is ripe to participate in the development of standard messages and open systems which will close the transaction/payment loop by permitting access on an open but secure way to trade partners.

1.3.3 AIRLINE RESERVATION SYSTEMS

Airlines have a very short lifespan product so it is essential that the distribution systems for this perishable product are fast, effective and as 'real-time' as possible. The airline business depends on up to date information, allowing fast and accurate responses to be provided to the customer for seat reservations, fares, hotel, car hire, routings, timings and other airline services. Since the late 1960s airlines as wholesalers have encouraged their retailing partners, the travel agents, to connect to their systems to facilitate them to sell their seats directly to the prospective passenger.

This was first implemented by airlines installing their own terminals in the agents offices. As agents rebelled against the need to have separate 'boxes' to talk to individual airlines (and the marketing edge that gave to the automated airline), the travel industry came together to create 'multi access systems' such as the TIMAS system in Ireland. Airlines have now progressed into 'Global Reservations Systems' which is the third wave or generation of automated airline distribution.

The first development was the installation of airlines own computer terminals into the agents offices. This acted as an extension of the airlines own Reservations Dept and provided a distinct marketing advantage to the airline involved known as the 'halo effect'. Mr Dick Brennan, General Manager-Marketing, Timas Ltd ³⁵ has described the situation as follows:

The process of distribution was to develop into a bunfight in the US market. An airline whose terminals were placed in a travel agent office gained extra flown revenue from that agent which resulted from the inherent bias that the airline has built into its system. This was particularly so on high density routes in the US market.

The airlines called this extra revenue 'halo' revenue and it amounted to approximately 7%. When one considers that a carrier like American Airlines had a turnover of \$2bn at that time, it can be appreciated that 7% of that revenue is a lot of money. Needless to remark, the automation of travel agents in a market like the US became a very competitive business. The bunfight now turned into a

dogfight. Distribution systems spread like wildfire across the US and were dominated by a few big carriers, each system tended to predominate in the geographical areas where its airline had a high market share.

They were:

American Airlines - SABRE (New York & Texas)

United Airlines - APOLLO (Chicago and Mid West)

TWA - PARS (Kansas/Coast to Coast)

Eastern Airlines- SODA (Florida/East Coast)

Delta Airlines - DATAS (Georgia/South West)

The number of terminals proliferated and by the early 80s there was hardly a travel agency left in the United States who was not automated. ...At this point further expansion was limited. The only way any system could expand was at the expense of one or more of the others. So the process of buying agents out of existing contracts commenced. Up to then the airlines had been charging the travel agents sizable sums for the privilege of their terminals located in his office. This new competitive environment that had developed meant that the cost to the travel agent plummeted to a point where the airlines could no longer recoup the terminal costs from the travel agent so the 'halo' revenue began to be eroded. The dogfight had now turned into all out war and these systems began to look overseas for further expansion and Europe was an obvious target'.

This facility was called 'single host' as it provided only a single access to one airlines host computer. Technically, the airline terminals and ticket printers were connected on a terminal to host, or 'slave/master' basis. The travel agent acting as an airline clerk, being permitted to make reservations on that specific airline and usually with only limited functionality, controlled by airline authorisation 'sign-in' codes. This meant that the airline still retained control over the allocation of total space and other key functions.

The multi-access facility arrived, first in the UK, when the British Airways unions objected to the introduction of terminals into agents offices, as a result of which BA got together with the then British Caledonian Airways to set up a subsidiary company, Travicom, to provide connections to both airlines on a non-discriminatory basis. The Travicom system started in 1978 and quickly became known as 'multi access' as other airlines joined.

In the case of Ireland, Aer Lingus as the national carrier had started connecting agents in 1978. At the same time a UK company called Videcom, who were a company that supplied hardware to Travicom, commenced connecting a number of Agents to foreign based airlines. This was a unique situation as Ireland became the only country where there were both single-host and multi-access systems in competition. At that time also, foreign airlines did not generally connect their systems in the 'backyard' of a national airline (except in a huge open market like the US), unless perhaps that carrier was not automated.

ASTRAL, the Aer Lingus system was, however, a well developed system, Aer Lingus being the second airline in the world to introduce a realtime computer reservations system in 1967. So Irish travel agents had to make up their minds between the services available between the alternate systems. By 1980, Aer Lingus had 40 agents and Videcom had 17 and at this point the Irish Travel Agents Association and Aer Lingus agreed that in the interests of the travel industry, both systems were combined and Timas Ltd was born.

TIMAS which is the name of the system and the company, stands for Travel Industry Multi Access System, then became the first such company to be owned by both the travel agents and the national airline. Further travel industry facilities were developed to connect ferry operators, Sealink and B & I, and tour operators such as JWT Tours, who in 1983 became the first such company in the world to become interfaced to a travel agency distribution system.³⁶

The arrival of the 'global' systems came as a direct result of the extension by the US carriers of their now highly developed Computer Reservations Systems (CRS) into Europe and elsewhere. The European airlines became concerned about being overrun in their own territory and losing control of their distribution. As a result they came together cooperatively, to reduce individual cost and risk, in two groupings, to develop two mega systems, GALILEO (Aer Lingus, Alitalia, Austrian, British Airways, KLM, Sabena, Swissair, TAP, United) and AMADEUS (Air France, Air Inter, Braathens, Finnair, Iberia, Icelandair, Lufthansa, SAS). There are now airlines who are switching between and others who are joining both systems.

These CRS or global systems are based on the latest technology and connect agents to a neutral system containing the full airline databases, including the flight schedules, fares, other facilities of all the participating airlines which they sell direct to a travel agent and then update the airlines own computer system. These systems are huge and expensive. It is estimated that the Galileo system, which is still only partly developed, has already cost \$400m and, according to Air Transport World, is likely to cost at least \$800m to give it full functionality.³⁷

Worldwide communications among airlines directly are handled by SITA (Societe Internationale de Telecommunications Aeronautiques), a cooperative airline owned company which was established in 1949. According to Butler Cox³⁸ it now serves 300 airlines in 169 countries and is the biggest packet switching network in the world, switching almost 3 million messages per day. SITA connects 44,000 terminals in 20,000 airline offices sited in 1200 cities around the world.

So far, SITA has concentrated on the provision of actual infrastructure in terms of communications lines, switching equipment, computerised control systems etc. It has also provided computer processing or 'hosted' many airlines who have not been prepared to invest in their own systems. It has not, however, got into the provision of those airline services provided by CRSs directly as it saw that this might be in competition with the airlines who own it, or their CRS systems.

Airline passenger seat reservation technology is called 'interactive EDI' as it consists mainly of remote terminals and PCs connected directly to a host system providing almost instantaneous responses on an interactive request/answer basis. This is very different to

the requirements for trade data interchange, much of which is the electronic transfer of paper documents such as invoices, bills of lading, customs entries etc between two independent host systems where response speed is not the most critical factor.

.3.4

LACES PROJECT - UK AIRCARGO SYSTEM

LACES (London Air Cargo EDP System) was the first largescale attempt to automate the widespread activities of Customs, transport companies (airlines, forwarders, customs clearance agents) and all their related trade procedures. Written background on the project, however, is not readily available. It is very important, however, because of its size, its timing, as it was a forerunner for many other 'Community Systems' and as its onward progress mirrors the phased development path of EDI itself.

The following information is summarised mainly from the Joint Customs Cooperation Council (CCC) and International Air Transport Association (IATA) Project report titled 'Interfaces Between the Automated Systems of Customs and Carriers (Air Mode).³⁹ The draft report on existing systems - February 1986, contains a chapter on Development History which credits the UK development as the first community system with automated data exchange among Customs, air carriers and the importing community and which led the way for other communities in other modes of transport and in other countries.

In 1966, UK Customs commissioned a feasibility study into developing an integrated and cooperative clearance system at the London airports which would meet the needs of the airlines, forwarding agents and Customs. In response to this study the nationalised corporation responsible for telecommunications - National Data

Processing Service (NDPS) of British Telecom (then still part of the British Post Office), was contracted to develop LACES.

By September 1971, the new pioneering system came into operation. It consisted of a mainframe real-time computer system operated by NDPS but also under HM Customs control and with soon up to 500 terminals located in agents and airline offices. The system provided an automated system which integrated cargo consignment inventory control with import Customs Entry processing. Airlines entered manifest details and Agents entered airwaybill (aircargo consignment note) information which set up the inventory records for control by Customs. Customs entries could then be entered online and the data validated and corrected with automatic clearance provided after a specific 'time out' if there was no Customs intervention.

LACES provided the beginning of paperless entries for Customs which subsequently became as Direct Trader Input (DTI) but the paper entries had still to be submitted subsequent to computer processing, to conform with UK Customs law and due to the (perceived) need for original documentation in the event of litigation. It provided automated inventory control of the Bonded Warehouses operated by the Airlines and Transit Shed operators. For the Agents, it also provided a fast and economic method of Customs clearance, access to the airlines system for handling and customs status of their shipments. For the trading community, it was established that the average dwell time of consignments in transit sheds had been reduced from 5 to 1.5 days.

The system did not remain static. The requirements changed in the late 1970s as airlines developed their own large realtime cargo systems which included the inventory of all the cargo consignments as they moved through the airline network, airport to airport, and through warehouses and Customs up to delivery. In 1981 a new upgraded system, ACP80, Air Cargo Processing for the 1980s, was implemented. This provided for airlines with automated inventory systems to interface to the communal database and automatically update its consignment records.

The new system also allowed agents to 'log-on' to airline systems for shipment tracking purposes and all parties could access other relevant data in each others systems. Export processing was added to import clearance and the system was extended to Gatwick and subsequently to Manchester and other airports. HM Customs made a strategic decision also to develop their new Departmental Entry Processing System (DEPS) as a separate system as they looked to the needs of other transport modes, particularly the maritime community.

In 1985, the community looked to the next phase of development of which the stated objectives were to permit a number of technical improvements through the introduction of the latest technology, reduce the costs of updating and maintaining the system and increase its processing capacity. A prime need also was to have the flexibility to incorporate future requirements including the ability to facilitate intelligent terminals such as PCs and agents own inhouse computers to connect.

The ACP-80 system was still, in the second half of the 1980s, being supported by an operating system based on 1960s technology and applications written in first generation programming languages. This meant that any modifications were very costly and slow to implement, leading to a loss of support among users. An upgrade was planned.

The new system was called UKAS (United Kingdom Aircargo System) and the contract was given to another company, Travicom, who were to 'transparently' switchover the system to new hardware at midnight on Saturday, 31 October 1986, without system interruption. Unfortunately, the transfer was a technical failure and the system crashed. Cargo operations at the airports almost came to a stop as none of the parties, including Customs and agents, were able to revert to manual procedures. British Airways had to place an embargo on the carriage of cargo into Heathrow at an estimated loss of £5M to BA alone.

Within a week the community decided that they had no choice but to go back to British Telecom Advanced Technology (BTAT), who had replaced NDPS in the newly privatised industry to re-install the old system. Litigation was initiated and this is one reason why little is written on this event as the matter could be regarded as 'sub judice'. Subsequently, BTAT renamed the system ACP-90 for Air Cargo Processing in the 1990s and without publicity brought forward a development plan which is intended to achieve all the objectives of UKAS.

In 1989 BTAT, now simply BT (British Telecom) introduced the standard communications (CCITT) protocol X25⁴¹ which is the accepted international open standard and will ultimately permit all users to connect with PCs, mini computers etc, and communicate with other users computers on a host to host basis, which is a requirement of EDI for the '90s.

1.3.5 AMERICAN HOSPITAL SUPPLY

American Hospital Supply Corp, an aggressive supplier in the competitive healthcare industry, began in the early 1960s to work with a key customer, Stanford Medical Centre, to strengthen their business ties by examining jointly ways of reducing costs, whether they be phone calls, negotiating time, order preparation, storage and transport costs. A result of this was in 1963 a new telephone ordering system, called 'telAmerican'.⁴²

In 1974, this telephone system was upgraded to a pioneering electronic order-entry system ASAP (Analytical Systems Automated Purchasing) by placing terminals in the stockrooms of large hospitals. According to Al Rimkus, Computing Canada.⁴³

Accustomed to ordering supplies from salespersons making regular rounds, hospitals at first planned to use the system only in emergencies. But stock clerks preferred the terminals to sales people and turned to American Hospital with routine orders for everything from tongue depressors to expensive blood analyzers.

Soon its success was accepted by all. The hospital authorities quickly realised that it allowed them to order supplies only as they were needed and permitted them to reduce expensive inventory to a minimum, ensuring the order continuity and expansion of American Hospitals business. Hospitals could not use the system to order from other suppliers. As a result, the company benefitted from a huge increase in their sales. McGraw-Hill estimates that initially sales to ASAP customers grew from 18% to 20%, double the growth to other customers. This growth continued and in 1984 and 1985 sales through the system increased by 39% while average growth for all customers was 6%.

Competitor reaction was furious but temporarily ineffective, while alternative strategies were examined. Legal action was pursued but the 'right of use' to the new technology was not contested and the only action sustained was to prevent the company from establishing exclusive supply agreements with major hospitals. ⁴⁴ Eventually competitors developed their own systems and gradually ASAP lost what was seen as its almost monopolistic advantage.

In 1985 American Hospital was merged into the Baxter Healthcare group and it was recognised that their customers, hospitals and other institutions did not in future want single access to various suppliers. They decided that their early advantage was neutralised and that they would, for customer goodwill, move from a proprietary interface to a standard communications protocol using the public data network. This in turn would allow the customer to have a standard method which would allow him to access any supplier of his choice on a single system and not require individual terminals to each supply company.

The American Hospital Corporation story demonstrates a number of the key elements of the marketing potential of EDI. Firstly, the enormous advantage it can give a company when it can gain an advantage on its competitors, even if temporary. Secondly, it shows it can retain this advantage for a certain period (presumably, if other factors such as price and service remain the same) and, finally, it demonstrates that when the market reaches a level of maturity and other competitors have equipped themselves for playing on a level pitch, then the advantage disappears but EDI becomes by then a precondition for remaining in business.

This case history also demonstrates how EDI was evolved as a strategic business tool, also how information can be used as a competitive weapon from a corporate point of view and how EDI can change the relationship between the supplier, his customer and his competitors.

1.4

DEVELOPMENT OF EDI

EDI arrived almost simultaneously with other key technological developments in trading procedures and business communications. It is useful to examine the historic methods of Trade Data Exchange in conjunction with EDI and these new solutions such as Fax and Courier services. These latter were very successful in meeting certain aspects of business requirements. These processes can be sketched to establish their role vis-a-vis EDI and the relative success and interrelationship of each method.

Trade data interchange related activity developed in such sectors as banking, the airline industry and in other specific sectors. The examples instanced demonstrate scenarios where conditions existed so that electronic trading was perceived as the solution.

These cases also demonstrate that there must be a driving force, one strong organisation that can see the internal benefits but also has the influence to get commitment to the idea from its business partners. This can be done by selling it on the basis that there are benefits for everyone or , alternatively, through direct pressure, i.e. of a single powerful business participant, that EDI trading is to become the basis for a continued business relationship.

These examples show how EDI has evolved and is still evolving in its application and form to meet new business requirements as they emerge, both technologically and functionally. The main facilitating areas of the evolution are in the astounding technical improvements in computer hardware and the emergence of common data format standards. In the case of hardware, firstly, the reduction in the cost of computer equipment and, secondly, the improvements in processing capacity, speed and in particular, the area of communications and networking with the associated development of enabling software to facilitate data exchange on a hardware independent basis.

In the case of standards, none of these improvements could be exploited unless there was parallel progress in the development and in the adoption of standards. At first, these were inhouse or proprietary, secondly industry or sector agreed standards emerged, migrating next to national standards and ultimately to accepted international standards. Finally, these were approved by bodies such as the United Nations and the International Standards Organisation (ISO).

In the aircargo case, three distinct technological waves of EDI can be identified. First, the community participants, airlines and clearance agents, connected by dumb terminals to a database system as with a bureau; secondly, the arrival of inhouse systems with one major group, the airlines, requiring an interface to their computers and, finally, all parties want access from computer to computer or 'host to host'.

The best method to meet the need to communicate openly with many parties is through the use of agreed international standards for both the communications protocols and the data formats. The issue of standards for message formats, including their development is dealt with as a separate subject in Section 5.2.

It has, however, primarily been business considerations rather than technological developments which have driven EDI to its present state of usage. These have been marked by a number of stages. In the very first stage, as few as two companies who have a strong and well established trading relationship such as that of component producer (the supplier) and end product manufacturer (the customer) get together to reduce costs and improve the efficiency of their businesses.

The initiative for the new business approach can rest with either party. In this situation it would normally be the stronger or more aggressive party but not necessarily confined to the buying or the selling function. The motivation for the introduction of electronic trading links can be many, usually common factors are cost reduction, closer business ties, reduced order/delivery/payment cycle etc.

1.4.1 SUPPLIER/CUSTOMER RELATIONSHIP

In the United States where these electronic trading links were first developed they were usually initiated and implemented by either a major supplier or completely independently by a major customer. Phyllis K Sokol, in her book 'EDI-The Competitive Edge' ⁴⁵ says

EDI was introduced as a medium of trade initially by two types of companies, one, a major supplier, the other a major customer. Each offered to its trading partners a system supporting its own proprietary company format. Both did it to improve their own business situations and both had the clout to influence their trading partners because their business represented a major portion of the trading partners business.

In the case of a major supplier, it might offer hardware and software to his large customers in the form of one of its computer terminals or a PC connected directly to his Sales or Order/Entry system. The customer then uses this connection to place its orders to the supplier. In return for using the system the customer is promised better service, more timely deliveries, ability to check the status of stock availability and the delivery status of its placed orders.

On the other hand, all the information flows are updating the suppliers inventory system or other files and to update its own system the customer must turn around and rekey the data into its own computer. In addition, if the customer has several major suppliers and if each of them offer their own solution, with the result that the customer could wind up with several PCs, each with its own access codes, menu systems,

different product numbering codes, order formats and communications requirements.

The customer will cooperate for a while but will not regard this as a solution to its own needs. There are, on the other hand, significant benefits to the supplier, reduced order processing costs, better relationships from improved service leading to more sales.

In the case of a major customer taking the initiative, it is placing the orders and has all the incentives, viz control to some extent over price, contracts, size and quantity of orders etc on his side. It does not often need to provide hardware or software, instead it will let the supplier link to its purchasing system. Sokol ⁴⁶ says

Usually the supplier is required to call in (sometimes at specified times) and pull back any orders waiting for him. Those orders are in the proprietary standard supported by the customer, so in order to process them, the supplier must interpret the incoming data, reformat it or rekey it into his existing order/entry application, and then process it as any other order.

The customer may take the opportunity to decrease its supplier base and increase the amount of business it does with suppliers using its system. The supplier, however, may in turn have a number of major customers who may also wish their customers to use its own proprietary system. For a customer using this method it will have to develop a software link to reformat each of the suppliers data to bring it into its own application. This could be a quite considerable effort and it may force the customer to consider if the

benefits are worthwhile.

Overall, Sokol concludes, that 'Proprietary company systems, in general, offer greater benefits to the initiator of the system than they do to the trading partners.'

1.4.2 DEVELOPMENT OF EDI COMMUNITIES

It can be seen from these situations that a single determined trader can force its trading partners into an electronic trading relationship and that this can occur upstream along the trade cycle or value chain i.e. from a customer to his suppliers as well as downstream from a supplier to its customers. The major business, more often a large buyer (but can be any supplier, manufacturer, financial service or other official organisation such as Customs or a Health Authority), acts as a hub from which the individual traders (spokes) radiate. This effect is demonstrated below. (Fig 2).

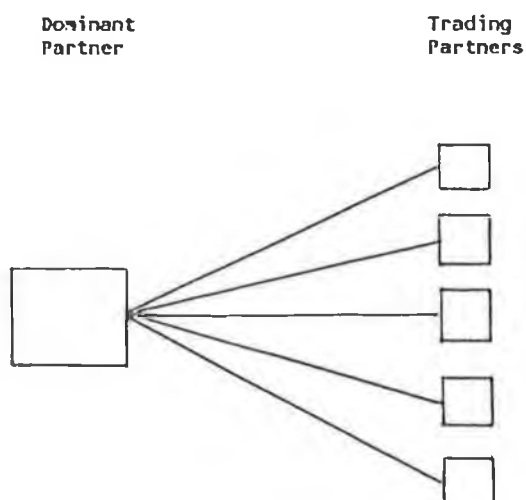


Fig 2 EDI HUB (PROPRIETARY STANDARDS)
(Source Based - Sokol)

The effect of electronic trading being forced on a firm can mean that it in turn will apply normal business practice to encourage another dominant trading partner to use EDI. In turn, this company becomes a hub and its spokes radiate out to form a new electronic trading community. At first, this new community will be independent of the original grouping surrounding the first hub, particularly if they are in a different sector or are not natural trading partners. This functionality will be very limited, and restricted to the principal only, one to one, and not with the other users. The effect of a second hub is shown in Fig 3.

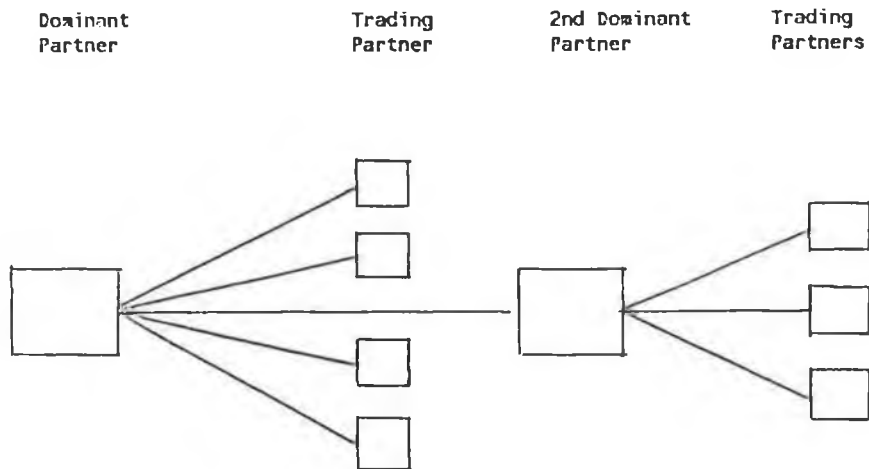


Fig 3 Growth of Second EDI Hub (Proprietary)
(Source Based - Sokol)

The partners in this type of early electronic trading relationship will generally use standards which are most convenient for themselves i.e. first, inhouse proprietary standards and then as more parties join, other perhaps non standard but industry agreed formats. The industry specific standards apply as soon as there is acceptance in the industry that inhouse proprietary

standards are not in its best overall interests. This is usually advanced by active industry association to sponsor and bring about the necessary business agreement between the competing parties. It is important also to provide the overall functionality needed by all the parties, large and small and for businesses at varying levels of computer sophistication.

Different industry sectors have developed very different types of standards, reflecting the actual data requirements at the specific transaction level. Not only can the data requirements be specific to the industry, but the communication methods such as the specific communications protocols, the physical connection arrangements, possible development of an industry's own network or alternatively the prescribed use of a particular third party Value Added Network (VAN), down to specific details such as line speeds, character sets, EDI addresses etc, are all areas where commonality in the industry can be agreed as a standard.

The next phase in the development of EDI occurred when the benefits of extending electronic trading, which at this stage were taken for granted by the traders using electronic trading within the industry, so it was natural to look to non-industry partners for similar EDI arrangements. Once various industries are involved there is need for standards of another type as the business requirement will be different. These can be international or national standards, naturally national standards came first.

A half way house on the road to national standards has been the development of electronic trading Community Systems where there is a cross-sectoral need to communicate to non-industry companies, with other trade or

service participants such as in the case of ODETTE, (Organisation for Data Exchange through Tele-Transmission in Europe, see Section 5.6.1). ODETTE includes European car manufacturers, component suppliers, banks, transport operators and forwarders and (Customs) authorities in different countries.

The current and future stages of EDI development are the emergence of international standards. These, when generally adopted, will permit companies in any trade sector to communicate to any other in any location in the 'electronic village' of the technological world we are entering in the 1990s. Two things are necessary for this, (a) the widespread adoption of UN EDIFACT as the one international data standard and (b) the interconnection of existing Value Added Networks (VANs) and with the closed community networks.

The latter can be facilitated through the implementation by the national Postal, Telegraph and Telephone Administrations (PTTs) or now more correctly PTOs (Public Telephone Operator), of X400 which is the international message handling standards and ultimately the proposed new EDI communications protocol, P-EDI, as proposed by the International Telegraph and Telephone Consultative Committee (CCITT). This work is being coordinated between the CCITT and the International Standards Organisation (ISO) with the United Nations, Economic and Social Council (UNECOSOC) through its Economic Commission for Europe (UN ECE), Committee on the Development of Trade.⁴⁷

This work is vital to the future development and easier implementation of EDI. It is, for example, an aim of the EC that there should be a carrier system in place, as seamless as the international direct-dial telephone network, to facilitate the spread of EDI.

1.4.3 HISTORIC METHODS FOR THE EXCHANGE OF BUSINESS DATA

It is useful, as shown by David Palmer, in EDI Technology,⁴⁸ to examine the development of the business procedures for document (data) exchange through its various stages, from the pre-computer days of manually produced documentation through in-house computer systems and up to electronic exchange of documents. The following indented sections are a summary of his document;

PRE-COMPUTER : From the earliest times of commercial trading involving the use of money as an exchange currency, records of the transaction were necessary. Originally the business documents (orders, invoices etc) were handwritten and delivered by personal messenger or courier, this continued for hundreds of years up to the mid 19th century when public postal systems came into use. For the next one hundred years or so business practice remained basically unaltered. Documents were now being typed (ledger and other accounting records often remained manual) and despatched through the postal system to the correspondent company who in turn entered them to his orderbook and ledgers.

Unlike many other public services, the State controlled postal system has deteriorated gradually but consistently in almost every decade and in every country, this has been due mainly to increasing labour costs and low productivity due to lack of technology.

This system of Trade document exchange was marked by high clerical costs as all documents and records were produced manually, high error rates due to the number of transcriptions, slow speeds of processing and inaccessibility of information as the physical document had to be located from manual filing systems.

At a time when significant improvements were being made in almost all other business activities, production, marketing and even clerical systems, the basic method of business transaction exchange was disimproving due to postal delays, with no solution in sight.

BATCH COMPUTER SYSTEMS :Computers were introduced to overcome all of the above problems (except postal delays). The first systems were all batch oriented, at first documents (data) were reformatted and punched, by high speed punch card machine operators onto cards and then loaded on the computer for a processing run, which also updated the companies main accounting systems.

The next generation of computers allowed data to be captured simultaneously as the documents were produced but the processing 'run' was still done in batch, usually at night. Errors were identified and could be corrected for re-input at the next batch processing run, perhaps the next night.

Many advantages arose from this improvement, such as reduction in clerical processing costs. However, from a trade cycle point of view, the documents (data) still had to go through the post and on arrival had to be re-entered into the computer system of the recipient, with consequent risk of error and delay. While there was a

saving in clerical staff for order and invoice processing, there was a new requirement for systems experts and extra repetitive work for punch room staff.

ON-LINE or REAL-TIME COMPUTERS: Trade documents (data) were validated as the computer processed and produced the paper document. Online systems provided all users easy access to the up to date and accurate data, control of other functional activities such as production, inventory and accounting could be extended, and these applications and other systems could be integrated to provide a coordinated approach to all aspects of the business.

Despite these and other in-house benefits, the trade documents had still to be enveloped, posted, opened on arrival and re-entered, all slow and error prone, in the business partners system. All this was achieved without any significant reduction in the total trade cycle time.

1.4.4 IMPROVEMENTS IN BUSINESS COMMUNICATIONS

Business generally benefited greatly from the many inventions and other technological developments, particularly in the area of verbal communications over this period. These did not, however, bring any real improvement in trade document exchange procedures, and to a great extent they hid the lack of progress in this area.

Firstly, the invention of the telegraph brought the potential for fast communications but it was only when the business application of its use, in the form of the inhouse telex machine came into widespread use, did

business benefit. Similarly, the really impressive developments in verbal and visual communications brought their own significant benefits, but these both addressed issues other than the transfer and exchange of business documents.

In summary, even well into the fourth quarter of the 20th century, despite the formidable array of technology available to modern business, it still depended on the national postal systems to collect and deliver the basic trading documents (orders, invoices, pricelists, quotations, statements etc) which are the very life-blood of commercial intercourse. Then on delivery these documents had to be re-entered into the recently arrived in-house computers of the recipient companies.

Two separate developments, one a new business, Courier Services and the other a technical product 'Fax' appeared for a while to be a full or partial solution. A third, a technical facility, E-Mail (Electronic Mail), however, is a messaging service for inter-personal memo type, communications on a terminal to terminal basis, and is a supplementary service in the exchange of business documents between trading companies.

It is beneficial, from the point of this study, to examine all these methods of business communications to establish what role they fulfil and to see are they a substitute for electronic data interchange and to what extent do they meet the requirements of modern business for trade data exchange.

1.4.4.1 GROWTH OF COURIER SERVICES

The arrival and the tremendous success of the courier and the huge worldwide express 'overnight' operators who combined parcels and documents (in supplied envelope packs) in their integrated 'door to door' delivery services, revolutionised the delivery of urgent documents. These companies claimed to have succeeded in breaking the monopoly of the state postal administrations regarding the activities of couriers. According to Mr H C Coxall, Director-International Express Carriers Conference, (IECC), Washington DC. ⁴⁹

By the time the IECC was formed (1984), the liberalising legislation to permit courier service had already been enacted in the UK and USA but operations in many other countries were exceedingly difficult with harassment taking place (with France and Germany being the most aggressive in this respect). However, as a direct result of our activities, both France and Germany had recognised, by early 1986, that private international courier services were of great economic benefit to the commerce of their countries and were a stimulus to their own postal services. Furthermore, from legal studies we had sponsored, government circles throughout the EEC had realised that by the competition articles of the Treaty of Rome, it was illegal for a State or monopoly undertaking to seek to prevent free competition in international courier service. Moreover, there is at this time, no government in the developed world which maintains a complete monopoly of international courier service for their post offices, while in terms of prior-

ity, we are continuing our efforts in other parts of the world, notably Japan.

These companies experienced massive growth, of the order of 30-40% per annum⁵⁰, first in the USA and then in Europe. They have now even claimed to have created the demand for overnight delivery but whatever about this claim, there is no doubt that they offered a suitable service, usually within hours or same day domestically, and overnight internationally, for urgent business documents. According to the International Courier Conference⁵¹;

Today most courier/express traffic consists of time sensitive documents such as bank documents, shipping documents and engineering documents.

The shipping and bank documents would include bills of lading, invoices, letters of credit, etc which fall into the area of trade document exchange and the engineering documents could be classified as graphics and design data. (All of which could be handled by EDI). The actual cost of using regular courier services would be a major consideration, except for urgent items. It is not possible to establish what percentage of all trade documents (orders, invoices etc) would be regarded as being time sensitive enough to be sent by courier, certainly it does appear to be the exception, rather than the standard procedure in trading or even export companies. With the growth of FAX and electronic mail and messaging the Courier companies are rethinking their market strategy and have already switched their resources to parcels traffic.

1.4.4.2 FACSIMILE TRANSMISSION AND REPRODUCTION - FAX

The Fax revolution arrived in the late 1970s and became common during the 1980s. Fax is the facsimile reproduction of letters and other documents on machines which are reasonably low-cost document transmission and reproduction machines connected directly to the telephone system, accessible in both directions, on a dial-up basis to all other fax subscribers.

These machines are now in common use and growing according to John Naisbitt and Patricia Aburdene in 'Megatrends 2000'⁵² there are now 5 million fax machines in the US and by 1992 there will be 9 million. Their use is particularly popular among larger companies but according to Terry Dodsworth, Industrial Editor, Financial Times⁵³, in an article headed 'Fax Machine Sales Growth Slows Sharply', who notes that for the UK, while 'Total sales are expected to reach 270,000-280,000 in 1989, growing from 200,000 in 1988, 98,000 in 1987, from only 10,000 in 1984 ... only about 15% of Britain's 1.3m small businesses have a machine at present'.

There is no doubt that Fax machines have greatly facilitated the speed of business communications, for those functions the documents transmitted are used for. However, as in the case of documents delivered speedily by courier or express carrier, trade documents received by fax transmission still have to be manually processed and sorted on arrival, keyed in to the computer system and then filed away by hand for future reference and access.

An added function in the case of Fax is that the paper documents usually arrive in the post subsequently and need further manual associating and processing. Fax

and courier may have replaced the mail for those business documents that they are used for and in that sense have compensated for the deterioration in the postal service over the years. Neither have, however, provided the capabilities that business needs for trade document exchange to match the improvements made in other areas of Information Technology developments.

It is of interest that one of the biggest of the express companies, Federal Express (FEDEX) a US \$10 billion ⁵⁴ turnover company attempted to develop a product called ZAP-MAIL, designed to transmit documents at high speed and reproduce them to their original quality at the destination point. The business objective of this product was to give it a major competitive advantage over its express rivals and to insulate the company from losses due to the general advent of fax. The product was not perfected commercially and FEDEX cancelled the launch and wrote off \$300 million development.

1.4.5 ARRIVAL OF EDI SYSTEMS

EDI as a business practice arrived almost simultaneously with Fax in the early 1980s. However, Fax, unlike EDI does not present any major technical difficulties, it is cheap to buy, it is readily available off the shelf and it can be installed immediately even using, if necessary, an existing telephone line.

As a solution to the need for trading partners to integrate their systems for their mutual advantage, neither Fax or courier services, or any other communication advance met this need. Business, in the absence of easier and cheaper methods, turned to EDI as the way to improve communications and at the same time capitalise on the advances of Information Technology

which was now, for the first time, combining successfully the individual sciences of computing and telecommunications. The first efforts as condensed from David Palmer ⁵⁵ were on the following lines:

(A) DATA TRANSFER BY MAGNETIC TAPE : This involves the normal creation of the transaction records on an on-line system and the production of a magnetic tape in machine readable form with all the relevant data, which is then physically transferred to the business partner for direct input in his computer system.

This transfer of computer data represented a major step forward as it eliminated the duplication of the data capture with consequent improvement in speed and reduction in cost and error rates. This method is still used and has no security risks, its chief drawback is that the benefits are confined to cost reduction and error elimination and the real benefits of computer linkages and systems interworking are not available through it.

(B) DATA TRANSFER BY TELECOMMUNICATIONS: This is real electronic data interchange. This involves the processing of the transaction records as in the previous case but the data is transferred automatically to the business partners computer where it is entered without the need for any human intervention into his system which is designed to receive it and where it updates his records and other files. The data is transferred via a communications link which can be a leased data line, a dial-

up line from the public network, a link to a Value Added Network (VAN) or a Trade Community System to which both parties belong.

1.4.6 DEGREES OF STRUCTURE IN THE EXCHANGE OF EDI MESSAGES

The relationship of EDI to other forms of electronic messaging, Fax, E-Mail etc is defined in Section 1.1. The wider relationship with these and other electronic messages, such as Telex, transmission of Application Files, EDI documents and the transmission of Design material such as CAD/CAM (Computer Aided Design/Computer Aided Manufacturing) is shown in Figure 4. This is from an article by Gary Dalton from EDI Forum' ⁵⁶ and it puts all business messaging into perspective.

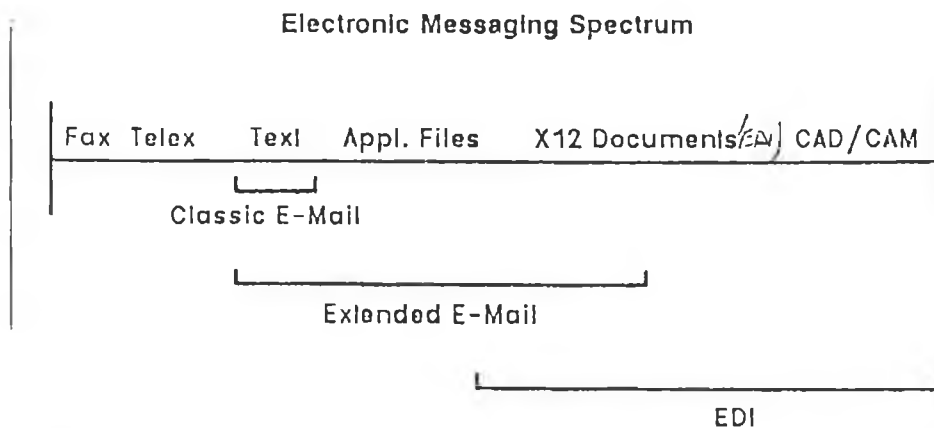


Figure 4. Electronic Messaging Spectrum
(Source: EDI Forum)

The following section reproduced from the 'EDI Forum'
⁵⁷the new US 'Journal of Electronic Data Interchange'
describes the various message structures as follows:

GENERIC EDI : Standard formats have been developed by a number of standards bodies. The format for a standard, generic purchase order defined by ANSI X-12 (American National Standards Institute's X-12 Committee), for example, is defined broadly to satisfy the needs of many different industries. Records are typically variable length and contain many optional fields. Technical requirements are based on general available equipment and widely accepted technical standards. When a firm sends a generic EDI purchase order to another firm that uses the same generic format, the receiving firm can capture the purchase order data directly in a computer supported business application without rekeying.

INDUSTRY CONVENTIONAL EDI : Some industries have developed standard formats and communication conventions that are used exclusively within that industry. Some of them base their conventions on a subset of the more generic standards. These format conventions may be considered to be essentially customised formats of the more generic standard EDI formats.

PROPRIETARY EDI : In a sense, proprietary formats and technological requirements are the most structured of all. They are typically fixed record length files with very little variation allowed and they often require specific communication equipment and communication protocols. Proprietary formats are developed by one firm for exclusive use by its trading partners. To date the majority EDI transactions are likely to be of this nature. Firms such as K-Mart, GM, and Service Merchandise have developed proprietary systems for early efforts in EDI. Most of these systems, however, are moving toward the use of generic standards.

1.4.7 CATEGORIES OF EDI

EDI has developed, at this point in time, into four main application areas. They are:

- Trade-data Interchange
- Electronic Funds Transfer (EFT)
- Interactive Applications
- Exchange of Graphics and Design Information

According to Butler Cox, ⁵⁸

Each type of application has reached different stages of development, has different implications for its users in terms of costs and benefits, and presents different problems to those implementing it.

The case studies and examples already given have touched briefly on some of these categories, more specific instances and descriptions of each type are as follows:

1.4.7.1 TRADE-DATA INTERCHANGE

This is the most common application. It is concerned with the interchange of information relating to business transactions, such as purchase orders, invoices, quotations, delivery orders, import and export customs documentation. This includes the situations already mentioned such as the supplier/customer relationship and the case studies of UK Aircargo/HM Customs, and the American Hospital Supply Corp.

This is an area where industry specific Community Systems have been developed and in many of these cases such as ODETTE in the European car industry, they can be designed to cover other industries and also cross industry sectors to include other activities, e.g. such as banking as a linked EDI partner. This should be distinguished from purely financial transactions between banks and other financial institutions of an Electronic Funds Transfer (EFT) nature, which falls into the next category.

The technology most commonly used for this application is the 'Store and Forward' technique. This is a sector also where the Value Added Networks (VANS) are focusing as their main area of concentration. It is this area of EDI, the part covered by the acronym, EDIFACT, which means 'EDI For Administration, Commerce and Transportation', that this document will mainly concentrate on.

1.4.7.2 ELECTRONIC FUNDS TRANSFER (EFT).

This includes all the banking specific activities, such as SWIFT (already referred to in Section 1.3.2) and others such as Bankers Automated Clearing Service (BACS), the Clearing House Automated Payments Service (CHAPS), it also covers other financial activities such as insurance for which in the UK there are two Value

Added Services, BROKERNET operated by INS (International Network Services) and LIMNET (London Insurance Market). RINET, Reinsurance and Insurance Network, has been established by the industry itself for the international business transaction, based in Brussels.

The type of transaction covered by EFT can include:

Customer Funds Transfer, Interbank Transfers, Direct Debits and Credits, Foreign Exchange Standing Orders, Savings Schemes, Subscriptions, Customer Balance Reporting, Collections Payment Systems (Payroll, Pensions, Creditors etc) Documentary Credits, Securities Trading.

BACS Ltd is one of the main EFT services in the UK according to Dr Christopher Eaglen in the 'EDI Handbook'⁵⁹ transactions through BACS are only 10% of the equivalent cost of paper transactions. He calculates that there are in the UK 9,000 major computer sites (public and private) and 150,000 microcomputers used for commercial payroll and accounting roles. Of these, 8500 are operating directly or indirectly in an EFT role with magnetic tape media and 2000 have a telecommunications link to BACSTEL, which is the name of BACS communications system. In 1987 over one billion EFT transactions were processed by BACS and the annual growth rate is estimated at between 17% and 20%.

At present BACS is confined to strictly EFT transactions and while a parallel relationship to EDI is accepted, this is likely to continue for some time. Dr Eaglen says ⁶⁰

The EDI and EFT processes for data interchange can either operate independently in both time and application or there can be some linkage through the use of a unique Field 10 reference link number embodied in both the EFT and EDI transactions. However, in a number of cases, Field 10 of the EFT transaction may be adequate for containing all the data for reconciliation of a transaction between two corporate organisations. For example, Field 10 may contain the suppliers invoice reference number.

While this is a step in the right direction, it is clearly very far short of integrating EFT into a comprehensive EDI trading and payments system which has to be the ultimate goal. The schematic relationship between EFT and EDI, as seen by BACS is shown in Fig 5.

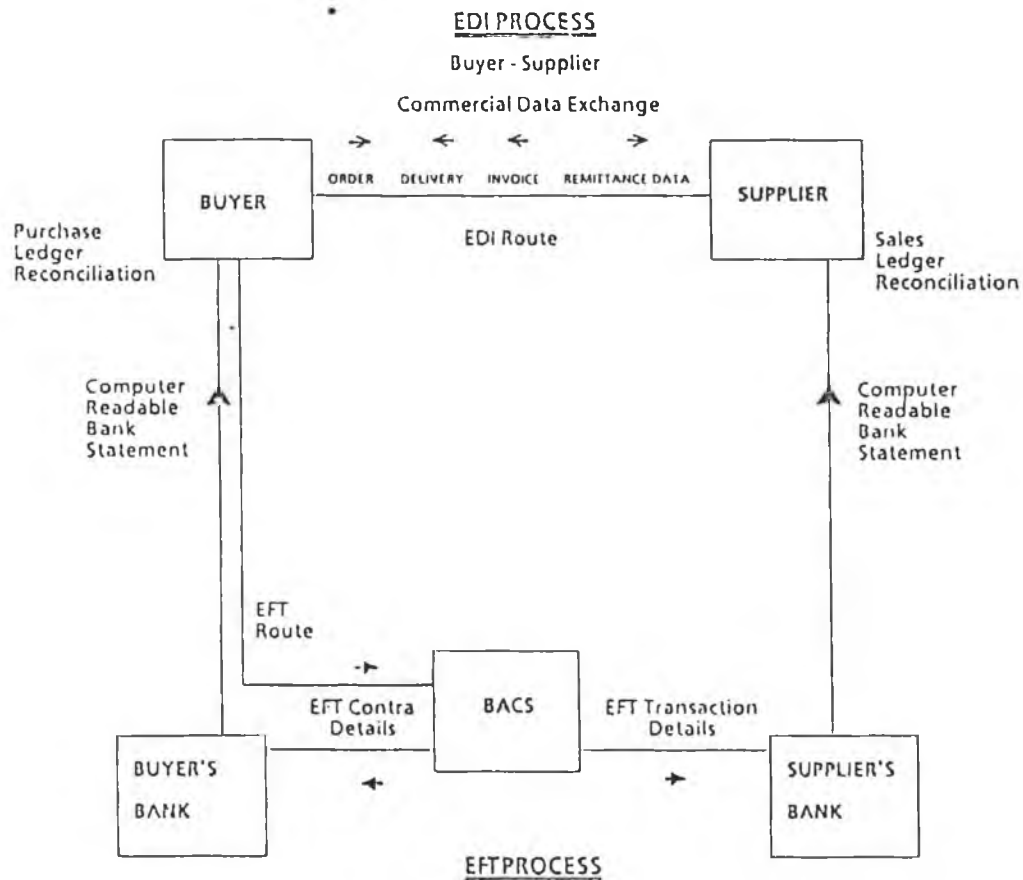


Fig.5 Schematic Arrangement of EDI and EFT processes.
(BACS) (Source: The EDI Handbook)

The situation in Ireland is similar to the UK with the full range of interbank BACS EFT services. According to Bruce Middleton, Computer Based Customer Services Manager, Allied Irish Banks⁶¹, the Irish banks are heavily involved in electronic transmission of financial data exchange and EFT. The necessary infrastructure is now in place. The ATM (Automated Teller Machine) network is now established and has broad card interchangeability between the main banks, permitting a customer to obtain funds from the nearest bank office and then permitting automated settlement between the banks involved for this and many other types of transaction.

Another example also is the growth of credit cards. The 'big two' Irish banks, Bank of Ireland and AIB (Allied Irish Banks) also have their own credit card services in conjunction with internationally known card 'brands' and these require an extensive automated financial system to provide support for these time critical and strict credit control demanding services.

The Irish banks approach to automation and EFT is predicated on their need to reduce local branch office workload and improve customer service. They are already allowing key customers to link on a secure basis into their Cash Management Systems to read historic information only. One of the services available by link or on magnetic tape are 'Autorec' statement balance enquiries and Paid Cheque details. There are at present no interactive services available. It would appear that the Irish banks are even more cautious than their UK or European counterparts are about security.

Because of the conservative nature of the banking world and the competitive situation particularly between the 'Big Two' banks, no official statements will be made or no 'on the record' information provided. The author is satisfied, however, that both banks, and particularly AIB, have now got the technology to link customers on an EFT/EDI basis and are doing so but only in certain specific cases. This is done only in response to strong customer pressure which might otherwise result in the loss of the account. That they are not yet prepared to offer these services on a public basis may, apart from security concerns, be due also to reluctance to make technology the new competitive battlefield, yet.

Behind the scenes they are forging ahead with preparations for the inevitable 'electronic war' of which only the timing is in doubt. For example the 'Big Two' have both nominated themselves as pilot sites to implement and test the new SWIFT/UN EDIFACT messages which include the Extended Payment Order and Remittance Advice which include buyer/seller trading information which are designed for exchange with shippers and consignees.

The Irish banks have based their EFT Services on a closed interbank network with magnetic media (tape and diskette) interchange with the customer. The banks decision was to have a 'Front End' system which would be capable of reading any customers data formats rather than using a telecommunications link. 2000 different formats can be read by this device. AIB alone take in between 150 and 200 computer tapes, diskettes, cartridges per day and this doubles on Tuesdays as weekly payroll runs are lodged for processing.

The BACS EFT system allows for a three working day processing and payment cycle. The actual minimum cycle period is 36 hours. Data must be received by BACS before 9 pm on Day 1. This data is processed by the BACS computer overnight and by 6 am on Day 2 is ready for transfer back to destination banks where it must be merged with the individual banks own data. At 9.30 am on Day 3 the transactions are posted by the bank to its customers accounts. It is possible to 'scatter' payments over a period of up to one month.

Cognotec, the Irish currency exchange rate and Stock Market information system supply up to date financial data to users using a terminal connected to the videotext system. In June 1990, a new Minitel service was announced by a consortium including, Telecom Eireann and AIB to provide a cheap electronic access to various services such as telephone directory information, supermarkets and financial information through a cheap terminal connected to the telephone. This is the French system which has become the most sophisticated in the world due to the free distribution of over 6 million Minitel terminals to domestic users. In terms of this study, these services are partly relevant as they are a different technology - videotext - and are strictly neither EDI or an EFT application but are an electronic trading service. AIB, however, intend that Minitel can be used for home banking.

.7.3

INTERACTIVE APPLICATIONS

Travel agents need to get immediate responses to their customers queries from an airline, shipping, carhire or other travel trade supplier. This is 'Interactive EDI'. SITPRO has carried out research and development work for the Western European EDIFACT Board on the requirements of the interactive environment. SITPRO says: ⁶²

Most of the current applications of EDI use direct batch or store-and-call-forward mechanisms for the transfer of the data. However, the nature of some applications need more immediate cooperation between the computer systems involved. We need, therefore, to examine the requirements for an interactive EDI and detail the way in which it can be achieved using existing internal standards.

In the context of EDI, 'interactive' needs to be defined. Generally it requires the active cooperation of both systems involved at the time of the exchange of the data. The exchanges form alternate requests and responses, one pair or many; and always in that order, that is not a number of requests followed by a number of later responses.

Butler Cox ⁶³says that

'Interactive applications, include such as information services and reservations services and online corporate cash management services. Although applications of this type used to be accessed from a terminal, they are increasingly accessed from PCs so the user may download the information for local manipulation, rather than merely inspecting it via the terminal. The dividing line between interactive EDI applications and the broader spectrum of interactive services is not well defined and EDI and non-EDI approaches are possible for many applications.'

1.4.7.4 GRAPHICS AND DESIGN INFORMATION EXCHANGE

This is perhaps the least used and developed area of EDI. It comprises the transmission of technical drawings and designs usually generated by Computer-Aided-Design (CAD) technology and transmitted electronically to another location. The transmission could be for a further design stage but it can also be linked to a computer with Computer-Aided-Manufacturing (CAM) facilities for use directly in the machine tool engineering or manufacturing process.

This allows the design of engineering and other products to be designed in separate locations in one or several countries and manufactured in one or several other locations. This method is used particularly for dispersed manufacturing as in car design manufacturing and assembly and also in the aerospace manufacturing and component industry.

The European aerospace company, Aerospatiale⁶⁴ has as its basis, design and engineering work carried out in a number of countries on a collaborative programme with the final aircraft assembly in France.

Aerospatiale developed its own standards in conjunction with its main partners, British Aerospace and MBB (Messersmidt) in Germany. These are called SET (Standards d'Exchange et de Transfert), the data was originally transferred in magnetic tape form through the express postal system but now direct telecommunications links are being developed.

The transfer of graphics is also heavily used in the magazine publishing, fashion industry and design business generally, using state of the art desktop publishing software. Design work is carried out in one location such as London or Paris and the end product, e.g. a fashion periodical, is printed in another city such as New York. The transfer of graphics together with other data, such as files, text, video, sound etc is now being referred to as 'Multimedia' which is a new technology in itself (see Section 6.2).

CHAPTER 2

IMPLEMENTATION OF EDI

Having read the case advanced for EDI and its many benefits as articulated in the previous chapter, the question may very reasonably be asked, if EDI is such a beneficial business tool, then why has it not to date been more broadly implemented and as this is clearly the case, what are the reasons? what is involved in implementing EDI? and, is knowledge and awareness about benefits sufficiently widespread among key decision-makers and managers in the business community, to encourage its implementation and to facilitate its exploitation?

There are many reasons which can be advanced in response to these questions, perhaps the one overriding reason is that EDI is not yet mature and stable as a technology but there are also certain other inhibiting factors affecting its growth. There is a need to look at the issues involved here more closely. Among these issues and inhibiting factors are:

Technical Issues :

- Choice of Network
- Incompatible Data and Communications Standards
- Technical Implementation Problems
- Lack of Software Enabling Packages

Business Issues :

- Concerns about costs
- Legal and Security Issues
- Awareness (or lack of Awareness) among Managers
- Lack of Interworking among Value Added Networks

2.1 TECHNICAL ISSUES

There is a tendency in the world of Information Technology, particularly among those who have successfully implemented EDI, to proclaim its benefits and simplify its difficulties. This also applies to suppliers of computer services who have a vested interest in this approach. It is often stated that EDI is 80% business and 20% technical. This argument is discussed again and there is no doubt that there is truth in it, particularly in those business sectors where EDI is well established with professional communities or other providers, but it cannot be universally applied as a maxim.

In addition, there is no overall standard approach to first time implementation, which as it were, could be developed commercially and sold as a package. This is because the overall requirements vary, from industry to industry, but more particularly the in-house system requirements vary from company to company. This applies to medium sized businesses with their own

applications. There are, of course, packages developed for specific purposes, e.g. Customs Clearance Systems which run on microcomputers, but these are not usually multi-functional and lack the integrated advantages of having external data flows directly fed into existing business applications.

The areas where there can be a standard approach is in the development of standard translation packages which build messages based on a generic standard such as EDIFACT and have a standard communications software package to drive these messages into a standard communication protocol, such as X25. The best known such package is the SITPRO developed Interbridge software package ⁶⁵ which is a generic EDI product used widely in several industries. Only in a very few industries is there sufficient commonality and enough experience to have a packaged approach. Competitive interests often militate against it, hence the success of the proprietary solution, while at the same time the packaged solution must be commercial.

The technical implementation issues are of such importance that they have to be fully addressed and understood. Successful electronic data interchange must, by definition, address all the differences in hardware and applications software of the parties participating. These are technical matters and while technical issues are not the main purpose of this document, they must be addressed.

The previous chapter, examined the evolution of various types of EDI developed to meet differing business requirements and levels of technology from dumb terminals in the customers office linked to the suppliers computer, to the exchange of computer tapes or diskettes right through to the full interchange of transac-

tions from computer to computer with full interface to the respective applications.

How does a potential EDI user get started and at where, in this range, should his entry point be? This question of decision and choice will not arise in many (or even most) cases, where the prospective user is being forced to use EDI to retain the business of a dominant supplier or customer. In such a situation, he may have to use the data format standards, the communications protocol and perhaps the Value Added Network specified by the major partner. (Here the user must consider that by committing to proprietary standards he may isolate himself off from general EDI, and he may have to invest again in open standards.)

Where the company does have a choice, it is useful to examine its options and the necessary steps it should take. Commencing then with the choice of network provision (which is often the biggest decision), there are a number of communications options for a company wishing to establish electronic trading links. David Palmer in an article "The Enabling Factors for EDI"⁶⁶ defines these as follows:

There are currently two communications options for practising EDI. These are value added and data services (VADs) and direct communications via public or private networks.

The European Commission, however, in its booklet "EDI in Perspective"⁶⁷ are far more specific and define four distinct telecommunication network facilities:

- a) **Direct dialling with modems over telephone lines**
- b) **Public Data Networks**
- c) **Managed Networks**
- d) **Private Networks**

There is a terminology problem about the differing titles of the telecommunications/EDI service providers, e.g. VANs, VADs, public and private networks, EDI Community Systems and closed user groups etc and there can also be an overlapping of functions. This language problem is mainly due to business jargon reflecting the differentiation between the specific extra or 'value-added' services provided by new operators, to meet the rapidly developing user requirements both business and technical. The user company can choose between, on the one hand, building his own links and services using the public telecommunications service (in Ireland, Telecom Eireann and in UK, British Telecom) and on the other hand, it can employ a commercial value added data service - VADs to handle all the requirements that are external to his own system. The difference between VANs and VADs is mainly degree and semantics.

These are the range of options and there are many in-between choices which are examined later. The decision factors may often, incorrectly, hinge on cost and inhouse technical capability but the major consideration should be, firstly, the existing business requirements and, secondly, the longer term business strategy of the company. The easy choice, if the company is a first time user and wants a simple low risk solution, may be to choose the VADs, as it will take the clients data and deliver it to his partner, also performing at a price, protocol conversion, data format translation and providing individual mailboxes.

Nevertheless, all the technical options should be examined, and to decide which approach to take and other fundamental issues, a feasibility study should be carried out. This may require consultancy skills depending on the level of inhouse expertise. The other issues which should be examined in this study include the rationale for the actual decision to use EDI in the first place and a quantification of its benefits and costs. This cost/benefit analysis should include all the business issues and the appropriate technical solutions which means a detailed implementation plan. A key issue for this implementation plan will be an analysis of the expected communications pattern between the company and its business partners. This will help to determine the correct network approach.

2.2

CHOICE OF NETWORK

In the early days, much of the data transfer was via the medium of magnetic tape but nowadays telecommunication links are the norm. Where there are only a small number of partners the communications links can be on a direct one-to-basis, according to Don Trafford, Chairman of the UK Edifact Technical Assessment Group

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When first used, communications were on a direct one-to-one basis, which sufficed when there are few partners with whom communication had to be effected. As the number of interchange partners grew, however, so grew the problems of incompatible machine-dependent communications protocols, time scheduling problems, and so on.

Thus evolved the third party network vendors - Value Added Networks (VANs). These (and there are now many to choose from), offer for example the interface between multiple and incompatible communication protocols (so that the problem becomes transparent to users). Typically, they also provide mailbox services from which the mailbox 'owner' can retrieve data either at a functionally convenient time or at a frequency agreed with the sender. Many other value added services are offered of which VANs are only too happy to provide information.

Another network option is to join an industry group who have established EDI connections in their sector (or, alternatively, if this does not exist, to work with and through the industry association or representative body to build EDI links). This presupposes that the demand for the links is primarily an intra-industry requirement but this is not always the case. Industry groups are often called 'Closed User Groups' (CUGs) as they are primarily designed for specific industry purposes and do not offer services generally to the public. David Jackson in his paper 'Preparing the Organisation for EDI'⁶⁹ says:

The first choice is between joining a public service such as Edict (ISTEL) or Tradanet or an appropriate closed user group (CUG) such as the CEFIC project for the chemical industry. This choice is not available for most EDI users as the closed user group projects cover to a relatively small number of users. It is the authors opinion that closed user group projects will eventually join with public services. As more applications for

EDI develop (and they will), then members of closed user groups (which are usually industry specific) will find themselves having to operate through two or more services. In the short term, however, CUG's may offer the best service where the analysis suggests that EDI traffic is restricted to members of this group.

A key question to be resolved, therefore, in any feasibility study is not a technical problem but a business issue, i.e. what are the specific business functions, and which are the partners that the company 'needs' rather than merely 'wishes' to have EDI links to. It may appear at first sight that the only strategic direction for a companies EDI programme, should be towards its main operations or core business activities.

There can sometimes be reasons why a company may not choose to do this and instead it may wish to use EDI to introduce efficiency and cost reduction into its range of bought-in services. The company may also have more control over these activities insofar as it can select the supplier and as it is paying for these services. As noted by Keith Blacker ⁷⁰ in his paper 'How to Build Effective EDI Links' the parties, choices and questions are as follows:

Are you going to start with customers, suppliers or the service providers (for example transport, banks and insurance)? If the first link is with customers, are they twisting your arm or are you leading and augmenting your service? If your first link is with suppliers, are you wishing to automate your paperwork process, or is EDI but one compo-

ment of a supplier development programme? As the customer you could instruct them that this is how you intend to work and leave them to cope with that approach within their operations. But if EDI is part of a plan to improve the supply mechanisms, the resulting communication should be to the advantage of both parties. If your first link is with a service provider, is it to satisfy his wish for cleaner, cheaper information or is it to give you a more effective service at lower cost? When you have formulated your strategy it needs to be agreed within the company at the appropriate level, otherwise the project will not get the support it needs.

The choice of network is, therefore, directly related to the required specific functions but also to the range of business activities transacted with the other participants both now and in the future. A large bulk chemical manufacturing company may, for example, have more individual transactions with office supply companies than he has with suppliers or customers in his own industry. This would be a very exceptional case, but it serves to illustrate the need for companies to look to all their business communications needs, particularly their future requirements and design their EDI implementation in a way which will meet these, as well as their core business operations.

The communication pattern for EDI can best be demonstrated by diagrams. Figure 6 shows the relationship between two companies using a direct communication link.

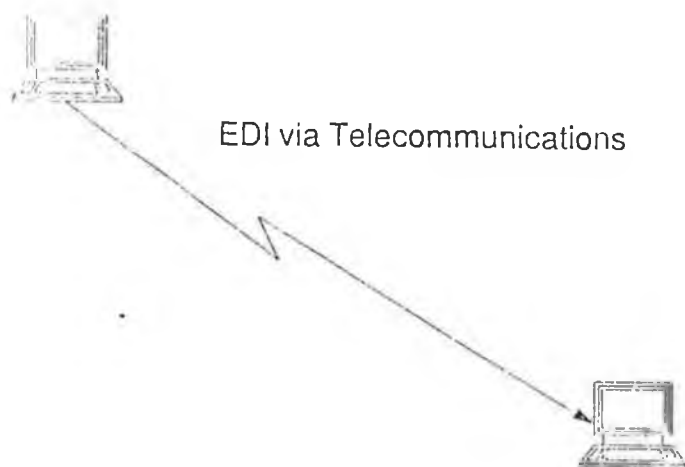
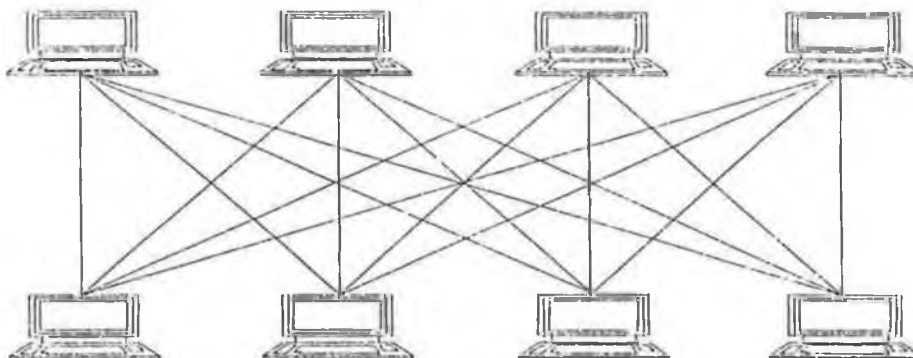


Fig 6 Direct Telecommunications Link
(Source: Chris Nelson)

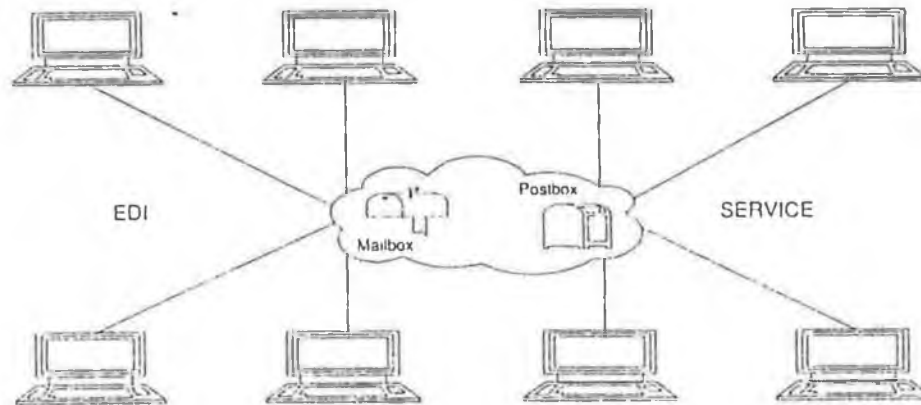
Problems arise when the number of companies who wish to communicate with each other via EDI increases. Firstly, each company will have to bear the cost of supporting a direct telecommunications link between each other's computers, with separate ports, modems and communications software. Secondly, different computers have different communications protocols, or varying versions of the same protocol. Thirdly, there can be major difficulties in co-ordinating transmission timings, which need to be scheduled among all the directly linked partners. This scenario is shown in Fig. 7.



TELECOMMUNICATIONS NIGHTMARE

Fig 7 Spiders Web of Individual Connections
(Source: C Nelson)

Clearly, where there is a large number of links required, an individual company cannot support an exponential number of links from his computer. A network to which all the participants, current and future, can make a single connection to is the only solution, as demonstrated in Figure 8.



TELECOMMUNICATIONS SOLUTION

Fig 8 Network Solution, Providing a Single Link
(Source: C Nelson)

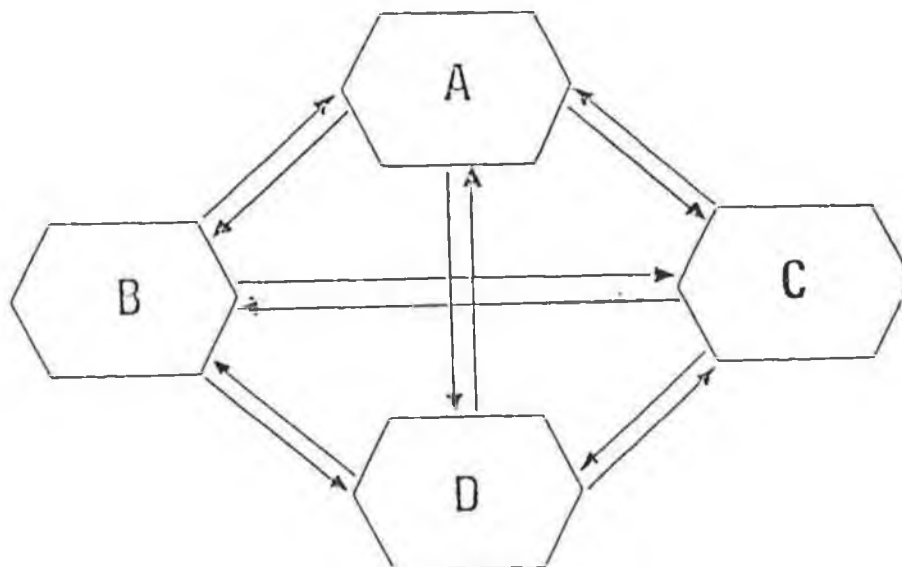
2.3

INCOMPATIBLE DATA AND COMMUNICATIONS STANDARDS

DATA STANDARDS: Agreement on a standard for data formats between the participants is a prerequisite for EDI. Data transfer between two parties can be based on the data standard of any one partner, or any specifically chosen format. Ian Finch ⁷¹in 'EDI Standards-The Issues and Non-Issues' says

Bilateral agreements sometimes work but, if agreements differ (however slightly) from each other, users must grapple with a multiplicity of formats in which the computer data is exchanged; the increased costs in the computer department could outweigh the savings made by greater accuracy in administration.

Data exchange in the form of messages, which are the equivalent of business documents e.g. an invoice, sent by one partner need to be understood by the recipient so that both computers interpret the data in precisely the same way. This requirement can be handled in one of two ways. Firstly, it is processed on receipt in the same format as it is transmitted. This means that the message is sent in the senders own format and is translated into the format which the recipients computer understands. If there is a third or more parties, then the practicality of translation of each of the individual formats becomes more questionable and the case for the second method, the use of agreed standard messages, becomes not just greater but absolutely essential. This is shown in Fig. 9.



-When four companies want to interchange data, twelve conversions are required

Fig 9 Need for a Data Standard
(Source: United Nations)

The problem for the company considering EDI is what standards should they opt for, bearing in mind their intended future needs to communicate outside their own industry sector and should they wait for the panacea of the fully accepted and generally implemented United Nations standard EDIFACT. The issues involved in the development of message standards have already been referred to and as it is probably the most critical area affecting the success of EDI, particularly in the area of international trade, it is dealt with in detail in Section 5.2.

A further difficulty, though not the responsibility of the Standards Authorities, is the availability of software packages to translate between different standards which would permit the direct conversion of a message in, for example, ODETTE to UN EDIFACT. This will only arise if the company wishes to do this conversion inhouse. The issue can otherwise be related directly to the choice of network as such services can be provided by the Value Added Services operator.

COMMUNICATIONS STANDARDS: Incompatibility in the communications protocols of different computer manufacturers hardware is one of the most common difficulties in EDI implementation. This arises when the computers involved have proprietary protocols and do not support an international standard, such as the CCITT (Comit e Consultif International Telegraphique et Telephonique) standard protocol, X25.

There are also differences between manufacturers versions of X25. The degree of difficulty in overcoming this problem will depend on the hardware manufacturers policy towards OSI (Open Standards Interconnection) and the support it provides, particularly for older models, where the problem is most acute. The problem can usually be solved either at the users inhouse computer or in the network.

Most computer hardware manufacturers have in the past only supported external communications with their own family of computers. This was done for obvious marketing advantage and control. In other words, IBM supported only its own communications protocols and, similarly to a lesser extent, ICL and Honeywell Bull.

However, due to customer pressure, the large manufacturers have revised their marketing strategy to take advantage of the market trend towards open systems architecture and the development of OSI by the CCITT.

David Palmer says in 'The Enabling Factors for EDI'⁷²

For some reason the thought of using a communications protocol strikes fear into the hearts of many people, including computer professionals. In practical terms there is no need to know any more about them than is known about the communications protocol used every time a telephone is lifted.

If direct links have been chosen, the protocol may well be dictated by the trading partner(s). If a VADS is being used there may be a wider choice but the choice will depend on the type of computer used and the type of protocols supported by the VADS. The most common methods of communication are Asynchronous, Binary Synchronous (2780/3780), SDLC and X25. All have their merits and drawbacks. Briefly, asynchronous protocols are cheap to implement but are the slowest (that is the dearest in call charges) in operation. 2780/3780 is quite cheap to implement on most computers and is generally reliable. The main problem is that these protocols are 'de facto' standards and some implementations are more standard than others so some companies have had difficulty in getting the communications working. SDLC is generally a trouble-free route but tends to be limited to IBM environments. X25 is, on the face of it, the best protocol. It offers

built in error correction and is an international standard. It is not widely used for EDI in the UK, however.

It is now possible for most hardware companies to supply a communications board or card to convert to, or emulate the required protocol, particularly a standard protocol such as X25. These boards are slotted into a predetermined physical slot into the back of the computer, without major disruption to office activities. The cost of these cards vary considerably from roughly £500-£1500 for a PC to several thousands for a minicomputer or a mainframe computer. As well as cost, there is a considerable variance between the manufacturers in terms of whether the whole design of the computer, especially older models, is suitable for external communications.

The second solution for companies who do not wish to invest in or whose hardware is not amenable to handling standard communication, is to employ a Value Added Data service to supply protocol conversion service as part of their overall data and network services. In this way, companies who wish to respond quickly to an immediate requirement for EDI, perhaps as a result of customer or supplier pressure rather than as a result of a well planned strategic development, can take the first step with the minimum of immediate consequences. This is not, of course, the recommended approach and while the use of a VADS may be the correct solution for the present, this should emerge as a result of the Feasibility Study.

2.4 TECHNICAL IMPLEMENTATION PROBLEMS

The number of and type of problems experienced in an EDI implementation can understandably be myriad and cannot all be anticipated. It follows that this section can only outline approaches to dealing with these, rather than solutions. The main problems are usually in the area of connectivity which is the business of the communications engineer.

The following are examples of the areas where the problems are likely to arise:

- Incompatibility between variations of the same communications protocol.
- Integrating the EDI connection with the applications systems.
- Inadequate Testing: Because of its very nature, connecting hardware and software from separate environments, EDI links must be rigorously tested. New links should be regarded as pilot test links until all combinations of functions are fully tested by parallel running of documentary and electronic transactions. Only then should it be available for every day commercial use without the backup of commercial documentation such as invoices etc. Proper testing allows problems to be identified and solved.
- Unstable Message Standards: One of the reasons that some of the early pioneering EDI projects took many years and a considerable amount of money to develop was

that new messages were being developed in a customised manner without the benefit of an overall Syntax or Data Element Directory such as EDIFACT, thus leading to much trial and error. This can still occur with subset messages of UN but new projects should be based on proven messages.

- Technical design of the EDI interface: If a careful design is not followed, there will be technical problems and it is likely that the full integration benefits of EDI will not be gained, or future developments will be restricted.

There are two main approaches to connecting computers. David Palmer in 'The Enabling Factors for EDI' says

"To put it in perspective, there are two ways of going about an EDI connection. Firstly, there is a direct connection from the network to the main computer housing the users applications. Secondly, a front-end processor can be used for the connection. This is typically a PC. The vast majority of companies really want to use the direct connection but a significant number are using a front-end processor (almost all a PC). The arguments in favour of the front-end processor are cost, speed, ease and strategy."

Palmer argues for the 'front-end' approach, that PC software is relatively cheap and the communications hardware is cheaper on a PC. Speed of implementation comes from the availability of many PC solutions off the shelf. It is also easier (and faster) for PCs to be connected to networks. There can be disadvantages

to this approach, which are mainly a sacrificing performance, particularly where high volumes are involved. Overall, Palmer believes that while the direct connection approach is best, it may also be the most difficult technically to achieve.

2.5 LACK OF SOFTWARE ENABLING PACKAGES

Software enabling packages can provide solutions to intending EDI users for translating data into messages and driving them into the communications. Messages are built from data from the users application by assembling the elements into the appropriate standard message format and then, in reverse, the dis-assembling of the messages into the data elements required to feed the application programmes.

There are, unfortunately, only a very limited number of such commercial packages available, the best known of which is the Interbridge package from SITPRO, the UK Trade Facilitation organisation. Some of the larger mainframe manufacturers provide their own packages, such as IBM and Digital Equipment Corp (DEC).

In most cases, where suitable packages are not available, customised software has to be developed to meet the requirement. This takes time, effort and cost. As often happens when pioneering work of this nature has been completed, there is a demand to buy this enhancement, rather than for other companies to 'reinvent the wheel'. This product can then also be standardised and packaged for marketing by a Software House, by direct sale or licensing. As more of these private solutions are developed and then made available publicly, EDI implementation will become easier.

2.6 CONCERNS ABOUT COSTS

Business is about profit and cost effectiveness. New technical advances however attractive in themselves, have to be very carefully evaluated to show that there is a clearly demonstrable cost benefit. EDI is often described as being strategically necessary, i.e. its introduction is vital to the very survival of the company. This claim can be advanced for various investment choices but it may be that it can be better demonstrated in the case of EDI in a situation where a company is faced with an ultimatum from key customer(s) that to retain its business it must take the EDI route.

The strategic approach can be also placed in a more positive context where a company after mature consideration decides that it corporately wants to change its posture in the market such as to achieve greater market share, or open new markets etc and to achieve this it must introduce a number of changes in its production and marketing, reducing costs and having better market information. This may require a number of initiatives but should include EDI as a key element.

There is a danger that the strategic argument can be abused and used to cloud straightforward economic issues and normal evaluation procedures. It is advisable that all projects are subject to normal cost benefit analysis, for one thing to avoid uncoded developments by enthusiastic executives, but it is more important, at any stage of the project, to be able to show that the original objectives are being achieved.

Managers fears about costs can only be examined when there is a full feasibility study and an implementation plan with costings. Otherwise there is only speculative surmising. At the time this plan is presented it

should contain all the information and options needed further investigation can be carried out if necessary. The general concern about costs associated with EDI has usually the same roots as the problem of lack of understanding or awareness of what EDI itself is.

2.7

LEGAL AND SECURITY ISSUES

Both of these areas can inhibit the progress of individual projects and have an adverse effect on the overall growth of EDI. They are often interrelated in the eyes of potential implementers so they are taken together here but while some security solutions can also help the legal requirements, they are really very separate issues. The solution to the security problem is primarily a technical issue. In other words, additional layers and refinements of security can be added in an attempt to meet all the customers fears, at a cost.

The legal issues are completely different insofar as they relate to the independent and conservative legal system. Perceptions of legal problems can affect the use by business of the available technology, as businessmen can feel constrained without clear guidelines. There is, however, much that has and can be done in this area which is referred to here and is examined further in Section 5.8 'Legal considerations'.

As most bodies of law are based on precedent, through the outcome of cases adjudged over a long period of time, there is clearly a lack of case history with EDI replacing a paper based system with highly developed practices which have evolved gradually since commerce first started. The principal feature of commercial law is the contract, and the problem in the new situation is how does it relate to the existing paper arrange-

ments and what evidential basis does it have for Courts.

UNCID, Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission,⁷³ describes the situation.

Because of its physical characteristics, the traditional paper document is accepted as evidence. It is quite durable, and changes or additions will normally be clearly visible. The electronic document is quite different. It takes the form of a magnetic medium whose data content can be changed at any time. Changes or additions will not appear as such.

The paper and the data communication links are only media for carrying information, however, and it is possible to establish techniques which give electronic data interchange characteristics that make it equal or superior to paper not only as a carrier of information but also as regards the evidential functions.

Firstly, EDI in itself presupposes procedures that make this form of communication more secure. In addition to identification this technique can also provide for error detection and correction. Authentication in the sense that the data content is correct can also be established and privacy can be secured by several means built into the system. Finally, authentication, in the sense that the correct authorised person has issued the message, can also be secured.

UNCID is a Joint Special Committee set up by the International Chamber of Commerce (ICC) with such bodies as UN Commission on International Trade Law (UNCITRAL), the UNCTAD Special Programme on Trade Facilitation, the OECD, the International Standards Organisation (ISO), the EC, the Customs Cooperation Council (CCC) and several other organisations. The UNCID rules are meant to provide a background for users of EDIFACT as well as other EDI systems.

The legal problem for international trade are obviously much more complex than for domestic trading within a single legal jurisdiction. In some countries, such as France and Italy, a paper document is required before a communication is recognised legally. Italian law requires the conditions covering the order and payment arrangements accompany each order. In the United States the Universal Commercial Code requires that contracts for the sale of goods worth over \$500 are only enforceable if there is a signed document proving the transaction.

The next problem is differences that can arise regarding the agreement and conditions of the sale or transaction, it is not possible, of course, to have detailed terms of trading spelled on the back of an electronic message, as happens with an order or invoice. Another factor is the legal identification and acceptance of a 'time and place of the contract, or deed'. The legal status of an EDI message, which can be a contract, covering the agreement and its time and place, must be established at both the origin and destination points.

The requirement for signatures is another thorny issue. The practice of law over the generations has attached special significance to signatures, notably on key commercial documents such as a Bill of Exchange for

which it is a requirement (Bills of Exchange Act 1882). The legal requirement for signatures, or an acceptable and secure alternative is also a major issue for EFT and other financial systems, where strict security measures are an overriding concern.

There are several approaches to the problem of secure identification or 'electronic signatures' used in personal banking and the financial services in the areas of EFT and EFTPOS (Electronic Funds Transfer at the Point of Sale). The basic method is the use of personalised cards with a magnetic strip containing a persons Personalised Identification Number (PIN), such as those used at cash dispensing machines. This system, while suitable for cash withdrawals, is not, of course, 100% foolproof, as cards and numbers get lost. It is also admitted that fraud has occurred with bankcards.

An electronic signature is data appended to or cryptographic transformation of a data that allows a recipient of message to prove the source and integrity of the data and to protect against forgery. The use of encryption techniques provides machine controlled unique identification or electronic passwords for both parties involved in a data interchange, and was originally developed for the military and intelligence communities. It is similar to 'scrambling' telephone calls. It is possible to add various layers of security such as double encryption depending on the requirements. It is also possible to have other procedures such as automatic modem dial-back to the sender after the connection has been established, secure delivery, acknowledgement and non repudiation, each party having a separate secret code key, which must be matched, for de-coding the encrypted data.

Finally, there are accounting and audit requirements, which also have both legal and security reasons, to provide proper audit trails. If controls on internal company systems are unquestionably necessary, then the need for control of access to functions delegated, as it were, to external business partners, is in the eyes of Auditors a fundamental requirement. From the overall business perspective, this is acceptable and correct, provided it can be reasonably implemented and does not blindly refuse the benefits of technology, for wrong reasons.

It is clear that a basic requirement for audit purposes is that all messages (transactions) should be logged and the history of the record, with any amendment, maintained. In other words, a complete audit trail at both ends of the transaction and in the network should be kept. With such histories maintained as part of the basic system, the additional security and audit requirements, considered as appropriate to the specific business, can be developed on top of this. Security is primarily a technical problem and extra levels can be added, at a cost. It is, however, seen as a concern affecting the uptake of EDI especially as more systems become available for access through the public dialup network. The legal issues are more immediate and these are addressed in Section 5.8.

2.8 AWARENESS OF EDI AMONG MANAGERS

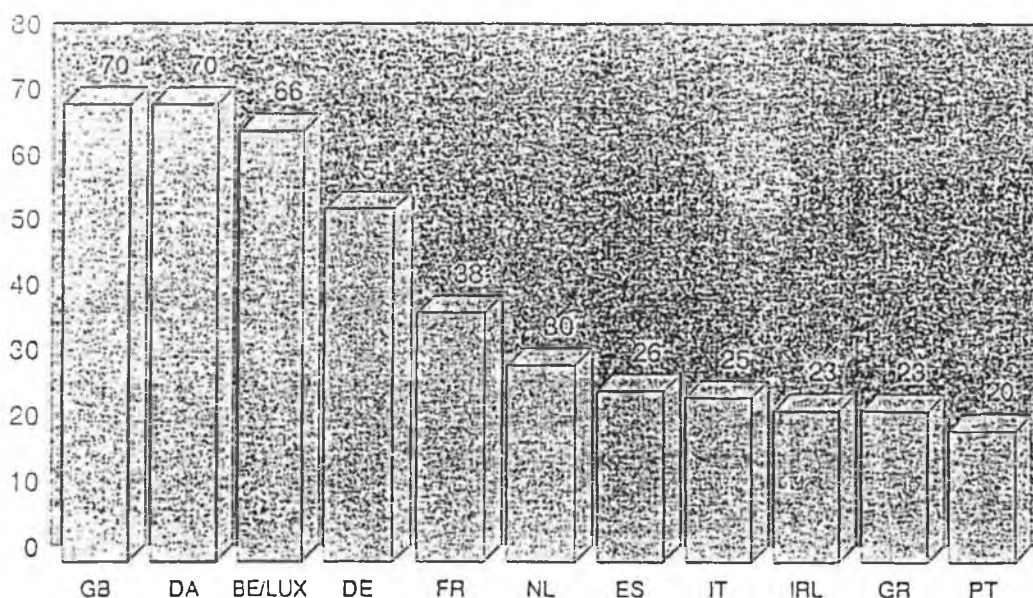
Butler Cox in their evaluation of EDI⁷⁴ give the following assessment of the state of awareness:

There is still widespread lack of awareness of the commercial benefits of EDI, especially among senior management. Where company boards have become aware of the potential of EDI and its importance, they know that it is their responsibility to make decisions about using EDI, but they have postponed any decisions until they understand the implications of the technology better.

TEDIS, the CEC body with responsibility for the development of awareness of EDI, have completed exhaustive research and study on this subject.⁷⁵ In June 1989, they carried out a survey of implementation, use and general awareness in each individual EC country. In conducting both a general and a detailed survey they carried out 1,000 interviews.

For example, one of their main findings, for the EC overall, was that of 600 respondents asked if they had a 'Good Understanding of EDI', 37% said they were 'unaware' of EDI and 63% said they were 'aware'. This varied significantly, from country to country, from a high of 70% awareness' in Britain and Denmark to a low of 20% 'awareness' in Portugal, with Ireland at 23%, as shown in Fig. 10.

"Good Understanding" of EDI Percentage per Member State



Percentage of total responses per state
EDI awareness survey June 1989

Fig 10 'Good Understanding' of EDI. Percentage per Member State (Source: TEDIS)

In another survey relating to the actual use and implementation of EDI, from 600 respondents, 16% said they had 'EDI implemented', 17% said they were 'planning EDI' (within two years), 29% said that they had 'No EDI plans' and 38% said that they were 'unaware' (of EDI). This is illustrated in Figure 11.

EDI Awareness Survey

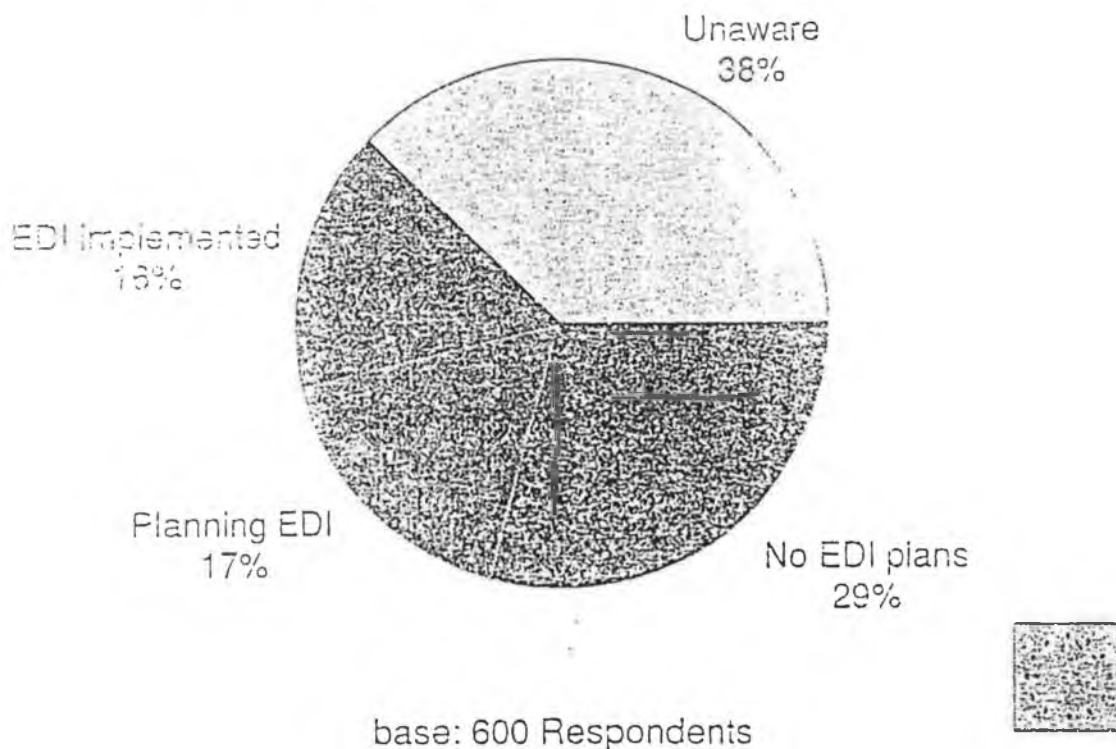


Fig 11 EDI Awareness Survey (Source: TEDIS)

Comparatively to Europe, in the US, the level of EDI activity and, therefore, awareness is generally accepted to be much higher than in Europe. The level of EDI activity in the US is indicated in the following table and diagram, taken from a survey by EDI Research Inc from several thousand US business managers on their interest and use of EDI in early 1988. This survey was sponsored by a group of 11 large US and Canadian companies, including such major firms, as AT&T, Digital Equipment, GE Information Services and McDonnell Douglas and is reproduced in an article 'The State of US EDI in 1988' in the 'EDI Forum'⁷⁶ by D.M. Ferguson and N C Hill.

EDI activity in the US: Of the 1094 respondents, 17.5% are currently engaged in an activity they define to be EDI. An additional 14.4% are planning to implement EDI within the next two years. The remaining 68.1% have no plans for EDI or are uncertain.

The figure of 68.1% for those respondents who have 'No Plans' is broken down further, as follows. Some 57.8% are 'not planning EDI' and only 19.4% 'Don't Know'. This last figure can be compared to the ECs figure for 'Unaware' which is 38%.

The comparable figures for the US are shown as follows.

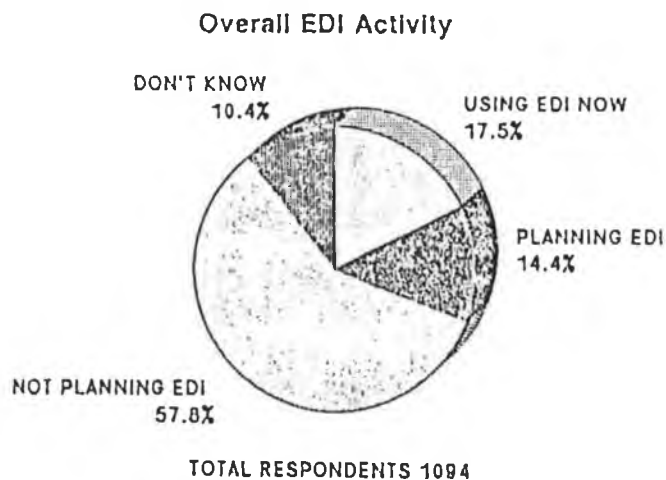


Fig 12 EDI Activity in the US, 1988.
(Source: EDI Forum)

To establish the main factors which inhibit or are perceived to be barriers to the growth of EDI implementation, the EC TEDIS study conducted specific surveys to identify the main inhibitors. This was conducted in two ways; firstly, by industry sectoral group, particularly in those industries where EDI activity is highest and where the benefits would appear to be greatest and, secondly, by leading member countries, where activity should in theory be highest, viz France, Italy, UK, W. Germany. The results are reflected in the following two figures.

EDI Awareness Survey

Inhibitors to EDI Adoption by Sector

Inhibitor	Sector			
	Finance	Travel/ transport	Retail/ wholesale	Chemicals
Lack of standardisation	⊙ ⊙ ⊙	⊙ ⊙ ⊙	⊙ ⊙ ⊙	⊙ ⊙ ⊙
Legal constraints	⊙ ⊙	⊙ ⊙	⊙	⊙ ⊙ ⊙
Tradition/established practice	⊙ ⊙	⊙ ⊙ ⊙	⊙	⊙
Security/privacy	⊙ ⊙ ⊙	⊙		⊙ ⊙
Lack of costs benefits	⊙	⊙	⊙	⊙
Restrictive PTT regulations	⊙	⊙	⊙	
Lack of information		⊙ ⊙	⊙	
Expensive information		⊙ ⊙	⊙ ⊙	

Fig 13 Inhibitors to EDI Adoption by Sector
(Source: TEDIS)

The next diagram (Figure 14) shows the same inhibiting factor broken down by the largest community countries.

EDI Awareness Survey

Inhibitors to EDI Adoption by Country

Inhibitor	Country			
	France	Italy	UK	FR Germany
Lack of standardisation	⊙ ⊙	⊙ ⊙ ⊙	⊙ ⊙	⊙ ⊙ ⊙
Legal constraints	⊙	⊙ ⊙ ⊙		⊙ ⊙
Tradition established practice		⊙ ⊙ ⊙	⊙	⊙ ⊙
Security/privacy	⊙ ⊙	⊙	⊙	⊙ ⊙
Lack of costs/benefits		⊙	⊙ ⊙	⊙
Restrictive PTT regulations	⊙	⊙ ⊙ ⊙		
Lack of information	⊙ ⊙	⊙ ⊙		
Expensive information				⊙ ⊙

Fig 14 Inhibitors to EDI Adoption by Country
(Source: TEDIS)

There are no directly comparable figures for the US but EDI Forum has conducted the following questionnaire so that US managers can identify the barriers (real or perceived) that hinder firms from entering or expanding their EDI implementation efforts. The US survey, 'Perceived Barriers to EDI' provides much more detailed breakdown information on their situation, as shown in Table 1.

Perceived Barriers to EDI

Question: What do you feel are the most important barriers to doing EDI or increasing the use of EDI with your trading partners? (Up to two responses possible.)			Customer		
			Training/Education	29	8.3%
			Lack of Standard		
			Formats	28	8.0%
			Customer		
			Acceptance	28	8.0%
High Cost/ Setup Cost	64	18.4%	Communication Links and Networking	19	5.5%
Compatibility of Software/ Hardware	43	12.4%	None	15	4.3%
Lack of Awareness of EDI Benefits	37	10.6%	Lack of Trading Partners	12	3.4%
Non-Automated/Non- Sophisticated Customer	31	8.9%	Total Respondents	348	
			(Does not include responses with 10 or fewer mentions)		

Table 1 Perceived Barriers to EDI.
(Source: EDI Forum)

2.9

INTERWORKING AMONG VALUE ADDED NETWORKS

Section 1.4 discussed the options of various methods of telecommunications. There is clearly a convenience advantage, from the point of easier implementation and connection, particularly for small and medium sized companies to use a Value Added Network (VAN). This is especially beneficial where the company's trading partners are already connected to that particular network. It is not, however, likely that all of a firm's customers or suppliers will be connected to a specific network. Hence the importance of interworking between networks.

Before making the decision to commit to a certain network, the firm must look not alone at the immediate convenience but also the longer term situation. The manager must be aware, at the time of making that decision, if the VAN he has chosen will meet all his future customer connection requirements. The reality is that, particularly in the UK, the competing VANs do not interchange traffic between them and the client can be faced with the necessity of joining a second or several networks to be able to connect with all his customers.

This is a most undesirable situation, as it will involve the company in extra membership and annual costs to join but equally important he will inevitably have additional system development costs for the interface from his own application system to the different networks. It is a common misconception that VANs or VADs will take the companies data and do everything necessary to make it compatible to the other trading partner. They certainly will do that in terms of adjusting differing data standards and communications protocols in the network (this is where they add value), but they do not, and cannot, become involved in how the customer designs its internal application system to handle the EDI dataflows.

The degree that a company has EDI traffic integrated into its existing application, i.e. its level of MIS sophistication, determines the extent of the benefit it gains. It is possible, therefore, that the cost of having a second or third network supplier connected could be even proportionately greater depending on the sophistication of the application system. On the other hand, a small user with only a PC connection to a VAN, would have to duplicate a connection for a second VAN, this would not be a really major expense. (Of course,

its benefit is also small and all cost/benefits are relative to the size and profitability of the business).

Governments are concerned about this issue. In the UK, the policy was to not only deregulate the national telecommunications and have real competition by having an alternative physical infrastructure in terms of underground cabling and satellite or dish communications by licensing Mercury Communications as well as British Telecom. On the back of these data carriers, the commercial networks were built. Alison Bidgood in her paper 'VADS Interworking: A Cloud on the EDI Horizon'⁷⁷ summarises the way the British scene developed, as follows:

The important point in the present context is that more than one company set about putting together a proprietary network for VADS services and today there are at least half a dozen companies offering a variety of VADS services over their networks to third parties. Even more important, these networks are physically separate at the moment. Unlike the national telecommunications networks, one network's customers cannot normally send messages to another network's customers.

One of the results of the completely deregulated situation in the UK is that a number of companies have been created to service the market requirement for Value Added Data services. These include traditional computer services companies such as IBM IE (Information Exchange), which has several hundred companies connected to the IBM international Managed Network Service, and GEIS - General Electric Information Service,

which is the biggest commercial network in the world. The new specialist suppliers are INS which runs on the Mercury Data Network and has 1,500 users, and ISTEEL which runs on the Infotrac Network and has 850 users in the UK.⁷⁸

The point Alison Bidgood is making is that in the UK, while there are physically separate networks the reasons for lack of interconnections are to do with competition between the companies and, secondly, standards. Whether they are physically separate or not, they are all, at present, proprietary and non-standard networks and the effect of this is that customers of one service cannot communicate directly with those of another unless they join both services.

Being aware of such consequences may, perhaps, be a factor why other countries have moved more cautiously as regards completely open competition (no doubt philosophical and political considerations are also relevant). No other country, apart from the USA, may be as active in EDI as the UK, but none, including the US, has the UK problem of having the market split into separate camps which are almost at war with each other and with no capability or even apparent willingness to have meaningful intercommunications.

In Ireland, each of these main suppliers have allied themselves or have been adopted separately by our main State communications companies. INS have joined with Telecom Eireann to market Eirtrade and ISTEEL were brought aboard by An Post as part of their service named PostGem (Global Electronic Messaging). There appears to be the imminent danger that the same divide will be imported by design or default into this country and it is of interest that this would be through Government bodies as both companies are State owned.

If this were to be the case, it would be in direct contradiction to official EC policy which is that EDI should be based only on accepted international standards and open network provided for all users.

This concern has been enhanced by the marketing strategies of the respective organisations, each of which is actively seeking as customers, some of the 13,000 Irish companies,⁷⁹ which have regular business with British companies. Many of these have EDI connections with one or other of these VADS, INS and ISTEEL. They have each established from their UK customers the names of their Irish suppliers or customers and are currently canvassing them to join the corresponding service. The UK firms found this to be a very effective and for them, an easy way of extending their EDI message traffic.

The Government has now decided that a third State agency, INET, should have the sole licence (e.g. a monopoly) for EDI traffic to Customs. These decisions raised a number of questions, undertones and apparent contradictions. Firstly, it can be asked why should there be two State companies duplicating and promoting competing imported services which do not interconnect. Secondly, why should the National Postal Administration be involved in what is generally accepted as a telecommunications service. Thirdly, what should another State company be now given the new business by right.

The CEC has major concerns on the issue of VANs and their lack of interworking and they at least have developed policies which address the problem in a positive manner. Mr Emile Peeters, Head of Unit "Electronic Data Interchange", Directorate General for Telecommunications, Information Industries and Innovation of the CEC, in his paper 'Current and Future EDI Initiatives of the European Communities'⁸⁰ states:

The need for an adequate telecommunications service is also being addressed. EDI services do not need very advanced or special telecommunications facilities but rather they place new demands on existing facilities. EDI shows how important it is to develop Open Network Provision (ONP) within Europe. Users must have the freedom to choose between service providers without having to worry about different standards at the network interface.

If European network services are not harmonised we will find ourselves in the awkward position after 1992 of having removed tariff and customs barriers to free flow of trade and trading information.

This is why, in June 1989, the Commission adopted the Directive on competition in the markets for telecommunications services which will open up the European Value added services market to competing service providers, allowing private companies to offer such services in competition with the PTTs. At the same time, the Commission adopted the ONP Directive, in order to facilitate the access of such service providers to the public network and to certain public services. When these Directives enter into force they will ensure the development of the harmonised and competitive European telecommunications infrastructure which is prerequisite for the development of EDI.

Interconnectivity is a major concern also for those companies already using EDI for core business functions and who are considering its extension for new business or other service, administrative or accounting reasons, only to find that their intended partners are tied to other networks. Of greatest concern, however, is the negative effect it can have on companies considering entering the EDI field. With other negative factors it can be a psychological deterrent to potential users, who need reassurance and confidence building.

Like all the other inhibiting factors, it is a real business issue and has to be evaluated, quantified and analysed in terms of benefits or disadvantages and not shirked. A decision on EDI should not be kept on review until ideal interworking of networks is achieved.

CHAPTER 3

APPLICATION OF EDI WORLDWIDE

3.1 OVERVIEW AND APPROACH

This chapter describes in broad terms the international application of EDI as an important new business tool and as a state of the art technology in the ever importantly growing telecommunications sector. Chapter 4 examines the position in Ireland in greater detail.

To achieve this academically and set it out in a scientific fashion, the research and methodology used is outlined in detail. It is important that all worldwide developments be taken into account as EDI is of its nature an international process. Indeed it cannot be complete in a purely local or domestic scenario. As trade becomes more international, so too does the communications media which control its exchange. This is the very essence of globalisation, especially in trade and business terms. The growth in the developments of electronic communications is accepted as a key factor (if not the key factor) in the globalisation process. The speed in the rate of development of communications is governed by the availability of suitable applications. EDI is at the

upper end of the scale of business applications which utilise the facilities of modern electronic telecommunications. EDI is not telecommunications but almost all current EDI is based on telecommunications to transport its messages.

To get the required Irish perspective on the application of EDI, the national situation in other countries is examined, particularly in the more technologically and economically advanced countries which coincidentally are also Ireland's main trading partners, on a comparative country by country basis, where the impact of EDI on exports will be greatest. It is also necessary to investigate the position in individual industries as the technology is not evenly spread and many so called 'hi tech' companies and industry sectors are very advanced in the application of EDI techniques while others are totally unaware of the existence of EDI.

The position in Ireland is examined in the next chapter using the methodology described here, firstly at a macro level nationally to establish official Government policy where this exists and, secondly, to establish how the State departments, Semi-State and other state bodies are actively dealing with the current position and setting future trends. The impact on transport as a key process in itself and as an essential element in international trading (all manufactured goods require transportation) is examined in detail. The application of EDI at a micro level is then analysed where this is possible, at individual company and industry level.

Two specific case studies, both of which are of very significant interest internationally are examined in detail in Chapter 4. These are the ICARUS project for Cargo Community Systems Ltd which is the world pilot test site for IATAs new standard EDI approach to the aircargo industry and, secondly, the introduction by Irish Customs & Excise of their Automated Entry Processing (AEP) system and the highly controversial decision of the Irish Government to have the trade aspects of this solely linked through a national network managed by the newly created State Agency, INET.

The attempt being made is to provide a broad outline of the international picture, then examine in more detail the position of the leading industrial countries who are also our trading partners. The next approach is to analyse the overall position in Ireland and the views of Irish companies through direct research. The impact on foreign trade and specifically the Irish transportation sector as it supports trade in exports and imports, is examined.

EDI is in its infancy internationally and even more so in Ireland. Awareness about what it is and how it can be implemented is thought to be very low. The potential benefits which flow from its application are not considered to be widely known or accepted except among a small and dedicated group of pioneers. The facts regarding industry's attitude to EDI as a business solution and its benefits need to be established in a clear scientific manner. It is important to separate the real facts of how it is perceived from what might be only assumptions or the convenient theories of the pioneers.

3.2 RESEARCH AND METHODOLOGY

3.2.1 RESEARCH OBJECTIVES

The primary objective of this dissertation is to carry out an investigation into what the nature of EDI is and to assess its application for Irish foreign trade and its distribution and transportation. The second main objective is to evaluate if EDI can help to remove the disadvantages of the peripheral location of Ireland and the additional burden of the cost of transport for our exports. This represents a broad area but it is appropriate to cover it in as comprehensive a manner as possible as previous studies, books and documents on EDI have dealt with specific aspects or technical problems and have not dealt with its overall business application in Ireland.

Other key objectives are:

- o Articulate and evaluate what its potential implications and benefits are for business generally and specifically for Irish exporters and importers.
- o Establish the international trends and the comparative position in Ireland.
- o Identify the critical factors which determine its success.
- o Establish the present and planned uptake of EDI in Ireland.
- o Identify the attitude of Irish business towards its use.
- o Evaluate any barriers affecting its progress.
- o Establish where the technology is leading to.

In addition to these specific objectives, there are a great number of issues to be examined and considered. One of the main claims for EDI is that it provides competitive edge advantage for a company and this can be more readily shown from case studies. It is now suggested that this can be applied to a complete economy or a country such as Ireland. The argument for this is that while we are arriving late into the high technology era, this can actually be an advantage because of the absence of investment and commitment to older technology. There is a further claim that through the use of the newly emerging international standards, Ireland as a country can more quickly implement EDI and, therefore, exploit the advantage faster than our competitors. These advantages, it is argued, will go a long way to equalising the disadvantage of our islands peripherality in relation to Europe and the extra freight costs. These claims have national implications for Government policy and need to be analysed and assessed.

The subject itself needs to be explained in understandable terms. The technology involved must be described in business terms and how this can be driven from a business point of view. This must be an objective. It has already been observed in Section 2.1 that EDI is 80% business and 20% technical. Nevertheless, most of the material written on the subject seems to concentrate on the breakthroughs and other technical issues. It is easy for businessmen to become bored or intimidated with a debate that concentrates on these technical areas, but it is argued, the dilemma is that progress is dependent on original technical development.

One of the main issues of the EDI debate is the question of standards. The value of proprietary as compared to industry and national standards and the global or international standards, has to be examined, explained and evaluated. From an Irish national point of view, i.e. the representation of the sum of individual companies, the emergence shortly of the UN and internationally approved standards is often presented as a potential panacea for Ireland. An assessment of the merits of waiting for a day when, hopefully, everything falls into place as compared to the value of success through achievement, even at an interim or imperfect stage of standards development is necessary for an informed debate on the subject.

The relative position of actual and planned uptake of EDI in the different industry sectors requires analysis. Where there are no EDI plans, due perhaps to lack of information, those industries which could have benefitted most should, if possible, be identified and their structure examined. Ireland has managed to obtain many computer and other high technology manufacturers, who use modern materials handling and manufacturing principles such as 'Just in Time' (JIT) which in turn need information exchange systems such as EDI for their support. The issue to be examined here is, are these the only companies exploiting EDI and what of native Irish industry, is it lagging behind?

A critical issue thought to be affecting the uptake of EDI is the availability and professional capability of the technical support services. In the first place, this applies to the Value Added Network services who are the closest to offering a complete EDI service. These companies are new and they need to be identified with their specialist services. The telecommunications network infrastructure for the country has great claims

made on its behalf, do these equally apply for EDI? The expertise available to a company, either inhouse or through consultancy, may determine its own readiness to become an EDI partner. The availability of expertise to exploit the infrastructure needs to be evaluated.

The whole issue of awareness of EDI is paramount and requires careful consideration as understandably if there is not knowledge about its capabilities, there will not be a climate for its uptake. This may be inextricably linked to the firm's stage of technological development as it is argued that many business managers want proven solutions and are afraid of pioneering development. Business people would clearly prefer the technology to be completely transparent and packaged, ideally like a consumer product, since this is not the case they may be unwilling to become involved. This, of course, defeats the idea that all business is a risk and that managers are prepared to take risks in areas of great potential benefit just as in, for example, developing a new product. The balance of where the advantage lies, whether to wait for improvements or go early, is assessed.

The other side of the risk coin is the cost of missing the opportunity. If the individual company, the industry sector or indeed the country does not avail of the technology, then will it lose out to a competing firm, to another group, or will another regional economic unit, i.e. another country, benefit from lower costs and increased investment which creates jobs? If the claims made on its behalf are only partially true, the relevance of EDI to administrators, economists and politicians as well as businessmen needs to be

assessed. A key issue, therefore, in view of these claims is, can EDI be simply treated as just another wonder computer facility and left to the technologists? What should the role of Government be?

There is also a fundamental question regarding the technological stage of EDI development which needs assessment. Is it still in the laboratory at the Research and Development phase or when is it likely to be a seamless solution that business managers and administrators can quickly come to terms with and master for economic purposes? If, as it is likely, that it is in none of these unequivocal positions, but a little of each, then how does industry proceed, should it implement or should it wait, and how does Ireland Incorporated position itself to take maximum advantage bearing in mind the benefits but also to avoid the possible pitfalls.

3.2.2 METHODOLOGY

To achieve these research objectives, the following methodology was used.

- 1. Desk Research:** A great deal of reading was required to obtain the secondary data which was necessary to obtain a broad understanding of the background, development and general application of the subject matter. In addition it became beneficial to obtain a more detailed knowledge of the technology (even if this was not an initial view). Study of case histories of individual projects was the most important aspect to provide the rationale for the development, the expected benefits, the technical and human problems experienced, and the lessons to be learnt.

The sourcing of the material for this presented major difficulties. There is very little written about EDI in a comprehensive fashion and nothing that I could find of a true research or academic nature. Indeed, at the start of the study there was very little at all written on the subject. The types of material were mainly trade magazines and the business pages of the serious newspapers. As the study progressed there appeared many papers presented by experts at conferences on EDI dealing with specific technical and business aspects and these are now being published as books with a large number of contributors, as shown in the bibliography. A number of books are now appearing, mainly of a specialist nature.

2. Field Research: This provided the primary data for the application of the subject in Ireland, attempting to establish the current overall national position, the state of the art, the up to date position on important projects on the ground, the national trends, the issues affecting users and the prospects for the success of the technology.

The author was also able to utilise his business position and contacts to get information which would not be available generally. This would consist of current highly commercial information which would not be published and perhaps not even written down. Access to the people with this information would be very difficult for most post-graduate students.

The formal aspects of the primary research consisted of three specific research areas:

(a) Questionnaire: A very detailed questionnaire covering all aspects of the required information and eliciting views and comments on the specific issues was necessary. The type of information required was detailed and was a mix of business and technical areas, some of which was very specific. Despite best efforts to the contrary, the final questionnaire did unavoidably tend towards the technical side, requiring computer literacy, if not expertise in technology. While a cross-section of industry views was necessary, it was clear that these questions would not be readily answered from companies selected on a random basis. It would also not be successfully completed by the average Irish manager. Great care had, therefore, to be taken with the selection of the companies involved in the survey and, secondly, in getting the appropriate person within the organisation to complete it.

In order to develop an approach towards compiling information and constructing a suitable questionnaire, a series of consultations and discussions was held with experts and practitioners in the field. The main assistance was provided by the EDI Association of Ireland (EDIAI) through help provided by industrial members of the Council of that Association, which was extremely useful. These discussions not alone provided background information on the subject generally, but helped to set the broad parameters of the study and the range of its technical areas as well as to start identifying some of the questions and issues on which views needed to be elicited.

It was decided that the next stage of the development of the questionnaire and refining the approach was to conduct a series of pilot interviews/discussions of a more detailed nature within eight companies who were EDI practitioners. These companies are listed in Appendix A. Again a cross-section of industry was important but it was considered more vital to get managers who were knowledgeable and willing to contribute. These companies were in the high technology manufacturing sector, freight forwarding, banking, shipping and administration/public service areas.

There were very clear conclusions emerging from these pilot discussions. Firstly, the companies included in the questionnaire should, if possible, be either known to be EDI users or to have a direct interest in becoming one. Secondly, the survey could not simply be addressed to the company as it was likely to end up on an inappropriate desk. The addressee should, as far as possible, be identified beforehand and it should be personally addressed. Where these two factors were unknown, then it should be sent to a company if it was in a business sector where EDI activity was prevalent or where there were well accepted benefits from its use. It should also be addressed to managers with primarily business functions and, failing individual names, such as General Managers, Marketing Managers or Managers of Information Systems.

In general, the companies to be selected should comply with some of the following criteria: be a leading industrialist, have a high export/import level of activity, be in a high volume production area, have a large number of suppliers or customers, be in a high tech business activity, be involved in transportation for overseas trade, or be a multinational company or with strong international affiliations. In addition to

trading and commercial companies, it was felt that useful information could be supplied by some of the essential services such as the telecommunication service providers, Government dependents and State Agencies and a broad range of Financial Services.

The questionnaire was then designed to meet the objectives and the issues as set out in Section 3.2.1. Consultations on the content of the survey with the pilot contributors resulted in a number of suggestions being made and many additional questions were framed. One area which two pilot contributors did indicate could be a problem, was the question of commercial secrecy. While both were prepared to provide information on an informal basis about their companies plans, they had a difficulty in providing information in writing even where there were assurances that the use and retention of that information would be kept on a confidential basis. The concern was that plans in this area were of a highly competitive and commercially sensitive nature and the marketing department of their companies would be extremely embarrassed and annoyed if such plans were to become known to a competitor. As a result the questions had to be very carefully designed in a way which would yield company plans and capabilities but in a way that the addressee might feel he could answer it without risking disclosure. To help overcome these somewhat conflicting approaches, a guarantee of non-disclosure was also provided.

The detailed questionnaire form is reproduced in Appendix B. The selection of the companies, the identification of the appropriate manager and the level and quality of the responses is dealt with in Section 4.11 Findings of EDI Survey.

(b) Detailed Case Study: This is the ICARUS (Irish Community Aircargo Realtime Users System) project which is of significant international interest being the world test site for IATA's new standard approach to EDI through the development of cargo community systems. This is also very important from an Irish point of view being one of the biggest EDI projects undertaken to date in Ireland. There are many pioneering aspects to this project which are important both nationally and internationally and the organisation of the project and the commercial company set up on a true community basis to run the venture is regarded as a model for other similar projects. (The author was directly involved in this project from the earliest time and had overall responsibility for its development).

(c) General Case Study: Irish Customs authorities Automated Entry Processing (AEP) system and the INET national network. This is a massive project by any international standards, even in terms of size alone. It is, however, hugely important from a number of other points of view including the use of new technology, an X400 national platform and the implications arising from the Government decision to grant a monopoly licence to INET for Customs traffic. One of the main issues to be examined is the basis for the benefits that were claimed for the trade and transport community, which would accrue from the introduction of this system.

3.3 POSITION IN OTHER COUNTRIES

There are many conflicting estimates made on the relative state of progress of EDI in different countries. There are no official statistics for EDI users available in any country. The variation in numbers is often due to the competing claims of the value added networks and service providers for the number of members they have on their books. In the absence of there being any standard way of comparing these it is difficult to provide a comparative basis for the state of EDI development from one country to another. VANs do not specify whether their members or users are fully connected and using the service or simply members waiting to be connected, or, are branch offices counted as separated EDI sites etc. There are no accurate numbers for companies who have EDI direct connections, not using VANs.

A more important yardstick for assessing EDI development would be the number of messages transacted, if this were available. This would relate to a situation where a smaller number of companies which have a well integrated EDI facility on their host computer with information flows backing into all their applications, will generate many times the number of messages as companies using only, for example, a PC as a standalone terminal. Unfortunately, neither the VANs or the PTTs provide figures on message numbers.

Another EDI indicator is the annual growth figure and in this respect one reads of growth figures often in excess of 100% per annum. This again is a highly selective figure as the base figures on which these are based is not always given. It is very easy to have growth of this order in an immature market. These figures will be much more meaningful from countries

like the US or the UK where there is a well developed market than, for example, Ireland, where EDI is only in its infancy.

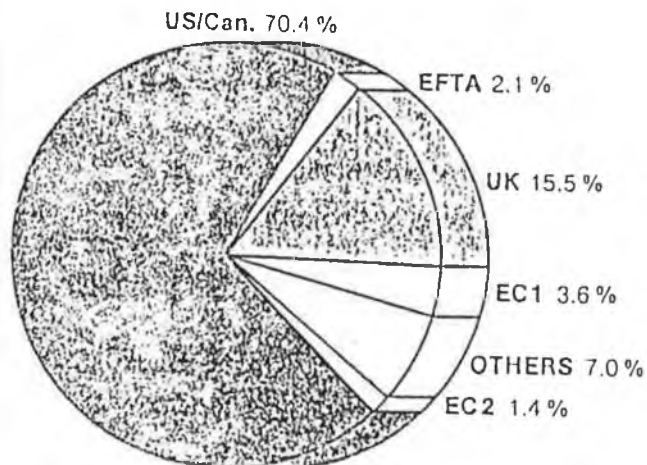
It is useful, therefore, to look at the comparative position between the advanced countries and economic areas to get a first hand feel for the distribution of EDI activity in terms of the number of company sites throughout the world. In a paper to an EC conference 'EDI-1991 and Beyond' entitled 'An Update on EDI in 1989' by Alfredo Sarich, Secretary General of the International Data Exchange Association (IDEA) provides the following overall figures.⁸¹

Worldwide more than 15,000 industrial leaders have already begun to use EDI. These leaders will necessarily involve thousands of others, small and larger suppliers, customers. Projections suggest that more than a half a million companies in the world will use EDI by 1998.

Further studies by IDEA show the following breakdown for the distribution of EDI throughout the world in 1989.

EDI IN THE WORLD

Distribution of Sites



EC1 Denmark, West Germany, Netherlands.

EC2 France, Italy, Spain, Portugal, Belgium, Ireland, Greece.

OTHERS New Zealand, Australia, Pacific Basin.

Fig 15 'EDI in the World' : Distribution of Sites
(Source: IDEA)

Fig 15 provides an overview of the main world centres for EDI activity. These will be examined individually on a country by country basis for the important countries and by economic region for other areas in this section.

Clearly, EDI is not uniformly distributed and it appears that, as in some other areas of economic activity, that the already rich are getting richer. This is shown by the following chart, Figure 16, taken from the same source which shows the relative growth rates for EDI in these main areas. The areas which have access to the technology are also those who will exploit it most. (There are some exceptions such as the position of Germany and France, vis a vis, for example that of the UK, this needs specific examination under their country section).

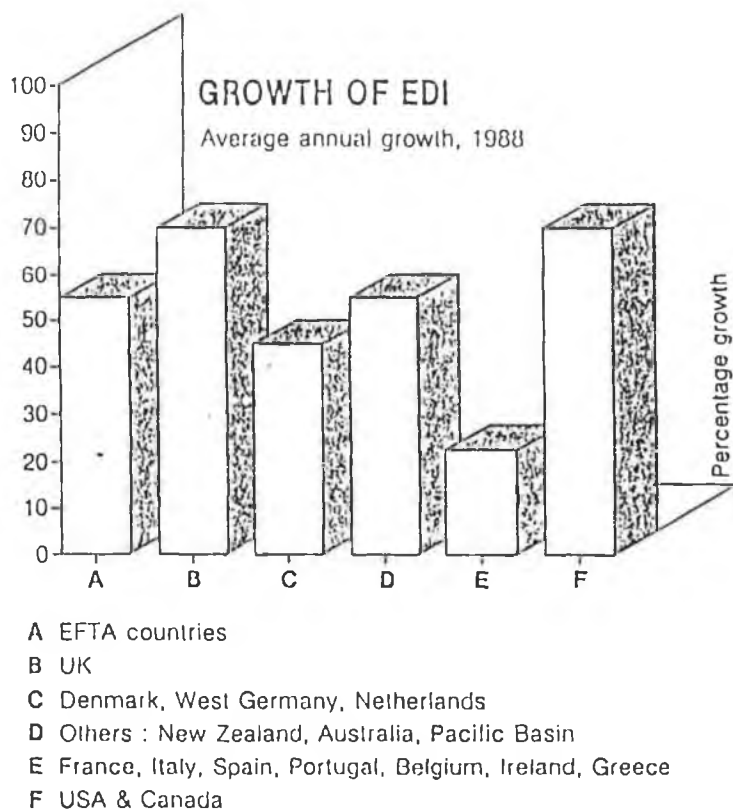


Fig 16 Growth of EDI (Source: IDEA)

3.3.1 UNITED STATES

Apart from pioneering projects, such as the LACES project in the UK (see Section 1.3.4), almost all the early Data Exchange activity has taken place in the US. It was in the US also that EDI was first organised on an industry or community basis such as in the case of the railroads. Perhaps the most significant US contribution, however, to the development of EDI was typical American free enterprise in action. This was the decision by large corporations such as General Motors, Ford, and many others, that they would only continue to do business with suppliers on an EDI basis, take it or leave it. It was through such market led activity in the trucking, rail, retail supply, hospital supply, automotive and aircraft component industries that EDI picked up the critical mass, which makes it the business tool that it is today in the US.

A number of case studies are detailed, in various contexts, elsewhere in this dissertation which show the sophistication and depth of EDI in the US (in this section we are dealing only with the national overview). One industry which has not been examined is the grocery industry and which has played a major role in whole development of EDI in America and throughout the world, because of a study 'Electronic Data Interchange for the Grocery Industry - Feasibility Report', carried out in 1980 by Arthur D Little (ADL) Inc.⁸² This report became the basis of their implementation but its importance goes way beyond that industry as it was the first (if not the only study) which approached the subject in a reasonably comprehensive way so that its findings have a much wider consequence.

The background to the study was that both parties in the grocery industry, The Grocery Manufacturers of America (GMA) and the Supermarket Institute (SMI) had already joined forces to develop a prototype bar coding system for automating supermarket checkouts based on a new product identification and coding standard, Universal Product Code (UPC) in 1973. During the implementation of this new technology both sides realised that a logical extension of their work would be to examine the feasibility of automating the supporting ordering and invoicing processes.

This led to the formation of a joint GMA/SMI Subcommittee on Data Exchange in 1976, and within two years the industry issued its requirements for a 'Data Transmission Network Feasibility Study' in the form of a request for proposals and ADL were commissioned. The main conclusion of the report was, of course, that the specific project was feasible, but its main points have more general applicability.

Firstly, it established on a Cost/Benefit Analysis basis that EDI is cost effective and importantly for that industry, that the benefits were spread fairly between suppliers and supermarkets. Secondly, that the system should be based on Open Systems networking and architecture. Thirdly, the report identified that the biggest issue affecting EDI was the question of standards and its recommendation was to develop its messages based on existing tested syntax and format standards, in this case those of the Transport Data Coordinating Committee (TDCC) which has played a key role in the whole area of standards development.

The most lasting result was, however, the development of the Uniform Communications Standard (UCS) which was implemented after a period of pilot testing in 1982. While this is now viewed as a industry specific and in that sense a proprietary standard, it was a major stepping stone in the uptake of EDI in the US, creating the opportunity for a single huge industry, but also many other loosely related companies taking on the same EDI solution.

Dr Richard C Norris who was the Director of the ADL study has reviewed the success of the project after eight years. In an article entitled 'The ADL Grocery Report Revisited' written for the 'EDI Forum' ⁸³ he concludes:

To a major degree, the answer is that EDI has developed pretty much as expected. Implementation has been gradual with participants starting with a single application and a single partner and then adding partners and new transaction sets over time. While some observers view this growth as being too slow, I believe that this view is too superficial. EDI is not a single thing, device, or piece of software that is simply installed and turned on. It is a form of activity that interacts with a whole variety of systems and functions.

He further concludes that the expected benefits have been fully realised and even underestimated, as only direct savings were calculated and the indirect benefits such as those arising from the use of the data, have been significant. He argues that the gradual change to the use of such new technology is to be expected and he cites the slow uptake of MRP (Manufacturing Requirements Planning) and, secondly, the ten year mean delay it took supermarkets to install checkout scanners to exploit the capability of the UPC standard from 1973 to the early 1980s.

Mr Norris also points out that EDI has to take its place in the queue of inhouse developments. Two areas which were not anticipated were the degree that EDI exposes inadequacies in an internal system, which must be corrected and, secondly, the incentive that the decision to use an open systems approach provided for Value Added Networks (VANs).

One company example of the success of UCS, resulting directly from the ADL study, is that of Super Valu Stores Inc⁸⁴ which has a turnover of \$9.4 billion and is a wholesale, retail and franchised operation based in Minnesota, whose 16 divisions exchange EDI transactions daily with 1400 vendors via 100 brokers and 200 manufacturers. As well as quotations, purchase orders, invoices and delivery details, payments are also approved from the paperless invoice notification.

In addition they have developed a single automated systems audit of all EDI transaction pairs which alone they estimate saves the company \$6,000 a day. Super Valu say that UCS (or EDI) has meant better business alliances, lower costs and more important, better customer service through constantly available and fresher grocery products to the consumer.

The case histories covered in this document show conclusively that in some specific US industries, EDI is the normal way of trading. A key question now is will it become the preferred business practise for business generally and, if so, when is this likely to occur? There are no definite sources which can be quoted for answers or predictions on such a highly dynamic technology and constantly evolving standards, it is clear that there is quite a distance to go before EDI reaches critical mass in the general commercial world even in the US.

Indeed, this highly revolutionary phase may well be part of the problem affecting general uptake. Business people do not like too rapid change as it may mean short lived investment. This view is supported by a number of commentators, such as the following contribution from Anthony J D'Anna, Consulting Member, AT&T, US in an article 'New Technologies and EDI Standards' ⁸⁵

Corporate America is as confused about data exchange as anyone around the world. Many US corporate leaders have been led to believe that a complete set of EDI standards have been completed, tested and implemented in the US. The notion of finding a new international single standard leaves many bewildered and some actually opposed to the concept. The difficulty for upper management may not be lack of knowledge and recognition of EDI but rather it may be that changes are coming much too fast. These changes coming from the standard makers and simultaneously from the providers of the technology that the EDI standards are based on. EDI may be just like the stock market in that when uncertainty reigns, investment slows.

The new international single standard referred to here is, of course, the arrival of the UN EDIFACT standard and its use in this way, is the most serious issue in the current EDI debate in the US. The outcome of this national debate will determine the success of EDIFACT in the US and, consequently, its overall success as a world standard for which it was designed. (This issue is examined in Section 5.2) The other side of the argument in the American debate is the cost of necessary migration from the ANSI (American National Standards Institute) X12 standard.

Industry sectors may be quite satisfied to maintain the EDI standards they developed for intra industry transactions and are likely to stay with these but there is general acceptance that a supra industry standard is required for inter-industry business, hence ANSI was developed. There is a major commitment to ANSI in the US. It is a very well developed and stable standard,

departing from it is a decision that has business and financial implications for individual companies as well as the national policy implications. The US Government accepts EDIFACT, through its Federal services such as the US Customs Service.

There is, however, a very narrow view of the international requirements of EDI in American business. This view is well articulated by Jack Shaw, President, EDI Strategies Inc, a consultancy company in his speech to COMPAT 89.⁸⁶

It is important that you understand just how isolated the United States is in some many respects. The American economy is so huge that whole industries and thousands of companies operate growing, profitable businesses without ever giving a thought to world trade. Many people involved in implementing EDI for such firms don't understand the fuss about international EDI. They may find it difficult to understand why people in other countries are developing EDIFACT when ANSI X12 is a "perfectly good" standard.

As in so many areas, countries look to America to see the likely EDI development paths for the world, Europe and, in this case, Ireland. It is useful to try to isolate the particular factors (apart from the normal American lead) which created the climate for the initial EDI efforts, and more importantly its continued growth. One such reason is the completely deregulated telecommunications environment. Unlike almost all other western countries, including the more sophisticated and freer markets, for example the UK followed suit much later, the US was the first to have postal and telephone authorities (PTT) as separate services.

The telephone service was also private and indeed when there was concern about the dominant position of Bell/AT&T, they were forced by antitrust legislation to break it up and the sell off segments of the service to competitors or new operators.

Deregulation of telecommunications in the US commenced in the late 1960s. In the first place the regulatory authority was the Federal Communications Commission (FCC) established under the 1934 Communications Act. Up to the '60s, the entire system was owned by Western Electric, a subsidiary of AT&T (then the largest company in the world) and called the Bell System. In 1968, the FCC decided that Bell should allow equipment other than AT&T to be connected.

In 1971 a general licence was issued to specialised common carriers allowing them to offer switched telecommunications services connected to the public network. This was followed by rulings and licensing throughout the 1970s which culminated in the 1982 Washington District Court decision ordering the splitting of the long distance phone services and opening them up to competition. The 1984 'AT&T Divestiture' decision by Judge Greene hived off the regional companies, known as Bell Operating Companies (BOCs), and made them subject to regulation by local State Utility Commissions.

The removal of monopoly has had a beneficial effect on the market. AT&T have since put a lot of research and effort in creating a market for various value added services and have expanded their horizons beyond the US, particularly to Europe. Many of their competitors have followed suit and this has created a dynamism in both the US and the world telecommunications market. There are many competitors for the international

telephone traffic e.g RCA Global Communications, ITT Communications and Western Union International (WUI), these too have been joined by the new domestic US competitors, MCI, GTE Sprint and Graphnet in the international arena for all forms of telecommunications traffic.

This unfettered market has undoubtedly led to the development Value Added Networks in the US and to pretty intense competition between them. As market oriented companies, while they may not claim to have created the market, they do claim to have helped develop it and at the very least, to have created an awareness of EDI. They have provided an option for companies to decide objectively on costs and service factors, whether they were prepared to undertake the work themselves or hire a VAN. Apart from cost or service issues, the removal of State monopoly of the basic infrastructure provided a psychological boost for both competitors and participants. (The beneficial impact of the absence of monopoly may best be evaluated when compared to other regulated markets where State monopoly is definitely considered restrictive).

3.3.2 CANADA

Canada is often regarded, to the disgust of Canadians, as a region of the US. There may even be some justification for this in EDI terms as for almost all practical purposes, the US and Canada operate almost as a single market area, there is now a Free Trade agreement. For example, the same Value Added Networks operate and Canada fully accepts and participates in ANSI standard setting activities. The telecommunications environment is also quite similar to the US.

Generally, as in many areas of relations between the two countries, there are few legal barriers to trade or cross border business.

The US/Canadian situation in relation to EDI could, therefore, be regarded as a single unit, certainly from an economic point of view. This is significant as it may well be the signpost for economic integration on a much wider basis between countries as EDI picks up critical mass. This may also apply even where there are much greater legal and language barriers than in this instance. This will particularly apply to the Europe of post 1993. Certainly, EDI will reduce barriers and will be one of the influences which will further internationalisation.

This position is demonstrated by the fact that as Marshall A Spence, President of the EDI Council of Canada points out, that more messages are transmitted across the US border than there are sent internally within their own country. He goes on to describe the EDI experience in Canada⁸⁷

In four short years, EDI has gone from a zero base to nearly 700 companies actively using EDI, a growth rate of approximately 100% per year ... Our Canadian EDI pioneers further decided that third party, value added communication networks were the most efficient method for corporations to use EDI in large volumes. Consequently, Canada has contributed significantly in this area of EDI technology. In fact, the GEIS EDI network, offered by General Electric, was first tested and developed in Canada.

Apart from a pragmatic approach in not re-inventing the wheel and working with existing standards and services, Canada has a number of very interesting projects which are uniquely Canadian and have international significance. One of these is the CANSIF (Canadian Standard Interchange Facility) project. This started out life as the first project under IATAs 'Standard Interchange Facility' (SIF) which predated its CargoSTAR EDI Standard, now pioneered as the ICARUS project in Ireland, Section 4.10.

At first the SIF was merely a set of recommendations of how the respective users should be organised and how they should relate to each other. It was first designed to create a data exchange environment in the air cargo industry. This was not broad enough to command commitment so a broader based proposal was developed and other participants were encouraged to join. A non-profit company, CANSIF Canadian Enterprises Inc was set up with such shareholders as Air Canada, Canadian Airlines, Vancouver Port Authority and the Canadian Freight Forwarders Association (CIFFA) with the intention of developing a multi-modal EDI system open to all parties on a national basis.

Canadian Customs have also launched their automated system with direct connections for trade input. This is known as CADEX (Customs Automated Data Exchange) system.

3.3.3 UNITED KINGDOM

The UK is considered to be the leading country outside the US in terms of EDI activity. It is also easily the most advanced in Europe. According to Langton Ltd, the Information Technology Consultancy⁸⁸ the UK position can be summarised as follows:

Limited forms of EDI have been around for the past 20 years. However, EDI received a major boost in the 1980s when the British Government de-regulated telecommunications, making it possible for independent companies (such as ICL) to offer a clearing house service known as a Value Added Network (VAN). As a consequence, the UK has a substantial lead over other European countries in the use of EDI. These countries are likely to overtake the UK in the mid to late 1990s if the European Commission succeeds in its mission to force through telecom deregulation across Europe in the run up to '1992'.

Deregulation of the telecommunications is identified here as the major reason for the thrust towards EDI. Nevertheless even in an unrestricted climate such an infant technology would also require active sustenance in other forms to help it grow rapidly and become established. In the first instance, there needed to be an awareness of the technology and its benefits on the broadest business spectrum, outside the enthusiasts or pioneers. This required a pro-active approach and it was supplied by SITPRO (The Simpler Trade Procedures Board) and, secondly, by Government in the form of a major study, The Vanguard Report.

VANGUARD is predated by SITPROs EDI activity but as its findings and implementations are of the greatest significance, it is dealt with first. The UK Dept of Trade and Industry (DTI) in conjunction with five sponsoring companies, British Telecom, IBM, INS, ISTEEL and Midland Bank, from private industry, launched the VANGUARD initiative in October 1986 as an awareness programme for Electronic Trading (EDI, Electronic Mail and online databases services), and the Value Added and Data Services which support these. A budget of £3.5 million was agreed by the DTI and the industrial sponsors.

3.3.3.1 VANGUARD PROGRAMME

The information on VANGUARD is summarised from a number of the official documents it has produced and from a summary report completed by the Manufacturing and Information Technology (MIT) Division, DTI for the European Commission (EC) DGX111 in January 1990.⁸⁹ The DTI had recognised the strategic importance of electronic data communications and felt it was in the national interest to actively promote this technology.

The first phase in the programme was the preparation and distribution of Briefing material, Newsletters and Information packs for industry generally, and particularly for consultants, for whom seminars were also held. Free consultancy was then in turn offered to selected UK firms, and about 900 availed of this service. Some 60 consultants from eight of the leading consultancies were used. The initial publicity attracted a lot of interest and companies were invited to register for follow up sessions. The 900 were then picked from some 2000 responses. A special study of the economic benefits of Value Added & Data Services (VADS) was commissioned from Coopers & Lybrand. This

phase took approximately six months.

The second phase consisted of detailed studies into those industry sectors which were considered could have most benefit. Fifteen reports were produced with specific recommendations for those sectors. In addition six general studies of overall issues such as Standards, X400, and the implications for small firms.

The industry sectors covered were:

Agrochemicals	Aerospace	Brewing
Catering	Construction	Educational Supplies
Electrical	Media	Pharmaceuticals
Printing & Publishing	Pulp & Paper	Salmon Farming
Textiles	Transport	Wholesale Food

One of the important aspects of VANGUARD was that it had all the appearances of official Government approval, the reports and video cassettes etc were published by H M Stationery Office. The private sector consultants were employed to do the research and the same people acted as consultants to industry. One of the main aims was to get genuine user groups established from within the industry sector itself, and getting them to continue after VANGUARD was concluded. The ultimate goal would be for them to draw up a Statement of Requirements which could be issued to suppliers for competitive tenders.

Nine industry sectors were selected for community development and each had consultants appointed, viz Aerospace (OASIS), Agrochemicals (Hoskins), Brewing (CAP), Educational Supplies (Peat Marwick McKlintock), Electricals (Langton), Pharmaceuticals (PA), Textiles (Scicon), Petroleum Transport (Price Waterhouse), Wholesale Food Distribution (Arthur D Little). In six

sectors distinct progress has been made, four new communities have been formed and in three cases pilot trials are being carried out.

Direct education was another area tackled. An Education Steering Group was set up with professors from five Business Schools and Universities: Cardiff Business School, Cranfield Business School, London Business School, City University and the University of Stirling. From these were commissioned case studies covering different projects that were successfully implemented in various business activities. These schools and universities, particularly Cranfield, became leading centres in teaching young managers and graduates the benefits of Electronic Trading.

The effects of VANGUARD are difficult to isolate but it is likely that it will be very positive and significant, particularly taken together with deregulation and other measures from organisations such as SITPRO, The Article Numbering Association (ANA) and others. The question is why should a non-interventionist Government as Thatchers become directly involved in developing the market and working together with private companies whose normal aim is to increase market share at the expense of their competitors rather, than cooperate with them? Mr Gil Patrick, who was appointed by the DTI as Strategic Advisor to shape the Phase 2 approach, puts forward the following points:⁹⁰

First of all the VADS market, unlike most others, is characterised by the need for many organisations, often with conflicting interests, to work together in communities, to agree on standards, systems and procedures and other matters of common interest. This requires novel and sometimes extremely difficult strategic decisions to be made. Second, these technologies are characterised by having a high critical mass, since electronic trading has to take place on a large scale to make economic sense, and indeed to be of interest to the users. Third, everyone has a lot to learn about these very new technologies which are likely to have such a great and complex impact on us all.

It will be some time before the full impact of VANGUARD can be assessed. While the brief of VANGUARD was broader than EDI, its impact may be much greater here than in the other areas. In the sectoral studies and communities the main emphasis is on EDI activities. The approach adopted here by the UK Government was up to that time unique in the world. Perhaps because of this and the huge upsurge in EDI activity which coincided with it, (and which has not yet occurred elsewhere, except in the US) it must be considered to be a major causative effect.

3.3.3.2 SITPRO (The Simpler Trade Procedures Board)

SITPRO is the Government agency, responsible to the DTI, for the facilitation of trade through the simplification of trade procedures. A key area of activity in recent years has been the application of Information Technology techniques for the trading, distribution and payment process. SITPRO has, therefore, a direct interest in EDI, its growth and development and because of Britain's trading position it has an interest in the international aspects, particularly in relation to standards.

SITPRO has also a software development department and as early as 1982 following the failure of the market to deliver suitable EDI software interface products, it developed an EDI translation package 'Interbridge' based on the main standards then in use, GTDI (UN/ECE Guidelines for Trade Data Interchange). This product has been constantly updated and now supports the GTDI, TRADACOMS and UN EDIFACT standards. The package has been mass produced and was first distributed free of charge but in line with changes in Government policy it is now sold through agents and the revenue helps to defray the costs of standards development. Interbridge is a generic translator, it will handle a number of standards, and it will also run on a wide range of computer manufacturers hardware types, and sizes ranging from PCs to minicomputers to mainframes.

The Chief Executive of SITPRO is Ray Walker who is one of the foremost names in the international EDI arena. He has been a member of the Board of SITPRO since 1976 and CEO since 1983. He was joint chairman of the UN/JEDI team of European and American experts with Dennis McGinness then of Philips, North America and ANSI, who together, despite all the odds, led the

development of the EDIFACT standard. In 1986, he was presented with the ANSI X12 award for outstanding contribution to international data exchange. In 1988 he became the first holder of the IDEA (International Data Exchange Association) Man of the Year Award. He is currently the Western European Rapporteur of the UN EDIFACT Board.

In these various roles, Mr Walker presents a very positive promotional image of EDI to business leaders, particularly as SITPRO plays an important role in organising briefing sessions and 'roadshows'. It also sponsors major conferences, such as the UK national conferences EDI'89 and EDI'90. In the international standards development process he is in a unique position to provide a UK input and influence from both an official Government and an industry point of view. SITPRO also acts as the coordinator of the UK contribution to EDIFACT standards development in its role of secretariat of the British Standards Institution (BSI) EDI Committee IST/14. The BSI is the national UK organ of the ISO (International Standards Organisation). The major contribution that SITPRO plays in the Standards issues, particularly the EDIFACT/TRADACOMS debate is dealt with under 'Evolution of Standards, Section 5.2.1.

The commitment of UK companies to a national standard (TRADACOMS) that is well developed, widespread and working is very similar to the view of ANSI by its users in America. This, however, is one of the main negative influences for the further growth of EDI, particularly at international trade level which will depend on the acceptance of UN Standard - UN/EDIFACT. The second major constraining issue is that of the non-interworking of the VADS themselves, especially the big ones, TRADANET and Istel, which means if two companies

wish to trade electronically, but both are subscribers to different networks, then one or both of them must join two.

It can be concluded that EDI activity in the UK has dramatically increased as a result of a favourable regulatory climate and very effective stimulative action at national level to give an initial kick start to this new technology. The regulative position on electronic trading is recognised officially by the EC as detailed in an official book 'Telecommunications in Europe' by Herbert Ungerer and Nicholas P Costello ⁹¹

The United Kingdom has moved rapidly to introduce competition in its telecommunication sector. It radically changed the organisation of the sector with the Telecommunications Acts of 1981 and 1984: introduction of a competing network provider, Mercury; privatisation of British Telecom; licensing of a large number of private providers of mobile radio, paging and cable TV and licensing of a large number of value-added services providers - to date nearly 200. In the Spring of 1987 the United Kingdom issued a new general value-added and data services (VADS) licence under which private providers may register.

With this radical transformation of its telecommunications sector in a very short period, the United Kingdom took a lead in the transformation of the European telecommunications market - though the rapidity of the transformation was also closely related with the specific context of UK policy. More recently, France, Germany, Spain and the

Netherlands have started to react to the changing conditions of the sector.

There are now a number of significantly sized VADS (or VANs) in commercial operation in the UK. The main companies include INS (International Network Services) owned by ICL (STC Group) and GEIS (General Electric Information Service), Istel originally set up by BL (British Leyland) but privatised in a management buyout and subsequently part sold to AT&T, IBM IES (Information Exchange Service), Fastrak for the financial and travel industries owned by the Midland Bank. Others detailed in Chapter 5 include the industry sector Community systems, e.g. ODETTE, CEFIC, EDIFICE etc.

A number of individual services offered by these companies are marketed separately e.g. INS offer Tradanet for domestic trade run on the Mercury network and Tradanet International run on, and in conjunction with GEIS, Motornet for the car industry, Brokernet for Insurance, Pharmnet for Healthcare. Other companies such as British Telecom, with Telecom Gold, the public data network for text, telex, E-Mail with 138,000 customers and gateways to online databases, have announced their intention to set up an EDI Global Network Service (GNS).

The most recent VADS subscriber numbers available i.e. end users are: INS 2000, Istel 800, IBM 200, Others 500.

3.3.4 GERMANY

Detailed information on the status of EDI in Germany is not as readily available as it is for the US and UK. Clearly also there is a language problem as much of the information normally freely available from Trade magazines and newspapers is not obtainable in the English language.

The German telecommunications regulatory arena is currently under review by the Federal Government.⁹² The position up to this has been that in West Germany (FDR) telecommunications has been a direct Government responsibility. Both regulatory and operational responsibility are vested in the Federal Minister of Posts and Telecommunications and both postal and telecommunications services are managed by the Deutsche Bundespost, which is a Federal Administration.

In September 1987 a Government commission reported on the future regulation of telecommunications and in 1989 proposals for legislative change were being developed and brought to Parliament. Some of the structural changes envisaged include the establishment of a public enterprise called 'Deutsche Bundespost Telecom'.

This is not to suggest that consequently there is little EDI activity. Indeed there is but it has followed its own development path. There is a very high level of activity in specific sectors, notably the Motor manufacturing industry. The ODETTE project is firmly established and is estimated to have 800 users. Other advanced sectors are Chemicals, Transport (Ports, Airports, Freight Forwarding, Rail), and Steel. Much of the activity is organised by large companies direct with their suppliers/customers or through Industry or Community Systems. Value Added Data Services (VADS) on

the UK model do not exist. There are other networks such as GEIS and IBM which operate freely providing services for their own clients.

One area where Germany may take an advantage is in the uptake of EDIFACT which is strongly promoted by the German Standards Institute, DIN (Deutsche Institut fur Normung E.V.) which liaises with the UN EDIFACT Board and acts as a funnel for its spread with industry. It also has a software company 'DIN Software GmbH' which offers EDIFACT software in the German language. It constantly updates the software as the UN standards develop.

According to Tradeflash, the EDI Newsletter for Europe⁹³ however:

The chemical and retail industries are growing but Germany is a country where old established national standards like VDA (automotive), SEDAS (retail) and BAV (Siemens inhouse) are still strong. The stated intention is to migrate to EDIFACT in '2 to 3' years, but there seems to be little pressure from Government or trade organisations to do this. The main concern of DIN, the German standards body, this year is to convert East Germany's 30,000 article numbers over to the DIN system. Understandably, EDI standardisation can take a back seat.

The author feels that this view may be a little facile and does not take all the factors into account and that it may in any case be advantageous to be using very old standards which will be easier and less costly to migrate from when EDIFACT is stable and has reached a critical mass which may well take two to three years and this may be faster than countries such as the UK.

In an earlier edition of TradeFlash (January 1990) Henry Schlieper of IBM Deutschland claims to have identified 1,300 companies using EDIFACT and it goes on to say 'The two countries which appear to have adopted EDIFACT most widely are Germany and the Netherlands for both domestic and international trade. The UK follows a long way behind, almost entirely for international trade ...'

While there may be little direct promotion by the Government, DEUPRO (Committee for the Simplification of International Trade Procedures of FDR)⁹⁴, is active in organising conferences and information releases on EDI in general and particularly supporting the UN standards. In terms of EDI user activity, Ernst Horig, Chairman of DEUPRO at the Compat 90:Madrid in May, quoted figures of 2,097 EDI links in February 1989 growing to 3,750 in March 1990, an increase of 79%.

These statistics are supported by figures relating to just one company in one state of the Federation alone. Mr Georg Schafer, Ministry of Home Affairs, Land Baden-Wurttemberg, FDR, at the 'EDI-1992 and Beyond' EC conference⁹⁵ stated the following figures for Mercedes-Benz;

Mercedes-Benz started in 1987 with EDI and the VDA norms which are special norms for the automotive industry. Mercedes-Benz has ten production plants with a total of 1,800 suppliers. 750 of these suppliers have tested EDI with Mercedes-Benz; 350 are still developing their systems; 150 are now paperless; a further 200 operate manual data exchange and electronic data exchange in parallel.

In a later contribution which is perhaps indicative of German thinking and approach to the development of EDI, Mr Schafer goes on to say;

What are the benefits of that decision? 15-20% less manual labour - as a conservative estimate - and stock optimisation. But most important is the gain in competitiveness by mastering every change as it takes place ... Large companies like Mercedes-Benz are the moving forces. They make the software even for the small companies and they provide the consultants with experience to learn what is coming next with EDI.

In conclusion, EDI in Germany may not have the same degree of acceptance or awareness as in the UK. There is evidence that its uptake is not as great, particularly with smaller companies and this may be due to the lack of marketing efforts by VAN suppliers. Nevertheless, there is a solid core of direct EDI activity with larger companies and it may well develop more on the US lines through business relationship pressure.

The German requirement for high productivity is also likely to ensure that such a cost saving tool will be exploited. German technology also will facilitate it. The only questions relate to Government policy in these areas, (a) full deregulation of the telecommunications services, (b) active support for EDIFACT as the international standard and official promotion, perhaps on the lines of VANGUARD in the UK.

3.3.5 FRANCE

France is accepted to be one of the leaders, if not the leader, on the use of advance digital telecommunications facilities and electronic services in the Western world. This may certainly be true of home and consumer use of techniques such as Home Shopping, Smart-card technology in which France has an undisputed pre-eminent position and Videotext. Much of this is due to the hugely successful Minitel revolution which is uniquely French, which has now resulted in 5.5 million users being connected to a variety of electronic services. Only a few of these are EDI services but it is important to understand the environment and infrastructure, which has created these services.

France Telecom is one of the two state companies, the other being the postal service which comprise the French PTT 'Administration des postes et telecommunications' directly responsible to the Minister. France Telecom has two basic activities, first, network and basic services for the country and, second, entrepreneurial activities such as the provision of advanced services and equipment. Telecom is thus able to become involved in both infrastructural and value added services but not on monopoly basis. Most of the value added type services are in the audio-visual, TV net-

working services 'Telediffusion de France - TDF', paging services, Mobile telephones etc.

A separate subsidiary company Transpac was set up to establish the packet switching network on which is based the Teletel service. The most successful product of Teletel is, of course, Minitel. (Minitel has now arrived in Ireland as a joint venture of Telecom Eireann, AIB, French Telecom and Credit Lyonnais). It would appear that the French authorities, including France Telecom, believed that electronic trading services would develop in this uniquely French way and that they either ignored EDI or did not anticipate the shape or direction or indeed expected the rapid development that has occurred in other countries.

EDI in France has developed along the pioneering industries which have emerged in other countries, e.g. automotive industry, transport, retail, distribution, banking. The only original area of development would be the travel and tourism industry (which is allied to Minitel) and other speciality electronic services, which Teletel has provided, and from which a number of EDI type information exchange services have been developed.

Overall, the current state of EDI activity in France is very low by comparison with its neighbours, using mainly proprietary standards and there has been a lack of acceptance of the need to use even broadly agreed national standards. M Henri Delahaie a leading EDI consultancy owner in France in an article titled 'From Minitel to EDI' in the 'Electronic Trader'⁹⁶ provides the following overview:

GALIA, the organisation dedicated to the automotive industry, carried the first tests in 1987-88 and has now an installed base of 200 companies. The most commonly used messages are still only purchase orders. GALIA uses the ODETTE standard with some modifications. In the view of some European-wide users, these modifications sometimes make compatibility between GALIA and ODETTE difficult. GEIS (General Electric Information Services) is the only third party network supplier to be operational at the moment, although France Telecoms Atlas 400 has also been sponsored by GALIA ... In distribution, the Trade association, GENCOD, part of the international EAN group, has been directly involved in EDI. GENCOD has contracted the Bull company to build a clearing house for the retail chains and their suppliers. In September, this service, ALLEGRO, had about 150 users, mostly in food, DIY and gardening and transaction volumes of barely 35,000 messages per month. The message standard is proprietary to GENCOD and it is incompatible with other sectors in France and the rest of Europe.

There have been setbacks in other industries, a number of smaller companies in the insurance sector set up a project called CELIAS but after some months this plan was aborted and a system 'ASSURNET France' was brought forward by the bigger companies. Other projects to have limited success are LIDIC for electrical distribution and EDONI in the general industrial area. One programme which is very successful is EDICONSTRUCT for the construction industry which is not alone exchanging EDI commercial messages but also CAD/CAM technical

documents from design to construction.

The public sector is more positive with a national programme called Tedeco under development. Tedeco is designed in the first place to transfer regional statistics from all the Departments to Paris. In the longer term it is intended to transact all Ministry of Finance local government business and, outside that, companies who do business with the authorities. This would create an EDI community of about 2000 organisations within the public sector (the private connections would be extra). The project is based on EDIFACT message standards and will be handled on the X400 communications protocol over the Atlas 400 Transpac service, scheduled for the end of 1991.

This diversity of effort, so unlike the normal French approach, was mirrored at private as well as official level. The only French official agency promoting EDI and in particular EDIFACT has been SIMPROFRANCE which has been attempting the same approach as the other COMPROS bodies, especially like the UK SITPRO, but its efforts have run into resistance. This has come mainly from AFNOR, the official French standards organisation and it meant that it could not get the resources or backing from Government it sought, leading to internal infighting at Government level.

This was also seen as symptomatic of the whole national problem and it led to calls for Government intervention in an area that France could normally expect to be a lead instead of a bit player. For example M Claude Porchorot, President of CIGREF, the Information Technology club for large corporations and Secretary General of Banque National de Paris (BNP) is quoted in 'TradeFlash'⁹⁷ making this appeal:

... calling on everyone in France, politicians, banks, the public and private sectors, VANS and software houses to cooperate rather than compete, to make EDI a reality. This would bring France to the head of the platoon in Europe. They should rally round Brussels (TEDIS) to give them the standards and directives. Only this way could they turn back the Anglo-Saxon tide.

The 'Anglo-Saxon tide' of course, refers to the huge lead of the Americans and the British in this area. It may be that M Porchorot had advance knowledge as shortly after his speech the Government through the Minister for the Civil Service and Administrative Reforms, M Michel Durafour, announced at the EDI 89-France conference, 9 November 1989, the launch of a major Government initiative named EDIFRANCE. This followed a report of a senior civil servant M Claude Chiarmonti⁹⁸ who also found that the 'opposition between standardisation and simplification is unsatisfactory' and that the new body should encompass all public and private interests but that it should be set up within AFNOR who should act as its secretariat.

At EDI '89 France also, outlining the programme, M Bernard Vaucelle, Director General AFNOR, stated "that EDIFRANCE should reply to a delay in implementation at the national level, regroup all that the public and private partners involved with EDI for a better coherence at national level and a better representation at international level". (This an official admittance of France's EDI backwardness). The main objectives of EDIFRANCE are to coordinate all efforts, provide a strategic national direction, provide coherence in the area of standards, provide training, promotion, information, and awareness and assistance and support for

projects and sectoral activities; examination and recommendations for legal changes which is a particular problem in France as invoices and many official forms are required to be in writing, i.e. on paper.

Mr Etienne Dreyfous, one of the world pioneers of EDI, who had been a prime mover in the LACES project (see Section 1.3.4) at London Heathrow back in the late 1960s and who was since named 'Man of the Year' by IDEA for 1990 and appointed Chairman of the West European Board, EDIFACT, has been appointed provisionally as President of EDIFRANCE and it has official backing right up to the Prime Minister who attended the EDI 89-FRANCE conference. Mr Dreyfous' appointment is likely to mean that EDIFRANCE will not develop French standards but will adhere to EDIFACT. Certainly, by combining all of the diverse influences together under one umbrella organisation and giving it also executive authority for standards and practical assistance in implementation, France has gone much further than other countries, including, for example, the VANGUARD programme.

Mr Delahaie's company, EDI Consult, has completed the first national report on EDI in France which is summarised in the September issue of Tradeflash,⁹⁹ this estimates that the number of EDI connections in 1990 is 800 and that this figure is growing at 66% to 100% per annum. This would mean in 1995, figures of 10,000 users (at the 66% rate) to 32,000 users at the higher rate, producing revenues of FF30m in 1989 to between FF450m (low) or FF935m (high), in 1995.

Overall, the picture in France can be summarised using the Tradeflash comment on the EDI Consult report:

The report concludes that EDI in France is still a narrow market with several pilot sites but few active communities. Therefore, the suppliers in the market have not yet reached critical market share. Take-off may happen because of public sector projects. But what is critical to the success of EDI is whether EDIFACT gains acceptance and whether EDIFRANCE and the suppliers led by France Telecom, can overcome a lack of awareness in the market. If they do not succeed the growth rates predicted in this report will not happen.

France, after a late start, has now seriously entered the EDI race and if the normal centralised, logical and Cartesian French approach, which has been so successful in other areas of telecommunications services follows through here, particularly through EDIFRANCE, the country can take major strides to not alone catch up but overtake other European countries, in a technology noted for fast developments, in a few short years.

3.3.6 ITALY

Very little detailed information is available on the actual usage of EDI in Italy, particularly user numbers and message counts. The overall scene appears, however, very active in terms of projects. In many respects it is like France, but there is more activity. This is true especially in the major industrial sectors, particularly in the automotive industry (ODETTE) with giants such as Fiat who have gone into joint venture with IBM to create INTESA, an EDI service for logistics, CEFIC for the chemical industry, DISH for shipping and the now accepted sector leaders such as

the transport, distribution and retail industries.

The regulatory situation regarding telecommunications in Italy is that of decentralised State owned operating companies. The Ministry of Posts and Telecommunications is regarded as the regulation, planning and control body.¹⁰⁰ Under the Ministry there is a State holding company, IRI/STET, which has three subsidiaries, SIP, Italcable and Telespazio, responsible for the different elements of the telecommunications service.

In 1986, STET set up a value added company, Televas¹⁰¹ to provide general communications services which in turn established TELEDIS for the EDI market. Teledis is operational since 1988 and runs on the Italian public data network (X25 network) ITAPAC. Teledis provides a central clearing house service with individual customer mailboxes and a variety of translation software for converting message formats. This is quite a unique service for a public operator in so far as the number of translation options offered include proprietary to EDIFACT, EDIFACT to ANSI X12 and EDIFACT to TRADACOMS.

The status of commercial networks such as IBM and GEIS is open. Seva SPA, a company owned by Olivetti the Italian computer manufacturer and several other leading companies has formed an alliance with AT&T Istel to develop Value Added Network services in Italy with international connections. Seva has its own private network. According to TradeFlash¹⁰²:

Seva also offers financial services like online economic and financial analysis, technological and systems auditing and electronic payments systems. To date the Italian finance sector has been ahead of the rest of Europe in electronic payments systems, so the alliance of Seva with Istels EDI conversion software could be a fertile mix for the banking systems of the 1990s.

Italy has a promotional body EDIFORUM Italia¹⁰³ set up as a special activity of the 'Forum Telematico Italiano' with specific responsibility for the creation of awareness of EDI in Italian business, administration and industry. It has five working groups, Technical, Development, Normative (Standards), Documentation and Public Relations. It has a key role in actively supporting the Standards bodies, Italian and international involved in this development, particularly EDIFACT.

3.3.7 HOLLAND

Holland is a very advanced and sophisticated EDI user country and there are claims, as detailed in the following paragraph, that it is in fact the European leader. For a country with a population of 15m, it is undoubtedly a relative leader, in terms of per capita usage, if this is the appropriate measure.

According to a TradeFlash report,¹⁰⁴ a new Dutch publication has claimed that based on research published in Holland's National EDI Guide, which is edited by Professor W C L Zegfeld, Head of the Dutch Research Agency, TNO, "there are 63 communities of EDI users, varying in size from 2 to 300 participating companies. A total figure of 2000 companies have implemented EDI

in Holland. This places it favourably in comparison with the UK and US, with 3500 and 10-14000 EDI users respectively" according to the Guide, which was officially launched at Holland's first EDI conference, EDI 1990 Nederland, The Hague, 12/13 November 1990.

This conference was organised by 'EDIFORUM Nederland' a new national organisation founded in December 1988¹⁰⁵ with such objectives as promotion of EDI based on EDIFACT, (this is significantly different from other similar national organisations); coordination of existing EDI organisations; working with international bodies; help resolve legal, fiscal and security problems; create a knowledge base on EDI; provide advice and assistance on implementation. All companies, public and private organisations are invited to join, SITPRONETH, the Dutch facilitation body are members as are the Standards organisation - NEHEM and the Ministry of Finance and Customs. An active awareness and promotion programme, with newsletters, conferences, seminars, workshops etc are planned.

Holland had the traditional State owned and controlled PTT organisation but following recommendations in detailed Government commissions, which are known as the Swarttouw and Steenbergen Committees,¹⁰⁶ the Government decided in 1989 to transform the PTT into a public limited liability company. Part of this official change in policy is also that the value added services market should be completely liberalised. VANS such as GEIS are very active in the Dutch market with an estimated several hundred clients.

There are in Holland a number of well established community systems such as INTIS, a major EDI network and system in the port of Rotterdam. Cargonaut set up by the Schiphol Airport Authority for the aircargo community, Transpotel which was an international electronic information system for the road transport industry, pioneered a videotext system with connections to freight companies in many countries but failed due to cost overruns, is now trying to become re-established. Philips, the huge industrial conglomerate, is a leader in world EDI developments (also having its own Compros organisation, Sitprophil) and is both user of EDI software services and a commercial supplier. See Section 1.3.1 Early Development of EDI.

The Dutch Government have had a policy of providing direct assistance to EDI communities to help them in breakthrough development and in bridging the financially difficult period between technical implementation and commercial breakeven. The Cargonaut system has received significant grant aiding. Since the formation of EDIFORUM, the Government has agreed to provide a sum of 15m Dutch Florins (IRf5m) under a programme called VEDI ¹⁰⁷ to fund EDI projects up to 50% of cost. The scheme will be run by a team of leading industrialists headed by Dr G J Wormeester, President of ECT, a large shipping and container company and managed by the Bakkenist Management Consultants.

The projects will include: (a) INTRACON (Intramodal transport of containers); (b) Philips, who plan to connect 100 suppliers within three years; (c) ZORGNET, a system linking health insurance to hospitals; (d) TRANSCOM in the food retail linking suppliers to supermarkets; (e) EDIPRAKT, linking suppliers to DAF trucks; (f) Social Security project involving the employers, the social fund itself and the Government.

In addition, prizes of up to DFL 150,000 for student dissertations on EDI will be offered.

The Dutch Customs have introduced an automated system, SAGITTA, with EDI or DTI (Direct Trader Input) links to Customs Brokers, Forwarders, Carriers etc. The Dept of Finance decided that the Customs system should be fed only through an X400 national Managed Network which would operate on a commercial basis and charge the trade for each transaction (there would, however, be no charge to Customs). The reaction among the trading community was very negative to the charging proposals to the extent that they would not cooperate and the Government made the service free. Cargonaut were also given direct access to SAGITTA.

3.3.8 OTHER EC COUNTRIES

3.3.8.1 SPAIN

Spain as a country has made very significant progress in the whole area of technological developments in recent years. This is especially marked in the area of telecommunications which has coincided with the liberalisation of the Spanish telecommunications market. Previously, the situation was that the PTT was a monopoly company, CTNE¹⁰⁸ with a large State shareholding. In 1987 the Government decided to set up Telefonica with the status of a private company, 31% of the shares are held directly by the State and a further 15% by State institutions.

Simpro-Espana¹⁰⁹ is active on the ground and there are a small number of areas of EDI activity. First, the automotive industry is heavily involved in ODETTE with about 200 users. Separately, EDS, the General Motors computing arm have given a contract to Telefonica Servicios (TS1) the value added service company for the GM links. A very large project is underway in the retail sector, AECOC, the Spanish retail organisation has decided to set up an EDI system named AECOM to link an initial pilot of 10 companies with 62 others in a users group and a future potential 5,500 AECOC members. all the local VANS such as IBM, Teleinformatica, the GEIS company, and another Spanish company, Ibermatica, are tendering for this business.

The Chemical industry through CEFIC is becoming organised. Two large companies, ERT and Rio Rodano, are advanced using GEIS as their clearing house. The Banks too are actively engaged in the usual forms of EFT but have also set up a working group to examine the broader industry issues and EDIFACT.

3.3.8.2 BELGIUM

Belgium is a highly industrialised country at the heart of Europe and in the mainstream of EC policies and activities. The PTT telecommunications regime is a publicly owned company RTT (Regie des telegraphes et des telephones). The structure is currently under review by a committee of 'four wise men' but with a view to liberalisation and some measures have been announced. VANs operate freely.

Like many other continental countries, direct EDI between large companies and their suppliers/customers is most common. The sectoral projects such as ODETTE, CEFIC, EDIFICE are well established. SEAGHA (Systems Electronic and Adapted Data Interchange in the Port of Antwerp)¹¹⁰ is a large cargo community system in successful operation in the port of Antwerp, founded in 1986. The company is structured on cooperative lines, open to all participants. Unfortunately it was developed at a time when there were major breakthroughs occurring in both areas of data format standards and telecommunications. This means that there will have to be further developments in the future to make the system open to other trade users.

3.3.8.3 DENMARK

The PTT structure in Denmark is decentralised. The regulatory regime is controlled by The General Directorate of P & T with direct responsibility to the Minister for Public Works. The operating aspects are managed by three regional companies, Copenhagen, Jutland and Funen Telephone Companies are owned partially by the State and the local authority, South Jutland Telecom is State owned as is Telecom Denmark which handle inter regional as well as international telecommunications. The commercial regime is liberal.

EDI is well developed in Denmark in terms of direct company to company and sectoral systems but there are no overall figures to provide a comparative view. IBM and the Copenhagen Telephone Co have set up a VAN named DANET offering network, software and consultancy services to a variety of industrial companies. In 1990 the Danish Retailers Association in conjunction with DVA, the Danish Article Numbering Association, launched HANCOM, for the supermarket, wholesale and smaller retail outlets. HANCOM is based on EANCOM which is the international Article Numbering Associations (EAN) version of EDIFACT. A report in the November 1990 edition of TradeFlash ¹¹¹ describes the significance of this standard development:

So far, the retail industry has been held back by the Danish Retailers Association from plunging into proprietary standards. According to Chris Sorensen of the Association, this has been quite hard as the Danish retailers have been about the most EDI-aware group in Europe according to a survey in 1988. They have been passing a form of EDI message to the banks for about fifteen years.

It has quite hard for him to persuade them to "hold their horses" until a European standard should appear. Now, Danish guidelines have written for EANCOM and everyone concerned, retailers, wholesalers and banks are all heading in the same direction.

Transport is normally a sector which develops along modal lines and this has also happened in Denmark but an attempt is now being made to bring the different modes together. This is called TEDIF, representing aircargo, trucking, sea, forwarding, the PTT, VANS and the Customs authorities. Forty companies have joined and the intention is to establish a fully coordinated EDI system so as to make Danish transport competitive in the single market.

3.3.8.4 OTHER WESTERN EUROPEAN COUNTRIES

One of the main economic concerns of those countries in EFTA (European Free Trade Area) is the effect of the post 1992 EC situation have on their economies. It is generally accepted that these will be felt also outside the EC and while these may not be precisely clear, one result will obviously be that there will generally be a much more competitive environment. In this respect, EDI is accepted as a key tool to sharpen the competitiveness and effectiveness of their major industries and also those public services which relate to industry or which add to the cost base of business.

While EFTA, as a trading bloc may not be as strong as the EC, the individual EFTA countries are economically comparable to any others in terms of GNP and technological advancement. This is also certainly true as regards EDI particularly in countries such as Sweden, Austria, Switzerland. Finland too has emerged as a major force in traditional areas such as forest industry, also shipbuilding and in telecommunications, computing and EDI, NOKIA is a European leader.¹¹²

Detailed reports are not readily available for each of these countries but there are references to their EDI activities under the industry sector projects, such as ODETTE, for the automotive industry in which, for example, Sweden through its major car manufacturer, Volvo, has played a major role. In Finland also SAAB-Valmet has an extensive network linked to its major suppliers which is based on ODETTE standards. Finland is a good example for Ireland and has some comparability. One of the key events was the establishment of FINNPRO first as the trade facilitation body. It quickly identified EDI as the way forward and together with Government and industry a body called OVT (which means EDI) was set up¹¹³ and became actively involved in sponsoring projects. In Switzerland leading companies such as Nestle have moved their traditional ordering and procurement processes from manual procedures to EDI based systems.

Other reports available are through EAN, the International Article Numbering Association, which has members in each country and where flourishing EDI activities exist in the wholesale/retail and the supermarket sectors. These are detailed in the EAN annual reports with reports from each country with numbers of stores engaged in checkout bar-code scanning, Electronic Point of Sale (EPOS) systems, and those which have these

front-end systems backed up to their ordering systems and their suppliers with EDI systems. (The focus of this document is on international trade rather than retail trading).

Norway has achieved rapid progress in a number of distinct EDI areas, including oil products and fish farming. It has also, and which is of significant interest to Ireland, automated its Customs system TVINN. Concurrent to this and with full trader involvement at the initiative of NORPRO ^{114a} a trade project called NODI was launched. This is an independent foundation which is now self financing. NODI-Import commenced in 1987 with Norwegian Customs, the Telecommunications company, 6 importers and 5 forwarder/carriers involved. NODI-Export is now underway and 21 companies are switching customs and trade messages based on EDIFACT message subsets. NODI works closely in conjunction with Customs and TVINN which is expected to be fully developed by 1992 at a cost of NOK 60m (7.7m ECU). Both of these projects can be compared to Irish Customs developments.

Austria too is active in the public and private areas with developments taking place mainly directly from the larger manufacturers and wholesale companies to their suppliers. This is done more on the German model and apart from technical standards there is no evidence available of direct Government intervention or support. Greece and Portugal, though both members of the EC, are included here in passing only, as they are considered to be lagging behind through lack of development of the telecommunications infrastructure though this is being addressed in both countries and, secondly, very little information on projects or activity is available.

From the point of view of this dissertation, these countries are not Ireland's main trading partners. They are of interest mainly because of their size or population similarity, secondly if they have taken a particular development path or if there are strong Government, either of a regulatory or of an incentive nature, these are worth recording. They are relevant also from the viewpoint of competing with Ireland for foreign investment which up to now labour costs were a key factor but now other factors including telecommunications infrastructure and value added services will be important considerations.

3.3.9 PACIFIC RIM COUNTRIES

This economic region is the most rapidly growing and developing in the world. Much of this growth is based on low cost and high productivity and increasingly much of the product produced is of the high technology consumer goods nature with a high demand for electronic and computerised components. This also requires electronically assisted manufacturing facilities and also a realisation that Information Technology can become a factor for competitive advantage in international trade, and this in itself created a base for EDI.

In addition, many of these countries are young and do not have the bureaucracy which has held back the deregulation of the PTTs in the western world. Even where there is state control of telecommunications there is more of an entrepreneurial and pro business approach, than the more traditional European PTT civil service attitude.

3.3.9.1 JAPAN

The Japanese telecommunications environment was deregulated in 1985 and Nippon Telegraph & Telephone, which had the domestic monopoly, is now set up as a private corporation and now has to compete nationally, with 800 VAN providers, and internationally with KDD (Kokusai, which was also a monopoly) and 18 other VANs who have registered for international traffic.

The number of industry groups and VANs offering services has led to a high degree of EDI activity in Japanese business, particularly in manufacturing, it should be remembered that the Kanban system of planned waste elimination and minimum stock holding which we now call Just-in-Time, was developed by Toyota and quickly taken on board by the rest of Japanese automotive and other manufacturing industry. JIT, of course, depends on up to date information on suppliers stockholding, order and delivery capabilities which in turn requires either online computer access (which is fine for one supplier) or realistically EDI in a multi-supplier situation. This diversity of suppliers has, however, led to a major problem of standards, especially in communications, with proprietary hardware protocols and Japanese national standards such as the Zengin protocol and the J-Procedure which is used widely in procurement.

Apart from car manufacturing, the industry sectors which have developed on intra-sectoral lines, according to Pearleen Chan¹¹⁵, who has reviewed the Pacific Rim area, are the Steel, Confectionery, Pharmaceutical, Paper and Pulp industries. As many of these and other industries are now looking for cross sectoral as well as international communications, there is a national move towards UN EDIFACT.

Kevin Wilmott writing in the Financial Times¹¹⁶ provides an overall summary of the state of EDI activity in Japan:

Early indicators are encouraging; there is already an EDIFACT committee with 70 members. But in comparison with the UKs EDI user base of more than 3,000, Japanese companies committed to EDI number less than 300, although as many as 10,000 are probably trading electronically with simple text transfer.

Japan as a country has recently announced its intention to support and promote EDIFACT. Many of its corporations are now amongst the biggest globally and have formed strategic alliances and multinational operations. The Government has established a Japanese EDIFACT Board and it has committed to cooperate with international bodies for standards development, for example with Singapore it has agreed to appoint a Joint UN Rapporteur (Kenji Itoh) for the two countries jointly and for the region if this is acceptable to the other countries.

3.3.9.2 AUSTRALIA

There is a very active EDI scene in Australia, both in terms of companies using direct EDI links and industry community systems as well as a very strongly competitive VAN supplier situation. Firstly, telecommunication value added services have been for some time deregulated and well developed privately. EDI has also been helped by a strong computer orientation by small firms and by the need to communicate quickly and cost efficiently over the extremely long distances.

The main third party VAN suppliers are GEIS ¹¹⁷ which is strong in the manufacturing, the wholesale/retail and the banking sector to which it is strongly allied. Telecom Plus provides Tradelink, an EDI service to the automotive and the wool industries as well as for the Federal and State Governments. OTC (Overseas Telecommunications Corporation) runs an insurance system as well as the EXIT project which is an Export Customs declaration system for about 800 forwarders and transmitting 40,000 export transactions per month. Paxus Comnet operate an Airline to Travel Agents system as well as TRADEGATE a Government driven and community supported gateway for imports.

A number of industry services have become VANs in their own right, NEIS (National Engineering Information Service) set up for heavy engineering, now also provides EDI services for a range of industrial companies. Another large EDI service is run by Coles Myler, a giant retail group who have now announced that the EDI service for its K-Mart division will be upgraded over five years for general stores, suppliers and distribution centres.

The general standards used in Australia are the US ANSI X12 standards¹¹⁸ which 'were the only ones available' but many proprietary standards exist. Despite its lack of control of the basic infrastructure, the Federal Government plays an important role, firstly it officially recognises the importance of EDI as a tool of economic advancement and it has decided to sponsor UN EDIFACT in a real way through a directive requiring State administrations to insist that contractors migrate to EDIFACT and that all EDI networks must interwork together to permit seamless communications for end users. TRADEGATE which is developed under Government direction but of significant interest, there

is no requirement to go through this gateway to Customs, will also use EDIFACT.

3.3.9.3 NEW ZEALAND

New Zealand, like Ireland, has a small population with an open economy and widespread trading links. The official policy is competition and deregulation. According to Barry Houston ¹¹⁹ there are three areas of EDI activity. First, the oil industry led by Mobil, second, the grocery trade, apparel and general merchants, following the implementation of EPOS (Electronic Point of Sale) systems are now ready to extend this to their suppliers through EDI. Third, Customs have automated their system CASPER and their network CEDI*FIT had over 70 users at the end of 1989 with 10 in pilot testing mode. The messages used are subsets of EDIFACT, like Ireland, CUSDEC (Customs Declaration) and CUSRES (Customs Response). This can be further compared in relation to the Irish Customs system.

3.3.9.4 HONG KONG

Hong Kong is an oasis of the most successful, unfettered and deregulated free enterprise economy with all that it entails, in the middle of the most populous socialist economy in the world. However, according to Pearleen Chan ¹²⁰ EDI has not permeated to the high proportion of Chinese people which typify Hong Kong's trading community. It appears to be largely a western and multinational concern.

Due to the legal structure the international VANs operate freely but mainly for their multinational customers. Other local networks, such as GazettEDI, Intertrade also provide EDI services. In addition, there are many closed industry networks of a proprietary nature, mainly in the banking, shipping and container terminals. Juletta Broomfield¹²¹ reporting in EDI88, makes the following points:

Implementing EDI in Hong Kong in a coordinated manner across the trading community as a whole is no easy task. There are enormous challenges to be faced including potential inertia from small traders, the increasingly aggressive and frequently fragmented approaches of EDI service vendors, integration of EDI with other systems such as electronic payments, vested interests from those companies that have already implemented some form of EDI, interfacing to inhouse systems, and the problems of handling the Chinese language. This is the objective of TRADELINK Electronic Document Services Ltd.

The above, to the authors mind, is a most excellent summary of the difficulties facing EDI in any location or country but it does in addition paint the local scene admirably. TRADELINK was set up in April 1988 as a result of cooperation from the Hong Kong Government and eleven leading private interests, including the Air and Sea terminals, the Telecommunications company, various banks and the Swire group. Resulting from this an initiative in March 1990 to launch a total community approach to EDI called SPEDI (Shared Project for EDI) presumably to address those problems described by Ms Broomfield.

The first declared objective of SPEDI is to develop a detailed proposal and technical specification for development of this community service. It is planned to set up message development groups, using EDIFACT, to meet the needs of transportation, banking, insurance and international trade documents. Part of the strategy is to offer the trading community easy access to the community service, using EDI or Fax, and make sure that traders have the minimum need to make changes to existing systems or business methods.

3.3.9.5 SINGAPORE

Singapore can be compared to a well regulated, smaller version of Hong Kong. Private enterprise is the pervasive philosophy but many of the most successful services are controlled by the State but in a strongly pro-business manner. Government influence is very strong in all areas of life, from strict law enforcement which gives the City/State some of the safest streets in the world, to excellent utilities, infrastructure and high standard low cost public housing, all designed to encourage economic development.

According to Pearleen Chan ¹²² as part of its economic programme, the Government unveiled in 1986 in its strategy, the National Information Technology (IT) Plan, which included a plan for a nationwide EDI network named TRADENET, which was launched in January 1989 linking Freight Forwarders, Cargo Agents, Shipping Companies and Traders to the Customs authorities and relevant Government departments, for electronic processing and clearance of their imports/exports, which is now handling 80% of all transactions. Ms Chan further states:

Spurred on by the success of TRADENET which now has more than 1500 subscribers, Singapore is in the process of extending the use of EDI to other sectors such as medical, retail, manufacturing and construction. MEDINET for the healthcare community, LAWNET for the legal community and GRAPHNET for the manufacturing and construction industries have since been introduced. In addition to these, specialised services handle medical claims processing, statute searching and exchange of CAD/CAM drawings, generic services such as ORDERLINK for procurement of goods and services, LINK for billing, collection and payment. INFOLINK for access to integrated information services and MAILLINK for electronic mail have all been introduced commercially.

Singapore is probably the closest one can get to a planned economy in a free market, this being, however, a contradiction in terms. What can be achieved there may not be readily accomplished in other economies. Its approach can be taken as a model for other countries to aim at, the key being that these are not just planned schemes and programmes but rather well designed products which have been coordinated with the trade and which can be marketed to business on their merits as they have a real economic value to the user.

3.3.9.6 KOREA

The Government of Korea has identified EDI as an important tool for the positioning of its international marketing strategy, and to provide a competitive edge in its own right. In 1986 a three year study was launched to build networks and encourage usage at the same time.

According to Pearleen Chan ¹²³the usage of computers and communications in Korea was still only prevalent among large corporations and banks so an integrated approach is even more important. As a result of the study, the Government has now commissioned a five year programme, costing USA\$580 million to build a community EDI service, Korean Trade Network (KT-NET) to bring traders, port operators and Government agencies into a common system by 1995. In the private sector the steel industry has introduced STEELVAN and the automotive industry, MOTORVAN. There are in addition a number of links between Korean and North American companies, using US standards. It is expected that KT-NET will use proprietary for domestic but that it will migrate to EDIFACT for international trade by 1996.

3.3.9.7 TAIWAN

Taiwan earns more than 50% of its GNP through international trade. However, in a climate where EDI might be expected to prosper, there has been a lack of success in the efforts of some of the major traders in the steel and the plastics industries due, in the opinion of Pearleen Chan, to lack of standards and low interest from trading partners.

There are now a number of EDI services and Customs and the Communications Ministry have introduced a joint service with the transport sector for trade documentation. There are also EDI services for the retail and food sectors. Taiwan Telecommunications Network Services (TTN) is planning in 1991 a major development for distribution, retail, manufacturing and transport. The Government too has commissioned the Institute for Information Industry to define EDI standards and to prepare and implement a plan to promote and implement EDI.

3.3.10 RUSSIA AND EASTERN EUROPE

Information Technology is not a western preserve and advanced computing and telecommunications are well developed in the former Socialist Republics, particularly if the function or the economic activity has a military or national strategic importance. (This does not apply, for example, to Russian agriculture where there are more bureaucrats administering the industry than there are actual farmers in the US).

There are many reasons why EDI should be important in the USSR and the Eastern Bloc (that is up to recent events). Firstly, there are the great distances. Secondly, foreign trade is vital to produce the much needed hard currency. Thirdly, shipping is an important area both to support foreign trade and as a hard currency earner in its own right. Fourthly, the nature of the State bureaucracy requires a greater volume of data, statistics, licensing and regulatory control than most Western countries. Despite all this, the EDI situation is not well advanced.

In Russia, there is acceptance of the need for EDI systems but there are problems in the availability of technology, both with PCs of western capabilities and in the quality of the telecommunications. John Sanders¹²⁴ writing in 'EDI Interface' says that: "Probably the greatest impediment to the swift and widespread implementation of EDI is the backwardness of the Russian telephone system". Nevertheless, there are successes such as in the Port of Leningrad where the Baltic Shipping Company has developed an EDI system. This is seen somewhat as a national prototype with plans to extend it, using EDIFACT syntax, to the appropriate ministries in Moscow. The next step is expected to be in the railways and then through the transportation chain to the traders, bankers and other business functions at both ends.

Kevin Willmott, reviewing EDI in the Financial Times¹²⁵ says: "Activity is also now expected to emanate from one of EDIFACTs early converts, Eastern Europe. An EDI association has recently been formed in the Soviet Union with the aim of turning theoretical interest into practical interest". Poland was a leader of the world movement towards a common standard, EDIFACT, and the UN Rapporteur for Eastern Europe is a

Pole, Eugene Danikiewicz. Poland has taken a lead in the standards development area but there is only little progress with implementation on the ground.

Countries, like Yugoslavia, Hungary, Czechoslovakia and Rumania, are also active. The Times¹²⁶ reports that Bulgaria is planning its own developments but is also anxious to set a lead for its neighbours:

Bulgaria has the telecommunications base to operate EDI, an X25 packet switching network called BULNET but the country needs the start-up skills it hopes to get by collaborating with Western companies. Eventually it wants to provide EDI software for the rest of the Comecon countries.

CHAPTER 4

APPLICATION OF EDI IN IRELAND

This chapter describes the position of EDI in Ireland, with particular reference to Irish Government policy, towards its use and the regulatory position of the State towards value added networks and data services. It attempts to evaluate the quality of the public infrastructure for telecommunication services, provided by Telecom Eireann. The commercial EDI services of both Telecom Eireann and An Post and the trading practises of the latter in relation to the regulatory environment are examined, as are the commercial services provided by the international network operators. Information on other support services and projects which create the proper environment for the growth of EDI, is detailed.

Next, details of actual projects in Ireland, such as the world first ICARUS Aircargo System and case studies of a number of Irish companies, are given. The detailed findings of the survey questionnaire which is a key aspect of this dissertation are provided, giving the position, views and expectations of Irish managers on the application of EDI for their businesses.

The impact of EDI in trade and transport procedures is examined objectively in an appropriate environment where all the independent commercial parties would be fully involved in the decision making process and agree to participate. It may appear obvious that this should be the best way to implement nationwide computerisation with EDI techniques. By way of comparison the implementation in practice of a real project in Ireland where consultation on the process and agreement to participate has not been achieved, is examined. This is the Irish Customs Automated Entry Project (AEP) which is an important project of international significance from many points of view due to the urgency of the implementation, the size and the use of new technology and standards.

4.1 GENERAL POSITION IN IRELAND

In general, the evidence available on the level of actual EDI activity in Ireland suggests that this is very low. There are, however, a number of interesting projects and two of significant international interest. There are no official or reliable figures for the number of users or their message traffic available. There are many indications that there is now quite an interest in the subject among Irish companies, particularly those engaged in international trade, in distribution, supermarket and the transportation sectors and that we may shortly be reaching a take off point in the near future. If this is so, the nature, direction and the implementation approach are the main areas of interest as well as the speed of the takeup of these systems and how this may be influenced by Government or other bodies. Firstly, it is appropriate to examine the policy of the Irish Government towards EDI.

4.2 GOVERNMENT POLICY TOWARDS EDI

In order to establish the status of EDI officially and the level of activity, there is no one Government department or State agency which can be approached. This means that while there are several departments and agencies involved in specific aspects, there is no single body which has the overall responsibility for its promotion and development. The Dept of Industry and Commerce has a positive interest in EDI and is aware of its potential from a trade, competitiveness and facilitation point of view but it does not have any dedicated resources or a section, or even individuals with specific responsibility in this area. The Dept of Communications is also fully briefed on EDI and the manner of its implementation but their brief is regulatory and to monitor the telecommunications scene in an

overall way.

The Dept of Finance are directly responsible for planning the biggest Irish EDI system, the Customs & Excise, AEP (Automated Entry Processing) project and other departments are considering projects (such as the Land Registry Office) which have an EDI content. State agencies, such as Eolas (The Irish Standards Institute) are directly involved and play an active part in EDI standards development but not its promotion. Coras Tracthala (CTT, The Irish Export Board) who, like Eolas, report to Industry & Commerce and have an awareness and a positive attitude to EDI but have no dedicated resources to actively support, sponsor or promote it.

CTT are the body which has the responsibility for trade facilitation and has, in theory, an organisation called IREPRO which exists on paper, and is actually registered with the international COMPROS umbrella organisation for the receipt of documentation and reports. However, the reality is that the funding for this activity was cut off sometime back in 1984/85 and while there is the name of a contact, Mr David Strahan, all the meetings and activities have been suspended since that period and for all practical purposes the function is not being pursued and no trade facilitation exists as far as the Irish foreign trade community is aware. This is a significant loss as far as EDI is concerned as internationally these organisations have identified EDI as the most effective road towards trade facilitation and they also have become in many cases the official vehicle for its development and promotion.

This position has been established through direct experience and from others involved in this sector and it is verified from discussions with key people in Government, State agencies and independent business consultants. What cannot be readily established, however, is what the overall Government policy is towards the development of EDI or indeed does such a policy exist. It has not been possible to get any official answer to that question, the impression given by each of these bodies is that they believe that they should be the overall coordinators but they have not been given the responsibility or the resources and, in the meantime, they are getting on with their bit. Resources are always mentioned as being a critical problem and that because of the position of the public finances, it is extremely difficult (and perhaps also unwise for any senior civil servant to promote any new areas which would involve expenditure) particularly where the payback is not immediate or even obvious.

There is also a view given in relation to expenditure, that as an underdeveloped region of the EC and particularly in an area such as telecommunications infrastructures where there is EC funding and programmes, then that is the approach to be followed. This is the correct approach in relation to the basic infrastructure itself, such as the Telecom digital network and its associated hardware. But the application and uptake of value added services, such as EDI, which depend on business to business cooperation and are still at the primary stage of development and require awareness, understanding and coordination, need for their success a concerted approach as shown in other countries, involving all the parties, in trade, Government agencies and telecommunications services.

Much of the work to be done requires not so much money and resources but sound policies and an energetic approach to their implementation. In Iceland, for example, according to its own report¹²⁷ to the EC, a country which has a population of only 250,000 both Government and industry have come together with the Council for Standardisation (STRI) and the Icelandic EDI Association to set up ICEPRO with overall responsibility for EDI standards, coordination, promotion and consultancy work. This is a question of developing a national strategy through re-focussing the work of existing bodies rather than setting up a new costly organisation. It is appropriate to look at some of the reasons why such an approach, which as we have seen is now commonplace, has not happened in Ireland.

4.3 REGULATION OF IRISH TELECOMMUNICATIONS

All Irish telecommunications are governed by the Postal and Telecommunications Services Act 1983. Prior to this all telephone and postal and their allied services were managed and operated directly by the State through the Minister for Posts and Telegraphs. The main objective of the Act was to set up two semi-State organisations, Telecom Eireann and An Post, with the full commercial and financial responsibility for the business of the two services including their control and operation. The regulation of both bodies was to remain largely with the State in the form of the Minister of Posts & Telegraphs (now Communications). This Act was really a decentralisation decision, in essence, rather than proper deregulation. Its effect was to transfer the operating powers from the Minister to the commercial State companies. These include powers to issue licences for postal or telecommunications services, subject to appeal to the Minister. The Minister must, however, under the Act, consult the

appropriate company before issuing any licence.

The problem with the Act is that there is no precise definition of what basic telecommunications services are, and particularly 'value added' services which can be created by a company other than the telephone company adding, for example, a computerised process but using telecommunications to transmit it to other parties. The Act merely states in Section 87.(1) that

The company shall, subject to the provisions of this section, have the exclusive privilege of offering, providing and maintaining telecommunications services for transmitting, receiving, collecting and delivering telecommunications messages within the State up to (and including) a connection point in the premises of a subscriber for any such service.

In many respects, this Act set back the process of deregulation as the new commercial companies would understandably, protectively guard the powers now vested in them to an even greater extent than when vested solely in the Minister and they were acting as civil servants. This proved to be the case with An Post who shortly took on the private courier services whose sudden appearance on the streets and their inexorable rise, they clearly viewed as a major threat to their 'privilege'. They were to lose this battle at Irish Government level, at EC level and with public opinion. (The regulatory and business success of the international couriers and express parcels operators is also discussed in Section 1.4.4.1)

After the launch of An Posts 'PostGEM' EDI service, the existing private network operators, GEIS and IBM, both received reports from their customers who were approached by PostGEM sales personnel and who informed them that neither of these companies were licensed to operate under the 1983 act. This occurred during 1989 and 1990 and has been confirmed by officials of the two companies. In both cases the companies took the matter up with the regulatory body, the Dept of Communications, with a view to establishing the position in Irish and EC law and if a licence was required and, if so, to obtain one. The department's response was to the effect that they would look into the matter, that there were developments in the EC and that one likely solution was that general licences, as in the UK some years previously, might be issued.

The legal basis of An Posts involvement in EDI services is very unclear from their brief as defined in the Act (where apart from introducing a Giro System for banking services which is specifically provided for in Section 6.7.(1) of the Act, it does not mention any right, responsibility or 'privilege' for electronic or telecommunications services. An Posts charter, as succinctly stated, in Section 6.3.(1) is:

The company shall, subject to the provision of this section, have the exclusive privilege in respect of the conveyance of postal packets within, to and from the State and to the offering and performing of the services of receiving, collecting, despatching and delivering postal packets.

To enable the operation of the PostGEM service, which is clearly not one of the 'postal packet' services defined above, An Post were duly licensed by the Minister. That licensing clearly did not bring with it any authority to police the Act so the only other conclusion that can be drawn is that the allegations which were made were for commercial reasons. This is precisely the area where there is at least, abuse of a favoured position, if not State monopoly, that the EC is concerned (as well of course as its view that competition is the best way to develop the value added services market).

The matter has since been dealt with by the EC, through Directives 90/387/EEC and 90/388/EEC dealing with Open Network Provisions which require that Member States must signify their conformance and indicate the measures they have put in place to satisfy the Commission that fair and non-monopolistic access to telecommunications is available to companies. The Irish Government has not applied for a derogation on this subject so it appears reasonable to the lay person that the EC regulations are now effective in Ireland.

This view has since been confirmed by the statement of the Minister for Tourism, Transport and Communications in his address delivered in his absence by the Secretary of the Department of Communications, Mr Bernard McDonagh,¹²⁸ to the EDI Association of Ireland's (EDIA-I) conference on EDI in University College, Dublin on 12 February 1991 which states as follows:

Many of you will be aware that the markets for some telecommunications services, and in particular the markets for Value Added Network Services have been liberalised since 1st January this year by an EC Directive. I know some of you will also be aware that we have been experiencing problems in coming to grips with the legislative changes which necessarily arise from implementation of the Directive in this country.

We now believe we have the solution to these problems and when the revised legislation is in place a licensing system to regulate the provision of value added services will be introduced. In the meantime no action will be taken, under the Postal and Telecommunications Services Act, 1983 against any provider of value added network services provided reserve services, as identified in the EC Directive, are not offered.

4.4

TELECOM EIREANN

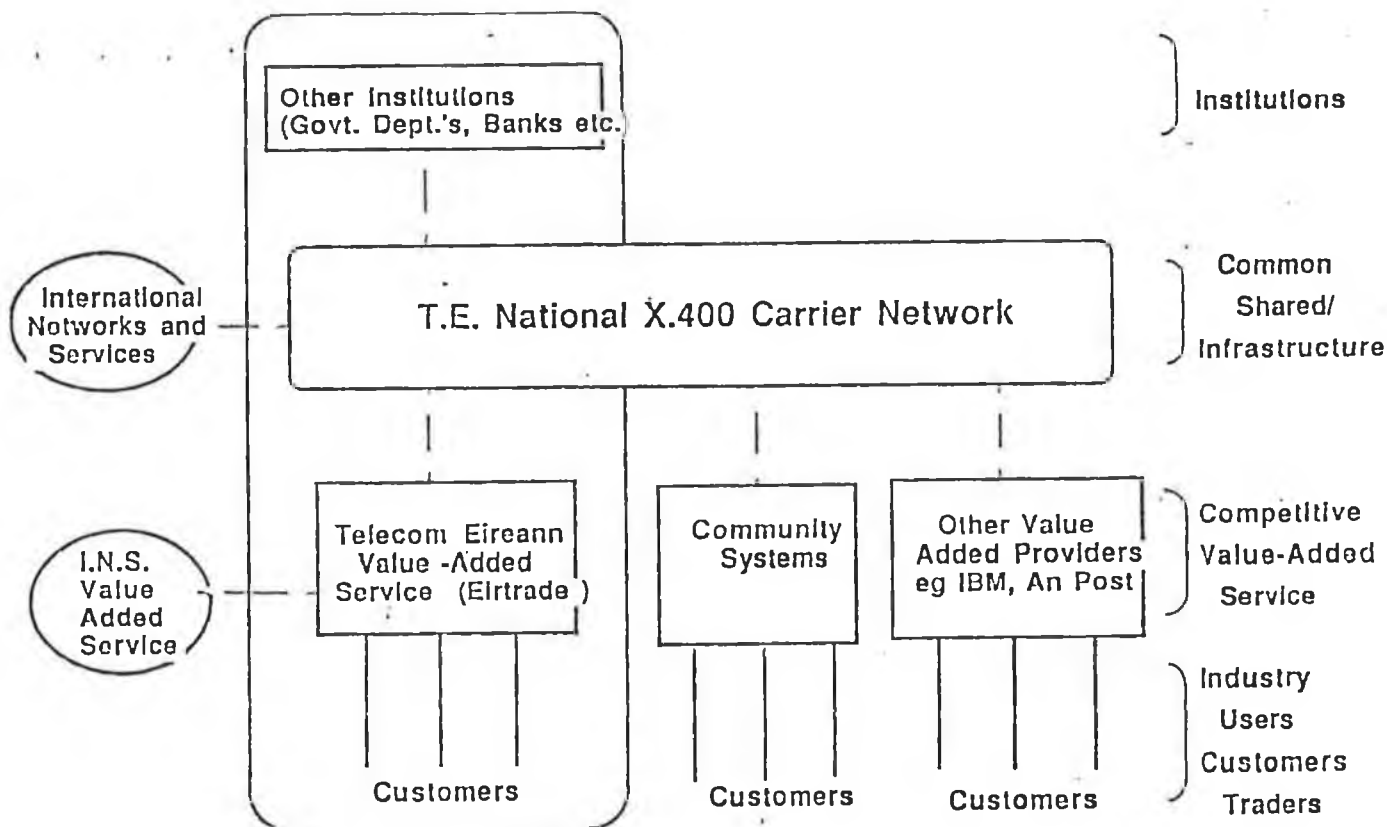
As the national telecommunications service Telecom Eireann has a broad policy towards the development of EDI, firstly to stimulate EDI as an essential business service and, secondly, as a new added value facility which will create an additional demand for its telecommunications services and, thirdly, to participate in the EDI services market as a competitor or retailer through its EIRTRADE Ltd subsidiary. These objectives are to be achieved, as described in its booklet 'EIRTRADE - Supporting the Business Communication Need of the 90s'¹²⁹

Telecom Eireanns plans for the provision of EDI and related trading services involves two elements:

- **the provision of a national network which can act as a carrier service for a variety of value added service providers**

- **the provision directly by Telecom Eireann of a range of value added services to Irish customers.**

In 1989, Telecom announced plans to install the necessary high technology infrastructure to provide a national network for EDI and Electronic Trading in 1990. It was stated that this would be an X400 platform which would allow competing EDI and other value added services to operate and provide connectivity at national and international level. Mr Noel Herrity, Bord Telecom executive at an EDI Association of Ireland meeting on 6 February 1990 at EOLAS, Glasnevin, said the network would be ready June 1990 and would facilitate EFT (Electronic Funds Transfer), Design Express a CAD/CAM (Computer Aided Design/Computer Aided Manufacturing) for the engineering and textiles/apparel industries, FACTORNET for the credit factoring, invoice and payment exchanges and gateways to networks such as GEIS and INS. These services were subsequently marketed by EIRTRADE, see 4.4.1



Network Configuration Phase 2

Fig 17 Irish Planned National Network Configuration (T.E.)

Ireland, through the Telecom Eireann developments is well placed to capitalise on the EDI/Electronic Trading revolution. Much of the infrastructure is now in place, funded by the EC, through the STAR (Special Telecommunications Aid for the Regions) programme providing £33.2 million and it compares very favourably with other countries. The main workhorse of data communications is EIRPAC, the public data network. This is more accurately referred to as the public packet switched network based on the OSI standard X25 communications protocol. EIRPAC is now available

throughout Ireland (switching nodes are sited strategically in the main centres) and access to the network is not dependent on distance, so for all locations nationally, calls are charged as local calls.

EIRPAC offers a variety of data transmission speeds, such as 1200 BPS (Bits Per Second), 2400, 4800, 9600 and 19.2K. In 1990, Telecom launched DASSNET (Digital and Special Services Network) which provides high speed digital lines for companies requiring very high volume or mixed data and voice communications. These lines are available domestically but are also connected directly to the national networks of our main trading partners, as shown in the following diagram.

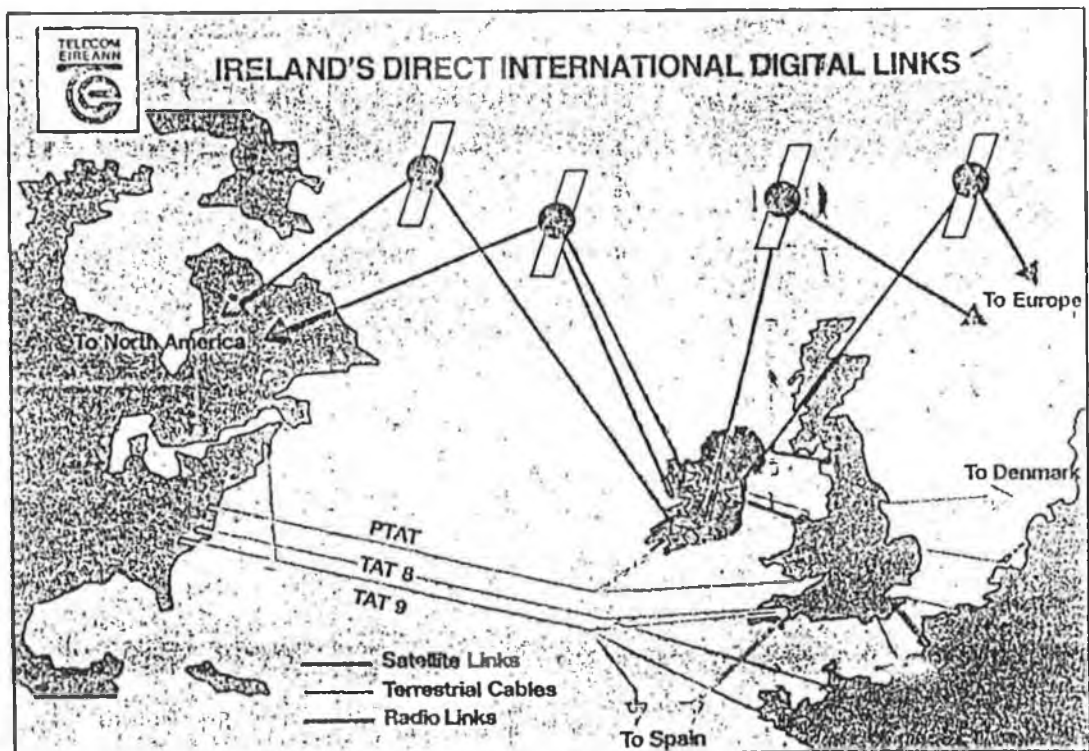


Fig 18 Ireland's Direct International Digital Links
(TE)

4.4.1 TELECOMS 'EIRTRADE' EDI SERVICE

The key element of EIRTRADE services is an agreement signed with International Network Services Ltd (INS) which allows Telecom through EIRTRADE to act as service provider for the INS range of services in Ireland. In the UK these EDI services are marketed under the trading name TRADANET and have 1,600 customers (at that time - February 1990, now estimated to be 1,800). Through TRADANET International, the company is extended to 6,000 which is the link to the GEIS (General Electric Information Services).

The EIRTRADE strategy is to target those companies which have connections to UK companies currently using INS or TRADANET. Telecoms research¹³⁰ shows that 153 UK EDI customers have sister companies in Ireland. Already some 20 Irish companies are customers of UK EDI services. As Irish exports account for 59% of total output, the overall target market is the larger of the 13,000 Irish companies who currently export to the UK.

The EIRTRADE provides an electronic 'postbox' and 'mailbox' for each of its customers. Customer A can then batch data and 'store' it in his postbox, the network then acts as a 'clearing house' and delivers the data to the 'mailbox' of the recipient Customer B who can then 'retrieve' the data at his convenience. This service is generally called 'Store and Retrieve' and it means that the customer does not need to have dedicated telephone lines to each of his clients, he can have access on a single dedicated data line (X25) or a telephone 'dial-up' (X28) line to the network. It also means that he does not have to have agreed or scheduled set times with his customer for the transmission of data, transactions can be batched or transmitted individually at the originators convenience.

One of the major problems is that of standards. TRADANET is committed to Tradacoms the UK national standard, while EIRTRADE is committed to EDIFACT. EIRTRADE and TRADANET International provides support for both standards, but Telecom acknowledges ¹³¹ that 'there is a large existing base of users in the UK, which is a key trading partner with Ireland, who already use the Tradacoms message standards. Furthermore, while Telecom Eireann can encourage users to adopt the EDIFACT standards it does not have the regulatory function or power to dictate which standards are used'.

As a service provider for a UK based service, it is commonly understood that the data processing of the EIRTRADE service is run on the INS computers based in the UK. This is not admitted by EIRTRADE nor is it denied and it is presumably a transitional situation. The major anomaly here is that data transmissions between Irish based customers of the service, would be exported for processing and then re-imported for delivery if this is the case. This could also include data exchanges with Government, such as Customs declarations and releases, on the EIRTRADE Customs AEP service SAD-Direct.

No figures are provided for EIRTRADE customer numbers, this being regarded as a highly commercial secret by both Telecom and the An Post POSTGEM service. It is thought, however, that numbers in EIRTRADE are likely to be between 10 and 30. It is unclear what the divide between clients who are participating in trials and actual paying customers using a business service.

4.5 AN POSTS 'POSTGEM' EDI SERVICE

In the deregulation process that led to the breakup of the Dept of Posts and Telecommunications, it is understood from people who worked in the department, that there was a major debate about the relative business prospects for the two emerging semi-state commercial bodies, An Post and Bord Telecom. It was clear to all that demand for postal services were stagnant or decreasing, while the prospects for telecommunications services were very high. An Posts role in the electronic communications market, in areas such as EDI and other electronic trading services, is seen as a political attempt to protect the postal service from the future effects of the replacement of mail by electronic mail and other electronic communications facilities (even if these could not actually be identified as products at that time).

It was considered important that the opportunities for the two bodies be in some way equalised through permitting An Post into areas where there would likely be a switch from traditional post and which could possibly be profitable businesses in their own right. A number of such areas were Express Mail (EMS) to compete with courier services, Door-to-Door Parcels delivery (SDS) Electronic Mail, a Giro service to compete with the banks, and other postal alternatives. One such area which An Post considers it lost out badly on postal revenue, to Bord Telecoms gain, was FAX.

An Post benefitted from the EC STAR programme in its plans to develop the products which would achieve this mail alternative revenue which are generally described as PostGEM, (GEM = Global Electronic Messaging).

PostGEM was launched by the Minister for Justice and Communications, Mr Ray Burke, in October 1989, who said in his speech¹³², 'The European Commission has played a most important part in helping An Post to develop these services. The moral and financial support provided by the Commission through the EC STAR Programme has enabled An Post to move forward with this project progressively over the last two years ... The aim of the STAR Programme is to foster the economic development of the least favoured regions, of which Ireland is one, by improving access to advanced telecommunications services. A total of 50 million ECUs, approximately IR£38.8million, has been allocated to Ireland under STAR for the five year period 1987-1991'.

The PostGEM services consist of, TelePost, which is a unique postal arrangement where mail is transmitted electronically, then printed and delivered by conventional post. John Stern,¹³³ writing in the Sunday Tribune on 26 August 1990, describes it - 'For example, a Spanish investment management firm, Procon, is using PostGEMs Telepost service to send customer correspondence electronically to Dublin, have it printed from the PostGEM computer and delivered the next day through the regular postal service'. This is clearly an innovative postal support system.

PostNET is claimed to be a full X25 national network and looks like a replication of EIRPAC. This runs on the Telecom cable infrastructure but it has its own computers for switching and processing. It is very unclear why Government policy should approve of duplication of a valuable national asset by two sister State companies and if this is commercially viable. The cornerstone of the PostEDI service is the fronting in Ireland of the UK based ISTEEL service, second in size to INS, with 850 British customers. ISTEEL is now part

of the giant US AT & T company, the world's largest communications organisation.

Its EDI service in the UK is known as EDICT. It was developed originally by British Leyland for the automotive industry and with privatisation it was bought by its management. It was based on that industry's standards, ODETTE, but as it grew into chemicals, engineering and aerospace, it developed TRADACOMS, ANSI and EDIFACT. Like EIRTRADE, it appears that PostEDI service is transferred to the ISTEEL computers in the UK for processing, mailboxing and distribution. Customer numbers, for the same marketing policy reasons, are likewise not stated, these are considered to be about the same as EIRTRADE even though the service is longer in operation.

It would appear also that PostGEM may have a much heavier volume of traffic than EIRTRADE because of the high volume nature of some of its customers business. Other branded services offered by An Post through the general marketing arm of PostGEM are - GeoMAIL, an electronic mail service which is also connected to a number of European Databases and GeoFAX which is the An Post branded Fax service and access to INFONET, a worldwide value added network.

4.6 IRISH COMMERCIAL VALUE ADDED NETWORKS

Apart from the newly created state owned Value Added Services, the well established international services operated by GEIS (General Electric Information Services) and the IBM information Exchange (IE) have been in operation for many years and have their own customer base, mainly in the multi-national and high technology sectors, whose Head Office and main manufacturing bases generally already use the service.

There are fine differences between these services. GEIS is a genuine international VAN, the biggest in the world with 8000 subscribers. IBM on the other hand offer total computing solutions to their clients and in only some of these cases does the customer want customer data exchange and networking, which IBM can readily supply through its International Information Network (IIN). It does seem that IBM are now beginning to regard EDI as a commercial business solution which could be profitable in its own right and as with the PC market, once they are satisfied that the market opportunity is defined, they go after it very positively and successfully.

Customer numbers are again confidential. There are indications that GEIS could have in the region of 100 clients and IBM a good deal less. In both cases they use the Telecom public data network with their own switching and processing nodes. Both companies marketing efforts have been placed under question by the issue of the licensing requirement. Because of the 1983 Act, it is understood one of these companies, GEIS, originally felt that their value added EDI and network services would only be offered as part of their international services, i.e. to their Irish based customers for exchange overseas and they have only

offered their services within Ireland, i.e. between their Irish based customers more recently. Even while using the State telecommunications infrastructure, customers of both companies were told that their services were not licensed.

Senior executives of both companies have confirmed to the author that they have always had open discussions on their activities with the Dept of Communications. The difficulty they had was not with the Department but in effectively trying to counter the statements which were being circulated in the market. Following the allegations, they had taken legal opinion from senior counsel and it was confirmed that under EC law, licensing was not required as a result of the EC Directive which provided them with the legal basis and comfort they required.

4.7 EDIAI (EDI ASSOCIATION OF IRELAND)

The EDI Association of Ireland was established after a small group of interested EDI activists had come together in February 1989 to establish an ad hoc committee to bring forward a constitution and membership rules. The EDIAI was formally set up at its first AGM on 9 October 1989, at which rules were approved and a committee was elected, (the author was elected chairman). The structure decided on was a limited liability company to give the Association the greatest flexibility in the event that some future activities could have a commercial nature. The objectives of the EDIAI are:

To promote and encourage the use of EDI in Ireland using international standards.

To provide a general forum for public and private enterprises in Ireland with an interest in EDI.

To provide a vehicle for the participation of the Irish business community in the development of international EDI, including participation in the design and ratification of standards for international EDI.

Now only in its second year in existence, the Association has 67 members and is growing steadily, reflecting the national interest in EDI. In its first year the EDIAI has been heavily engaged in a programme of seminars, workshops and presentations with a view to creating an awareness of the subject and a forum for companies to ask specific technical questions and progress a range of issues, such as standards, security, legal problems, interchange agreements and many others. Four evening seminars were arranged by the

Association and a further 10 presentations were delivered by EDIAI council members using a standard EDI generic presentation package at a range of business conferences all over Ireland.

A survey was conducted to establish the priorities of the members in relation to EDIAI activities. This indicated that they would like to see the Association becoming actively involved in the development of message standards. Another desire was the setting up of special interest groups related to business sectors and associated with this was an expressed willingness to become involved with EDI trials as a form of learning and development.

In February 1991, the EDIAI held a major conference on EDI viewed from the point of view of the Managing Director or Chief Executive and dealing only with business issues. A panel of Irish and international speakers were invited, including the Irish Minister for Communications, Ray Walker, the UN Rapporteur for the Western European EDIFACT Board. The conference was considered by the attendees and the international speakers to be the most business oriented EDI conference they had experienced.

4.8 POSVAN (POINT OF SALE VALUE ADDED NETWORK) PROJECT

At the end of 1988, Digital Equipment Corp (DEC) Ireland Ltd and Telecom Eireann decided to financially back a project proposed by Mr Patrick Kirby, a civil servant on secondment from the Dept of Social Welfare, to carry out a detailed study, to evaluate the market potential for EFT-POS, (Electronic Funds Transfer at the Point of Sale) and other value added transaction services in Ireland and overseas.

At a seminar on EDI organised by the Irish Federation of Computer Users (IFCU) on 9 May 1990 in the UCD Industry Centre, Mr Kirby described in 'bullet point' headings, that the main findings of the study were that electronic trading was:

- a survival issue for exporters
- critical for economic development
- provided competitive advantage
- essential for domestic markets
- should avail of share networks
- has huge international potential

He said the functions of a Value Added Network were to provide a carrier service, mailboxing facilities, protocol conversion, network management and security. The services they provide can include EDI, E-Mail, Home Banking and Shopping , EFT and Information Services. He saw the future of the market being developed by the VANs, as follows:

New electronic highways known as value-added networks or VANs are providing the bridge between trading partners to facilitate domestic and international exchange of business information ... These networks may be owned by third parties or by a consortium of users. Needless to say, they are not charitable institutions and the users of the electronic bridge will have to pay a toll. One of the key questions which only time will resolve is the extent to which the user communities will choose between 'making' or 'buying' value-added networks.

It is understood that Telecom Eireann are implementing a number of the key recommendations of the POSVAN study as part of their strategic development for both the national infrastructure and for the provision of services, through EIRTRADE.

4.9

MINITEL IN IRELAND

The France Telecom service known as Minitel, discussed in Section 3.3.5 is scheduled to be launched in Ireland in Spring 1991. The feasibility study to launch the service and the project itself was aided by the EC STAR fund by £1m. A new company, Minitel Communications Ltd, whose shareholders, according to its booklet 'An Introduction to Minitel', are Telecom Eireann 30%, France Telecom 30%, Allied Irish Banks 20%, and Credit Lyonnais 20% has been established with a stated mission, "To create and develop a demand for a mass electronic marketplace in Ireland through Minitel and provide a profitable return for service providers and the Minitel investors".

Firstly, it must be said that Minitel is not in itself an EDI service as the technology it uses, videotext, is primarily designed for information services and is not considered to be suitable for transmission of documents. Nevertheless, it is of significant interest for a number of reasons. Firstly, as it provides allied services which help the development of EDI. Secondly, as an indicator of the maturity or the development stage of the electronic trading market and, thirdly, and most important as EDI services such as information or reservations for freight and other services, could be hosted on Minitel as Service Providers. The success of Minitel in Ireland, as was the case in France, will depend on the number and quality of Service Providers. It can contract to provide their specialist functions. In France, there are now over 13,000 service providers.

The incentive for the service companies is well structured, the service can be provided free where all charges are paid by the provider, or in four user tariffs, ranging from 6.5p, 11.5p, 16.5p, 21.5p per minute of which Telecom gets 4p and Minitel 2.5p. For the second, third and fourth band the service provider would get 5p, 10p or 15p respectively.

The attractiveness of the system to customers is that it is cheap. A Minitel terminal costs only £200 to buy or £5 per month to lease. It is simple, like a fax machine to install, and will use an existing telephone line, if usage does not require a separate line. Business customers are being targeted first in Ireland and the core service provider is the Allied Irish Banks (AIB) which will provide up to date company or personal account information and balances as well as other financial information. AIB claim to have 49% of all account holders in the Republic of Ireland.

Telecom will have the Irish telephone directories available as a service. Cognotec will provide its financial information services, which include stock exchange updates, exchange rates etc. Other services planned include Dun & Bradstreet credit information, home shopping and many transactions. Minitel plan to have 10,000 terminals in use in Ireland in the first year, 1991, increasing to 90,000 by 1994 and to 150,000 by 1997.

4.10. ICARUS PROJECT

ICARUS is an acronym for Irish Community Aircargo Realtime Users System. It is an important project of international significance, being the world pilot test site for IATAs (International Air Transport Association) EDI standard for the aircargo industry and it has also been recognised by the EC under its TEDIS programme.

This project is presented as direct, first hand, research as the author has had a key role from the outset, first as Chairman of the industry working group which initiated the project, as a member of IATA's Cargo Community Systems Committee which approved it, as Project Manager for the planning phase and currently as General Manager of the commercial operating company - Cargo Community Systems Ltd.

The idea was developed between Aer Lingus and the Institute of Freight Forwarders of Ireland (IFFI) in 1985. It was agreed to set up a working group - Cargo Computerisation Committee (CCC) to examine how links could be developed between existing systems of the participants to establish how this could be achieved and to set out the main requirements of such a system. The automation of the Customs Clearance process was a

key issue at first and Customs & Excise joined the Committee as did Aer Rianta - the Irish Airports Authority. Visits were made to a number of European sites and consultants were commissioned to carry out a Feasibility Study of the technical connectivity options.

However, when Customs decided to develop their own national multi-modal system, they and Aer Rianta dropped out of the group and rather than leave such development to speculative proposers, such as the EDS 1987 proposal to the Irish Government for a National Trade System Customs, Ports, Airports and Cross Border), IFFI and Aer Lingus supported the CCC recommendation that an Airline/Forwarder system be set up for commercial transactions and that a gateway be left open for a link to the Customs system.

Internationally at this time, IATA were wrestling with the problem of unique non-standard and uncoordinated Cargo Community Systems (CCS) being developed in airports throughout the world forcing Airlines not only to join and invest separately in each, but to also carry out major modifications to their systems to communicate with them. IATAs then current recommended solution, Standard Interchange Facility, had not been successful. Consultants advised that it could not be possible because of the varying Customs requirements to have a fully standard CCS but that it should be possible to create a technical solution for Airline/Forwarder links.

As a result, a Functional Design Specification was developed by Philips, Eindhoven under contract, but IATA wanted to have the concept implemented and needed two pilot test sites to prove it. This was considered vital as a number of systems, particularly the Air

Cargo Fast Flow (ACFF) in New York sponsored to the extent of \$12 million and the Miami International Cargo System (MICS) with development costs of \$18 million spent had both to be cancelled and their costs written off by their respective Port Authorities. In the Miami instance, it was due to technical problems in rewriting the imported LACES/ACP 80 software and in New York due to lack of user commitment and the heavy costs for Customs Brokers, Airlines and Forwarders.

The vehicle adopted by the Irish Aircargo Community to move the project forward was a limited company and the principles adopted for it were that it should be neutral, and open to all categories of participants. Cargo Community Systems (CCS) Ltd was incorporated in February 1988, owned 50% by Airlines (including Aer Lingus, British Airways, Lufthansa and Ryanair) and 16 Irish Freight Forwarders.

A Technical Group for the Airlines and Forwarders was set up to define the system requirements and in September 1988 when the IATA design specification became available, it was found to address these. IATA then selected Dublin and CCS Ltd as the first world pilot site. A Request for Proposal was issued incorporating the IATA specification. Philips Business Systems, Dublin (part of the international group) won the contract and they commenced development in April 1989. The hardware and software was installed in January 1990 and detailed testing of the users systems was carried out over the next 3/4 months. The system went commercially live in June 1990.

The technical features of the system allows the participants computer system to communicate at a business level regardless of their hardware and software differences. It provides protocol conversion particularly for the Airline domain of SITA type communications to and from the standard world of OSI, the X25 protocol. It provides for routing, management and handling of EDI messages, and storage in the event of disconnections. One of the key features is a message conversion module which translates between the IATA CargoIMP (International Message Procedure) standard and the UN/EDIFACT standard.

At a functional level, it will facilitate any business function between participants. The initial functions are :

- Reservations for Cargo Shipments
- Shipment Tracking Worldwide
- Transfer of Airwaybill
- Flight Schedules

Other functions include acknowledgment and error messages, broadcast and E-Mail type messages. New messages planned are cargo space availability and links to external 'value added' services for neutral timetables and other database services.

There is significant international interest in this project with a constant stream of international visitors. CCS Ltd have also been shortlisted in a closed tender for the CCS being developed by Singapore Airlines which is a much larger system. Swissair are now developing the second IATA official pilot in Switzerland. It is estimated by IATA that there are 40 locations requiring such a standard solution.

4.11 FINDINGS OF EDI SURVEY

Section 3.2 Research and Methodology outlines the research objectives and how the research target group was selected to represent the views of the broadest range of business and administrative organisations as users or potential users of EDI. The pilot survey of eight users identified that there was insufficient available information or awareness amongst the majority of companies, which would mean that a general 'broadcast' survey would not be responded to as the average firm would not be able to complete the questionnaire. The technology itself and awareness about it is not evenly spread. This meant that the target group had to be selected to consist of companies who were known to be users, were considering usage, or were in a sector where there were EDI activities or competitors in one of these categories.

The names of the companies which were considered to meet the criteria as set out in Section 3.2.2 Methodology, were compiled from a number of sources. Firstly, there were the personal contacts and companies known to the author. Secondly, the discussions with various experts and particularly the pilot survey contributions added additional names, and finally, the list was completed by selection from the membership list of the EDIAI which was made available by the Secretary of the Association.

In addition to the company, the name of the appropriate manager was identified where this was possible. In many cases this meant telephoning the company and outlining to them the information required and obtaining the appropriate name of the executive involved. Only in less than 10% of the cases was there a name not available in which case the questionnaire was addressed

to the General Manager, Marketing Manager or MIS Manager, depending on the size and nature of the organisation. The questionnaires were sent by post with a covering letter explaining the background. The respondent companies are listed in Appendix A.

The target companies can be classified into four business areas:

- 1) **High Technology Companies.** These were mainly multi-national companies in the computer manufacturing and electronics industry and their components.
- 2) **Transport Sector Companies.** These consisted of airlines, shipping lines, forwarders and customs clearance companies.
- 3) **Indigenous Irish Companies.** Engaged mainly in the Food and Drinks Processing, Distributing and Export. These included companies in the meat and milk processing, sugar and flour manufacturing, drinks and confectionery area.
- 4) **General Business and Administration.** These included large Irish industrial companies in crystal glass, paper and packaging and distribution. It included retail and supermarkets and the financial and banking sector. It also included Government departments and commercial semi-state administrative and trading companies. A number of computer and telecommunications services were also included.

In all, eighty six companies were identified and selected as suitable targets and of these, thirty six replies (42%) were received. In follow-up telephone conversations with a number of the companies which did not reply, they indicated that they felt that the information was too commercially sensitive and some felt that as EDI involved other companies with whom there were agreements of non-disclosure, they would not put information in writing. (This may have applied to VANs rather than EDI participants). This group included three companies who had participated and advised in the pilot study. Companies who were quite prepared to talk about their plans informally but in many cases were not willing to document these plans because of concern about leakage, the community being so small and fear that dissemination of their plans to a competitor could have serious consequences. This reaction was especially noticeable in the highly competitive retail, food and supermarketing sector.

The sectoral responses broke down as follows:

GROUP	Target	Replies	%
High Tech/Electronics	16	8	50%
Transport Sector	12	8	66%
Food Processing/Drinks	13	6	46%
General Business/Banking			
Administration/Retail	45	14	31%
TOTAL	86	36	42%

Table 2: EDI Questionnaire Responses (Source: Irish Survey)

Considering the care in the selection of companies and the nomination of intendent respondent, the response overall to the questionnaire was felt to be quite disappointing and consideration was given to doing it again to a wider target. It was decided, however, not to take this approach for two reasons. Firstly, when analysed the quality of the replies was very high and the reasons such as confidentiality for the lack of replies became clear. The information on company intentions was specific and hard and as their views on issues affecting Irish companies was the main purpose of the survey, it was considered that this was achieved. The second reason was that a broader target group would also produce much more 'non-responses' and even if it was successful in increasing the total response, it would be unlikely to add to the quality of the first replies.

Number of Users/Potential Users

Of the 36 companies responding, 15 or 42% were currently using EDI as against 21 or 58% who were not users. Most interestingly however, of the 21 non users 16 or 76% said they were likely, or highly likely, prospective users, with only 5, or 24%, being unlikely or highly unlikely. This gives a very positive statistic overall with 31 of the 36, or 86%, companies responding said they were either users or likely users of EDI. These are demonstrated in Table 3 below, by sector.

	Current Users		Non-current Users as Prospective Users	
	Yes	No	Likely	Unlikely
High Tech	3	5	5	
Transport	6	2	2	
Food/Drinks	1	5	5	
General Business/Admin/ Finance	5	9	4	5
	-----	-----	-----	-----
	15	21	16	5
	42%	58%	76%	24%

Table 3: Current or Prospective Users (by Sector)

REASONS FOR USING EDI

The rest of the questionnaire dealt solely with the plans and views of EDI users or potential users. The business reasons given for using EDI by 31 respondents offered multiple choices were scored and weighted resulting in the following order:

- 1) Corporate competitive and strategic reasons.
- 2) Reduction in leadtimes and inventory.
- 3) Cost reduction reasons.
- 4) Improved customer service.
- 5) Other reasons, e.g. trading partner requirement.

The above reasons are the long term strategic reasons for a companies EDI development and are not to be confused with the immediate pressures that are often the catalyst for a company to take on its first EDI project. The 31 responses in order are:

- 1) Development of EDI in its business sector.
- 2) Competitor(s) using EDI
- 3,4,5) Suppliers insistence)
- 3,4,5) Purchaser insistence) equal
- 3,4,5) Companies pressure on suppliers) third
- 6) Other, e.g. State/Customs requirement

BUSINESS DOCUMENTS/FUNCTIONS

Only 15 of the respondent companies were using EDI at the time of the survey. Their business use of EDI is interesting but as the response is too small, it is not representative overall. The future planned business uses is of much more value, it details the breakdown of the functions or standard business messages being used, and provides information on the spread of functionality, and was as follows:

Purchase Order	4
Invoice	7
CCS IATA Messages*	6
UK Customs SAD*	4
Exchange Order	1
Acknowledgement	1
Shipping Notice	1
Electronic Funds (EFT)	1

Table 4: Business Functions/Messages Used

*The CCS Ltd airline functions include several messages, the main ones being, Space Reservations, Status Request (Shipment Tracking) and Airwaybill Transfer. The UK SAD represents Irish based transport companies transmitting Customs declarations to the British Customs. Many of the messages being used at that point relate to the transport sector, indicating the relatively high level of EDI activity in that sector.

The breakdown for the messages or functions planned was:

Purchase Order	11
Invoice	11
Other CCS IATA Messages	5
Irish Customs SAD	5
Manifest	3
JIT Message	3
Purchase Order Change	3
Bill of Lading	2
Delivery Order	2
Forecasts	2
Acknowledgement	2
Activity Schedules	2
Shipment Tracking	2
Other EFT Messages	2
Financial Remittance	1
Price Catalogue	1
Tourist Information	1
Purchase Order Response	1
Dispatch Advice	1
Return Affidavits	1
Ships Stowage Plans	1
Stock Update	1

Table 5: Business Functions/Messages Planned

As far as possible, duplication has been eliminated even if some of these functions appear similar, they each have a specific and separate function in the plans of the company.

MARKETS REQUIRING EDI LINKS

The following countries were scored by 29 respondents as their intended international points for EDI links, in this order:

1. Ireland (for domestic trade)
- 2 United Kingdom
- 3 Germany
- 4 Other EC Countries
- 5 France
- 6 United States
- 7 Japan
- 8 Canada

It is significant that in a technology highly used by multinational, high tech companies, mainly manufacturing for the export market, that the Irish market was selected as number one in importance. This may indicate the importance to these companies of protecting the Irish supply chain by providing connections to local or domestic suppliers of parts and components etc and for critical services such as transport, which will be Irish based.

INTENDED EDI TRADING PARTNERS

The business activity of the intended EDI partner stated by 30 respondents was as follows:

- 1 Freight Forwarder
- 2 Carrier
- 3/4 Manufacturer)
- 3/4 Distributor) joint
- 5 Supplier to manufacturer
- 6/7 Bank/Financial service)
- 6/7 Retailer) joint
- 8 Customs
- 9 Customer
- 10 Agents, Subsidiaries etc

Table 6: Intended EDI Trading Partners

The clear message again demonstrated by these replies is the perceived importance of transport to support business in an EDI trading environment.

DATA STANDARDS

Of 23 replies to the question of what standards they currently were, or would intend to use, some companies indicated that they would use more than one standard. This gave a total choice of 32, which is summarised as follows:

1	UN EDIFACT	18	57%
2	IATA CargoIMP	6	19%
3	Tradacoms	4	12%
4	ANSI X12	3	9%
5	ODETTE	1	3%

Table 7: Data Standards Used or Planned

The EDIFACT response reflects the predominant position of this standard as the future global standard for Irish EDI users. The high position of the IATA standards reflects the level of activity in the aircargo sector due to the ICARUS project.

CHOICE OF COMMUNICATIONS

31 companies answered the question of how would they connect to their clients. Some said they would use multiple methods or networks, this produced 46 choices, which breaks down as follows:

1	Value Added Networks*	15	33%
2	Eirpac Dial Up	14	30%
3	Leased Lines	10	22%
4	Private Network	7	15%

Table 8: Choice of Communications Methods

*In the case of the 15 who opted for Value Added Networks (VANs), it was possible to classify these further. 5 were unspecified or not yet selected, 3 were PostGEM/Istel, 2 were Eirtrade/INS, 2 were SWIFT, 2 were SITA and 1 was INET.

COSTS AND BENEFITS

In answer to the question 'Did/will you have major expenditure to modify your system to handle EDI developments?', there were 29 replies which are summarised as follows:

Major Expenditure to Handle EDI?

Yes	9	(31%)
No	15	(52%)
Don't know	5	(17%)

Table 9: Level of EDI Expenditure

A subsidiary question attempting to establish the system modification cost to handle EDI as a percentage of the hardware and software investment only elicited 7 replies. (The answers cannot, therefore, be taken as being representative. For the record, the average costs were 13% for hardware and 33% for software).

A separate question to establish the benefit to the company from EDI if fully implemented to be expressed as a percentage of the total project did not lead to clear answers. Most replies indicated that this type of information was not available. (This was a difficult question to phrase and it appears to have also been too ambitious, particularly at such an early stage of EDI development).

INTENDED USE OF INTERNATIONAL STANDARDS

Asked if they intended to migrate to full international standards for both communications and data formats, 26 companies replied indicated they would use the following:

X25 Communications Protocol	16	62%
X400 Message Handling Standard	10	38%

Table 10: Use of International Standards

In relation to UN EDIFACT as the emerging international data standard, 22 companies or 85% said they intended to migrate to it in the future.

FACTORS INHIBITING GROWTH OF EDI

29 respondees gave their opinions to three questions of the state of awareness of EDI and its benefits. Firstly, on the position within their own company. Secondly, among managers generally within their industry and, thirdly, their score on a list of the same general factors identified in an EC survey, this latter in turn produces a comparable Irish survey result.

1	Unawareness of EDI Benefits	48%
2/3	Other reasons: lack of EDI critical mass & resources, other priorities	26%
2/3	EDI Enabling Software	26%
4	Implementation Costs too high	22%
5	Communications expertise	19%

Table 11: Inhibitors at Company Level

The significant single inhibiting factor is clearly confirmed as lack of awareness of the benefits of EDI within the companies of the respondents. More or less equal weight is given to each of the other reasons. It is interesting that the other 'written in' reasons were all basically relating to lack of resources, other higher priorities, lack of market critical mass and 'scepticism' about its success was mentioned.

In response to the question 'In your opinion, is lack of awareness among managers inhibiting its growth in your industry?', the 29 responses broke down as follows:

Definitely Yes	31%
To some extent	38%
Don't know/no opinion	17%
No*	14%

Table 12: Inhibitors at Industry Level

*The 'No' figure was written in and as it was possible to establish the source, it is very interesting to note that these responses came almost exclusively from the Transport sector, which is actively involved in implementing EDI. Overall, the conclusion again is that 69% of those responding felt that lack of awareness is an inhibiting factor to at least some extent.

Using the factors identified by the EC TEDIS survey, the 29 respondees scored each of the factors in the following manner: 3 high; 2 medium; 1 low; which results in the following order.

	FACTOR	SCORE
1	Lack of Standardisation	69
2	Tradition/Established Practice	63
3/4/5	Security/Privacy	54
3/4/5	Cost/Benefit	54
3/4/5	Lack of Information	54
6	Expensive Information	48
7	Legal Constraints	42
8	Restrictive PTT Practices	35

Table 13: Specific Factors Inhibiting Growth of EDI

In the comparative EC TEDIS study carried out in four countries - France, Italy, UK and F.R. Germany, see Figure 14, it is significant that 'Lack of Standardisation' also figured as the number one factor in each of the three countries. This is further validated by the sectoral study in Finance, Chemicals, Travel/transport, Retail/wholesale, see Figure 13, in which it was also the highest in each of these sectors. It is not possible, because of the number of variables, to draw a line by line comparison with each of the Irish results and each of the other individual countries and specific sectors.

There is, however, a very close correlation between these and this study, particularly with 'Security/privacy' and 'Tradition/established practise' which figured in the top four in all categories in both of the other studies. The only significant difference between the Irish and the EC studies was the heading 'legal constraints' which figured very high in the EC studies. In many it was second or third and its perceived very low rating as an inhibitor in Ireland. This may be due to the absence of any real level of usage to date in Ireland and, secondly, a concentration on the technical planning for future development rather than the result of actual experience of the business and legal side. Overall, with this exception, it can be said that the Irish survey results are in general line with the EC countries and with the selected business sectors.

REGULATION OF IRISH NETWORKS

In response to the question, 'For EDI, do you favour a single Irish National Network licensed by the State or independent competitive commercial services?', there was a clear and unequivocal answer from 30 responses. 21, or 70%, saying that they wanted competitive commercial services and 9, or 30%, opting for a licensed national network.

QUALITY OF PUBLIC DATA INFRASTRUCTURE

There was a very mixed response to the question of whether the Irish public data infrastructure meets EDI needs. Of 27 replies, 9, or 33%, felt that the needs were met adequately or better, 10, or 37%, were neutral and 8, or 30%, said that they were met inadequately or worse. Overall, this has to be considered a very uncritical and, therefore, positive assessment of the Telecom Eireann backbone network and public data services.

ROLE OF GOVERNMENT IN EDI

In answer to the question 'Should a specific Government Dept/Agency have overall responsibility for EDI?', there were 29 responses with 18, or 62%, saying 'No' and 11, or 38%, saying 'Yes'.

Those who responded positively were asked to indicate on an unsolicited basis which organisation should be responsible and of the 11 who gave a yes reply, 5 said the Dept of Industry & Commerce, 3 said Telecom Eireann, 2 said EOLAS (Irish Standards Institute) and one said the EDIAI (EDI Association of Ireland).

INTERNAL COMPANY RESPONSIBILITY FOR EDI

To establish which executive or departmental function has the prime responsibility for EDI development and implementation within Irish companies, 31 replies were received and these broke down as follows:

Marketing Manager/Dept	1 (3%)
Computer/DP Manager/Dept	22 (71%)
Other	8 (26%)

Table 14: Departmental Responsibility for EDI

The 'Other' figure was broken out to indicate that most companies would set up an inter-departmental project team, 3 said they would have a Project Manager, 3 said it would be the appropriate department manager and 2 indicated it would be the Financial Controller or his department.

SOURCE OF EDI EXPERTISE

A total of 29 companies identified the source of their EDI expertise from internal and external sources, 6 of these companies indicated that they would use two sources, giving 35 choices which break down as follows:

Inhouse Specialists	24	(68%)
Software House	3	(9%)
EDI Consultants	7	(20%)
Other	1	(3%)

Table 15: Source of EDI Expertise

The one 'Other' source was indicated as the trading partner of the company which is a very interesting and realistic source, particularly if the trading partner is a large 'hub' like company, providing incentives for EDI to its partners and possible a standard technical solution such as a PC package.

Many companies offered detailed information on their lack of access to and availability of expert EDI resources. These comments from several companies ranged from the difficulty of finding and then keeping such scarce expertise, to the lack of telecommunications expertise. The lack of familiarity with EDI techniques on the part of inhouse MIS staff was criticised. In the case of multinational companies the expertise is available, but often located in Head Office, in another country. Comment was also made on the general lack of experience and knowledge of software houses.

INTEGRATION OF EDI WITH MATERIALS APPLICATIONS

In response to the question, 'Please give your views on the integration of EDI with advanced materials systems MRP (Material Requirement Planning), CIM (Computer Integrated Manufacturing), JIT (Just in Time) etc', there were only 15 responses of which 13 or 87% indicated that there should be integration with at least some of these systems, only 2 or 13% felt that this was not practicable. Most views were that integration with

these specific applications were a 'natural fit', 'essential', necessary to provide full benefits', 'directly linked'. One answer felt that integration with MRP was beneficial but not with CIM or JIT. the 2 negative replies said that integration was 'far away' and 'down the road'.

EDI, TECHNICAL OR BUSINESS?

Respondents were asked to give their opinion on the often quoted statement that EDI is 80% business and 20% technical. There were 26 replies, a positive 21 or 81% said yes and only 2 or 8% said no, 3 or 11%, either didnt know or had no opinion. There would appear to be at least an interpretation difference, if not a contradiction, between this response and the definite location of responsibility within company for EDI, in the Computer/DP department. This is a frequent area of misunderstanding and it is best explained by a company view that the EDI as a facilitator is a business responsibility and up to the business managers to demand its development while the actual expertise and work involved in implementation is the function of the technologists.

HUMAN SIDE-EFFECTS OF EDI

Respondents were asked to give their comments on the consequences of the success of EDI and its effects on the human aspects and rationalisation of the organisation, staffing levels etc. 18 replies were received with comments.

All the comments accepted that there would be effects on the organisation and staffing. Opinions varied considerably as to the extent and consequences of this. Many felt that the more repetitive, indirect and mundane work would be reduced, thus improving the quality and time which would be available for other work. Resources could be re-allocated to more productive work and particularly improving customer service. Many felt that there would be industrial relations problems as a result of severe cutbacks in clerical staff. On the other hand, many felt that this would be the same as for any large automation or computerisation process and would be handled by both sides of industry in the traditional way.

Some comments felt that EDI as a competitive edge tool would put some inefficient companies out of business but for others it would mean growth with greater economies and productivity but with no reduction in the number of staff and it has to be looked at as a survival issue. Only two comments were made about the necessity for organisation structural change facilitated by the changed work patterns introduced, both recognised this and one also commented that EDI would point up shortcomings in the existing organisation.

GENERAL COMMENTS AND INFORMATION

Comments were also invited on the role that EDI will play in developing the EC Open Market after 1992. 21 comments were received with 20 very positive and only one negative. The nature of the comments was mainly that EDI could help to deliver many of the efficiencies that the Open Market is all about. The competitive nature of the Open Market would also mean that Ireland would have to exploit the benefits of EDI, otherwise we would lose out as a country but by doing so it could help to equalise some of the disadvantages we suffer from due to our peripheral location.

In relation to EDI's potential to create 'Paperless Trading', there were 25 comments with 22 positive and 3 negative. Many of the views firstly indicated that they did not think that trading would ever be fully paperless but that EDI could go some way to reducing some of the burden of costly paperwork. Generally, the views were that EDI would play an important role in working towards this ideal and that the benefits, even for partial success, would be significant.

Final general comments were supplied by 14 respondents and these provided affirmation of the importance that Standards play in the minds of users and potential users. There were complaints about the variety of standards and particularly the slowness in their development. There was general belief that UN EDIFACT is the correct road for Ireland and there were two specific views expressed. First, that the lack of agreement on Standards should not be an excuse for further delay and a second comment that EDIFACT will require time and in the meantime projects should go ahead. The need for coordination at national level was expressed also information services and seminars.

4.12 IRISH INDUSTRY CASE STUDIES

Three cases from different industry sectors are examined to provide an overview of activities at a micro level in the individual company. These are Digital Equipment Company (DEC) Ireland Ltd, in computer manufacturing. Secondly, the Irish retail, food and distribution sectors, where a number of firms which are giants in the supermarket sector are on the verge of plunging into EDI but are slow to take the first step. Thirdly, in the forwarding and transport industry, traditionally a leader in EDI, as seen in one Irish owned company, Irish Express Cargo Ltd.

4.12.1 DIGITAL EQUIPMENT COMPANY (DEC) LTD

Internationally, DEC are the second largest computer and electronics company, after IBM. They have 120,000 staff worldwide. In Ireland they have some 3000 staff located in manufacturing plants in Galway city and Clonmel, Co Tipperary and a marketing and service centre in Dublin. The companies main European centre of manufacturing is the Galway plant.

As a massive user of myriad component types from many suppliers, DEC has long recognised the important role that EDI plays in its logistics and manufacturing. This section is compiled from data supplied by Ms Cliona Curran, DEC EDI Co-ordinator, Galway, at the IMI Conference on EDI on 31 January 1990 in Dublin and by Martin McCarthy, Plant Manager, Galway, at the EDIAI Conference in Dublin on 12 February 1991. DEC Galway was asked by the parent organisation to develop a Europewide solution to its EDI needs and it has done this.

Ms Curran introduced her talk by demonstrating the underlying DEC concept of EDI as the key link or facilitator in a matrix between Profit on the top and Customer Satisfaction and Return on Investment on the base of the pyramid as follows:

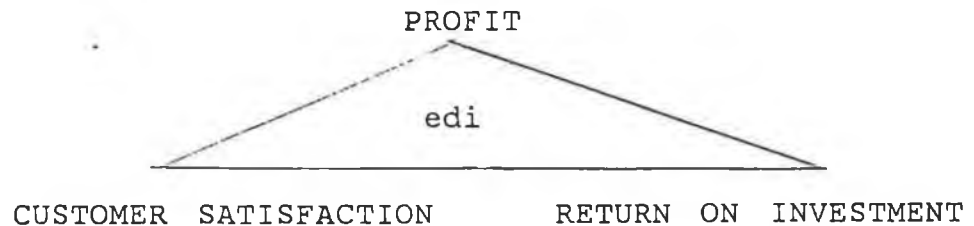


Fig 19 DEC EDI Business Matrix (Source: DEC)

DEC have their own commercial EDI product EDI/VAX, which they also use in their own internal business where it is used as a buyer approved interface application. They then sit down and work through with key suppliers both technical and commercial matters. The company has developed Basic Order Agreement (BOA) which is a general contract with specific EDI paragraphs. The EDI Galway project started in April 1989 with five pilots and is planned to be completed in three phases:

- 1) The first phase consisted of a buyer to supplier EDI link.
- 2) Internal process to automate the Purchase Order process but actual order decisions are taken by the MRP system instructing the Purchasing system with the buyer still in control.
- 3) Next phase is to provide the optimum business process, providing full integration of EDI into JIT systems which will also eliminate waste in the system, and will not require human intervention.

Some of the issues now being addressed are, is an Invoice necessary in an EDI environment from a 'Best Business Practise' viewpoint?. Organisation changes are rapidly following on as DEC found that one benefit of EDI is that it puts the accountability back in the value chain to Production. The resources thus freed up are available for more value-added duties.

Mr McCarthy's theme was that EDI is not about technology but about profit. He took a very advanced position that EDI is now a 'de facto' business solution and there should be no more debate about standards or technical issues. The issue he said was about competitive pressure and with the arrival of open systems there was an opportunity to achieve a major drive on cost reduction, particularly in overhead/administration costs. He identified the areas in which this could be achieved:

- Order Processing
- Purchasing
- Materials Management
- Accounts Payable/Receivable
- Design to Manufacturing
- Shipping

Mr McCarthy detailed the experience of DECs Augusta, main plant:

WHAT IS OUR EXPERIENCE

AUGUSTA PLANT

<u>PRELIMINARY FINDINGS</u>	<u>PRE-EDI</u>	<u>POST-EDI</u>
ADMIN CYCLE TIME OF PO PLACEMENT AND ACKNOWLEDGMENT	5 WKS	3 DAYS
SUPPLIER LEADTIME	10 WKS 12 WKS	8 WKS 8 WKS
BUYER / PLANNER TIME TO IDENTIFY ORDERING REQUIREMENTS	5-10HRS / WK	10 MINS / WK
BUYER / PLANNER TIME REQUIRED TO PLACE 50 PO's	25 HRS / WK	2 HRS / WK
INVENTORY LEVELS	FY'88 JULY 1	FY'88 JUNE 30
BUYER A	\$1088K	\$453K
BUYER B	\$862K	\$43K

digital

Fig 20: Digital Equipment Corp Preliminary EDI Findings

Martin McCarthy made the following points about the business reality of EDI. "a) The technology infrastructure is in place throughout most of Europe. b) acceptance of EDIFACT as the international standard for business documents/messages. c) Many trading partners are not really willing to devote time and effort to get involved in EDI. d) Many trading partners do not have the EDI capability they say they do. e) EDI is no longer a 'Nice to Have' we now regard it as essential to future business (and for future business). f) Emphasis must now be on using EDI to help identify business changes to improve internal and external processes".

Pat Kirby, whose POSVAN study¹³⁴ was commissioned by DEC, among others, has independently detailed the benefits realised by DEC Galway.

- Cutting the time taken to prepare and issue a purchase order from 2 weeks to 3 days.
- Getting an acknowledgement from the supplier in 3 days instead of 5 weeks.
- Cutting the cost of preparing the purchase order from \$125 to less than \$32.
- Further savings in the time spent by buyers and planners.
- Finally, a reduction in inventory which can be partly attributable to the impact of Just-in-Time.

EDI has enabled Digital to focus more on its core activity of making computers and some activities have been contracted out. For example, Walsh Western, the Freight Forwarders, now handle some assembly work, packaging, warehousing and they, not Digital, are responsible for distribution throughout Europe. These tighter relationships based on information flows could not happen without EDI and it has resulted in a fundamental reorganisation of procedures at the Galway plant.

As the European distributor for Digital, Walsh Western have built a very sophisticated communications network, based on X400 technology, servicing Ireland, UK, their Dutch distribution centre and all their own depots. It is also connected to Customs authorities in several countries and to other business partnerships. This is an example of very advanced use of EDI and it also demonstrates how EDI can change the role of business partners and create new opportunities.

4.12.2 IRISH RETAIL, FOOD AND DISTRIBUTION SECTORS

The supermarket scene in Ireland is categorised by companies who are fully aware of the benefits of EDI, have the technical and business expertise to implement and exploit it but are worried about competitive and commercial secrecy that it appears that no one company wants to be first to take the decisive step. On the other hand, while some of the companies who are very keen competitors are prepared to work together on technical and other neutral issues, they are not prepared to agree to any joint introduction for their common suppliers. The suppliers too are very concerned

about the openness of systems and networks introduced on the reasonable fear of being tied or 'locked in' to any one network or company. It is also known in the trade that some large groups insist that suppliers have dedicated lines for them only.

The situation is in some respects a classic pre-EDI environment with huge buying companies, acting as 'hubs', are waiting to decide their optimum corporate strategy and the weak suppliers are waiting and wondering what electronic trading has in store for them and with, unfortunately, very little or no say or influence in the decision making process. This aspect is not, however, the standard or desirable 'win win' situation for each of the trading partners in a normal EDI trading relationship. It is, however, merely a reflection of this industry and its trading norms, rather than any inherent change brought about per se by EDI.

Due, however, to the perceived commerciality of such marketing initiatives in which EDI appears to be included, secrecy is considered to be so important that these developments are never publicly disclosed. There is, therefore, very little detailed information that can be quoted or referenced. In a presentation to the Irish Federation of Computer Users (IFCU) seminar¹³⁵ on 9 May 1990, Mr Frank Murphy, Financial Controller, Superquinn Ltd and also Chairman of the ANAI (Article Numbering Association of Ireland) sub-committee on EDI, in the course of a generic description of EDI, gave the details of activity in Ireland. ANAI is a member of EAN (European Article Number Association) who have developed EDIFACT sub-set messages which, he says, are fully compatible with the UN standard. These are:

Invoice, Purchase Order, Despatch Advice,
Price Catalogue and Party Information.

At present ANAI are conducting trials using PostGEM, An Posts value added network service, which started over nine months ago between two retailers, Superquinn and Quinnsworth with a number of suppliers, Johnson & Johnson, Allegro, Avonmore, Nokia, with some further work in hand with a variety of other companies also. These trials are progressing very satisfactorily.

At this point in time, the suppliers mentioned send invoices on a full parallel basis to both Superquinn and Quinnsworth and transmission of the price catalogue have just started. Purchase Orders have also been transmitted successfully but at present there is no demand for this message in the retail trade. This is at variance with the UK experience where purchase orders were the messages most in demand.

Almost one year after this seminar, the trials have not yet progressed into any real commercial implementation. In July 1991, Quinnsworth advised their suppliers of their intention to use EDI. One problem which exists but which is not necessarily the main factor is the issue of VAT payments. In an article in Irish Business, April 1990 issue, Brian Trench¹³⁶ says:

Critically, there is no agreed form for entering sales tax (VAT) information. Nor are the Revenue Commissioners ready to take such information on line, ... but that from a standing start they are progressing quickly. The legislation is in place allowing VAT returns to be made in computerised form.

It is understood, confidentially, that the main reason that these successful trials have not been turned into actual implementations is the competitive situation between the big supermarket chains consisting of the two companies mentioned and Dunnes Stores, which is by far the biggest of all. Dunnes are known to be about to launch their EDI programme and the other two companies, which are second (Quinnsworth), and, third, (Superquinn), have come together as a result of their technical cooperation and are waiting to respond. It is believed that Dunnes may use PostGEM in which case the others are likely to abandon PostGEM for EIRTRADE.

Dunnes compete essentially on price, offering the housewife the lowest prices, so costs are of the essence. Quinnsworth are probably the most efficient and marketing oriented with highly effective computer systems permitting flexible 'offers' which can be implemented rapidly. They are also the only Irish chain whose 59 stores are fully checkout automated with bar-code readers providing stock updates and reordering facilities. Superquinn offer superior customer service and are also highly computer sophisticated and marketing oriented but, however, with only 15 stores, in Dublin and East Coast middle class areas, they do not compete for the same market as Dunnes, except in specific shopping centres.

The activity is not confined to the giant supermarket players. Other food and drinks manufacturing and distribution firms are involved, such as Kerry Foods, Irish Sugar Co, Bord Baine (Irish Milk Board), Odlums Flour, Gilbeys (Baileys Irish Cream) and Cow & Gate. Brian Trench in the same article referred to above, goes on to say:

Avonmore Foods is considering means of handling electronically transactions with its far-flung depots and many contractors. Meanwhile the Co Kilkenny based company is already participating, with a dozen other companies, in an EDI project run on a network established by An Post. The pilot phase of this runs until June.

One of the most active participants and a user of EDI services, is a small but very efficient supermarket chain, L & N, operating in the South Leinster and East Munster region, who are quietly and without hype getting on with the job of implementing EDI with their key suppliers. Another company not in this sector, Reliable Plastics, Sligo, but a supplier to Erin Foods, of precision injection mouldings, mainly for the UK market, is a firm believer in the benefits of EDI. According to an article by John Sterne, 'EDI Stirring a Data Revolution' in the Sunday Tribune, 26 August 1990, their Managing Director is quoted - "Seamus Monaghan claims that EDI is highly efficient, has helped to speed up the payments process and gives his firm a competitive edge. His next objective is to persuade the company's customers in Ireland to adopt the online service".

There may be more behind scenes talk at present than actual EDI activity but the Irish retail, food and distribution business is gearing up for the electronic trading era. It will require a dynamic catalyst to get it beyond the takeoff stage. This is likely to occur in the highly competitive world of supermarketing but once the first real steps are taken, it will lead to a rapid chain reaction in the sector. This, in turn, will have consequences for general Irish business.

4.12.3 IRISH EXPRESS CARGO LTD

Freight forwarding has in the last twenty years in Ireland developed into becoming a vital link in the trade cycle, particularly as logistics and JIT manufacturing have assumed such importance. Most of the companies in this sector are young, flexible and efficient, unlike many of the older players in the world of shipping and transport.

Irish Express Cargo was founded in 1972 and, at first was exclusively in the aircargo sector, but later extended into general forwarding, door-to-door services and express deliveries to/from the UK with its own vehicles. The company has grown rapidly into the largest wholly Irish owned freight company with turnover of £40m and seven offices. According to the February 1991 issue of the computer trade journal 'ComputerScope' Site Report¹³⁷, in the last eight years the company has invested heavily, over £1m, in Information Technology, initially for cost and management reasons and then for customer service but it now finds that it is the strategic reason for new business development as clients need the critical transport and tracking information to feed their JIT, inventory and other materials systems. In the article, the company's Managing Director, Finn O'Sullivan, is quoted - "All of the major business contracts achieved over the last three years revolved around the technology we used rather than whether our rates are better than the guy next door".

Mr O'Sullivan in a paper to the EDIAI conference ¹³⁸in Dublin on 12 February 1991, said about their approach to EDI:

Our customer links were our first priority and that period we went down a learning path once again with major clients, such as Hewlett Packard, Apple, Prime, Western Digital and at the same time made connection to UK DTI for Customs. The customer links varied from direct leased line connections to dial-up availability. We opened our entire system to these customers for most of the functionality of the system - operations, accounting, reporting, tracking, communications.

In early 1990, we made what I would consider our first true EDI link and that was via the CCS system to various airlines. This connection was a true host/host connection with all parties exchanging business messages such as cargo reservations, airwaybill transfer and tracking/tracing. This creates the environment between business partners where neither has to duplicate the others data - there is true electronic data transfer. In terms of business efficiency we saw the disappearance of the telephone as a means of transferring information and data. Further developments will connect us via CCS with scheduling, tariff and other such data bases.

The benefits of technology, of which EDI is the logical and natural extension, are well quantified by Irish Express Cargo. Mr O'Sullivan says; "In 1984, any operational clerk had the time to handle an average of 100 shipments per month - this is an industry norm. By 1988, we had changed this picture dramatically - the average shipments per month being handled, depending on the department, was anything from 250 to 300 and, in fact, by 1990 this had gone up to 400."

The company has links to their US Freight Agent Associate, Circle Freight, at their San Francisco head office based mainframe computer, for pre-arrival and post-departure tracking in the Circle system throughout America. This connection is over IBMs International Information Network. A second link in the European direction also with IBM, links Irish Express Cargo to Kuhne & Nagle, its continental correspondent, and one of the biggest international agencies, this is more advanced and both companies are considering opening up full file transfer capabilities.

For the future, Finn O'Sullivan says, "I look for the transport sector to be a major player in this new world of business cooperation. The Freight Forwarder is positioned in the centre of the transport chain and needs to become an integral part of an Information and Data Exchange ... We hear about the removal of paper from the trade chain - I see that beginning to happen. Our customers are starting to transfer data electronically to us and that data is being used, without duplication, all along the international chain, it comes to us, from us to the airlines, from the airlines to our partner overseas and finally from our partner to the ultimate customer. We are also beginning to see purchase orders being created from the other end of the chain". (Irish Express Cargo were a pilot company

which provided information and assistance for the Survey Questionnaire).

4.13 **IMPACT ON IRISH FOREIGN TRADE AND TRANSPORT**

This section examines the benefits to foreign trade from the national position rather than from the individual company point of view. The thesis so far has largely dealt with the company unit. It analyses the cost to industry from transit delays due to documentation requirements and information processing procedures at import/export or trade points. It examines if an automated community system directly integrated with, or linked by EDI to all the participants involved, including Customs, could overcome these and how this should ideally be structured. The thesis has looked at solutions in other countries and how the lessons from these can be applied here to avoid mistakes, encourage participation and if Ireland's late entry in this area could permit it, to take advantage of the latest technological developments.

It discusses the interrelationship between the independent parties who provide the services necessary for international trade and who must cooperate fully if such a system were to be successfully introduced. It also examines the benefits to the economy and to the individual parties of such a system. It defines such an agreed system which in many areas is called a Cargo Community System with Customs participation and describes how best it can be introduced and the issues involved. The fundamental principles on which the system should be based are identified.

The Irish Customs (AEP) system is then examined, together with the national managed X400 network which is being set up in association with it. This project is, however, highly controversial for several reasons. Firstly, because the Customs Clearance Agents and Forwarders who complete 90% of the SADs are expected to mainly bear the costs of the network system set up for it. Secondly, by definition, the Customs AEP system has only a lifespan of two years until 31 December 1991, at which point 83% of Irish trade will be EC and many of these companies will be out of business. Thirdly, there are still disputes about the claims made for the benefits to trade. The system will only be successful if it has significant uptake by Traders/Agents to transmit their Customs declarations (SADs) electronically to the system, this is known as Direct Trader Input (DTI), rather than Customs officials keying-in manually completed forms which is called Customs Input (CI). Customs have stated that the system is essential as the number of SADs has increased from 1.5 million to 2.3 million and due to staffing cutbacks they are unable to process these manually. The savings will be achieved by reduced service for the manual processing. Customs require that 80% of SADs be received by DTI and 20% by the CI route for a successful implementation.

4.13.1 TRADE AND TRANSPORT ENVIRONMENT

The main trends from a transport perspective in Irish foreign trade over the last 25 years have been a switch from the UK to continental Europe, rapid growth, high import content in manufactured exports helping to equalise the directional imbalance and an increase in higher value products such as computers and chemicals. In this period the transport sector has been transformed to meet the new competitive requirements. Fundamental structural changes have also occurred, driven by the need of industry to keep inventories as low as possible through the adoption by manufacturers of the Japanese 'Just in Time' (JIT) materials re-order, delivery and control concepts.

JIT and other efficiency and quality programmes have gained wide acceptance since the periods of energy crises and economic recession. As a result, there has been a significant reduction in shipment sizes but much increased frequencies. This has also in turn led to the rapid development of the 'Express' and 'Door-to-Door' integrated delivery services. Internationally, the transport industry has responded to these newly expressed needs of industry in a number of ways, by exploiting the opportunities provided by the partial deregulation of road transport allowing return loads, investment in faster and more efficient Roll-on, Roll-off and conventional ships, containers, larger specialised all-cargo aircraft as well as dual purpose passenger-cum-cargo planes, expensive loading and handling equipment and also in sophisticated inhouse computer systems to streamline the control and documentation processes.

The increase in capital investment has resulted in improvements in operational efficiencies. There has also been progress in the marketing side of transport providing better customer service and keener pricing. Greater specialisation and competition has also given more customer choice and a whole new range of products and services have been introduced. There has also been more cooperation through joint ventures and co-loading agreements between Irish and foreign transport companies which help to reduce costs and improve service.

From the traders perspective, however, similar advances have not been made in improving the information and paperwork flows which govern the integrated movement between the transport participants, of the customers goods in the total trade cycle from exporter to importer. Information on inventory is now paramount in the new trading environment. The responsibility for this lack cannot, of course, be placed solely at the door of the transport industry but as carriage is the common ingredient in international trade, the carrier is the central source and on the other hand potentially the main beneficiary of integrated information systems.

4.13.2 TRANSPORT COMMUNITY PARTICIPANTS

Apart from prime carriers, there are several other participants who have key roles in the transport of goods internationally. Some provide essential services in the interface areas at ports, airports and cross-border points. These include Customs, Warehouse/Transit shed operators, Customs Clearance Agents/Brokers. Others, such as Forwarders, have several roles viz. broker for a shipper, agent for a carrier, the provision of direct transport services. In addition to forwarding and carrier functions, the Express operators offer a completely integrated service 'Door to Door' in both the country of origin and the country of destination.

These service providers, both individual and multi-functional, present an interesting mix of Government service and private industry, each with their independent roles and differing objectives but who must work very closely together if they are to provide the quality and speed of service the trader requires. It is the effectiveness of the dovetailing and integration of these services which dictates the actual level of this service and this is to a large extent determined by successful information exchange.

The primary objective of a Customs Administration is protection of the States revenue, while profit is the accepted motive of free enterprise. The question is whether these independent bodies, as a group, can act cohesively in the overall interest of trade without the imposed discipline of an integrated automated system. The experience of other countries shows that there will not be fundamental changes or improvements if they continue to separately use traditional paper based procedures and if the exchange of documents and other

vital pieces of information, is still done manually.

Lack of co-ordination between any of these parties leads to movement delays in the transit of the goods from the exporter to importer. Movement delays can be due to the actual lapsed time it takes to do the clerical processing of the essential paperwork. This processing is really a sequencing or standard queuing time, providing that all the documentation and information is present and in order. The second and really serious Customs delays are those caused by the lack of a key document such as an Invoice, or an EC Transit form. Information is just as critical as documentation, such as an importers VAT number or his authority or instructions to pay duties/taxes on his behalf.

Absence of any documents or information means additional delays on top of the length of clerical time to process the documents when they are available. In business, these missing document situations are often referred to as 'Customs' delays. This is not, of course, strictly correct as a Customs official is not allowed to release goods until the legally required signed declaration forms and other supporting documents are actually presented to him.

Nevertheless, it is true that the Customs process does, of necessity, mean movement delay and this is often compounded by delays in passing information and documents between the other parties involved in Customs clearance, often for purely commercial purposes. Indeed some independent observers have felt that there is a vested interest in maintaining the status quo due to the number of people employed in Customs clearance activities. The CII (Confederation of Irish Industry),¹³⁹ believe that Customs Clearance charges raised by Agents are an unnecessary extra cost to trade and could

be eliminated in the context of computerisation of Customs procedures.

This view is narrow as it ignores the fact that the work is specialised and the situation is similar to most other countries where with only a few exceptions, this activity is carried out along the same lines. Indeed many countries, such as the US, require that Customs Brokers are licensed after undergoing official examinations. There is also now a general acceptance for the need for radical change, allowing for computerisation and particularly in the EC post 1992 context, on the part of both Customs officials and those involved in Customs Clearance services.

Movement delay can be demonstrated in the case of an airfreight shipment which may only take a few hours in its air journey of several thousand miles but could take several days to be processed on the ground in the absence of a required item of documentation or information. While this type of delay may be relatively more dramatic for the aircargo mode it is equally true for surface transport.

Modern logistics and 'supply chain' methods require that not alone does the delay (whether due to Customs or private operators) need to be eliminated but the whole process should be streamlined by a linked computerised system which will improve throughput times and at the same time provide status or 'tracking' information on each individual consignment as an automatic by-product. As all internationally traded goods require transportation, the core transport chain process, together with Customs procedures, is an obvious and pivotal point for such a system.

4.13.3 IRISH CUSTOMS SERVICE

Customs procedures, in most countries, have not always kept pace with technological changes. In addition, the physical method of cargo handling at ports prior to RoRo (Roll-on, Roll-off) was traditionally largely determined by Customs control procedures. This usually involved the offloading and stacking of containers in a yard or the checking of individual shipments into storage in a Bonded warehouse or transit shed.

With these handling operations in progress, the paperwork control processes run in parallel. The importer, or his nominated Agent, is notified to produce the required documents or, if he wishes, appoint an Agent to get the official entry forms prepared and passed in a Customs House 'Long Room' (as it is traditionally called). Then it must be produced to an Officer for possible inspection of the goods at an Examining station. Except for 'Roll-on, Roll-off' this procedure has not fundamentally changed since the days of the sailing ships.

In Ireland it must be acknowledged that there has been a significant improvement in Customs service in the past five years. First came the Ro-Ro revolution and truckers and Agents found that if they had all the necessary documentation prepared in advance, Customs allowed the immediate movement of such vehicles, (subject to examination or retention of specific items) straight through dockside marshalling yards onto Irish roads. This method was extended to the Cross-Border traffic which was at this time beginning to experience rapid growth.

In the case of aircargo, however, the inherent speed advantages of the mode were cancelled by the application of conventional shipping type procedures. This compared unfavourably to the far more flexible and faster procedure granted to onboard couriers, parcel post and the new express integrated services for the same goods. A study carried out by Price Waterhouse for Aer Rianta, Irish Airports showed that Customs and processing delays were a major factor in the non-growth of aircargo traffic through Dublin Airport over the last ten years.

4.13.4 TRADE FACILITATION

The Irish Customs service has improved significantly at a time of great internal changes in organisation and work methods which have generally been introduced in the Public Service. Customs, while the biggest factor impacting on the movement of goods are, however, only one party involved in the transport chain. Movement delays still occur from the lack of effective coordination among the other participants.

The whole procedure, as are all document based systems, is highly error prone. It is also dependent on perfect realtime communications between all the separate parties, which is an impossibility. Accurate information about all aspects of the shipment is essential before Customs are ever involved. These are areas under the control of the Exporter, Importer, Carrier and Agent. This problem is clearly amenable to solution by Information Technology as achieved in many other countries.

The attitude of the Irish Government to the body charged with Trade Facilitation, IREPRO, is dealt with in Section 4.2. The official climate has quickly changed with the prospect the creation of the EC internal market in 1993. The Commission has long recognised that borders act as trade barriers not alone restricting the expansion of the market but are adding an extra cost component to the total costbase of European industry compared to its competitors the US and Japan.

4.13.5 COST OF TRADE PROCEDURES

Costs in this area are notoriously difficult to quantify and it is important to try to identify where possible the precise functions that are being described. For example, the EC in its 'European Telecoms Fact Sheet 15'¹⁴⁰ states that 'In international trade, the costs related to paperwork are estimated to be between 3.5% and 15% of the value of the merchandise'. This can, of course, refer to all paperwork including Orders, Invoices, Shipping, Customs, Delivery and Payment.

The EC pamphlet on 'TEDIS'¹⁴¹ states that 'the cost of transferring data on paper has been put at 7-8% of the value of the transactions'. The United Nations organisation, UN-ECE (Economic Commission for Europe) based in Geneva says that in relation to the development a common language for electronic trade exchange stated in its Press Release ECE/TT/11 Sept 1986 its general adoption would lead to:

A substantial reduction in the cost of procedures (which at present account for about 7% of the value of the goods).

Again, a number of separate business functions appear to be included in these figures. A more precise breakdown in actual costs is available from Paolo Cecchini, Chairman of the EC 'Cost of Non-Europe' steering committee whose book 'The European Challenge 1992' contains research results from 500 firms in Belgium, France, Germany, Italy, the Netherlands and the UK.

Administrative formalities and border controls – the bill

Ecu millions	Costs
7,500	administration
415-830	delays
4,500-15,000	business foregone
500-1,000	government spending* on intra-EC customs controls

*On 6-country basis: Belgium, France, Germany, Italy, the Netherlands, UK.

Table 16 Cost of EC Customs Formalities
(Source: Cecchini)

Cecchini also demonstrates that these costs are often minimum per consignment costs and that they bear more heavily on small firms (and consequently on smaller countries) and act as a clear disincentive to exporting. His research as stated shows that 'Customs costs

per consignment can be up to 30% to 45% higher for companies with under 250 employees than for larger companies'. The actual costs are given in the next table.

Average costs per consignment in intra-EC trade (ECU)

Country	Imports	Exports
Belgium	26	34
France	92	87
Germany	42	79
Italy	130	205
Netherlands	46	50
United Kingdom	75	49

Table 17: Customs Costs per Consignment
(Source: Cecchini)

These costs would correspond generally with the trade view of the efficiency and liberality of these Customs authorities with the Benelux Free Trade area at one end of the scale and Italy at the other end. It is felt that Ireland would be between the UK and French figures, perhaps closer to the French.

The Confederation of Irish Industries (CII) has been very concerned about the competitive position of Irish foreign trade, particularly because of our higher distribution and transport costs. CII estimates that freight transport costs are 10% of total export values compared to about 5% in the larger member states. In its submission to Government regarding Customs Facilitation¹⁴², it states 'Although Customs duties in EEC trade have been abolished, Customs procedures and documentation are more onerous than before. It is estimated that the total cost of procedures and paperwork is about 5% of the total value of intra community trade. This amounts to about £630m in total Irish trade with the rest of the community'.

In an article 'Delivering the Goods After 1992', in the booklet 'Single European Market 1992' which carries the EUROOPEN logo, CII states, 'Estimated cost savings of at least £60m per annum can be saved by computerising and streamlining Customs and trade procedures before and after 1992'. These figures are given as minimum savings and relate to the paperwork processing element of Customs clearance. A higher figure is claimed if they were to include the costs to Irish industry due to movement delays, missed opportunity costs, loss of cash flow, lack of confidence in export marketing due to lack of knowledge of Customs and international trade requirements.

4.13.6 CRITICAL ANALYSIS OF BENEFITS TO TRADE

The figures mentioned above are so significant and so various in their range that the greatest care must be taken with their accuracy and in this case even more importantly what function precisely they represent. The other area of concern about the figures is that even if they are totally accurate on the costs to trade, there is nowhere either in Cecchini or in the various CII documents a definition or specification of what solution would be required to eliminate these costs. The logic for the benefits of generic and widespread EDI cannot be simply transferred to the internal automation of Irish Customs procedures using DTI.

It is one thing for the EC to claim that EDI has the potential to reduce significantly administration and other costs to trade. It is accepted and understood that the level of savings aspired to, in the order of 7% and above, are a goal or overall objective and its achievement presupposes that all the related business activities i.e. quotation, ordering, invoicing, transport and shipping documentation, status and tracking, customs clearance, inventory updates, manufacturing and MRP, remittances and banking (all separate functions and systems) would all be to some extent interconnected.

It is something completely different to suggest that savings of anything of this order will result from computerisation, even on an EDI basis, of only one single function of trade - customs clearance. The logic for the claims of benefits in relation to computerised customs clearance appear to be based on either of two premises. Firstly, they would suggest that this function would be completely eliminated

allowing exporters and importers to cut out the middle-man or the agent and perform this function directly. The alternative premise to this is that as a result of customs automation, the workload would be greatly reduced and the companies carrying out this function, Forwarders, Customs Clearance Agents, Shipping and general transport companies, to invest in the necessary hardware and systems and make these efficiencies and economies which they could then pass on to the trade.

Each of these premises have a basis but they require further examination to establish their feasibility. The saving of £60m a year results from a calculation of the average customs clearance charge of £30, for each of 2 million annual import and export shipments, achieved either through the elimination of the middle-man or through cost reduction as a result of automation. The issues are to evaluate if the first is possible from a structural and business practise point of view and, secondly, that the efficiency factor has been designed into the system and can be delivered as claimed. It is important also to examine other reasons for Customs automation, apart from benefits to trade.

Customs clearance has been traditionally an expert service supplied by small specialist companies in one location. Many trading companies employ their own inhouse specialists but the great majority find it more economic to use supplied services at the point of import (or export) being used for the particular shipment. Companies increasingly require other specialised transport services, apart from customs clearance, such as pickup/delivery, expert knowledge of shipping rates, import requirements in other countries, insurance, hazardous goods requirements etc. These are supplied by Forwarders. Trading companies now tend to appoint a single forwarder to handle all their ship-

ments in all locations.

Due to factors already mentioned, viz competition between Forwarders and also the threat to their business from the 'Door-to-Door' operators, who market an all-in price for pickup, export and import customs clearance and delivery, the importance of revenue from customs clearance has become decreasingly important. In many cases, Forwarders do not separately charge for this service and all progressive freight companies aware of the elimination of customs for 83% of goods after 1993, are replacing clearance revenue in their budgets.

EDI, as shown, has the potential to eliminate the middleman but it is clear in this instance that business will not generally take on the role of customs clearance for other reasons that even with DTI, Customs Clearance is only one of the many transport services required. Even if it were to do so, the benefit would not be of the order suggested. As regards the efficiency measures, it would be difficult, if not impossible, to assess any cost improvement benefits from the automation of the trade aspects in advance of details on how the new system and procedures would work.

Advance information was available on the Customs system but not on the trade access or DTI at the time of the decision to approve AEP. In the event, the trade now argues that due to the very slow response time, 1-4 minutes from transmission to response, office inefficiencies rather than economies can arise. Efficiencies have also to be calculated against capital and running costs and these also were not known at the decision time. Information on the nature of the access or interface to AEP and the costs involved only became known in October 1990, and these have a lifespan of two

years for 83% of the transactions in which they can be recouped.

It is clear, therefore, that the AEP system may have been proposed on trade grounds but that this could not have been its sole or main justification (or if it was, the basis was incomplete). It is understood that the proposal was considered by the high level Sectoral Committee on Costs, an inter departmental and social partners grouping (part of the then National Understanding), examining costs in the public service sector, chaired by the Secretary of the Dept of the Taoiseach and was thought to be beneficial and referred to the Revenue Commissioners and the Dept of Finance.

Apart from the representations of the CII, other trade interests which sought a solution to the problems by trade procedures and delays, were Dublin Port and Docks Board who felt that Customs delays were a major factor in the loss of trade to Larne and other northern ports. Aer Rianta, the Airports Authority, were similarly concerned about loss of business at Dublin Airport and many other port and harbour authorities around the country. The Irish Chambers of Commerce were active with the Dublin Chamber in the forefront of the campaign, as well as many individual transport, trading and manufacturing companies. In retrospect, these groups had a genuine business interest but can be considered to be in the background of the activity as compared to the frontline expertise of the transport companies. They had no common idea of what they were looking for and many had no detailed knowledge of either transport or computerisation, except they were honestly seeking a solution 'as other countries have'.

The Customs authorities have consistently stated their requirements from AEP and these were all to meet internal needs. The prime justification was modernisation and increased staff productivity where the volume of SADs was growing rapidly and staff numbers decreasing due to personnel cutbacks. The Revenue Commissioners had to get approval from the Dept of Finance for AEP and it would be standard practise that all such capital expenditure would have to be cost justified on a firm 'bottom line' basis showing real actual savings which could then be removed from annual budgets, rather than any 'useful to have' benefits for trade in general.

Customs cannot be accused of making large claims of savings in the trade areas. One claim that they have made is that there would be a saving of time by Agents and others as the need to be present to lodge SADs in Customs offices would not be necessary. The AEP system design did not incorporate any trade functions. It was an internal entry processing system only and did not have functions available in some countries such as inventory control of warehouses and transit sheds, pre-arrival tracking, control and marshalling of dockside truck areas. These were in fact the facilities that many of the background interest groups were seeking. What Customs needed was a DTI (or EDI) link to Trade as it would not be possible for them to input the SAD data, their plan requires 80% DTI and 20% CI (Customs Input).

It is now clear that there was a major discrepancy between the expectations of trade and what the AEP system actually provides. Why this should be may be attributed to many reasons, one perhaps was a lack of understanding of a highly technological subject which the people involved did not feel comfortable with and

preferred to leave it to the 'experts'. There may also have been a feeling that approval of the system was the achievement and the background trade interests then withdrew and left the matter to the frontline trade interests, viz Customs clearance agents, Forwarders, carriers. These were the firms who would be making the investment and as businesses they would establish the reality of the cost/benefit for them.

4.13.7 DIRECT TRADER INPUT

Direct Trader Input (DTI) is the term for the electronic transfer of the Single Administrative Document (SAD) data directly from a traders system to Customs using EDI techniques thus saving Customs staff the workload and time involved. In this way, records on a Customs system, such as AEP, are created automatically and the pre-programmed surveillance control and release routines can commence processing immediately. This concept has long been in operation in the UK and other countries. It goes without saying that Customs need the full cooperation of the trade to get such a system agreed and there should be economic and service benefits for the trade as a 'quid pro quo'. Customs outlined their internal AEP plans in March 1989¹⁴³ but the only information provided on DTI was that the Dept of Finance had decided that this function would be handled by a commercial managed network providing the sole connection to Customs and operating independently of Customs.

It emerged that the Revenue Commissioners and the Dept of Finance were acting on the recommendations of a report by business consultants, Arthur Andersen, which was accepted by the Government through the Finance department. The contents of this report have never been made public but it has since been the sole justi-

fication of the approach taken. The charging recommendation appears to be that the trade would be willing to pay for a DTI service, and the network provided would be the national EDI service, which would be financially viable.

It appears that the consultants were influenced by earlier events where proposals from a variety of interested computer service companies promised to implement a national trade system for Customs, Ports and Airports, free of charge to the State but at a high transaction cost to users. These were initiated by the giant General Motors sister company, Electronic Data Systems (EDS) who offered the Government a total national trade system for £5 per Customs entry, payable by the trade. This was followed by a combine of IBM Ireland, Dublin Port, Aer Rianta and other interests. An Irish company, ICIS, came into existence to make a rather similar proposal as did ICL Ireland with the UK firm, Community Network Services (CNS), a company operating a community system in Southampton.

Customs issued a Request for Proposal for a managed network to feed AEP in September 1988 to a restricted number of suppliers. There was no decision and it became known that the Minister for Finance had changed the rules and in January 1990 an announcement was made that none of the applicant companies were successful but that a consortium of three companies, Telecom Eireann, An Post and ICIS were being asked to implement a national network from 1 June 1991.

In the event, the three companies were unable to establish a 'modus vivendi' and after several months the Minister had to announce the withdrawal of ICIS and the consortium was reduced to the two State companies with an Executive Chairman from An Post. This new

company was brought together with personnel from its parents during the Summer of 1990 and in September it was launched with the name, INET. It still maintained that the national and the Customs AEP system would be ready for January 1991. This did not prove possible but it did succeed in getting it into operation in April 1991 and uptake of the system grew very slowly into the Summer of 1991.

INET started life very controversially. Its attitude to the trade was considered to be very inflexible and un-commercial, much of a 'take it or leave it' approach. It also made claims that it was to be the sole national EDI X400 platform. This upset the existing value added networks, including the subsidiaries of its own parents, EIRTRADE and PostGEM. This claim was contrary to EC law and subsequently had to be dropped, as also were statements that other operators were unlicensed under the 1983 Act. This statement was also made about CCS Ltd, ICARUS service, which was identified as a competitor in the freight area and was refused access to INET for its members Customs traffic. There is general interest to see how INET will adapt to the post-1992 Customs situation and if they can replace the monopoly traffic with new commercial business.

CHAPTER 5

FACTORS INFLUENCING GROWTH

5.1 OVERVIEW OF GROWTH POTENTIAL

EDI presents just one aspect of the global electronic communications revolution. It has, however, a key role which is essential to the international trade sector and this is assuming a greater importance in world economics as the 21st century approaches. The growth and future direction of EDI will, therefore, be bound up inextricably with the international dimension and the efforts that can be brought forward towards equalising the technical difficulties, the standards problems, and the general business practise issues, all areas that will ease its implementation and make it compatible and acceptable to the widest range of companies, organisations and countries.

The factors which will impact on these areas on the technical aspects will relate to the international connectivity of Value Added Networks with each other and with all the other players such as the national PTTs, Community Systems, and large multi-national corporations. On the standards aspects, their merging and migration will be governed by national governments

and international bodies such as the United Nations, the International Standards Organisation and supra-government organisations such as the European Community and to a lesser extent, EFTA and COMECON. The business issues will evolve naturally through use of the basic infrastructural framework put in place at the network, technical interface and the standards levels.

Other factors which will positively influence the development of EDI as we now know it will be new inventions or technical breakthroughs permitting functions which were previously impossible, to be performed. There will also be greater experience with the technology and its implementation and use will become simplified. There will be integration of EDI technology with other leading edge technologies providing a much enhanced range of new solutions and products.

There will be negative factors as well as positive factors which will impact on growth. The main areas, other than technical issues (which are usually more readily soluble) will be in human areas such as the legal considerations, security requirements (as they are perceived) and the behavioral and organisational factors. These issues may now appear as inhibitors or negative factors but once there are acceptable solutions, they will convert those business managers, who are very interested but concerned, into EDI missionaries. All surveys, including the Irish survey included here, have shown, however, that the issue of greatest concern and importance is that of standards.

5.2 IMPORTANCE OF INTERNATIONAL STANDARDS

The attempt to plot the future success of international standards and see where they are going, particularly UN EDIFACT, it is useful to first look back and put into summary where existing standards have come from. This is especially important as far as the US is concerned as it is the world leader, and many of the standards have emerged from there and it is now a critical area where there may be stiff resistance to the general acceptance of EDIFACT as the one true international standard.

5.2.1 EVOLUTION OF STANDARDS

In the section dealing with the US (3.3.1) and the American Hospital Supply Co case study, it has been shown that EDI activity of a proprietary nature can be well documented back to the mid 1960s. The progression in standards in both the US and the UK is worth noting. Firstly, in the US, it can be shown that most EDI implementations based on an agreed or broadly accepted standard fell into the period, post the Arthur D Little study and the earlier development of the UCS, Universal Communication Standards. Another important stage was the development of the Transportation Data Coordinating Committee (TDCC) message format syntax which in turn played a major part in the development of the ANSI (American National Standards Institute) standard, ANSI X12.

Ralph W Notto, who was the systems consultant to TDCC from 1975-1984 and who is now President of EDI Inc, has written an article 'EDI Standards - A Historical Perspective' ¹⁴⁴in which he summarises the evolution as follows:

Six very significant events in the history of EDI from the North America perspective are:

- 1) The development and publication of the first set of EDI standards (1974-1975).
- 2) The definition of the technology for the processing EDI transmissions (1977-1982).
- 3) The A D Little study for the feasibility of electronic data interchange in the grocery industry and the resultant grocery industry standard and pilot project (1977-1982).
- 4) The involvement of the American National Standards Institute (ANSI) and the development of the X12 generic EDI standards (1978-1988).
- 5) The formation of the Joint EDI (JEDI) Committee and the broad agreement reached for revision of the EDI standard data element dictionary (1983-1984).
- 6) The intercontinental coordination of EDI standards (1985-1989).

These events can be traced on the following diagram showing the timeframe of the main developments.

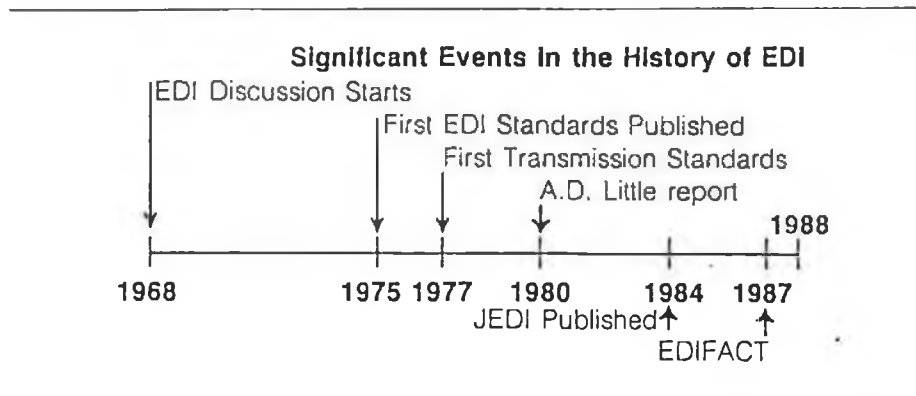


Fig. 21 Significant Events in The History of EDI (US)
(Source: EDI Forum)

In the case of the United Kingdom, as previously shown, standards evolved independently from those first developed to meet the needs of the LACES Project (section 1.3.4) which helped in the creation of many of the basic data elements and the syntax, which in turn became the basis for much of the later standards development work.

The development work to create a national standard for the UK to avoid the plethora of proprietary and industry specific standards, was undertaken by the Article Numbering Association (ANA) in 1980. The ANA was a suitable body for this, in the absence of any official body, as its prime function was to implement the bar-coding systems of the International Article Numbering Association (EAN), which are mainly in the wholesale, retail and distributive industries, many of whom were ideal targets for EDI. A working group was established to define a single set of standards for the main business functions and the project was called TRADACOMS (TRADING DATA COMMUNICATIONS) and which became the name of the subsequent standard issued.

TRADACOMS standards were published in November 1982 as a manual entitled 'Trading Data Communications: Standards for Trading Data Exchange'. The syntax took into account other developments and in particular the UNTDI (UN Trade Data Interchange) rules and there are similarities but in structure only. The real success of TRADACOMS made it the UK de facto national standard and it quickly proved itself as a practical and efficient solution. It was adopted, of course, by the ANA but also by many UK industries and most importantly by the INS TRADANET network, by far the largest VAN in Britain.

With the gradual emergence of UN EDIFACT later in the 1980s, and their adoption by the second largest VAN, Istel (but not exclusively) and by organisations such as SITPRO which is a semi-official body as part of the UK Board of Trade (Dept of Trade and Industry), there emerged a classic confrontation between the emerging international UN standard, now also very actively supported by the European Commission (EC) and a tried and trusted 'Made in Britain' standard. This led to a very interesting and objective debate argued in public at conferences and in the trade press with conviction and strong support on both sides between the two interest groups. These were led by SITPRO, represented by Ray Walker their Chief Executive, now the UN EDIFACT Rapporteur and Tom McGuffog, Chairman of the TRADACOMS committee of ANA.

The debate did not result in victory for either party which is understandable because of the commitment on both sides but to a classic British compromise which emerged after a meeting between the two main protagonists. The solution was primarily pragmatic but it had also a strategic purpose. TRADACOMS would continue as the national UK standard for domestic trade and UN

EDIFACT would become the standard for international trade. While for many companies involved in both domestic and export markets, there will be an additional overhead to maintain two or more standards, the outcome does recognise the existing investment in a mature and widespread solution while at the same time facing towards the emerging world standard which is still in the design stage and is not yet a working proposition.

5.2.2 CONVERGENCE OF INTERNATIONAL STANDARDS

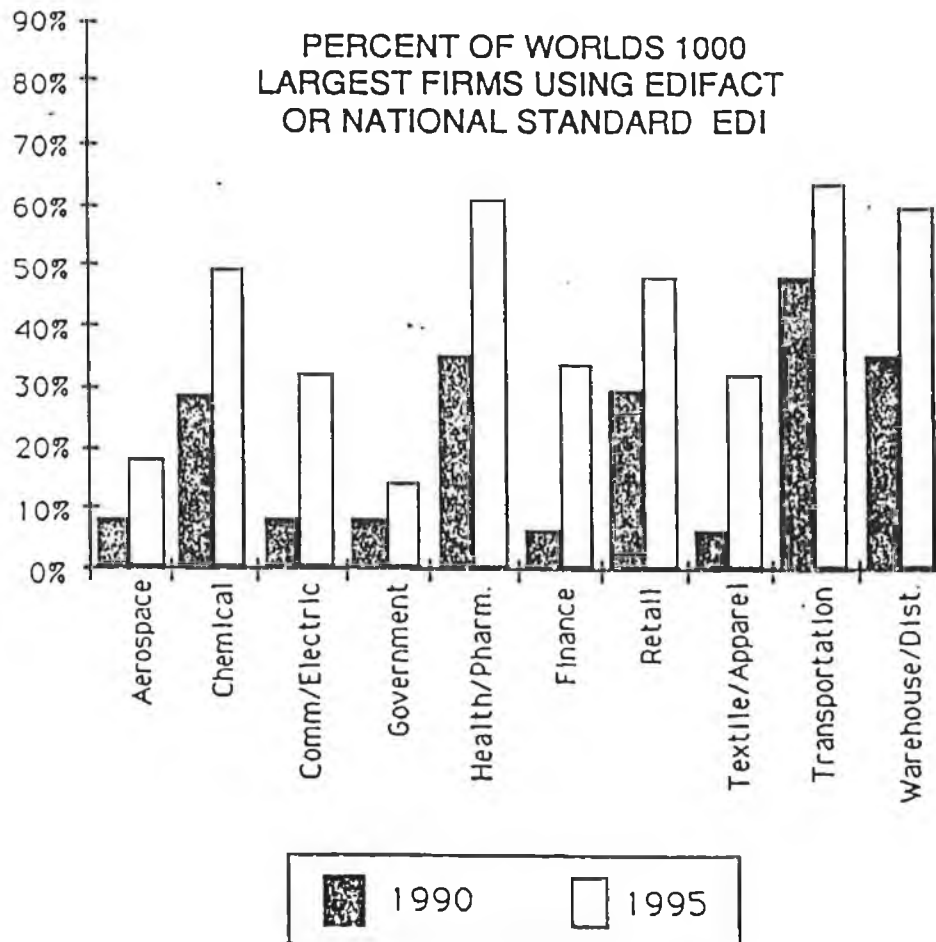
In looking at the future, one has to either accept or reject the proposition that EDIFACT will emerge as the internationally accepted standard. With the growing trends towards standardisation in many products, one language or standard, whether EDIFACT or another, appears inevitable. All the available evidence strongly suggests that this will be EDIFACT. The question really is when will EDIFACT reach a level of critical mass throughout the business world.

This raises two specific questions, firstly to the UN Standards setting body itself, how quickly will working messages for the specific business functions be delivered to users? and, secondly, at what point will the major corporations in the chief trading countries such as the US, UK, Germany, Japan, France etc where there are other standards both national and proprietary, already imbedded into business practise, commit at the level of the business unit, rather than at the national standards setting body level, to implement and use EDIFACT as their working standard. As in the UK and the US, many other countries will continue to use their own national standards for their domestic trade and EDIFACT for overseas business.

Gartner Group Inc, Stamford, Connecticut¹⁴⁵, the well established research centre, have carried out detailed studies on this subject. They believe that national and other standards will remain in operation well into the mid 1990s. According to Gartner, "Over the next five years, no large multinational will be able to adopt only one EDI standard for its operations. Companies must plan to support at least four major types of EDI standards simultaneously. In addition, multiple versions of specific documents, syntaxes and data dictionaries must be supported, as well as at least one previous release of each".

The following diagram from Gartner Group gives their percentage growth figure between 1990 and 1995 for the Fortune 1,000, the worlds largest companies, to convert their proprietary systems to UN EDIFACT or national standards EDI:

Penetration of Standards-Based EDI Will Increase Significantly as Companies Convert Proprietary Systems.



Source: Gartner Group

Fig. 22 Use of Standards Type by Fortune 1000 Firms 1990 and 1995 (Source: Gartner)

It may appear confusing that in many countries and businesses that statements have been made that EDIFACT is the current or committed standard. As there are still only the Invoice and Purchase Order as full United National Standard Messages (UNSMs) approved through the EDIFACT process, all other messages claiming to be EDIFACT are in fact sub-sets or derivatives

based on the EDIFACT rules. There is every likelihood that as the delays mount waiting for new messages to be approved, business will continue to develop the messages required which look similar and use the same structure and syntax but are not fully compatible. This will create a sub-culture of messages which are almost but not quite at UN standard level and which will have to be restructured and brought into line later.

The UN process for message development is discussed in the next section but it must be said that after a very successful start and with the two messages getting rapid approval, the whole process has now seriously slowed down. This is leading to concern that there could be underlying problems and that the slowness is not alone holding back EDIFACT but is also holding back the development of EDI itself. The official reason provided by the UN EDIFACT Board is that new quality control processes and a new data dictionary to align all messages have been introduced.

It must be assumed that these are temporary delays of a technical nature and that these delays will be overcome at which time world uptake of the full standard messages will resume. The speed at which there will be integration between EDIFACT and all other standards, is impossible to accurately predict at this point in time. It will be governed by the 'critical mass' factor i.e. EDIFACT will continue to grow gradually but exponentially up to a point where companies perceive that the majority of businesses or at least the majority of firms that they relate to, have taken it up. At that point, new companies are likely to cease starting with older standards and businesses using other standards are likely to migrate gradually to EDIFACT.

This progression is also demonstrated by the following diagram which shows the Gartner Groups convergence throughout the world:

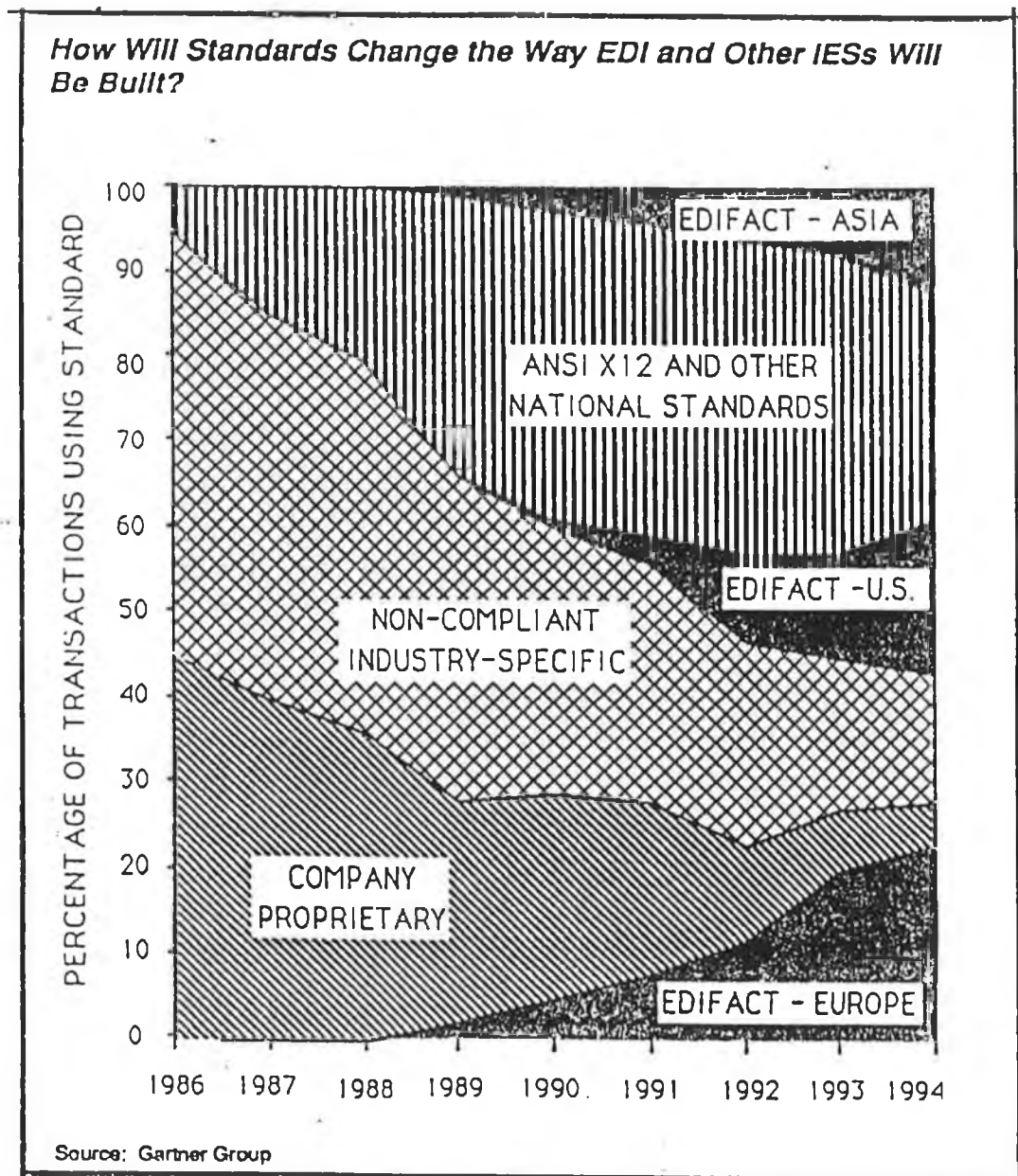


Fig. 23 Convergence of Standards 1986-1994 (Gartner Group)

5.3 ROLE OF UNITED NATIONS

The greatest acknowledgment that EDI is of major international significance and a business issue of world economic importance, is that it has been recognised as such by the United Nations. The UN has set up structures to encourage its growth and provide internationally acceptable standards to increase the value of its implementation.

The UN interest stems from the United Nations-Economic Commission for Europe (UN-ECE) based in Geneva. (It should be noted that this is a full UN body and not specifically European). UN EDIFACT is the result of long and patient discussions between its Working Party on Facilitation of International Trade sponsored by the United Nations Conference on Trade and Development (UNCTAD), and the many other parties, governments, standards bodies, community systems, industry groups etc involved. The work of this group dates back to the early 1960s when it developed the United Nations Layout Key for Trade Documents, which was a standard layout for trade documents such as the invoice designed to make them amenable for inhouse computerisation.

According to its terms of reference,¹⁴⁶ the Committee, "shall facilitate international trade and transport by promoting rationalisation of trade procedures and the effective use for this purpose of electronic or other automatic data processing and transmission". After its early success with paper procedures the Working Party turned its attention to 'paperless trading' which could be achieved through telematics, i.e. the computerisation of trade data and its electronic transmission. The Working Party set up groups of experts (G.E.) to make recommendations, first on the areas of Rationalisation of Data Elements (G.E.1) and, secondly

on Automatic Data Processing and Coding (G.E.2).

In 1975, all the diverse groups came together in Stockholm to set out basic principles and start defining the requirements for trade data interchange. This was facilitated by proposals drawn up the previous year by the UK delegation. In 1978, drawing together work carried out in several countries and many organisations significant progress was reported in the Data Elements study and a set of data interchange rules were decided. This led to the publication in 1981 of the 'Guidelines for Trade Data Interchange' (GTDI), also known as UN/ECE TDI. It was like the US ANSI X12 a flexible or variable format standard. This was a significant improvement on the earlier fixed format proprietary standards as they are more efficient from a transmission point of view, the variable format transmits only the actual data, while the fixed formats transmit all fields, whether containing data or not.

In September 1985, the European standard was revised taking into account actual UK experience, as well as new French proposals and the European Commission (EC) who were now active players were keen to have the new UN/ECE TDI standard brought to the International Standards Organisation (ISO) for approval. The UN ECE decided to first see if it would be possible to combine with the North American ANSI standards to establish the goal of a universal standard. This initiative was agreed to by ANSI and an ad hoc group set up and called UN-JEDI. It consisted of teams from both ANSI led by Dennis McGinnis and Europe led by Ray Walker and was commissioned by the UN/ECE Working Party 4 Committee. To the surprise of many the work was successful after meetings in New York in November 1985 and in London in March 1986 a new set of recommendations for Electronic Data Interchange for Administration, Commerce and

Transport (EDIFACT) were agreed.

These were approved by the UN/ECE in September 1986 and became UN/EDIFACT. They were then transmitted to the ISO where they were published as an International Standard in July 1988 under its reference ISO 9735. These are the UN/EDIFACT syntax rules, the Trade Data Elements Directory (TDED) was already an international standard, ISO 7372. The UN/ECE at its forty-third session in April 1988 adopted Decision 1 (43) outlining its policy on UN/EDIFACT. This decision is shown at Appendix B. The follow on work of EDIFACT message development is described in the next section as the TEDIS body of the EC became the official secretariat of the Western European Board of UN/EDIFACT.

5.4 EUROPEAN COMMUNITY (EC) POLICY

Since 1986, the Commission of the European Communities (CEC) has been actively involved in the efforts of the UN/ECE to bring into alignment the diverging international EDI standards and it has more recently become very active in the development of the new EDIFACT messages working with the UN and the other bodies. In 1988, CEC set up the TEDIS (Trade EDI Systems) group within the appropriate department, DG X111, Telecommunications. It was agreed that it would provide the secretariat for the Western European EDIFACT Board. The European Committee for Standardisation (CEN) has granted the W/E EDIFACT Board the status of 'Associated Body', thus giving it authority in the field of EDI standardisation in Europe and recognising its competence.

The UN has appointed three rapporteurs to ensure worldwide coordination of message development. They are Ray Walker for W/Europe, Nicole Willenz for North America and Eugene Danikiewicz for Eastern Europe. A new Board and rapporteur has been agreed for Japan/Singapore and a fifth is likely for Australia and New Zealand. Their role is to establish consultative machinery, provide technical support on syntax, data elements, segments and guidelines and to coordinate all this with the UN/ECE Working Party 4 secretariat in Geneva for its Trade Facilitation activities.

The Western European Board covers the EC and the EFTA countries. The Rapporteur is responsible to the Board itself which includes both EC and EFTA representatives, individual countries, CEN and the main industry groups. He acts as Chairman of the Steering Committee and he is supported by expert groups, Technical Assessment, Maintenance Advisory, as well as Awareness and Documentation functions. The main work is carried out by the Message Development (MD) groups which consist of Trade (MD1), Transport (MD2), Customs and Procedures (MD3), Finance and Banking (MD4), Special Projects, Tourism and Construction (MD5), Statistics (MD6). The organisation of the Board is as follows:

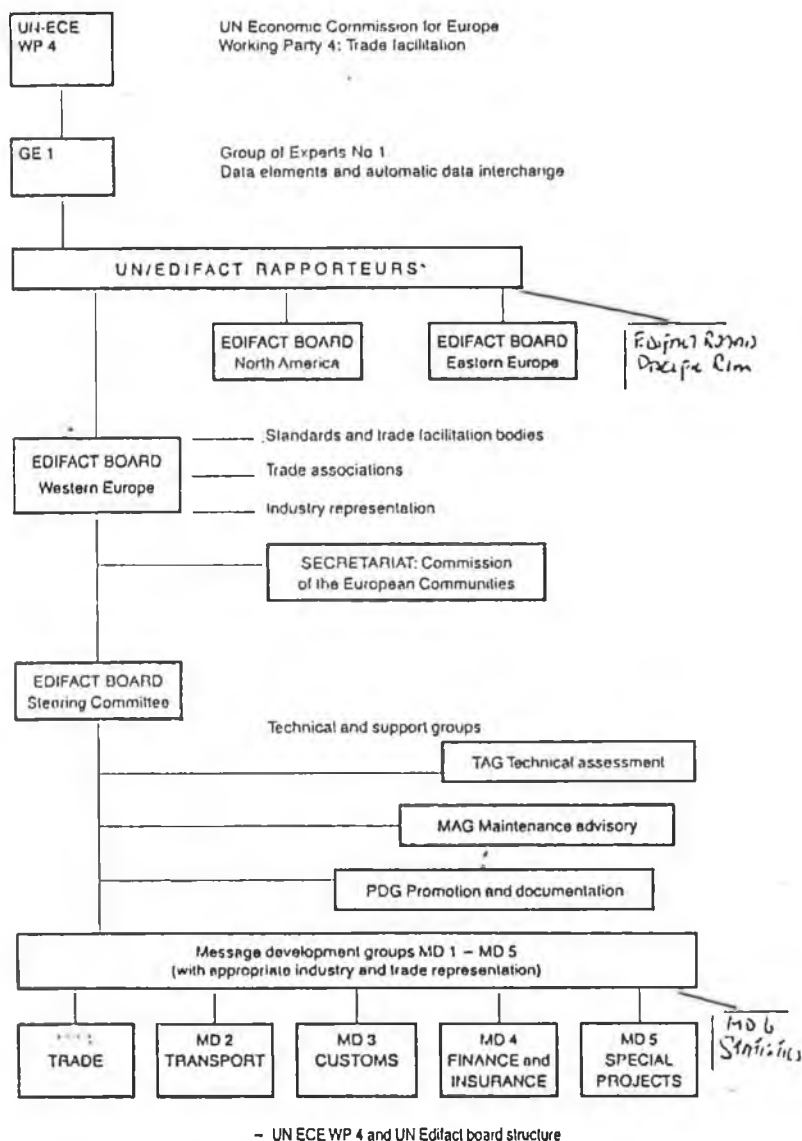


Fig. 24 Western European EDIFACT Board, Organisation (CEC)

Two messages, the Invoice and Purchase Order, have since 1989 received the full EDIFACT message approval. Some 50 other messages are in varying stages of development and approval. The appended chart gives their position. The UN process consists of four stages or status, O, P, 1, and 2. Status 'O' indicates a message under development. Status 'P' is when the rapporteurs teams are all in agreement and submitted to the UN/ECE. Status '1' is when the UN/ECE decides to have the message put into trial use. Finally, Status '2' is

when the message gets full UN/ECE approval as a UNSM (UN Standard Message). Current lists of UN/EDIFACT Standard Messages (UN SMS), approved or under development, are included in Appendix D.

In addition to the message development work, the CEC provides many other support activities and facilities. One such facility is CEBIS, Commission EDIFACT Board Information System, which is a database information system developed by TEDIS to assist the Message Development Groups and the MAG and TAG groups and correlates all the work being separately carried out and has the facility to measure the effect of changes to one or other messages. It is planned to make message information from CEBIS available to public users via X25 access.

The TEDIS activities of the CEC are also coordinated with the work of the Simplification of Trade Procedures (COMPROS) bodies in the member countries and EFTA, such as SITPRO (UK), DEUPRO (Germany), SIMPROFRANCE etc. Close working links have been established with the industry groups such as ODETTE, motor industry, CEFIC, chemicals, EDIFICE, electronics and computers and EAN-COM, European Article Numbering Association for retail and distribution, RINET, re-insurance. In addition, TEDIS is also working with other background groups in a number of other industry sectors - Medical, Iron and Steel, Furniture, Image Processing. Transport is a key area of interest but does not have an umbrella body so it is coordinated on a country by country and on modal basis.

TEDIS also provides assistance to EDI user groups on network facilities and telecommunications. EDI does not require new networks but it does make new demands on the existing infrastructure. TEDIS acts as the user representative in the debate about telecommunications policy taking the user needs, such as the lack of capacity in international lines and passing these on to the responsible authorities. Among the problems experienced in Europe are that the ISO X25 standard protocol has not been implemented in the same way in each country and major differences in both the level and the method of charging apply in individual country PTT tariffs. Integration of EDIFACT with communications protocols and in particular X400, is an area of great interest to all users.

TEDIS is also engaged in developing appropriate security measures for EDI transmissions. A study has been carried out and an official TEDIS publication has been issued. This has been written by Dr Michael Purser, Lecturer in Trinity College, Dublin, who is also the Technical Director of Baltimore Technologies, an Irish software house specialising in hi-tech telecommunications areas. See Section 5.7, Security. A second area of general concern is that of the legal aspects of EDI and here TEDIS has also carried out a study which examined the main issues of the 'paper based laws' which require actual documents and signatures. TEDIS decided that the first step was to establish the current actual legal position on EDI throughout the EC and EFTA and the obstacles these present. This study was put out to tender and completed in 1990.

TEDIS is also responsible for the promotion of EDI and providing publicity to increase awareness of it. The TEDIS Awareness surveys which have already been referred to indicate the low level of awareness in some countries, varying from 70% in the UK and Denmark to 20% in Ireland, Greece and Portugal. The TEDIS summary of this study, as published in the Activity Report, TEDIS Programme 1988-1989¹⁴⁷ is very interesting:

The main conclusions of the report are that, while 60% of those interviewed had heard of EDI, their knowledge of it was quite limited. Some 16% of respondents had implemented EDI. There was a clear distinction between the northern European countries, which were more involved in the development of EDI and those of southern Europe. The vast majority of those interviewed wanted more documentation on the subject, preferably via national channels. The survey stresses the need for action on standards, liberalisation of telecommunications services, security and legal constraints, as well as special measures for small and medium-sized industries... The distribution and transport sectors are convinced that, over the next five years, EDI will become an essential precondition for trade with the large firms established in most European countries.

To help publicise EDI in the EC, in October 1988, a programme to select pilot EDI projects was launched and the ICARUS project in Ireland, from 63 proposals received from throughout the EC, was selected and came out on top of all the projects nominated in terms of the grant provided. There were 11 other projects selected from the wholesale, retail, paper, insurance,

chemicals, music and other sectors. The STAR programme, from 1987-1989, was very successful, at least as far as Ireland was concerned, in helping the peripheral areas of the EC to develop their telecommunications infrastructure. In January 1991, a new STAR type programme, Telematique, was announced. This programme is to concentrate on services rather than infrastructure and this is of significant importance to Ireland. Further details are provided in Section 5.9.

In departments other than DG X111 and TEDIS, there are also many EC activities furthering the development of EDI. These include:

CADDIA Programme: Cooperation in Automation of Data and Documentation for Imports/Exports and Agriculture.

CD Project : Coordinated Development Project for the EC Customs Union, representing the member Customs Administrations, also with the Customs Cooperation Council representing the independent worldwide Customs bodies, which is also based in Brussels.

Customs union is at the root and very heart of the Single Market and the Community. In the lead up to completing the internal market, much of the efforts are concentrated on the elimination of the Customs barriers. To achieve this the internal barriers have to be removed but an effective external barrier for the whole EC has to be put in place as once in Germany or Portugal, goods have also free access to the UK or Ireland. Both of these efforts require computerisation and data exchange between the authorities themselves but also with trade participants.

The other main area of EC support for EDI is in the important area of deregulation and control of monopolies, particularly as it applies to the PTT (Postal Telegraph and Telephone) companies especially where these are also the national telecommunications company and in some cases the national regulatory body. This is an area of major achievement by the EC with a series of directives dating back to 1983. The philosophy that the EC has developed to telecommunications policy was brought together in its 1987 Green Paper, 'Towards a More Dynamic Europe' entitled 'On the Development of the Common Market for Telecommunications Services and Equipment'¹⁴⁸ which formed the basis of most of the subsequent directives and regulations.

Some of the most significant policies enunciated in this Green Paper are:

- **Creating an open competitive environment for telecommunications services.**
- **Free (unrestricted) provision of value added services within and between member states on a competitive basis.**
- **Separation of regulatory and operational activities of Telecommunications Administrations particularly for licensing, type approval, interface specifications, frequency of wavebands approval.**
- **Interoperability of network and infrastructural services on a community-wide basis.**
- **Acceptance by the Telecommunications Administrations of clear obligations to interconnect with and provide access to trans-border service providers.**

The Green Paper accepted that some basic services could be retained by the PTTs as 'reserved services'. This clearly referred to voice telephone service and was further subject to review taking into account technological developments such as digitisation of the networks. It also stated that these reserved services should not be defined to provide a monopoly to the PTT or to be inconsistent with the Treaty of Rome. All services other than the basic or reserved services would be regarded as competitive services.

These provisions and others, many of which have since been implemented, have the greatest importance for the vigorous and competitive development of the Irish value added services market. There is clearly a government attitude of paternalism towards the semi-state companies in this area while Telecom Eireann are now financially strong enough to face competition, this does not apply to An Post. There is grave concern in Government circles that unless An Post is given every advantage possible in the Electronic Messaging area, then its traditional loss making postal services will ultimately make it an even greater burden on the State. As indicated also in the previous chapter, An Post will take commercial advantage of its position, if permitted, while Telecom Eireann who had a bad experience in 1989 with the EC due to the trading practises of its subsidiary, TEIS (Telecom Eireann Information Systems), have taken stock and now claim to be committed free marketeers.

5.5 EMERGENCE OF OPEN COMMUNICATIONS

As a technology based business solution, the growth of EDI will be greatly influenced and directed by removal of computer manufacturers proprietary communications standards (or more accurately, restrictions and their replacement with open standards). These have already arrived as defined standards but their uptake depends on the commitment of the manufacturers and the insistence of the users. These are based on the provision of Open Systems Interconnection (OSI) and it is worthwhile to first examine the developments in this area.

5.5.1 OPEN SYSTEMS INTERCONNECTION (OSI)

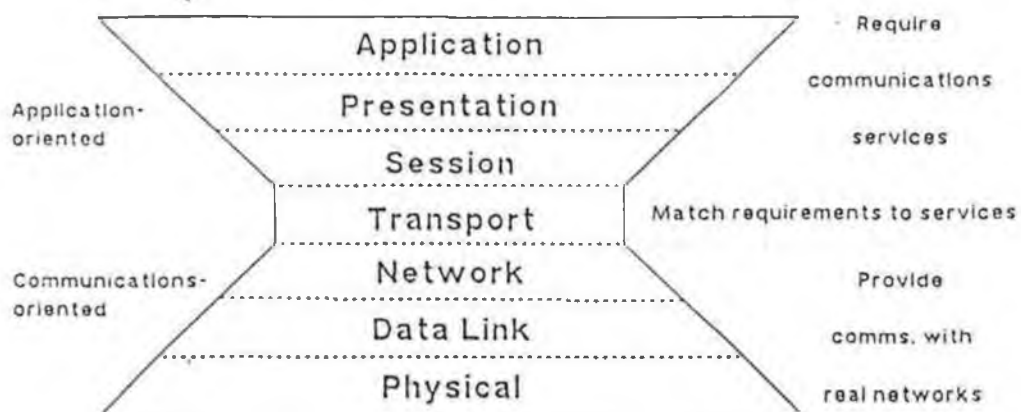
The purpose of Open Systems Interconnection (OSI) is to allow physical connection and interworking between any computer systems and making them mutually accessible using any networks, regardless of computer equipment manufacture or type. This work has been tackled by the International Standards Organisation (ISO) and it has published a number of recommendations and standards. The objective is to provide the user with (a) interoperability, (b) network independence, and (c) vendor independence. It is defined in ISO 7498.

To achieve these aims the ISO have developed their famous OSI Basic Reference Model which divides all the diverse functions involved in communications into manageable layers, each containing functions which are logically separate to the next but each of which provides services to the layer above except the highest, which is the Application layer and the lowest, which is the Physical layer and is concerned with the transfer of the 'bits and bytes', their timing and the voltage and even the plugs. Each layer, using the services of the next lowest layer, communicates with

its equivalent layer in another system.

The following is the OSI 7 Layer Basic Reference Model:

OSI Standards



The OSI 7 Layer Model

Fig 25 Open Systems Interconnection - 7 Layer Model (Source: CCITT)

Functionally, the OSI Model can be also represented as follows:

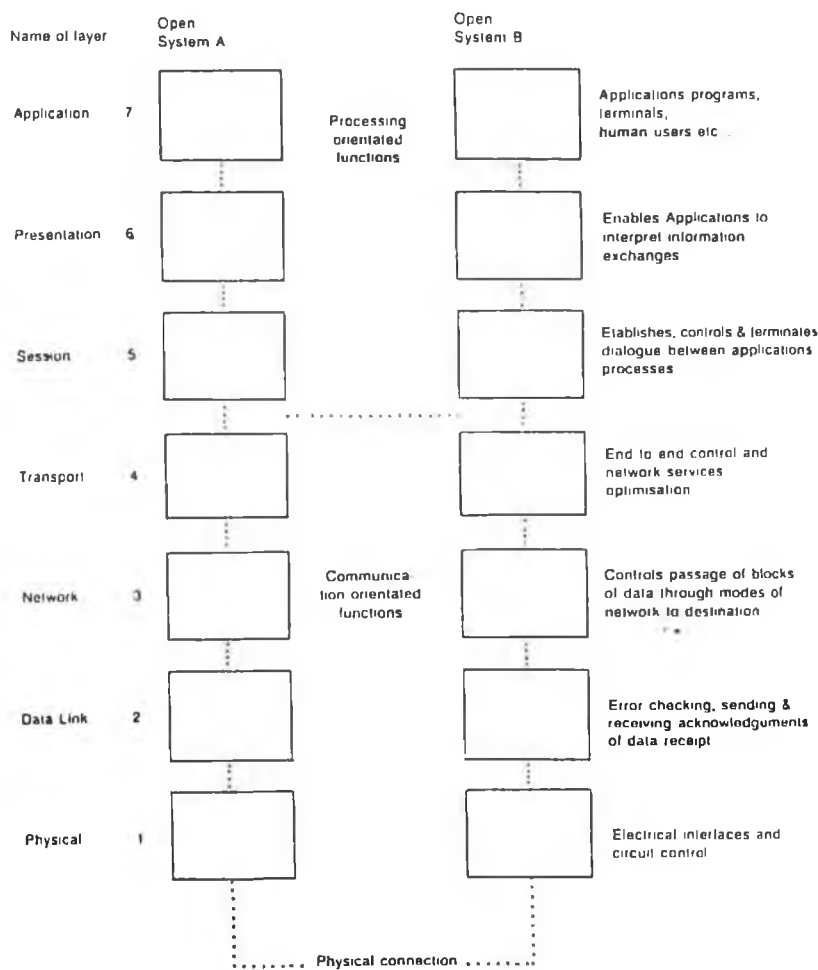


Fig 26 Functional Description of OSI Model
(Source: Blenheim)

Most of the details of OSI are technical and its scope is vast and should not be over simplified. The technical details are not relevant to this dissertation except at the Application Layer where there is another element required to allow the applications of the different systems to communicate together intelligently. This requires specific application service elements of which there are some standards specified,

such as FTAM (File Transfer and Management) which is a direct point to point connection, and X400 which is based on the 'store and forward' principle. Where there is not a suitable standard solution available, specific solutions have to be developed and these, by definition, are proprietary by nature. One of the most acceptable standards for many types of EDI is the X400 Message Handling System which will play a major part in the future of EDI, particularly for document rather than for information exchange.

5.5.2 MESSAGE HANDLING STANDARD (X400)

X400 consists of a series of recommendations from the CCITT (Consultative Committee for International Telegraph and Telephone) for message handling systems (MHS). X400 is the CCITT reference number and it is also approved by the ISO as an international standard and is known as the Message-Oriented Text Interchange System (MOTIS).

The CCITT recommendations appear every four years and X400 first saw life in a preliminary form in 1980. It was defined in 1984 and greatly enhanced in 1988 at which time a Message Store was added. It will not be complete until 1992. It was not intended as an EDI facilitator, rather it was designed for Electronic Mail and other inter-personal and inter-organisation messages, files and data. The basic principle is that messages or data can be transmitted by the originator and held within the message handling system until the recipient is ready to receive it. Neither party has to be in touch with the other or interact directly, or to establish 'handshaking sessions' at the time of the transmissions.

The great value of X400 is that it provides a vendor independent, guaranteed delivery on an end-to-end basis of messages in a seamless fashion which, up to now, has been one of the great technical difficulties in implementing standard EDI solutions. Nick Pope writing in 'EDI Technology'¹⁴⁹ describes some of the other features of X400:

- To reliably transfer data without loss or corruption.
- To hold EDI messages until the recipient is ready to receive them.
- To interwork with separately managed message handling systems.

All these facilities are available in the currently specified standards. There are a number of other features planned and commonly known and while these are not yet fully defined in the standard, some vendors are developing them. These are:

- To exchange messages securely, independent of threats to intermediate message handling systems.
- To selectively retrieve messages based on attributes of the EDI data (e.g. retrieve a message from a given source or of a given type).
- To maintain an audit record of all EDI messages submitted and received.
- To acknowledge receipt of data and clearly identify where responsibility for handling a message lies.

- To pass (i.e. forward) on to a designated recipient EDI messages for further processing.
- To bind other types of data to EDI messages to be transferred as a unit.

These facilities represent a major technical breakthrough in terms of the ease of EDI implementation. The old problem of course remains that these facilities are useless if only implemented on a unilateral basis so they will not be fully exploited until there is a level of critical mass. There are many indications that the network companies have provided facilities and that X400 will be taken up by multinationals for their internal and external EDI and by other large companies. It is also encouraged by State organisations and is seen together with UN EDIFACT as being the standard OSI solution for EDI.

It must be pointed out that there are a number of inadequacies with the argument that X400 is the full and final solution for EDI. Firstly, it provides only a very slow response time. In some applications this can vary from over one minute to five minutes and the standard times can be even greater with three levels of message priority defined. This means it is not suitable for conversational messages of an interactive nature.

The second area where it is currently inadequate is that it does not yet have a global addressing system which would make it a totally seamless, and transparent to the user, international messaging solution, such as the international standard dialling numbers as used in the telephone system. This has to be the objective but this will only be delivered after the definition of the X500 standard which is expected to contain an interna-

tional addressing structure.

5.6 INDUSTRY SECTORAL DEVELOPMENTS

As with most areas of economic activities, real progress only is achieved when business concludes that EDI has financial advantages and takes the new technology and standards on board for direct exploitation. This is the acid test. On this basis, EDI can already be concluded as being a success, certainly in some industrial sectors. These particular industry groups will also be the engine of much further growth both in themselves and perhaps even more importantly, as models for other industries to follow. It is not possible to review all the sectors which have developments (most business activities have already been touched by EDI), only those which have already and continue to play a major role.

5.6.1 AUTOMOTIVE INDUSTRY - ODETTE PROJECT

ODETTE (Organisation for Data Exchange by TeleTransmission in Europe), was established in 1984 by the European automotive industry to improve communications and encourage EDI between vehicle manufacturers and their suppliers. ODETTE works through national bodies, representing both manufacturers and suppliers, three of whom as delegates represent their countries on the Plenary Committee which is the decision making body with its own secretariat and is supported by eight working groups.

The countries represented are Belgium, France, Italy, Netherlands, Spain, Sweden, UK and Germany. It includes such manufacturers as Fiat, Ford, General Motors, Peugeot, Renault, Rover, Volvo, Volkswagen and

suppliers such as Bosch, Lucas, Perkins Engines, Philips, SKF and many others. The project was started in the UK in 1985 between the UK manufacturers together with Austin and Vauxhall and suppliers such as Lucas but it grew quickly to include other countries.

The objective set for ODETTE was to replace the old slow, paper based procedures with a standard EDI system in line with modern requirements and to permit such concepts as 'Just in Time' and logistics in an industry consisting of many manufacturers and suppliers based in several countries and with components and assembly being drawn together for the final product. The European motor industry had suffered greatly from Japanese competition in terms of cost structure, efficiency and productivity, all of which could be significantly improved through proper use of EDI. The specific goals were to reduce leadtimes, increase manufacturing flexibility, reduce errors and delays in paperwork and produce a major improvement in manual administrative procedures.

In addition to the specific aim of introducing EDI, it was realised that this presented a window of opportunity to examine many of the established business practices to provide for greater trading efficiency through system integration internally and the whole supplier/manufacturer relationship. According to David Thomas, Chairman, ODETTE Project¹⁵⁰, at the TEDIS 1989 Conference "To complement the electronic messaging we have groups working in the area of product identification, reusable containers, customs clearance procedures and engineering data exchange (CAD CAM) again removing the possibility of clerical error and reducing the time taken for the movement of the goods and for new product development".

Other areas which are implemented are standard bar code labelling and reading systems which are automatically transmitted with the EDI message and are used for products in packages and bulked in containers and on pallets. This work has been completed in conjunction with the US Automotive Industry Action Group (AIAG) which is close to being the American equivalent of ODETTE and so it is effectively a world standard. Under examination also are such activities as financial settlements, transport, distribution and retail. There is a working group looking at the legal implications for the industry of electronic data interchange.

As UN/EDIFACT was not available at the start of the project, ODETTE had to develop its own message standards but these were based on the emerging syntax message guidelines (UN/GTDI) and general directories. As EDIFACT messages appear, ODETTE is developing industry subsets for its users. It has also developed its own File Transfer protocol, OFTP, ODETTE File Transfer Protocol. Because of its size and the broad range of its suppliers, ODETTE has been taken up by many companies outside the car industry. Indeed in many respects it is more of a standard than a sectoral group.

5.6.2 CHEMICAL INDUSTRY - CEFIC/EDI

CEFIC (European Chemical Industry Federation) is the Brussels based organisation representing all the 15 national Chemicals Federations of Western Europe, including FICI, the Irish Federation. This is an even more important grouping than ODETTE as, according to the CEC¹⁵¹, it represents over 40 major chemical companies employing two million people and accounting for about 30% world production and over 60% of world chemical exports with a turnover of 300,000 million ECUs. Some of the 21 companies now using CEFIC/EDI in 8 countries are - Akzo, BASF, Ciba-Geigy, Dow, Du Pont International, Exxon International, Hoechst, ICI, Monsanto, Shell International.

CEFIC/EDI states in its brochure¹⁵², "Back in 1987, CEFIC launched an EDI project aimed at establishing a Europe-wide system of electronic links for the transmission of structured commercial documents between chemical companies and their trading partners. Following a period of trials, the overall conclusion is that EDI is a viable way for companies to trade. It can markedly improve operating efficiency, providing better customer service"

CEFIC now has a permanent EDI secretariat which works with the company appointed members of the variously tasked working groups. These deal with, firstly, message development in trade, transport, customs and statistics. Secondly, there are groups for telecommunications, business requirements, maintenance and documentation. The documentation group has now produced a manual which has been distributed to all interested parties.

CEFIC is fully committed to UN/EDIFACT and sees its uptake as a key element in the rapid development of EDI within its own but also in allied industries. It is a member of the Western European EDIFACT Board and participates in the message design and development groups. It is supported by the CEC TEDIS group. Because of its commitment to the UN standard as the only truly international standard and that its success is vital to its multinational operations, it has published the following statement¹⁵³ from the Federation in Brussels:

Seventeen multinational chemical companies have for over two years been participating on the CEFIC/EDI Project with the aim of establishing a Europe-wide electronic data interchange environment linking the Chemical Industry and its trading partners... They have been developing and testing between themselves some EDI standard messages based on application of the universally accepted UN/EDIFACT standard.

It is the firm intention of these companies to apply progressively these standard messages in their normal commercial activity...Furthermore, the European Chemical Industry represented by CEFIC declares its full support for the UN/EDIFACT standards and its intention to adopt them as a basis of its future EDI development. CEFIC, with the participating companies, is willing to make available to interested partners information on the standards and to cooperate with them in the development of universal EDI standards.

CEFIC works closely with its US counterpart CIDX (Chemical Industry Data Exchange) and also with other European industry EDI groups such as ODETTE and EDIFICE. It has also concluded that for communications the X400 standard is the way forward and it uses the ODETTE File Transfer Protocol, OFTP.

5.6.3 ELECTRONIC INDUSTRY - EDIFICE

EDIFICE (EDI Forum for companies with Interests in Computing and Electronics) is the non-profit organisation representing 37 major companies in the European electronics sector. The Forum was formed in 1986 with participation from France, Germany, Italy, Netherlands, Sweden, Switzerland and the UK. The main aims of the Forum as stated in its Memorandum of Understanding ¹⁵⁴ are -

To act as forum, under the name EDIFICE, to support, have influence in and promote the implementation and use of international standards enabling transmission of data between partners.

EDIFICE will endeavour to ensure that the Electronics Industry will be able to take optimal advantage of EDI developments and minimise duplication in message and transmission standards.

The existence of only one standard will provide the maximum benefit for EDI users. Therefore EDIFICE will actively support and promote the development and adoption of a single global EDI standard for use by the electronics industry.

Many of the 20 leading computer manufacturers, such as IBM, DEC, Hewlett Packard, Philips, Motorola, Bull, Honeywell, Siemens etc are participating companies. Some of these are subsidiaries of major US electronic companies and all have very active trading links with the US. This clearly presents a problem due to the well established nature of the US ANSI standards in America. This also reflects the overall standards issue at a practical working level and means that more than one standard has to be supported.

It may be for this reason that EDIFICE has not come out clearly in unqualified support of UN/EDIFACT as the universal standard as has CEFIC and to a lesser extent ODETTE. However, it clearly does support EDIFACT and its message development groups are working on design guidelines, syntax and directories all based on the UN standard messages (UMSMs). It would appear that it wants a gradual transition to EDIFACT and an important aspect of this is to convince its North American parents and sister companies, as represented by its US equivalent, EIDX (Electronic Industry Data Exchange) to migrate with it. This may be deduced from a further statement from the EDIFICE memorandum:

As a result of an approved statement by EIDX, the US Electronic Industry EDI group, EDIFICE will liaise in order to mutually develop and maintain EDI guidelines based upon EDIFACT for US and European Electronics Industry.

So far EDIFICE has concentrated on the ordering function with the Purchase Order (now a UNSM), Purchase Order Response Message and Purchase Order Change Message. New messages now being developed are: Delivery/Forecast Message, Price/Sales Catalogue Message and Request for Quote and Quote Message. EDIFICE is also

examining communication transmission protocols which it recommends to its users should move in line with the OSI model, either X25 or X400 according to requirements. It is also recommending Bar Code standards and is involved with the relevant parties to protect the industry interests in related business activities such as transport, customs clearance, electronic funds transfer and it sees promotion of EDI as an important aspect in its future uptake and success.

5.6.4 RETAIL AND GENERAL INDUSTRY - EANCOM

The International Article Numbering Association EAN, whose primary role is to develop product or article numbers and bar coding standards for a very broad range of retail and wholesale goods and industries, has recognised the value of EDI, and in response to the demands of their members they have set up a project EANCOM to promulgate standards, information and expert assistance on EDI.

EAN includes all 18 European national states and worldwide has 46 countries with over 125,000 companies. This is a huge market for EDI and represents one of the best routes to the widespread use of EDI in general business. The EAN organisations, such as ANAI in Ireland (which is represented internationally by the UK organisation), have a National Numbering Organisation, backed up by a professional secretariat who are active in promoting general EAN standards. Specifically in this instance they encourage EDI pilots and trials based on their EANCOM standard which is closely related to UN/GTDI, and based on UN/EDIFACT message implementation guidelines. EANs policy is to actively support the development of EDIFACT and to encourage new users to adopt it but to only migrate existing EANCOM users to UN as they review their business strategies.

The stated policy of the EAN Working Party on Communications (EANCOM) on standards¹⁵⁵ is: "Development of EAN subsets of the UNSMs (UN Standard Messages) for use in the international communication amongst EAN users and for use at national level in EAN member countries which decide to adopt EDIFACT as their national communication standard".

In their request to the industry body, EAN, the participating members requested a standard communications system, including telecommunications facilities to allow purchase orders, delivery orders and confirmations, invoices, product descriptions etc to be automatically transmitted between trading partners computer systems. While EAN recognises that international exchanges should be EDIFACT, each country has domestically full flexibility, and much work has at an earlier stage taken a different path. This is particularly so in the UK, where the national organisation ANA (UK) has developed its own standard, TRADACOMS, which has been very successful with some 2,000 UK companies having implemented it. As earlier pointed out, this has very important implications for Ireland, because of the subservience of the Irish body to the UK, and as TRADACOMS is the main standard of INS, which is marketed in Ireland by the Telecom Eireann subsidiary Eirtrade.

5.7 SECURITY IMPLICATIONS

As identified in section 2.7, concern about security can be an inhibiting factor in the development of EDI and it must be considered as a perceived negative factor by potential EDI users. It could, therefore, affect its uptake and growth. It is primarily a technical consideration and technical solutions are available. What is necessary to identify here are the specific issues that concern technical experts and the reports they provide to business managers.

Dr Michael Purser, Lecturer in Trinity College, Dublin and Technical Director of Baltimore Technologies Ltd, a company specialising in communications and advanced software development, is an acknowledged expert on this subject and his company has been commissioned by the CEC DGX111, TEDIS Programme, to write and produce a series of 10 Factsheets on all aspects of this issue which are due to become official CEC advisory publications on this subject.

In a lecture to the EDAI (The EDI Association of Ireland) in Dublin on 26 March 1991, Dr Purser provided an overview on security in EDI interchanges and the remainder of this section is a summary of the main points of his presentation and the CEC Factsheets. He said that information security was concerned with two main issues - a) Authenticity, and b) Confidentiality. Authenticity means that the interchange is unaltered in the correct sequence from the purported sender, delivered to its authorised destination and is not deleted. Confidentiality requires that the data is only revealed to the authorised recipients.

The threats presented to data exchanges are:

- **Leakage** : (Eavesdropping, Interception, Disclosure) through unauthorised wire-tapping, copying records etc.
- **Traffic Analysis:** unauthorised computer access to information on a companies message traffic.
- **Masquerade:** Impersonation by a user or a system to access information to which it is not entitled, often at the start or end of a legitimate transaction.
- **Replay:** A valid message may be recorded by an intruder and which when replayed under invalid conditions, are accepted.
- **Modification:** Removal or change to a message such as a financial transaction.
- **Security Level Violation:** An authorised user, once inside the target system, may be able to increase the level of his authorisation as defined in his password or access level.
- **Repudiation:** Denial of receipt of a message or performance of an act, for any reason.
- **Denial of Service:** Rejection of an authorised access and, secondly, deliberate overload of a system or network with spurious messages which could cause it to crash.

Security measures can be applied at two levels, either in the end users applications or at the network operator (or both). There are standard requirements defined (ISO 7498.2) for the communications level and UN/EDIFACT defines security at the application level. According to Purser "Technically, security threats are countered by security services which in turn rely on security mechanisms. For example, data leakage is countered by a data confidentiality service, based on encryption mechanisms; data modification is encountered by a data integrity service, based on manipulation detection checks (MDCs) or message authorisation checks (MACs)".

There are three approaches to implementing security. Firstly, the US ANSI approach which places the onus on the users. This chiefly uses a MAC which is a code appended to the message and sent to its recipient where the code is recalculated using a key. Secondly, the EDIFACT method which uses embedded encryption coding within the message itself. Thirdly, the Secure File Transfer, or the ETEBAC approach (developed by a group of French banks) which has point to point security provided by the network infrastructure with acknowledgement at both the communications and the application level.

The TEDIS Factsheet entitled 'Network & System Security Threats'¹⁵⁶ concludes:

Use of a network, particularly a public network, exposes authorised users and their traffic to new threats, and increases the exposure to existing ones - such as unauthorised access to users systems. Security services and mechanisms exist to combat these threats. The more extensive the facil-

ities offered by or via the network, the greater the variety of possible security threats. In turn, this leads to additional services being offered by the network or required from end-systems, to counter these new threats. EDI, as a network application, is not exempt from this trend. As standards such as EDIFACT develop in scope and sophistication, so EDI users exposure to security threats and their need for security services will also grow.

Security has been seen as an inhibitor affecting the growth of EDI and it is likely that this will continue for some time. Nevertheless, it is also likely that as security measures become more available and as they become a standard feature of both networks and users applications, then the often undue concern about security for EDI trading will diminish and indeed good solutions could then make it become a positive factor. It is appropriate to point out that generally a much higher level of security exists in EDI systems than in the conventional trading methods employing postal services, telephones, fax facilities and paper based transaction documents.

5.8

LEGAL CONSIDERATIONS

This issue has been discussed in section 2.7. Legal aspects have been identified in user surveys as major issues of concern to potential EDI users. As in the case of Security, this concern can be an obstacle to the growth of EDI but on the other hand, perceived progress in this area or indeed improved understanding of its implications could remove this blockage and become a plus for new users.

The law itself responds only slowly to everyday social and economic changes. Experience in general legal matters affecting computerisation is that the law lags very far behind and this will apply even more so with EDI. The concern here is to what extent this will have a negative affect on the growth of EDI. The CEC are currently examining several aspects of the problem having commissioned a basic update in the form of a report on the status of the existing legal environment in each country as it impacts on EDI. Overall, it is clear that there are perceived problems and while these may have a negative affect on EDI uptake, the difficulties are themselves soluble.

It is accepted, however, by a number of authorities including the EDIAI (EDI Association of Ireland) that there are a number of recommended approaches which can be adopted to minimise subsequent legal problems and thus ease the concerns of companies considering implementation. There is also a view that much of this concern is due to over caution on the part of those executives who fear the changeover to electronic trading and prefer the control they personally exercise through the existing manual methods. This view is supported by the fact that there have been very few, if any, incidents of cases arising from EDI transactions being referred to the courts. To the extent that there is concern, however, whether it is real or merely perceived is immaterial, it must be accepted as a negative factor affecting to some extent the growth of EDI. Law will always act as a restraining factor but it has not in the past greatly slowed the pace of technological development in related business areas.

In the real world of business, legal problems need to be addressed and if the approaches recommended overcome the undue concerns, then the issue is at least neutralised. The recommendations take a number of approaches. Firstly, at the contract level between the trading partners the use of Interchange Agreements can cover the terms or conditions of the business relationship. This should be applied to the ongoing contractual relationship but can apply as well to specific transactions. Secondly, the trader can or should have a service agreement with its Network Provider or value added service. This enhances the trading partners position if they both have agreements. Thirdly, if it is considered necessary for reasons other than the legality of the 'terms and conditions' of sale to introduce special measures, the trader may employ some of the security facilities mentioned in the previous chapter to ensure non-repudiation, guaranteed delivery, confirmation of receipt etc.

Interchange Agreements, which have already been discussed in Section 2.7 can be considered a new form of contract which addresses the EDI or electronic trading practises. Instead of an individual contract per transaction, they will have validity on an ongoing basis. They also have the advantage that they can be updated as necessary where an agreement is found to be inadequate, or where the business situation changes. In addition, some form of written procedure or manual is always required when computer systems are introduced, even internally within companies. This merely extends this to the trading partner and covers trading issues as well as technical matters. An example of the Interchange Agreement used by the UK EDI Association and being considered for Irish use, by the EDIAI on the recommendation of EIRTRADE. UNCITRAL (United Nations Commission on International Trade Law) has published a

document on legal problems arising in electronic funds transfer. The International Chamber of Commerce (ICC) has been responsible for the UNCID rules (Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission) referred to in Section 2.7. The UNCID rules are reproduced in Appendix E.

5.9 EC TELEMATIQUE PROGRAMME

Telematique is the follow up programme to the EC STAR (Special Telecommunications Aid for Regions) which is a European Regional Development Fund (ERDF) and from which £38 million will have been paid out in Ireland when the programme is completed in 1992. STAR was primarily for telecommunications infrastructure and was based on 50% funding so it financed £78 million of Irish projects, mainly Telecom Eireann work on Optic Fibre Links, Cellular Radio and a direct Microwave Link to mainland Europe. Some 16% of the total was spent on promotion of advanced telecommunications services designed to use that infrastructure.

Telematique is designed for development of services rather than infrastructure. According to the documentation supplied by Eolas, Telematique, is an EC initiative intended to provide advanced telecommunications services to improve the efficiency of the business sector. As it is intended only for peripheral areas of the EC, it can be of the greatest significance to the development of EDI, electronic trading and value added services generally in Ireland. A secondary objective is to extend the use of advanced services in the public sector but the prime target is for Small and Medium Sized Enterprises (SMEs).

The total value of the programme is 200 million ECUs and Ireland's share is expected to be 10-15% or approximately IR£10-12 million. Eolas, the Irish Standards Institute are the Project Managers for the EC and they are hoping to be able to convince the Commission that because of the quality of the Irish projects, that Ireland could become somewhat of a showcase site for the use of advanced telecommunications and that more funding should, therefore, be given to Ireland.

The type of projects which it is intended to fund are those particularly where 'additionality' can be shown. That is where projects or services, which would not otherwise be launched, can be demonstrated. Funding will be provided for hardware, software, data conversion, telecommunications costs, service promotion and staffing. The projects will have to be individually approved by the CEC but on the recommendations of Eolas. This is unlike the STAR programme where the decisions were taken by a high level committee of senior civil servants, Telecom Eireann and Eolas officials and therefore had a Government or political dimension.

Dr Ronan Breslin, Head of Information Technology at Eolas, has stated¹⁵⁷ that the basis of decisions on this occasion will be that the ventures are to be of a commercial nature. They can apply to users of services or service providers, such as networks and value added services. In the case of the first STAR programme, much of the money dedicated to services was spent on feasibility studies and non-viable hi-tech projects.

CHAPTER 6

THE WAY AHEAD

6.1 DEVELOPMENTS AND TRENDS

EDI has already demonstrated its potential as a significant business tool at the company level and as an important economic vehicle at the national policy level. There are many improvements which will be brought about in the current EDI systems at a technical, business application, awareness, legal, security and cost of implementation over the next few years. These will greatly encourage the uptake and use of EDI, particularly if there is a favourable regulatory climate and a positive and proactive attitude from Government.

Many users, however, believe that EDI is not an end in itself and that it is only yet at the very start or 'first generation' of the technique. Indeed some experts believe that it is only part of a whole new technological breakthrough in telematics, which is the integration of computing and telecommunications, which will radically change the way business is transacted (and the very patterns of living itself). These experts believe that EDI when combined with these and other technological developments will, in the first place, provide the basis of a revolutionary new approach to the way business is transacted between businesses.

These developments are based on the full computerisation of the internal processes within a company which is a position many companies have already almost achieved. The next step is the full automation of its information exchanges with its business partners, not just for specific functions such as orders, invoices etc, but the full spectrum of all interchanges, including images, graphics, design material etc with customers, suppliers, services, financial services and Government services (VAT, tax etc). These systems can be called Inter-Enterprises Systems (IES). This concept has been defined and developed by a number of business consultants and in particular by the US Consultancy, Gartner Group Inc, who specialise in this area of Information Technology and they provide the following overview of Inter-Enterprises Systems.

6.2 INTER-ENTERPRISE SYSTEMS

The Gartner Group overview of Inter-Enterprises Systems (IES) is as follows:¹⁵⁸

Designing and implementing applications which provide for automated information interchange with customers and suppliers is a major business issue and technological problem. These inter-enterprises systems (IESs) must provide competitive advantage, while being based on communications and applications standards. Over 8000 companies worldwide have implemented 'first generation' IESs using electronic data interchange (EDI), the premier technology for such systems. But EDI itself is just one technology which addresses only a small part of the overall business problem of how to strengthen and streamline customer/supplier relationships. A true

inter-enterprise system must incorporate a wide range of technologies and enable the electronic interchange of any type of information which is currently exchanged in paper form, including revisable text, graphics, images, funds transfer and sound.

To meet these business demands, there is now in existence or under development, a whole range of technological facilities which have to be harnessed to turn them into viable business products. One of the main problems is that while there is a lot of money being spent on the Research & Development for such technological developments, most of this is being spent in the laboratory on the technical and scientific elements and not enough effort is being made on prioritising the spend on the marketing side of technology, to concentrate on those solutions which business has first identified as being most urgent and most likely to be commercially viable. There is a danger that there may be too many 'hi tech' facilities chasing too few genuinely commercial business requirements.

The area of Systems Integration is at once the great challenge and the great opportunity for EDI. Systems integration will operate in two main areas. Firstly, at the company level of integrating EDI into existing business applications to get the quantum gains from exploiting the information flows. Secondly, and of greater strategic consequence, the integration together of the individual systems which are currently separate as they are based on different technologies, which are also in different computers and in different organisations. This integration is where one technology merges with another and this can produce a mutant offspring which can often be called a completely new technology or technical facility. This accelerating

pace of innovation is now a feature of the global telecommunications revolution and is likely to dominate the future of electronic trading, including EDI.

An example of this is Multimedia, which is the term used to compute, store and transmit several media such as text, graphics, sound, animation, images, voice, E-Mail and Fax. Standards for this are being developed and it will revolutionise 'again' the whole area of business and other communications.

6.2.1 INTEGRATED SUPPLY CHAIN INFORMATION SYSTEMS

One of the best potential areas of the integration of inter-company or inter-enterprise systems with EDI as an essential element is in that of logistics or supply chain management. The potential and the implications of this development have been examined by Cliona Curran, EDI Programmes Manager, Digital Equipment International, Galway, in an article in Logistics Information Management¹⁵⁹ based on her PhD entitled "Integrated Supply Chain Information Systems: The Next Phase after EDI?"

Ms Curran overviews the position as follows:

It is accepted that information is no longer a luxury element in a company but is in fact the lifeblood for Corporate Survival in the 1990s. Accurate data on market trends, profits, cash flow, performance quality and productivity will be vital for success in increasingly competitive markets. As a result, integration has become one of the main issues in manufacturing today: integration not just of internal systems but also of external trading partners, applications and processes. Trading partners will now be no

longer separate entities disconnected from the internal makeup of a particular company but an integral part of its working system.

How can this position be achieved? Curran paints this new picture by first tracing the development of EDI through its first and second phases and then plotting its future as it integrates with other technologies and techniques, as follows:

EDI: Curran argues that most companies have only reached its initial stages of electronic trading, i.e. replacing mail and telephone with electronically transmitted orders and invoices. In EDI, there are two distinct levels.

EDI - Stage 1 This is typified by use of a PC and standalone software driven with EDI to send or receive documents or messages. Where there is an inhouse application, this is not interfaced so orders etc have to be rekeyed. This is often implemented as a result of supplier/customer pressure and while there may not be major benefits, it does keep the company in business.

EDI - 1 Stage 2: This is where the front end system PC is linked to the business application permitting the direct transfer of information without rekeying. Significant system changes have to be made to have the application interpret the data but the benefits make this very worthwhile.

EDI - 11: This is where the standalone EDI system is eliminated by the integration of EDI functionality into the actual application. This requires a major enhancement to the system allowing it to directly interpret EDI data and activate and pass on this data to other

applications.

Curran argues that EDI-11 creates an environment in which all the internal business applications and systems within an organisation should be fully integrated. Many companies using EDI are moving to this stage with a few large corporations already there. This is a major development for companies but necessary to attain a high level of efficiency with business partners. It is also the basis of a move to a new phase reflecting companies mutual desire to achieve the goal of inter-company process integration. EDI-11 is the furthest companies have gone at present but to achieve the latter and meet new business demands such as 'Quick Response', flexible production and other, as yet, undefined future requirements a new system approach will be required. This is Integrated Supply Chain Information Systems (ISCIS).

Efficiency requires the integration of different technologies and techniques (e.g. EDI, E-Mail, Bar-coding) and this means that companies can no longer depend on batch processes to run their businesses. The new business requirements need online, interactive processing complimented by EDI. The concept of ISCIS is that information from one part of the supply chain can move with the minimum delay to another part of the chain. The only delays should be for changes in data formats and waiting time between processes. ISCIS complements a process-independent supply chain where information can flow unhindered through the chain rather than the traditional process-dependent supply chain.

Curran points out that ISCIS depends on three elements -

(a) Information Channel - to move the data through the supply chain but also between the applications of a company. Curran gives the examples of company networks or Ethernet-type networks.

(b) Interactive, online processing - traditional batch processing, such as waiting for the orders in the morning post before running the Order Entry System, is inadequate for a JIT environment.

(c) EDI Links: EDI linkages between companies permit the movement of the supply chain information and together with the information channel in each company provides the backbone holding all the elements together.

Curran points out that to successfully implement ISCIS, a number of system developments and business procedures will have to be implemented or changed.

- o Application to information channel links will have to be two-way and reactive.
- o Controls will have to be developed to ensure that only accurate information enters the information channel.
- o Modifying applications to recognise the relevant information or data elements.
- o Filtering the information flow at each application link.
- o Notifying an application when there is new data in the information channel.
- o Developing controls and rules for differing requirements.

This environment will also require additional skills, personnel must be more information oriented, analytical and proactive about their information requirements. Systems will become more 'rule based' and this will allow supervisors to 'manage by exception'. Decisions will be needed on the control processes and time delays, e.g. it may not be wise to change a production plan for a single order or pay every invoice immediately.

The shape of the organisation too must adjust. It will need to be flatter and wider and more dynamic to cater for the continual change. Integration must consider all the processes if they are to be truly interactive. The data processing area will need to be capable of switching from a batch to an online process. A much greater number of links to separate applications will have to be developed and maintained.

The system itself, in terms of the hardware and software will have to be more robust. It must be capable of handling continual change, adding and deleting links. Breakdowns will be much more serious (there is almost no fast effective way to revert to a manual process). Back-up facilities and contingency plans will become more important. The end users of the system should be given more scope to handle their change requirements, report production etc up to detailed programming by equipping them with end user computing tools.

To achieve all the above, companies will have to invest more in technology. This is already happening and is justified by the reduction in stockholding levels to meet fluctuating demands and replacing this with more accurate and timely information, not just only of the organisation itself but of the central supply chain.

Curran points out that security will be a major area of concern as ISCIS gains acceptance but she believes that there are adequate solutions. She concludes by arguing that a company's ability to respond quickly to market change is crucial and the role of the supply chain and its integration are of paramount importance.

6.3 **REVOLUTION IN TELECOMMUNICATIONS**

EDI is just one feature of the massive breakthrough in the technology of telecommunications. The pace of change and invention is likely to increase rather than remain constant or decline. There will be many more features, technological breakthroughs and new products. There will also be integration of existing technologies and services in ways now difficult to predict. All this is demonstrated by the actual success rate to date. The following figure produced by the CEC shows that it took telecommunications services 140 years to grow from one service - telegraphy - to about twelve at the beginning of the last quarter of the century (1975). By the year 2000, this will have at least tripled and probably quadrupled.

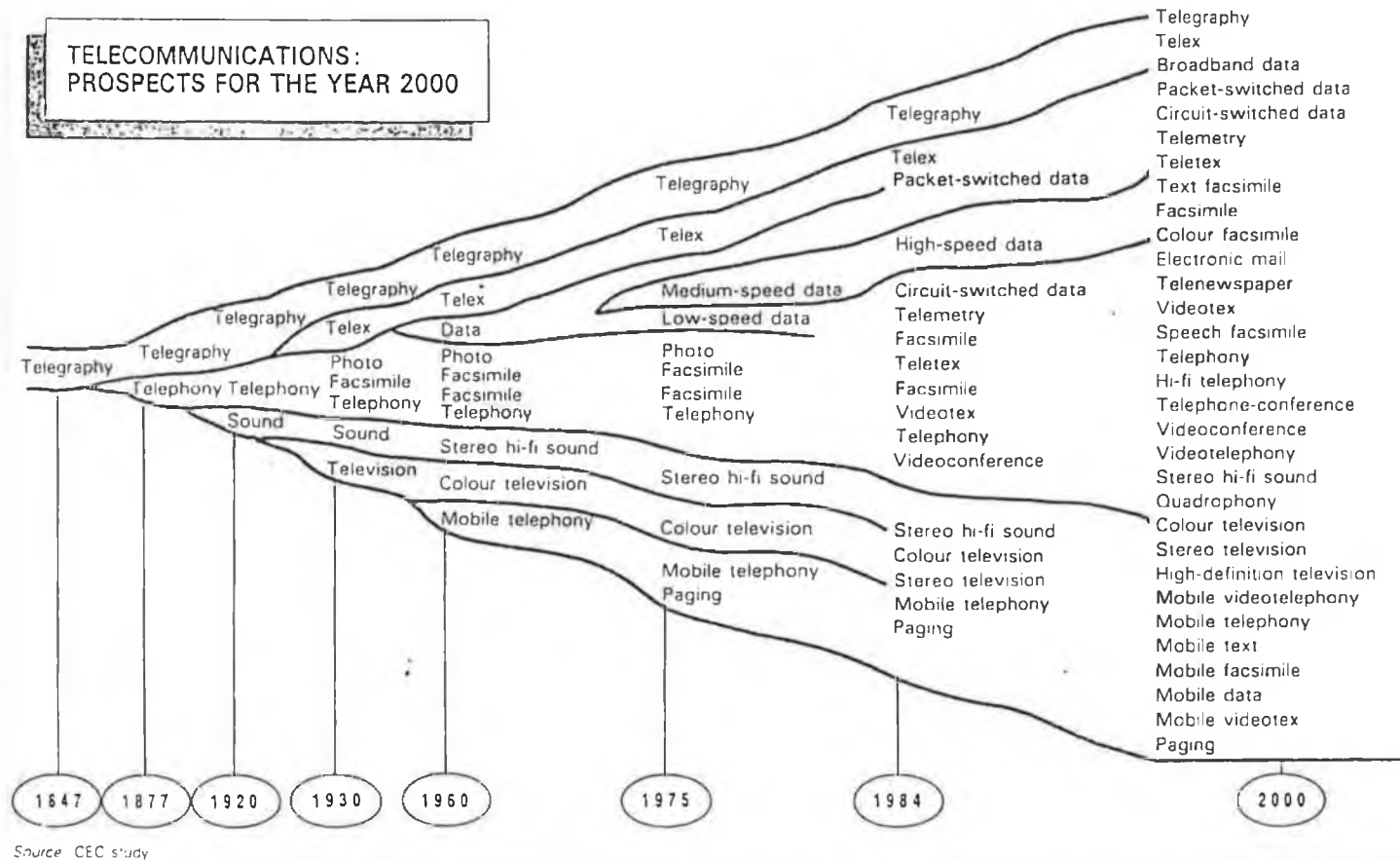


Fig. 27 Telecommunications: Prospects for the Year 2000
(Source: CEC).

The importance of this is fully understood by the CEC who have put appropriate programmes into place. It is also understood by some Irish Government authorities and major improvements have been effected in the area of telecommunications infrastructure, but there is little evidence that the correct market approach has been identified or the appropriate regulatory climate in place to achieve the right results in the critical value-added services area, which are needed to exploit this infrastructure. It is the crucial area and factor as many jobs can be created and the whole economic environment improved directly through the proper use of advanced telecommunications. In their book 'Telecommu-

nications in Europe'¹⁶⁰ Ungerer and Costello state:

The trend towards the integration of telecommunications, data processing and the audio-visual media is accelerating. It is this trend which transforms telecommunications into an all pervasive force, making it the base of a broad range of future economic, social and cultural activities.

The rapid broadening of telecommunications services into the infrastructure of a wide variety of services has given to telecommunications a new role in the economy and society. Telecommunications is developing into one of the basic inputs of our future communications-based society.

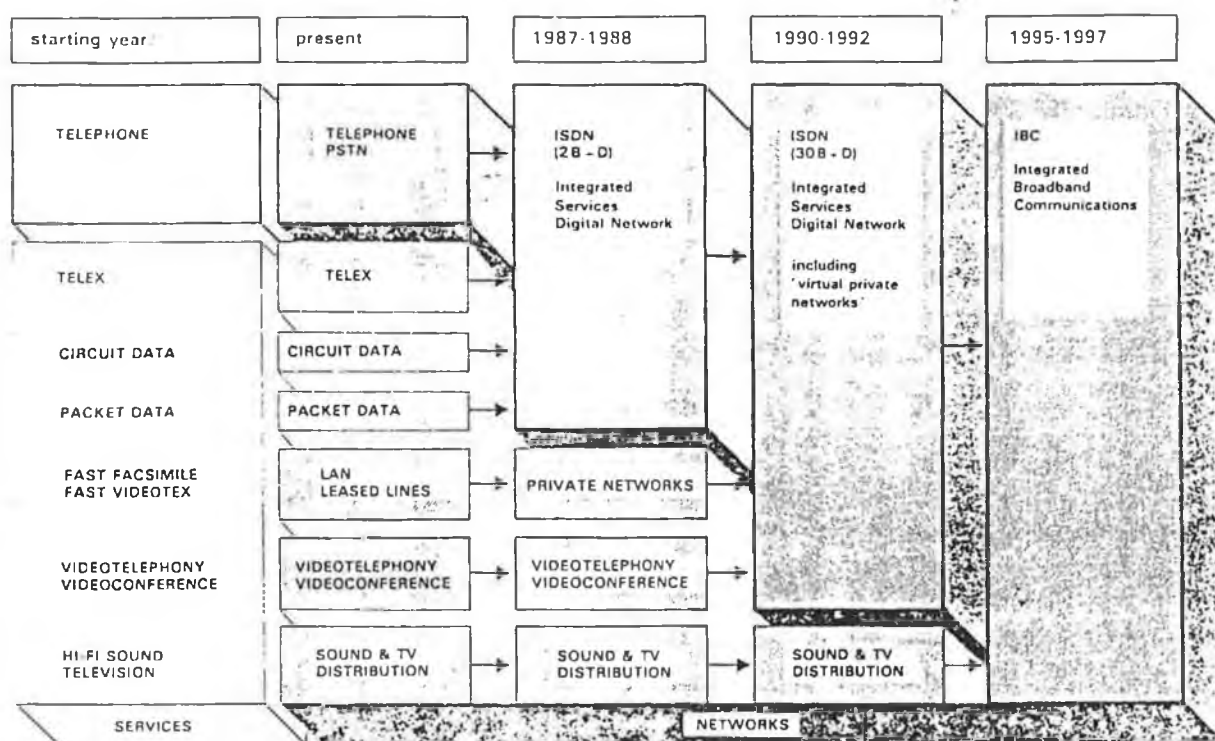
Telecommunications will be a major factor in structuring the Community-wide services market in 1992. It will determine, to a large extent, Europe's future position in high technology.

By the end of this century, the competitiveness and security of up to 60 million jobs in the European Community will depend largely on the emerging information technologies.

The telecommunications authorities throughout Europe are now implementing the infrastructure which will facilitate these developments. This is the provision of Broadband or Wideband circuits, which are capable of handling highspeed, voice and data communications,

radio and TV broadcasting, and many higher level communications applications, e.g. video, CAD CAM, Images etc. (Voice only circuits are inadequate as they generally only operate at a frequency of up to 20 KHz (kilohertz). The CEC plans for the integration of telecommunication services into Integrated Broadband Communications (IBC) are shown below in Fig 28.

STAGES OF SERVICE INTEGRATION



Source: CSELT

Fig 28 European Integrated Broadband Communications (IBC). (Source: CEC)

Telecom Eireann is well ahead in planning the introduction of such an Integrated Broadband Communications infrastructure in Ireland utilising fibre optics to replace the copper wire cabling. These use light as a digital information carrier, thus providing multiple circuits. Telecom's development programme for Ireland is shown in the following diagram. Integrated Broadband Communications (IBC) is also often referred to as ISDN (Integrated Services Digital Network).

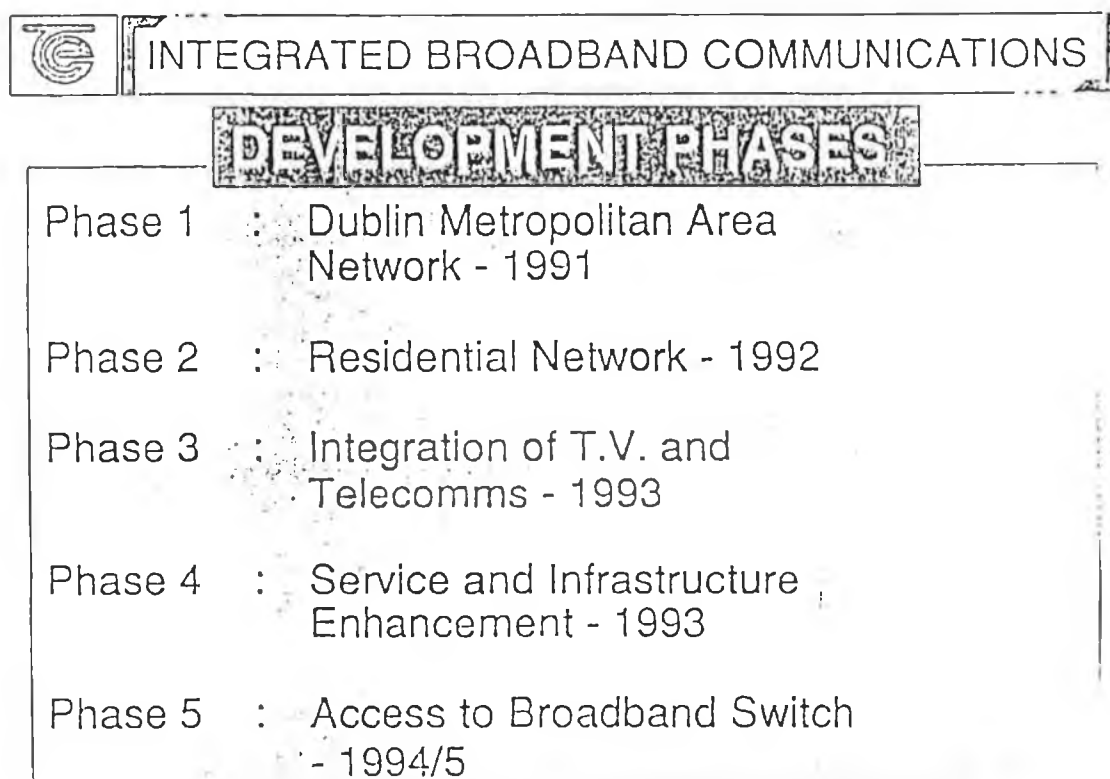


Fig 29 Development Phases of Irish IBC
(Source: Telecom Eireann)

6.4 NEW TECHNOLOGICAL FACILITIES

There are now many new technologies, features and facilities which are based on telematics and are allied in some way to EDI. These are in varying stages of development, some are in commercial use, some in initial or trial use and some are still on the drawing board. It is also apparent that these like EDI will undergo further development and change and there will be integration into and merging of the boundaries of what may now be separate technical facilities.

There are an almost infinite number of these new technical facilities and more are inevitable. The most interesting for potential integration to EDI, at this point, are the following:

6.4.1 OFFICE DOCUMENT ARCHITECTURE

Office Document Architecture (ODA) is an international standard agreed by the ISO and approved by the CCITT for the interchange of documents that may contain text, graphics, image and data material, from computer to computer.

According to ELEDIS, Quarterly Report on Electronic Data Interchange Systems,¹⁶¹ it provides the following facilities:

ODA enables documents and images to be interchanged between different computer systems so that both recipient and sender see exactly the same image. Once received, the document can be edited at will and this edited form (or its original) can be sent to another computer for further handling and retransmission. The standard provides, in addition,

added features which permit it to retain control over the processing functions. This means that the document itself can control whether sections have section numbers, whether special characters are allowed, whether the presentation and layout are exactly those which are required, etc.

While there are similarities with EDI, the standards, architecture, technology and even the immediate purposes of ODA are very different so the question is how will they develop simultaneously and will there be convergence or divergence? The opinion of ELEDIS to this is as follows:

ODAs flexibility and its ability to gather for functions that cannot be accommodated by the relatively simpler data interchange standards will make it a serious competitor in the field of commerce and trade in the 90s.

ODA accepts documents and reports whose contents can be in character, raster graphics or geometric graphic form; its ability to accommodate data, images and, in future, voice - make it an ideal candidate for the advanced data interchange mechanisms of the next decade when computerisation, image handling and storage will reach much higher thresholds of quality, speed, efficiency and user friendliness.

Experience, however, suggests that standards that have the same final objective will not remain isolated from developments in information technology and it appears

almost certain that the two (ODA and the rest of the EDI standards) will eventually converge.

6.4.2 DOCUMENT IMAGE PROCESSING

Document Image Processing (DIP) or imaging, is the automation of paper processing, copying, storage and retrieval. While it now appears most suitable for a large organisation or company to use on an inhouse basis, it can also be transmitted via networks over great distances and between compatible computers of different companies.

Imaging as such is not new but what DIP now allows with the aid of the new fast processing and storage capabilities to the new random access methods, using the same optical storage technology as for reading audio CD discs (e.g CD-ROM, Compact Disc-Read Only Memory, techniques) to provide instant recovery of any document, required in any location in a building or with communications on a wide area basis. This is allied to new generation methods for entering documents such as laser scanning and other efficient copying systems where before such document entry was laboriously fed in by hand, copy by copy. With this new technology all these facilities are available at much lower costs than heretofore.

It is indeed likely that the further reduction of the technology costs will drive the market in imaging, together with additional new facilities and features. One example of one such facility mentioned by ELEDIS, is where in addition to the delivery of the documentary report for an insurance claim, the insuring company could also expect to receive photographic images of the accident or the damaged property.

6.4.3 COMPUTER-AIDED ACQUISITION AND LOGISTICS SUPPORT

Computer-aided Acquisition and Logistics Support (CALs) is the new 'buzz word' term emanating from the US Department of Defense and it consists at this point of a series of US Government approved specifications for documentation and documentation handling in the area of procurement. The objective of the Defense Department is to have a digital highway over which procurement, supply and logistic information can travel between the different users.

This is of the utmost importance to the Defense Department as according to ELEDIS¹⁶², its documentation problem is huge:

It stores more than 200 million engineering drawings , it has 1000 procurement officers and 300,000 suppliers around the world. The US navy has 200,000 separate manuals with several million changes each year. CALs conformity is becoming a requirement for Defense requests for proposals.

It is accepted that CALs has still many problems to resolve. The number of standards and the different versions of each of them are difficult obstacles to its full implementation. Nevertheless, the rewards are many. For the US Air Force alone, CALs has the potential of saving \$135 million per year in development costs, of reducing the lifecycle costs of each major weapon system by \$583 million and of cutting the change cycle by 115 days.

In Europe, the CALS concept is usually referred to as Advanced Procurement and Logistics (ALPS) and has been under consideration and trial use by NATO on a number of European defence projects. This technology is rapidly moving from the concept stage and use by the military to/from their commercial suppliers to the normal next phase of commercial use by private industry from where it will move to general inter-industry use.

6.5 PROGNOSIS

From all the evidence it can be concluded that EDI already is, at this point in time, a business reality, is growing very rapidly, is an essential development for individual companies to reduce overheads and obtain a competitive advantage. For those companies which do not accept it as such and exploit it, may be placing their future at risk through carrying uncompetitive costs and lack of market flexibility which comes through the sophisticated automated manipulation of business information. The basis for this prognosis, if true for the present, is much more vital for the future taking into account the technological developments which are now available and others which are sign-posted. Because of the rapidity of these developments, it is important that companies do not wait but to make a start on a road which can quickly create new opportunities in their existing business and in completely new business areas which would not otherwise have been presented. Those companies which do not accept the technology or procrastinate too long in its implementation, run the risk of losing competitive edge and the marketing advantage provided by closer customer links and by superior business information.

If these prognoses are true for the individual company, then they are equally true for an economy. Indeed for a developing country they can be much more important as EDI, together with the modern telecommunications environment which it needs and the value-added services it in turn fosters, has the capability to equalise disadvantages and to quickly create an attractive climate for multinational companies to site and invest in. In this respect, Government has a very important role to play and while such a role may not be necessary or appropriate in highly developed economies as it has in a case of such an emerging economy as Singapore. It is submitted that the Singapore policy towards an integrated EDI approach is a good parallel for Ireland, particularly if the investment in digital telecommunications and the whole thrust of Irish industrial development policy towards high technology, is to be capitalised. Definition of the role Government should play is, however, critical. It should be consultative, cooperative and supportive and if it is involved directly it must not be seen to be monopolistic or bureaucratic or it may be totally counterproductive. Great care must, therefore, be taken with the terms of reference of any body having a direct role for Government.

Added to the potential of future technological developments, EDI has a huge application for general business and for Irish international trade in particular. However, progress will not happen in an orderly fashion without planning, foresight and coordination. If there is a national opportunity in its exploitation and there is also a serious national threat should this not be done. The exciting technical possibilities described are all likely to become reality and to become part of the Irish trading environment but if their arrival is not first delivered and adapted by Irish business

interests, then it may signal that it is already too late and that overseas interests will use it to take further competitive advantage over indigenous Irish industries. On the other hand, planned and coordinated development of EDI and other electronic trading services will help provide a levelling up of Ireland's disadvantaged peripheral location and provide in many cases a national competitive advantage.

However, the new era of electronic trading will not come about simply by waiting for the technical developments. The main issues are now clearly shown to be of a business, rather than a technical nature. The rewards of success will have to be earned by business managers on the ground, being firstly convinced of its benefits and, secondly, having the confidence to implement it, preferably not solely as a result of trading partner pressure but because they have decided that it is advantageous to do so. To achieve this position in Ireland, much work needs to be done in the area of an organised awareness campaign. Apart from the commercial interests, which are important, the EDIAI (EDI Association of Ireland) with its 65 members, is the only body active. This is an area where the role of Government must be looked at.

Irish business managers, as elsewhere, do not want a heavy handed Government role in their choice of trading procedures, manual or electronic and they have expressed clear views on this subject. This view is also endorsed by the response by many in the trading community to the Government sponsored INET networking proposals which many businessmen believe were poorly cloaked efforts to make money on the back of an essential state service, the Customs service in the first place and later on, general trade. (Others believe, perhaps cynically, that the reason that it was not

given to the telecommunications company, was to improve the commercial prospects of a financially failing semi-state postal company). Whatever the actual reason, as the first official response to EDI, this approach is seen to be opportunistic and lacks any integrated or comprehensive thinking to what is a complex issue requiring the greatest consultations between all trade bodies and Government itself.

Any involvement by Government is, therefore, only worthwhile if it is an integrated and coordinated one and it should also be designed from the point of view of trade interests and agreed with the trade. It is understandable at present that the Irish Government does not wish to spend money on new agencies or programmes. Indeed it is not desirable that a new bureaucracy be introduced. Money required for programmes such as awareness should be funded jointly by both industry and Government. Many will strongly argue against any role for Government, irrespective of its stated objectives and even if arriving with official funding. This, however, does not tally with the position elsewhere where there are various levels of Government support (except perhaps in the US), much of it of a helpful, morale boosting and by definition, low cost, nature.

In most other countries, where Ireland is competing, and where the uptake of EDI is at a much more advanced stage, there are official bodies providing support for functions such as standards development, promotion and education, coordination and assistance with technical matters. In some countries, such as France, there were problems of overlapping responsibilities and it is desirable that these should not be repeated here. In the UK the example of the VANGUARD Programme is an excellent model, where SITPRO, the British Standards

Institute (BSI), the sectoral industry interests groups, together with the network and computer services companies, all worked successfully as a team during the programme to achieve specific objectives.

Some countries have taken a step further with the development of an overall strategic policy being brought forward. In Ireland, there would appear to have been such bodies established for much less economically important issues. The first stage of getting official recognition of the need for such a programme is Government acceptance and understanding of the benefits of EDI. It would seem that Ireland may not yet be at that point. Initiatives in this area should be thoughtfully handled. As already stated, business managers in industry are against any official programme and would be suspicious of the dead hand of officialdom in what they would see as a competitive edge tool to be used for market exploitation.

Another area where positive support and leadership could be provided by Government is the issue of national standards. At present, there is a stated Government policy of supporting the UN/EDIFACT standard and this indeed is correct as the first principle. It is a first principle only and cannot stand alone as, firstly, it does not reflect the position of those companies which are affected by the delays which are being experienced with the actual production of the UN standards and, secondly, it ignores completely the actuality of those Irish companies under immediate risk to their business unless they adopt EDI with their UK trading partners but using Tradacoms standards, and the position of the two State owned Value Added Networks.

UN/EDIFACT is considered in most countries to be the way forward but as a goal to be reached over a transi-

tion period in, perhaps, a number of stages with the investment in existing standards providing the normal return on investment over its business lifetime, as any other investment, before being discarded. There is a distinct feeling that the view in official quarters, is that the Irish national decision to adopt UN/EDIFACT would, in itself, produce a sort of a panacea, a perfect climate and that little else needed to be done in the area of standards. This, of course, is contrary to the reality of the existence of a diversity of standards. For potential users, EDI is also a pragmatic technology and where the objective cannot be achieved due to the unavailability of EDIFACT, then it can and should be achieved using any other practical standard. This approach must be recommended as EDI itself is the business objective, EDIFACT is only a technological/standards issue (even though it is an important one).

This is a perception of the official attitude, insofar as any actual view or policy exists. If this is true, adopting through decision or default, such simplistic approaches the Irish Government have managed to avoid deciding, perhaps even considering, what their role, if any, should be and who should administer it. (In political terms, this is often internally as important). It is possible that there has been a policy decision that there should be no role. This is, however, considered unlikely as it would have meant that options would have to be looked at and this would inevitably involve the players in the Government departments, in the Agencies such as Eolas, and in the trade.

In the normal course of Government policy decision making affecting trade, there would be a strong representation from Irish industry and this has not been the situation in the case of EDI. That is certainly, as far as EDI itself, as a generic and strategic economic tool or initiative has not, as far as can be established been the subject of representations from trade interests. This excludes any lobbying by the CII for the introduction of Customs computerisation and Direct Trader Input (DTI) as already discussed. It may, of course be, that the CII and the Dept of Finance both believed that the networking arrangements for Customs DTI would deliver a full blown national EDI trade solution (while this would explain a number of attitudes, it should, hopefully, be considered as being unlikely).

The appropriate department to provide the national lead on EDI from a trade perspective is clearly the Department of Industry and Commerce. The Department of Communications has a national interest with the regulatory and infrastructural responsibility for telecommunications but all other departments, such as Environment, Finance, Health and Social Welfare, are all big potential users but as any private user they could be accused of placing their needs before the national interests.

6.6 RECOMMENDED STRATEGIES

EDI cannot prosper in isolation so efforts towards its successful development should take place at a number of levels, at unit business manager level, at corporate (or chief executive) level, at industry or institute level, at departmental or national government level, at EC 'Government' level as well as the level of the

various international bodies, such as the United Nations. It appears that the higher level organisations such as the ISO, the UN and the CEC, have already a clear view of the significance of EDI, have established specific objectives and have developed strategies which they are extremely active in pursuing and are providing the appropriate leadership. At the lower levels, from national Government down, however, there are very few similar national integrated approaches. Indeed the scene in Ireland is marked by a lack of basic awareness of all these levels and no coordinated approach whatsoever towards the implementation of the technology. To achieve positive results, there must be a direct interplay of the relationships at each of the above levels.

Essentially, the issues identified in the research questionnaire represent the main issues which need to be addressed. These are also almost identical to those isolated by the CEC Awareness survey, carried out by the TEDIS group. The latter include such issues as Lack of Standardisation, Security, Legal Considerations, Restrictive PTT regulations. These issues are mainly of a technical or solution-seeking nature, all of which will be solved in one way or another given time. The other issues, however, such as Tradition/established practice; Lack of cost/benefit; Lack of information; and Expensive information, are all general business issues which could actually be globally described under the heading of Awareness of EDI. Indeed, the issue of Standards itself could better be defined as an awareness issue rather than a technical issue as most of the difficulty relates to the national politics of the situation rather than the technology factors.

It goes without saying that companies will not get involved in the general technical issues of EDI implementation unless they first reach a minimal level of awareness of its potential. This is the real opportunity for a positive role for Irish Government involvement and in an area which will not require new structures or major expenditure. A national awareness campaign should be launched by the appropriate Government department or agency but it should not be narrowly based. Awareness should cover all aspects of the subject and, as well as EDI, other areas of electronic trading should be included. There should also be a full role and involvement of trade and industry, firstly in terms of the campaign objectives and, secondly, in terms of industry co-funding and the participation of expert personnel or consultants in the campaign itself.

To ensure that the correct balance between State and industry interests is obtained and to jointly establish the campaign objectives in addition to assisting Government in committing and involving industry to the greatest extent possible, an official Working Party should first be set up to make recommendations on these and other specific issues. This should include civil and public servants from the relevant departments and the State agencies such as Eolas. On the industry side, all the network and value-added players, as well as some specific large and medium sized companies, which are known to be users should be at least asked for views. Organisations such as the EDIAI (EDI Association of Ireland) would willingly contribute information and views on how the industry involvement should be handled.

It would be the function of this Working Group to define the Terms of Reference of the joint industry/Government body, its structure, personnel resources and its scheduled lifespan (it should not be left open ended unless it became self financing). Its scope should, however, be deliberately left broad to allow it flexibility to tackle additional issues which can crop up in such a fast developing environment and also specifics which existed but were not previously identified. The main limitations, or boundaries, that should be placed on it by Government should be total cash resources rather than scope or time. It should also be allowed to function for a time longer than the official funding period if it can prove that it is successful and it can convince industry or other authority, such as the CEC, to provide additional funding for specific programmes. This type of programme or initiative would have been directly applicable for funding from EC programmes such as STAR or TEDIS and could qualify under Telematique.

The report of the Working Group would have to present a strong case to convince both Government and industry of the benefits that would be derived from such an initiative in the Irish context. They should also make specific recommendations on which department should be the main sponsor and which companies would be interested in becoming involved with either cash or personnel resources. There are a number of precedents for this, such as the POSVAN study, and others outside the direct area of electronic trading. Companies such as Telecom Eireann have a statutory as well as a commercial responsibility for developing this area of telecommunications. Undoubtedly, the large computer manufacturing and services companies would also be willing partners and many others. The direct participants such as the value added services could be invited

but this should first be considered by the Working Group as it could be seen as providing a market advantage. The thrust should be towards users rather than providers.

The objective of these recommendations is to bring all the key decision making levels together in an overall cohesive plan which would unlock the potential of EDI in Ireland by tackling effectively the problem of the lack of awareness of EDI in Irish industry. Awareness is, as the EC survey has shown at almost the lowest level in Europe and which is in the broadest sense at the heart of the issue in Ireland. The reality, of course, is that when there is a Government involvement, many other pressing issues and political matters can cloud or change what appears to many as compelling logic.

The reality of the machinery of Government decision making too, is such that the case for promoting what could be seen as a missionary concept such as EDI could fail simply because the case is never made or heard at the right level. There has first to be an acceptance of a case to allow a proposal to even get to the stage of consideration. This would also first involve sponsorship by a department who also need to be convinced and who would also expect to be the implementing department. There may not be enough awareness of EDI or acceptance of its potential in any department to even take this proposal to the very first base of serious examination followed by sponsorship.

It must, therefore, be assumed that in the real world of public administration these recommendations for a national kick-start to EDI may never reach the implementation stage. EDI must, therefore, depend for its launch-pad on market forces which in any case are the

ultimate criteria. In this way it will be proven successful or not as a competitive business tool. This is also the way most business people would want it, a tenet of business practise being that those who are farsighted and prepared to risk or invest are entitled to whatever reward or advantage there may be. Individual effort is more welcome than Government holding companies hands. Successful ventures encourage imitation and competitive advantage forces it. (This is the correct approach, the only issue here is a national one, whether the sum of the individual efforts would achieve as much in the same timespan as an integrated country-wide programme).

EDI, like all successful technologies or practises, will grow in time regardless of how it is promoted. The issue is whether it is exploited for national economic advantage or forced on a reactive business community which has conceded the initiative. In the free enterprise area, there are many recommendations for individual companies and industry bodies to follow for their own and for national advantage without any Government involvement. A catalyst is still required in the awareness area for general business. This catalyst could come in the form of the EDIAI. EDIAI sees its role as a pan industry body determined to get out the EDI message, its benefits, standards, technology, to all Irish companies.

Irish companies will not be slow to adopt the new business practises once they become known. Irish based multi-national and leading indigenous companies are already in the forefront of the technology as has been shown. The step up that is needed is to bring this to the broad base of industry, to avoid a two-tier situation. There are a number of other parties which have responsibilities here to provide information, advice

and leadership, such as the Business Consultancies and Trade and Professional Associations. The leading consultancies, which are virtually all internationally connected, are already aware and active exponents of the art and science of EDI. The trade associations such as the ANAI (Article Numbering Association of Ireland), the ICS (Irish Computing Society) are already very interested and active in promoting EDI.

There are quite a number of professional bodies in areas such as chartered accountancy, institutes of purchasing, materials management, transport, banking, insurance, wholesale and retail, indeed the whole gamut of business activities as well as public administration. All of these bodies have a duty and responsibility to their members to advise them of a development as important as EDI. This responsibility will be doubly important should there not be any national initiative. In this case it would be the prime duty of the EDIAI to initiate the call invoking the assistance of these bodies to become active in promoting EDI for the benefit of their members.

The prime responsibility and role for the development of EDI in Ireland rests with the networks and value-added services whose direct commercial interest it is to have the greatest uptake. There is now an adequate level of service infrastructure for both national and international needs, public and private and there is the beginning of fair competition between the services (provided the state sponsored companies accept the EC regulatory position). There is a key responsibility on the part of all these competing services to cooperate with each other and with the interested bodies in the greater good of the EDI industry overall. There has to be an acceptance that by increasing the size of the national cake there will be more business for each

player. All the commercial operators must work individually and collectively for EDI as being good for business for both themselves and for their customer, the user.

The potential of EDI as it is currently, and even more so as it will develop, having integrated with other technologies, is such that critical threats and opportunity exist whether these are addressed or not, for all companies involved in international trade, in transport or other servicing functions of trade. If all efforts are joined at manager, corporate, industry sectors, professional and institute level, and particularly if all this is properly coordinated by Government, the scenario painted by the US Office of Technological Assessment¹⁶³ can be achieved for the Irish economy, using EDI as one of the key

New computerised technologies for collecting, storing, manipulating, communicating and using information and data, which have the potential to revolutionise the structure and performance of the world economy. They have the potential to change the performance of the economic system itself.

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APPENDIX A

List of Companies

1. Computer & Hi-Tech Manufacturing Companies (8)

- * Digital Equipment Corp., Galway
- Wang Laboratory Ltd, Limerick
- Nixdorf Computers Ltd, Bray, Co. Wicklow
- IBM, Dublin
- Apple Manufacturing Centre, Cork
- Hewlett Packard (Ireland) Ltd, Dublin
- Northern Telecom, Galway
- Memory Computers Ltd, Dublin

2. Transport Companies (8)

- * Bell Lines, Dublin/Waterford
- B & I Line, Dublin
- British Airways Cargo, Dublin
- * Irish Express Cargo Ltd., Dublin
- Aer Lingus Cargo, Dublin
- James P Jones & Son Ltd., Dublin
- Ryanair Ltd, Dublin
- Beagans Customs Clearance Ltd., Dundalk

3. Food/Drinks (Manufacturing Export & Distribution) (6)

- Bord Baine (Irish Dairy Board), Dublin
- Odlums Ltd, Portarlinton, Co Laois
- Cow & Gate Ltd, Wexford
- Cadbury's (Ireland) Ltd, Dublin
- Irish Sugar Co., Dublin
- Gilbey's of Ireland, Dublin (Manufacturer of
Bailey's Irish Cream)

General Business, Services & Administration (4)

Bank of Ireland Ltd, Dublin

Article Numbering Association of Ireland (ANAI),
Dublin

Anglo Irish Bank Corp., Dublin

* Baltimore Technologies Ltd, Dublin

Cognotec Ltd, Dublin

* Customs & Excise, Revenue Commissioners, Dublin

Coopers & Lybrand, Dublin

Cargo Community Systems Ltd, Dublin

Bord Failte (Irish Tourist Board), Dublin

Beechams of Ireland Ltd, Dublin

Net-Link Research Ltd (POSVAN Project), Dublin

Superquinn Ltd, Dublin

Smurfit Paribas Bank Ltd, Dublin

Waterford Crystal Ltd, Waterford

Pilot Survey Participants

* Indicates the companies which participated in the pilot survey. In addition, the following companies willingly participated in the pilot survey but did not wish to return detailed questionnaires for reasons such as commerciality, confidentiality, security and other reasons. (See Section 4.11).

* Allied Irish Banks Ltd, Dublin

* Philips Electronics Ltd, Dublin

* Walsh Western International Ltd, Dublin & Limerick

CONFIDENTIAL

QUESTIONNAIRE FOR USERS/POTENTIAL USERS OF EDI

EDI is defined as the technology for the transfer of business documents, by agreed message standards electronically between the computer systems of Trading partners, without human intervention.

	NUMBER	OFFICE USE 1 2 3
1. Are you currently using EDI ?	YES <input type="checkbox"/> NO <input type="checkbox"/>	<input type="checkbox"/> 4

2. Are you a prospective user of EDI ?

CIRCLE NUMBER

5	4	3	2	1	
HIGHLY LIKELY	LIKELY	UNCERTAIN	UNLIKELY	HIGHLY UNLIKELY	<input type="checkbox"/> 5

If you are 'Unlikely' or 'Highly Unlikely' please finish at this point and return the survey directly.

3. What are the reasons you use/intend to use EDI ?

PLEASE RANK IN ORDER, 1-5 (WITH 1 HIGHEST)

CORPORATE COMPETITIVE/STRATEGIC REASONS	<input type="checkbox"/>	<input type="checkbox"/> 6
COST REDUCTION	<input type="checkbox"/>	<input type="checkbox"/> 7
REDUCTION IN LEADTIMES/INVENTORY	<input type="checkbox"/>	<input type="checkbox"/> 8
CUSTOMER SERVICE	<input type="checkbox"/>	<input type="checkbox"/> 9
OTHER (specify).....	<input type="checkbox"/>	<input type="checkbox"/> 10

4. What documents/functions are you using/planning?

a) BEING USED NOW :	INVOICE <input type="checkbox"/>	<input type="checkbox"/> 11
	PURCHASE ORDER <input type="checkbox"/>	<input type="checkbox"/> 12

b) OTHERS BEING USED NOW : Please specify	<input type="checkbox"/> 13
---	-----------------------------

.....

.....

c) DOCUMENTS/FUNCTIONS PLANNED : specify	<input type="checkbox"/> 14
--	-----------------------------

.....

.....

5. To which countries do/will you have EDI links ?

IRELAND			15
UK			16
GERMANY			17
FRANCE			18
OTHER EC			19
US			20
JAPAN			21
OTHER (specify).....			22

6. State the business of your intended EDI partner(s)

SUPPLIER TO A MANUFACTURER			23
MANUFACTURER			24
FREIGHT FORWARDER			25
CARRIER			26
BANK/FINANCIAL SERVICE			27
DISTRIBUTOR			28
RETAIL OUTLET			29
OTHER (specify).....			30

7. What are the immediate pressures to use EDI?

EDI IN YOUR INDUSTRY SECTOR			31
COMPETITOR(S) USING EDI			32
SUPPLIER INSISTENCE			33
PURCHASER INSISTENCE			34
YOUR PRESSURE ON SUPPLIERS			35
OTHER (specify).....			36

8. What Document/Data Standards do/will you use ?

UN EDIFACT			37
TRADACOMMS			38
ODETTE			39
ANSI X 12			40
OTHER(specify).....			41

9. How do/will you connect to your clients ?

DIRECT LEASED LINES			42
CLOSED PRIVATE NETWORK			43
'EIRPAC' DIAL-UP FACILITIES			44
VALUE ADDED NETWORK (specify).....			45

10. Did/will you have major expenditure to modify your system to handle EDI developments ?

YES	<input type="checkbox"/>	<input type="checkbox"/>	46
NO	<input type="checkbox"/>	<input type="checkbox"/>	47
DONT KNOW	<input type="checkbox"/>	<input type="checkbox"/>	48

If 'YES' please state modification cost as a % of

YOUR HARDWARE INVESTMENT.....
YOUR SOFTWARE INVESTMENT.....

11. What would the approx cost benefit be to your company from EDI fully implemented ?

PLEASE STATE SAVING AS A % OF TOTAL COSTS |...| 49

12. Will you migrate to full international standards?

X.25 COMMUNICATIONS PROTOCOL	<input type="checkbox"/>	<input type="checkbox"/>	50
X.400 MESSAGE HANDLING STANDARD	<input type="checkbox"/>	<input type="checkbox"/>	51
FULL UN EDIFACT MESSAGES	<input type="checkbox"/>	<input type="checkbox"/>	52
NONE OF ABOVE	<input type="checkbox"/>	<input type="checkbox"/>	53

13. State the main inhibitors to EDI in your company

UNAWARENESS OF EDI BENEFITS	<input type="checkbox"/>	<input type="checkbox"/>	54
COMMUNICATIONS EXPERTISE	<input type="checkbox"/>	<input type="checkbox"/>	55
EDI ENABLING SOFTWARE	<input type="checkbox"/>	<input type="checkbox"/>	56
IMPLEMENTATION COSTS TOO HIGH	<input type="checkbox"/>	<input type="checkbox"/>	57
OTHER (specify).....	<input type="checkbox"/>	<input type="checkbox"/>	58

14. In your opinion, is lack of awareness of EDI among managers inhibiting its growth in your industry?

DEFINITELY YES	<input type="checkbox"/>	<input type="checkbox"/>	59
TO SOME EXTENT	<input type="checkbox"/>	<input type="checkbox"/>	60
DONT KNOW/NO OPINION	<input type="checkbox"/>	<input type="checkbox"/>	61

15. A recent EC survey indicated the following factors inhibited the growth of EDI.

PLEASE SCORE EACH HEADING WITH 3..(HIGH)..TO 0 (LOW)

INHIBITOR		
LACK OF STANDARDISATION.....	<input type="checkbox"/>	62
LEGAL CONSTRAINTS.....	<input type="checkbox"/>	63
TRADITION/ESTABLISHED PRACTISE.....	<input type="checkbox"/>	64
SECURITY/PRIVACY.....	<input type="checkbox"/>	65
LACK OF COST BENEFIT.....	<input type="checkbox"/>	66
RESTRICTIVE PTT PRACTISES.....	<input type="checkbox"/>	67
LACK OF INFORMATION.....	<input type="checkbox"/>	68
EXPENSIVE INFORMATION.....	<input type="checkbox"/>	69

16. For EDI, do you favour a single Irish National Network licensed by the State, or independent competitive commercial services ?

LICENSED NATIONAL NETWORK	<input type="checkbox"/>	70
COMPETITIVE INDEPENDENT NETWORKS	<input type="checkbox"/>	71

17. In your opinion, does the Irish national public data infrastructure meet EDI needs ?

CIRCLE NUMBER

5	4	3	2	1	<input type="checkbox"/>	72
FULLY ADEQUATELY	ADAQUATELY	NEUTRAL	INADEQUATELY	VERY INADEQUATELY		

18. Who has prime responsibility for EDI development and implementation, in your company ?

MARKETING MANAGER/DEPT	<input type="checkbox"/>	73
COMPUTER/DP MANAGER/DEPT	<input type="checkbox"/>	74
OTHER (specify).....	<input type="checkbox"/>	75

19. Should a specific Govt. Dept/Agency have overall State responsibility for EDI ?

YES	<input type="checkbox"/>	76
NO	<input type="checkbox"/>	77
If 'YES' Please indicate what should be done and by which organisation.....	<input type="checkbox"/>	78
.....		
.....		

20. Where do you get your EDI technical expertise ?

- | | | | |
|----------------------|--------------------------|--------------------------|----|
| IN-HOUSE SPECIALISTS | <input type="checkbox"/> | <input type="checkbox"/> | 79 |
| SOFTWARE HOUSE | <input type="checkbox"/> | <input type="checkbox"/> | 80 |
| EDI CONSULTANTS | <input type="checkbox"/> | <input type="checkbox"/> | 81 |
| OTHER (specify)..... | <input type="checkbox"/> | <input type="checkbox"/> | 82 |

Please state if you have had difficulties here: 83

.....
.....

21. Please give your views on the integration of EDI with advanced materials systems MRP, CIM, JIT etc. 84

.....
.....

22. Please comment on the Human effects of EDI, eg rationalising the organisation, staff numbers etc. 85

.....
.....
.....

23. EDI has been described as 80% business and 20% technical. Do you

- | | | | |
|----------------------|--------------------------|--------------------------|----|
| FULLY AGREE | <input type="checkbox"/> | <input type="checkbox"/> | 86 |
| DISAGREE | <input type="checkbox"/> | <input type="checkbox"/> | 87 |
| DONT KNOW/NO OPINION | <input type="checkbox"/> | <input type="checkbox"/> | 88 |

24. In your view what role will EDI play in developing

a) OPEN EC MARKET (1992)..... 89

.....

b) PAPERLESS TRADING..... 90

.....
.....

25. Please give any other views on EDI, its Standards, Development, Implementation, Technical issues etc 91

.....
.....
.....
.....

COMPANY INFORMATION

Your replies to the questionnaire and all information supplied about your company will be kept confidential and will be used only for the purposes of this research.

Please indicate by ticking below if you would like to receive a copy of the main findings of the research in overall summarised form.

COMPANY NAME.....ADDRESS.....

TEL.....FAX.....

BUSINESS ACTIVITY.....SIC(STANDARD IND CODE)....

COMPANY TYPE:

PRIVATE COMPANY
 PLC
 SUBSIDIARY/OPERATING CO
 OTHER (pse specify).....

PLEASE STATE ORIGIN COUNTRY OF PARENT COMPANY.....

TURNOVER (IRISH COMPANY) last full trading year |£.....|

REGIONAL BREAKDOWN OF YOUR TRADE (in approx %s)

	IRE	UK	GER	FRA	OTHER EC	US	JAPAN	OTHER
	1	2	3	4	5	6	7	8
SALES								

TICK HERE FOR SUMMARY OF RESEARCH

COMPLETED BY.....POSITION.....

"The Economic Commission for Europe,

Noting with satisfaction that after two decades of successful work the Working Party on the Facilitation of International Trade Procedures has taken a significant step forward with the adoption of Rules for Electronic Data Interchange for Administration, Commerce and Transport and related data elements, segments and messages (EDIFACT),

Recognizing the benefits for world trade to be drawn from the universal application of EDIFACT,

Noting further that EDIFACT is expected, through the joint work of ECE and the UNCTAD Trade Facilitation Programme (FALPRO), to reach a level of worldwide acceptance comparable to that of the United Nations Layout Key for Trade Documents,

1. Requests the Executive Secretary to regard work on EDIFACT as a priority task and to allocate to it the necessary resources at his disposal;
2. Invites the other regional commissions to co-operate with ECE in the promotion and application of EDIFACT;
3. Recommends that, given the desirability of the worldwide application of these Rules and associated documentation, they be named henceforth the United Nations Rules for Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT);
4. Requests the Executive Secretary to draw the attention of the Economic and Social Council to this decision;
5. Requests the Executive Secretary to report to the Commission at its forty-fourth session on the implementation of this decision."

WHAT IS UN/EDIFACT

19. Electronic Data Interchange is generally defined as the computer to computer transfer of commercial or administrative transactions ^{2/} using an agreed standard to structure the data pertaining to that transaction. "To structure", i.e. to construct in an organized configuration the various information elements which have to pass from one computer to another to complete the transaction, is the governing idea of UN/EDIFACT, in the same way as a language is the structuration of words into sentences used to convey a meaningful message to the interlocutor.

^{2/} In this context, a "transaction" means a set of data required to perform a given function, e.g. consignment instructions, Customs clearance, payment etc.

APPENDIX D

The status indicators are:

0 Draft document
 1 Draft for Formal Trial
 2 Recommendation (UHSM)

		<u>Sept 1990</u>	<u>March 1991</u>	<u>Sept 1991</u>
TRADE/MATERIALS MANAGEMENT				
Commercial Invoice	(INVOIC)	2	2	2
Purchase Order	(ORDERS)	2	2	2
Purchase Order Response	(ORDRSP)	0	1	1
Purchase Order Change	(ORDCHG)	0	1	1
Delivery Schedule	(DELFOR)*	0	1	1
Delivery Just-in-Time	(DELJIT)*	0	1	1
Price/Sales Catalogue	(PRICAT)	0	1	1
Quality Data Message	(QUALITY)	1	1	1
Party Information	(PARTIN)	0	1	1
Request for Quotation	(REQOTE)	0	1	1
Quotation	(QUOTES)	0	1	1
Statement of Account	(STATAAC)	0	0	1
Despatch Advice	(DESADV)*	0	1	1

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		<u>Sept 1990</u>	<u>March 1991</u>	<u>Sept 1991</u>
TRANSPORT				
Int'l Forwarding & Transport Message Framework - a related set of messages (IFTMFR)*		1	1	2
- Provisional Booking (IFTMBP)*		1	1	2
- Firm Booking (IFTMBF)*		1	1	2
- Booking confirmation (IFTMBC)*		1	1	2
- Instruction (IFTMIN)*		1	1	2
- Instruction Contract status (IFTMCS)*		1	1	2
- Arrival Notice (IFTMAN)*		1	1	2
- Int'l Forwarding & Consolidation Summary (IFTSUM)*		0	1	1
BANKING & INSURANCE				
Remittance Advice (REMADV)*		1	1	2
Payment Order (PAYORD)*		1	1	2
Extended payment order (PAYEXT)*		1	1	2
Debit advice (DEBADV)*		1	1	2
Credit advice (CREADV)*		1	1	2
Extended Credit advice (CREEXT)*		1	1	2
Multiple Payment Order (PAYMUL)*		0	0	1
Letter of Credit (DOCAPP)		0	0	0
Current Account Insurance (CURRAC)		0	1	1
Reinsurance Account (REINAC)		0	1	1
SERVICE MESSAGES				
Control (CONTRL)		1	1	1
General (GENRAL)		0	0	1
Maintenance (DIRMNT)		-	0	1
CUSTOMS				
Customs Declaration (CUSDEC)*		1	1	2
Customs Response (CUSRES)*		1	1	2
Customs Cargo Report (CUSCAR)*		0	1	2
Customs Conveyance Report (CUSREP)*		0	1	2

APPENDIX E

UNIFORM RULES FOR INTERCHANGE OF TRADE DATA BY TELETRANSMISSION (UNCID)

Article 1 : Objective

These rules aim at facilitating the interchange of trade data effected by teletransmission, through the establishment of agreed rules of conduct between parties engaged in such transmission. Except as otherwise provided in these rules, they do not apply to the substance of trade data transfers.

Article 2 : Definitions

For the purposes of these rules the following expressions used therein shall have the meaning set out below :

- a. **Trade transaction** : A specific contract for the purchase and sale or supply of goods and/or services and/or other performances between the parties concerned, identified as the transaction to which a **trade data message** refers;
- b. **Trade data message** : Trade data exchanged between parties concerned with the conclusion or performance of a **trade transaction**;
- c. **Trade data transfer** (hereinafter referred to as «transfer») : One or more **trade data messages** sent together as one unit of dispatch which includes heading and terminating data;
- d. **Trade data interchange application protocol (TDI-AP)** : An accepted method for interchange of **trade data messages**, based on international standards for the presentation and structuring of **trade data transfers** conveyed by teletransmission.
- e. **Trade data log** : A collection of **trade data transfers** that provides a complete historical record of trade data interchanged.

Article 3 : Application

These rules are intended to apply to trade data interchange between parties using a TDI-AP. They may also, as appropriate, be applied when other methods of trade data interchange by teletransmission are used.

Article 4 : Interchange standards

The trade data elements, message structure and similar rules and communication standards used in the interchange should be those specified in the TDI-AP concerned.

Article 5 : Care

- a. Parties applying a TDI-AP should ensure that their transfers are correct and complete in form, and secure, according to the TDI-AP concerned and should take care to ensure their capability to receive such transfers.

- b. Intermediaries in transfers should be instructed to ensure that there is no unauthorised change in transfers required to be retransmitted and that the data content of such transfers is not disclosed to any unauthorised person.

Article 6

- a. A trade data message may relate to one or more trade transactions and should contain the appropriate identifier for each transaction and means of verifying that the message is complete and correct to the TDI-AP concerned.
- b. A transfer should identify the sender and the recipient; it should include means of verifying, either through the technique used in the transfer itself or by some other manner provided by the TDI-AP concerned, the formal completeness and authenticity of the transfer.

Article 7

- a. The sender of a transfer may stipulate that the recipient should acknowledge receipt thereof. Acknowledgement may be made through the teletransmission technique used or by other means provided through the TDI-AP concerned. A recipient is not authorized to act on such transfer until he has complied with the request of the sender.
- b. If the sender has not received the stipulated acknowledgement within a reasonable or stipulated time, he should take action to obtain it. If, despite such action, an acknowledgement is not received within a further period of reasonable time, the sender should advise the recipient accordingly by using the same means as in the first transfer or other means if necessary and, if he does so, he is authorized to assume that the original transfer has not been received.
- c. If a transfer received appears not to be in good order, correct and complete in form, the recipient should inform the sender thereof as soon as possible.
- d. If the recipient of a transfer understands that it is not intended for him, he should take the reasonable action as soon as possible to inform the sender and should delete the information contained in such transfer from his system, apart from the trade data log.

Article 8 : Confirmation of content

- a. The sender of a transfer may request the recipient to advise him whether the content of one or more identified messages in the transfer appears to be correct in substance, without prejudice to any subsequent consideration or action that the content may warrant. A recipient is not authorized to act on such transfer until he has complied with the request of the sender.
- b. If the sender has not received the requested advice within a reasonable time, he should take action to obtain it. If, despite such action, an advice is not received within a further period of reasonable time, the sender should

advise the recipient accordingly and, if he does do, he is authorized to assume that the transfer has not been accepted as correct in substance.

Article 9 : Protection of trade data

- a. The parties may agree to apply special protection, where permissible, by encryption or by other means, to some or all data exchanged between them.
- b. The recipient of a transfer so protected should assure that at least the same level of protection is applied for any further transfer.

Article 10 : Storage of data

- a. Each party should ensure that a complete trade data log is maintained of all transfers as they were sent and received, without any modification.
- b. Such trade data log may be maintained on computer media provided that, if so required, the data can be retrieved and presented in readable form.
- c. The trade data log referred to in paragraph (a) of this Article should be stored unchanged either for the period of time required by national law in the country of the party maintaining such trade data log or for such longer period as may be agreed between the parties or, in the absence of any requirement of national law or agreement between the parties, for three years.
- d. Each party shall be responsible for making such arrangements as may be necessary for the data referred to in paragraph (b) of this Article to be prepared as a correct record of the transfers as sent and received by that party in accordance with paragraph (a) of this Article.
- e. Each party must see to it that the person responsible for the data processing system of the party concerned, or such third party as may be agreed by the parties or required by law, shall, where so required, certify that the trade data log and any reproduction made from it, is correct.

Article 11 : Interpretation

Queries regarding the correct meaning of the rules should be referred to the International Chamber of Commerce, Paris.