Communications Canada

PORT INFORMATION SYSTEMS

AROUND THE WORLD

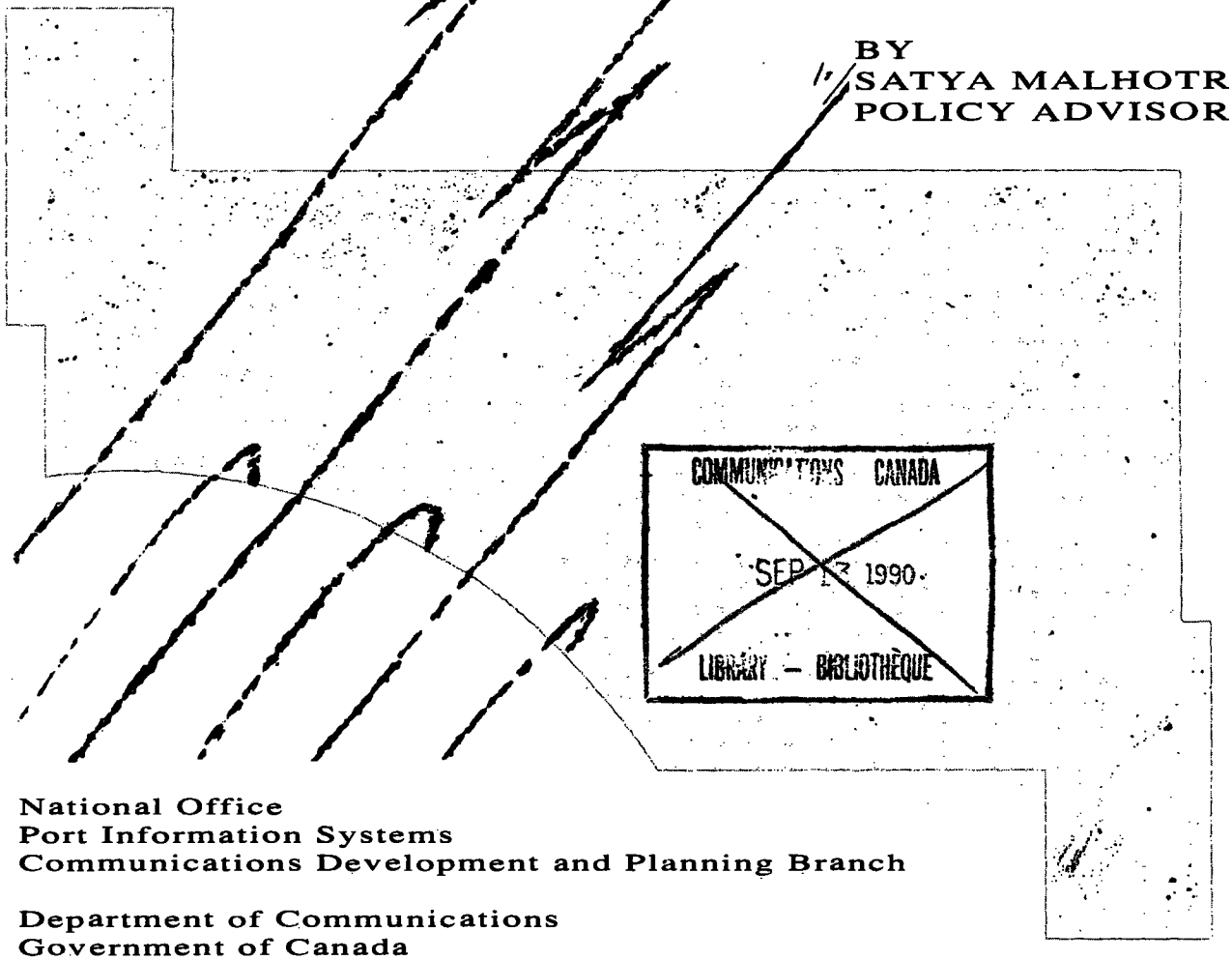
EDI

ELECTRONIC DATA INTERCHANGE

Canada

PORT INFORMATION SYSTEMS AROUND THE WORLD

BY
SATYA MALHOTRA
POLICY ADVISOR



National Office
Port Information Systems
Communications Development and Planning Branch

Department of Communications
Government of Canada
300 Slater Street
Ottawa, Canada
K1A 0C8
Tel. : (613) 991-0780
January 1990

Cat. No. Co22-89/1990

ISBN 0-662-57193-2

F O R E W O R D

Businesses involved in the transportation industry are rapidly adopting Electronic Data Interchange (EDI) to increase the efficiency of their operations. Because the interests of the many parties that make up the transportation chain are so diverse, it is a complex challenge to develop a common system that meets all their requirements. As documented in this report, many projects are now under way throughout the world, with varying degrees of success.

The Government of Canada, recognizing the importance of EDI technology to the transportation industry, is assisting in the development of comprehensive systems for Canadian users and has set up an interdepartmental organization to co-ordinate government efforts. In 1988, the federal Department of Communications, which is leading this initiative, established the National Office, Port Information Systems, using resources provided by several federal government departments. The primary objective of the National Office is to initiate a national Port Information System infrastructure for Canada. The Office also acts as scientific authority for government agencies assisting in the funding of the developments, and is the focal point through which the private-sector activities are co-ordinated with various government departments.

The National Office also conducts cross-sectoral research on EDI issues, of which this document is one example.

Dan Hewitt,
Project Director,
National Office,
Port Information Systems

TABLE OF CONTENTS

I N T R O D U C T I O N

Electronic Data Interchange (EDI) is the electronic alternative to the mass of paper required in international trade and transport. Studies reveal that the cost of preparing and handling paper documents ranges from 4 to 7 percent of the final consumer price of products. There are numerous amounts of redundancy within all these documents. As a result, the interest in the implementation of EDI at various ports and airports is accelerating worldwide, with the United States being the most advanced, followed by Western Europe and Japan. In Southeast Asia, Singapore has the region's only fully functioning EDI Newtork — Trade Net, which covers the port, airport and several government agencies.

Major seaports and airports throughout the world, including those in Canada, now have projects underway. The airlines and the banks have had their networks, SITA and SWIFT, for some time. The West German ports of Bremen and Hamburg were the first among seaports while London Airport, United Kingdom was the first among airports in Europe to adopt EDI.

Most port authorities are now spearheading the automation of trade and transportation paperwork by sponsoring the setting up of local computer service centres at various seaports and airports. These centres will allow port users to create and electronically transmit most trade and transportation documents, including those needed for customs clearance, to all parties participating in the system. The following pages highlight the work being done in introducing EDI at various seaports and airports around the world.

In preparing this report, the author has drawn freely on a number of published and unpublished sources, especially the articles written on the various port information systems that are now in existence or being implemented

throughout the United States and Europe. Much useful information was also obtained from conversations with EDI managers at various seaports in the United States, who contributed their special knowledge of the EDI concepts pertaining to their port information systems. At the time of publication, the most current information available was used as resource material for this report. In order to ensure accuracy and to revise the document, it would be appreciated if any errors or omissions could be identified and forwarded to the attention of the author.

CHAPTER ONE

THE AMERICAN SEAPORTS

The United States, unlike most other countries, has adopted a regional approach to automating its trade documentation procedures. The key agents of Electronic Data Interchange implementation are the quasi-public authorities that manage the U.S. airports and seaports. The U.S. Customs Service is working to tie its centralized automated government system to local port-sponsored facilities, while at the same time it is being directly interfaced to a number of leading customs brokers and steamship lines.

During the past few years, the U.S. port industry has devoted many resources towards developing the computerized (electronic data interchange) documentation service centre at each port. Such service centres are envisioned as local teleprocessing networks through which port users, such as steamship lines, airlines, freight forwarders and agents, may electronically exchange trade documentation among themselves, and with the U.S. Customs Service and various federal government departments. The first of these service centres came on line recently at the ports of New Orleans, Hampton Roads, New York-New Jersey and Baltimore, and at Miami International Airport.

Other significant advances in EDI implementation in the United States include introduction of a new international EDI standard, Electronic Data Interchange for Administration, Commerce and Transport (EDIFACT), by most U.S. carriers, freight forwarders, brokers, seaport and airport authorities and the U.S. Customs Service.

Baltimore, Maryland Port Authority, ACROSS

Automated Cargo Release and Operations Service System (ACROSS) is paid for and operated by the Maryland Port Authority (MPA). A key function of the system is the automated transmission of manifest and entry data to U.S. Customs. The system provides local cargo tracking, document preparation, vessel scheduling, statistical reporting and electronic mail between subscribers. The vessel scheduling covers such things as the positions of ships approaching the harbour, berth availability, and assignment of longshore work gangs to particular vessels.

As of January 1987, six companies, including Kerr Steamship Co., Maher Terminals and the Baltimore Maritime Exchange, were using the system. Users can rent terminals from the MPA to connect to the system or can do so using a microcomputer. The cost of developing the system was approximately $4.8 million.

The main benefits of the system are the reduction of paperwork related to manifest and entry submission, and a reduction of one day in the time required to clear cargo through the Port of Baltimore.

Hampton Roads, Virginia Port Authority, NEPTUNE System

This system evolved from the Virginia Port Authority's (VPA) in-house computer system that was set up to manage shipments handled by Virginia International Terminals, the port authority's operating subsidiary. The development cost of NEPTUNE, approximately $150,000, was mainly for software written by the VPA's own programmers.

The services to the local shipping community, which existed previously, included import and export cargo status information on container break-bulk shipments, posting of delivery orders by brokers, shipping-line releases, vessel schedules and departure notices, and electronic mail.

The principal function of NEPTUNE is to transmit manifest information to U.S. Customs. In September 1986, the system became the first U.S. port service centre system to successfully transmit manifest data to U.S. Customs. The first client was Anders William & Co., acting as an agent for Netumar Lines, South African Marine and Barber West Africa Line. The main benefit of the system is the reduction in the time required to clear cargo through Hampton Roads; what used to take days now takes only hours.

Two major lines serving Hampton Roads, Sea-Land and Trans Freight Lines, are now transmitting manifests directly to customs rather than through the port system. Also, adding a broker interface to customs has been given a low priority as most of the port's broker users are implementing their own direct links to U.S. Customs.

New Orleans, CRESCENT

The CRESENT (Computerized Reporting and Expediting of Shipments to Control Essential New Orleans Trade) system was developed by Cyber Data Systems, a subsidiary of McDonnell Douglas, at a fixed cost of $2.3 million including hardware (IBM System 38). It took more than one year to develop.

The CRESCENT system is the product of a working partnership between the Port of New Orleans and the local shipping and trade community. It is a "total port system" since it supports both industry automation as well as internal port automation. (See Figure 1.)

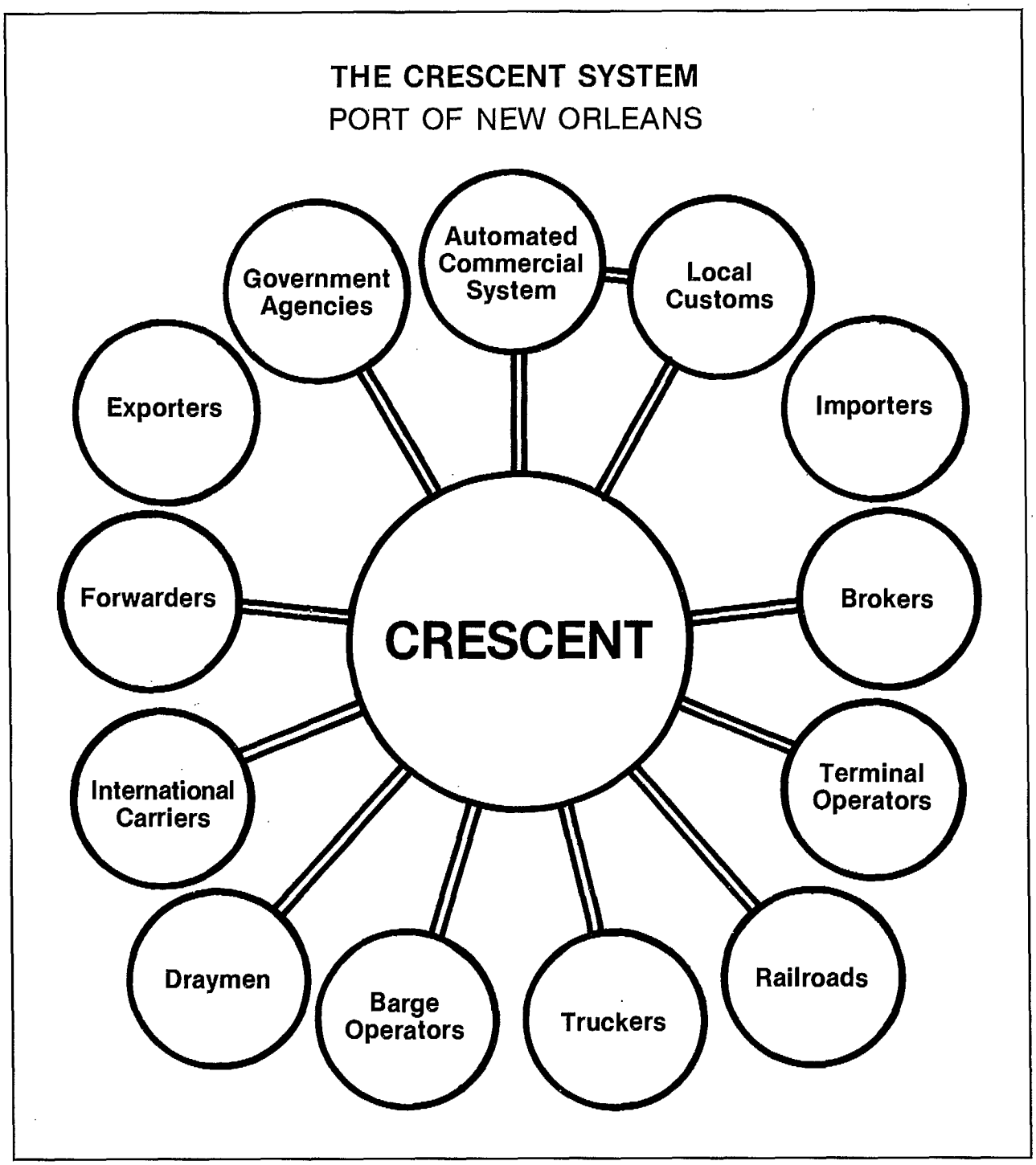
The initial thrust for the CRESCENT system was inspired by the U.S. Customs Automated Commercial System (ACS), which was designed to "preclear" cargo by as much as 72 hours in advance of an ocean vessel's arrival in port. Working in concert with U.S. Customs and the local shipping community, the CRESCENT project developed a system to transmit ocean manifests and then pass those releases to the appropriate carriers or agents. The CRESCENT project also developed an Automated Broker Interface (ABI) system to transmit automated broker entries to customs. When customs returns ABI releases to CRESCENT, the system automatically passes them on to the appropriate brokers.

Building on this initial concept, the Port of New Orleans and the local trade community extended the notion of a port service centre so it could address all the practical needs of the entire port community. Working through task forces comprised of port staff and members of the industry, a "total port system" was developed to facilitate the movement of cargo through the Port of New Orleans and to streamline the internal functions of the port.

For industry users, the potential benefits of participation in CRESCENT are enormous. Using the CRESCENT software applications, industry users can perform any of the following functions:

- file electronic berth applications with the docks department;
- submit import manifests to U.S. Customs;

FIGURE 1



Source: Port of New Orleans, Louisianna, U.S.A.

- file export cargo declarations with U.S. Census;
- submit export booking requests to ocean carriers;
- print/receive vessel arrival notifications;
- submit an RFQ (request for quotation) for an inland cargo movement and have it placed on an electronic bulletin board;
- pull an RFQ off the freight quote bulletin board and submit an electronic bid to move the cargo;
- submit an electronic delivery order request;
- publicize vessel scheduling through an electronic scheduling system;
- send electronic messages (CRES mail) to other CRESCENT users;
- file electronic entries for the port's Foreign Trade Zone;
- determine the status of cargo through an electronic status system that allows the appropriate party to view its cargo at any point as it moves through the Port of New Orleans; and
- release cargo at the wharf/terminal site.

The critical function of CRESCENT, based on the feedback from local users, is the electronic transmission link to U.S. Customs for both manifest and entry data. Columbus Line, through its agent Biehl & Company, was the first carrier to begin submitting manifests electronically to U.S. Customs. The system allows non-computerized users to enter manifests on line, as well as permitting computerized firms to transmit electronic manifests to CRESCENT. Users from anywhere in the world can access CRESCENT through the public Tymnet data communications network.

Among the anticipated users are both local and national offices of the U.S. Customs Service, other government agencies, exporters and importers, forwarders and brokers, shipping lines, barge operators, truckers, railroads and terminal operators.

A major implementation problem has been that smaller ocean carriers (who are potentially among the main beneficiaries of the system, because they are often not computerized) do not uniquely number each bill of lading as required by U.S. Customs in its system. When manifests and entries cannot be matched they are rejected.

The CRESCENT system for external operations started functioning in 1987. When fully implemented, CRESCENT's internal applications will automate the following functions for the port:

- the berth application and approval process for the docks department;
- the harbour police arrival/departure process;
- wharfmaster reporting functions;
- billing (including harbour fee, demurrage, commodity billing, and dockage);
- statistical reports;
- record keeping (including all contract summaries and billing for contracts);
- marketing and sales activities (including maintenance of a company file and the automation of all sales call reports);
- central purchasing process;
- stores inventory system;
- port-wide maintenance process through an ''engineering'' module;
- payroll (including personnel record keeping);
- general ledger system;
- accounts payable/receivable;
- port directory; and
- Port of New Orleans Tariff.

The port clearly views CRESCENT as a major strategic initiative. Usage fees have been established for some services that are viewed as value-added, but core services, such as transmissions to customs are to be free. There is no intention to try to recover the initial development costs and the fees are only charged to cover the operating expenses. The advantages of the system are said to be faster cargo releases, fewer phone calls regarding cargo status, quicker movement of cargo through the port, fewer errors and delays in documents, reduced courier and paper costs, and more precise pick-up and delivery times.

CRESCENT serves about 20 clients, primarily in the marine mode. Major companies like Sealand, who have their own EDI systems, are not connected with the CRESCENT system.

Charleston, South Carolina State Ports Authority, ORION System

At the time of ORION's development, the U.S. Customs' system was not automated so the systems could not be linked. ORION therefore evolved as a service centre, linking local agents, truckers, the U.S. Department of Agriculture, brokers and the South Carolina State Ports Authority (SCSPA) in order to electronically handle a variety of paperwork and speed cargo through the port.

The only charge associated with the system is for the rental of terminals to hook up with the SCSPA's IBM mainframe. The port claims the system pays for itself by preventing any cargo from slipping through unbilled.

In late 1986, the SCSPA decided not to build an interface to the U.S. Customs' national system. The port's users, in particular the brokers, saw little need for the port to build this interface as U.S. Customs was planning to do it themselves. The SCSPA also found that the cost of linking to U.S. Customs' ACS system was unattractive, although it was technically possible.

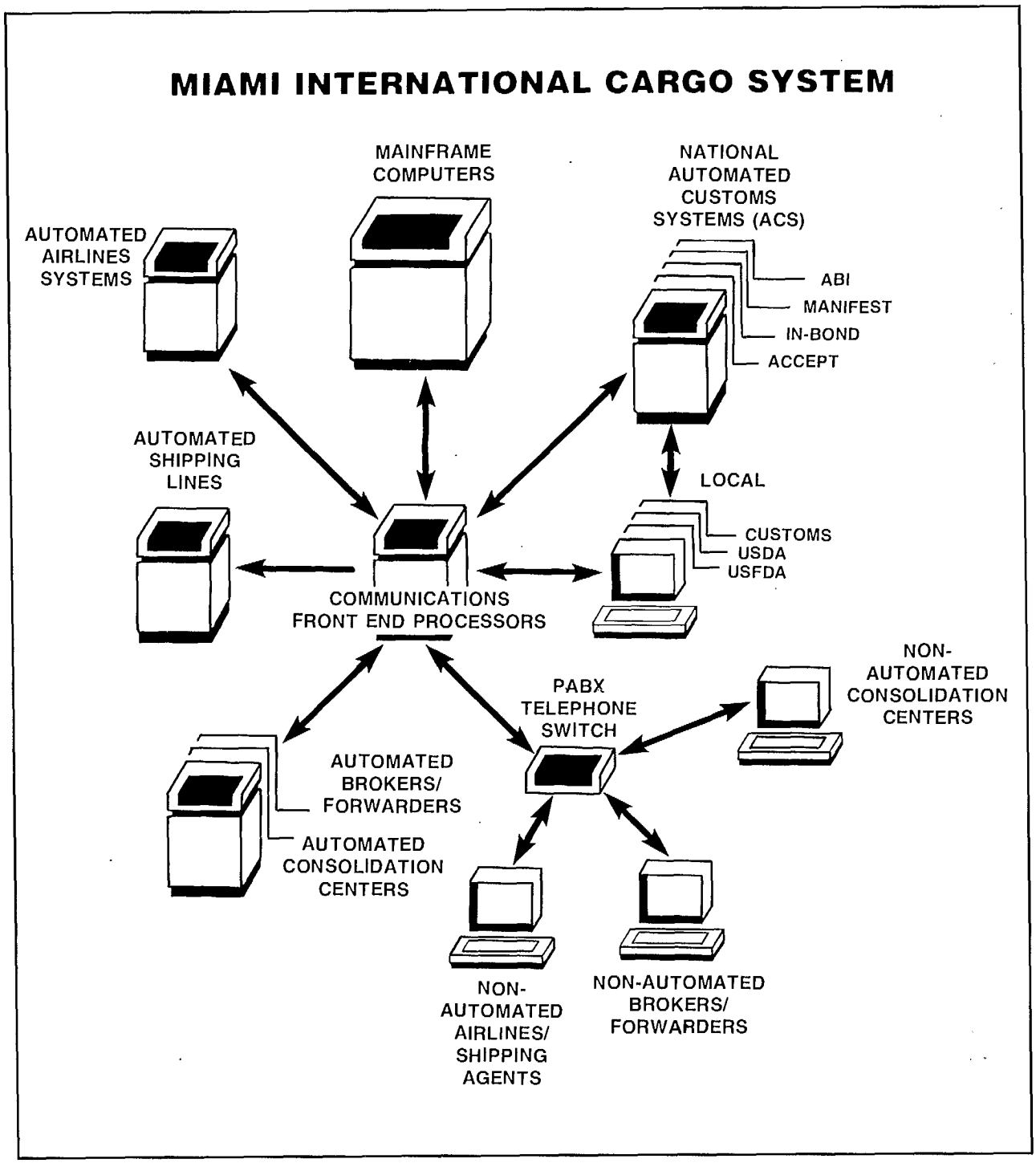
The SCSPA claims that the major benefit of the ORION System is a reduction in paperwork and time to clear cargo; which has changed from days to hours.

Miami, MICS

The Miami International Cargo System (MICS) (see Figure 2) was developed by Miami International Airport, in co-operation with the Port of Miami, U.S. Customs, the local cargo community, Computer Sciences Corporation (CSC) and British Telecom Advanced Technology (BTAT). CSC, a major U.S. service bureau and systems integrator, has been developing cargo management systems for 15 years; the forerunner of BTAT (National Data Processing Service) developed the original LACES system for London's Heathrow Airport in 1971.

MICS is a version of the ACP80 system that was originally developed for the London airport. In Miami, it is being applied to both the air and marine modes and is being implemented at both the airport and seaport. Implementation at both sites is possible because U.S. Customs is using the same Automated Manifest (AMS) and Automated Broker Interface (ABI) systems for both modes and Dade County operates both the airport and the seaport. Miami therefore provides an example of a single dominant player controlling the operation of both the seaport and airport, and implementing and operating an integrated system to serve both modes.

FIGURE 2



Source: Port of Miami, Florida, U.S.A.

Any user can input data to MICS, but the system's security provisions allow data output only to pre-authorized users. For exports, MICS automates reservation of space, airline reception, assignments to flights, holding location, loading sequence, weight and volume information, preparation of manifests, cargo tracking, etc.

For both air and sea imports, record-keeping is done electronically, which facilitates customs declarations and inspections. MICS identifies shipments requiring action by the U.S. Department of Agriculture and other federal agencies, and notifies receivers when a shipment is released.

MICS is designed to handle automated and non-automated manifests, either from terminals or from transmitted data. Forty percent of the port cargo has been automated although 50 percent of the agents do not have the computer capability to do the job. The air system has been up and running since October 1987, although the work at U.S. Customs is not fully completed. MICS is linked with 44 carriers, 12 of which are automated. It currently uses TDCC Standards, but plans to move to the EDIFACT when approved. The system took about five years to develop and development costs, including hardware and software, were approximately $18 million.

MICS has lowered shipping costs on an average of 12 percent in its initial year of operation.

New York–New Jersey, ACES

In 1986, the Port Authority of New York-New Jersey authorized a $250,000 development fund and organized a Port Community Working Committee (PCWC) to implement EDI at the port. The PCWC, composed of representatives of each sector of the industry and the Port Authority, unanimously selected the Automated Cargo Expediting System (ACES). ACES allows for the use of the industry's existing on-line computers as well as the use of microcomputers by non-automated firms, thus minimizing the capital costs for system users, who will bear the full cost of system use.

It was determined that an electronic data interchange (EDI) network must meet all the port community's needs, including security. General Electric Information Services (GEIS), one of the EDI industry's leading third-party networks, was selected to develop and implement the system. GEIS operates one of the largest commercially available teleprocessing networks; it can be accessed in 750 cities in 97 countries.

C H A P T E R O N E

ACES is designed for fast, accurate, and inexpensive electronic interchange of ocean-borne cargo information. A three-month pilot program began among maritime industry organizations on December 15, 1988. It involved 11 organizations representing steamship lines, customs brokers and terminal operators. During the pilot program the steamship lines, brokers and terminal operators interchanged up to nine business documents, or transaction sets involved in the movement of ocean-borne cargo. This reduced the volume of paper in files, the number of telephone transactions, the volume of mailed documents, and significantly reduced the time it took the industry to disseminate or receive information.

The pilot program participants included Atlantic Container Line, Sea-Land Services, Trans Freight Lines, and Maersk Lines for steamship lines; Leading Forwarders, Inter-Maritime Forwarders, Brauner International, Silvey Shipping, and Trans-World Shipping for custom brokers; and Maher Terminals and Universal Maritime Services for terminal operators.

In May 1989, the New York-New Jersey Port Authority announced that ACES was commercially available to all organizations engaged in maritime cargo transactions in the New York-New Jersey metropolitan area. Once operational, the ACES system will place the Port of New York-New Jersey in the vanguard of total cargo information interchange in the United States. ACES will result in benefits to each element of the industry involved in the movement of ocean-borne cargo. Shippers will be able to realize increased cash flow from on-time deliveries of inventories. Steamship lines will be able to offer faster service by eliminating unnecessary delays. Customs brokers will have up-to-the-minute cargo information for their clients. Terminal operators will achieve more efficient use of their facilities with more rapid turnaround of containers.

Future enhancement of the ACES system would include export applications and intermodal links with railroads and motor carriers. A later phase will investigate the feasibility of incorporating sets of transactions for various U.S. federal government agencies such as Customs Service, Food and Drug Administration and the Department of Agriculture.

The cost of transmitting or receiving a document via ACES could be as low as 20 cents, less than the cost of a postage stamp. ACES will also result in significant time reductions with some cargo being cleared the same day instead of after four days.

Golden Gate Ports, California, RACERS

After more than a year of study, the Golden Gate Ports Association (GGPA), which represents the ports of Oakland, San Francisco, Redwood City, Richmond, Sacramento and Stockton, started a pilot program for implementation of a regional EDI system. With trials set to begin in the fall of 1989, it is estimated that full implementation of RACERS (Regional Automated Cargo Expediting and Release System) will be in place by the spring of 1990.

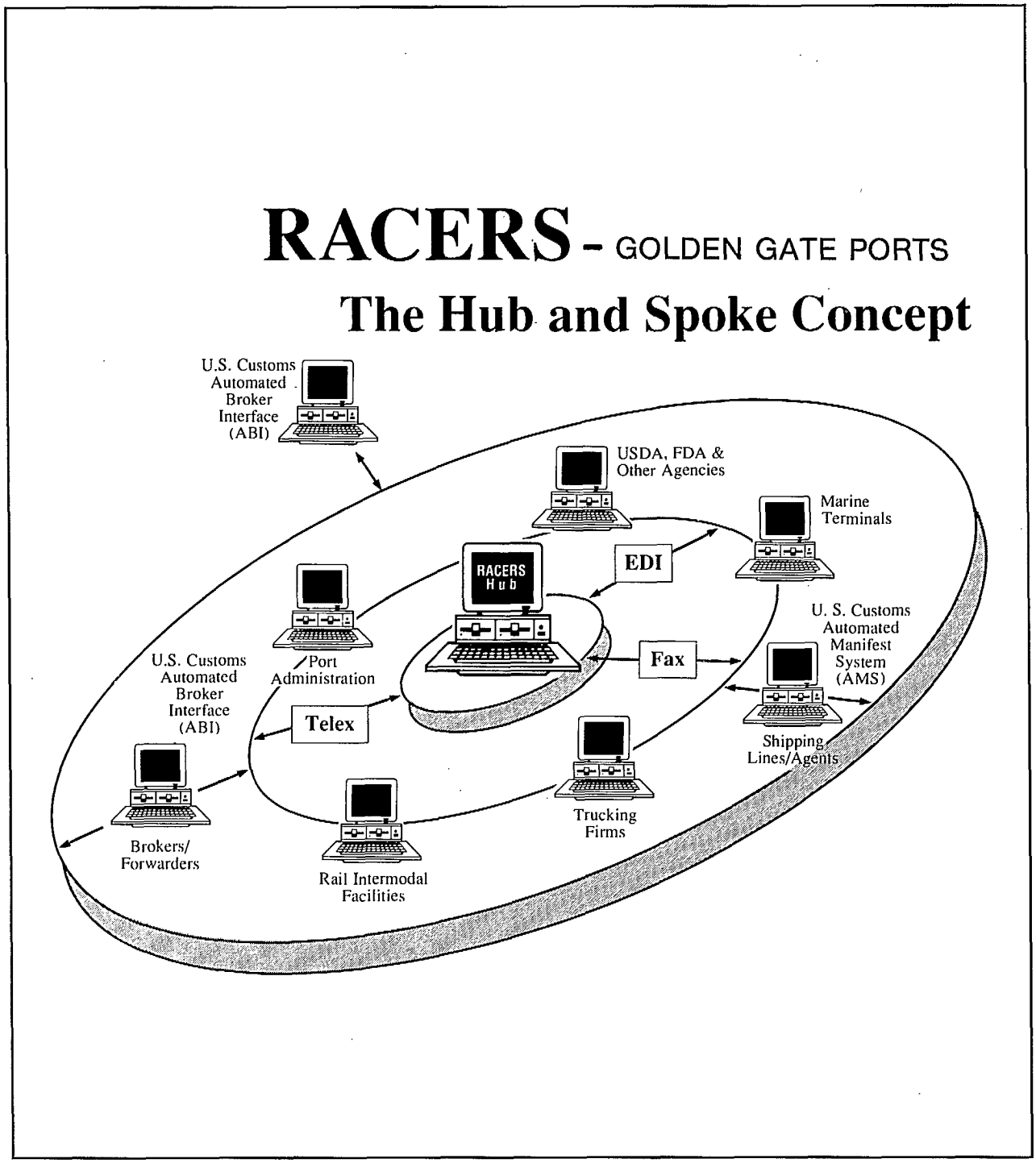
The GGPA is taking a different approach in efforts to implement an EDI network for the six ports. Rather than build an entirely new system, as has been and is being done by other ports and port authorities in the world, the Golden Gate group has adopted RACERS into the existing electronic data systems. This approach seems much cheaper and will add substantial flexibility to the system.

RACERS is like a "hub and spokes" system (see Figures 3 and 4), the hub consisting of a small intelligent computing system that will be able to piece together the various bits of information it receives. The spokes will be lines of communications with customs, steamship lines and agencies. Rather than implementing some sort of standard hardware and software combination for all users to communicate with, RACERS plans to use a third-party network to translate the signals that will come from the various partners.

When in place, RACERS will automatically warn importers, brokers, truckers, rail carriers, and others, of existing as well as potential problems and delays regarding imported cargo. The system is designed to notify users of a problem by telex, facsimile or computer. Users will never have to call up their shipment information directly within the system. This feature will keep proprietary information from public access.

The project, estimated to cost about $500,000 in the first year, has received financial support from the Maritime Administration (MarAd), the government's promotional agency for the shipping industry. MarAd hopes that RACERS will become a prototype system for other port regions in the country.

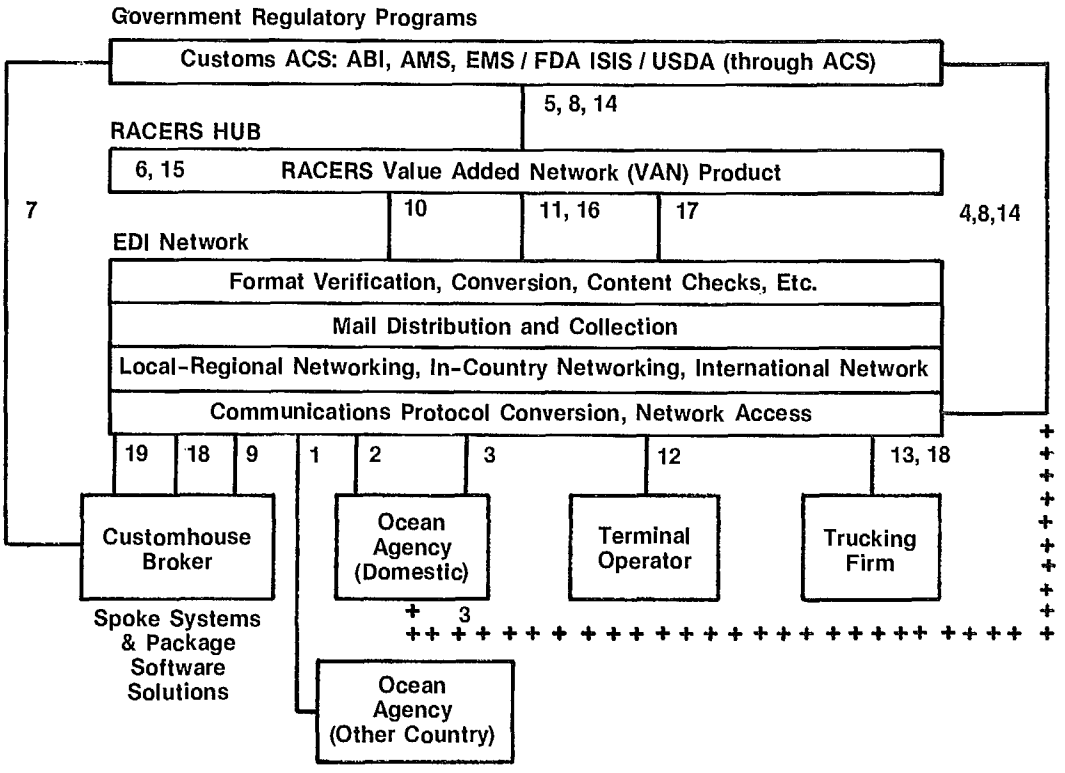
FIGURE 3



Source: Golden Gate Ports Association, San Francisco, California, U.S.A.

FIGURE 4

SIMPLIFIED RACERS OPERATION ON A TYPICAL IMPORT SCENARIO



General Description of RACERS Process

1. Agency at port of lading in other country books manifests export shipments for import to the United States.
2. Agency at port of discharge in the United States receives notification of inward shipments.
3. Agency prepares pre-arrival manifest for inward shipments to conform to U.S. Government requirements and communicates manifest to Customs (and thereby to other government programs).
4. Communications service delivers transmission to Customs.
5. Customs provides a copy of the manifest to RACERS as part of a regional port program.
6. RACERS evaluates terminal relationships to determine terminal operator for vessel.
7. Broker prepares and files Automated Declaration with U.S. Customs
8. Customs evaluates manifest and declaration to provide shipment status information to Agency and RACERS. From this information, RACERS can derive broker affiliation with the shipment.
9. Broker arranges for transportation services and provides a delivery order to the trucking firm and the terminal as an EDI transaction.
10. The VAN provides RACERS with an evaluation copy of the delivery order.
11. From the delivery order, RACERS is able to ascertain the trucking firm affiliation with the shipment. Additionally, RACERS determines that the trucking firm is not an EDI participant but can be notified via facsimile. RACERS converts the delivery order to facsimile for VAN delivery.
12. The terminal operator receives delivery order in EDI format.
13. The trucking firm receives delivery order in facsimile format.
14. Customs places an inspection hold on the shipment and notifies RACERS and the Agency.
15. RACERS determines that the trucking firm will be affected should equipment be sent to the terminal for shipment pick-up. Additionally, the broker involved has requested that their firm be informed of any holds of this type via a facsimile transmission and that the broker wants all holds notified in an EDI transmission.
16. RACERS generates a facsimile transmission addressed to both the broker and the trucking firm indicating an ALERT to the hold condition.
17. RACERS generates an EDI transmission to the broker indicating the hold.
18. The VAN delivers the facsimile documents to trucking firm and broker.
19. The VAN delivers the EDI document to the broker.

Source: Golden Gate Ports Association, San Francisco, U.S.A.

Jacksonville, COSMOS

COSMOS (Computerized On-line Service for Marine Operational System) is the Jacksonville Port Authority's (JPA) new, fully-integrated computer system. It has many applications but is meant primarily to help JPA and its customers work more quickly and closely with U.S. Customs.

Shipping manifests received by JPA from the agent of an ocean carrier, or from the carrier itself, can now be filed electronically with U.S. Customs. Customs then ties the manifest to broker entries to calculate the duties and taxes. These assessments, made and paid electronically, allow cargo to be released by customs even before it reaches the port, speeding up release of the goods.

COSMOS also handles most of JPA's billing fees for dockage, wharfage, terminal use, and handling and storage charges at the port; as well as utility fees and air terminal landing charges at Jacksonville International Airport. The system also assists the JPA with its statistical and financial operations, including payroll and invoicing. COSMOS has resulted in a 70 percent reduction in paperwork at the port.

Ports of Los Angeles and Long Beach, and Los Angeles International Airport, ACCESS

ACCESS (Automated Commercial Cargo Expediting and Search System), serving the Southern California International Trade Community, is a community cargo information system that will facilitate international trade and commerce. This system will allow trading partners such as air carriers, ocean carriers and agents, terminal operators, customs brokers, freight forwarders, break bulk agents, government agencies, truckers and railroads, to achieve a fast, cost-effective exchange of information.

ACCESS is a cargo-status-based system designed by the representatives of the southern California trade community. It will provide only those functions that deliver substantial benefits to the trade community and its trading partners.

ACCESS will provide four key functions:

- Cargo logistics – key information concerning the physical movement of cargo.

- Document preparation/transfer – electronic transfer of documents that are currently sent by mail or courier and then rekeyed. Pre-arrival notices, due bills and delivery orders will all be sent electronically.
- Release/hold notifications – sent from government agencies to brokers, carriers, terminals and truckers.
- Cargo status inquiry – consolidated information about the status of any shipment.

ACCESS, when implemented, will deliver substantial benefits to the local trading community by:

- Reducing the number of phone calls to trace cargo, thereby saving substantial amounts of time and money. Currently six to seven calls are made for each bill of lading.
- Reducing courier and mailing costs by electronically transmitting forms and documents.
- Reducing document rekeying time by transmitting bills of lading electronically between computer systems.
- Improving customer service.

In the near future, southern California will be the largest marine-air-rail-road transportation hub in the world. It is estimated that by the year 2000 over 100 million tons of cargo will be moving through the six sea ports and 2 million tons of cargo through the Los Angeles International Airport.

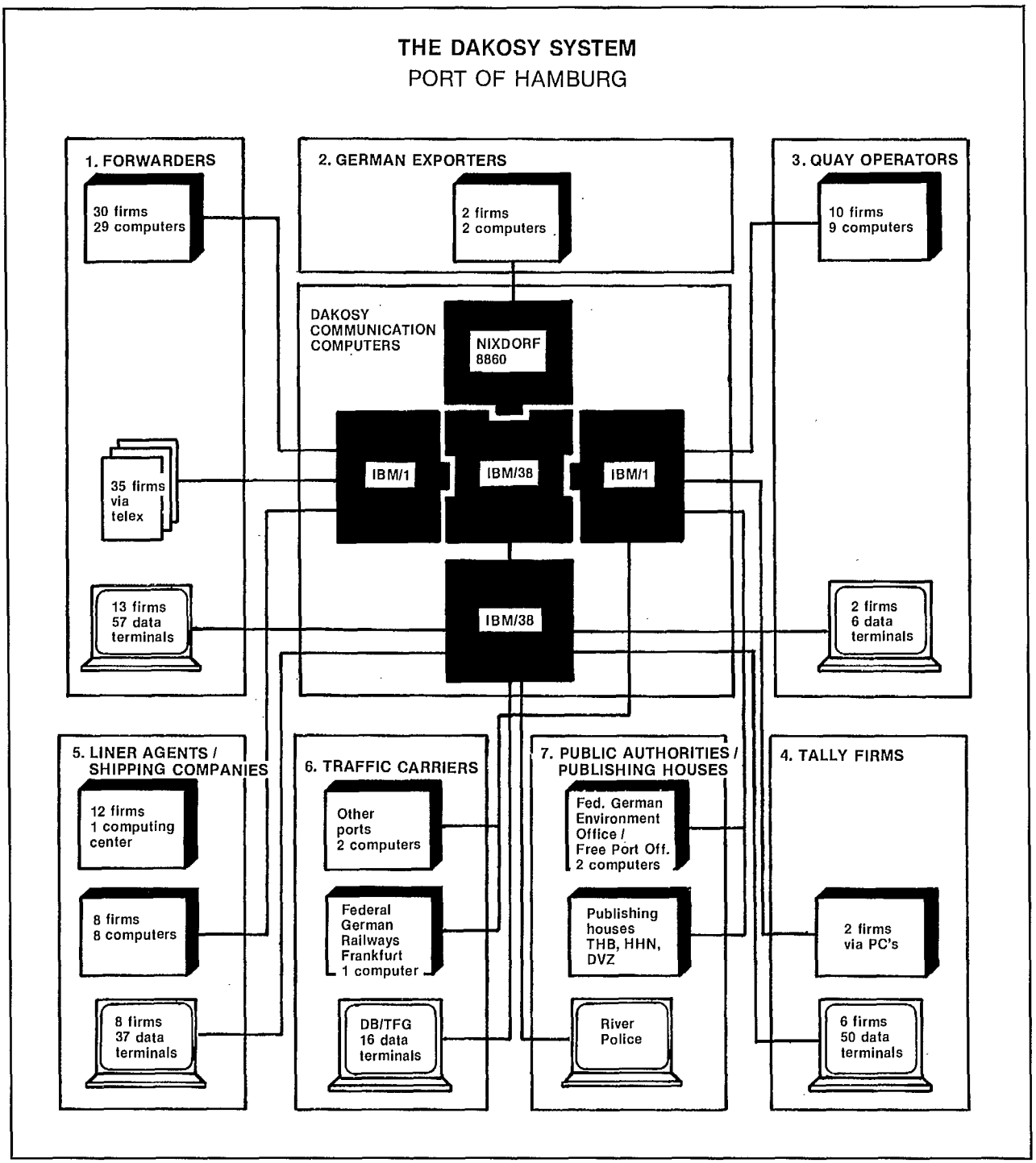
CHAPTER TWO

EUROPEAN SEAPORTS

A number of forces drove the implementation of EDI-based systems in European ports. Among the major factors that influenced the adoption of EDI were the high costs of paperwork in international trade, coupled with containerization of cargo and "just-in-time" inventory policies.

In order to minimize inventories, speed cargo movement, prevent delays and maximize use of the existing port infrastructure, European ports started implementing EDI in their information systems early in the 1980s. The Port of Hamburg was the first port in the world to introduce EDI in its operations.

FIGURE 5



Source: Port of Hamburg, West Germany

Hamburg, West Germany, DAKOSY

DAKOSY (Datenkommunikations system), the Port of Hamburg's data communications system, is a local service centre system that has been in operation since 1983. Its objective is to improve the efficiency of operations and speed cargo movement by expediting data flow among port users.

The system is viewed by the port as a communications instrument accommodating different EDP systems and participating firms. The four basic groups of users (totalling some 135 subscribers) are forwarding agents, brokers, liner agents and terminal operators (see Figure 5). DAKOSY's basic function is to enable these firms to electronically exchange shipment and bill of lading data. Information is recorded once by each party and is then made available to others who need it.

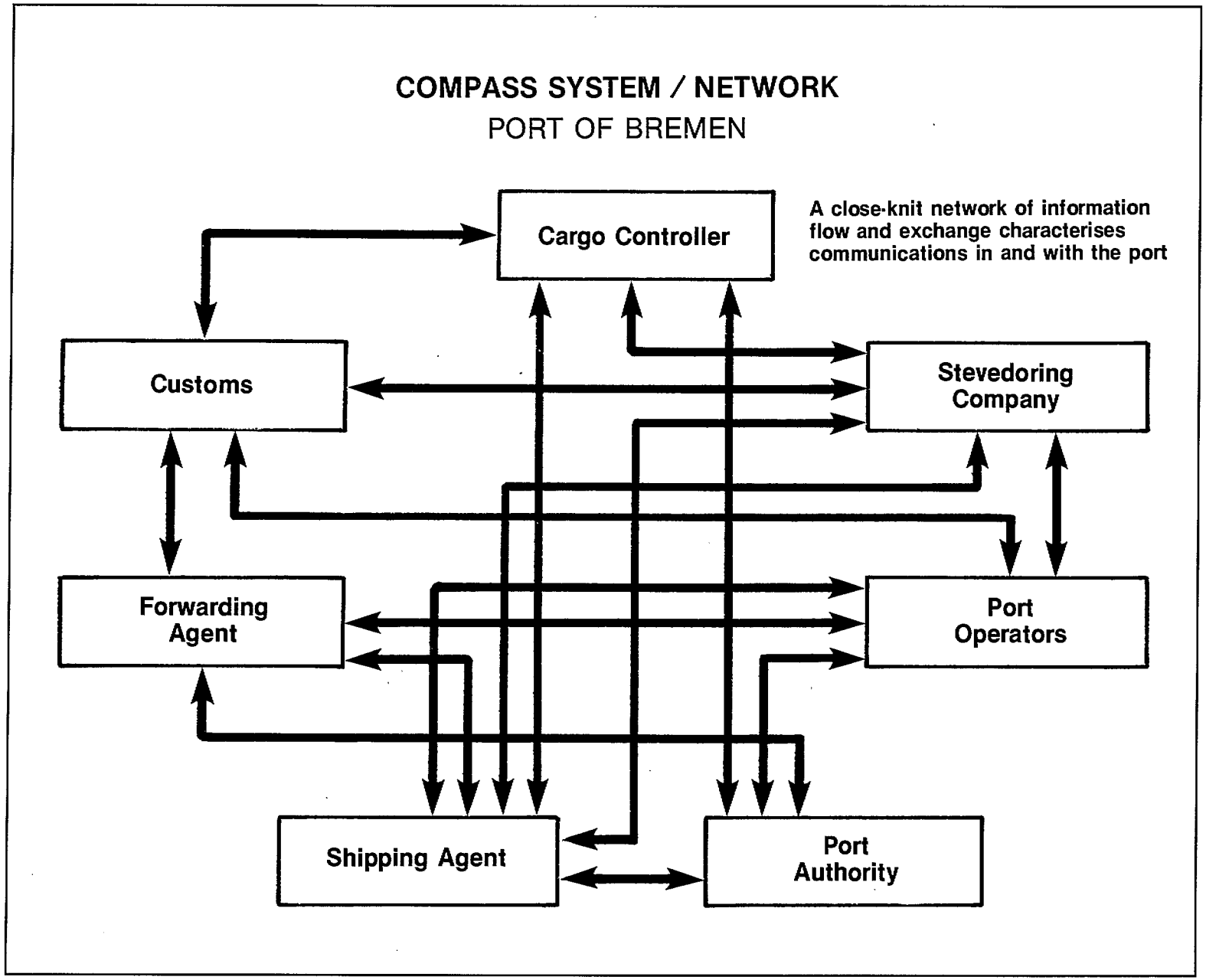
DAKOSY does not provide, and there are no plans to provide, services such as bookkeeping, invoicing or further processing of data received. It does, however, provide data entry/document creation screens through terminals hooked up to its IBM computers for those companies who do not own computers. In addition, the system maintains a centralized list of all sailings reported and entered by the agents.

The system will adopt EDIFACT standards as soon as these are available. Unlike most other port information systems, DAKOSY has been developed for general export cargo rather than for imports and it is jointly owned under a separately incorporated company, by the firms who use it. German Customs is not linked to the system.

DAKOSY was set up in 1982 by the Hamburg Port Operator's Association with share capital of DM 2 million. It is owned 30 percent by DIHS (a pool of Hamburg forwarders), 30 percent by DHU (an association of Hamburg Cargo-handling firms), 30 percent by DIHLA (a pool of Hamburg liner agents), and 10 percent by DIHL (a pool of Hamburg tally firms).

DAKOSY's policy is to adapt to whatever equipment and data format the user requires, performing whatever conversions are necessary to effect data pass-through. The system successfully links a wide variety of computers, including microcomputers, different models of mainframe IBMs, HP3000s, Wang, Honeywell-Bull, Siemens and PDPs. At the heart of DAKOSY, there is a configuration of two IBM 38 systems.

FIGURE 6



Source: Port of Bremen, West Germany

Bremen, West Germany, COMPASS

In December 1973, Datenbank Bremische Hafen (DBH) was formed in Bremen to develop COMPASS (Computer Oriented Management of Port and Shipping Services) to implement EDI at the ports of Bremen. Set up by 108 companies, including 57 forwarding agents (42 percent share capital), 4 port operating companies (38 percent share), 19 shipping agents (11 percent share), 14 stevedoring companies (7 percent share), and 14 other companies (2 percent share), with a total share capital of DM 120 million. By the end of 1974, following initial trials, DBH developed a "step by step" concept in collaboration with the Port of Hamburg (See Figure 6).

The first two steps dealt with exports and were put into practise in 1975 and 1978; imports were integrated later along with shipping agents, stevedoring and cargo control companies. The Federal Ministry for Research and Technology provided half of the development costs of over DM 20 million.

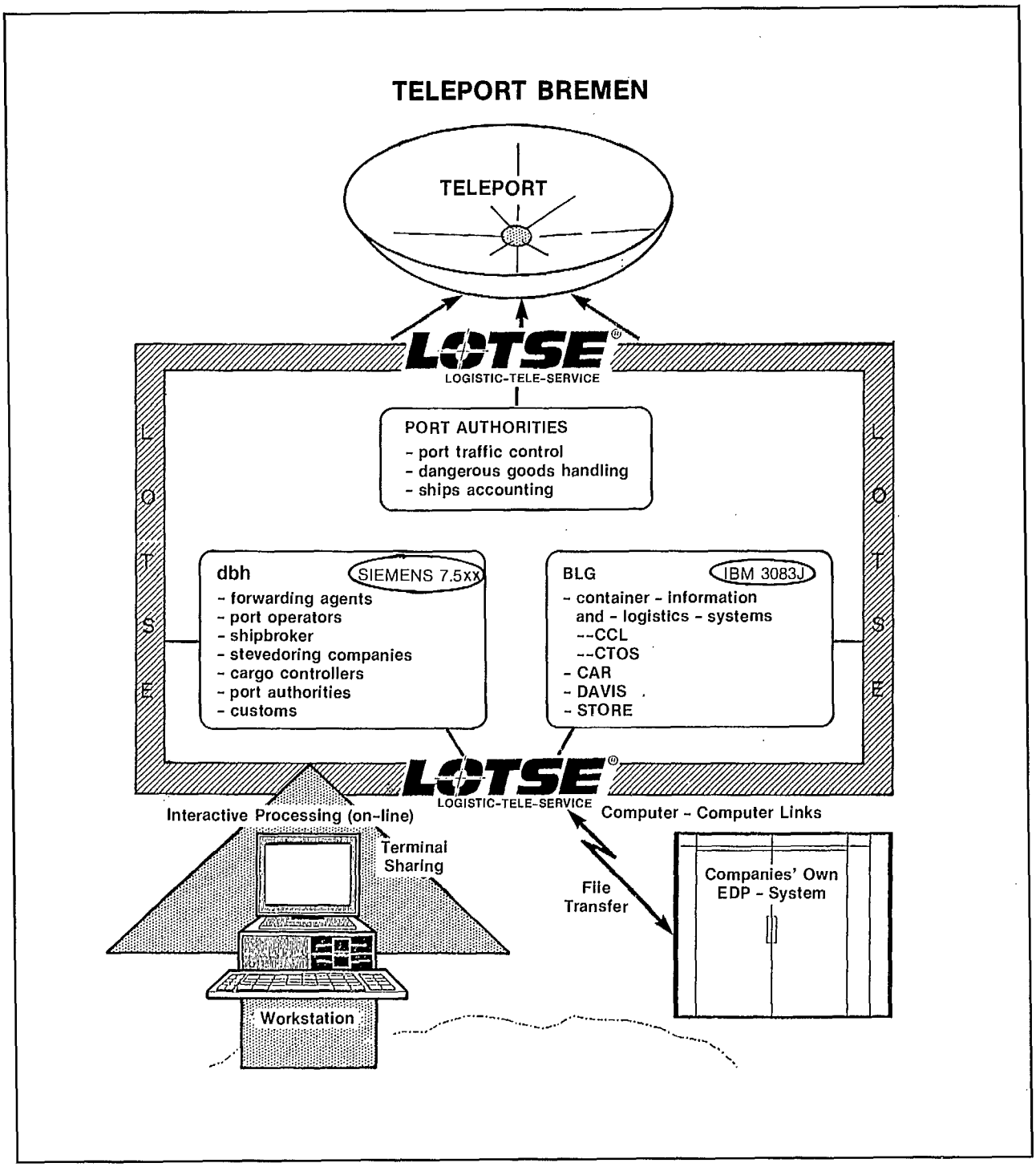
COMPASS allows the user direct access to the computer via a display screen. Display terminals, with connected printers, are installed at the individual companies and are permanently linked to the computer via Federal Post Office lines. There are 105 operations sites, 730 data terminals and microcomputers (directly connected to the Siemens CPU), 451 display screens and 179 printers. COMPASS stores master data for 600 ships relating to 350 ports for approximately eight weeks in advance, 4,500 addresses, 4,000 offers, 2,000 tariffs and 10,000 customers regulations. In 1988, it handled about 15 million transactions.

A large number of built-in checks and controls ensure optimum security of information. Data privacy is ensured by a multi-step control system with access codes.

There is a wide range of outward oriented, data processing logistic systems linked to COMPASS in Bremen. These include Bremen Lagerhaus-Gesellschaft's CCL for optimized container handling, CAR for automobile exports, STORE for import distribution, DAVIS for project shipments, etc.

Open communications are made possible by the LOTSE (Logistic-Tele-Service) interface, also developed by DBH. Since 1984, many different national and international data links have been facilitated by the LOTSE. This service has brought the "integration concept" to the transportation business. It permits the port operators in Bremen and Bremerhaven to set up a direct computer to computer link for their customers, not only with COMPASS, but also with the other logistic information services of the ports of Bremen.

FIGURE 7



Source: Port of Bremen, West Germany

Some of the characteristic features of LOTSE are:

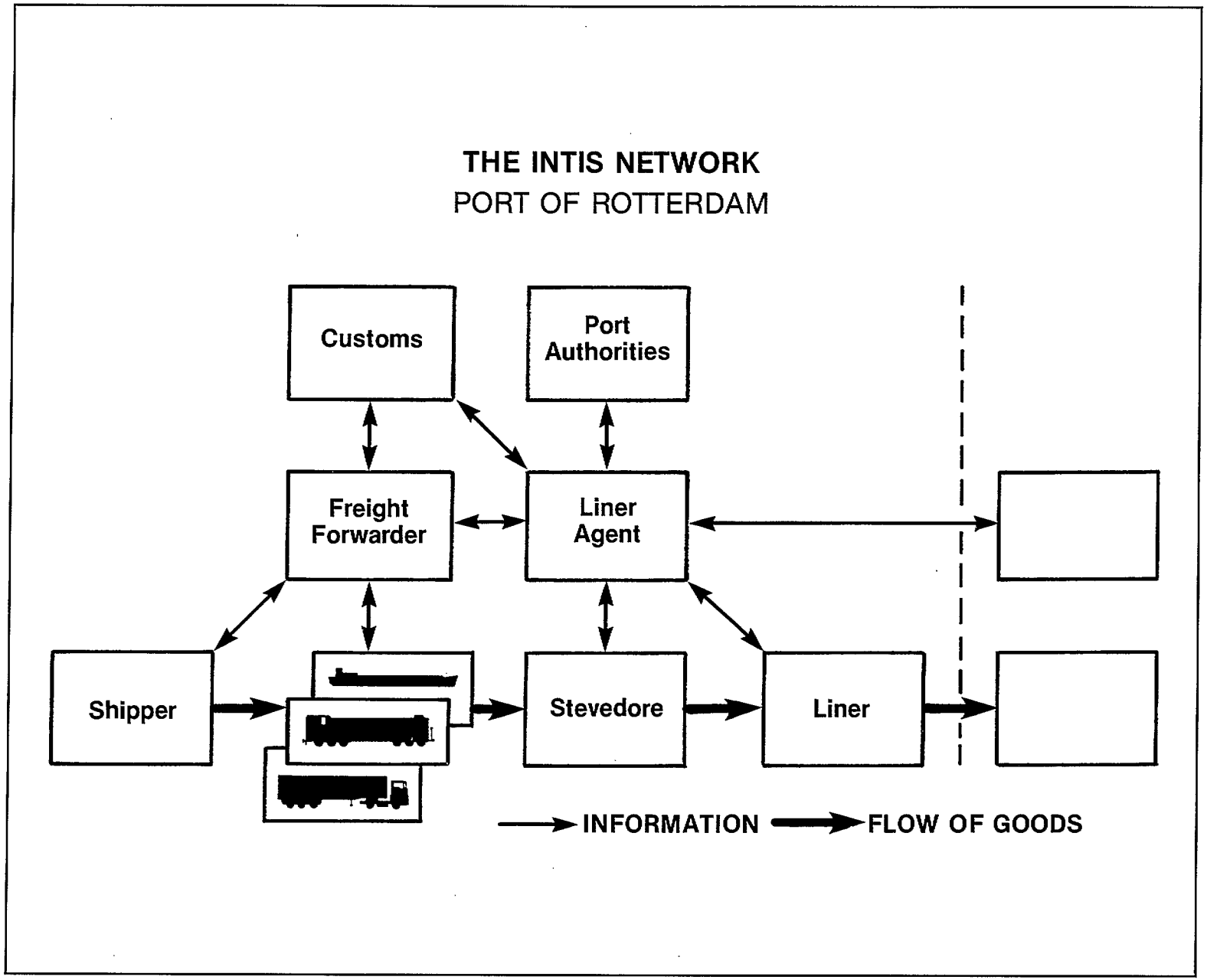
- It operates with all postal telecommunications services (PTT), for example, telephone network, non-switched network for direct calls, networks with line/packet switching (Datex-L, Datex-P), and data communications via satellites.
- It supports the character-oriented control procedures BSC or MSV 2 with the device protocol 2780, 3770 and 3780 or the bit-oriented control procedures HDLC or SDLC.
- It offers transaction processing connections for Transdata terminals (for example, Siemens 9775/9103) as well as SNA data terminals (for example, IBM 3270/3287) or compatible data terminals of other manufacturers.
- It communicates with data transmission software IBM, SNAVTAM, BTAM, TCAM as well as with Siemens DCAM, BCAM, TRANSIT-SNA/-CD.
- It follows ISO recommendations for open systems interconnection (OSI).

The advantages of this system are evident in that more and more forwarding, shipping agents and their customers in Germany and abroad, including such well-known names as Krupp, Peine Salzgitter, VEW/Vienna, Merck or Robert Bosch are using LOTSE. At present LOTSE sets up almost 1,200 computer to computer links (file transfer) every month. Connected into the system are 98 data stations with switchover facilities (terminal sharing).

In the export trade, the shipping agent processes the bill of lading data of the forwarding agents in the COMPASS system and produces the cargo manifests. Ocean freight rates are then calculated and freight manifests prepared using cargo data. This is done by means of communication programs using the same terminal and the agent's own programs on his own data processing systems. In the same way, the cargo and freight manifests are put together into "combined manifests."

Recently Teleport Bremen was created to connect Bremen with ports on other continents. An agreement signed with the Port of Singapore Authority in February 1989 will pave the way for the establishment of dedicated lines for electronic document forwarding, information exchange, telefax, electronic mail and other EDP related functions. Similar agreements with Hungary and the Port Authority of New York-New Jersey are underway. Teleport Bremen will act as a communications terminal to route information flow where needed, allowing smaller entities to plug into the global network of EDI services (see Figure 7).

FIGURE 8



Source: Port of Rotterdam, Netherlands

The costs of using COMPASS system are shared and depend on the extent to which the system is used by each subscriber. These costs are decided by the users themselves in a special committee.

Rotterdam, Netherlands, INTIS

In 1982, following a study by two consultants, the City of Rotterdam, together with regional and national governments set up a joint working group with private-sector employers and labour unions to direct a master plan for the computerization of port activities. There was a common belief that computerization was critical to maintaining and enhancing the Port of Rotterdam's competitive position. Rotterdam, Bremen and Hamburg are all transfer points for merchandise shipped to and from the European interior, including France, Germany, Switzerland and Belgium. In 1984, a decision was taken to implement the International Transport Information System (INTIS), at the Port of Rotterdam.

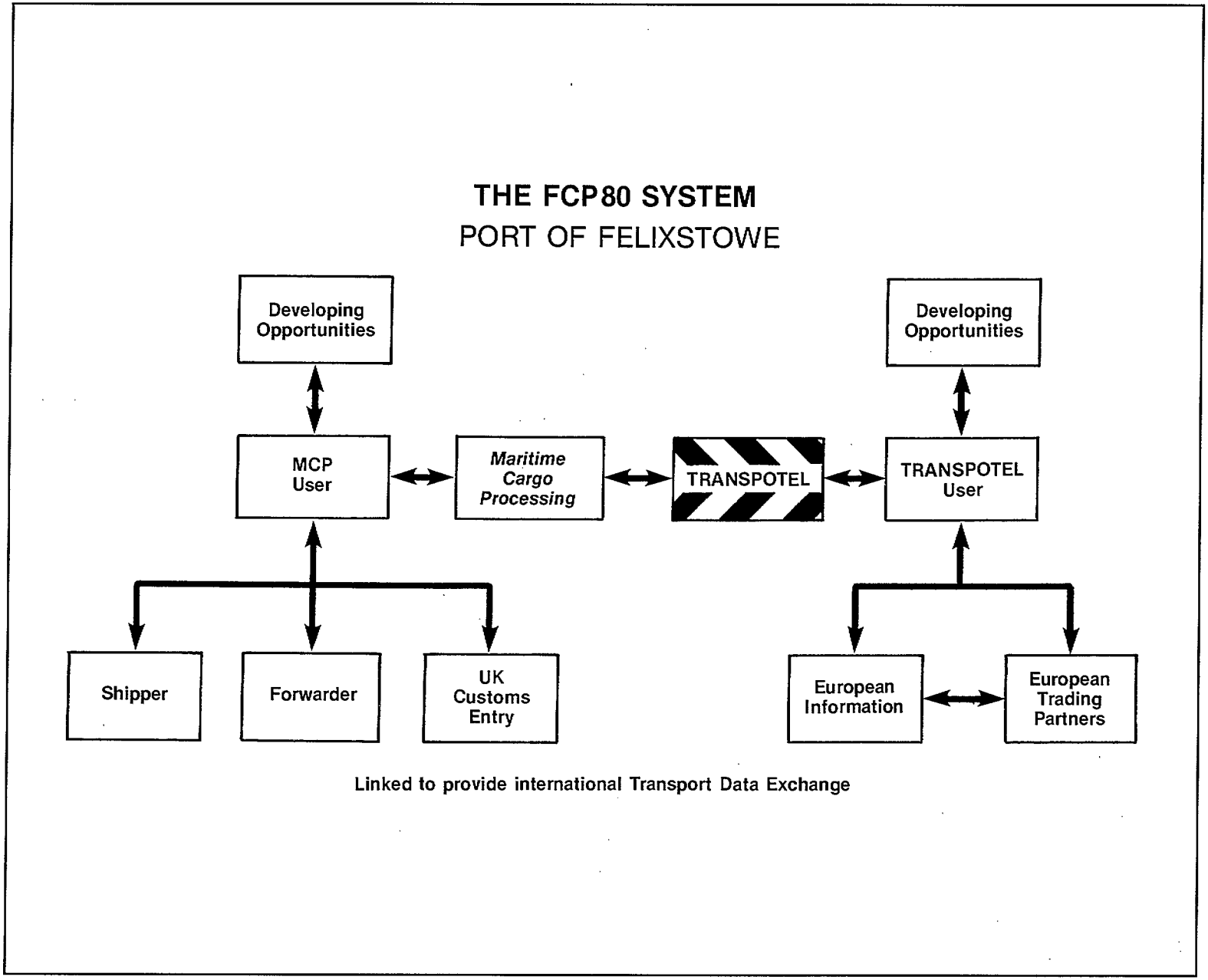
INTIS provides a store and forward message service of standard trade documents between forwarders, agents, stevedores, shipping lines, the port, customs and banks (see Figure 8). INTIS's design allows for communication of data, text, sound (voice) and images. Services provided include: core community system data communications, data translation, international telecommunications capabilities and electronic mail. It also performs document and protocol conversion between the dissimilar systems of its community of users.

The INTIS network uses facilities of the Dutch PTT Telecommunications Authority. To expand the possibilities available to users, links with CARGONAUT and SAGITTA have been established or are in preparation. CARGONAUT is the information system for the air cargo industry at the Amsterdam Airport and beyond. SAGITTA is Dutch Customs' automated system for import declarations.

Many other services in the master plan for INTIS are:

- an information centre providing 24-hour INTIS support and advice;
- terminal back-up;
- a library of computer programs (developed by INTIS or purchased, available with the INTIS communication network);
- training and user awareness (includes initial training, courses for users, etc.);
- a transportation monitoring management system;

FIGURE 9



Source: Lloyd's Transpotel, Colchester, U.K.

- an electronic monitoring information system (linked to financial and community exchanges);
- a supply inventory management system;
- access to databases – company, tariffs, regulations, ship movement, Lloyds and other ship registers, registration, transportation routes, etc.; and
- data processing services.

INTIS has created gateways to international computer networks: IBM and GEIS. It is now possible to set up links with other port systems such as Felixstowe's FCP80 (described later in this report). FCP80 is connected through TRANSPOTEL (developed by the United Kingdom, the Netherlands and West Germany, and by a group of freighting experts in Switzerland) to European trading partners. It gives insight into who in the United Kingdom and Europe is moving freight and who has freight capacity available.

One of the distinctive features of INTIS is that it supports the EDIFACT standards for data and message formats. This will enable INTIS to connect easily and cheaply (since not every connection will require customized programming) with its users and with other systems worldwide.

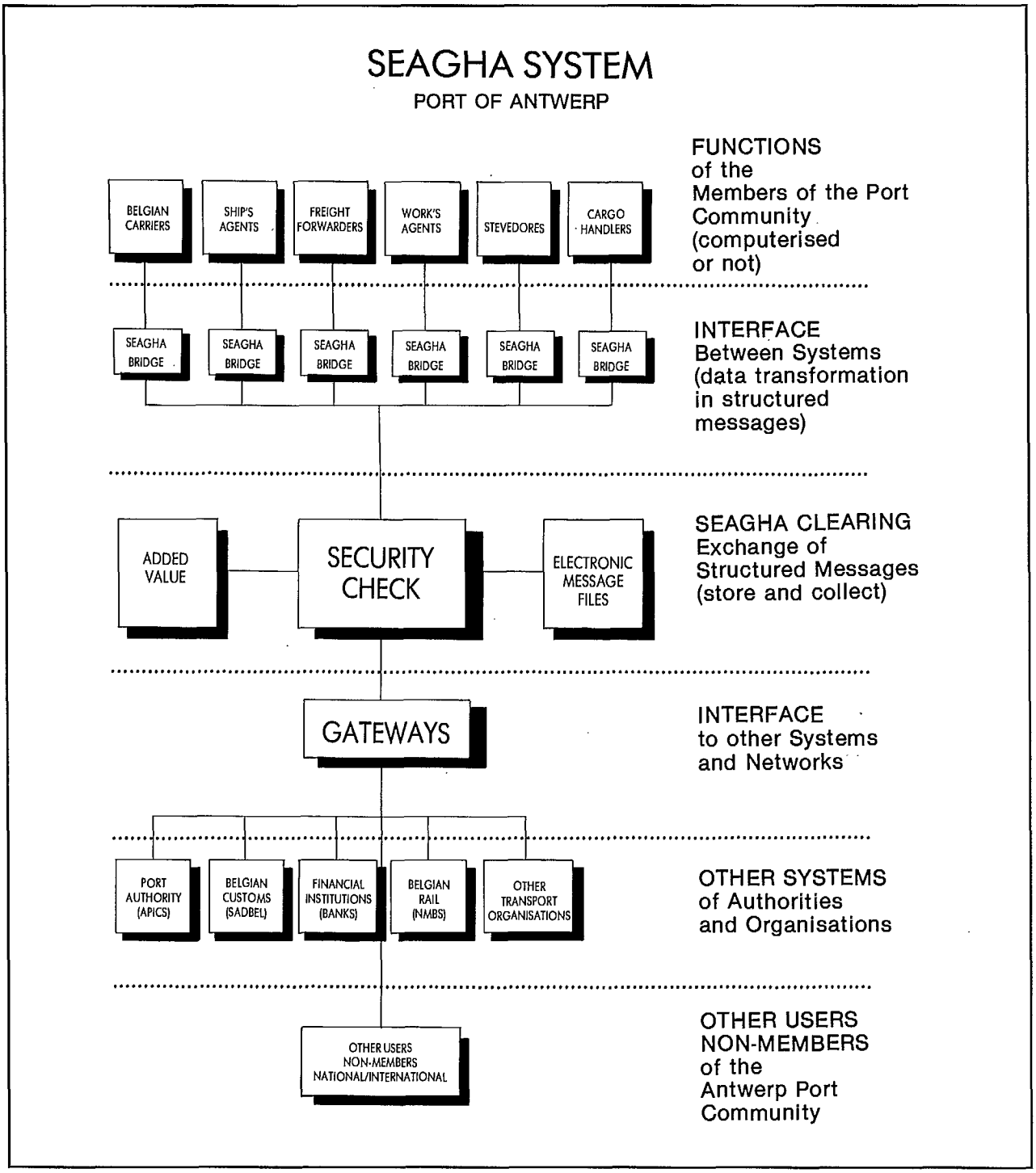
Formally incorporated as INTIS in August 1985, the initial share holders were the City of Rotterdam (including the port authority) at 40 percent, the PTT at 9 percent, private companies at 40 percent, and others at 11 percent. Sales of shares plus initial capital development grants from the Dutch Ministry of Economic Affairs Services provided start-up financing for the project.

Felixstowe, United Kingdom, FCP80

The FCP80 (Felixstowe Cargo Processing in the Eighties) system, developed by Maritime Cargo Systems, is an integrated operational and administrative tool for the Port of Felixstowe, UK, which owns and operates container terminals handling about 800,000 TEUs per year. The system is integrated in such a manner that all computerized activities are processed on the same computer and data is automatically passed from one activity to another (see Figure 9).

Designed by the port users themselves, Phase I of FCP80 was implemented in January 1984. With this system, trader information is directly input into HM Customs Departmental Entry Processing System. The system caters to every aspect of the UK Customs from entry through to automatic duty payment.

FIGURE 10



Source: Port of Antwerp, Belgium

Phase II, Inventory Control, became available in 1985. It provides a comprehensive range of information to facilitate and control efficient freight flows and reduce dwell times at all stages of movement. Computer files are created for each vessel due. FCP80 now has more than 350 company subscribers.

UK Customs clearance and documentation procedures are computerized for both import and export cargo movements. Other computerized functions include real-time container control via radio data transmission from cranes, ship-planning, stores, equipment, personnel, financial and cargo status.

The system has been very successful, as indicated by the extension of services to the neighbouring ports of Harwich, Ipswich, Lowestoft, Yarmouth and the Medway ports. The marine and airport communities in Scotland are coming on line in October-November 1989.

Another measure of success of the system is that the port has attracted several new shipping lines and forwarding agents to Felixstowe because of its quick customs clearance times. The system has also been sold to Australia for use in its ports.

A new 0.5 million pound sterling computer centre was recently built and 3 million pounds sterling have been spent on upgrading the original Honeywell equipment. EDIFACT standards are being incorporated.

Antwerp, Belgium, SEAGHA

SEAGHA (System Voor Elektronischn Aangepaste Gegevensuitwisseling in de Haven Van Antwerbe) was founded by the Antwerp Port Authority on October 28, 1986. It is a co-operative company comprised of six associations representing master stevedores, shipping agents, freight forwarders, shipping companies and ship owners. It is managed by a Board of Directors chosen from the participating associations and was started with a capital investment of BEF 7 million.

SEAGHA has been ready for use since early 1989 and provides its users, whether computerized or not, all means and facilities (programs, equipment and support) to convert data on documents into structured data sets in accordance with internationally recommended standards and to transmit these as messages to those who desire them. It allows users, who are already computerized, to participate in the system while retaining their own in-house system, program and data structure through a microcomputer interface. For non-computerized companies, modules are provided for data entry and storage (see Figure 10).

A network is provided by SEAGHA through the public telephone (PTT) system and a message dispatching centre. Electronic mail allows users to drop messages in various mailboxes belonging to a number of addresses. SEAGHA guarantees the confidentiality of the contents of the messages through a strict logic security as access is limited to the user's own mailbox. In future, users will be able to communicate with other systems and networks via gateways.

The cost of developing the SEAGHA system has been over BEF 70 million, financed by the members, a loan and the users. The cost will be recovered from the users through a start-up fee, charges for network use, program maintenance fees, code tables, and the sale of international standards and user manuals. Special rates will be applied for the use of the system beyond normal business hours for large volumes. Every user will bear the cost for the line connection with the SEAGHA.

The network, provided by the TELINDUS, is a combination of the PTT lines (leased/dial-up); IBM compatible microcomputers (XT to AT386), and others.

Leningrad, USSR, EDIFLOT

A pilot program called EDIFLOT is being initiated at the Port of Leningrad, USSR. This is to streamline and automate the financial reports currently transferred between shipping agents. The test program is structured under the EDIFACT standard. Major shipping lines, such as the Baltic Shipping Company as well as other federal services and their overseas agents and ministries of river, rail and road transport are to take part in the project. USSR Customs Authority is not yet involved in the project, although its operations are to be computerized soon.

Swedish Ports

Svensk Hamn Data, a company formed by nine Swedish ports to develop compatible EDP systems in Sweden's ports, is looking at the feasibility of setting up two EDI pilot projects as the first step towards the development of an integrated EDI system for Swedish transport. At present, the company is examining the needs of the port communities of Uddevalla on the west coast and Norrkiping on the east coast, with a view to establishing a joint structure for setting up EDI pilot projects. The lessons learned from these trials will be used for larger scale applications.

C H A P T E R T H R E E

AIRPORTS

Since air cargo is almost invariably of higher value, low weight, and more time sensitive than marine cargo, the air mode has led in the development and implementation of EDI systems at several airports in the world. Key players include carriers, brokers, forwarders, airport authorities and customs. Some of the major airport information systems, which have implemented EDI, are described in this chapter.

London, Gatwick and Manchester, United Kingdom, ACP80

London Airport Cargo Entry System (LACES) began operations in 1971 and was developed by British Telecom's National Data Processing Service (NDPS). The system design included two basic sub-systems. The first was a basic input system to UK Customs. It allowed customs personnel to enter import information provided by agents (no distinction is made in the United Kingdom between customs brokers and freight forwarders) into a departmental processing system that handled the basic customs functions of control and clearance. The second sub-system was a basic cargo control system for the carriers.

The original contract between NDPS and the airport community was for 10 years. Over the years, the system was modified repeatedly. For example, the original system only provided for import entries, but was expanded in 1977 to include exports. In 1979, the system was extended to Gatwick airport and in 1981 to Manchester. By the end of the 1970s, however, the user community had itself evolved. On the one hand, UK Customs had decided to develop a national cargo clearance system, including the air and marine modes, while some carriers had developed their own, integrated cargo control systems. Users in general had begun to ask for more flexibility and features. As a result NDPS undertook the development of a second generation system called Air Cargo Processing for the Eighties (ACP80).

ACP80 introduced a number of new functions. On the customs side, the entry facility was modified to allow direct trader input (DTI). Instead of requiring agents to bring their documents to customs where they would then be entered by customs officials, the agents could enter the required information directly themselves. The air mode system, called HM Customs Departmental Entry Processing System (DEPS B) began operations in October 1981.

A second, more primitive version, primarily because it lacked a DTI capability, called DEPS A was developed for the marine mode; it began operating in 1982.

The DEPS system provides valuable functions to UK Customs, and consequently to the transportation community. For transshipment, it matches packages imported with packages exported, and signals any that are unaccounted for after a certain period of time. It also allows the entry declaration to be made electronically; clearance (or any special conditions, such as package inspection, document inspection, etc.) is handled automatically by the system, and these or other requirements are signalled to the agent as soon as the entry is processed. Some 80 percent of all consignments are cleared immediately.

The heart of ACP80 is a system known as the Bureau, which provides inventory control facilities for imports and exports. It is also linked to DEPS. Equipment situated in users' own offices provides access to the Bureau, DEPS and airline systems.

Airline operators without their own in-house systems use the Airline System Bureau's (ASB) comprehensive inventory control facilities for import, export and transit cargo. Airline operators with their own cargo management systems use their own computers for inventory control, and use the Airline System Interface (ASI) to transmit consignment information to ACP80 and DEPS. Agents use ACP80 to access the inventory control information held in the Bureau and ASI systems and to monitor the movement of cargo through the airports, and through DEPS to provide an entry processing and clearance system for air and marine import cargo.

The medium for data communications is British Telecom's Public Data Transmission Service, a packet switching network.

In spite of many modifications to ACP80, NDPS had fallen behind in technology, features and cost. In 1986, a new system, UKAS, was designed to replace ACP80 and in addition to provide the speed, power and the possibility of storing and communicating free format information on a page-by-page basis. But, unfortunately, the UKAS system failed to function properly and, as a result, the project was abandoned. The original ACP80 was upgraded (called ACP90) to meet the current needs.

Paris, France, SOFIA

In 1972, French Customs established a project team to develop a computer system for international air cargo. With the assistance of a consortium of private sector consulting firms, SOFIA (Système d'ordinateurs pour le traitement du fret international aérien) became operational in July 1976 at the Paris airports of Orly and Roissy Charles-de-Gaulle).

Following the successful implementation and evaluation of SOFIA, certain system enhancements were undertaken to permit the application to be expanded beyond the air mode to principal road depots, railway stations and marine port

complexes. In 1978, other modes were added and the system's acronym was changed to SOFI 1. By 1985, SOFI 1 had been installed at 53 customs offices throughout France, processing over 40 percent of the national entry volume.

SOFI 1 did not include an automated customs cargo inventory system. It did, however, incorporate a direct trader input facility whereby subscribers to the system could create import and export declarations on a real-time, interactive basis by inputting data into a terminal linked directly with files of the customs information centre.

All costs associated with the development of the SOFI system by customs personnel, supported by private sector consultants, were assumed by French Customs. The operation and maintenance of the system is performed by customs personnel, with technical maintenance of hardware carried out by a team of technicians supplied by the manufacturer. The cost of operating the system has been shared equally between customs and the subscribers to the system. An agent, private importer or government agency may subscribe to have a SOFI terminal on their premises for their own use or for use jointly with another or secondary subscriber. Other shared facilities contracts exist whereby Chambers of Commerce or private companies manage a facility and provide terminals for the use of smaller firms that do not have the volume to warrant the exclusive use of a terminal.

The annual fixed subscription price for a terminal is approximately 20,000 F. The computer calculates automatically the number of transactions for each user and a statement is printed out to the attention of the principal subscriber.

Since 1980, the fee schedule has decreased as the system has been expanded to a large number of customs ports. Fees have also declined due to economies of scale and revenue generated from an increasing number of subscribers. French Customs has also assisted in the development of various versions of SOFI 1 in a number of other countries (for example, Egypt, Ivory Coast).

SOFI 2, a modification of SOFI 1, was implemented in 1984. This system provides the distributed minicomputer architecture necessary to extend the system's availability and capacity to process the volume of additional customs offices. It involves the replacement of obsolete hardware and software that has become increasingly difficult and expensive to operate and maintain. The new architecture integrates all existing customs automated systems so that all applications can be accessed through a single terminal simultaneously. The new architecture has increased the system's reliability, performance, expandability, back-up capability and ease of software changes through automated analysis and programming tools.

By 1991, French Customs plans to have an automated interface with certain foreign countries. A possible scenario for this exchange could consist of a French agent creating an export declaration on the SOFI 2 system. This data would be transmitted to the UK system and an "accepted" message returned. A hard copy of the export declaration would be printed out and would accompany the shipment to the United Kingdom. There the additional or incremental data elements required for the import declaration would be added to the export declaration record via a UK system terminal to create a goods declaration. The data would be processed and, once accepted, the UK terminal would print out the hard copy entry declaration to be signed and presented to UK Customs with all required supporting documentation.

Frankfurt, West Germany, ALFA

In 1978, an automated airfreight clearance system (ALFA) was introduced at Frankfurt Main Airport. By the end of 1984, ALFA had also been implemented at Stuttgart and Munich airports. The system allows importers, agents, freight forwarders and carriers to transmit cargo and import declaration data directly from their in-house automated systems to ALFA. Alternatively, subscribers to the system may lease an ALFA terminal linked directly to the customs system through which cargo and goods declaration data can be entered. All the air freight brought to Frankfurt Main Airport from abroad is processed through ALFA.

PAN AM, Flying Tiger, Swiss Air, Air France, Trans-Mediterranean, SAS, British Airways and KLM input cargo information into ALFA through a leased terminal. Lufthansa has a direct automated interface between their internal cargo control system and ALFA; British Airways and KLM are both studying this alternative. Currently six agents at Frankfurt have an automated interface between their entry preparation systems and ALFA, while two agents are leasing ALFA terminals. Another 30 agents at Frankfurt have recently made applications for the system. Approximately 70 freight forwarders in Germany currently use the system. The firm LUG, which operates a central private warehouse in which all imported shipments (excluding transshipments) are stored, has direct access to the system for the purpose of checking that the goods have been cleared by customs.

The system's development was funded by German Customs utilizing both in-house staff and private sector consultants. The cost of leasing an ALFA terminal, including a pro rated portion of the cluster controller and for the communication line to the subscriber's premises, averages approximately 1000 DM/month. German Customs provides a free public facility at the Frankfurt airport where the importing community can manually key-in data using ALFA terminals.

All users of ALFA are provided with a magnetic card through which system security is maintained. By placing the card through a reader slot on the keyboard, the system verifies the user's identification. No user password is required by the system. ALFA has the capability of terminating a user's access if certain procedures are not followed or if unauthorized access is attempted. All transactions are recorded in the system by user identification number; therefore all transactions can be monitored or traced.

For those importers and agents capable of direct transmission, entry data for dutiable goods may be transmitted to ALFA after the arrival of the aircraft. Currently at Frankfurt Main Airport, eight importers/agents provide entry data to customs via ALFA. Input from three firms, including the air carrier SAS, is carried out in real time using ALFA terminals located at their premises. The remaining five firms use their own entry preparation system to create their import goods declaration. As entry records are created, they are stored in the importer/agent system, then transferred to ALFA for processing.

With the successful implementation of ALFA at Frankfurt, Stuttgart and Munich, the system was extended to Cologne in 1985, Dusseldorf and Hamburg in 1986, followed by Berlin and Hanover in 1987. Cargo control, entry processing equipment, as well as terminals are Siemens.

Tokyo and Osaka, Japan, NACCS

NACCS (Nippon Air Cargo Clearance System) is an on-line system that automates the import and export clearance procedures of Japanese Customs, as well as related private-sector business processes (for example, inventory, calculation of freight charges, storage charges, etc.) for air cargo handled at Narita (Tokyo) and Itami (Osaka) airports. The system incorporates the requirements of Japanese Customs, airlines, bonded shed operators, customs brokers, consolidators, air cargo agents and banks.

The concept of an automated air cargo import clearance system was initially studied by the Japanese Ministry of Finance in 1971. During 1974-75, customs in Tokyo studied these concepts in detail and decided to solicit the participation of the private sector in the design of the system. In 1976, the Nippon Telegraph and Telephone Public Corporation (NTT) was commissioned to design, construct and maintain the system. In October 1977, the Nippon Air Cargo Clearance System Operations Organization (NACCS Centre) was established by a special law passed by the Japanese Parliament. Under the supervision of the Ministry of Finance, this organization was made responsible for the computer operation, installation and control of terminals in users' offices, compilation and distribution of various statistical reports to users, and maintenance and control of data and files.

In August 1978, the import system, which covers the cargo inventory control and goods declaration processing, became operational at Narita Airport and Baraki where the Tokyo Air Cargo City Terminal (TACT) is located. By November 1980, the system was extended to Osaka's Itami Airport. NACCS allows airlines with in-house systems to transfer cargo data directly by means of flexible disk or paper tape. Other airlines create a cargo inventory in NACCS by entering air waybill (AWB) data into a NACCS terminal located on their premises. Cargo data is subjected to customs selectivity to identify high-risk shipments.

NACCS has a facility whereby brokers can create import entry declarations by inputting data directly into a NACCS terminal located on their premises. NACCS also interfaces with banks so that duties and taxes payable can be transferred automatically from the importer's or broker's account to customs.

In April 1981, an Export Air Cargo Computerization Study Group was formed with a mandate to study problems associated with export air cargo, verify the need for an automated export system, and propose a conceptual design for an export system that would be integrated into NACCS. Based on the group's findings an Export System Development Promotion Council was organized to promote the development of an export air cargo system. By January 1985, NTT had designed and implemented into NACCS an export processing component.

Funding, totalling 80 million yen, to create the NACCS Centre was supplied jointly by both public– and private–sector users. NACCS' operating costs include rental charges for the system (hardware, software, maintenance, communication circuits), the terminals, and also running costs. These costs are shared by each

user group according to a pre-determined usage formula. In order to determine the cost split between customs, airlines, bonded shed operators, consolidators, customs brokers, air cargo agents and the banks, the gross volume of system usage of each sector is calculated based on system usage frequency for each job function. The current apportionment breakdown is customs 63 percent and private sectors 37 percent.

Smaller firms often contract-out their import/export data input to larger firms having the economies of scale instead of using a NACCS terminal. Alternatively, a small scale user can use a NACCS public terminal located in the NACCS centre offices for a fee of 1,000 yen per declaration.

NACCS operating costs to be covered by system usage charges for the eight year period from 1985 to 1992 are estimated at 25 billion yen.

All NACCS computer centre's hardware and software is owned by NTT and use the NTT J3077A mainframe facility designed by Nippon Electronic Company.

There is a direct interface on export between the NACCS computer centre and seven in-house systems with 286 terminals located at Baraki Air Cargo City Terminal, 139 at Narita Airport, 29 in Tokyo area, 140 at Itami and 14 in Osaka area.

Japanese Customs and customs brokers are currently studying the feasibility of a similar automated clearance system for marine cargo.

Hong Kong, HACTL

Hong Kong Air Cargo Terminals Ltd. (HACTL) is the handling agent for all cargo carrying airlines operating in Hong Kong. It operates one of the largest air freight complexes in Asia. The company was first registered in December 1971 with its five shareholders being Jardine, Matheson and Co. Ltd.; The Swire Group, which also owns Cathay Pacific Airways; Hong Kong and Kowloon Wharf and Godown Company Ltd.; Hong Kong Whampoa Dock Company Ltd. and the Hong Kong Government. HACTL was formed with the express purpose of operating a consolidated air cargo terminal at the Hong Kong International Airport. Having been granted a franchise by the government for the handling of all air cargo at Hong Kong Airport, HACTL commenced operation in 1976.

In 1976, 177,000 tonnes of air cargo was handled at Hong Kong Airport. By 1984 this had grown to over 417,000 tonnes. This 1984 air tonnage was valued at over HK $40 billion or 28 percent of Hong Kong's total value of exports. While the terminal has served up to 198 cargo carrying flights in a single day, it is important to note that only 40 percent of HACTL's tonnage is carried by freighter aircraft. The remaining 60 percent of cargo is transported on passenger aircraft. Today 92 percent of all air cargo through HACTL is containerized, with the most important outbound commodity being articles of apparel and clothing accessories.

To complement its sophisticated physical handling facility, HACTL developed a cargo inventory-control computer system that contains shipment information for all import, export and transshipment cargoes carried by the airlines at Hong Kong Airport. This system, known as COSAC, was primarily designed and implemented by consultants hired by the Swire Group in consultation with the air carriers. COSAC operated on Swire computers from 1977 until February 1980 when the operation of the system was transferred to HACTL computers.

Although the primary system users are HACTL and the airlines, Hong Kong Customs is able to access data within the system and input examination/clearance status. The system, however, does not afford Hong Kong Customs with any capability for automated selectivity.

Because Hong Kong is free port with duties and taxes only levied on a limited range of commodities (for example, alcohol, tabacco, petroleum/hydrocarbons, cosmetics, etc.) the COSAC system does not encompass any customs functions related to import/export declaration processing or associated accounting processing. Hong Kong Customs views itself as primarily an enforcement agency. COSAC is therefore looked upon as an efficient vehicle by which Hong Kong Customs can access cargo data in order to take decisions on enforcement-related actions. Given this unique free-port environment, customs procedures have been streamlined and simplified. A close and co-operative rapport has also developed between HACTL personnel and customs.

In terms of user involvement in the operation of the COSAC system, a policy group made up of senior airline managers and HACTL representatives exists to oversee the performance of the system. The group also discusses cost-sharing arrangements proposed by HACTL and through a recently formed Cargo Information Exchange Scheme Working Sub-Group studies future interface enhancements to COSAC.

C H A P T E R T H R E E

HACTL has viewed itself as a complete cargo handling service with the automated COSAC system being an inseparable part of that service. Therefore no separate charges are levied for the use of COSAC. Costs to operate and maintain the system are integrated within tonnage charges levied by HACTL for cargo handling. No storage charges are levied if cargo is removed from the terminal within 48 hours. If an airline requests additional hardware that HACTL feels is unnecessary, the airline may rent a HACTL terminal for a fixed incremental fee. Their lines also absorb any SITA (Société Internationale de Télécommunications Aéronautiques) telecommunication charges related to the receipt or transmission of cargo information over this airline network. Hong Kong Customs is supplied HACTL terminals without charge.

The Hong Kong Air Cargo Terminal's system provides a cargo inventory control facility for 39 airlines. Currently five airlines (CX, KLM, Swiss Air, JAL and British Airways) with automated in-house cargo inventory systems are capable of interfacing with COSAC through the airlines' SITA telecommunication network. These airlines transmit cargo data to COSAC in a telex-level form up to eight days in advance of the scheduled arrival of a flight at Hong Kong Airport. A software package takes the teletype messages received from airline systems and unpacks them for further processing into a VDU entry format acceptable to COSAC. The volume of cargo data transmitted to COSAC represents approximately 50 percent of the cargo volume processed by COSAC. This capability for airlines to interface directly with COSAC came into existence in February 1985. At least one other airline plans to interface with the system in the immediate future.

The COSAC system has a facility by which HACTL can book, receive, build-up cargo and create export manifests. Efforts are also under way that will allow the COSAC system to accept export cargo data directly from airline in-house systems. Hong Kong Customs does not currently use COSAC for any export control functions.

The Hong Kong Trade Facilitation Council, in conjunction with HACTL's Cargo Information Exchange Scheme Working Group, is investigating the feasibility of introducing a "Standard Interchange Facility" (SIF) in Hong Kong. Although only in the conceptual stage, this "Hotline System" would provide a facility to link all parties involved in the import/export process. It is the objective of the Hotline System to operate within a reasonable time frame in a paperless environment.

Dublin, Ireland

A consortium of airlines and cargo agents at Dublin Airport plans to implement an electronic data interchange service at the airport by the middle of 1989. This is to address the opening of trade frontiers that is taking place within the European Economic Community.

A request for proposal for a new EDI network service was issued by Cargo Community Systems (CCS), a company based at Dublin Airport. The CCS is a consortium led by four airlines (Aer Lingus, British Airways, Lufthansa and Ryanair) and 14 cargo agencies set up to implement an electronic data interchange facility at Dublin Airport. By the middle of 1989 inter-company messages and information from the air waybills will be circulated on line through this system. Automatic protocol conversions will allow data to flow smoothly from airline mainframes to cargo firms' computers. At a later date it is expected that the CCS facility will be extended to computerize much of the document handling involved in international cargo transport. The CCS also wants to comply with EDIFACT standard because the forthcoming customs systems for Europe will be using this standard.

C H A P T E R F O U R

CANADA

Canada has many proprietary EDI systems in the transportation field, but to date none that could be called a community system. An attempt is now being made to introduce EDI community systems in Vancouver, Halifax and Montreal.

In Vancouver, CANSIF Canada Enterprises Inc., a non-profit corporation established in 1988, is developing a multi-modal, national EDI system for processing documents associated with cargo movements for the Canadian transportation industry.

CANSIF's Stage 1 development plan was to initiate and demonstrate the cost effectiveness of services by implementing a national pilot for air and marine. The $1.2 million budget consisted of a federal government contribution of $500,000 and a CANSIF contribution of $700,000. CANSIF's share was provided mostly by its founding members, who are Air Canada, Asia Pacific Foundation of Canada, Canadian Airlines International Ltd., Canadian International Freight Forwarders Association, Empire Stevedoring Ltd., Fraser River Harbour Commission, Livingston Group Inc., and Vancouver Port Corporation.

CANSIF's services are being initiated for air and marine simultaneously through a national pilot that began on October 16, 1989. In total there are 23 sites involving 17 major transportation firms operating in Canada. The cities initially included are Montreal, Toronto, Ottawa, Calgary and Vancouver.

Message services initiated for air include waybill, reservations, status check, and acknowledgment. Message services initiated for marine include bill of lading, advice note, and wharf receipt.

For both pilots, CANSIF is using international EDI standard messages that are compatible with intermodal freight movements. In its field trials, it is incorporating TDCC and EDIFACT standards for its marine, trucking and rail messages and the Cargo-Imp protocol for its air messages.

In the field trials, Canada Customs sends cargo release notification reports to CANSIF by downloading information into a telecommunications network provided by General Electric Information Services (GEIS) of Rockville, Maryland. The information is transferred through an electronic mailbox system to which Canada Customs and CANSIF have access.

CANSIF is a user-owned organization and it will act as a clearing house for Canadian EDI messages in the transportation field. It has recently entered into an agreement with Transact Data Services Inc. (TDSi) of Toronto, to provide technical support and services for its pilots. TDSi, in turn, has signed an agreement with Data Dispatch Corporation, McLean, Virginia to let TDSi distribute its newly updated EDI/SYNAPSE software package in Canada. The goal is to develop a national, multi-modal, EDI system for the Canadian transportation community for both domestic and international shipments.

Similarly, EDIPORT Atlantic was formed in Halifax to meet the information needs, through implementation of an EDI system, of the Halifax marine community. A consultant's report was prepared, with federal and provincial government assistance, to assess the user's needs and to recommend a viable EDI system for the ports' community.

As well, EDI initiatives at the Port of Montreal are under consideration by a group of senior executives from user firms and both the federal and provincial governments. The aim of this group is to determine the needs and requirements of the Montreal transportation community and to determine the optimum way of meeting those needs.

CHAPTER FIVE

AUSTRALIA

Australia is attempting to move quickly to implement EDI in its transportation system. In 1989, it established TRADEGATE Australia on the recommendations of the Inter-State Commission National Communication Working Committee on Cargo Movements. TRADEGATE is a non-profit company owned and operated by private and public transport industry organizations. Its mandate is to develop the most efficient and cost-effective data exchange and information services for Australia's trade participants. Services will be available to all companies in the shipping, transport and associated industries. There will be no dominant group; and common services will be provided to help all members increase their competitiveness.

TRADEGATE's EDI system, when developed, will operate via the Paxus Comnet network, linking participants throughout Australia with each other and with their overseas trading partners in North America, Europe and Asia. The objective is to increase efficiency and reduce paperwork by improving communications between carriers, ports and terminals.

The new system will help in the electronic preparation and transmission of standard forms such as invoices, manifests and customs entries together with access to related services, including electronic mail. The aim is to capitalize on EDI's real savings by avoiding duplication, fragmentation and by preserving confidentiality of information.

TRADEGATE will be concerned mostly with transferring, rather than storing, information. Users will not be able to "poll" data. Information will be sent only to the recipient identified by the sender. Access by users will be limited to the exchange of information among trading partners.

Subscribers will not need any major new equipment. They will be able to use existing telecommunications links and standard computer hardware. Small business will be able to link standard microcomputers to the network via an ordinary telephone connector using a modem or acoustic coupler.

Over 2000 members of the Australian trade and transportation community have put up A$1 million to make the TRADEGATE plan a reality.

CHAPTER SIX

CONCLUSIONS

In general, there is tendency on the part of airports and seaports to develop their own systems unique to their own requirements and the clientele they serve. One reason for their uniqueness may be the lack of common international standards such as the EDIFACT. There are, however, cases where systems developed at London, Frankfurt and Paris airports were later adopted at other airports within these countries. But the fact remains, the uniqueness of a system at a given port often creates difficulty for those shippers and carriers who use more than one port in their business.

Larger companies tend to have less need for port service centres as they have, in many cases, their own well-developed EDI systems. On the other hand, small companies do depend heavily on port service centres as they do not have a sufficient degree of computer capability or resources.

In general, there are two basic port information models in use. One, where all activities regarding trade and transportation data interchange facilities are financed, controlled and managed by a port authority, and the second, where the port authority is one of several sponsors of the system and participates actively in a port information system while the local trade and transportation community owns and controls the service centre. Most of the port information centres are sponsored, funded and/or operated by the local or regional port authorities (Miami, New Orleans, etc.). The exceptions include, among others, INTIS in Rotterdam, COMPASS in Bremen and DAKOSY in Hamburg.

In terms of common issues, aside from the lack of international standards, one of the most prevalent issues is that of system security. Confidentiality of data is an absolute requirement for all system users, and all development initiatives will have to address this aspect.

The system architecture generally falls into two categories, that of a complete operational system whose databases control the vast majority of functions within the community (FCP80 for example), and a system providing the network store and forward services only, while allowing users to maintain their own applications (SEAGHA for example).

It should be noted that cost comparisons between systems developed and used by various ports cannot readily be made. The needs of users

and the state of technology available at the time of development, which in concert drove the system architecture and design, were all based on the optimal solution for that location at that point in time. Comparisons cannot be made without detailed analysis of what the product provided for the users per dollar. For instance, comparing the cost to develop FCP80 in the United Kingdom to that of ACES in the United States, without comparing functionality and users' requirements would not be reasonable.

INFORMATION SOURCES

1. DAKOSY Data Communication System
   Port of Hamburg
   Crimon 9
   2000 Hamburg
   West Germany

2. INTIS Electronic Data Interchange for the Transport Industry
   INTIS B.V. Europoint IV
   Marconistraat 16
   NL-3029
   AK Rotterdam

3. Maritime Cargo Processing
   Orwell House
   Ferrylane, Felixstowe
   Suffolk, UK

4. TRANSPOTEL with Maritime Cargo Processing
   Orwell House
   Ferrylane, Felixstowe
   Suffolk, UK

5. Integrated Port Information System
   Maritime Cargo Processing
   Orwell House
   Ferrylane, Felixstowe
   Suffolk, UK

6. SEAGHA, System for Adopted Electronic Data Interchange in the Port of Antwerp
   Antwerp, Brouwersvliet 33 bus 8
   B-200 Antwerpen, Belgium

7. FCP80 at the 16th IAPH World Ports Conference and Exhibition
Miami, April 23-28, 1989
Maritime Cargo Processing PLC
Orwell House
Ferrylane, Felixstowe
Suffolk, UK

8. West Coast Ports Launch Program to Develop
Own EDI Network
Golden Gate Ports Association
EDI Monthly Report
Congressional Information Bureau, Inc.
1325 G Street, N.W.
Washington, D.C. 20005
April 1989

9. Three Canadian Ports to Launch EDI Projects
Andrew Tausz
Journal of Commerce
November 14, 1988

10. EDI and Port Service Centre Systems
Canada Ports Corporation
EDI Council of Canada Forum, November 9, 1988
Toronto, Ontario

11. U.S. Ports Lead Move Toward Documentation Automation
Jon Jacobs
Trade Facilitation 1 (1987) 40-41
Elsevier Science Publishers Ltd. UK

12. EDI in International Trade and Transport: Economic Advantages
Hank Van Maaren, CETIMA Consultancy, Trade Facilitation 1 (1987)
22-24, Elsevier Science Publishers Ltd. UK

13. Comprehensive Facilities, Database for O'Hare International Airport
Jeff Bloom, Envirodyne Engineers, Inc.
222 West Adams Street
Chicago, Illinois, USA

14. EDI Comes to Ireland
Irish Computer
September 1988

15. Electronic Data Interchange
A Survey of Developments Related to Trade/Transportation Data Interchange Facilities.
P.K. Neogi, Communications Canada
January 1988

16. Miami International Cargo System
Computer Sciences Corporation
6565 Arlington Blvd.
Falls Church, Virginia, USA

17. CRESCENT Overview
The Port of New Orleans
P.O. Box 60046
New Orleans, Louisiana, USA
August 8, 1988

18. INFOPORT, A System for Automated Cargo Control (Miami)
Computer Sciences Corporation
6565 Arlington Blvd.
Falls Church, Virginia, USA

19. The Potential for INFOPORT Montreal
Secor
January 1987

20. The Automated Cargo Expediting System (ACES)
Larry Sposi
The Port Authority of New York and New Jersey
December 21, 1988

21. New York-New Jersey Port Authority Scraps Automated Cargo Plans at JFK
Ira Breskin Journal of Commerce
April 6, 1989

22. ACES, Now Commercially Available to Maritime Interests Serving NY/NJ
Robert P. Casalas
EDI Monthly Report, May 1989
A Publication of the Congressional Information Bureau
Washington, D.C.

23. EDI Committee on Felixstowe
Canada Ports Corporation, Ottawa
April 1989

24. Interface between the Automated Systems of Customs and Carriers (Air Model), A Joint Customs Cooperation Council/International Air Transport Association Project
Draft Report on Existing Systems
February 1986

25. German/U.S. Port EDI Link Under Consideration, CSX Transportation
EDI Monthly Report, May 1989
A Publication of the Congressional Information Bureau
Washington, D.C.

26. Singapore's TradeNet Being Opened to More Government/Industry Utilization
Metro-Mark Integrated Systems Inc.
EDI Monthly Report, May 1989
A Publication of the Congressional Information Bureau
Washington, D.C.

27. Port Service Centre Systems at Felixstowe, Rotterdam and Antwerp
Report to the Ports Canada EDI Committee
Jean Lesperance
Canada Ports Corporation
May 17, 1989

28. The Ports of Florida
Global Trade, May 1989
P.O. Box 13219
Philidelphia, Pennsylvania, USA

29. Datenbank Bremische Hafen GmbH
Documentation About the COMPASS System
Port of Bremen, West Germany (undated)

30. Your Partner for Telecommunications and Data Processing in Logistics
Datenbank Bremische Hafen GmbH
Port of Bremen, West Germany (undated)

31. LOTSE, Open Telecommunications with the Ports of Bremen
West Germany
(undated)

32. Teleport Bremen
Port of Bremen
Bremen, West Germany
(undated)

33. PORTUS
The Ports, EDI and International Trade
Helge Kittlesen
EDI, Special Issue on EDI
Canada Ports Corporation, Ottawa
Winter, 1989

34. RACERS, Regional Automated Cargo Expediting and Release System
Golden Gate Ports Association
San Francisco, California, USA
(undated)

35. RACERS, A Standard Approach to a Regional Community Cargo System
Golden Gate Ports Association
San Francisco, California, USA
August 8, 1989

36. Automation, Diversification Busswords at Jacksonville
Kay Pinckney
Journal of Commerce
(date is not available)

37. TRADEGATE Australia, An Electronic Communications Network for Australia's International Trade Community
Andrew Robertson
P.O. Box R986 Royal Exchange
Sydney, Australia
(undated)

38. Southern California ACCESS, Automated Commercial Cargo Expediting and Search System
Port of Los Angeles, Port of Long Beach and Los Angeles International Airport
(undated)