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EDI Opportunities at the Military Sealift Command

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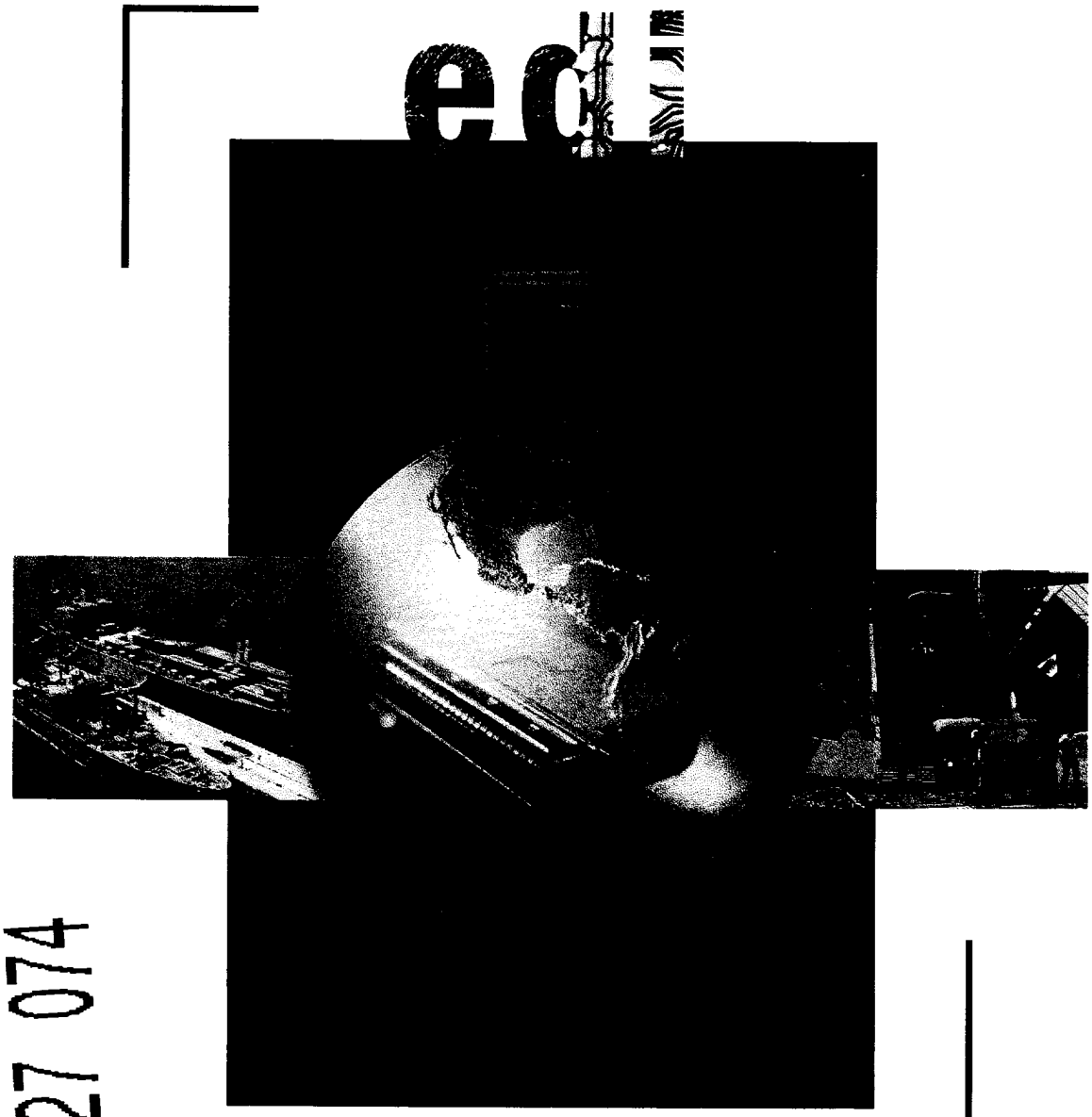

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Harold L. Frohman
James E. Cotterman

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January 1997

Harold L. Frohman
James E. Cotterman

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Logistics Management Institute
2000 Corporate Ridge
McLean, VA 22102-7805

Executive Summary

The Department of Defense is aggressively implementing electronic data interchange (EDI) to eliminate costly paperwork. The Military Services, Defense Logistics Agency, U.S. Transportation Command and its component commands, and the Defense Finance and Accounting Service have built or modified automated systems to support the electronic exchange of transportation information. The benefits of an electronic business environment include streamlined operations, improved communications, and more efficient operations.

Using criteria that both the private and public sectors frequently employ, we examined 14 business areas within the Military Sealift Command (MSC) for potential application of EDI techniques. We eliminated eleven of these business areas as candidates for EDI. Four business areas (special missions, ship support, dry cargo, and mobilization sealift) had low transaction volumes and most of their trading partners were not EDI capable. We eliminated four other business areas (nonfuel petroleum products contracting, ship construction and repair, non-small-purchase contracting, and voyage and time charter contracting) because telecommunications costs would negate any business savings. However, for these business areas, alternative electronic commerce methods, such as use of the Internet, may yield significant savings to MSC with minimal investment. We also eliminated two other business areas (tanker operations and nonfuel petroleum products delivery orders) as EDI candidates because the anticipated savings totaled only $10,000, which could not justify the investment of time, money, and personnel needed to achieve them. Finally, we eliminated the small purchase contracting business area because of its planned move to the Naval Supply Systems Command's Fleet and Industrial Supply Centers.

Of the three remaining business areas, we found that only one is economically justified. We recommend that MSC use EDI to process ocean cargo invoices and payments. By doing so, MSC would save more than $1.4 million in direct costs and another $1.7 million in reduced interest charges over the next 10 years.

In one of the final two business areas (commercial invoices), MSC is testing the use of EDI for nonfuel petroleum products invoices. However, our analysis shows

that an EDI investment in this area is not likely to result in major savings. Consequently, we recommend that MSC carefully review the test results before it expands the initiative to all commercial invoices. In the last business area (liner agreements process), MSC and the Military Traffic Management Command are planning to reengineer their associated business processes. We recommend that MSC consider EDI as one of its key tools for reengineering the liner agreements process.

By focusing its EDI investment dollars in the invoice processing and payment business areas, MSC will be able to streamline its operations and experience significant savings over 10 years. In addition, MSC's key trading partners, including U.S. flag carriers, will also reap the benefits of increased efficiencies, reduced costs, and prompt payments.

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Chapter 1
Introduction

PURPOSE

The Department of Defense is implementating electronic data interchange (EDI) on a widespread basis. The military services, Defense Logistics Agency, U.S. Transportation Command (USTRANSCOM) and its component commands, as well as the Defense Finance and Accounting Service (DFAS) have built or modified automated systems to permit the electronic exchange of transportation information. These exchanges are designed to streamline operations, improve communications, and enhance operational efficiencies. These are also the premises of the *Military Sealift Command (MSC) Reinvention Implementation, February 1996*, as well as its *Electronic Commerce (EC) Electronic Data Interchange (EDI) Implementation Plan, Version 1.0*, dated 6 March 1996.

This report presents an analysis of EDI opportunities to guide MSC in implementing its EDI program. It identifies the most promising opportunities for applying EDI, analyzes the life-cycle benefits and costs of those opportunities, and provides an implementation plan and schedule designed to help MSC implement EDI in an orderly and cost-effective manner. We reviewed operations, acquisition and contracting, invoicing and payment, and the intermodal program for potential EDI projects.

OVERVIEW OF EDI

Electronic data interchange is the computer-to-computer exchange of routine business information in a standard format. It is an automated system designed to link transactions to application software to improve a business process. It relies on business application software. EDI information should flow from one application to another without human intervention; the result is streamlined business operations with less chance of human error.

The term "electronic commerce" encompasses EDI and other forms of electronic communication, including fax, electronic mail, and the Internet, used in business-to-business communication.

Since the mid-1980s, the private sector has steadily begun to embrace the concept of using EDI systems to replace paper purchase orders, shipping notices, payments, and a variety of other business documents. According to Robert Clifton, secretary of the EDI Coalition of Associations, most major shippers and many of

the large companies, such as automobile manufacturers, are using EDI heavily. According to at least one estimate, more than 44,000 U.S. companies use EDI in their business operations.[1] However, the majority of small companies are not using EDI.

For example, in 1991, 10 of the largest ocean carriers agreed to develop a common shipping information system by establishing the Information Systems Agreement (ISA). The result was the development of common EDI software, known as Ocean, which provides common booking, documentation, tracking, and invoicing capabilities. ISA's core group of ocean carriers operate 400 cargo vessels and transport 1.4 million 20-foot containers at 300 ports, and serve about half the shippers worldwide.[2]

Since 1986, when the Department of Defense established a Defense Transportation EDI (DTEDI) program, the Defense transportation community has made an effort to establish and expand its use of EDI. This effort was reinforced in May 1988, when Deputy Secretary of Defense William H. Taft IV directed DoD components to make "maximum use of electronic data interchange for the paperless processing of all business-related transactions."[3]

Several major initiatives have occurred within Defense transportation since then:

- In February 1994, the Defense Logistics Agency began transmitting government bills of lading (GBLs) electronically to the DFAS.
- In May 1994, the Deputy Under Secretary of Defense (Logistics), DUSD(L) directed all DoD components to make maximum use of EDI in their business-related transactions.
- In January 1995, the DUSD(L) designated USTRANSCOM as lead agency for the DTEDI program. Subsequently, USTRANSCOM developed a strategic plan for managing the program and accelerating its expansion. DoD now uses EDI to exchange bills of lading, invoices, rate tenders, and shipment status messages throughout its components and with industry.

REPORT ORGANIZATION

Although the primary purpose of this report is to identify and assess EDI opportunities within MSC, we also provide a detailed concept of operations and imple-

[1]Doug Harper, "Many Shippers Slow to Use New Technology," *Journal of Commerce*, 13 November 1995, p. 5C.

[2]Robert Mottley, "ISA's Ocean Attracts a Following," *American Shipper,* December 1995, pp. 71–72.

[3] William H. Taft, IV, "Electronic Data Interchange of Business-Related Transactions", Memorandum, The Deputy Secretary of Defense, 24 May 1988.

mentation plan for integrating the recommended opportunities into MSC's operations.

- Chapter 2 assesses EDI opportunities within MSC and identifies those that merit further consideration.
- Chapter 3 presents an economic analysis of the estimated benefits and costs of each potential project.
- Chapter 4 provides detailed operating concepts for the recommended projects.
- Chapter 5 describes the tasks MSC should undertake to implement the recommended projects and includes a proposed schedule.

Finally, several appendixes provide a variety of supplementary information, including details that support the analysis presented in the body of the report.

Chapter 2
EDI Opportunities

In this chapter, we describe our approach for identifying EDI opportunities within MSC. We then assess 14 business areas for EDI potential, using criteria that both the private and public sectors frequently employ. Finally, we identify those business areas with potential EDI projects that deserve further evaluation.

EDI FEASIBILITY CRITERIA

The private and public sectors commonly use the following four criteria to determine whether a specific business area is a suitable EDI project:

- Significant transaction volume
- EDI-capable trading partners
- Automated business systems
- Stable business environment.

Transaction volume is often regarded as the most important criterion. That view is based upon the assumption that processing business transactions electronically is less costly than paper processing. All other things being equal, EDI applications that replace the most paper offer the greatest cost savings. Although transaction volume primarily refers to the number of paper transactions received or originated by a particular business area, the assessment sometimes includes the total quantity of information processed.

The capability of an organization's trading partners to accommodate EDI transactions must also be considered. Using EDI to exchange a limited number of transactions per trading partner is cost-ineffective. The most favorable scenario occurs when most of the transactions are exchanged with a small number of trading partners, especially if some of them are already EDI-capable. As a result, less time and internal resources are required to implement EDI on a large scale. In addition, organizations cannot achieve the potential cost savings without long-term, stable business relationships with EDI-capable trading partners.

An organization's internal automation capability is also important because of the need to send and receive EDI transactions and the corresponding processing requirements. Therefore, we assessed each potential project to determine whether there are application systems that could send and receive EDI transactions. The

existence of trading partner automated systems to generate source data was relevant also.

Finally, we assessed the stability of each area's business environment. Ideally, the functional processes supporting a particular business area should be relatively stable. In addition, implementing EDI is easier if a reengineering effort is not planned or ongoing that would affect the stability of the functional processes.

BUSINESS AREA ASSESSMENT

We reviewed the following functional areas to identify business areas with EDI potential:

- *Operations.* In FY94, MSC spent over $1 billion to support the traffic operations areas we reviewed.
- *Acquisition and contracting.* MSC awarded contracts totaling $1.3 billion in FY94 including $302 million for ship charters, $335 million for liner agreements, and $146 million in procurements at area commands.
- *Invoicing and payment.* Commercial payments of $1.9 billion were made by MSC in FY94.
- *Intermodal program.* MSC signed liner agreements totaling $335 million in FY94 and shipped over 3.7 million measurement tons using containers.

A detailed review of those functional areas identified 14 business areas with EDI opportunities. Most of those opportunities were identified through interviews with key personnel at MSC Headquarters and MSC, Atlantic (MSCLANT). We assessed each business area using the four feasibility criteria with a simple yes or no rating. All criteria had to be met for a business area to be considered a potential EDI project. A summary of the assessments appears in Table 2-1. (Appendix A contains details of the assessment, including transaction volume and trading partner analysis.)

Table 2-1. Initial Assessment of MSC Business Areas for EDI Potential

Business Areas	Significant Transaction Volume	EDI Capable Trading Partners	Automated Business Systems	Stable Business Environment	EDI Candidate Potential
Operations					
Special Missions	No	No	Yes	Yes	No: Low transaction volume—less than 300 invoice adjustments to 4 trading partners; trading partners vary over time; cannot assume EDI capability.
Tanker Operations	Yes	Yes	Yes	Yes	Yes: Medium volume — Material Inspection and Receiving Report (DD Form 250).
Ship Support	No	No	Yes	Yes	No: Low volume — less than 600 sail orders and fuel requests annually; trading partners are primarily internal and have no EDI capability.
Dry Cargo	Yes	No	No	Yes	No: Trading partners are primarily internal and do not have EDI capability; no standard application system; MSC transmits sail orders via Autodin and electronic mail.
Mobilization Sealift	No	No	No	Yes	No: Limited data exchanges are primarily data queries; major trading partners are NWS Earle and MARAD, neither is EDI–capable; no standard application systems; nonstandard information requirements.
Acquisition and Contracting					
Nonfuel Petroleum Products Contracting	Yes	Yes	Yes	Yes	Yes: Nonfuel Petroleum Products Contracting should be a separate EDI project from delivery orders and invoices.
Non-small-purchase/Nonfuel Petroleum Products Delivery Orders	Yes	Yes	Yes	Yes	Yes: High volume — over 6,000 orders for supplies and services (DD Form 1155) annually.
Ship Construction and Repair	Yes	Yes	Yes	Yes	Yes: Combine with other contracting processes.
Small Purchase Contracting	Yes	Yes	Yes	No	No: Small purchase contracting activities are to be shifted to Navy Field Contracting Support offices. Micropurchases (less than $2,500) are to be procured with credit cards.
Non-small-purchase Contracting	Yes	Yes	Yes	Yes	Yes: Will be considered with the use of DD Form 1155.
Voyage and Time Charter Contracting	Yes	Yes	Yes	Yes	Yes: Standard contracting process has potential.

Note: MARAD = Maritime Administration; NWS = Naval Weapons Station

Table 2-1. Initial Assessment of MSC Business Areas for EDI Potential (Continued)

Business Areas	Significant Transaction Volume	EDI Capable Trading Partners	Automated Business Systems	Stable Business Environment	EDI Candidate Potential
Invoicing and Payment					
Ocean Cargo Invoice Processing	Yes	Yes	Yes	Yes	Yes: Significant transaction volumes represent major opportunity for savings.
Commercial Invoice Processing (includes Non-fuel Petroleum Products invoices)	Yes	Yes	Yes	Yes	Yes: Ongoing invoice pilot test with Mobil Oil Corporation offers opportunity for expansion.
Intermodal Program					
Liner Agreements	Yes	Yes	Yes	Yes	Yes: EDI to be considered as part of critical review outcome.

OPERATIONS

Special Missions

The charter of the Special Missions division is to manage, operate, repair, and maintain MSC's fleet of Special Mission Ships that provide mission-specific support to DoD customers, including laying cable and oceanographic support. The primary information flows involve notifying contractors of an incorrectly certified invoice, or a discrepancy report identifying problems with the contracted service.

Our assessment found the transaction volume for both primary documents to be low. The Special Missions division generates less than 300 invoice adjustment schedules that are sent to four trading partners in an average year, and less than 150 discrepancy reports sent to one trading partner per year. Although only one company is typically responsible for operating and maintaining the ships at any given time, the contract is for a specific duration of only 4 years. Therefore, the time and expense of establishing an EDI trading partner relationship is difficult to justify. Additionally, the EDI capability of the companies that typically respond to the bid requests is limited or nonexistent. MSC has an existing accounts payable system, PAYS, that we believe could be modified to generate invoice adjustments and discrepancy reports in an EDI format. Finally, the business

environment is not undergoing a reengineering effort nor is such an effort planned.

Because of low transaction volumes and limited trading partner capabilities, we conclude that the Special Missions area is not a viable EDI project.

Tanker Operations

The tanker operations division is primarily responsible for moving bulk petroleum that the Defense Fuel Supply Center (DFSC) manages. MSC tankers pick up fuel from DFSC contractor terminals and unload it at one or more other terminals.

Tanker operations personnel manually process over 1,400 *Material Inspection and Receiving Reports* (DD Form 250) per year. It is such a key document to tanker operations that MSC policy requires the government quality assurance representative at the terminal to transmit an internally developed message at each load point that carries much of the same information (Load Report 4020). MSC primarily loads and unloads fuel from three different contractors' terminals, each of which has some EDI capability. In addition, DFSC is EDI-capable and has expressed interest in using EDI to exchange data with MSC as part of its fuel delivery program. MSC currently has automated systems that could be modified to receive DD Form 250 reports from the contractor terminals. Although no automation appears to exist at the terminals, the fuel contractors should be able to easily develop software to generate the required DD Form 250 reports. The business environment is stable and there are no current reengineering efforts under way or on the horizon.

Material Inspection and Receiving Reports satisfy the EDI feasibility criteria. In chapter 3 of this report, we present the economic analysis and estimated benefits associated with instituting an EDI program in this area.

Ship Support

The primary mission of ship support is to support civil-service-manned ships by providing logistical and limited-service support. Primary activities involve coordinating fuel supply requests and requesting logistics services such as tug support.

Ships at sea communicate with the MSC area commands via sail orders that are usually transmitted via electronic mail (E-mail). The transaction volume for both sail orders and fuel requests is less than 600 per year, not substantial enough to warrant the use of EDI. In addition, the sail orders are already exchanged electronically, so introducing EDI would not replace paper transactions. The trading partners are primarily internal and do not have EDI capability. Limited automation exists, as the sail orders are generated using a standard E-mail message. Fuel requests are manually prepared and forwarded to the Engineering Department for processing. However, nonfuel service contract requests are input into the Gov-

ernment Furnished Equipment and Tracking (GFET) System. The functional processes for the ship support area are stable, and a reengineering effort is not under way or planned.

Ship support functions have low transaction volume and the corresponding trading partners are not EDI-capable. We conclude this business area is not a good candidate for EDI.

Dry Cargo

The dry cargo division is responsible for providing operational messages in the form of sail orders to vessels under MSC operational control. The dry cargo division also sends messages to ports and the affected U.S. embassy in advance of a vessel's arrival, as well as to freight forwarders.

Dry cargo issues over 600 sail orders annually during peacetime. During a recent contingency, Operation Desert Storm, sail orders surged to 2,500 per year at MSCLANT alone. Therefore, the transaction volume is substantial enough to satisfy the volume feasibility criterion. Although some of the freight forwarders and ports with which MSC exchanges data are EDI–capable, the majority of its trading partners are internal (vessels) and do not have EDI capability. Sail orders are currently transmitted using Autodin and E-mail; therefore, no application systems exist that could accommodate EDI. The business environment is stable and no reengineering efforts are planned.

We conclude dry cargo operations is not a viable EDI project because of trading partner limitations and a lack of automated business systems.

Mobilization Sealift

The mobilization sealift division is primarily responsible for maintenance of the mobilization infrastructure and activation procedures. Mobilization infrastructure operations include monitoring the condition, location, and availability of ships and contingency ship-loading equipment.

The transaction volume that this project office processes or initiates is very low and involves limited data exchanges. Those exchanges are primarily manually prepared data queries regarding maintenance, status, and the availability of reserve fleet vessels. Mobilization Sealift's two trading partners—the Maritime Administration (MARAD) and Naval Weapons Station Earle in New Jersey—are not EDI-capable. No business system automation exists and is not expected to be developed because the information requirements are not standard and are easily satisfied without system automation. The business environment is stable at this time, although new efforts are being undertaken to strengthen this program through test efforts such as the Voluntary Intermodal Service Agreement.

As a result of the low transaction volume, lack of EDI-capable trading partners, and lack of automated systems, we conclude mobilization sealift does not satisfy the EDI feasibility criteria and should not be pursued as an EDI project.

CONTRACTING

Nonfuel Petroleum Products Contracting

The MSC Engineering Department requires indefinite delivery, indefinite quantity (IDIQ) contracts for supplies needed for ship operations and routine maintenance.

Although MSC issues only five requests for proposals (RFPs) per year to four or five trading partners, the delivery orders resulting from the subsequent IDIQ contracts are of sufficient volume to justify EDI. Additionally, the corresponding invoices are also of sufficient volume to support using EDI (nonfuel petroleum products invoices are addressed in the commercial invoice processing section). MSC has a finite number of trading partners that can fulfill their contractual requirements, all of whom are large, EDI-capable organizations. In addition, several have expressed interest in using EDI to exchange data with MSC. MSC has an existing system, GFET, that is used to input contract requirements that we believe could be modified to generate EDI-formatted RFPs and other documents as needed. The functional processes supporting the business environment are stable, and no reengineering efforts that will affect those processes are planned.

Nonfuel petroleum products satisfy the initial EDI feasibility. In chapter 3 of this report, we present the economic analysis and estimated benefit of instituting an EDI program in this area.

Delivery Orders for Non-Small Purchases and Nonfuel Petroleum Products

MSC initiates over 6,000 delivery orders (DD Form 1155 - *Order for Supplies and Services*) annually as a result of IDIQ contracts for items exceeding $100,000 (i.e., non-small purchase) and nonfuel petroleum products. MSC's nonfuel petroleum products trading partners are a small group of large, EDI-capable organizations. In addition, because of their size, we believe the non-small-purchase trading partners are largely EDI-capable. Automated business systems that could be modified for EDI purposes exist in the form of the GFET system. Finally, the business environment is stable and reengineering efforts are not planned or under way.

MSC's delivery orders satisfy the EDI feasibility criteria and should be further evaluated for incorporation into MSC's EDI program. In chapter 3 of this report, we present the economic analysis and estimated benefit of instituting an EDI program in this area.

Ship Construction and Repair

MSC's Engineering Department participates in numerous acquisition projects for ship construction and repair, all of which require voluminous technical drawings.

The ship construction and repair business area awards 120 to 150 ship repair contracts annually and sends the initial RFP to an average of 30 vendors each time. Such high transaction volumes warrant consideration as an EDI project. Over 1,000 delivery orders are issued against these contracts (further discussed below under the non-small-purchase contracting business area). Although the trading partners are a mixture of small, medium, and large shipyards, they are typically supported by EDI-capable subcontractors that could accommodate EDI-formatted technical drawings. MSC currently uses computer-aided design/computer-aided manufacturing (CAD/CAM) software to produce its technical drawings. The drawings are then distributed on CD-ROM. The ship construction and repair business environment is stable, as these functions will always be required as long as MSC maintains a worldwide fleet.

The RFPs and associated documents required during the solicitation process are too complex to use EDI. However, there is potential in using EDI to exchange the technical drawings produced using CAD/CAM software. Therefore, we explore the economic analysis associated with this potential EDI project in chapter 3.

Small Purchase Contracting

MSC executes a wide range of small purchases (i.e., less than $100,000) in support of its business activities and personnel. Of the 14,379 contracts MSC awarded in 1995, small purchases accounted for 13,847, or more than 96 percent. Small purchase contracts generate a significant number of paper transactions that can be replaced by EDI. Although many of MSC's trading partners are small businesses, they can exchange EDI-formatted documents by using the Federal Acquisition Computer Network (FACNET). Many of the commercial service providers associated with FACNET cater to small businesses, offering low-technology EDI solutions. MSC's GFET system could be modified to generate small purchase contracting documents. In addition, the U.S. Navy's Acquisition Management Automation System (AMAS) is being modified to meet MSC's small purchase contracting requirements. AMAS is a contender for DoD's migratory small purchase contracting system. (Appendix B discusses AMAS and FACNET in greater detail.) The small purchase contracting business environment is not stable, however, because small purchase contracting functions are planned to be shifted to the Naval Supply Systems Command's Fleet and Industrial Supply Centers (FISCs). In addition, credit cards will be used for "micropurchases"— small purchases costing less than $2,500. In 1995, micropurchases would have accounted for 70 percent of all small purchases.

Because small purchase contracting functions will no longer be an MSC function, we conclude it does not warrant further consideration as an EDI project.

Non–Small-Purchase Contracting

Contracts for items over $100,000 constitute a significant amount of MSC's contracting business. MSC issued RFPs to an average of 30 vendors for each of 532 contracts it awarded in 1995. A large number of paper transactions are processed for non–small purchase contracting. Although we did not survey MSC's trading partners, the value and complexity of the contracts lead us to believe the trading partners have EDI capability. MSC currently uses its GFET system to initiate internal contracting requirements, and we believe that it could be modified to send and receive EDI transactions.

Non-small-purchase contracting transactions satisfy the EDI feasibility criteria. We further evaluate this opportunity in chapter 3.

Voyage and Time Charter Contracting

MSC is responsible for procuring one-time-only spot or voyage charters as well as long-term or time charters that span several years with options for additional years.

Although MSC awards an average of only 10 charters per year, the RFP for each charter is sent to 200 to 250 vendors. Although many potential respondents receive their RFP via AT&T's EasyLink network service, approximately 75 continue to receive paper copies of the RFP. Bids are typically faxed or mailed to MSC, and the contract award is mailed to respondents or posted on the EasyLink bulletin board. Although the trading partner community was not surveyed, only 10-12 of the larger companies typically respond to the RFP. Those companies are the U.S. flag carriers, many of which are EDI-capable. MSC has existing application systems that could potentially be modified to generate RFPs and issue contract awards. The business environment is stable and not expected to change.

Voyage and time charters are a feasible EDI project and are further evaluated in chapter 3.

INVOICING AND PAYMENT

Ocean Cargo Invoicing

Although MSC is not directly responsible for booking vessel space to transport containerized or break-bulk cargo, MSC receives and processes the corresponding invoices.

Ocean cargo invoices make up a significant share of the information flows processed within MSC. MSC processes and prepares over 30,000 invoices per year for payment by the DFAS. MSC's four or five key trading partners are major ocean transport companies (e.g., Sea-Land and Matson Navigation) that account for over 80 percent of the invoices and are EDI–capable. MSC has several application systems, including the Cargo System (CARS) and its accounts payable system, PAYS, that can be modified to process EDI transactions. Finally, the functional processes supporting the business environment are stable and need only to be enhanced to use EDI.

Ocean cargo invoicing appears to be one of the best candidates for an EDI project and is further evaluated in chapter 3.

Commercial Invoice Processing

MSC's commercial invoices result from the procurement of charter hire, nonfuel petroleum products, fuel, communication services, and small purchases (e.g., miscellaneous supplies and services).

MSC's Accounting Department processes in excess of 14,000 invoices per year for subsequent payment by DFAS. Transaction volumes this high normally offer the potential for significant paper reduction. The majority of MSC's trading partners are EDI-capable, and those that are not, such as small purchase vendors, could exchange EDI data with MSC by using FACNET. The accounting department's existing accounts payable system, PAYS, could be modified to support EDI. In addition, other support systems, including GFET, could also be modified to support EDI transactions. Although the functions supporting this business environment are stable, small purchase invoices will be largely removed from the accounting department's responsibilities when small purchase contracting functions are shifted to the Navy FISCs.

MSC is currently testing EDI in the payment process for nonfuel petroleum products with the Mobil Oil Corporation by receiving EDI-formatted invoices from Mobil Oil. MSC also plans payment of those invoices with electronic funds transfer. MSC awarded 532 contracts in excess of $100,000 in 1995, each of which generated an average of four delivery orders for a total of approximately 2,100 invoices.

Commercial invoice processing satisfies the EDI feasibility criteria and is further evaluated as an EDI project in chapter 3.

INTERMODAL PROGRAM: LINER AGREEMENTS

Liner agreements are negotiated by MSC on an annual basis and involve over 60,000 rates that are submitted to MSC. MSC negotiates 10–12 liner agreements per year. Those liner agreements provide a single rate for transporting container-

ized cargo from a point inside the continental United States to a point outside. The rates tendered by the ocean carriers include motor carrier transportation as well as ocean transport.

The transaction volume for liner agreements meets the EDI feasibility criterion because of the large number of rates tendered by the ocean carrier industry and the paper-intensive negotiating process. The actual transaction volume appears low because of the partial automation introduced to the liner agreement process through the use of floppy disk mailings. However, the acquisition process continues to be labor-intensive, costly, and time-consuming for both MSC and the commercial carrier industry. Historically, 15 carriers respond to MSC's request for liner agreement rates, and those carriers include the largest U.S. flag carriers, such as American President Lines (APL) and Sea-Land. The large carriers are proficient in EDI. Sea-Land currently services 60 percent of the originating East Coast liner requirements and APL services approximately 60 percent of the originating West Coast liner requirements. The liner agreement process is already partially automated, and the supporting application systems, including the Carrier Analysis and Rate Evaluation (CARE) system, could be modified to process rates tendered by ocean carriers. Although the business environment is currently stable, MSC and the Military Traffic Management Command (MTMC) are currently critically reviewing the methodology for determining liner rates and awarding the agreements.

The liner agreement process satisfies the feasibility criteria and is further evaluated in chapter 3.

SUMMARY

In this chapter, we used several criteria to assess the potential of applying EDI to MSC business areas in operations, acquisition and contracting, invoicing and payment, and the intermodal program. Nine business areas appear to be viable EDI projects: Tanker Operations, Nonfuel Petroleum Products Contracting, Non-small-purchase and Nonfuel Petroleum Products Delivery Orders, Ship Construction and Repair, Non-small-purchase Contracting, Voyage and Time Charter Contracting, Ocean Cargo Invoice Processing, Commercial Invoice Processing, and Liner Agreements. All of these business areas have significant transaction volumes, their trading partners are EDI-capable, automated systems exist that can be modified for EDI, and their business environments are stable.

We believe EDI prospects for the remaining business areas are currently not feasible. Most of these areas offer peripheral support, involving message traffic rather than processing paper transactions. The one exception, Small Purchase Contracting, is not a feasible EDI project because it is planned for transfer to the Navy FISCs.

In the next chapter, we analyze the economic benefits and costs of each potential project and recommend those projects that should be implemented by MSC.

Chapter 3
Economic Analysis

This chapter presents our economic analysis of the EDI opportunities identified in Chapter 2. We begin by discussing the expected direct and indirect savings from implementing EDI and then address the investment and operating costs required to achieve those savings. We conclude by recommending which EDI projects should be implemented by MSC.

DIRECT SAVINGS

In Chapter 1, we defined EDI as the exchange of information between computer applications systems. EDI usually enables an organization to significantly reduce or eliminate most of the manual steps required to process paper documents. The savings associated with the reduction of such paperwork are referred to as direct savings.

Table 3-1 depicts the results of our economic benefit analysis. The table shows the overall cost savings per document and expected net savings (or loss) if EDI were introduced into the business area. (Appendix C provides the detailed calculations used to determine the savings per document.)

Table 3-1. EDI Project Economic Benefit Analysis

Business area	Document	Annual volume	Cost savings per document ($)	Telecom cost per document ($)	Net savings (loss) per document ($)	Annual net savings (loss) if 100% EDI ($)
Operations						
Tanker Operations	DD Form 250	1,440	7.33	0.25	7.08	10,195
Acquisition and Contracting						
Nonfuel Petroleum Products Contracting	RFP	25	2.48	62.00	(59.52)	(1,488)
	Bid response	25	32.95	23.25	9.70	243
	Contract award	25	2.82	1.55	1.27	31.75
Non-small-purchase and Nonfuel Petroleum Products Delivery Orders	DD Form 1155	2,100	4.25	0.25	4.00	8,400

Table 3-1. EDI Project Economic Benefit Analysis (Continued)

Business area	Document	Annual volume	Cost savings per document ($)	Telecom cost per document ($)	Net savings (loss) per document ($)	Annual net savings (loss) if 100% EDI ($)
Acquisition and Contracting (Continued)						
Ship Construction and Repair	Technical drawings	120	4.14	(1,260)	(1,256)	(150,703)
Non-small-purchase Contracting	RFP	26,884	1.98	15.50	(13.52)	(363,472)
	Bid response	18,095	11.95	7.75	4.20	75,999
	Contract Award	18,095	2.82	1.55	1.27	22,981
Voyage and Time Charter Contracting	RFP	750	1.98	23.25	(21.27)	(15,953)
	Bid response	900	9.85	6.20	3.65	3,285
	Contract award	900	5.57	1.55	4.02	3,618
Invoicing and Payment						
Ocean Cargo Invoice Processing	Invoice	30,000	7.71	0.25	7.46	223,800
Commercial Invoice Processing (includes Nonfuel Petroleum Products Invoices)	Invoice	2,100	8.55	0.25	8.30	17,430
Intermodal Program						
Liner Agreements	RFP	550	11.09	62.00	(50.91)	(28,000)
	Bid response	165	14.43	15.50	(1.07)	(177)
	Contract award	165	0.38	N/A	0.38	63

In determining the direct cost savings of each document, we assumed that all operating costs would remain the same except telecommunications, which would increase in an EDI environment. We therefore subtracted telecommunication costs from the direct cost savings to obtain a net direct savings figure for each document. Opportunities offering significant savings are potential EDI projects. We eliminated from further consideration projects that would show little savings or

even net costs and therefore do not justify the investment of time, money, and personnel that would be needed to implement them. For example, we eliminated tanker operations because the savings are only $10,195, and MSC has not looked at streamlining that area as it has invoicing.

Prior to subtracting telecommunications costs, cost savings per document range from a high of $32.95 for nonfuel petroleum products bid responses to a low of $1.98 for processing RFPs for non-small purchases and time charters. When estimated telecommunications costs are included in the analysis, the economic benefit of using EDI in many business areas is significantly reduced. Where project costs negated any net savings, we eliminated the project from further analysis or consideration. For example, the estimated costs to transmit contracting and liner agreement RFPs render those areas uneconomical.

Therefore, MSC needs to automate its contracting processes in order to streamline its operations and reduce expenses. In their current form, RFPs will always incur net losses because of the large volume of information that must be transmitted. However, telecommunications costs could be significantly reduced if the boilerplate portion of an RFP was disseminated using the *Federal Register* or the World Wide Web (WWW) on the Internet. MSC could eliminate those net losses if it used alternative electronic commerce (EC) solutions, such as the WWW, to disseminate information to prospective suppliers or carriers. (Appendix D describes alternative EC solutions available to MSC.) Although bid responses and contract awards in all acquisition areas show a net savings per document, true savings cannot be realized unless the entire acquisition process uses EDI or similar electronic techniques. Receiving EDI-formatted bids is of little value to MSC if the RFP was manually generated because the bids are normally evaluated against the original RFP. Without an electronic RFP, a substantial amount of software programming is required and very little paper is removed from the contracting process. Thus, because of low savings and paper-based RFPs, these projects are not economically feasible.

Results

The greatest direct cost savings would occur in the ocean cargo invoice processing area. Although the savings would not be as great, commercial invoice processing would also provide savings to MSC. Those savings may be easily attained because of MSC's test experience with processing EDI-formatted invoices from the Mobil Oil Corporation. However, we recommend a review of the test results to determine whether it is economically feasible to expand the Mobil Oil test to the remaining invoices.

Table 3-2 shows the annual projected direct cost savings for cargo and commercial invoice processing through Fiscal Year 2006 (FY06). We expect the largest direct cost savings ($217,000) would occur in FY06. Commercial invoice processing includes MSC's current EDI pilot invoice processing test with Mobil.

Table 3-2. Direct Cost Savings from EDI

	Savings ($000)										
Business area	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Cargo Invoice Processing	11	45	67	101	137	163	170	190	197	201	1,282
Commercial Invoice Processing	0	4	5	8	11	13	14	15	15	16	101
Total savings	11	49	72	109	148	176	184	205	212	217	1,383

In developing the estimates in Table 3-2, we made the following assumptions:

- *Operating concepts.* We assume that MSC will adopt the information flows and EDI concepts presented in Chapter 4. However, adopting these concepts will not eliminate all manual processing requirements. For example, electronic invoicing by itself will not solve problems caused by erroneous manifest documentation or vendor error.

- *Implementation.* We assume that MSC will consolidate related EDI efforts and implement the cargo invoice processing and payment area first. Although the savings are relatively small for commercial invoice processing and payment, we believe that MSC's pilot test with Mobil could be easily expanded to accommodate the remainder of commercial invoices with little additional resources. (MSC will need to review its test results and determine the feasibility of expanding the pilot test to the remainder of commercial invoices.) We estimate that MSC will require approximately 1 year of development and testing before it can implement a production system.

INDIRECT SAVINGS

Many private-sector companies have found that implementing EDI can produce indirect benefits substantially larger than the direct benefits. However, indirect benefits are also more difficult to quantify. Private-sector firms have found that for every dollar in direct savings generated by EDI, they can save another $3.00 to $5.00 in indirect savings. These savings are usually obtained by making significant modifications to application systems and business procedures. Companies cite reductions in inventories, improvement in customer relations, and streamlined operations as indirect benefits of EDI. MSC is likely to experience some of those benefits and may experience others, such as improved quality control, enhanced

contract payment management and auditing, increased price discounts, and reduced interest payments.

After 10 years, MSC could save almost $300,000 annually in interest penalties and late fees by reducing the amount of time required to pay cargo and commercial invoices. Table 3-3 shows the annual projected indirect cost savings attributable to a reduction in interest charges over the 10 years ending in FY06. (The savings are based on the implementation rate discussed in Appendix C.) Although indirect savings are not normally included in economic benefit analyses, we included the reduced interest payments because MSC has consistently incurred large interest charges each year and can quantify the expenses.

Table 3-3. Indirect Savings Attributable to Reduced Interest Charges

Savings from interest charge reductions ($000)											
Business area	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Cargo Invoice Processing	14.0	56.0	84.0	126.0	171.0	204.5	224.1	238.1	246.6	252.1	1,616.4
Commercial Invoice Processing	0.0	1.9	4.0	6.0	8.8	12.0	14.3	15.7	16.7	17.2	95.7
Total Savings	14.0	57.9	88.0	132.0	179.8	216.5	238.4	253.8	263.3	269.3	1,712.1

INVESTMENT COSTS

Table 3-4 shows that implementing EDI for the two business areas cited above (cargo invoice and commercial invoice processing) will require MSC to make a one-time investment of approximately $643,000. Most of those costs are required to implement an EDI program regardless of the project. Program management and implementation support costs would increase as other projects are implemented. MSC has already purchased the hardware and EDI translation software as well as hired contractors to begin developing a centralized EDI translation processing site called the Electronic Commerce Center (ECC). Therefore, we believe most of the charges will occur in the first year of MSC's EDI program.

Table 3-4. EDI Investment Costs

Investment category	Requirement	Cost ($000)
Hardware	One minicomputer	50.0
EDI translation software	Sterling Software EDI Server (includes training)	132.0
System integration	—	100.0
Program management (promote/coordinate; revise/refine operating procedures; develop trading partners)	1.5 full-time GS-11 (step 5) employees @ $51,000 per year	76.5
Implementation support:		
Coordination/general support	1.0 contractor man-year	180.0
Standards development/ modification	0.5 contractor man-year	90.0
Training	—	15.0
Total		643.5

We base our estimate of investment costs on the following assumptions:

- *Hardware.* MSC is developing a centralized EDI translation site (i.e., ECC) that requires one minicomputer.

- *EDI translation software.* Because the ECC is centralized, only one EDI translation software package is required. However, it must be able to route the various EDI transmissions to and from the appropriate applications and trading partners. Therefore, a more complex package such as the EDI Server product by Sterling Software is required, at an approximate cost of $132,000, including training.

- *System integration.* Many private-sector companies consider system integration as the most costly category in a typical EDI integration. MSC is currently using a contractor to configure and install the EDI Server translation software. We estimate that configuring the hardware and installing the software will cost approximately $100,000.

- *Program management.* We assume that MSC personnel will perform all program management tasks such as promoting and coordinating the program, revising and refining MSC operating procedures, and soliciting trading partners. We estimate that these tasks will cost approximately $76,500 for one full-time and one half-time GS-11 employee at Step 5, in-

cluding benefits (benefits are assumed to equal 30 percent of the annual salary). After the first year of the program, we assume that an EDI program office will take over the remaining development tasks.

- *Implementation support.* Implementation support costs include such activities as coordination and general support; standards development and modification, including the development of implementation conventions; and training. Because some of these activities require specialized skills (particularly training and implementation conventions), many defense agencies use contractors to perform them. For cost-estimation purposes, we assume that MSC will use contractors to perform these activities at a cost of approximately $285,000. These costs may also be spread over 2 or 3 years.

OPERATING COSTS

Although EDI will significantly reduce most of MSC's direct labor costs, we expect that it will increase some operating expenses, including the following costs shown in Table 3-5:

- *Telecommunications.* MSC's telecommunications costs will increase by approximately $7,000 per year at the EDI program's peak in 10 years. This estimate is based on the current EDI value-added network (VAN) charges available from Sprint on the Federal Telecommunications Services (FTS) 2000 contract. (Those are the same rates used to calculate the telecommunications charges identified in Table 3-1.) Thus, we estimate that EDI-formatted ocean cargo and commercial invoices both cost $0.25 to receive electronically from a commercial trading partner. Details of the telecommunications estimate are provided in Table C-12 in Appendix C.

Table 3-5. Estimated Operating Costs

	Costs ($000)										
Business area	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Telecom-munications	0.4	1.5	2.2	3.4	4.6	5.5	6.0	6.4	6.6	6.8	43.4
Staffing	76.5	76.5	76.5	76.5	76.5	76.5	76.5	76.5	76.5	76.5	765.0
Software maintenance	0.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	180.0
EDI mailbox	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
Total	77.4	98.5	99.2	100.4	101.4	102.5	103.0	103.4	103.6	103.8	993.2

- *Staffing.* MSC will need to create an EDI program office to manage its implementation efforts and provide ongoing support. The program office responsibilities will need to include the following activities:
  - Trading partner administration and promotion
    - Negotiating and maintaining trading partner agreements and addendums with commercial trading partners
    - Negotiating and maintaining interface requirements agreements with DoD trading partners
    - Promoting MSC's EDI program by sponsoring EDI workshops
  - Standards and conventions development and maintenance
    - Attending American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X12 meetings
    - Developing and maintaining implementation conventions
    - Providing technical support
    - Developing EDI training programs
    - Resolving EDI legal and security issues
    - Performing functional integration with both MSC and other DoD systems (e.g., MTMC).
- *Software maintenance.* Most EDI translation software vendors provide software maintenance support that includes software upgrades, correction of software bugs, and telephone support. Although the first year is typically included in the purchase price, each of the following years cost approximately 15 percent of the purchase price of the translation software.
- *EDI mailbox.* We assume that MSC will require a single EDI VAN mailbox that costs $40 per month (i.e., Sprint charge from the FTS 2000 contract).

Overall, we estimate that MSC will incur an additional $993,200 in operating costs over 10 years, with a maximum of $104,000 annually.

RECOMMENDATION

Based upon our economic analysis of MSC's EDI opportunities, we recommend that MSC implement EDI in the ocean cargo invoice processing business area. That is the only area in which it is clearly economically feasible to implement EDI.

In addition, we recommend that MSC review the results of its current EDI pilot test with the Mobil Oil Corporation to determine whether expanding that effort to the remainder of the commercial invoice processing and payment area is economically justified. MSC may be able to expand that program at minimal expense based on its current efforts with the pilot test. MSC should also consider incorporating EDI into its intermodal liner agreement process, pending the outcome of a critical review of that process. If that process is selected for reengineering, EDI should be incorporated as part of the reengineering effort.

Although the remaining EDI opportunities were not economically justified, MSC should consider alternative electronic commerce solutions such as the Internet. Appendix D discusses possible EC solutions.

Table 3-6 presents a summary of the estimated net savings that MSC may realize if EDI is implemented in the ocean cargo and commercial invoice processing and payment business areas. The remaining EDI opportunities do not merit further consideration because of their low transaction volume or because introduction of EDI into the process was not economical. This was particularly true of the acquisition activities, many of which would incur negative savings if EDI were implemented.

Table 3-6. Net Savings

	Savings ($000)										
Business area	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Direct cost savings	11.0	49.0	72.0	109.0	148.0	176.0	184.0	205.0	212.0	217.0	1,383.0
Interest cost reduction	14.0	57.9	88.0	132.0	179.8	216.5	238.4	253.8	263.3	269.3	1,712.1
Investment costs	(403.0)	(240.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(643.5)
Operating costs	(77.4)	(98.5)	(99.2)	(100.4)	(101.4)	(102.5)	(103.0)	(103.4)	(103.6)	(103.8)	(993.2)
Total	(455.4)	(232.1)	60.8	140.6	226.4	290.0	319.4	355.4	371.7	382.5	1,458.4

SUMMARY

In this chapter, we presented an economic analysis of MSC's EDI opportunities. The analysis discussed direct cost savings, indirect cost savings, investment costs,

and annual operating expenses. Only one project, ocean cargo invoice processing and payment, will clearly save MSC money if EDI is implemented. Additional savings may be realized from implementing EDI in the commercial invoice and processing business area. However, MSC needs to review the results from its current invoice pilot test with the Mobil Oil Corporation to determine whether expansion is economically feasible.

In the following chapter, we present operating concepts for implementation of the ocean cargo and commercial invoice processing and payment functions.

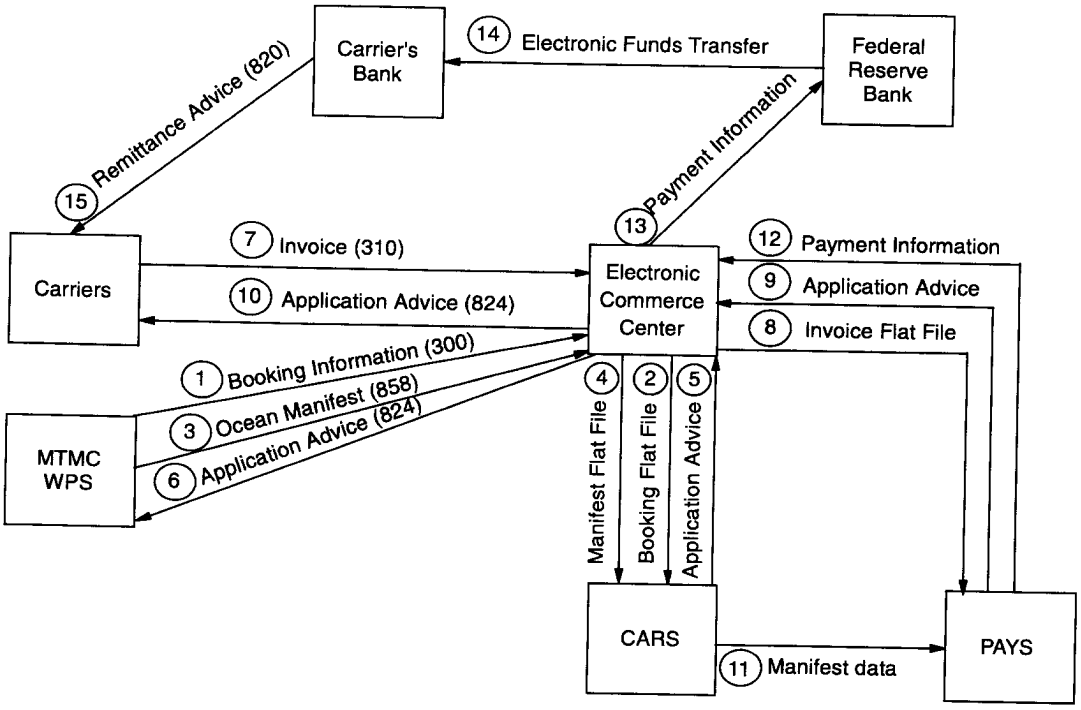
Chapter 4
EDI Operating Concepts

In Chapter 3, we identified two business areas within MSC that can benefit from using EDI: ocean cargo invoice processing and payment, and commercial invoice processing and payment. In this chapter, we propose specific operating concepts for each area. We also propose the technical configuration (hardware, software, and telecommunications) needed to implement the proposed operating concepts.

OCEAN CARGO INVOICE PROCESSING AND PAYMENT

Figure 4-1 shows the electronic process that MSC could use to receive ocean cargo invoices electronically from its commercial carrier trading partners.

Figure 4-1. Ocean Cargo Invoice Processing and Payment Operating Concept



Note: The numbers in parentheses on the data flow lines refer to the ANSI ASC X12 transaction set to be used. Transaction set 300 - Reservation (Booking Request) (Ocean); Transaction set 310 - Freight Receipt and Invoice (Ocean); Transaction set 820 - Remittance Advice; Transaction set 824 -Application Advice; Transaction set 858 - Shipment Information.

In this operating concept, MTMC will transmit confirmed booking information for a shipment to MSC's ECC using Accredited Standards Committee ANSI X12 Transaction Set 300, Reservation (Booking Request)(Ocean), as shown in data flow 1. The ECC translates the data from an EDI format into a flat file[1] and sends it to CARS in data flow 2. In data flows 3 and 4, MTMC transmits military manifests generated by its Worldwide Port System (WPS) to the ECC and subsequently to CARS in a flat file format. CARS then performs initial data checks and if errors are found, application advice identifying the errors is sent to the ECC EDI translator in data flow 5. The ECC translates the application advice from a flat file into ASC X12 Transaction Set 824, Application Advice, and transmits it to the WPS system, as shown in data flow 6.

Following delivery of the containerized cargo, the commercial carriers submit their electronic invoices to the ECC using ASC X12 Transaction Set 310, Freight Receipt and Invoice (Ocean), as shown in data flow 7. The ECC receives the invoice, translates the data from an EDI format into a flat file, and sends it to MSC's accounts payable system, PAYS, for processing in data flow 8. PAYS then performs initial edit checks; if the invoice is rejected, an application advice containing the rejection reasons is sent to the ECC EDI translator in data flow 9. The ECC translates the application advice from a flat file into ASC X12 Transaction Set 824, Application Advice, and transmits it to the commercial carrier that originated the invoice, as shown in data flow 10.

After the manifest and booking information are reconciled by CARS, the manifest information is forwarded to PAYS in data flow 11, for reconciliation with the corresponding invoice and subsequent payment processing. In data flow 12, PAYS forwards the payment information required for electronic funds transfer (EFT) to the ECC. The ECC translates the information and transmits it to the Federal Reserve Bank in data flow 13.

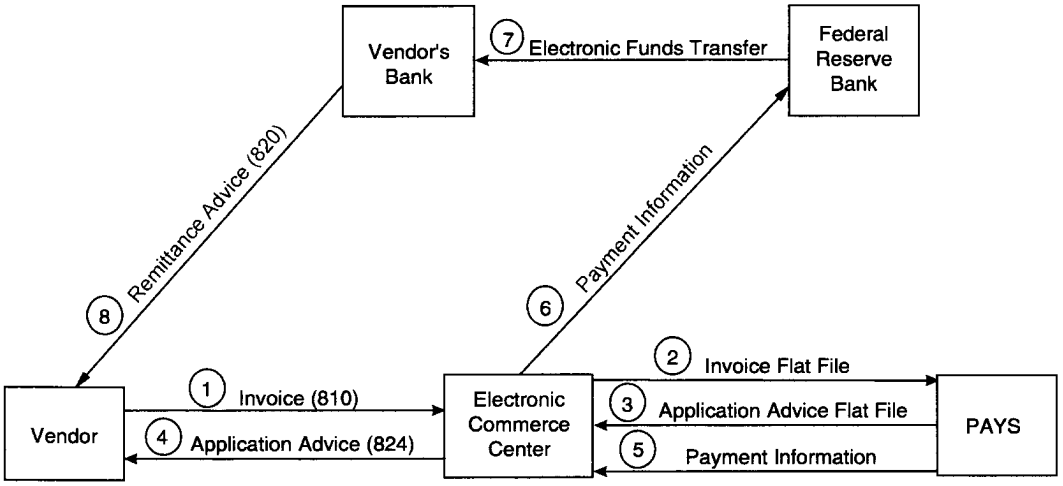
In the future, MSC plans to pay carriers using EFT to their financial institutions, as data flow 14 shows. Data flow 15 depicts a future enhancement that enables a carrier's bank to send the carrier an electronic remittance advice, after the EFT has occurred.

[1] EDI translation software converts EDI-formatted data received from trading partners into a file format recognized by the receiving application system. That file is called a flat file. Data extracted from an application system for subsequent conversion into an EDI-formatted file by EDI translation software is also referred to as a flat file.

COMMERCIAL INVOICE PROCESSING AND PAYMENT

The EDI operating concept for non-small purchase invoices (over $100,000) is shown in Figure 4-2.

Figure 4-2. Commercial Invoice Processing and Payment Operating Concept



Note: The numbers in parentheses on the data flow lines refer to the ANSI ASC X12 transaction set to be used. Transaction set 810 - Invoice; Transaction set 820 - Remittance Advice; Transaction set 824 - Application Advice; Transaction set 858 - Shipment Information.

In this operating concept, vendors will transmit ASC X12 Transaction Set 810, Invoice, to the ECC for translation into a flat file. The flat file is then sent to PAYS for initial processing, as shown in data flow 2. If the invoice is rejected by PAYS, application advice information identifying the reasons for rejection is sent to the ECC for translation and then transmission to the vendor that originated the invoice, as shown in data flows 3 and 4.

In data flows 5 and 6, PAYS sends the payment information to the ECC for translation and subsequent transmission to the Federal Reserve. As previously mentioned in the ocean cargo invoice processing operating concept, MSC plans to use EFT for vendor payment, as shown in data flow 7. The vendor's bank then sends a remittance advice to the vendor in data flow 8.

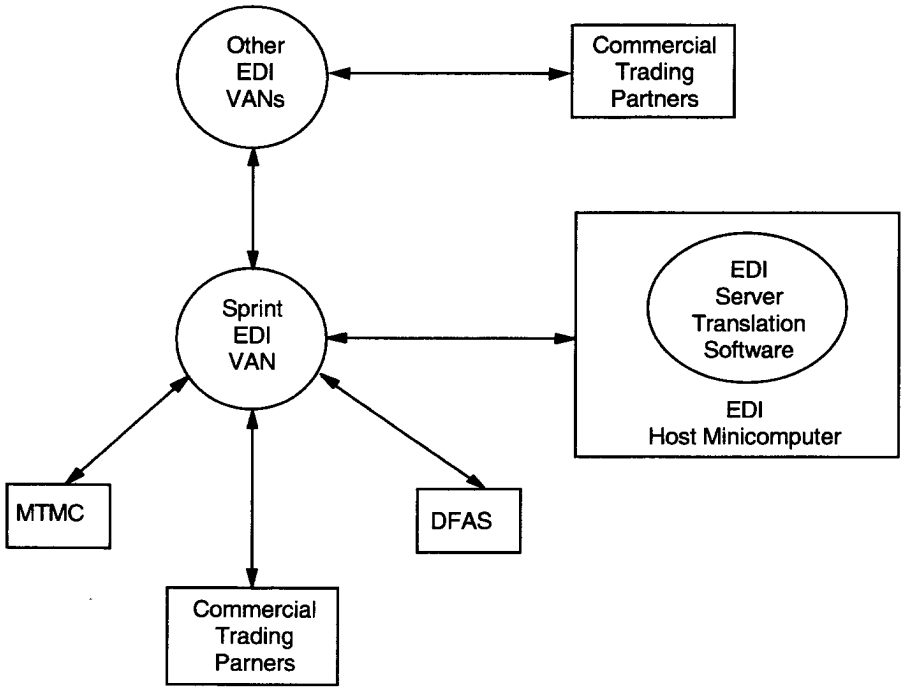
TECHNICAL CONFIGURATION

This section provides an overview of the technical configuration that MSC designed for its EDI program. MSC plans to use a centralized system architecture, called the ECC, that will process all incoming and outgoing EDI transactions. The

ECC is currently in development, and testing is expected to occur during calendar year 1996.

Figure 4-3 illustrates MSC's ECC. The specific components of the ECC are described in more detail below.

Figure 4-3. Electronic Commerce Center



EDI Value-Added Network

One of the keys to a successful EDI program is the selection of a telecommunications strategy supporting the exchange of EDI transactions. Although MSC may elect to use existing communications networks—such as the Defense Information Systems Network (DISN)—to exchange EDI transactions internally, those networks cannot be readily used to exchange EDI transactions with commercial trading partners, primarily because of security considerations. In addition, not all DoD activities have access to an existing DoD communications network.

In the private sector, companies make extensive use of commercial EDI VANs to exchange business information both internally and with their external trading partners. More than 19 commercial concerns—including AT&T, General Electric Information Services, and Advantis (a joint venture of IBM and Sears)—have established EDI VANs that provide a variety of services. Those services include mailboxing that allows trading partners to independently schedule their data ex-

changes; communications protocol and speed (data-rate) conversions that permit communications among incompatible computers; and record keeping that provides audit trails. These and other services simplify communications among EDI trading partners by providing telecommunications processing at an intermediate point, which removes the need for each pair of trading partners to negotiate and conduct telecommunications individually. Commercial EDI VANs have been in use for more than 15 years and currently process approximately 500 million transactions annually.

The ECC will use a commercial VAN to exchange data electronically with commercial trading partners and with DoD trading partners that do not have access to a military data network (such as DISN). The DTEDI community currently uses Sprint EDI VAN services that are available through the FTS 2000 contract administered by the General Services Administration. As the data requirements and operating concepts are finalized, MSC should explore the feasibility of direct connections with some of its high-volume DoD trading partners, such as MTMC and DFAS-IN.

EDI Host

The EDI host, most likely a dedicated Unix-based minicomputer, is the core of the ECC and must be able to accommodate MSC's EDI program as it expands. The EDI host's primary purpose is to process data into and out of the EDI translation software, and transmit it to the intended recipient (i.e., an EDI VAN or MSC application system).

EDI Translation Software

EDI translation software enables MSC to exchange data with all of its trading partners in a standard format without changing internal application systems. That software is commercially available for virtually all major hardware and operating systems.[2] MSC has currently contracted to purchase Sterling Software's EDI Server. In addition to its EDI translation capability, the EDI Server performs telecommunication routing.

SUMMARY

This chapter proposed operating concepts to support implementation of two EDI opportunities at MSC. It also included a diagram and corresponding explanation of the centralized EDI translation process that MSC is currently developing. In the next chapter, we propose the implementation tasks and a schedule for implementing these operating concepts.

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[2] For more information on EDI translation software, see LMI Report IR530RD1, *A Guide to EDI Translation Software, 1996 Edition,* Harold Frohman, March 1996.

Chapter 5
Implementation Strategy

This chapter identifies the tasks that MSC must undertake to implement the functional operating concepts discussed in Chapter 4. It also proposes the time needed to complete the implementation tasks.

IMPLEMENTATION PLAN AND SCHEDULE

Table 5-1 lists the tasks typically needed to develop and implement EDI operating concepts. It also indicates the estimated time needed to complete each task. Although the tasks are ostensibly the same for each implementation, we identify specific trading partners, transaction sets, and other issues when applicable.

1 Develop Functional Requirements

In this task, the project team would identify the data and operational issues that affect MSC's efforts to implement EDI.

1.1 Finalize Operating Concepts

The project team will review and assess the proposed operating concepts presented in Chapter 4. In doing so, it will need to work closely with MTMC and DFAS.

1.2 Detail Data Requirements

In this subtask, the project team, working with MSC functional managers, will identify the data requirements needed to accomplish the EDI information flows identified in Chapter 4. In developing the requirements, the project team should strive to minimize the number of data elements required in each EDI transmission. That effort should result in reduced telecommunications costs by eliminating unnecessary or redundant data. MSC will need to coordinate its findings with the capabilities of its commercial trading partners, especially the ocean carriers.

1.3 Identify and Resolve Business and Legal Issues

The project team will review current business policies and legal issues for purposes of identifying changes that will permit the various operating concepts to be expeditiously implemented.

Table 5-1. Implementation Plan and Schedule

Task	Number of Months						
	1	2	3	4	5	6	7
1 Develop functional requirements							
1.1 Finalize operating concepts							
1.2 Detail data requirements							
1.3 Identify and resolve business and legal issues							
2 Train MSC staff							
2.1 Provide introductory EDI training							
2.2 Train users and developers in EDI mapping							
3 Review EDI standards and conventions							
3.1 Map data requirements							
3.2 Modify ASC X12 transaction sets							
3.3 Prepare implementation conventions							
4 Specify technical operating requirements							
4.1 Review and complete hardware specifications							
4.2 Identify software requirements							
4.3 Establish telecommunications strategy							
5 Procure and install hardware and software							
5.1 Procure and install hardware and software							
5.2 Train staff in using EDI translation software							
5.3 Procure and install telecommunications components							
6 Establish commercial trading partners							
6.1 Solicit commercial industry							
6.2 Execute trading partner agreements							
6.3 Develop test plan							
7 Integrate and test system							
7.1 Modify application systems							
7.2 Develop interface programs							
7.3 Establish telecommunications							
7.4 Update operating procedures							
7.5 Train operators							
7.6 Test, evaluate, and modify system							
8 Implement production system							▲

2 Train MSC Staff

In this task, MSC staff will receive introductory EDI training and training in EDI mapping.

2.1 Provide Introductory EDI Training

MSC personnel responsible for EDI operations will receive an introduction to EDI training.

2.2 Train Users And Developers In EDI Mapping

In this subtask, EDI users and software developers will receive training in how to map data to EDI transaction sets.

3 Review EDI Standards and Conventions

In this subtask, MSC will map its data requirements into ASC X12 transaction sets and prepare the corresponding implementation conventions.

3.1 Map Data Requirements

In this subtask, the project team will map the data requirements developed in Subtask 1.2 into the appropriate ASC X12 transaction sets. The transaction sets include ASC X12 310 (ocean freight receipt and invoice), 810 (invoice), and 824 (application advice). It is imperative that MSC coordinate its actions through the DTEDI community. Although not responsible for developing the initial transaction set, MSC will also need to accept the ASC X12 300 (booking) and 858 (manifest) transaction sets.

3.2 Modify ASC X12 Transaction Sets

MSC will work with the DTEDI community and the ASC X12 committee to modify the required ASC X12 transaction sets to accommodate the new data requirements identified in Subtask 1.2.

3.3 Prepare Implementation Conventions

The project team will prepare and subsequently publish the DoD implementation conventions for the required ASC X12 transaction sets. Those conventions must be approved by the DTEDI data maintenance working group.

4 Specify Technical Operating Requirements

MSC will identify the hardware, software, and telecommunications necessary to support the operating concept.

4.1 Review and Complete Hardware Specifications

In this subtask, the project team will review MSC's technical architecture and assess MSC's system-throughput requirements for determining MSC's hardware specifications.

4.2 Identify Software Requirements

In this subtask, the project team will determine the additional software and application system modifications required to support the planned operating concept. In addition, the project team will determine any specific EDI translation software requirements.

4.3 Establish Telecommunications Strategy

The project team will develop a telecommunications strategy for receiving EDI-formatted data from commercial trading partners and MTMC. In addition, the project team will develop a telecommunications strategy for exchanging payment data with DFAS-IN for subsequent disbursement to the ocean carriers.

5 Procure And Install Hardware And Software

In this task, MSC will procure, install, and configure the hardware, software, and telecommunications components identified in task 4. MSC staff responsible for EDI operations will also be given training in using the selected EDI translation software.

5.1 Procure And Install Hardware And Software

MSC will procure and install the hardware and software needed to support the operating concept.

5.2 Train Users In Using EDI Translation Software

In this subtask, MSC personnel will training in using the selected EDI translation software.

5.3 Procure And Install Telecommunications Components

MSC will procure, install, and configure the components needed to satisfy the telecommunications strategy identified in subtask 4.3.

6 Establish Commercial Trading Partners

MSC will solicit its key commercial trading partners (e.g., ocean carriers and supply vendors) to participate in its EDI program, execute trading partner agreements with those partners, and develop a test plan for exchanging EDI data with its trading partners (including DoD trading partners).

6.1 Solicit Commercial Industry

The project team will solicit its commercial trading partners to electronically send EDI-formatted invoices to MSC.

6.2 Execute Trading Partner Agreements

In this subtask, MSC will sign and execute EDI trading partner agreements with those commercial trading partners that desire to exchange EDI-formatted data with MSC.

6.3 Develop Test Plan

In this subtask, the project team will develop a plan for testing the exchange of EDI-formatted data with each potential trading partner. The plan will encompass both the sending and receiving of ASC X12 transaction sets.

7 Integrate and Test System

MSC will modify the application systems, develop the necessary interface programs, establish the telecommunications connectivity, update the operating procedures, train the operators, and test the system.

7.1 Modify Application Systems

In this subtask, the project team will ensure that the application system modifications developed as part of Subtask 3.2 are implemented in a timely and coordinated manner. These efforts should be coordinated with system redesign efforts, either under way or planned, for MSC's application systems.

7.2 Develop Interface Programs

In this subtask, the project team will create and install interface programs that format and pass data between an applications system and the EDI translation software located at MSC's ECC.

7.3 Establish Telecommunications

The project team will establish and test the telecommunications connectivity identified in Subtask 3.3.

7.4 Update Operating Procedures

Building upon the operating concept identified in Subtask 1.1 and the revisions to procedures identified in Subtask 1.3, the project team will formulate detailed operating procedures for day-to-day operations. Those operations should address software operation, transmission times, error-handling procedures, customer-service levels, backup routines, and business procedures.

7.5 Train Operators

In this subtask, the project team will formulate and oversee a comprehensive training program that includes basic EDI concepts, EDI translation software operation, and new internal operating procedures.

7.6 Test, Evaluate, and Modify System

The project team will field the EDI-technical configuration, establish telecommunications links, test the system using actual invoice data, and make any necessary system modifications. The testing should be carried out in two phases. First, the project team will test the system using sample data, evaluate the results, and make appropriate modifications. In the second phase, they test the system using real data sent by a selected number of trading partners. They should then evaluate and modify, as appropriate, every component of the entire system—telecommunications, hardware, EDI translation software, interface programs, and application systems. Both phases should be repeated until the system passes all testing criteria.

8 Implement Production System

Once testing is completed and all trading partners are ready to send or receive data electronically, the program will move into a production environment.

SUMMARY

By following the implementation strategy detailed in this chapter, MSC should be able to reap the benefits of using EDI to exchange data electronically with its commercial trading partners, MTMC, and DFAS-IN. Benefits include streamlining business operations and reduced expenses through the timely and accurate processing of data.

Appendix A
Data Flow Worksheets

This appendix presents a detailed description of the document and information flows associated with each of the Military Sealift Command's (MSC's) business areas that we assessed for EDI opportunities. Table A-1 provides the supporting detail for Table 2-1. It includes the number of trading partners with whom MSC exchanges information, the number of documents or transactions exchanged, the estimated document size, and the potential EDI transaction set that could be used to electronically exchange information with commercial or Department of Defense trading partners.

Table A-1. MSC Estimated EDI Data Flow

Functional area	Business area	Data flow	Project description	Trading partners (annual)	Estimated annual document and page volumes to be replaced[a]	MSC application system	Potential EDI transaction set
Operations	Special Mission Ships	Invoice adjustment schedule	Convert paper-based invoice adjustment schedules to EDI	3–4	700 – 900 pp.	None	854
		Discrepancy reports	Convert discrepancy reports to EDI	3–4	300 – 400 pp.	None	854
	Tanker Operations	DD Form 250 (load/unload)	Receive and process EDI-formatted DD Form 250 transmissions	5	120 forms/ month 12 months = 1,440 doc (@ 2 pp. = 2,880 pp.)	None	856 or 861
	Ship Support	Sail orders	Generate sail orders in EDI format	50–70	500 – 600 pp.	None	323
Intermodal Program	Liner Agreements	MSC submits RFPs to carriers	Convert RFP to EDI	50	50 TP × 10 C = 500 docs (@ 200 pp. = 100,000 pp.)	CARE	602
		Carrier bid response to MSC	Convert carrier bid responses to EDI	15	15 TP × 10 C = 150 docs (@ 50 pp. = 7,500 pp.)	CARE	602
		MSC requests best and final offer (BAFO) from carriers	Convert BAFO from diskette to EDI	15	15 floppy disks	CARE	602
		Carrier submission of BAFO to MSC	Convert final bid responses from diskette to EDI	15	15 floppy disks	CARE	602
		MSC award notification to carriers	Convert award notification to EDI	15	15 TP × 10 C = 150 docs (@ 5 pp. = 750 pp.)	CARE	602
Acquisition and Contracting	Nonfuel Petroleum Products	Solicitation	Convert solicitation (RFP) to EDI	3-5	5 TP × 5 C × (150 – 200 pp.) = 3,750 – 5,000 pp.	None	840
		Bid response	Convert bid response to EDI	3-5	5 TP × 5 C × (50-75 pp.) = 1,250 –1,875 pp.	None	843
		Contract award	Convert paper notification of award to EDI	3-5	5 TP × 5 C × 20 pp. = 500 pp.	None	836

[a] Estimated volumes information provided by MSC personnel interviewed and other written sources.

Legend: C = contracts; CARE = Carrier Analysis and Rate Evaluation; CARS = Cargo System; docs = documents; GFET = Government Furnished Equipment and Tracking; IBS = Integrated Booking System; MTMC = Military Traffic Management Command; NAVCOMPT = Navy Comptroller; O = orders; PAYS = MSC's accounts payable system; pp =pages; RFP = request for proposal; TP = trading partners.

Table A-1. MSC Estimated EDI Data Flow (Continued)

Functional area	Business area	Data flow	Project description	Trading partners (annual)	Estimated annual document and page volumes to be replaced[a]	MSC application system	Potential EDI transaction set
		Delivery orders	Convert paper delivery orders (DD Form 1155) to EDI	1	Unknown[b]	Unknown	850
	Ship Construction and Repair	General Technical Requirements (GTR)	Convert nonstandard GTR to EDI	4	17,000 pp.[c] (CD–ROM)	None	841
	Small Purchase Contracting (<$100,000)	MSC purchase request (NAVCOMPT Form 2276)	Convert requirements to EDI	Internal	13,800 pp.	GFET	None
		Solicitation	Convert RFP to EDI	100	500 C × 100 TP × 25 pp. = 1,250,000 pp.	None	840
		Bid response	Convert vendor bids to EDI	50	500 C × 50 TP × 3 pp. = 75,000 pp.	None	843
		Contract award	Convert award to EDI	50	10 –12,000 pp.	None	836
		Order for supplies or services (DD Form 1155)	Convert paper delivery order to EDI	N/A	7,000 C × 2 pp. = 14,000 pp.	GFET	850
	Non-small-purchase Contracting (>$100,000)	Solicitation	Convert paper-based RFPs to EDI	30–50	50 TP × 522 C = 26,100 docs. (@ 50 pp. = 1,305,000 pp.)	None	840
		Bid response	Convert paper-based responses to EDI	20–30	30 TP × 522 C = 15,660 docs (@ 20 pp. = 313,200 pp.)	None	843
		Contract award	Convert paper-based contract to EDI	30	30 TP × 522 C = 15,660 docs (@ 15 pp. = 234,000 pp.)	None	836
		Order for supplies and services DD Form 1155)	Convert paper-based orders to EDI	30	532 C × 120 O = 6,384 orders (@ 2 pp. = 12,768 pp.)	None	850

[a] Estimated volumes information provided by MSC personnel interviewed and other written sources.
[b] Part of an ongoing invoice EDI pilot test with Mobil Oil Corporation; transaction volume unavailable.
[c] Volume varies from 50 to 300 pages, depending on the complexity of the requirements.

Legend: C = contracts; CARE = Carrier Analysis and Rate Evaluation; CARS = Cargo System; docs = documents; GFET = Government Furnished Equipment and Tracking; IBS = Integrated Booking System; MTMC = Military Traffic Management Command; NAVCOMPT = Navy Comptroller; O = orders; PAYS = MSC's accounts payable system; pp =pages; RFP = request for proposal; TP = trading partners

Table A-1. MSC Estimated EDI Data Flow (Continued)

Functional area	Business area	Data flow	Project description	Trading partners (annual)	Estimated annual document and page volumes to be replaced[a]	MSC application system	Potential EDI transaction set
	Voyage and Time Charter Contracting	Solicitation	Convert paper-based RFPs to EDI	200–250	75 TP × 10 C × 750 docs (@ 75 pp. = 56,250 pp.) (most via EasyLink)	None	840
		Bid response	Convert paper-based responses to EDI	10	10 TP × 10 C = 100 docs (@ 20 pp. = 2,000 pp.)	None	843
		Contract award	Convert paper-based contract awards to EDI	10	10 TP × 10 C = 100 docs (@ 20 pp. = 2,000 pp.)	None	843
Invoicing and Payment	Ocean Cargo Invoice Processing	Invoices	Receive and process EDI-formatted invoices	10	30,000 invoices (@ 2 pp. = 60,000 pp.)	CARS and PAYS	310
		Booking	Process EDI-formatted booking request from MTMC (EDI is planned as part of MTMC's IBS project)	10	Unknown	CARS (and MTMC IBS)	300
		Discrepancy reports (SF 361)	Generate discrepancy reports in EDI format	10	5% of invoices × 1 pp. = 1500 pp.	PAYS	854
		Government Bill of Lading (GBL)	Receive and process EDI-formatted GBL from MTMC (currently in paper form)	6–10	400 GBLS [@ (10 –20 pp.) = 4 – 8,000 pp.]	None	858
	Commercial Invoice Processing	Vendor invoices	Receive and process EDI-formatted invoices	200–300	14,379 invoices (@ 3 pp. = 43,179 pp.)	GFET and CARS	310

Legend: C = contracts; CARE = Carrier Analysis and Rate Evaluation; CARS = Cargo System; docs = documents; GFET = Government Furnished Equipment and Tracking; IBS = Integrated Booking System; MTMC = Military Traffic Management Command; NAVCOMPT = Navy Comptroller; O = orders; PAYS = MSC's accounts payable system; pp =pages; RFP = request for proposal; TP = trading partners.

Appendix B
Small Purchase Contracting

This appendix presents our findings on the Military Sealift Command's (MSC) small purchase contracting business area and federal and DoD procurement initiatives that affect it.

BACKGROUND

MSC awarded 14,379 contracts in FY95. Table B-1 shows how many contracts were awarded by cost threshold and which MSC location initiated the contract.

Table B-1. Total Number of Military Sealift Contracts Awarded for Calendar Year 1995 by Cost Category

Ordering Location	Cost Category					
	Under $2,500	$2,500–$25,000	$25,000–$50,000	$50,000–$100,000	Over $100,000	Headquarters Total
Headquarters	661	272	31	16	276	1,256
LANT	3,368	1,232	91	43	46	4,780
PAC	2,570	1,855	147	76	49	4,697
FE	263	55	16	38	161	533
MIDL	2,829	275	8	1	0	3,113
Total	9,691	3,689	293	174	532	14,379

Note: LANT = MSC, Atlantic; PAC = MSC, Pacific; FE = MSC, Far East; MIDL = MSC, Middle Atlantic.

Of the 14,379 contracts awarded, 13,847 (96.3 percent) were for purchases less than $100,000 and would have been eligible for procurement using simplified acquisition procedures. Of these contracts, 9,691 (69.9 percent) would have been eligible for procurement using credit cards (i.e., for small purchases costing $2,500 or less).

An initial review of the MSC small purchase contracting business area indicated that it is a potential EDI project. However, the small purchase function is affected by a number of federal and DoD procurement initiatives, discussed in the next section.

FEDERAL AND DOD PROCUREMENT INITIATIVES

Federal government procurement has been the subject of recent streamlining initiatives and legislation designed to reform the acquisition system and enhance its effectiveness and efficiency.

The *National Performance Review* (NPR) of 1993 was a major management reform initiative to identify ways to make the federal government operate more cost-effectively. Section 30 of the NPR addressed federal procurement and recommended procedures to lower costs and reduce bureaucracy (including paperwork) by permitting credit cards to be used by non-contracting personnel for purchases costing $2,500 or less.

The *Federal Acquisition Streamlining Act of 1994* (FASA) made changes in the way goods and services costing $100,000 or less are acquired. The act replaces the previous $25,000 threshold with a new threshold of $100,000 once an agency was certified to use the Federal Acquisition Computer Network, or FACNET, for electronic commerce.

The *Federal Acquisition Reform Act of 1996* (FARA) (Division D of the FY96 *Defense Authorization Act*) amended FASA to eliminate the $50,000 acquisition threshold cap on use of streamlined acquisition procedures until an agency receives interim FACNET certification. Thus, the small-purchase threshold is $100,000 even without automated, EDI-capable acquisition procedures. FARA requires that the small purchase threshold revert back to $50,000 after 31 December 1999, if an agency does not have FACNET certification or a similar approved certification.

As a major participant in the *Department of Defense Corporate Information Management* (CIM) initiative for the development of a standard procurement system (SPS), the U.S. Navy has been developing and testing one of two candidate systems, the Acquisition Management Automation System (AMAS). The other candidate system is Procurement Desktop. AMAS is currently undergoing run-off testing to determine the best system for further SPS development. AMAS is a migratory procurement system designed to automate all possible resource management, administrative, technical, and office functions related to procurement across the total acquisition life cycle, as well as provide an operational interface throughout the command. AMAS has four application functions: contracts management, program office, small purchase, and contracts.

The Navy chose MSC as a test bed for feasibility studies on the AMAS small purchase module. The module is presently used to support the procurement of small purchases, but not that of non-Military Standard Requisitioning and Issue Procedures (MILSTRIP) items.

MSC small purchase procurement functions are scheduled to be transferred to the Naval Supply Systems Command and specifically to the command's system of Fleet and Industrial Supply Centers (FISC). The exact date for function transfer has yet to be determined. FISCs are not operative using AMAS. Further decisions on function transfer remain in question because it is unknown whether the current FISC acquisition system can support MSC ship support requirements in a timely manner.

MSC currently does not have a credit card purchase program capable of supporting the large volume of acquisition requirements eligible for credit card purchase. However, it has developed detailed guidance for implementing credit card procedures.[1]

[1]Commander Military Sealift Command (COMSC) Instruction 4200.16, *Government-wide Commercial Purchase Card Program*, 30 November 1995.

Appendix C
EDI Cost Savings

This appendix describes our methodology for estimating the direct savings the Military Sealift Command will realize if EDI is implemented in particular business areas. It draws on an approach that the Logistics Management Institute developed and applied to the Department of Defense *A Business Case for Electronic Commerce*[1] and to that of the Defense Commissary Agency (DeCA).[2] First, we develop an estimate of the dollar value of the processing steps involved in each functional area. We then estimate the total direct savings from implementing EDI within the functional area per document. Finally, we apply assumed implementation rates to each recommended functional area to calculate life-cycle savings over a 10-year period.

DIRECT COST SAVINGS

Direct cost savings occur when EDI permits an activity to eliminate a variety of manual document-processing steps, such as sorting, distribution, mailing, data input, error resolution, and storage. Table C-1 describes several of those steps in detail. It also shows low, medium, and high estimates of the costs of carrying out those steps. In 1990, the Defense Finance and Accounting Service–Indianapolis Center (DFAS-IN), developed the standards used in the table. These have been adjusted to 1996 dollars for accuracy and to account for inflation.

[1]LMI Report DL001-06R1, *A Business Case for Electronic Commerce*, Thomas P. Hardcastle and Thomas W. Heard, September 1990.

[2]LMI Report DL203R4, *The Defense Commissary Agency: A Business Case for Electronic Data Interchange,* Thomas P. Hardcastle and Robert Hazan, September 1993.

Table C-1. Direct Cost Savings Through EDI

Operation	Activity	Comment	Cost category ($)[a]		
			Low	Med.	High
Document distribution	Separate documents, make copies, route to mail room, prepare address labels, and stuff envelopes	Costs increase with complexity of operation	0.02	0.05	0.07
Mailing	Procure envelopes and stamps	Costs increase with number of documents requiring single envelopes	0.13	0.19	0.31
Document receipt	Receive, open, sort, date, route, and stamp	Costs increase with complexity of sorting	0.01	0.02	0.04
Document processing	Match, reconcile, and audit	Costs increase with document complexity and data volume	0.18	0.31	0.50
Document preparation and control	Examine and prepare for data entry	Costs increase with document complexity	0.16	0.25	0.57
Data entry	Enter data	Costs increase with volume of data	0.07	0.21	0.82
Error resolution	Research and correct errors, and prepare correspondence	Costs increase with volume of data	0.06	0.08	0.11
Document storage and retrieval	Log, separate, sort, microfilm, box, file, and retrieve documents	Costs increase with filing and microfilming requirements	0.12	0.19	0.34
Telephone procurement	Procure material and services	Costs increase with number of telephone solicitations	2.15	4.24	6.45

[a] In current dollars as described in the *National Budget Estimate for 1996*, March 1995

Table C-2 summarizes the direct cost savings by operation for each EDI opportunity under consideration. Savings per document vary from a high of $8.30 for each commercial invoice processed through EDI to a low of –$1,256 for each Ship Construction and Repair technical Drawings processed. The elimination of paper transactions in each of the business areas results in positive savings. However, the estimated telecommunications costs required to transmit RFPs and detailed Ship Construction and Repair technical drawing create net costs in those areas and render them uneconomical EDI projects.

Table C-2. Direct Cost Savings/Loss Per Document

Operation	Process Area						
	Ocean Cargo Invoice Processing	Commercial Invoice Processing	Non-small-purchase and Nonfuel Petroleum Products Delivery Orders	Ship Construction and Repair (technical drawings)	Voyage and Time Charter Contracting		
					Request for proposal	Bid response	Contract award
Document distribution	0.05	0.02	0.05	0.07	0.07	—	0.07
Mailing	0.25	0.25	0.31	0.31	1.00	—	0.31
Document receipt	2.56	2.55	0.08	—	—	0.04	—
Document processing	0.05	.0.02	0.99	—	—	0.50	—
Document preparation and control	2.56	2.55	0.92	0.57	0.57	0.57	—
Data entry	1.58	1.26	.69	2.85	—	2.10	2.10
Error resolution	0.47	1.71	0.39	—	—	—	—
Document storage and retrieval	0.19	0.19	0.82	0.34	0.34	0.34	0.34
Subtotal ($)	7.71	8.55	4.25	4.14	1.98	—	5.57
Minus telecommunications charges	(0.25)	(0.25)	(0.25)	(1,260.00)	(23.25)	(6.20)	(1.55)
Net total ($)	7.46	8.30	4.00	(1,256.00)	(21.27)	(2.65)	4.02

Table C-2. Direct Cost Savings/Loss Per Document (Continued)

Operation	Process Area									
	Non-small-purchase Contracting			Nonfuel Petroleum Products Contracting			Liner Agreements			Tanker Opera-tions
	Request for Proposal	Bid Response	Contract Award	Request for Proposal	Bid Response	Contract Award	Request for Proposal	Bid Response	Contract Award	
Document distribution	0.07	—	0.07	0.07	—	0.07	9.25	2.85	0.07	—
Mailing	1.00	—	0.31	1.50	—	0.31	1.50	1.00	0.31	—
Document receipt	—	0.04	—	—	0.04	—	—	10.24	—	0.19
Document processing	—	0.50	—	—	0.50	—	—	—	—	2.20
Document preparation and control	0.57	0.57	—	0.57	0.57	—	—	—	—	2.72
Data entry	—	—	10.50	2.10	31.50	2.10	—	—	—	1.44
Error resolution	—	—	—	—	—	—	—	—	—	0.59
Document storage and retrieval	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	—	0.19
Subtotal ($)	1.98	11.95	2.82	2.48	32.95	2.82	11.09	14.43	0.38	7.33
Minus telecommuni-cations charges	(15.50)	(7.75)	(1.55)	(62.00)	(23.25)	(1.55)	(62.00)	(15.50)	—	(0.25)
Net total ($)	(13.52)	4.20	1.27	(59.52)	9.70	1.77	(50.91)	(1.07)	0.38	7.08

In estimating the savings from implementing EDI, we used existing MSC processing times whenever possible. We used DFAS-IN standards where we could not determine an appropriate MSC standard. (For example, MSC metrics for storing an ocean cargo invoice for later retrieval are unavailable. Therefore, using the DFAS-IN standards, the cost is $0.19.) In Tables C-3 to C-11, we provide detailed savings worksheets for each functional area. For each table, we show the key assumptions used to assign processing dollar values, such as the level and salary of the government employee that processes a document, or the number of minutes it takes an employee to do so. To calculate actual labor costs, we added 30 percent for fringe benefits and overhead. All calculations use 1996 constant dollars.

Table C-3. Direct Savings Worksheet: Ocean Cargo Invoice Processing

Operation	Processing unit savings per document ($)				
	Mailroom	Invoice Examination	Invoice Reconciliation	Filing	Total
Document receipt	0.05	—	—	—	0.05
Document preparation and control	—	0.25	—	—	0.25
Data entry	—	2.56	—	—	2.56
Document distribution	0.05	—	—	—	0.05
Document processing	—	2.56	—	—	2.56
Document processing[c]	—	—	1.58	—	1.58
Error resolution[d]	—	—	0.47	—	0.47
Document storage and retrieval	—	—	—	0.19	0.19
Total	0.10	5.37	2.05	0.19	7.71

[a]Based on GS-6, Step 5 @ $30,600/year; rate of 1 invoice/10 minutes (supplied by MSC).
[b]Based on GS-6, Step 5 @ $30,600/year; rate of 1 invoice/10 minutes (supplied by MSC).
[c]Based on GS-8, Step 5 @ $37,800/year; rate of 1 invoice/5 minutes (supplied by MSC).
[d]Assumptions:

- GS-8, Step 5 @ $37,800/year ($18.90/ hour).
- Reconciliation requires 1 hour (supplied by MSC).
- 25 percent of all invoices require reconciliation.
- 10 percent of invoice errors will be corrected by EDI, 10 percent error rate is human error (e.g., transposition), remaining 90 percent of error rate is documentation errors.
- $18.90 × $.25 × $0.10 = $0.47.

Table C-4. Direct Savings Worksheet: Commercial Invoice Processing

Operation	Processing unit savings per document ($)				
	Mailroom	Automation Support	Invoice Examination	Filing	Total
Document receipt	0.02	—	—	—	0.02
Document preparation and control	—	0.25	—	—	0.25
Data entry[a]	—	2.55	—	—	2.55
Document distribution	0.02	—	—	—	0.02
Document processing[b]	—	2.55	—	—	2.55
Document processing[c]	—	—	1.26	—	1.26
Error resolution[d]	—	—	1.71	—	1.71
Document storage and retrieval	—	—	—	0.19	0.19
Total	0.04	5.35	2.97	0.19	8.55

[a]Based on GS-6, Step 5 @ $30,600/year; rate of 1 invoice/10 minutes (supplied by MSC)
[b]Based on GS-6, Step 5 @ $30,600/year; rate of 1 invoice/10 minutes (supplied by MSC)
[c]Based on GS-6, Step 5 @ $30,600/year; rate of 1 invoice/5 minutes (supplied by MSC)
[d]Assumptions:

- GS-6, Step 5 @ $30,600/year ($15.20/hour).
- Reconciliation requires 1 hour (supplied by MSC).
- 15 percent of all invoices require reconciliation.
- 75 percent of invoice errors will be corrected by EDI (from Plans and Analysis Division Study, *DeCA Invoice Key-in Rate*, 28 January 1993).
- $15.20 × 0.15 × 0.75 = $1.71.

Table C-5. Direct Savings Worksheet: Non-small-purchase and Nonfuel Petroleum Products Delivery Orders

Operation	Processing unit savings per document ($)
Document distribution	0.05
Mailing	0.31
Document receipt	0.08
Document processing	0.99
Document preparation and control	0.92
Data entry	0.69
Error resolution	0.39
Document storage and retrieval	0.82
Total	4.25

Note: MSC standards were not available. The savings per processing unit as presented in LMI Report DL001-06R1, *A Business Case for Electronic Commerce*, Thomas P. Hardcastle and Thomas W. Heard, September 1990, were used and adjusted for inflation (1996 dollars).

Table C-6. Direct Savings Worksheet: Ship Construction and Repair

Operation	Processing unit savings per document ($)
Document distribution	0.07
Mailing	0.31
Document receipt	—
Document processing	—
Document preparation and control	0.57
Data entry	2.85
Error resolution	—
Document storage and retrieval	0.34
Total	4.14

Note: Based on GS-7, Step 5 @ $34,136/year ($26,259 plus fringe benefits) at $17.07/hour or $.285/minute; assume 10 minutes needed to prepare and copy (duplicate) a CD-ROM containing technical drawings.

Table C-7. Direct Savings Worksheet: Voyage and Time Charter Contracting

Operation	Processing unit savings per document ($)		
	RFP	Bid response	Award
Document distribution	0.07	—	0.07
Mailing	1.00	—	0.31
Document receipt	—	0.04	—
Document processing	—	0.50	—
Document preparation and control	0.57	0.57	—
Data entry	—	8.40	2.10
Error resolution	—	—	—
Document storage and retrieval	0.34	0.34	0.34
Total	1.98	9.85	2.82

Note: Based on GS-11, Step 5 @ $50,518/year ($38,860 plus fringe benefits) = $0.42/minute; assumes 1-page input/minute; bid responses are 20 pages and contract awards are 5 pages.

Table C-8. Direct Savings Worksheet: Non-small-purchase Contracting

Operation	Processing unit savings per document ($)		
	RFP	Bid response	Award
Document distribution	0.07	—	0.07
Mailing	1.00	—	0.31
Document receipt	—	0.04	—
Document processing	—	0.50	—
Document preparation and control	0.57	0.57	—
Data entry	—	10.50	2.10
Error resolution	—	—	—
Document storage and retrieval	0.34	0.34	0.34
Total	1.98	11.95	2.82

Note: Based on GS-11, Step 5 @ $50,518/year ($38,860 plus fringe benefits) = $0.42/minute; assumes 1-page input/minute; bid responses are 25 pages and contract awards are 5 pages.

Table C-9. Direct Savings Worksheet: Nonfuel Petroleum Products Contracting

Operation	Processing unit savings per document ($)		
	RFP	Bid response	Award
Document distribution	0.07	—	0.07
Mailing[a]	1.50	—	0.31
Document receipt	—	0.04	—
Document processing	—	0.50	—
Document preparation and control	0.57	0.57	—
Data entry[b]	—	31.50	2.10
Error resolution	—	—	—
Document storage and retrieval	0.34	0.34	0.34
Total	2.48	32.95	2.82

[a]Mailing costs are higher as a result of larger documents.

[b]Based on GS-11, Step 5 @ $50,518/year ($38,860 plus fringe benefits) = $0.42/minute; assumes 1-page input/minute; bid responses are 25 pages and contract awards are 5 pages.

Table C-10. Direct Savings Worksheet: Liner Agreements

Operation	Processing unit savings per document ($)		
	RFP	Bid response	Award
Document distribution	9.25	2.85[a]	0.07
Mailing[a]	1.50	1.00[b]	0.31
Document receipt	—	10.24[c]	—
Document processing	—	—	—
Document preparation and control	—	—	—
Data entry	—	—	—
Error resolution	—	—	—
Document storage and retrieval	0.34	0.34	—
Total	11.09	14.43	0.38

[a]Based on GS-7, Step 5 @ $34,136/year ($26,259 plus fringe benefits) = $0.285/minute; bid responses require approximately 10 minutes to distribute.

[b]Approximately 70 percent of the received bids are sent out again for best and final offer (BAFO).

[c]Based on GS-13, Step 5 @ $77,160/year ($55,394 plus fringe benefits) = $38.58/hour or $0.64/minute; each response requires 8 minutes. 8 × $0.64 = $5.12; process occurs 2 times because of BAFO; $5.12 × 2 = $10.24.

Table C-11. Direct Savings Worksheet: Tanker Operations

Operation	Processing unit savings per document ($)
Document distribution	—
Mailing	—
Document receipt	0.19
Document processing	2.20
Document preparation and control	2.72
Data entry	1.44
Error resolution	0.59
Document storage and retrieval	0.19
Total	7.33

Note: The savings per processing unit as presented in LMI Report DL001-06R1, *A Business Case for Electronic Commerce*, Thomas P. Hardcastle and Thomas W. Heard, September 1990, were used and adjusted for inflation (1996 dollars).

Table C-12 details the estimated telecommunications charges. We began by determining the average number of characters per page for each type of document. The cost per page for each document was then calculated by dividing the number of characters by 100, rounding them to the nearest 100, and multiplying by $0.0126. Although the Federal Telecommunications Services (FTS) 2000 contract cost per 100 characters transmitted using the Sprint EDI Value Added Network

(VAN) is $0.0122, we increased the transmission charge by $0.0004 to approximate the overhead charge incurred for each transmission. Finally, we multiplied the cost per page by the total number of pages to derive the total cost per document.

Table C-12. Estimated EDI VAN Telecommunications Charges

Business area	Document	Characters per page (rounded to nearest 100)	Cost per page (chars/100 x 0.0126)	Total pages	Total cost (total pages x cost/page)
Ocean cargo invoice processing	Invoice	1,000	$0.126	2	$0.25
Commercial invoice processing	Invoice	1,000	$0.126	2	$0.25
Non-small purchase	RFP[a]	2,500	$ 0.31	50	$15.50
	Bid response	2,500	$ 0.31	25	$7.75
	Contract award	2,500	$ 0.31	5	$1.55
Nonfuel Petroleum Products Contracting	RFP[a]	2,500	$ 0.31	200	$62.00
	Bid response	2,500	$ 0.31	75	$23.25
	Contract award	2,500	$ 0.31	20	$6.20
Voyage and time charter contracting	RFP	2,500	$ 0.31	75	$23.25
	Bid response	2,500	$ 0.31	20	$6.20
	Contract award	2,500	$ 0.31	5	$1.55
Non-small purchase and nonfuel petroleum products	Delivery orders (DD Form 1155)[b]	500	$ 0.126	2	$ 0.25
Ship construction and repair	Technical drawings	10,000,000 (CD-ROM)	$1,260 (entire document)	N/A	$1,260.00
Liner agreements	RFP	2,500	$ 0.31	200	$62.00
	Bid response	2,500	$ 0.31	50	$15.50
	Contract award	N/A; sent on floppy disks	N/A	N/A	N/A
Tanker operations	DD Form 250[c]	2,000	$ 0.25	1	$ 0.25

Note: N/A = not applicable.

[a]We assumed that RFPs, bid responses, and contract awards average 65 characters per line and that the average page in an RFP has 37 lines for a total of 2,405 characters per page. Transmission charges are based upon increments of 100 characters; therefore, we rounded the number of characters per page to 2,500.
[b]DD Form 1155 - Order for Supplies and Services.
[c]DD Form 250 - Material Inspection and Receiving Report.

IMPLEMENTATION RATES

Many EDI systems can be fielded relatively quickly, but realizing full benefits takes time. The amount of time typically depends on the trading partners' EDI capabilities, ease of implementation, and amount of internal resources available for the implementation. Based on our experience with both government and private-sector EDI projects, we developed MSC's implementation rates as shown in Table C-13.

Table C-13. Implementation Rate

Business Area	Implementation rate (%)									
	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06
Cargo invoicing	5	20	30	45	61	73	80	85	88	90
Commercial invoicing	0	5	20	30	45	61	73	80	85	88

We used the following assumptions: In FY97 MSC will implement ocean cargo invoice processing and payment, and in FY98 it will implement commercial invoice processing and payment (assuming it is economically feasible to expand the current pilot test with the Mobil Oil Corporation). We also assume each project requires a full year or longer to develop the EDI process before it is ready for implementation. We multiplied the cost savings per document by the implementation rates in Table C-13 to obtain the life-cycle EDI cost savings shown in Table C-2. MSC will realize its greatest return on EDI investment in the 10th year of its program.

INDIRECT COST SAVINGS FROM REDUCED INTEREST CHARGES

Although indirect cost savings frequently yield greater savings than direct cost savings, they are also more difficult to quantify. As a result, they are normally excluded from an economic analysis of EDI opportunities. However, certain cost savings that indirectly result from implementing EDI in a business area are sometimes easily identified. An example is a reduction in interest charges resulting from the late payment of invoices. MSC incurs interest charges every year of at least $300,000. Because the use of EDI is expected to decrease the time needed to process an invoice for payment, we included the savings in our analysis.

Table C-14 shows the estimated savings MSC should realize if EDI is implemented and invoices are paid in a timely manner.

Table C-14. Indirect Cost Savings (Interest Charge Reduction)

Business Area	Interest charge reduction ($000)										
	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Ocean cargo invoices	14.0	56.0	84.0	126.0	171.0	204.5	224.1	238.1	246.6	252.1	1,616.4
Commercial invoices	0.0	1.0	4.0	6.0	8.8	12.0	14.3	15.7	16.7	17.2	95.7
Total	14.0	57.0	88.0	132.0	179.8	216.5	238.4	253.8	263.3	269.3	1,712.1

We based our estimates on the following assumptions: MSC processes 30,000 ocean cargo invoices and 2,100 commercial invoices exceeding $100,000 per year. The $300,000 in interest charges is equally distributed across both invoice types. Thus, we divided $300,000 by 32,100 invoices to determine that each invoice incurs an interest charge of $9.34 {[$300,000 / (30,000 + 2,100)] = $9.34}. We then multiplied the number of invoices in each category by the assumed EDI implementation rates identified in Table C-13.

Appendix D
Alternative Electronic Commerce Solutions

Although many of the Military Sealift Command's (MSC's) EDI opportunities would not be economically justifiable projects, alternative electronic commerce (EC) solutions may offer greater cost-effectiveness and streamlining capabilities. This appendix describes alternative EC solutions that MSC should consider for those EDI opportunities.

CONTRACTING

MSC's contracting functions consist of three major information flows:

- request for proposals (RFP) sent by MSC to interested commercial organizations;
- bid responses sent by commercial organizations to MSC; and
- contract awards that MSC sends to commercial organizations that initially requested the RFP.

RFPs are traditionally poor candidates for using electronic data interchange (EDI) because of the number of pages that must be transmitted. The EDI telecommunications charges incurred to send RFPs typically negates any direct cost savings.

However, MSC could save money and streamline its operations by using a combination of EDI and either the Internet's World Wide Web (WWW) or the *Federal Register*. For example, most RFPs contain the same redundant or boilerplate information. Allowing prospective suppliers and other interested parties to access that data on the WWW or through an electronic version of the *Federal Register* would significantly reduce the size of RFPs. MSC could then send the unique portions of the RFP using EDI.

Another alternative is for MSC to place the entire RFP on the WWW. All interested parties could access the RFP and download or print the RFP as necessary. One of the increasingly common methods for displaying, printing, and viewing published material on the WWW is to produce a document in the Adobe Acrobat Reader format. Other formats include ASCII text, Microsoft Word for Windows, and Hypertext Markup Language (HTML). In order to obtain a list of interested vendors, potential respondents could be required to register on-line prior to receiving the RFP.

In most cases, bid responses require privacy or secrecy and cannot be displayed on a computer for access by the general public. Therefore, bid responses do not appear to be a suitable candidate for EC.

Contract award information is an excellent candidate for EC. Similar to RFPs, contract awards can be displayed on the WWW for access by the public. Alternatively, the contract award could be electronically mailed to users who registered prior to reading or downloading the RFP from the WWW.

Alternatives to the WWW include a simple electronic bulletin board system that requires users to access the computer system using modems. Users could then download the data using standard communications protocols such as XMODEM or Kermit. However, the disadvantage of this alternative for interested participants is that large RFPs may take an inordinate amount of time to download.

SHIP CONSTRUCTION AND REPAIR

Technical drawings are currently created by MSC computers that use CAD/CAM software. Those drawings are then written to CD-ROM. An alternative method of doing business might be to permit users to access the drawings on MSC's WWW site. However, that access may be subject to security considerations, depending on the data contained in the drawings.

Appendix E
Glossary

AMAS	Acquisition Management Automation System
ANSI	American National Standards Institute
APL	American President Lines
ASC	Accredited Standards Committee
BAFO	best and final offer
CAD/CAM	computer-aided design/computer-aided manufacturing
CARE	Carrier Analysis and Rate Evaluation
CARS	Cargo System
CD-ROM	compact disc – read-only memory
COMSC	Commander Military Sealift Command
DFAS	Defense Finance and Accounting Service
DFAS-IN	Defense Finance and Accounting Service – Indianapolis Center
DFSC	Defense Fuel Supply Center
DISN	Defense Information Systems Network
DLA	Defense Logistics Agency
DoD	Department of Defense
DTEDI	Defense Transportation Electronic Data Interchange
DTRS	Defense Transportation Reporting System
DUSD(L)	Deputy Under Secretary of Defense (Logistics)
EC	electronic commerce
ECC	Electronic Commerce Center
EDI	electronic data interchange
EFT	electronic funds transfer
E-mail	electronic mail
FACNET	Federal Acquisition Computer Network
FARA	Federal Acquisition Reform Act
FASA	Federal Acquisition Streamlining Act

FISC	Fleet and Industrial Supply Center
FTS2000	Federal Telecommunications Services 2000
GBL	government bill of lading
GFET	Government Furnished Equipment and Tracking
GTR	General Technical Requirement
HTML	hypertext markup language
IBS	Integrated booking system
IDIQ	Indefinite delivery indefinite quantity
ISA	Information Systems Agreement
MARAD	Maritime Administration
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MSC	Military Sealift Command
MSCLANT	Military Sealift Command Atlantic Area
MTMC	Military Traffic Management Command
NAVCOMPT	Navy Comptroller
NPR	National Performance Review
NWS	Naval Weapons Station
PAYS	MSC's accounts payable system
RFP	request for proposal
SPS	standard procurement system
UNK	Unknown
USTRANSCOM	U.S. Transportation Command
VAN	value-added network
WPS	World-wide Port System
WWW	World Wide Web

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Harold L. Frohman and James E. Cotterman

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13. ABSTRACT ***(Maximum 200 words)***

The Department of Defense is aggressively implementing electronic data interchange (EDI). The military services, Defense Logistics Agency, U.S. Transportation Command and its component commands, and the Defense Finance and Accounting Service have built or modified automated systems to support the electronic exchange of transportation information. In this report, we analyzed EDI opportunities for the Military Sealift Command (MSC), focusing on operations, acquisition and contracting, invoicing and payment, and the intermodal program. In those functional areas, we identified nine potential EDI projects, including ocean cargo invoicing and payment operations, vendor invoicing, acquisition, and tanker operations material inspection and receiving reports. However, only one of those projects is clearly economically justified. We recommend that MSC implement EDI in processing its ocean cargo invoices and payments. Doing so would save MSC more than $1.4 million in direct cost savings and another $1.7 million in reduced interest charges over the next 10 years.

14. SUBJECT TERMS

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