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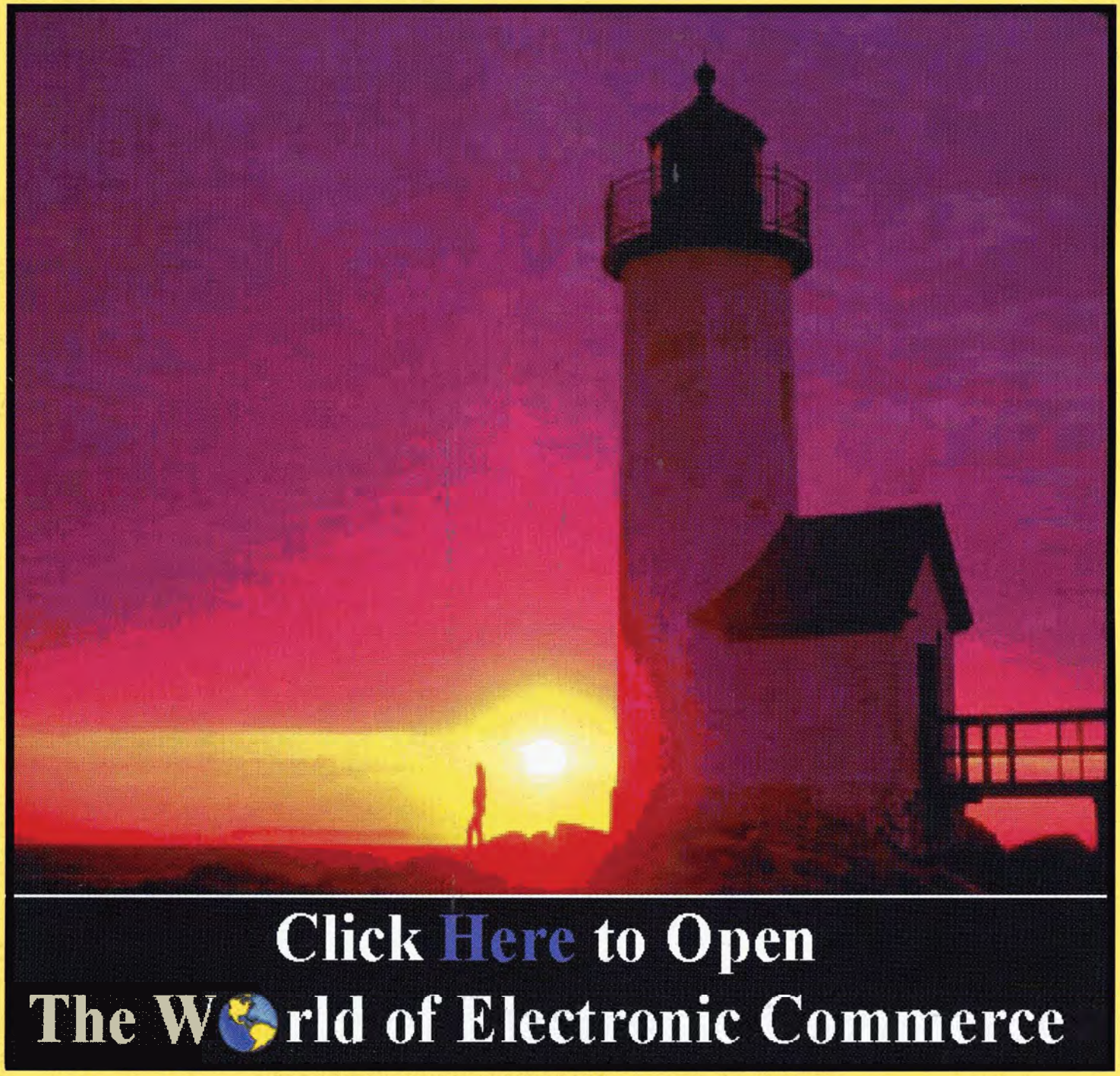
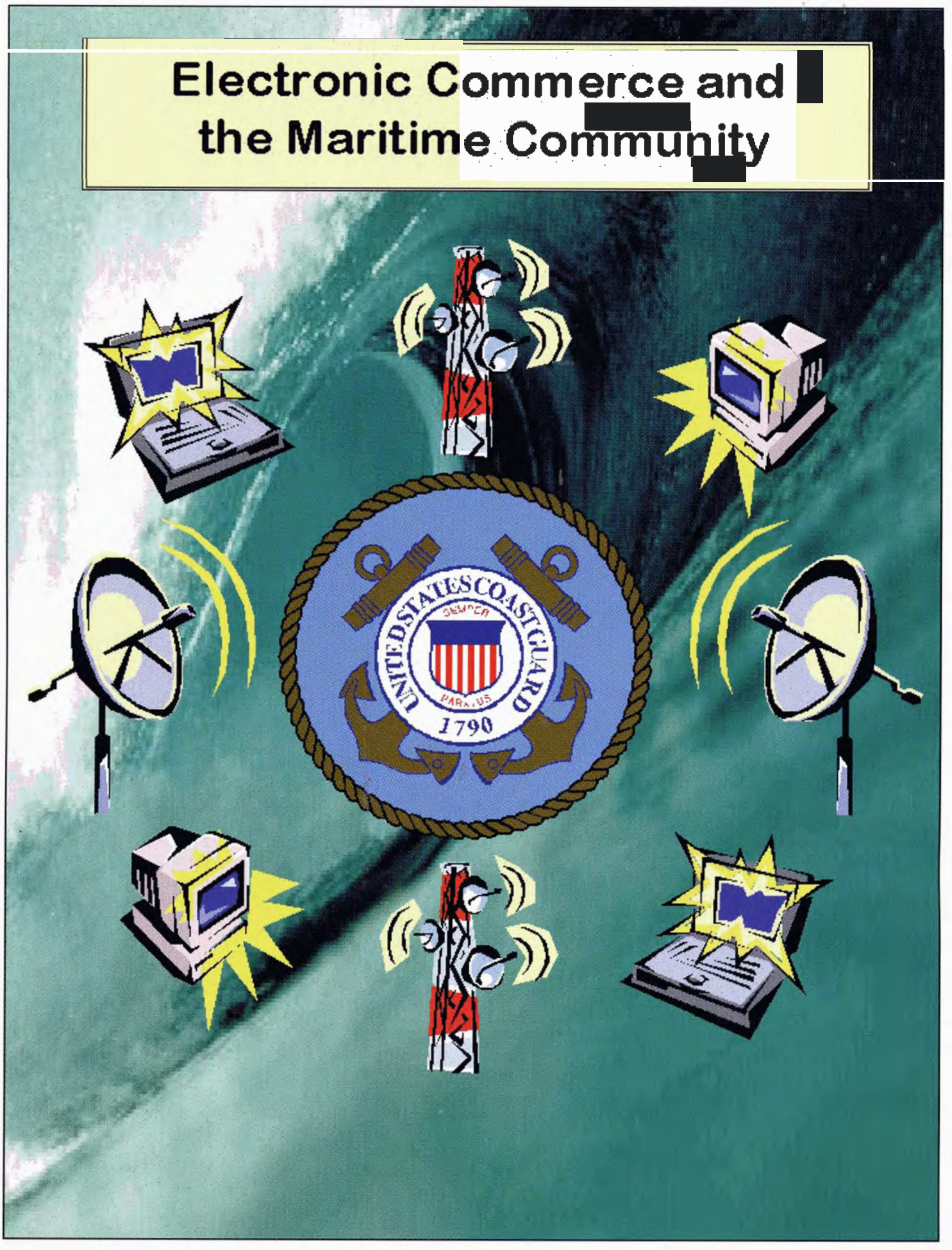


Electronic Commerce and the Maritime Community



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Our 53rd Year

Proceedings

of the Marine Safety Council

October-December, 1996 Vol. 53, No. 4

Electronic Commerce in the Maritime Community

Features

Departments

RADM CARD SPEAKS . . .

By Rear Admiral James C. Card,
United States Coast Guard

Electronic Commerce: Bringing the Marine Industry Together-Again

Electronic Commerce continues to revolutionize the marine industry. The economic pressures of a global marketplace and the need to eliminate safety-related casualties and pollution are forcing companies to leverage the benefits of technology in a breakneck drive to remain competitive. Yet in our day-to-day activities, we oftentimes forget that many of these commonplace technologies took years to gain national and worldwide acceptance. Can you recall life before the facsimile machine, electronic mail, the portable desktop computer or even the telephone (whether or not you would admit the last)?

Last month, we examined how the changing uses of technology and the creation of Chief Information Officers in many companies are contributing to the management of an important asset, namely information. But the application of technology is not new to the maritime community.

As early as 1888, the first electrically-lit buoy was deployed in U.S. waters. Some 11 years later, the first wireless messages between ship and shore were sent from lightship SAN FRANCISCO, followed closely by an experiment with radio communication in 1901. The year 1917 ushered the first experimental radiobeacon, which later paved the way for widespread use of radio in ship direction-finding. The 1 940s saw the first widespread use of LORAN (Long-Range Navigation), and more recently, global positioning Systems (with satellite-tracking capability) have afforded shipping companies a means to better manage vessel movements. Numerous other innovations and applications took place throughout our Nation's history, each considered cutting-edge in their own time.

These days, shipyards are using Electronic Commerce (EC) to transmit engineering information between contractors and subcontractors, and ship operators are exploring the advantages of transferring operation, maintenance and inspection activities via EC means as well. Vessel Movement Systems worldwide have also fostered improved management of our ever-increasing waterways traffic, and the Internet is changing the way the maritime industry markets their services.

The Coast Guard, too, is using technology to facilitate commerce. In the near future, planned upgrades to Coast Guard communication stations will provide continuous transmission of coastal weather and marine information broadcasts from two consolidated master stations (Chesapeake, VA and Port Reyes, CA). In vessel plan review, the Marine Safety Center is exploring the use of electronically-formatted technical drawings. In November of 1996, the National Maritime Center published a final rule on Electronic Records of Shipping Articles and Certificates of Discharge to eliminate manual recordkeeping of mariner employment records. Annually, this change alone is projected to save shipping companies an estimated $1,200,000 and the Coast Guard $360,000.

Despite our successes, we must remain vigilant for more improvements. Our persistent and innovative use of electronic commerce in the maritime industry offers the opportunity to refine the way we do business. Through continued education and cooperation, we can work to improve the safety, performance and competitiveness of the maritime industry as an efficient intermodal option.

BY THE WAY... Editor's Point of View

By Cheryl Robinson

Proceedings magazine strives to keep you informed about all aspects of the maritime industry. Our theme for this issue is "Electronic Commerce in the Maritime Community." From articles on current developments to future trends, our goal is to put you in the best position to respond to the changing demands of the industry.

Electronic Commerce, among other things, is the process of improving information transfer. Experts will agree that the maritime industry needs the most comprehensive data in less time. Is faster really better? You decide.

Speed may not be everything to everyone, but it's one factor in helping the maritime community maintain it's competitive edge—locally and globally. Most are willing to invest in the latest technology and equipment in their business to ensure their future.

Our staff hopes you have received some new information and useful ideas. Several articles are presented to provide a broad spectrum on Electronic Commerce. However, some of the information does overlap and is presented in the interest of enhancing each reader's knowledge base.

If you have any topics you would like to see in upcoming issues, send in your idea and we will do the rest. Suggested themes are only limited by your imagination.

NEXT ISSUE:

"ANNUAL INDEX"

UPCOMING ISSUES:

"SAFETY THROUGH SHARED LESSONS LEARNED"

"PARTNERSHIPS/ALTERNATE COMPLIANCE"

Electronic Commerce & The Maritime Industry: Improving Information Transfer

By LT Robb Wilcox

We are in a time of rapid change within the process of information transfer. Not long ago, the exchange of information relied solely on the use of paper. Then, new technologies, such as the facsimile (FAX) machine, developed the means for transferring information faster with the use of paper as well as electronic technology. We are still in a transitional phase moving away from the use of paper to the electronic exchange of data in the business environment; however, the rapid growth of affordable computer networks has introduced new ways to quickly and efficiently conduct business.

The theme of this issue, "Electronic Commerce," is intended to inform the reader about several current initiatives dealing with information transfer in the marine community.

The term, Electronic Commerce (EC), refers to the paperless exchange of business information through Electronic Data Interchange (EDI), Technical Data Interchange (TDI), e-mail, computer bulletin boards, FAX, imaging, and other similar methods. The change from paper to the electronic means of communication offers the potential for improving many business practices including mail, procurement, technical drawings exchange, technical data exchange, etc.

With the need for information exchange and fast data transmission, much of society has already tapped into the potential power of the Internet for receiving and transmitting information. The U. S. Coast Guard's Office of Marine Safety and Environmental Protection has managed information sharing over the Internet with a homepage (http:/ www.dot.gov/dotinfo/uscg/hq/g-m/gmhome.htm). This has drastically reduced the cost for printing many publications, as well as provided better service through up to date information in an organized way pertaining to many important marine industry issues including: marine safety program information, publications/reports/forms, regulatory notices, safety alerts, as well as a wealth of additional information. One article describes the development of a homepage on the Internet called NSnet (http://www.nsnet.com), funded by the Advanced Research Projects Agency (ARPA), to help link the maritime community together through a global maritime information network.

All types of information can be exchanged using electronic means, influencing many different people involved in the life-cycle of a ship including designers, shipyards, suppliers, operators, and regulators. Engineers can exchange information to be used for collaborative design through many mechanisms including the use of whiteboards on the Internet. Shipyards need to receive and transmit a lot of data to designers including electronic drawings, engineering calculations, and specifications. Suppliers need to work with the shipyards and other suppliers to send/receive data on orders and specifications. Operators need to be able to transfer information for many reasons including the exchange of reliability, availability, and maintainability data for the successful maintenance and operation of ships. Regulators such as the U.S. Coast Guard can use EC for many purposes including transfer of ship design plans for review and approval, the transfer of all paper forms/letters, procurement, communication of marine standards, and the exchange of safety data. All these applications indicate the use of Electronic Commerce within the maritime industry has the potential to facilitate business practices and improve competitiveness.

Electronic Commerce has such an impact on reducing cost, improving efficiency, and boosting the quality of businesses that it has been adopted rapidly. One article describes how the potential benefits to industry and the Government resulted in the Federal Acquisition and Streamlining Act of 1994, initially being implemented by the Department of Defense, designed to use EC to streamline the Federal procurement process. This Act significantly changes the way Government does business through a paperless environment. Another article, describes the growing need for efficient Corporate Information Management (CIM) and

improved data collection methods. This article also introduces IDEF modeling language techniques as a tool to assist in systems engineering and data management.

Special projects have already initiated the development of certain aspects of data exchange in the marine industry. The ISIT (Integrated Shipboard Information Technology) article describes this project supported by ARPA funding to develop the infrastructure for improved data exchange between ship and shore facilities. Another article describes how the Ship Operations Cooperative Program (SOCP) is funding the development of a Reliability, Availability, and Maintainability (RAM) database for the marine industry, for a more detailed article see the Marine Safety Council Proceedings on Risk Management in the Maritime Industry (April-June 1996, Volume 53, Number 2). The Coast Guard's MSTEP (Marine Safety Evaluation Program) is examining the means for the exchange of safety data and applying this information to regulatory decisions, see also the Marine Safety Council Proceeding on Risk Management in the Maritime Industry.

Although information exchange using electronic means has been available for some time, there are still obstacles to applying the full potential of EC. Merely having a computer does not allow for the potential applications of the electronic exchange of information. Differences in computer hardware and software make it difficult for computer systems to interact with each other. This results in unavailable data or information that is often costly to obtain through conversions. The solution to this problem is the standardization of electronic information formats.

To be able to communicate using electronic means requires the development of standards for data transfer. These standards have traditionally been developed for specific applications within a company, business, or country. This intra-communication (within an organization) approach has limited the exchange of electronic data within the user group of "custom" software or software translators that are unique between different computer programs. The American National Standards Institute (ANSI) is the coordinator for the development of standards in the United States. They have developed several important standards for Electronic Commerce including the IGES (Initial Graphics Exchange Specification) and ANSI X12 standards. Computer aided design file standard IGES is a standard for the exchange of engineering drawings. ANSI X12 standards were developed to create an EDI document so the sender and receiver can correctly identify and interpret the business information being transmitted for many forms pertaining to the subjects of communications and controls, product data, finance, government, materials management, transportation, purchasing, industry standards transition, distribution, and insurance.

There needs to be international standards to provide the means for communication on the global market. It is too expensive to build information translators for all the different "custom" software programs. ANSI X12 and IGES are important standards, however, they apply only to American business and industry. There is an internationally sponsored set of Electronic Data Interchange standards called EDI for Administration, Commerce and Transport (EDIFACT) that is primarily used in Europe and Asia. ANSI X12 has agreed to begin a gradual alignment with EDIFACT in 1997. On the international levels, IGES is being converted to a more comprehensive standard ISO 103037 (Standard for the Exchange of Product Model Data, STEP). One article describes STEP and the joint Navy/Industry Digital Data Exchange Standards Committee as standards groups providing information model's to be developed with product data along with physical descriptions of an object (such as a ship). Specific shipbuilding data transfer standards via STEP are being developed for several purposes (application protocols) including: ship arrangements, ship molded forms, ship piping, ship structures, and ship mechanical systems. The STEP standards are intended to provide a comprehensive means of exchange of product model data for each specific application protocol, an important standard for designers, builders, operators, and regulators of ships.

Advances in computer technology have aided the reengineering of businesses "to do more with less" by developing new ways to effectively transfer information. Electronic Commerce offers a solution for the efficient means of data transfer if used properly. The maritime community must continually apply the appropriate technology available to improve business processes, decrease cost, increase speed, increase accuracy, and improve customer satisfaction. However, it takes time, resources, and cooperation to make the implementation of new technologies a reality. Resources like the offices of the Electronic Commerce Resource Center (ECRC), a Federal funded organization to assist companies and government with the transition to Electronic Commerce, can assist the maritime industry in taking advantage of this leading technology. Through the development of better quality business practices, EC offers a way to facilitate processes and improve the competitiveness of the American shipbuilding industry. I hope the articles are informative and stimulate your interest in this rapidly developing technology. The government and the marine industry have the alternative to lead or follow in the implementation of Electronic Commerce, I hope we make a wise choice.

Lt. Robb Wilcox is a project manager in the Coast Guard National Maritime Center's Shipbuilding, Design and Operations Facilitation Division. He is a 1991 graduate of the CGA and a 1995 graduate of MIT with BS/MS degrees in Naval Architecture and Marine Engineering. Telephone (703) 235-1633.

Electronic Commerce (EC) and Electronic Data Interchange (EDI) - Technologies for a Competitive Business Environment

By Dr. Cecil Joe
Orange Electronic Commerce Resource Center
Outreach Office at University of Houston, Houston, TX 77204-4083

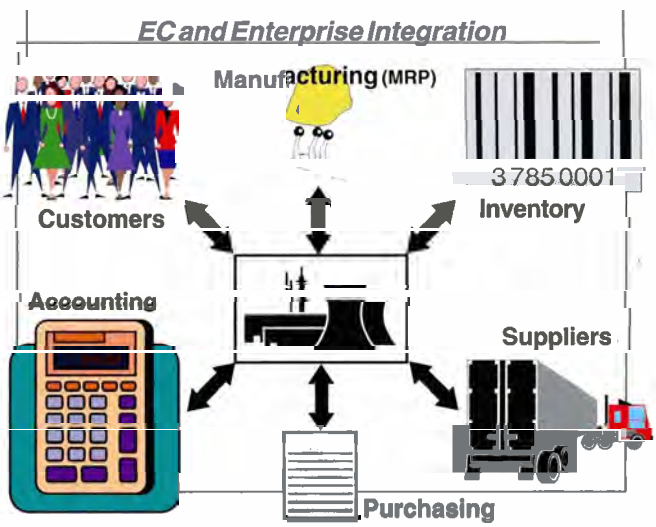
Electronic Commerce

Electronic Commerce (EC) is the broad terminology that refers to the electronic means of conducting daily business. The EC umbrella includes technologies such as Electronic Data Interchange (EDI), electronic mail (e-mail), Electronic Funds Transfer (EFT), and electronic bulletin boards. The adoption of EC by business enterprises has been proven to contribute to improved accuracy and control of data, reduced order cycle time, improved customer service, improved internal operations, increased financial control, reduced labor processing cost, and decreased administrative costs.

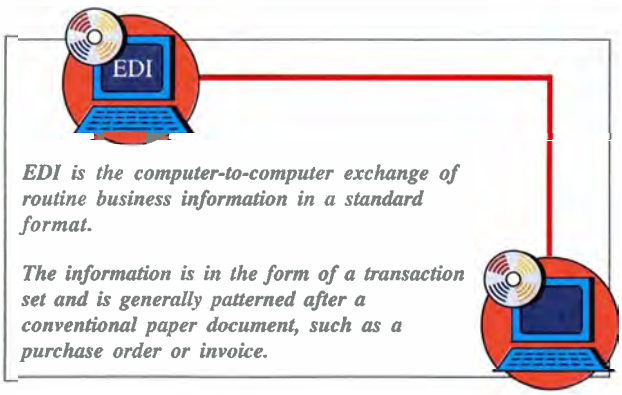
By adopting EC, businesses and organizations can conduct their day-to-day functions in a highly automated and integrated manner. Such an automated, integrated business environment facilitates overall process improvement. EC focuses on automating business and technical data. EDI is concerned primarily with promoting business information (or data). Technical data exchange deals with the electronic exchange of engineering drawings, technical illustrations, scanned images, etc. EDI focuses on automating routine business transactions, such as solicitations for bids, orders, invoices, and payments. EDI is a standards based method to transfer routine business information electronically between computer systems of business or trading partners and across industrial networks. In the EC context, a trading partner is any business enterprise or organization that is involved in the exchange of business transactions electronically.

The Vision of EC

Enabling integration of enterprises worldwide is one of the goals of the EC. The ECRCs throughout this nation are currently working towards achieving this goal. While the short-term goals are to increase the use of EDI by business enterprises (especially small businesses), the overall vision is for government and business to work from a common digital database, in real time, on the design, development, manufacturing, distribution, and servicing of products. There are numerous hard-hitting reasons for businesses to embrace EC. By adopting EC strategies and technologies, businesses can reduce time to market a product, reduce costs and improve quality.



EC strategies will improve responsiveness by facilitating integration of business and technical data, and through automation of tedious, mundane data entry tasks. EC technologies will help reduce administrative lead times through electronic bids/orders/shipping documents as well as electronic funds transfers. EC promotes data consistency by integration of databases which reduces the risk of errors in design, process planning, manufacturing and other functional areas. By contributing towards the creation of a shared data environment, adoption of EC reduces the system design, development, planning and re-supply times. EC eliminates duplication of data required in different processes in functional areas such as design, planning, manufacturing and service.



EDI is the computer-to-computer exchange of routine business information in a standard format.

The information is in the form of a transaction set and is generally patterned after a conventional paper document, such as a purchase order or invoice.

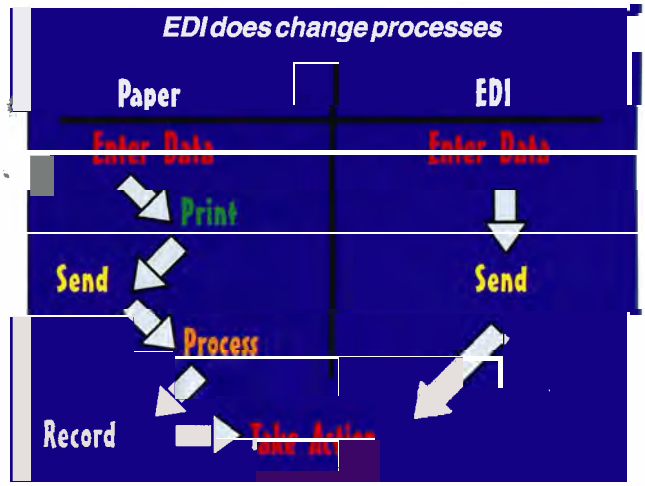
Electronic Data Interchange (EDI)

Some of the routine documents in most business environments include purchase orders, shipping notices, invoices, etc. EDI is an electronic equivalent for these paper formats and occuring *between computers using certain standards*. These computers may be operating on different computer systems and are inter-organizational. A popular misconception revolves around the term EDI. EDI is not just the electronic transaction of business or any other information. If two or more organizations engage in exchanging business information electronically, it does not necessarily follow that they are EDI transactions. Only when an enterprise exchanges business documents *using a standard format* (for example, X. 12) with another enterprise can the transaction be referred to as an EDI transaction.

Why is a standard format important during electronic transactions of information? The business information between two enterprises (or trading partners) must be exchanged in a format that can be understood by the computers of both (trading) partners, regardless of differences in computer systems. As the exchange occurs between computer systems, this information must be exchanged in a standard format. This necessitates that the information must be contained in a pre-established, uniform format that can be interpreted by a computer *without any human intervention.*

It is important to understand the differences in intra-organizational and inter-organizational trends over the last three decades. At the *intra-organizational* level (within a company) there has been an explosive growth in the use of computers and other advanced information technologies. However, there has been a marked difference in the mode of exchange of business information at the inter-organizational level. Organizations still continue to rely on traditional paper, non-electronic means of conducting business with one another.

It is important to reiterate that EDI does not attempt to eliminate paper. Rather, it focuses on eliminating the time and data entry associated with paper intensive processes. In most paper-based business environment, routine information is re-keyed several times into different computers. EDI provides a powerful, smart mechanism linking various computer processes to ensure that duplicate data entry is unnecessary and reduces the risk of manual errors encountered during re-keying of data.

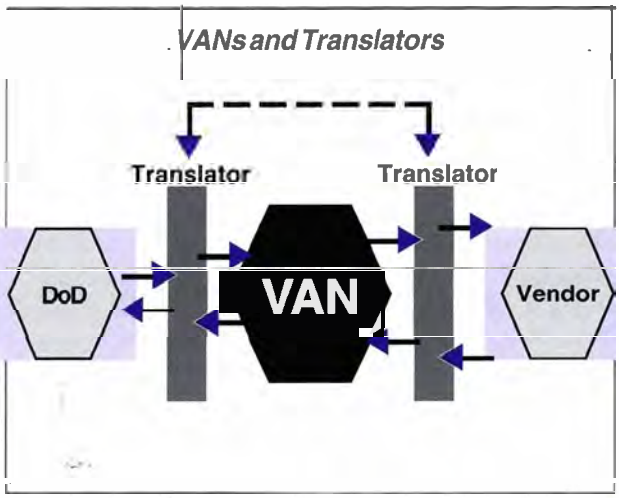


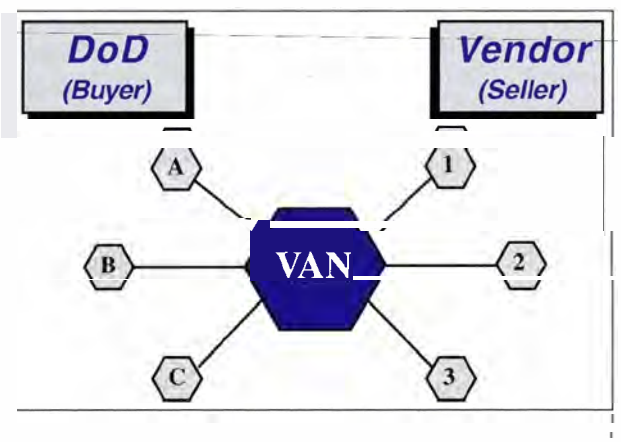
Examples of EDI documents, or transactions, include purchase orders, invoices, quotes, and purchase order acknowledgments. In recent years, EDI is also being used industry-specific transactions such as health care claim payment forms.

Continued

Value Added Networks (VANS)

A Value Added Network (VAN) is a network primarily providing communication services to businesses interested in EDI transactions. In effect, a VAN is a giant electronic clearinghouse for data and functions in a virtually paperless, highly-automated environment. A VAN receives transactions from a sender (trading partner A) and then places it in the electronic mailbox of the recipient (trading partner B). A VAN can be viewed as an interface between two enterprises interested in exchanging documents using EDI and function as an intermediary between trading partners pursuing business using EDI technology.





Consider the following scenario of two trading partners exchanging information via EDI. Both the trading partners must have accounts with a VAN legally allowing them to exchange business documents with each other. Prior to exchanging information via EDI, trading partners usually draft and sign a Trading Partner Agreement formalizing their EDI business relationship. Trading partner A can electronically transmit the business data (in a certain standard format) to the VAN via modem and phone lines. The VAN receives the transactions, sorts them by designated receiver (Trading Partner B), and stores them in the receivers' mailboxes. Trading Partner B can then retrieve them after connecting to that VAN. Each enterprise having an account with a VAN will have a password that controls access to their mailbox. Other security controls include data encryption which are to ensure an organization's computer software, data, and programs are protected against any unauthorized access, disclosure, or modification.

VANs also provide training, technical support and consulting to enterprises interested in adopting EDI technologies. The ancillary services provided by VANs include error detection / correction services, data translation services between different EDI standards, provide an automatic backup system, etc. These additional services provided are the value-added components of VANS. Most VANs provide 24-hour, 7-day-a-week access to their networks.

A Transaction set refers to the electronic version of the business or technical information that two enterprises are exchanging via EDI. Some examples of transaction sets include:

- RFQ's
  Purchase Orders
- Invoices

EDI: Trends and the Future

Electronic data interchange (EDI) transactions are fast becoming the norm in the business environment globally and are replacing paper document transactions. The primary motivation is the need to reduce costs, increase efficiency, improve quality of business (both internally and externally). EDI is currently being used in over 50 industries including automobile, grocery, manufacturing, health care and pharmaceutical industries.

EDI pioneers include GM, Boeing, Wal-mart and General Electric. These industrial giants have been realizing the benefits of implementing EDI and have also forced their smaller suppliers to become EDI compliant. The theme 'EDI or DIE' will soon become a sober reality for businesses unwilling to change their business practices. If EDI is not already a requirement in your industry or business today, it is likely to become one in the near future.

EDI has already changed the face of business by redefining the ways normal day-to-day operations are performed. The greatest challenge to EDI

implementation is cultural as both management and employees in various business environments are used to handling paper and will resist any attempt to change. Some others perceive it as an Information Systems (IS) tool. However, EDI changes every aspect of business. It has redefined the manner in which business and technical information is managed and used. As the EDI bandwagon continues to roll along, successful forward-looking companies will adopt and flourish in today's global economy. Other enterprises will be forced to adopt EDI or must be prepared to perish in the face of aggressive competition. The telephone is a vital communications tool in today's business world. However, experts have predicted that by the end of this decade, it would far easier to do business without a telephone than without EDI!

Education about EC / EDI is a key step in any organization's quest to migrate towards an electronic commerce business environment. Organizations performing business with the federal government can approach their regional ECRCs regarding various EC and EDI related seminars offered in their area (see related article on the ECRC organizations to identify your regional ECRC). Numerous other organizations such as the regional EDI Users Groups, universities, and other organizations offering EDI education & training have a home page on the World Wide Web (search under the key words 'EDI, Seminars, Education'). By attending these seminars and workshops, organizations will learn about the issues and obstacles organizations they will face in embracing EDI.

The author acknowledges use of illustrations from the ECRC Education material in this article.

Electronic Commerce & The Electronic Commerce Resource Centers (ECRCs)

By Dr. Cecil Joe
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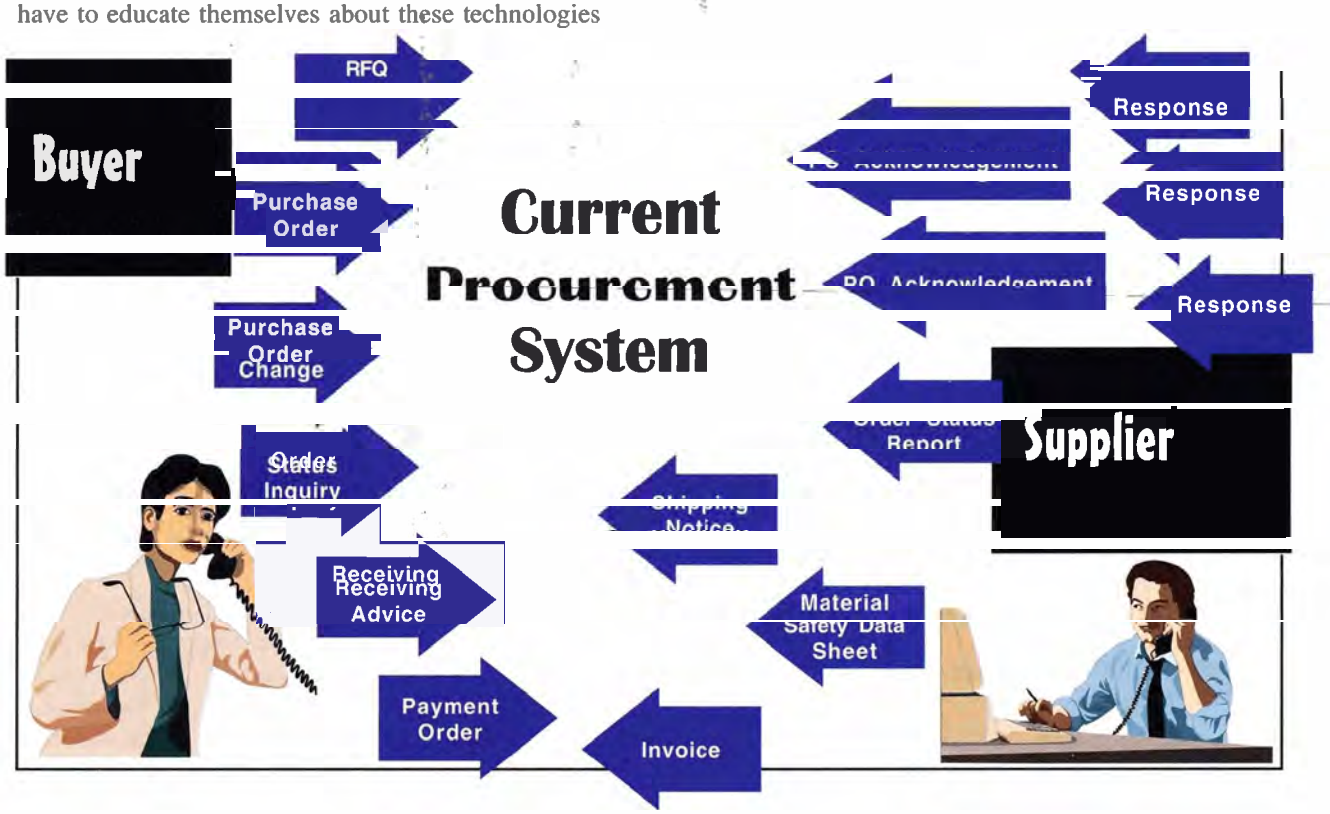
The Electronic Commerce Resource Center (ECRC) program was created primarily to accelerate the migration of American industries towards performing electronic commerce transactions with the Department of Defense (Michael McGrath in *ECRC - Electronic Commerce Resource Center , Promoting EC for a More Competitive U.S. Industrial Base, 1995*). The Department of Defense (DoD) depends on an industrial base which should be capable of responding quickly to commercial and defense needs. The business enterprises and organizations that comprises this integrated industrial base have to compete in an aggressive global environment where cutting-edge information technologies and strategies can decrease lead time to market a product and boost efficiency. In this context, manufacturing enterprises have to educate themselves about these technologies in order to be able to take decisions that will enable them to remain competitive today. The ECRC Program was funded by the US Congress to help such manufacturing enterprises respond better to this technology deployment need.

Electronic Commerce Resource Centers

THE ECRC PROGRAM is intended to meet the critical need of assisting small business and small Government shops in introducing EC practices and principles into their business practices.

The US Congress passed the Federal Acquisition Streamlining Act (FASA) which requires the federal government to migrate its paper intensive acquisition



system towards a computer based electronic system that is easily accessible to both government and private organizations. This has created a need for Small and Medium sized enterprises (SMEs) to begin adopting Electronic Commerce (EC) practices in their business environment.

The Federal Acquisition and Streamlining Act (FASA)

Additionally, larger supplier chains are beginning to force their suppliers to adopt EC to reduce the cycle times involved as well as to drive down costs. In this article, an overview of the ECRC program is provided including its functions and responsibilities.

FASA's Goals

- Facilitate acquisition of commercial products
- Reduce administrative costs
- Expand the use of simplified purchase procedures
- Improve the efficiency of the procurement process
- Uniform treatment of DoD & civillian agency procurements

Benefits of Electronic Commerce (EC)

EC is the standards-based exchange of business and technical information electronically. EC tools include:

- Electronic or e-mail
- Electronic Data Interchange (EDI) (also see related article on EDI)
- Enterprise Integration tools

Current Buying Procedures

From a buyer's perspective:

- Very paper intensive
- Lots of regulations and certifications
- Military specifications
- Administrative burden
- Mix of paper and EDI suppliers

EC has enabled (and will continue to enable) American businesses to be competitive by having a positive impact on quality, reducing costs, and decreasing lead time to market a product, among others. EC provides a business enterprise, the leverage to access a larger market, as well provides efficient links to a wider circle of suppliers. The DoD is adopting EC to perform a majority of its procurement and technical data activities. This requires that SMEs and industrial chains interacting with the DoD must migrate towards an environment where transactions can be performed electronically. The 11 ECRCs already established throughout the country help SMEs learn and adopt these EC technologies and strategies.

The ECRC Program includes the Technology Hub, the two Team Integrators, and the 11 regional ECRCs.

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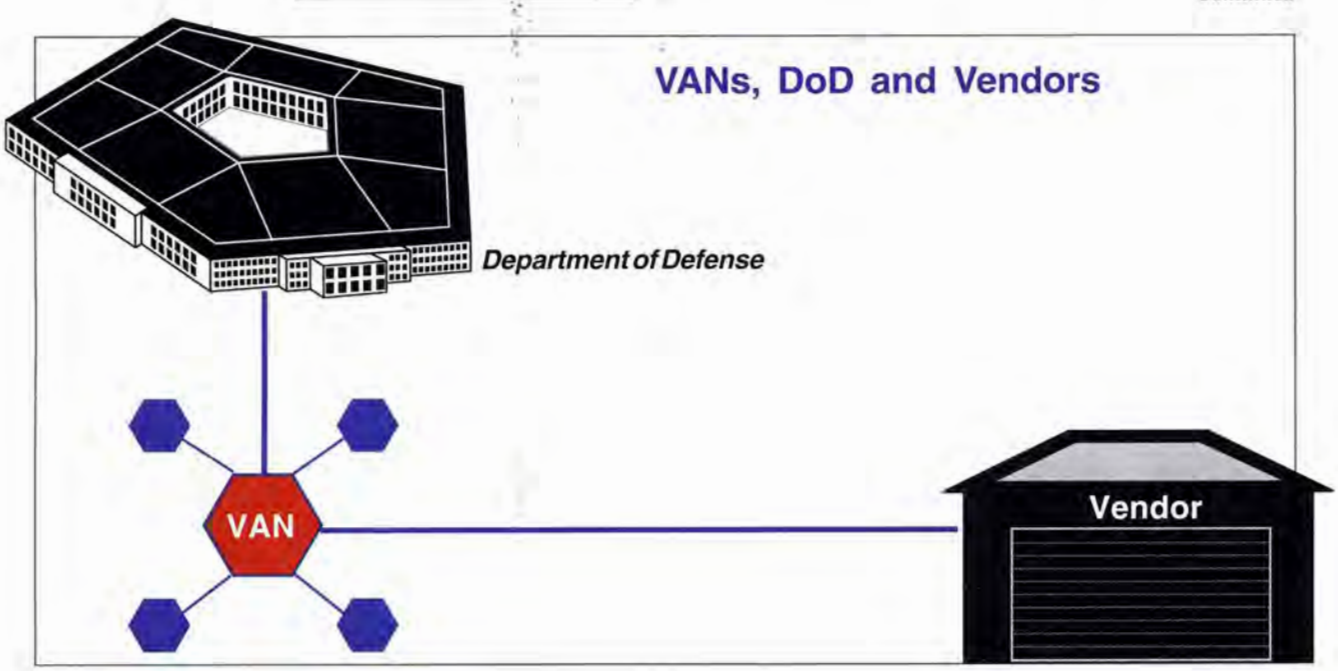
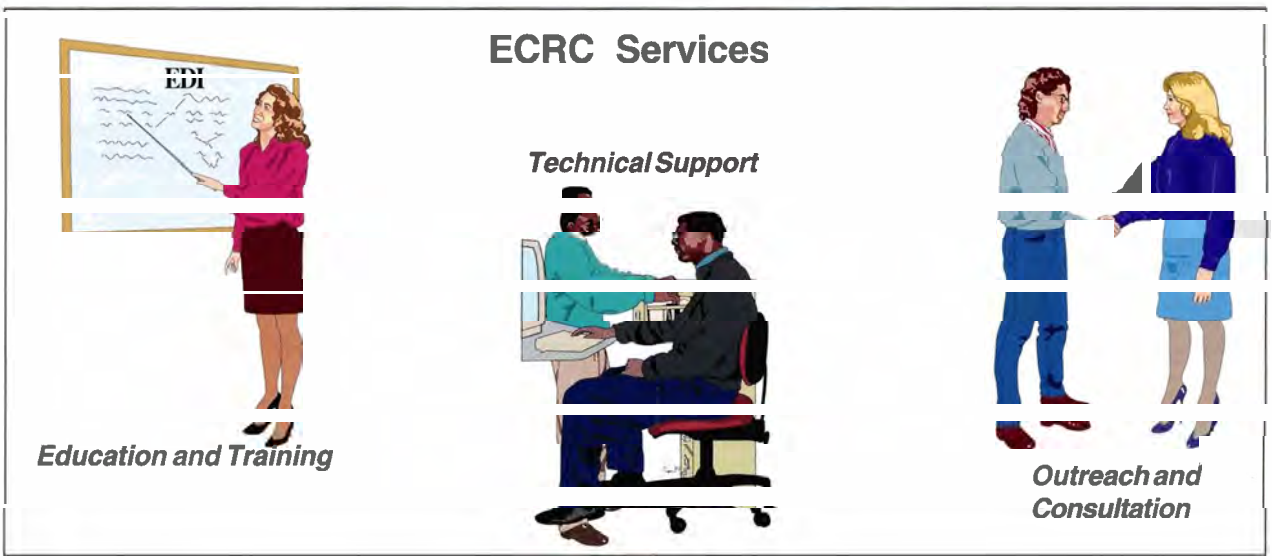
VANs, DoD and Vendors





The Technology Hub identifies leading-edge EC technologies and solutions to both government and industries in an effort to maintain industrial strength (in *ECRC - Electronic Commerce Resource Center, Promoting EC for a More Competitive U.S. Industrial Base, 1995).* Some of the initiatives of the Technology Hub include operating an EC testbed, developing collaborative engineering tools, developing standards such as the Standard for the Exchange of Product Model Data (STEP), etc. The Technology Hub evaluates, demonstrates, validates and transfers these technologies to industry through program participants and partners. The Team Integrators coordinate, plan and communicate the functional operations of the 11 regional ECRCs. These regional ECRCs work directly with government agencies, SMEs, procurement organizations and universities to facilitate the adoption of EC technologies.

Core Functions of The ECRCs

The four core functions of the 11 ECRCs include:

- Outreach
- Education and Training
- Technical Support
- Consultation

Outreach involves publicizing the ECRC program services to supplier chains and SMEs who are currently part of the dod supplier chain or are interested in becoming DoD suppliers. Education and Training (E&T) involves designing courses on EC, EDI and related technologies, as well as providing seminars on these topics to interested American manufacturers and other businesses. Technical Support and Consultation includes performing a needs analysis and developing solutions that can resolve an enterprises EC technology needs.

The ECRC Core Courses or Seminars

The 11 Regional ECRCs provide the following courses (please see the map to identify the regional ECRC in your area).

EDI Orientation

This course provides an overview of :

- What is EDI
- Current Uses of EDI
- Hardware and Software Issues EDI
- EDI Implementation Practices for SMEs

Technical Data Exchange (TDE)

In this course, an introduction to TDE is provided which involves the electronic exchange of technical information (including engineering drawings, scanned images, etc.) between business partners or organizations. Other issues addressed in this course include the problems inherent in TDE and give an overview of the standards for the exchange of such information.

Business Opportunities with DoD Through EDI

This course introduces the implementation of EDI within the federal government and DoD, discuss the opportunities using FACNET as well as discuss the EDI components and implementation guidelines.

Getting Started with Electronic Commerce

In this course, an introduction to the Internet is provided with an overview of the history and information resources available on the Internet. This course will also outline some of the onlines services and highlight potential of the Internet as a marketing resource to businesses.

The author acknowledges use of illustrations from the ECRC Education material in this article.

For more information on the Education & Training courses in your area, please email cecilj@ecrc.luorc.edu or gbarnes@ecrc.luorc.edu or mgonzalez@ecrc.luorc.edu.

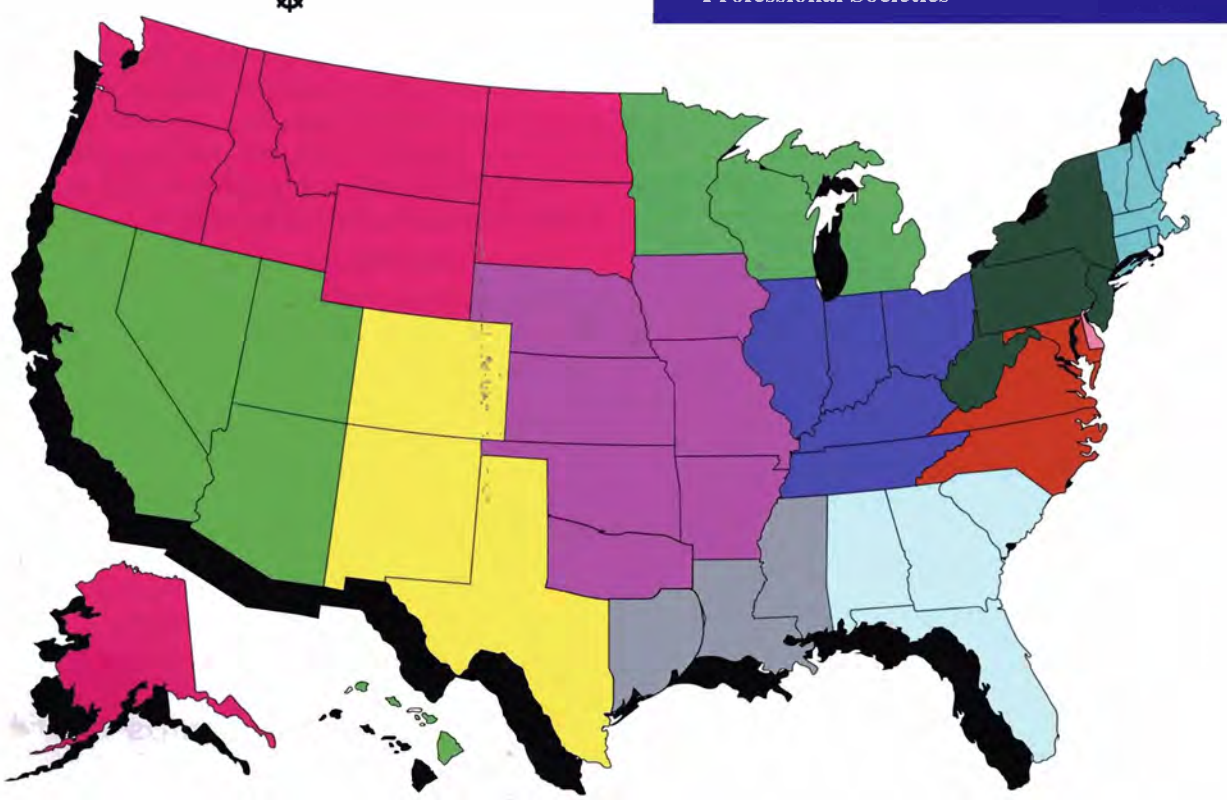
EDUCATION AND TRAINING

Electonic Commerce courses:

- DoD EDI
- Getting Started with Electronic Commerce
- Electronic Data Interchange Orientation
- Technical Data Exchange
- Issues in EDI Implementation

POTENTIAL PARTNERS WITH ECRC

- Small Business Development Centers
- Universities and Community Colleges Small Business Assistance Programs
- Professional and Continuing Education Programs
- Economic Development Organizations
- Procurement Assistance Centers
- Chambers of Commerce
- Professional Societies



The 11 ECRC throughout the country include the following (see map for reference):

- Johnstown ECRC
- Cleveland ECRC
- Dayton ECRC
- Orange ECRC
- Palestine ECRC
- San Antonio ECRC
- Oakland ECRC
- Atlanta ECRC
- Scranton ECRC
- Fairfax ECRC
- Bremerton ECRC

Making A Case For Electronic Ship Design Review

By CDR Randy Gilbert, USCG Marine Safety Center, Washington, DC

Preparing For The Future

This article is written to make a case for reviewing ship designs for Coast Guard approval electronically. I will also report on the early stages of the track line that is now being laid to "make it so."

Despite the fact that most ship designs are being produced electronically, almost all regulatory and classification approvals are conducted by reviewing paper drawings, commonly called blue prints. I believe the technology for designing and building ships has developed well beyond the need for relying solely on this archaic method. Paper drawings necessitate long lead times prior to construction, extremely meticulous coordination of revisions, and many layers of "rework" and extraneous efforts which do not help build a good, safe ship.

The time has come for a paradigm shift by reengineering the "design review process," to make use of available technology, in order to facilitate the reemergence of the U.S. shipbuilding industry into the international market place. Other transportation and manufacturing industries have experienced significant reductions in design cycle times. They have fully embraced a "system approach" to designing and building planes and vehicles, made possible by using the latest electronic modeling tools. The Coast Guard motto, Semper Paratus, means we should be ready to step into the future with the marine industry too.

Customer Service– Its The Law!

Following the passage of the Government Performance and Results Act, the Coast Guard's Marine Safety and Environmental Protection Directorate (G-M) has been a front runner in acknowledging and taking action on improvements through streamlining, regulatory reform, and process reengineering. In order to streamline its functions, G-M has reorganized and formed the National Maritime Center (NMC) to be an independent USCG Headquarters unit responsible for the initiation and execution of marine safety activities. The majority of such activities are focused on customer service and are in alignment with Vice President Gore's reinventing government initiatives.

One of the Missions of the NMC is to **"Foster partnerships between industry, academia, and the government in order to identify and resolve ship production and operation issues and to promote innovative marine research, design, construction & repair, and operations to achieve established levels of safety while minimizing any regulatory burden."** The Marine Safety Center (MSC) is a sub-unit of the NMC and plays a major role in facilitating smart designs, economical shipbuilding and safe operations.

The slow and lengthy process of designing ships has been identified as a significant problem in the U.S. Shipbuilding industry. Since the Coast Guard is deeply involved in this process, the MSC has taken steps to be a part of the solution and is seeking to work in partnership with the shipbuilding industry.

The American Bureau of Shipping (ABS) has had a long standing relationship with the Coast Guard, working together to increase our service to the marine industry. In an effort to reduce duplicative efforts, ABS has performed plan review on behalf of the Coast Guard since 1982, and stability approvals since 1984. More recently, ABS has assisted the Coast Guard with developing an Alternative Compliance Program for certification of U.S. Flag vessels and with the Department of Transportation's regulatory reform efforts. ABS stands ready to do their part in solving this lengthy design cycle time problem too.

Cooperative Partnerships

It bears re-emphasizing that this article is about **what can be**. The most effective way to overcome problems, which prevent us from reaching our destination, is through working cooperatively together in trusting, goal-oriented partnerships. RADM Jim Card has led the way by entering into two formal partnerships with the marine industry. One is with the

Passenger Vessel Association and the other is with the American Waterways Operators. Both partnerships have 5 important components: **formal relationship; common goals; mutual trust; open and frank communication; and quality approach**. In "partnering for the future" everyone benefits and the cooperation fosters a positive environment for the expansion of the marine industry.

Setting up an industry-wide system for designing and building ships by using advanced computer technology is in the best interest of all parties. Although formal partnerships have not yet been established, organizations are positioning themselves to work on creating such a system. Similar to some chemical bonding mixtures, there needs to be the introduction of a catalyst to speed up the forming process. The work being done in the area of **simulation-based-design (SBD)** at the Gulf Coast Region Maritime Technology Center at Orange, Texas (GCRMTC-Orange), may be our needed catalyst.

The GCRMTC- Orange, which is part of the Gulf Coast Region Maritime Technology Center under the administration of the University of New Orleans, is focusing its efforts on developing an SBD process utilizing "best of breed" commercial-off-the-shelf (COTS) technologies, as well as technologies being developed through the Defense Advanced Research Projects Agency SBD Program. Essential to the development of this process is the analysis and development of future markets, products and business processes that will expand the US marine industry.

The guiding philosophy of the GCRMTC-Orange is a clear understanding of current business (including design) processes and a clear vision of the improved business process ensuring technology is applied as an enabling tool. This is in opposition to developing business process for the sole purpose of exploiting a particular technology. Drawing review by regulatory bodies is part of the current design process. Electronic, remote design review as a collaboration between the regulatory body and the designer is a part of the envisioned SBD process. Due to its research efforts and available resources, the GCRMTC-Orange site is particularly suited to engage in a cooperative electronic design review process development effort. It has the unique advantage in its ability to demonstrate and validate these processes and accompanying technologies first-hand with minimal cost and risk to industry.

Another federally funded program that may provide assistance is the Electronic Commerce Resource Center (ECRC), also located in Orange, Texas. It is sponsored by the Department of Defense (DoD) and is dedicated "to providing outreach and educational services to small and medium-sized business in the areas of electronic data interchange." In particular, they aim to improve quality at a reduced cost, reduce time-to-market, and minimize waste—all three areas are in alignment with the electronic design review concept.

Four TASK Plan

The Coast Guard, American Bureau of Shipping, GCRMTC-Orange, and the ECRC in Orange have begun charting a trackline which will bring about simulation-based-design and electronic design reviews.

Task 1 - Create a Partnership to develop an Electronic Plan Review system

a. Set up common file transfer formats which could be used to send files rapidly over secure internet or direct links or provide all parties secure access to a central design database.
b. Develop a common procedure for electronically attaching an "approval stamp."
c. Develop a procedure for communicating and conferring over drawings (video conferencing).
d. Develop a common procedure for making design review comments (post-it note feature) on the designs or as a part of the design file.

Task 2 - Develop 3-D Modeling and Virtual Reality technology standards

a. Fully develop the 3-D component design concept.
b. Develop centrally located design file storage and access protocols.
c. Develop a procedure for approving designs by system components, so that when modifications are made to suit new owners, only the portions effected need to be reevaluated.
d. Develop a procedure for using virtual reality to build, operate and inspect a ship before it is built in reality.
e. Develop common electronic data interchange (EDI) standards for all components of design, which will include all of the information that is needed by every part of the entire marine industry (design, purchasing, installation, approval, service data, etc.) throughout the service life of the vessel.

Task 3 - Integrate a Cradle-to-Grave system approach

a. Using the Integrated Definition (IDEF) method of modeling, set up electronic files to store and pass all input and output information.

Continued

b. Develop processes for measuring and storing all important data for components which can be used as predictors for risk assessment, service life costs, etc.

Task 4 - Make full use of training and simulation capabilities

a. Work with universities and training facilities having marine programs to teach all aspects of electronic commerce in the marine industry.
b. Develop help menus and tutorials that can be used while designing and constructing ships which will provide all needed information for producing safe (lawful & minimum risk) ships and structures.

To give an overall sense of the time line envisioned for this project, Task 3 describes the context in which the entire plan is to be effected and, will be incorporated into the other tasks as required. Tasks 1 and 2 are to be done in parallel. Finally, Task 4 is necessary as an integral part of the other three to ensure the success of the Project.

Conclusion

The Marine Safety Center is in the process of strategically planning for the future. An important part of planning for the future is knowing your organizations SWOT's, which stands for Strengths, Weaknesses, Opportunities, and Threats. By knowing our strengths, we will be able to optimize them. One of our strengths is having a good relationship with many designers and builders; together we form a team for safety. We would like to invite your assistance with this endeavor and welcome all helpful suggestions in improving ourselves so that we can better serve the marine industry and the public.

By learning of and admitting to our weaknesses, we can focus on mitigating or removing them. The current system of only conducting design reviews on paper is a weakness. It has added more time to the already lengthy process of designing ships. We will work towards reengineering the design review process to make use of the new design technologies. With the assistance and cooperation of all parties, this problem can be resolved together.

NIDDESC–Enabling Product Data Exchange for the Marine Industry

By James A. Murphy and James L. Mays

Introduction

The use of computer-aided design (CAD) technology in the U.S. Navy and marine industry has evolved from a drafting-based design tool to a three-dimensional (3D) product-oriented information database, used for design, production and service life support. One of the most significant enhancements to current CAD technology has been the incorporation or integration of non-graphic attribute information with traditional graphics data. This expanded information database or product model data has enabled the marine industry to expand CAD use to include such activities as engineering analysis, production control and logistics support. While significant savings can be achieved through the exchange of digital product model data between different agents, significant work needs to be done to develop data exchange standards to support this expanded information content.

The Navy/Industry Digital Data Exchange Standards Committee (NIDDESC) was formed as a cooperative effort of the Naval Sea Systems Command (NAVSEA) and the National Shipbuilding Research Program (NSRP) to collect and exchange information on product model data requirements and to ensure that benefits expected by industry and Navy are incorporated into national and international data exchange standards. The NIDDESC effort has resulted in the development of a suite of product model data exchange specifications. These exchange specifications have been submitted for inclusion in the Organization for International Standards (ISO) 10303, Standard for the Exchange of Product Model Data (STEP) as Application Protocols (APs).

This paper describes NIDDESC exchange specification accomplishments and STEP plans.

Background

The U.S. marine industry has been progressively expanding the use of computer-aided design (CAD) and computer-aided manufacturing (CAM) technology for both naval and commercial ship design and construction. More recently, these 3D CAD/CAM implementations have expanded the traditional graphics-oriented applications to include associated non-graphic attribute information such as weight, material, and production control information.

This combination of graphic and non-graphic information, known as product data or product model data, has become the basis of current CAD/CAM use by many in the U.S. Navy and marine industry. Several shipyards have developed design and production systems on the integration of traditional CAD/CAM systems with other information databases. The NAVSEA CAD 2 system acquisition enabled the Navy to pursue the implementation of a product model architecture for design, construction, maintenance and modernization of naval ships.

The trend toward the integration of previously separate database systems for design, material, fabrication, etc., has resulted in a need for better and more complex data exchange mechanisms capable of handling this expanded information base. One of the most significant benefits associated with CAD/CAM use is that once captured, data can be re-used at significant savings. Savings can be accrued through the reuse of data for design developments, as well as in transferring existing data from one activity to another. The savings comes from the improved modeling and simulation of systems that will be available earlier in the design process. These systems allow engineers to test more conceptual designs and do more rigorous analysis resulting in an improved product. In addition to the savings accrued through the reuse of digital data, further benefits can be achieved through the reduction of errors associated with regeneration of data and reduced time required to enter data. The focus has begun to shift from whether or not to develop products in digital form, to how to accomplish this goal in the most effective manner.

Data Exchange Environment

There will be two different digital data transfer environments within the marine industry in the future.

Continued

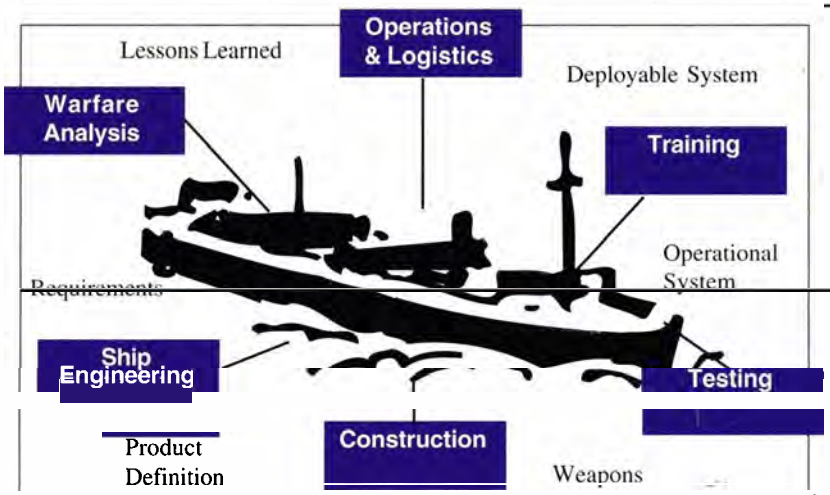


Figure 1 - ***Product Model Data Environment***

These two environments, concurrent uses of data being brought around by acquisition reform and the transfer interfaces used by NAVSEA over a system's lifecycle, have been used to determine requirements and priorities for data exchange.

The first type of digital data exchange or sharing occurs between an organization and its subcontractors, for such purposes as design support or fabrication. Given the fast pace of the process, this needs to be done in a concurrent fashion, with multiple organizations sharing real time information. The trend is toward integrated product and process teams sharing the same data, at the same time, from different locations. Given the complexity of modern weapons systems, there is a need to increase teaming of experts in different companies and to improve system integration.

The second type is between successive organizations responsible for different aspects of a ship's 40 year life-cycle such as: design, fabrication, operation, service life support or disposal. The sharing and reuse of data over this period of time has the potential for tremendous savings over the life of a ship. NAVSEA's Simulation Based Design Master Plan depicts how product model data plays a key role in ship support processes. Figure 1 displays the lifecycle environment where we expect the product model data to play a critical role.

Data Exchange Mechanisms

Several CAD data exchange standards have been in use in the marine industry for a number of years. These standards are based on the exchange of neutral file descriptions and have met with varying success. As with most CAD system databases, these exchange standards are primarily graphics-oriented, concentrating on the transfer of lines, arcs, splines, text, etc. There remain some options to enhance existing standards to incorporate additional attribute information, thus enabling more of a product data transfer. In general, though, full product model transfer will require a next generation standard designed to handle graphic and non-graphic attribute data. A summary of existing and developing standards for digital data exchange is provided below.

- ANSI/US PRO/IPO 100-1993, Digital Representation for Communication of Product Definition Data. This standard is commonly referred to as the Initial Graphics Exchange Specification (IGES). Most current CAD data exchange is via IGES. IGES is the approved ANSI standard for neutral file transfer of CAD graphics data and is used throughout the industry. Initially developed for graphics, IGES has been enhanced or expanded to include 3D geometry and some limited attribute information.

- DXF is a proprietary exchange format developed and maintained by Autodesk, Inc. that is primarily used in the exchange of personal computer-based CAD systems graphics data. It has been used successfully for the exchange of wire-frame geometry, but is not suitable for complex 3D surface and solid model exchanges. There is no formal revision process associated with updating or enhancing DXF as an exchange mechanism.
- MIL-D-28000, Digital Representation for Communication of Product Data: IGES Application Subsets and IGES Application Protocols. MIL-D-28000 is the Department of Defense (DoD) Computer-Aided Acquisition and Logistics Support (CALS) performance standard for the acquisition of technical data in CAD processable vector format. This military standard defines the use of IGES subsets for DoD 2D drawings and 3D product model data acquisitions.
- ISO 10303, STEP (Standard for Exchange of Product Model Data). STEP is also designated a DoD CALS performance standard. STEP is the ISO format for product model data exchange currently under development. This next generation standard is targeted to replace IGES, providing for a more robust exchange of product information.

Product Model Cooperation Between the Navy and Marine Industry

Several U.S. Navy ship acquisition programs have developed 3D product model databases to support the detail design, fabrication, and assembly functions. The SEAWOLF submarine and the DDG 51 class destroyer programs have made significant use of the product model approach and have exchanged this data between lead and follow shipyards. More recently the LPD 17 project used 3D product model data for design analysis, simulation and visualizations.

The SEAWOLF data exchange between Newport News Shipbuilding and General Dynamics Electric Boat Division was based on IGES. The SEAWOLF program enabled the exchange of significant product data through the use of IGES for graphics and project specific translation of non-graphic attribute or list type data. Limitations of the IGES specification required both Newport News and Electric Boat establish CAD modeling and data exchange procedures to ensure successful data exchange. Production transfers of piping and structures part data and all kinds of drawing data have been achieved in this program.

The DDG 51 class destroyer acquisition program made extensive use of 3D product model data for detail design and fabrication of the Flight IIA ships. The DDG 51 engineers exchanged product data between lead and follow builders, Bath Iron Works and Ingalls Shipbuilding. The exchange was accomplished through the transfer of a custom file description developed specifically for the CAD systems used by the DDG 51 shipyards, CADDS4X and CALMA.

With the award of the CAD 2 contract to Intergraph, NAVSEA expanded its development and implementation of CAD systems, based on a product model architecture. This product model architecture provided the foundation for the use of product model data for the LPD 17 program.

The LPD 17 database consists of 3D product model information. The NAVSEA product models have been used to facilitate the analysis and visualization of equipment loading and boat handling. Using the 3D data, visualization software allowed Navy Sailors to view the operation of the boat handling systems from the vantage point of the operator, resulting in significant changes to the boat handling system, Figure 2.

History of NIDDESC

The increased emphasis on the ability to exchange digital information, as the Navy and the U.S. marine industry continue to develop and utilize 3D product model data, led to the formation of NIDDESC. NIDDESC was formed in 1986 as a joint effort of the U.S. Navy and the National Shipbuilding Research Program (NSRP). Work activities, approved by the NIDDESC steering committee, are performed by a working group consisting of industry technical experts. The initial work items led to data modeling efforts describing several aspects of a ship's product data model. NIDDESC concentrated on development of data models to exchange ship structures, piping, HVAC, electric/cableways, and outfit and furnishing.

NIDDESC member organizations include major shipyards, several design agents, and NAVSEA representatives. In the past NIDDESC industry members have included: Bath Iron Works, General Dynamics/E. B. Division, Ingalls Shipbuilding, NASSCO, Newport News Shipbuilding, Angle Inc., Gibbs & Cox, JJH Inc., Lovdahl & Assoc. and the National Institute of Standards and Technology. Most of these organizations have been involved in NIDDESC since its inception. In a cost sharing environment, this represents a significant commitment by industry to the development of improved data exchange standards.

While savings associated with the exchange of data has justified the development of interim translation

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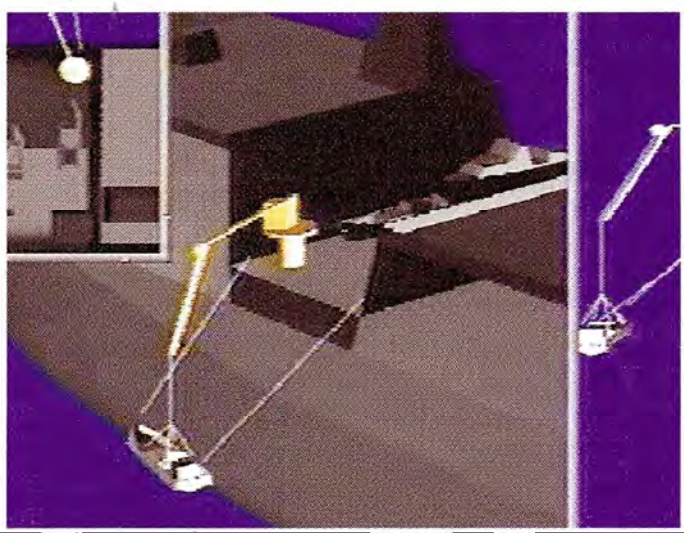

Figure 2 - Simulation of a Boat on a Davit
This product model data will be provided to the LPD 17 Full Service Contractor for use in performing the detail design, ship systems integration, construction, testing, logistics and life cycle support planning for the LPD 17 Class.

capabilities, the need for a single definition of product data and improved transfer mechanisms has been recognized by industry in general. This need led to the initiation of ISO 10303, STEP, by industry on an international scale.

Current Status of NIDDESC Efforts

The NIDDESC product data models are interim standards that will be used by the U.S. Navy for product model data until STEP is available. These NIDDESC product data models were baseline documents having been used to help move the STEP effort forward. Some ship product model data application areas have yet to be addressed and one product model data application, Combat Systems, is of unique interest to the Navy. Table 1 identifies the product data standards needed to be available to address the U.S. Navy/industry exchange needs and identifies the exchange protocol's availability from NSRP and their transition to STEP.

Function	NIDDESC	ISO 10303
Ship Arrangements	NSRP0429	STEP AP215
Ship Moulded Forms	NSRP0429	STEP AP216
Ship Structure	NSRP0429	STEP AP218
Ship Piping	NSRP0424	STEP AP217
Ship HVAC	NSRP0426	
Ship Electrical & Raceways	NSRP0425	
Ship Outfit & Furnishing	NSRP0428	
Ship Mechanical Systems		STEP AP226
Ship Electronic Systems		
Ship Combat Systems		

Table 1 Shipbuilding Data Exchange Application Protocols

All NIDDESC interim standards are available on a CD-ROM from the NSRP library. They can be requested by contacting Ms. Sara Castle at:

University of Michigan
Transportation Research Institute
Marine Systems Division
2901 Baxter Rd.
Ann Arbor, MI 48109
(313) 763-2465 fax: (313) 936-1081
E-mail: seai@umich.edu

Future of NIDDESC

The need for a shipbuilding approach to the formation of product model data in STEP and the interests of U.S. shipbuilders has led to the continuation of NIDDESC.

NSRP is funding the second phase of a task to continue NIDDESC efforts. The objective is to "Convert NIDDESC Standards to ISO Standards" under a managed alliance. The NSRP task will continue to focus on incorporating the U.S. marine industry's product model information requirements into the ISO 10303 Standard for the exchange of product model data. These standards are being developed by the NSRP task in cooperation with the European Marine STEP Association (EMSA), the UK's ShipSTEP and SEASPRITE Projects, and the Japanese Marine Standards Association (JMSA).

The primary objectives for the second phase of the project are:

- Continue development of the ISO Application Protocols for ISO 10303-215 Ship Arrangements, ISO 10303-216 Ship Moulded Forms, ISO 10303-217 Ship Piping, ISO 10303-218 Ship Structure, and ISO 10303-226 Ship Mechanical Systems.
- Begin development of the ISO Application Protocol for Ship HVAC Systems.

The participants in the NSRP task include shipbuilders (Newport News Shipbuilding, Ingalls, General Dynamics/Electric Boat); software vendors (M Information Engineering); and academia/laboratories (University of Michigan Transportation Research Institute).

The Defense Advanced Research Projects Agency (DARPA) is also funding a task that will include many of the NIDDESC participants on it, as well as software vendors. This task is "DARPA MariTech Development of STEP Model Database and Translators for Data Exchange Between U.S. Shipyards Project". The objective is to develop prototype STEP APs to demonstrate:

- Using translators to permit data exchange of product models
- Enhancing shipyard internal data sets to better support planned activities
- Building portion of the product model database
- Populating a product model with a typical ship data set.

The participants on the DARPA task are made up of shipbuilders (Newport News Shipbuilding, Ingalls, Bath Iron Works, General Dynamics/Electric Boat), software vendors (Kockums Computer Systems, Intergraph, Computervision); and academia/laboratories (University of Michigan Transportation Research Institute).

At the conclusion of this program, each participating shipyard will have enhanced the content of its internal, company specific product model data set and will have developed translators supporting the shipbuilding processes defined in the first phase of the program. This will greatly enhance the ability of the U.S. shipbuilding industry to be competitive in the international commercial market-place by providing all participants with significant expertise in the use and application of STEP and product modeling technology. In addition, the participation of Intergraph Federal Systems, which is the U.S. Navy's CAD 2 vendor, will assure that the exchange of prototype product model data can be demonstrated to and from the U.S. Navy.

For information on either of these two efforts you can contact Mr. Ben Kassel at:

Naval Surface Warfare Center/DTMB
CDNSWC2031
Bldg 192, Room 158
Carderock, MD 20084-5000
(301)227-1355 fax:(301)227-5753
kassel@oasys.dt.navy.mil

Information on the current status of the STEP Application Protocols can be found on the World Wide Web. By looking at the SC4 On-Line Information Service (SOLIS), on URL **http://elib.cme.nist.gov:70/1/subject/sc4/step**, descriptions of the STEP APs can be accessed. Additional technical information is available in some of the directories.

Interested parties can also get on the STEP shipbuilding e-mail list by sending a message to majordomo@cme.nist.gov. No subject is necessary and the body of the message should just say: subscribe step-ship@cme.nist.gov to have your e-mail address automatically added to the mailing list.

Summary

NAVSEA and the U.S. Maritime industry is committed to capturing the benefits of product model data. The ground work has been laid, in cooperation with industry, to create exchange mechanisms that will support the sharing of data through a system's entire lifecycle.

High speed and high quality data exchanges require the teaming and cooperation of ship operators, designers, manufacturers, component vendors and software developers to design a neutral file exchange capability having the functionality needed by all parties. NIDDESC will continue to play a role in bringing U.S. shipbuilding participants together to support this important endeavor.

Additional Information

If you are interested in additional information on the NIDDESC efforts you can contact the Navy or the industry cochairperson.

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billingsley_daniel@hq.navsea.navy.mil

How to Publish It on the Internet!

Creating your own Web page is easier than you think.

By Steve T. Bett, Ph.D., ECRC, Orange, Texas
bett@luorc.edu

Why create a Web page?

Some of the reasons typically given for establishing a Web presence and engaging in some form of electronic commerce are listed below:

It conserves trees. (Electronic commerce promises to be paper-less)

- It is inexpensive (about $300 to get started) and cost effective
- The Internet has a global reach. It provides instant access to a global market
- The potential audience is already over 30 million and still growing exponentially
- It is interactive. It provides a way to keep in touch with your customer base
- It is, at least in theory, an outstanding marketing tool
- Anyone with a computer and a modem can get to your Website and access your pages.
- Electronic catalogs and training materials can be quickly and easily updated
- It simplifies and reduces the cost of distribution of information with a short shelf life

Why is HTML important?

To create your own home page, marketing message, on-line catalog, or some other Web document, you need to use HTML, the language of the World Wide Web. For

Features added by HTML

HTML as window dressing

HTML adds six things to plain e-mail style text. Four to improve the texts appearance and organization, one to help the client and server computers identify and categorize the document, and one to help the reader identify related information and navigate the Web. Dressing up the text is not just "eye candy" to make the document more attractive and appealing. Having the ability to make large bold headlines and add emphasis to important points can also improve communications. Having the ability to add hassle-free charts and images can also improve the effectiveness of the message.

Better Looking Proportional Fonts

- Proportional fonts are automatic (default style)
- To reintroduce fixed width typewriter text use <TT>or<PRE>

Emphasis (bold headlines, display type sizes, italic)

- Coding Conventions
  - <B>**bold text**</B>
  - <I>*italicized text* </I>
  - <H1>**32 point bold heading+ paragraph breaks**</H1>

Word wrap that conforms to the size of the window

- In the process the browser removes all of the carriage returns and tabs
- line breaks and paragraph breaks have to be re-added unless <PRE> is used
  - Coding conventions:
    -
 line break (starts new line)
    - <P> paragraph break (adds blank line)

Formatting

- Better control over horizontal and vertical space in and around page elements
- Line breaks, paragraph breaks, horizontal rules <HR>
- Option of retaining plain text format with the <PRE> preformatted tag.
- List formats:
  - <OL> ordered (i.e., numbered) list

simple formats, you can get by with about 20 of the approximately 100 available commands or directives. The suggested initial Web page, shown below, uses only eight pairs of tags.

HTML, which is fast becoming the world's most popular electronic format, was designed to help researchers share their findings and discuss their theories. It was designed to add an easy graphic and cross referencing capability to email.

In the 1980's, email messages consisted of plain ASCII text. If graphic files were attached, they were often difficult to decode and interpret. There was a need for a medium of exchange which would be as fast and sharable as email yet have an extended graphic capability. It had to be simple to use and not require any particular software package or computer platform. HTML fulfilled this need.

HTML was designed to create Web documents which were hassle free and easy to share. HTML files are transmitted as simple ASCII text documents. To identify the document as one containing bracketed HTML codes, called tags, the extension is changed from filename.txt to filename.htm. If you read the Web document as a text document you will see the source code. You will see embedded tags in otherwise standard typewriter text.

Unlike the files generated by proprietary word processors, adding the HTML codes does not significantly change the size of the file. A one page 4k file will usually remain 4k in size. The same text packaged as a Word file will balloon to 6 to 7k. Proprietary page layout programs typically add 50% or more to the size of the same information in ASCII text format.

Proprietary files are often difficult to read if you don't happen to own the software and the computer used to create them. Since HTML files are text documents, they can be read by as text files with embedded tags by any computer. Any computer with a web browser will be able to interpret the tags. The necessary software is easy to acquire and will cost less than $50.

HTML is one of three key components to the Internet communication protocol (http) devised in 1989. The other components are the **Web server** and the **client**, popularly known as the Web browser. Browser software such as Netscape, Mosaic, or Internet Explorer, resides on your PC and communicates with remote servers on the network. Most of the computing power resides in the client software or in the server program. The message file is as compact as possible to reduce transmission times.

Continued

- <UL> unordered (or bulleted) list
- <DL> definition list (no markers displayed, just indents)

- Margin indents <OL> <UL> <DL> (these tags also include paragraph breaks)
  - These tags add a paragraph break, indent 1 inch, and define the type of list item (numbered, bulleted, unmarked).
  - Each item in the list begins with <LI>
- Tables (T= table, R= row, D= column data, H=heading (bold and centered))
  - Basic table format: (one row, two columns, no border, shown below)
    <Table><TR><TD>cell data</TD><TD>
    cell data</TD></TR></Table>

In-line Images

- Support for two types of graphic file formats: gif and jpeg
- Coding convention: <IMG SRC="file name.gif">
- Sound files and video clips can also be introduced

Hypertext (back links to same page and forward links to another page)

- Anchor - another name for a hypertext link <A>...</A>
- Coding convention: <A HREF="file name.html"> highlighted text </A>
- Clicking on the highlighted text brings up the *invisible named link.
  *Note: Text inside brackets is not displayed by the browser.

Page Description Information

- <HTML><HEAD><TITLE>text<HEAD><BODY>...
- The descriptive title shows up as a window label but does not print.
- color and background pattern are attributes of the body tag
  - <BODY BG COLOR="#FFFFFF"> changes color to white HEAD><BODY>...

The Web browser (or client) does two things very well. It sends out a request for a specific set of files on a specific server, the server sends the files specified in the URL and the identified HTML document, and the client interprets the message and displays it on the computer screen.

The first part of the URL (Universal Resource Locator) is something like a phone number or mailing address. It identifies the server. The second part identifies the directory and file name of the information being sought. A typical format is arranged as follows: Protocol / Server address / Directory / Filename. Here is an actual URL: http://www.luorc.edu/ecrc/ecrc.html.

Internet transfer protocols typically end in "tp": **ftp** (file transfer protocol) is used to transfer files, **smtp** is used to transfer simple mail, **http** (hypertext transfer protocol) is used to transfer Web documents.

Fortunately, one does not normally have to enter this long address. If there is highlighted text or a hot spot on an image, indicating a hypertext link, clicking on it will automatically activate the URL and display the information at the new location.

Why learn HTML?

In another year, HTML editors will be perfected to the point that simple pages can be created without knowing any HTML codes. Your favorite word processor will probably have a print option that will automatically convert what you have composed to HTML. A number of conversion programs are already available from third parties which will do a good job of converting simple page formats. The WordPerfect converter does an excellent job converting WP tables to HTML tables.

It is still useful to know enough HTML to clean up glitches in computer conversions. As computer languages go, HML is about as simple and easy as they come. This is a high level language which means that most of the codes are in abbreviated plain English. How to use the 20 or so basic tags can be mastered in a week. Rarely do you get such a big a return on so small an investment of time and effort.

How to learn HTML

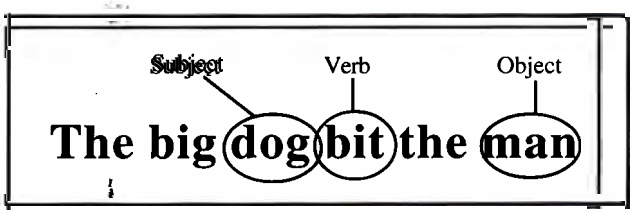
The best place to learn HTML is on the Web. There are dozens of excellent tutorials available. To find them, simply bring up Yahoo or one of the other search engines and enter HTML tutorial as a key word. Netscape has a button that will send you directly to a page of search utilities. Search utilities reside on a remote server and access a huge data base.

Just the basics

This article will introduce two concepts that will facilitate learning and suggest how to get started:

- HTML is a container language. It has a very simple two-dimensional representation
- HTML is basically a way to "dress up" and add features to plain text documents

HTML is a container language. If you were going to mark up a sentence to identify the subject, verb, and object, you would probably use circles and notation similar to that shown in Figure 1.



To express this in one dimension, you would have to use something like the following tagging convention:

The big <S> dog </S> <V> bit </V> the <O> man </O>. In other words, you would have to identify where the container began and where it ended. The tag <S> identified the beginning of the Subject and <slash S> identified the end of the Subject. This is the same kind of convention and logic that HTML uses to identify page elements. HTML is a sequential one dimensional representation of two dimensional containers. It always takes two tags (a tag set) to identify a container. If the closing tag is left out, the container extends to the end of the document.

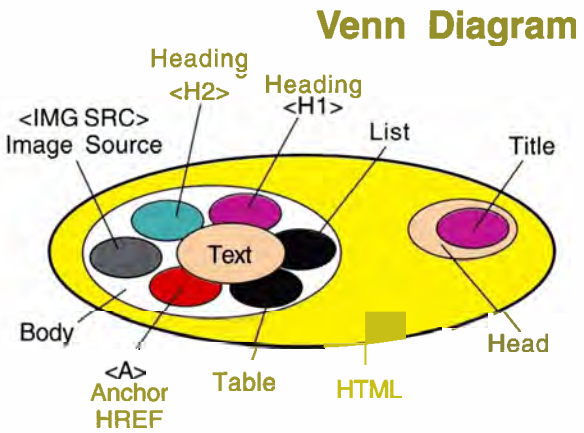


Figure 2. ***Two Dimensional Containers and a Linear Representation***

If you keep the two dimensional visualization in mind as you deal with HTML tags, it will all make sense.

Follow the horizontal line across the five containers, name the container each time it hits an edge. Starting from the left, the first container is <HTML>, the next is <HEAD>. The <TITLE> container contains some text. When you hit the edge of the title container the second time, use a close or exit tag </TITLE>. In a one dimensional representation, every container has two edges indicated by <TAG name> and </TAG name>. If you can grasp this concept, you have mastered 50% of this markup language.

A simple text editor is all you need to write HTML code

While you can invest in an HTML editor to simplify the process of inserting tags, all one really needs to create a Web readable document is a simple text editor such as the Notepad utility on your PC. The following example shows how simple this is:

You will need to have two applications open at the same time, Notepad and Netscape or some other Web browser. You will be writing the code in Notepad, saving it to a file, such as MY-HP.HTM, and then opening that file in Netscape to see how the browser interprets the code. To move back and forth between the two applications, press ALT-TAB.

Step by Step Instructions

Bring up your Notepad and copy the text in the source code column. Coding consists of inserting tags. Tags consist of abbreviated English descriptive commands inside of brackets. Notice that there are usually two tags corresponding to the two sides of a container, an opening tag and a closing tag. The following document contains a heading tag (H1), a paragraph break (P), and a list item tag (LI). The kind of list item marker is determined by the kind of list indent that one uses. (OL), which stands for ordered list, would insert a number in the LI position. UL, which stands for unordered list, would insert a bullet.

Pay careful attention where you save this file because you will have to find it again to open it with a browser. If you have not loaded the browser software on your PC, save the file to a diskette and carry it to a computer that does has Netscape or some other browser. When you save your file, change the extension from .txt to .htm. (on a Mac the extension is .html)

Do not close the notepad. Open Netscape or any browser you may have on your computer. You do not have to have a Web connection to use the Web browser as an HTML interpreter. In Netscape, open the file you have just saved. The tags will not be displayed. Instead you should see a bold headline in 32 point type, some text in proportional Times Roman, and a bulleted list. (http://www.luorc.edu/ecrc/publ-it.htm)

In Windows, you can ALT TAB back to the Notepad, add to the page and make changes, and save again. Then ALT TAB back to Netscape, click on the RELOAD button, and display the changes and additions.

Figure 3. A Simple Web Document

```
<HTML><HEAD><TITLE>My Home
Page</TITLE></HEAD>
<BODY><H1>My Home Page</H1>
This is what I would like to have
included on my first home page.
<UL><LI>My name</LI>
    <LI>My address</LI>
    <LI>My phone number</LI>
    <LI>My email address</LI>
    <LI>A list of my interests</LI>
    <LI>My favorite places to visit <I>
    (a list of URLs)<I></LI></UL>
</BODY></HTML>
```

Note: The interactive version of this article displays both the source code (shown above) and how it is interpreted by a Web browser such as Netscape. The browser will interpret the tags and display the text contained between the text accordingly. <H1> tells the browser to insert a line break before and after and display the text between the tags as 32 point* boldface Times Roman. The <LI> tag indicates where a page element such as a bullet is to be inserted. HTML is not case sensitive except for text that appears inside of quotation marks or preformat tags. Tags can be in upper case, as shown above, lower case or a mix. The indents shown above are also for the benefit of the author and reader. HTML ignores any tabs or hard returns. The exception is text placed inside of a <PRE> tag set. For additional line spacing , a break tag
 could be inserted after each </ LI>

What to do next

If you have a new computer, the browser software will probably be preloaded. Otherwise, if you have not done so already, you will need to contact a local ISP (Internet Service Provider) to establish a Web connection. Download a Web browser and save it on your hard disk. All browsers are free for 30 days. There is, as yet, no charge for schools and non-profit groups. Others pay a nominal fee of less than $50.

The quickest way to come up to speed in HTML is to bring up a page you like with your browser and save it to your disk. Open the file in a text editor and enter your own text between the tags. On the Internet you always have ready access to the source code.

Use Yahoo, or another

Continued

search engine, to find a glossary of Internet terms and "bookmark" it. Your browser will have a special button to create your own hot list of frequently used websites. Whenever you have a question about the meaning of a term, view your bookmarks and select glossary. When the glossary comes up, simply enter the key word and check the definition.

The author's Web page includes a reference sheet with an almost complete list of HTML tags. You may print yourself a copy. An HTML Guide and a Tables Tutorial is also available at the same Web site. The interactive version of this article will include 40 links to other HTML tutorials. Alternatively, you may search for new ones under a key word such as "HTML guide" on Yahoo.

Check out some of the HTML editors available on the Web. Some are free and most can be tried out for 30-60 days. I recommend HotDog Pro and Netscape Gold 3.0.

If you have a spare $40, buy a book on HTML. One of the better instructional books is by Laura Lemay (SAMS division of Prentice Hall Computer Books). You can check the table of contents and a sample chapter at http://www.samsnet.com

Summary

HTML is a simple page description language used to create Web documents. You can create your first Web document in less than 20 minutes using the simple text editor available on your PC. The 20 basic commands or tag sets can be mastered in less than 7 days using the tutorials available on the Web. You will find more resources on the Net than you will have time to check out.

Two concepts were introduced to help you understand HTML: (1) The idea that HTML is a sequential one dimensional representation of two dimensional containers, and (2) HTML is a way to dress up or add features to the plain text found in email messages. Among the features that HTML adds were better looking fonts and formats, hassle-free in-line images, and hypertext links to related documents.

New tag sets will continue to be added to HTML but the basics will remain the same. Although next years crop of word processors and HTML text editors will make developing Web pages as easy as developing a document in Word, it is still worthwhile to learn how to read the source code. You will get years of returns on your small investment of time and effort required to develop this skill.

Frequently Asked Questions

One of the most frequently asked questions (called FAQs on-line) is: who owns the Internet.

The answer is: no one. It's not a company or even a person. It's more like a world, where countries are connected to other countries, but remain separate entities. There is no one person who rules the world and no one entity regulates the Internet. Just like countries of the world, the networks of the Internet have different "governments." Some have a central authority and some don't. Some networks allow more access to their information than others. Fortunately, there are plenty of lists on the Net, so you don't have to worry about the places you can't get into unless you're an aspiring hacker.

Who pays for the Internet? Everyone and no one. The Internet was never, and is not now, free. Each network "country" pays for its share of the network. Whether the people using that network pay a fee depends on how they get their access. Some cities offer "free net" access. This means someone else is paying the bill. Other users get access through providers (of which there are several million).

Anyone who desires to enter cyberspace should shop for a provider offerings the best price and the best technical support. It doesn't matter how cheap the cost, if you can't get your software properly configured to establish a link. Reliability of service is also an important factor in choosing an Internet provider. It is an actual computer linking you to the network. You can expect them to go down occasionally, but if it is a regular occurrence, or if there are more customers than phone lines, unlimited hours at a set price doesn't mean a whole lot.

Why would I want to get on? It sounds hard. It is true, the Internet's UNIX interface was not easy for the computer illiterate. But in 1991, the Internet and business communication changed forever.

Internet Technologies Put Information A Mouseclick Away

By Steve Bett, Ph.D., ECRC, Orange, Texas bett@luorc.edu

Interconnected computer networks, what we now call the Internet, have been around for 26 years. The ingredients making the Internet attractive to a large cross section of the population, however, are quite new. It wasn't until 1995 that all the pieces started to fall together:

- HTML, the language of the Web, created as an SGML document type definition.
- http (The hypertext transfer protocol) successfully tested
- text based client software distributed among researchers to access documents on web servers
- the first graphical Web browser, Mosaic, freely distributed over the Internet
- search software residing on a remote server provides access to a huge information database
- a significant number of useful locations (or URLs) to visit providing more than plain text.

During the same five year period, corporate information officers (CIOs) began to see this development as a possible way to solve some of their information access and information sharing problems.

The most visible component of this information revolution has been the graphical Web browser. Netscape, Internet Explorer, and NCSA Mosaic are examples of powerful client software packages providing the kind of window on the Web shown in the illustrations. It is hard to imagine an easier or more intuitive interface. The Web browser is the breakthrough technology making it possible to "point and click" your way across the Internet.

The browser may have been designed to search for and retrieve Web documents residing on remote Web servers, but it also simplified access to all of the older Internet services. If you have an email account, for instance, you can respond to or comment on any Web page without changing applications. Simply clicking on the "mail to" link brings up a pre-addressed email window as shown in Figure 1. Your inquiry or comment can then be typed and sent off with the click of a button. Compare this response time to writing a post card or even calling an 800 number. Answering such email is just as easy and quick.

The browsers provided new capabilities without ignoring the traditional Internet services. You can still access gopher and FTP sites without switching to another program. In most cases, the browser provides a more intuitive and generally better interface to the traditional applications than were previously available.

This combination of power, simplicity, and low cost has not gone unnoticed in the world of commerce. Corporations are getting on the Internet in record numbers to market their goods and services and to improve customer support. They are also installing TCP/IP, the Internet protocol, on their internal file servers to facilitate internal communications

Continued

The computer screen becomes a window on the web and the mouse a navigational aid

The mouse is a palm sized input device that controls the position of the on-screen pointer. Pressing a button on the mouse produces an audicle "click" and initiates some action. Positioning the pointer over the word "contact" in Fig. 1 and pressing or "clicking" the mouse button brought up the email window shown in the bottom right of the screen.

Fig. 1. ***A Web page with clickable options as viewed on a graphical Web browser. Clicking on the first option on this index page, brought up an email window. Soon a single user interface will be able to quickly access almost every type of application.***

Fig. 2. ***Browser window with toolbar turned off to reveal more of the Web page. Each of the 4 graphics is a clickable image map that will link to a document on a remote web server***

and provide easier access to their information data bases. Corporate communication systems using all of the Internet tools without being directly connected to the global Internet for security reasons are referred to as intranets or virtual personal internets. To the user, it looks the same as the Internet, there are just a few million less places to go.

Since the Internet communication protocols were specifically designed to be compatible with any hardware or software, many problems one encounters with proprietary systems are eliminated at the outset. By presenting information in the same way to every computer, they can pull all the computers, software and databases that dot the corporate landscape into a single system. This enables employees to find information wherever it resides. When 30% of an employees time is spent locating information, this becomes a valuable tool. When the Internet caught on, people weren't looking at it as a way to run their businesses, but this is what is happening.

The Web (or more accurately networks linked through the hypertext transfer protocol [http]) is a powerful supplement to other forms of communication. In some areas it has already begun to supplant or replace some of the older communication technologies.

The more obvious virtues of electronic publishing include a reduced the need for paper, a promise that older computer technologies never delivered on, and quick updating and correction. Since Web browsers run on and communicate with any type of computer, all sorts of documents - phone books, procedure manuals, safety regulations, training materials, requisition forms, travel forms, calendars, and schedules - can be published and maintained in electronic form. Electronic documents were always easy to update but they used to be difficult to share. By publishing them on the Web, they are easily viewed by anyone with access desktop computer, a less than $20 a month connection, and a less than $50 client software package.

When the managers of medium to large businesses see how simply the Web and the browser conveys all kinds of information, most see an answer to many of their access and distribution problems. They are struck with the wide variety of data you can get at with just one interface. Compared to proprietary systems, the Web is simple, inexpensive, and good enough for most business uses. Eli Lilly, for instance, was able to link 3000 sites around the world for $80,000. With a reported investment of less than $30 per site, Lilly workers are now able to collaborate and share information with unprecedented ease. Internal or personal internets, referred to as intranets, can improve internal communication and save paper without the security risk associated with a global connection. AT&T, IBM, Levi Strauss, 3M, SGI, and many other major companies are putting together intranets to improve efficiency and encourage internal collaboration.

The Web gets information out of the arcane world of databases into a format anyone can use. The Web provides a simple way of doing things that in the past required loads of complex code, specialized programs, and highly trained programmers. The language of the Web, HTML, is so simple that most people can master the basics in a week. Those with an aversion to any kind of code do not have to wait long for a solution. By next year, their favorite word processor will probably include HTML format as one of the available print options. This will make Web documents as easy to create as paper documents. Companies may still have to have a Webmaster and a few specialists, but not a pool of code writers. With an HTML converter on their familiar word processing program, most people can do it themselves. They can create and manage the information they are responsible for as easily as they can type a business letter.

Fig. 3. ***Beginning a search under the key word "Intranet" using the Yahoo search utility. The search revealed that there were over 400 documents on the Net related to intranets. The first twenty were displayed in a clickable format. Notice the 10 buttons on the toolbar.***

The hypertext document is quickly becoming the navigation standard. Click on a blue highlighted word, a graphical button, or another "hot spot" on a web page and you quickly jump to another portion of the document, to another Web page, to a file server, or to a database search engine. Since all Web pages work this way, it requires little, if any training and it makes navigating the Web and finding electronic information simple enough for a six year old.

The new technologies are adapting to the way people want to work, rather than requiring them to invest precious time in learning a complex set of commands or adjust to a confusing interface. The machines are getting smarter and are requiring less in the way of training. Subsequently, even more improved tools and more sophisticated Internet applications are coming. It is already possible to fill out electronic forms, query databases, hold desktop video-conferences, and make secure business transactions. There is every reason to believe that what a few are doing today will become the norm tomorrow as the procedures become more refined and familiar.

The new Internet technologies have put all types of information just a mouseclick away.

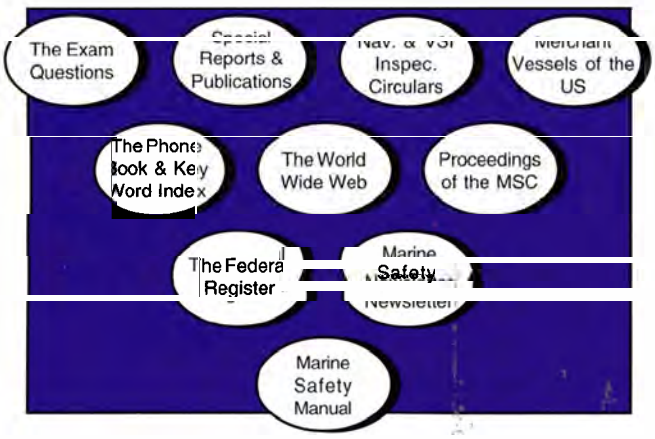
The Marine Safety World Wide Web

Information – More, Better, Cheaper, Faster

By Commander Theron Patrick,
Chief Publications and Information Division, National Maritime Center

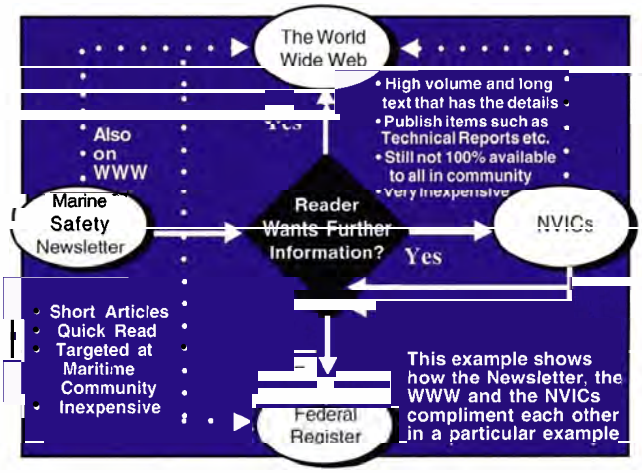
Part of a Plan!

In early 1995 the "USCG Marine Safety and Environmental Protection (G-M)" Publications and Information program was created. The reason for its creation and its basic philosophy was and remains very simple. "Combine and coordinate all USCG "G-M" mass communications to improve our communications with the Maritime community, promote consistency, contain costs and speed delivery." The Parts (the Publications) of the program are shown in the following diagram:



While most of the publications of the program were well known, there was one new, and "strange" item called the World Wide Web (WWW). Everything about the Web was new. The technology, the format, even the language (What is a Webmaster? It sounds like someone out of a Dungeons and Dragons Game, not a government employee) was strange, but early research showed the tremendous potential of the Web, thus the G-M WWW site was born.

The G-M WWW is part of the integrated communications program, not a stand alone project. Like the Proceedings you are now reading the WWW exists to advance Marine Safety and Environmental Protection. By itself it is a powerful and useful tool, but when combined with other tools a symbiosis is created. To understand how this works, an example may be best:



The Intergrated Publications Concept takes advantage of the strengths of eacyh type of publication to "get the word" to the right people.

The Marine Safety Newsletter designed as a "quick read: with short targeted articles and little in the way of explanation or detail is provided. In a recent issue, a 1/3 page article about "passenger vessel security" was published. If the reader wants further information on a particular topic, the article in the newsletter provides other sources for more detailed information, the principle one was **The World Wide Web**, which has all (300+ pages) of the relevant documents including the original IMO resolutions.

The Site Building Process

In real estate the rule is "location, location, location", on the WWW the rule is "Content, Content, Content. " The G-M site goes by that rule and is no empty shell. As of the day I write this the G-M site had over 120 megabytes of information ranging from a simple phone book of all USCG Marine Safety related units (so you want the address for every Captain of the Port in the country!) to all of the Navigation and Vessel Inspection Circulars back to 1987 (the rest by February 1997), all Marine Safety related 1995, 1996 and 1997 regulations, changes and notices from the Coast Guard (as well as ones of interest from OSHA, USDOT, etc.) and Volumes 1, 2, and 5 of the Marine Safety Manual (the remaining Volumes by March 1997).

We are using the WWW to publish information that would not be as readily available without it. For example we have published all of the exam questions used in the License and Mariner Exam. These questions have always been "published" but by putting them on the WWW many more can get them and critique them, which is the reason we publish them. We also post the Oil Spill Removal Organization Classifications. By using the WWW we can update this list weekly so that the Maritime Community members that need this information can get the latest information at the click of a mouse.

What Gets Published

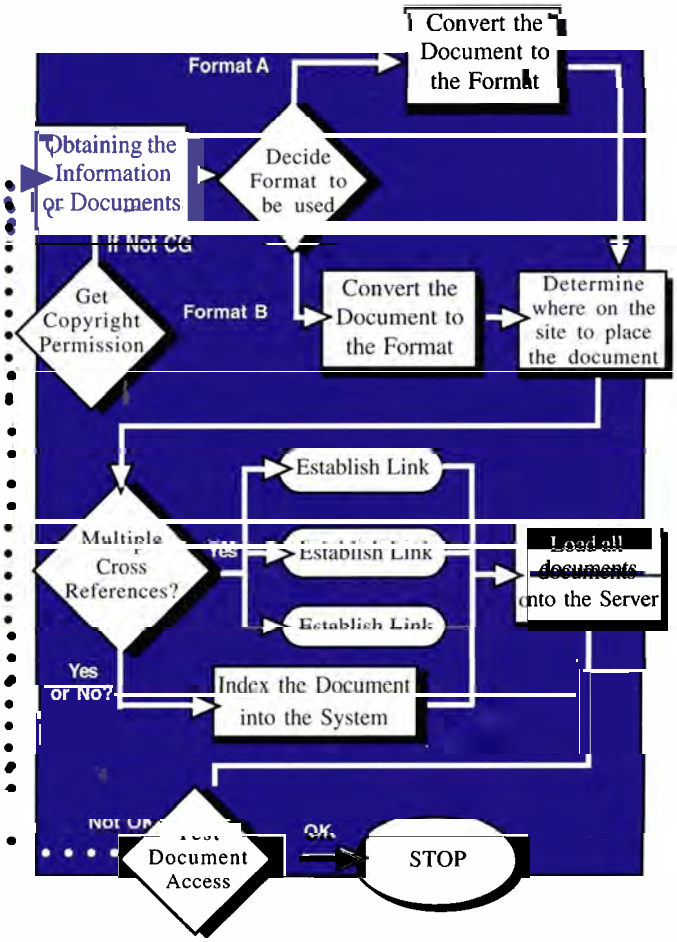
From a technical view, despite the claims of the advocates of the Web and many a software publisher getting information on the World Wide Web is not always a simple nor inexpensive process.

With the technology constantly changing and usually improving, the situation is getting better, but from the WWW author's (my) view, there are four main issues that are critical to the evolving design of the G-M site.

What information is of use to the customers. (you)

- Customer (you) resources for using and reading the material on the site.
- G-M (us) resources for creating and maintaining the WWW site.
- What information do we have that we can post that we can put on the WWW. Converting the documents to a WWW useable format takes time and money, both of which are in short supply.

As the following diagram shows, just getting one document in place can be convoluted from a management view.



Customer Resource Issues

- Internet access is usually provided by a commercial provider. Modems are slow, and the majority of our customers access the WWW by modem. We have therefore kept our file sizes as small as possible.
- The software (the browser) runs from the latest version of Netscape down through very primitive, minimal function, browsers supplied by the commercial services. To insure maximum access we do not use advanced features such as Java Script–decorative graphics. Secondary software that the customer may need is limited to Adobe Acrobat Reader, which is a free download and a database program such as the ones that are bundled in most computers sold in the last few years.

G-M Resource Issues

- Very little information we have is in a format

Information the customer needs has been determined by a two part process.

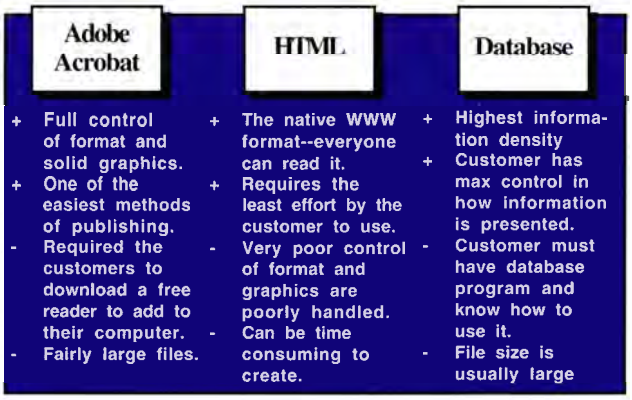
- We made reasonable estimates based on our own experience.
- Feedback via e-mail and other forms of communication.

Information that we have that we can post has been somewhat harder:

- The vast majority is on paper only. Therefore we have to covert it.
- Information existing in electronic form are mainly in a proprietary format requiring extensive work to reformat into a WWW useable form.

Continued

For these reasons we have had to put some of the most desired "documents" up incrementally.



Formats Used

We keep the formats we use to three simple ones so the end users don't have to be Internet experts to get the information they need.

What is on the G-M World Wide Web

In this short article I can't list everything but the general organization of the site, and what it contains is:

1 General
2 Marine Safety Program Information
3 General Information about the Marine Safety and Environmental Protection Program.
4 Includes Items such as phone listings, public speeches, a Key Word Index and Information on the Business Plan.
5 Publications, Reports and Forms
6 A Wide variety of publications including
7 The Navigation and Vessel Inspection Circulars,
8 The Marine Safety Manual,
9 The Marine Safety Newsletter and the Proceedings
10 Various Special Studies.
11 The forms section where the forms required for vessel documentation are posted. More forms to be added during February 1997.
12 Prevention Through People
13 Files on the USCG's Prevent Through People Initiative. Including Public addresses and Studies.
14 Regulatory Notices, Changes and Final Rules
15 Marine Safety Federal Register publications of interest to the Maritime Community from 1995 and 1996. Includes Coast Guard and other federal agency actions.
16 Lessons Learned and Safety Alerts
17 International Maritime Organization Circulars from 1995 through the present
18 All Commandants decisions on appeal for suspension and revocation
19 All NTSB decisions on appeal
20 Information by Program Area
21 Investigations
22 Inspection and Compliance
23 Response
24 Maritime Security
25 Marine Personnel
26 The Sea Partners Program
27 Other Sites in the Maritime Community
28 Other US Government Sites
29 USCG Sites including the National Strike Force Coordination Center
30 Classification Societies
31 Other Sites of Interest to the Maritime Community

Where is the G-M World Wide Web

http://www.dot.gov/dotinfo/uscg/hq/g-m/gmhome.htm

Prevention Through People and Electronic Communications

In 1870 Jules Verne imagined ships and boats communicating via a telegraph wire in his fantastic story ~~*20,000 Leagues Under the Sea*~~. Thirty years ago, the creators of Star Trek wrote of instantaneous voice & video communications. Today, we find daily references to computer-based information systems, cellular telephones, email, electronic marketing, and even "electronic doctor visits." All of these aspects of computer-based applications provide support to the goals of Prevention Through People (PTP). We are able to Know More, Do More, Train More, Offer More and Cooperate More on a global basis through these and other applications of electronic communication. The primary way this is accomplished is through the sharing of information. But, we have to make sure that the new technology helps and not hinders us in our pursuit of safer operations.

Many people see the coming implementation of various updated international instruments (ISM, MARPOL, SOLAS) and tighter budgets as requiring closer ship and shore relations to track non-conformities, accidents, near-miss events, and other ship-operating information. Direct electronic communications are seen as the wave of the future to comply with these new codes. One of the easiest ways to do this is through the use of electronic mail, or email. Frequent messages between the ship and the front office can not only keep the ship in touch with home, but also allow the office to know what is happening on the water. It is this constant communication that helps to break down the "us versus them" mentality that too easily forms between the people in the front office and the crew and officers of the fleet.

An example of what can happen when this type of communication breaks down is the 1993 grounding and loss of the tanker *Braer* off the Shetland Islands. The *Braer*, through a number of errors, lost power in heavy seas and started to drift towards a rocky coast. The Master attempted to contact the home office for direction and authority to hire tugs to keep the tanker from grounding. The length of time that it took to get approval for the tow was a major contributing factor for the accident. Electronic communications, whether email or voice, could have sped up response and decision making. When you have a fully laden tanker drifting in rough seas off a rocky coast, you don't have the luxury of waiting for phone connections.

Electronic communications can also help to mitigate the effects of an accident and speed the recovery, such as in the case of the Acomarit ship, *Sea Empress*. The ship's manager was able to provide instant communications links with the on-scene controllers. These electronic communications links allowed the front office to know what was happening in real time, and keep the public informed. The links also made it possible for the salvage operators to keep in contact with the members of the crew who stayed aboard and kept the engines and power operating aboard *Sea Empress*.

As a cautionary note, the maritime community must consider the full effects, including those on the human element, of integrating new technologies. Some of these new technologies are the adoption of electronic charts, Internet access, electronic forms, and electronic surveys such as are beginning to be promoted by ABS and other class societies. In the shadow of the *Royal Majesty*, a ship which grounded off the coast of Massachusetts, the National Transportation Safety Board sponsored a public forum in March 1996 to gather information on the state of the development of advanced electronic navigation and integrated bridge systems, the adequacy of industry and Government oversight, and the need for proper crew training in the use of this new equipment. But in our caution, we don't want to overlook the positive potential of new technology, such as the ability to download real-time navigation information from the ports.

Editor's Note: The Coast Guard's PTP program is aimed at increased safety and environmental protection, through a focus on the human element. This concept is being adopted by government and industry alike. The success of the program will be due to the commitment of everyone to share the lessons they've learned. The PTP section will be appearing regularly in Proceedings. To highlight your stories and lessons (or to receive a copy of the PTP Strategic Plan booklet,) call Coast Guard Headquarters, G-MSE, at (202) 267-2997, or send a fax to (202) 267-4816. Put PTP to work for you and your organization.

We're in This Together

Captain of the Port New York established a new section to focus on the national preparedness initiative in the autumn of 1995. With the full support of CDR John O'Brien Jr., Chief of the Marine Response Division, a seven person team was assembled to help industry understand and comply with oil spill response requirements established by OPA '90. This new group was dubbed "PREP," or the "Preparedness Section," after the National Preparedness for Response Exercise Program. Since their responsibilities are so broad in scope, the team defined their objectives under 7 strategic goals:

1. Review facility response plans and meet with every facility annually to discuss preparedness issues and industry concerns.
2. Participate in industry led exercises and drills.
3. Annually inspect area Oil Spill Response Organizations.
4. Utilize first aid pollution response equipment located within the COTP zone.
5. Foster new partnerships with local and state agencies.
6. Annually review and revise the Area Contingency Plan.
7. Schedule and facilitate Area Committee meetings.

The idea of a Preparedness Section was conceived by Lieutenant Larry Hewett, Assistant Chief of the Environmental Protection Branch of the newly established Activities New York. When talking about Preparedness, Lt. Hewett stresses, "it's an important mission separate from pollution, prevention, and compliance. PREP is the Coast Guard keeping its pledge to industry that we're in this together." The validity of these statements is evident by the formal recognition of the Preparedness Section within the Activities New York organization and mention of "preparedness" in the unit's mission statement.

During its first 8 months, PREP's main emphasis was on facility response plan review, facility visits, and renovation of the unit's pollution response first aid equipment. With these programs up and running smoothly, PREP refocused its attention on the Area Contingency Plan. As a result of this new focus, PREP recently introduced ASAP (Adopt a Sensitive Area Program) at a general meeting of the New York and New Jersey Area Committee. This program is designed to validate information in the area contingency plan on environmentally sensitive areas and to develop protective booming strategies for these areas.

In 1994, facilities and oil spill response organizations were formally required to deploy and operate certain amounts of their response equipment

annually and semiannually. ASAP encourages facilities and oil spill response organizations to select an environmentally sensitive area they would reasonably expect to protect in the event of a spill. This sensitive area is then used as the location for an equipment deployment drill. The adopting organization forms a planning team and works with Natural Wildlife Trustees, as well as Federal, state, and local agencies to develop a protective booming strategy for the targeted area. The team also identifies potential staging areas, access points, equipment and personnel needs, along with other response considerations. The formulated strategy is tested during an equipment drill and evaluated for effectiveness by everyone involved. This valuable information is gathered by an evaluation team and formatted by the PREP staff for inclusion into the area contingency plan.

PREP is using information gathered through ASAP to develop a new annex in the area contingency plan. This annex will provide detailed information about each environmentally sensitive area. The information will include booming strategies, access points, site characteristics, equipment lists, manpower needs, and sensitivity concerns. PREP's goal is to provide a lasting corporate memory accessible to everyone in the port. A detailed corporate memory will allow for better management of response resource, reduce contractor response time, and suggest a recommended response strategy already reviewed and agreed upon by members of the Area Committee.

To date, PREP personnel have monitored two major equipment deployment drills and several smaller drills within the port. As a result, booming strategies were developed and tested to 10 environmentally sensitive areas. Activities New York would like to publicly thank Exxon Bayonne, Northville Industries, BP Linden, GATX Carteret, Miller Marine, Clean Harbors COOP, TOSCO Tremley Point, Colonial Pipeline, Marine Spill Response Corporation, National Oceanic and Atmospheric Administration Scientific Support, New Jersey Department of Environmental Protection, New York State Department of Environmental Conservation, New York City Department of Environmental Protection, Coast Guard First District DRAT, and Coast Guard Group Sandy Hook for their involvement and support of ASAP. The recent success of this program goes in large part to their initiative and hard work. Activities New York hopes that others will follow the lead of these progressive industries and continue to take ownership of the Area Contingency Plan.

Atlas of t
Wind & W

World in Motion

A multimedia CD-ROM which integrates reference text, satellite data and digital vide sequences of the oceans, has been launched by Elsevier Science as part one of a new range of electronic products called OSIS (Ocean Science Interactive Series).

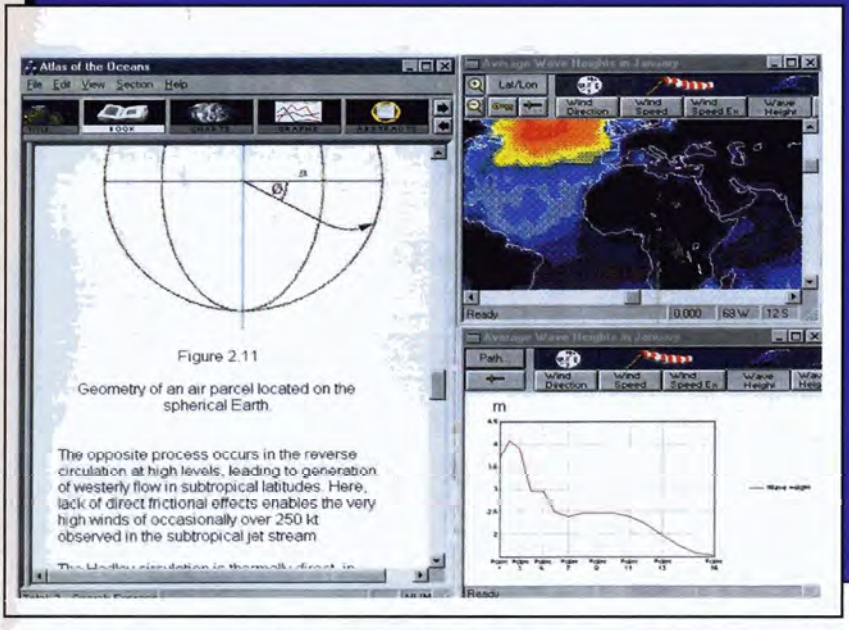
Atlas of the Oceans: Wind and Wave Climate focuses on wind and wave parameters, from which contour maps and graphs can be produced interactively by the user. It also includes a searchable electronic book on global wind and wave behavior.

The CD is geared toward professional scientists and academicians involved in both teachin and research. According to staff at Elsevier Science, the educational audience likes the fact that you can take a point on the globe and compare data on it over different parts of the year—it is good for illustrating basic principles.

From the research angle, becaus the datasets are presented in an open format, they are useful in a number of scientific areas. The disc opens like a book, with a table of contents on the left of the screen, and chapter texts on the right. From the text you can hyperlink to references, data and vide sequences. Oceanographic charts for any region of the earth can be drawn u by zooming in from a global ocean she screen.

There is a search bar at the top o

To order the CD-ROM, contact Susan Verhagen:
email: s.verhagen@elsevier.co.uk
fax: +44 (0) 1865 843986



e Oceans:
ve Climate

the screen, plus icons which indicate data and abstracts, accessible from any point. You can search the full text by key words, figures or authors.

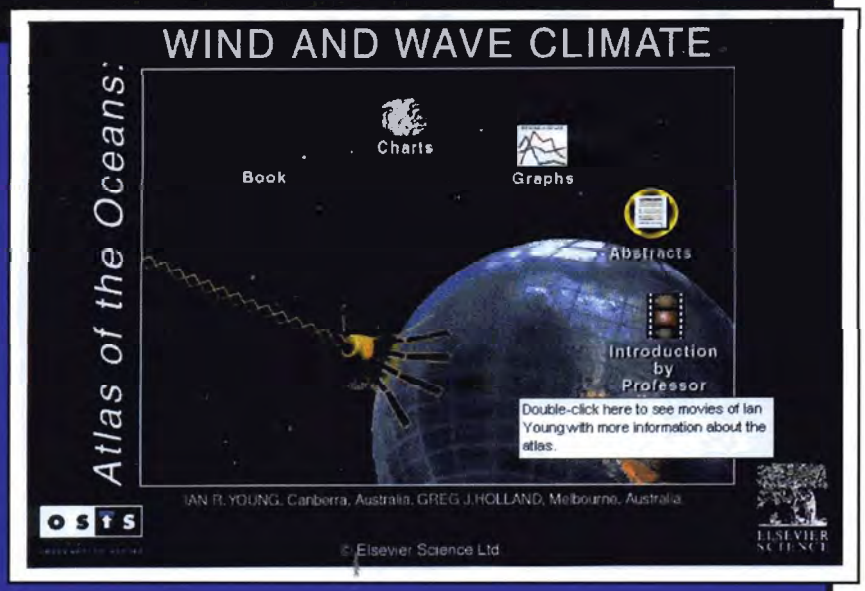
From within the text, you can link to a representation of a particular wave sequence created from satellite observations. For example, if the text is discussing wave heights in the northern part of an ocean for January, the user can click on the hyperlink and a chart will appear representing the feature of the ocean being discussed.

You can then cross-refer by looking at the same feature throughout the year or look at the same point for a different parameter, such as wind speed. "It is significant that these are not static images, since you are monitoring a feature changing over time," added Mr. Ruston. "Before satellite data was available it was difficult to get global coverage of these properties."

According to Elsevier staff they opted for CD-ROM because, there are a lot of similar publications going up on the Internet, but given the quantity of data we are offering, and existing Internet access deficiencies, users would have been faced with incredibly slow access. The Internet certainly has advantages in terms of linking to other sites, but it is nice to offer a complete package almost like creating a book, and the access is more immediate."

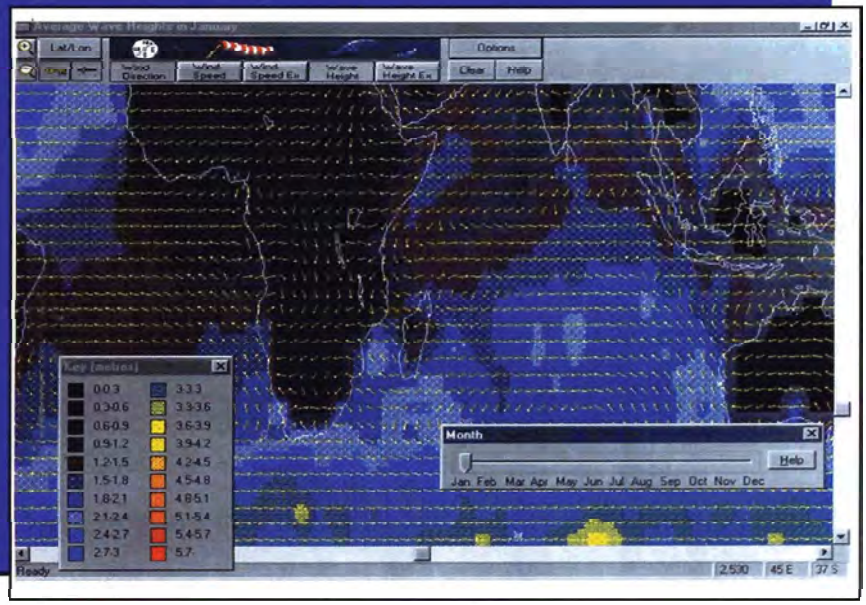
The CD-ROM is compatible with Window 3.1, '95, NT and Macintosh. A trial version, containing around 75 percent of its data, is available for free.

Elsevier Science: +44 (0) 1865 314 900.



The unique combination of text, calibrated data, and video make the Atlas of the Oceans: Wind & Wave Climate an essential tool for:
shipping operators ♦coastal, offshore and ocean engineers
♦researchers ♦tour operators ♦educators

The atlas is the first CD-ROM title in the Ocean Science Interactive Series. It is also available packaged with an illustrated hardbound book of the same title.



Coast Guard SIP Program A Self Inspection

By Glen Vizier

L & M Botruc Rental, Inc. has been in the Streamline Inspection Program (SIP) since November, 1993 when we started out with 6 vessels in the program. Basically SIP. is a Self USCG Inspection monitored by the USCG with vessel crewmen trained in the proper Coast Guard procedures to inspect a vessel, then having the captain fill out and send in to the main office a Monthly Recap Sheet each month listing the items found deficient during the inspection. A summary correction report (SCR) is completed at the office indicating what steps were taken to correct the deficiency. A copy of the SCR is sent to the vessel to retain on board with their records.

Since its inception, almost three years have passed with L&M Botruc Rental adding 9 more vessels into the program totaling 15 vessels. L&M Botruc and the USCG have been working hand in hand to make the SIP program the best in the country. Where several programs of this type between the Coast Guard and industry have failed, the SIP program is viable and working.

The SIP program has proven itself not only to be a great educational and maintenance tool but has also improved the safety on board the vessels. Through SIP, L&M Botruc Rental and the USCG have developed a great working relationship and a degree of trust matched by few others.

The SIP program has improved our maintenance and safety program in addition to our relationship to the Coast Guard.

Streamlined Inspection Process

By Thomas Christopher, S.I.P. Representative

ENSCO Marine Company is an offshore service company, owned and operated by ENSCO International Incorporated of Dallas, Texas, with the U.S. operations office being in Lafayette, La. ENSCO owns and operates 37 offshore vessels, including large anchor handling, straight supply, and mini supply vessels, as well as 54 offshore drilling units.

ENSCO Marine Company began the preliminary process of compiling a company action plan and vessel specific information in January of 1995. The I.C.S. sheets were simply supplied and duplicated from one of the four original companies to begin participation in the S.I.P. process in this region and tailored to our individual vessels. The seven (7) vessel crews actually began with the S.I.P. verifications and paperwork in May of 1995. Anniversary dates for the vessel annual inspection, also included an audit. Upon satisfactory performance and with the approval of the appointed shepherd and the home port O.C.M.I., the vessels were at this point endorsed on the C.O.I. for participation in the S.I.P. process.

ENSCO Marine Company appointed two individuals—one for training and another for documentation—thus ensuring accountability and completeness of the process. The vessel captain, mate and chief engineer were the individuals trained by the ENSCO S.I.P. representative at our facility. These individuals were directly responsible for ensuring the verifications were executed correctly—if not by direct participation, then through supervision. Subsequently, a copy of the verification recap sheets is turned over to the vessel's assigned port engineer for implementation and action. Upon completion of the reparations, the port engineer will supply the S.I.P. representative with a copy of the P.O. and back up documentation of the repairs, or supplies issued for the vessel crews to make repairs or replenishment, which ever is necessary. A copy of the action taken and the date it was completed is filled out on the Summary Correction Report form and sent back to the vessel master for his perusal, and final approval of all actions taken for that specific month's V.R. S. form, as he has the ultimate responsibility. The allotted time for completion of reparations of problem areas is 30 days from the point the V.R.S. reaches the office from the vessel.

In the implementation phase of the S.I.P. process on the vessels, there was much foot work to each of the vessels by the S.I.P. representative to ensure the crews were in fact executing the I.C.S. sheets correctly, and given further training other than what was presented to the officers initially, on an as needed basis. There were instances of the vessel crews not executing the I.C.S.'s correctly. Often misinterpretation or in some instances simply the person carrying out the verification would write his initials in the provided spaces on the V.R.S. form, indicating that the area checked was O.K. when in fact it wasn't completely checked. There were other instances, where the crews would check the areas O.K. on the V.R.S. form and were found not to be O.K. Yet, when queried about this, the response was, "Well, it's been like this for 10 years and no one has said anything about it to this point in time". Probably one of the biggest obstacles we faced in the program this far was changing the mind set of individuals.

Success of the S.I. P. process promotes awareness in everyone involved. Fleet crew members ask to be reassigned to S.I.P. vessels; customers request S.I.P. vessels for future work contracts; and vessel crews are learning from past errors using the C.F.R. references. In cases, I have found the ship's fire and safety plan (posted in plain view for the crew members and seen numerous times on a daily basis) was not being checked against the locations/placement of safety and life saving equipment. When this was brought to light on one of the vessels, within a few days the word had spread throughout the fleet, so it appears as though this process may possibly instill camaraderie among crew members.

Comparing the cost effects of the seven vessels during the first six months of the same time period of the previous year, there was a noticeable cost savings in most cases-some moderate and some significant. In some cases it was a dramatic savings and in others a moderate savings was observed. During the first two months of implementation of the process, all vessels marked an increase in expenses, due primarily to the vessel crews actually having a checklist to inspect equipment, as opposed to being instructed verbally, as has been the case, since the beginning. The following months the cost effects decreased and basically maintained a flat line, with the exception of machinery failures. The dreaded annual vessel inspection by the crews, normally taking days of preparation and expenses, has turned into nothing out of the ordinary for the crews, while the vessel remains in a state of readiness.

I am convinced that the company's relationship with the USCG has improved due primarily to the "partnership" of the CG shepherd, assigned to our company by the USCG, and myself talking on a more frequent basis and discussing problem areas to be improved upon by both sides. Thereby enhancing the benefits for both parties. It is the full intention of ENSCO to have all of the vessels on the S.I.P. process by the later part of 1996 or early 1997. Our company is currently in the process of going on line with the ABS certification of ISO 9001, and in doing so we are using the S.I.P. verification recap sheets as the core of the crews reporting vessel deficiencies, and the summary correction report as to action taken to make these reparations.

We here at ENSCO, from the company President on down the chain of command, are 100% advocates of the S.I.P. process, especially since the advantages far out number the disadvantages.

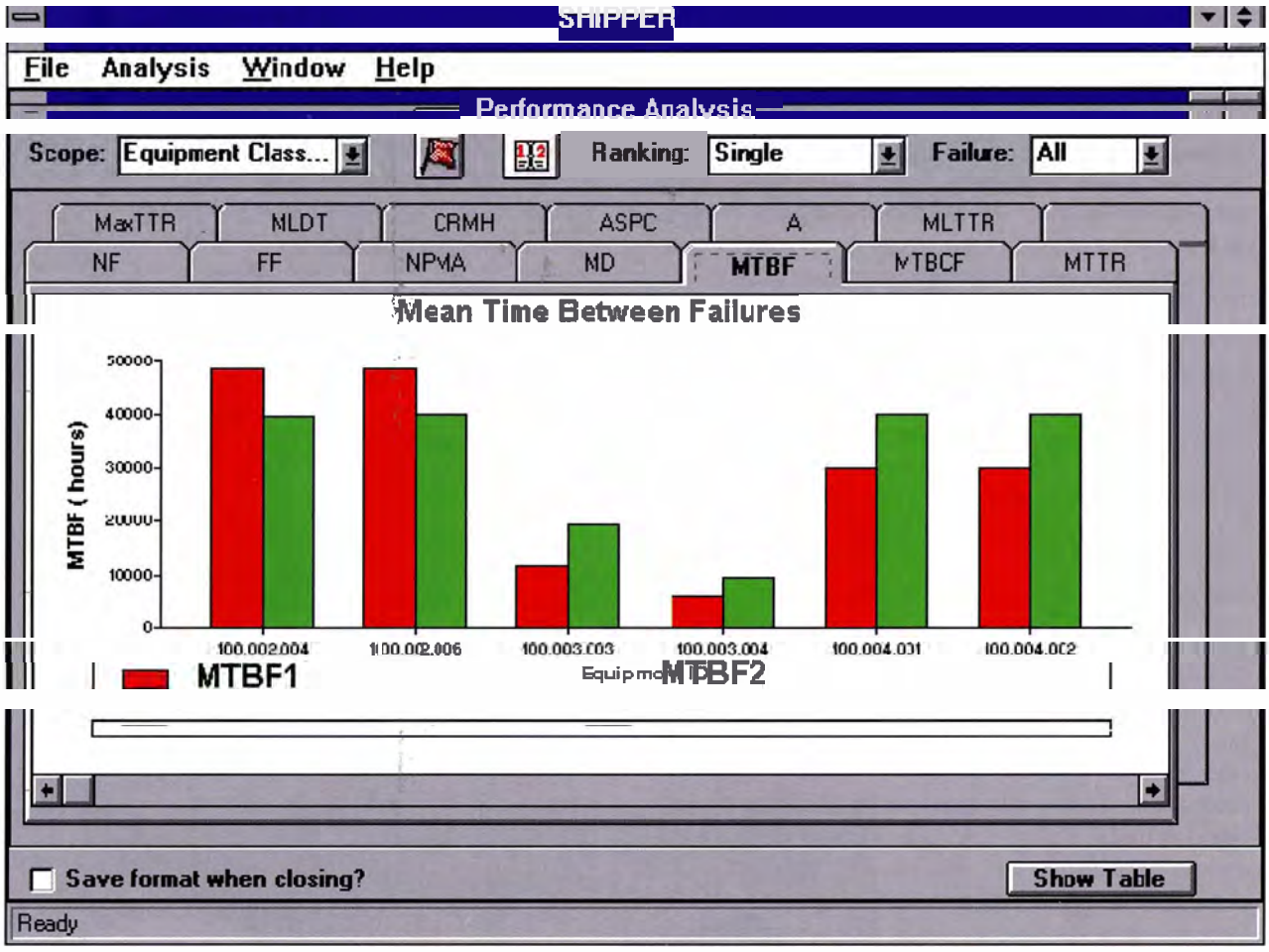
Experience is What Makes You Recognize A Mistake When You Do It Again

By Peter Schaedel
Vice President Corporate Quality
Energy Transportation Group, Inc.
Chairman, Ship Operations Cooperative Program

Reliability, Availability and Maintainability. How often have we not thought of these important factors? Is this equipment reliable, is that part available and can we easily maintain this item? The SOCP's (Ship Operations Cooperative Program) RAM Database /SHIPNET answers these questions and more.

The SOCP has developed an analysis methodology and a network of databases, called SHIPNET, to improve the total life cycle of ships in terms of cost effectiveness, reliability and overall quality and thus increase safety and profits. At the start of this project in 1993, various databases of Japan, Sweden, Norway and the United States were surveyed. Database operational procedures and format information were reviewed for each. This information was then used in subsequent tasks to develop data formats for the SOCP's RAM database/SHIPNET.

Data collection formats and procedures were

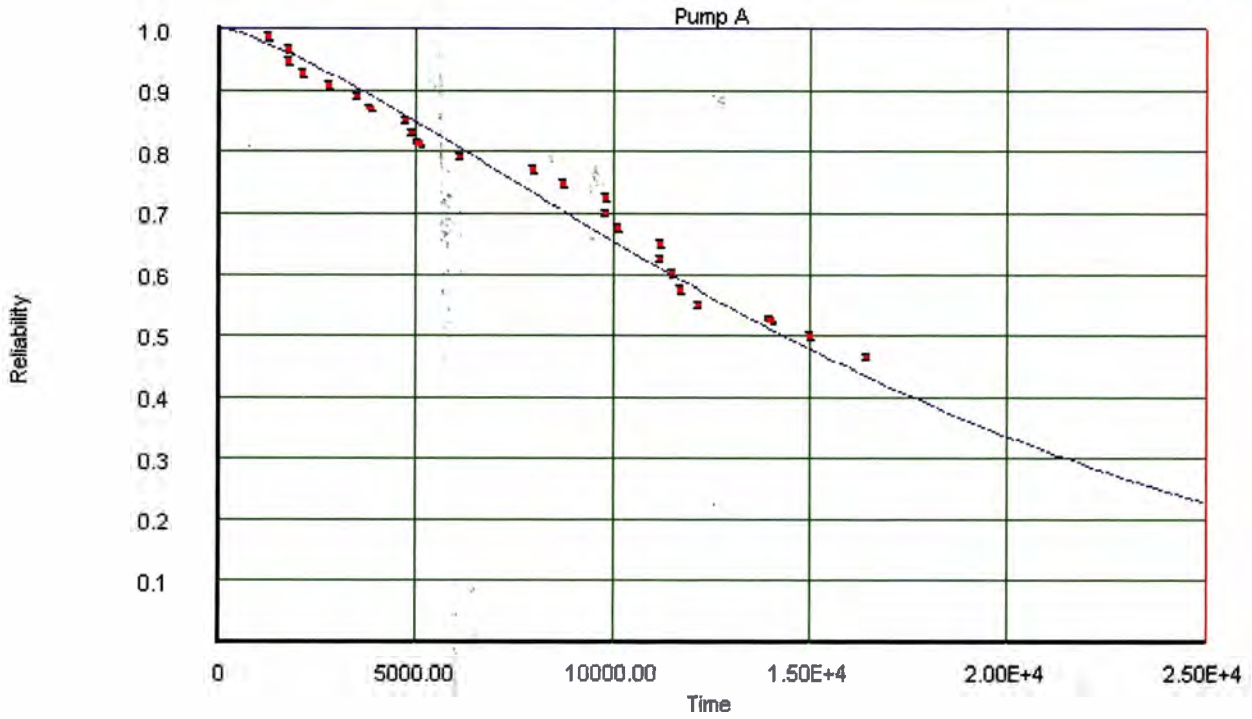


developed for ship machinery reliability data. Various performance indicators and RAM indices of existing databases were analyzed. Following this analysis, the SOCP established the parameters for performance indicators and RAM indices which will maximize benefits to the marine industry. A shipboard data collection program DATE (Data Entry) and shipboard analysis program SHIPPER (Ship Performance Review) have been developed. A shoreside fleetwide comparative analysis program, SPIN (Ships' Performance Indicator), is being developed and the centralized RAM database will be fully operational shortly.

Initial comparative studies of shipboard equipment using the SOCP's RAM Database have revealed interesting results and encouraged manufacturers to improve the quality of their equipment.

The US Coast Guard plans to use the RAM database/SHIPNET to revise its regulatory requirements and classification societies such as ABS and Lloyd's Register are investigating using equipment failure history data to assist them in improving their classification rules. Shipyards, equipment manufacturers and international agencies are being approached to share/exchange their knowledge and participate in the development of this valuable resource.

For current information, visit our website at http://www.uno.edu/~engr/ram/shipnet.htm



The NSnet and Electronic Commerce

As part of the MARITECH program, the Advanced Research Projects Agency (ARPA) has developed and established a global maritime information network — NSnet. Originally conceived as a tool to electronically network the U.S. shipbuilding industry, NSnet intends to link all segments of the global maritime community: shipowners and operators, shipyards, regulatory bodies, insurers financiers, suppliers/vendors, ports, and government agencies. The backbone of NSnet is a seamless blend of store-and-forward (FIDO) and Internet technologies supporing private e-mail, conference mail, file transfer and exchange, data from public library files, and Internet connectivity. It is envisioned that NSnet will be a catalyst in forming the maritime industry's infrastructure and promoting effective business practices regarding electronic commerce.

At root, the NSnet project aims at changing the way in which individuals and organizations communicate with one another inside the corporate environment as well as the way they interact with the world outside. When the NSnet project began in 1993, very few if any shipyards had electronic communications. Indeed, most shipyards were not even networked in-house. The last few years have seen an explosion in electronic communications. An increasing number of companies (and industries) recognize that business, once conveyed by fax, telephone, or mail, can be accomplished far more efficiently electronically. For example, the automotive, aerospace, computer, and clothing industries, in varying degrees, already have realized the value of electronic commerce.

The NSnet and Electronic Commerce

The maritime industry, too, can profit from electronic communications technologies. To address the communications needs of all the maritime community concurrently, NSnet is working simultaneously with all the key segments of the industry. For those persons who can access the Internet, NSnet has a site on the World Wide Web (WWW). Since its inception a little over a year ago, the NSnet Hope Page has received close to 100,000 "hits" (number of persons logging onto the home page), averaging 1,000 hits every business day. Log-ons have come from every part of the world.

The NSnet Home Page offers a wide array of information and communications resources by way of e-mail, electronic conferences, and "hot links" to other home pages related to the maritime community such as vendors, design agencies, professional organizations, standards and classification societies, shipyards, banking, finance and insurance, education, research and legal resources, and selected government on-line sites. Links to other maritime interests are continually being added to the home page.

Another feature of NSnet is its support of conferences (also known as newsgroups or discussion groups). Conferences are groups of messages separated by topic. Conference Mail is a very powerful medium allowing groups of people to stay informed, manage projects, develop workplans, discuss issues, and distribute and find information regardless of a person's schedule or location. Message-based conferences are sometimes called "non-real-time-conferences" meaning that the members of the group do not interact with each other simultaneously, but rather, read and create messages at their own convenience. At any one time there may be a dozen or so discussions going on in a group to which anyone can follow and contribute. Current NSnet conferences include: Admiralty Law Forum, Announcements, Chat, Dry cargo, Environment, Finance, Machinery, Excess Materials, Personnel, Surfaces, Design to Production, Human Factors, Standards, Welding, Industrial Engineering, Training, Tankers, and Liners. NSnet offers an on-line subscription service to the Conferences which can be accessed from the NSnet Home Page, free of charge.

Another feature offered by the NSnet is the NSnet Directory. By entering in a key word or words, the user can look up an organization or individual, choosing either e-mail addresses or street addresses and phone numbers. The e-mail addresses provided are hot-linked to a "mail to engine", that is, one can send an e-mail message directly from their Web browser. There is no charge to use the NSnet Directory services.

It is recognized that not everyone yet has access to the Internet. For those who don't, NSnet offers the NSnetKit. This software NSnetKit allows the user to send and receive e-mail messages (even to persons with Internet addresses) transfer files, and subscribe and participate in the NSnet Discussion Groups. While most

features are available to both kinds of NSnet users, the World Wide Web offers a simplified means of accessing some features and provides a window to a wealth of general information and graphics not available to NSnetKit users.

The impact electronic communications has had on conducting business is striking. The following are a few quotes by persons in the U.S. shipbuilding maritime community who use electronic communications, specifically NSnet, on a daily basis:

"It's relieved a lot of the paperwork burden. Particularly between two departments the paperwork has been greatly reduced. Instead of having to make 13 copies of a 50 page document, for example, we can post only those portions of a text that people need. E-mail has sped up the process of everything; we're able to communicate easier and better."

"It's cut down on the time it takes to transfer files, but the biggest change is in convenience. When someone brings in a (file), we can send it right away, we don't have to wait to coordinate by phone. We can send it whenever and they can pick it up whenever."

"E-mail takes care of what it's supposed to without a lot of fuss; it makes life and work a lot easier."

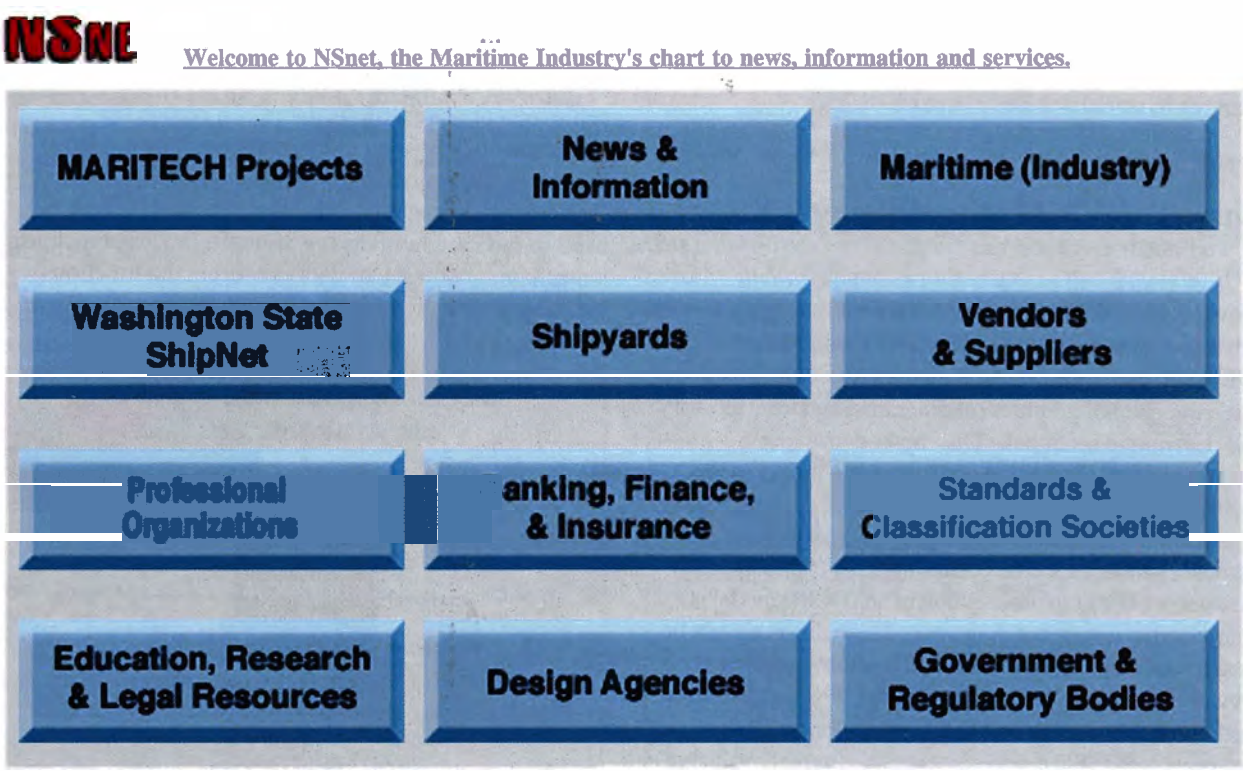
"E-mail is very efficient and a time saver. I can type things and have a record of it. People can refer back to my messages without having to track me down and ask me what I said or meant."

While e-mail is an important, immediately available form of electronic commerce, NSnet is pioneering other emerging communications technologies. Demonstrations of electronic "market places" where buyers and sellers can interact and rapidly transfer technical data for design, regulation, procurement, etc., are current items of interest in the program.

Daily, more and more businesses and industries are beginning to assimilate some form of electronic communications into the way they conduct business. The advantages that can be achieved from efficiently streamlining the "process" of commerce have yet to be realized full scale. NSnet is a tool for the maritime community, providing a means to access important information resources and to facilitate communications between individuals and organizations involved in maritime operations. Whether using the NSnetKit or the Internet, NSnet affords an efficient manner in which to carry out communications and commerce electronically.

Interested persons with an Internet connection can access the NSnet via the World Wide Web by typing in the URL: **http://www.nsnet.com**

For more information on the NSnet contact: Andy Dallas, NSnet Project Director at (703) 516-6000.



IDEF Methods and Enterprise Engineering

By Cecil Joe, Ph.D.
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Introduction

The purpose of the Integrated Computer Aided Manufacturing (ICAM) program was to increase manufacturing productivity by using computer technology application. A need for developing communication techniques and analysis methods for people involved in productivity improvement projects was identified. The development of the IDEF suite of Methods was direct result of this significant identification. In this article, an overview of two of the widely used IDEF methods is provided. These include the IDEFO and IDEF3 modeling methods. IDEFO is used to build function models while IDEF3 is used to develop process flow descriptions in a specific context. Both these techniques are currently being used in enterprise engineering projects as a communication tool and analysis mechanism to develop 'AS-IS' models as well as 'TO-BE' models (which are used to implement changes in an enterprise or organization).

The IDEFO Methodology

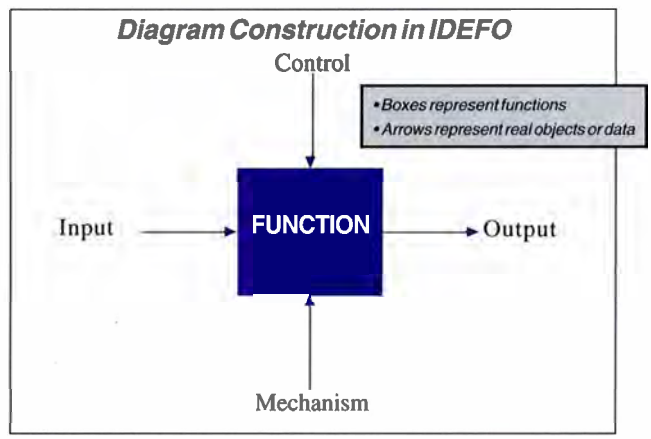
A Functional model is a representation of the activities and relationships between functions in an existing or planned system. The IDEFO method is the IDEF method developed by ICAM for modeling functions. It is comprised of graphics (or diagrams) and text (glossary and descriptive sections). This method provides a language and a process for constructing a model of the various activities, actions and decisions in an enterprise or organization. Each IDEFO model is built for a target purpose, within a specific context, from a consistent viewpoint. The graphical section of an IDEFO model is comprised of a series of diagrams. These diagrams can be used to decompose a function (subject) into additional divisions (for focus and manageability). From a CALS (or Continuos Acquisition and Life Cycle Support) perspective, IDEFO models have been extremely valuable in analyzing the life-cycle functions within an enterprise.

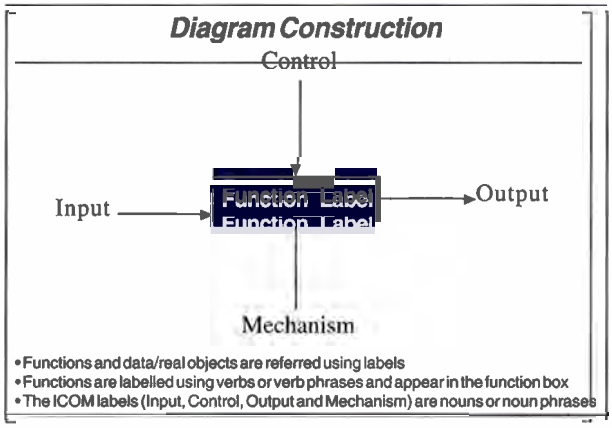
The diagrams in an IDEFO model are comprised of four distinct labels. These include:

- Inputs
- Outputs
- Controls
- Mechanisms

The input labels are used to designate inputs to a specific function being modeled. They can be data (or information) used to perform a function or can be real objects. Inputs can also be objects or data transformed by a function (being modeled). The input labels are always nouns or noun phrases. Outputs can be data or objects produced as an output or result of a function.

The control labels used can be information or objects that govern (or influence or control) the achievement or accomplishment of a certain function. For instance, customer expectations can be a control label that determines or influences a function such as 'establish requirement'. The Mechanism label can be used to indicate humans (personnel), devices (such as a mechanical object), or data executing the function being modeled. The mechanism (in the direct sense of the term) is the means by which a function is

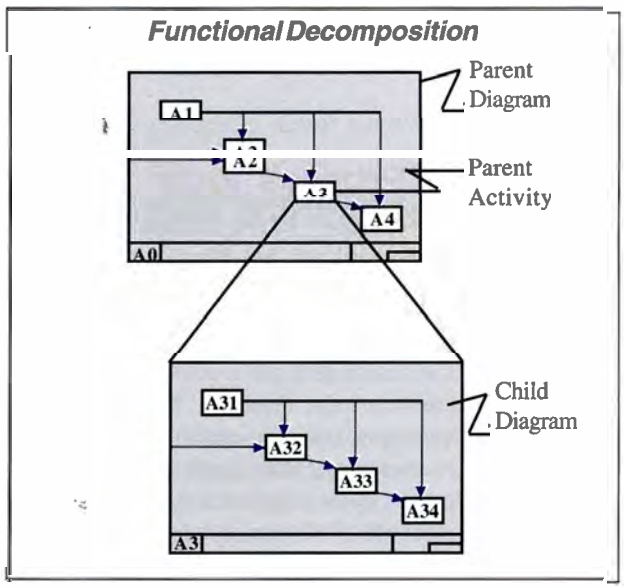




performed. The input, output, control and mechanism labels used to build an IDEFO model are all noun phrases or nouns.

The first step in building an IDEFO model includes defining the viewpoint, purpose and context of the model (to be built). The context diagram is then developed to place 'the situation in context'. The context establishes the boundaries of the subject or function being modeled. The viewpoint is the perspective (or bias) from which the a subject is analyzed by a modeler or modeling team. The purpose (or objective) states the reasons for which a model is being built. For instance, a computer manufacturer may be interested in studying the various processes involved in assembling a computer. In order to improve the existing methods, a well understood functional model may be necessary. The purpose of building a model (in the computer manufacturer's case) can be 'To understand the various steps in assembling a computer'. The viewpoint for the model being built would depend on the manufacturer. It can be the viewpoint of the vice president of manufacturing or the shop floor manager. The context then needs to be established. The context can be: The raw material and parts are assumed to be available. The product design is also available and the assembly operations are performed in-house with available equipment and resources (machines and humans). The output of the functions performed include completed or assembled computers. The context diagram helps place this modeling situation in context (see figure).

Decomposition is used in building IDEFO models to establish model hierarchy. It is a process of describing functions comprising of other functions and can be viewed as a process of detailing a function at successive levels of abstraction. The higher level function is referred to as the "parent" function. The more detailed diagrams are child diagrams which depict the detailed activities of the "children" functions. The arrows are used to describe the relationships between the functions. These arrows are also referred to as concepts. Concepts can be objects, information (or data), machines etc. Outputs can branch and can be used by two functions simultaneously or sequentially. Feedback arrows are used widely when modeling activities involving design specification changes, etc.



Any diagram in an IDEFO model can have a

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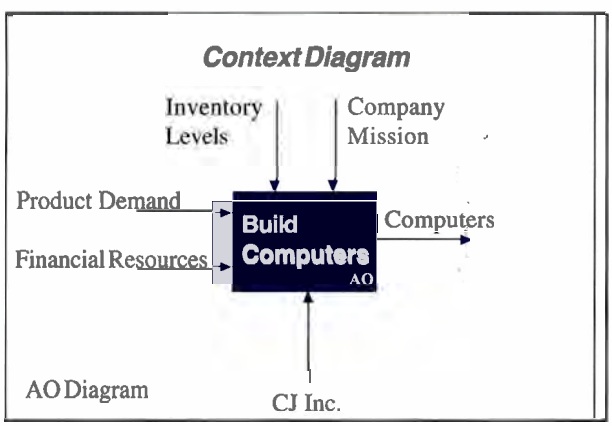
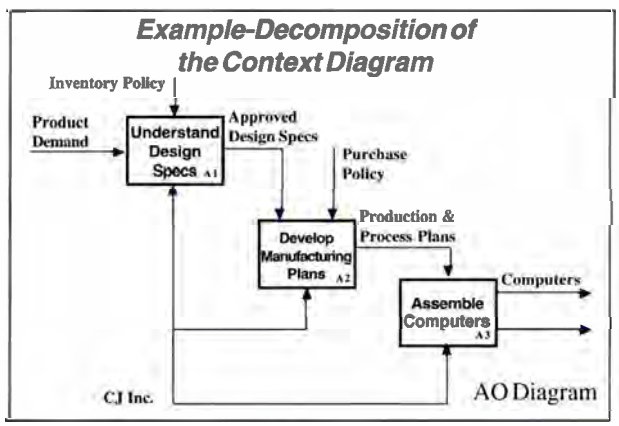




maximum of 6 functions and a minimum of 3 functions. Each box or function has an unique number that identifies its hierarchical position in the overall diagram. A glossary of the concepts and 1COMs used in the model is always provided to obtain a clear understanding of the terms used.

IDEFO models are currently being used in various applications including business process re-engineering, needs analysis etc. They can be used to identify vital tasks or steps in a manufacturing process, and can enable the identification of tasks where check points for control need to be introduced. They can also help understand the complex interactions between various functional divisions within an enterprise and help bridge the 'function void' that may exist in an enterprise. They can be used to help implement enterprise changes and facilitate the transition to a new process or functioning philosophy.

The IDEF3 Process Flow Description Capture Method

Another valuable tool to aid the capture of process flow descriptions is the IDEF3 method. IDEF3 process descriptions provide a systematic way to describe processes as an ordered sequence of events. They are based on 'causality relations' between processes and events in a representation that appears natural to experts in a certain domain (R. Mayer in 'IDEF3 Description Capture Method Report', technical report No. AL-TR-1992-0057. Knowledge Based Systems Inc. College Station, TX, May 1992. Under contract to HRD, Wright-Patterson AFB, Dayton, Ohio). Unlike IDEFO models, IDEF3 descriptions support different user descriptions of the various temporal precedence relationships in an organizations.

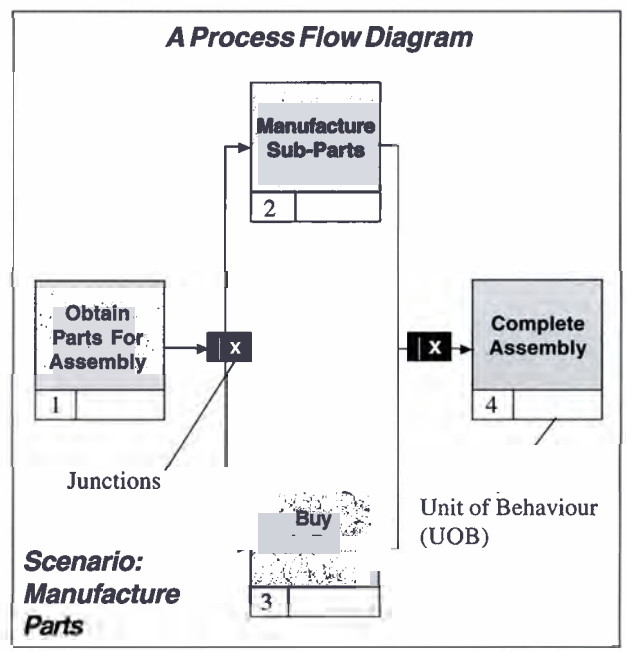
There exists two modeling modes in an IDEF3 methodology:

1. Process Flow Descriptions
2. Object State Transition Descriptions

IDEF3 process flow descriptions focus on 'how things work' in an enterprise by representing a network of relations between actions in a situation (or "scenario"). The object state transition description provides a summary of the allowable transitions of an object during a process. Both the diagrams of the process flow descriptions and object state transition descriptions (along with accompanying text) comprise the IDEF3 description. These "descriptions" (from applying the IDEF3 methodology) is different from the "models" produced by other IDEF methods. A model is always complete, consistent and is an idealized system of objects and their properties. A description is usually incomplete and can be viewed as incomplete recordings of facts and beliefs. A rich collection of descriptions can lead to the development of a model (in R. Mayer, "IDEF Family of Methods for Concurrent Engineering and Business Re-engineering applications", KBSI, College Station, TX, 1993).

The scenario is used to demarcate the boundaries for a process description (in R.Mayer, "IDEF Family of Methods for Concurrent Engineering and Business Re-engineering applications", KBSI, College Station, TX, 1993). Human experts tend to describe what they understand in terms of a sequence of steps or activities within a certain context. Hence, a scenario has been widely used to describe alternative views of potential systems designs (which can be used to re-engineer systems or build supporting sub-systems). Such approaches have been referred to as 'External Constraint Driven Design' approaches which are widely used in designing new systems (in R.Mayer, "IDEF Family of Methods for Concurrent Engineering and Business Re-engineering applications", KBSI, College Station, TX, 1993).

A process flow diagram in an IDEF3 process description consists of:

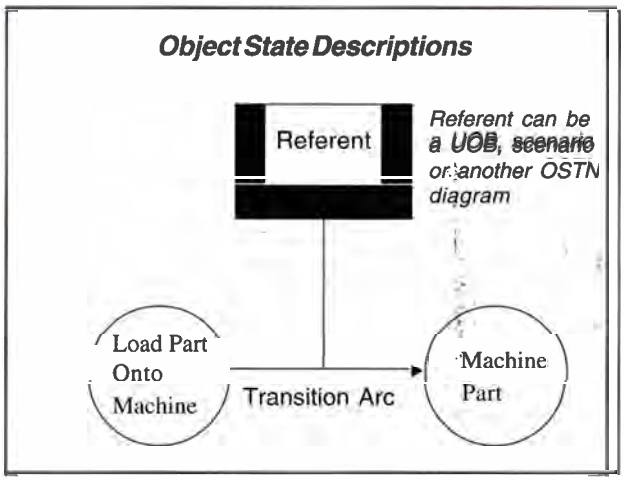


- Units of behavior (UOB)
- Junctions
- Links
- Elaboration
- Referents

In a scenario, the basic unit is called a Unit of Behavior or UOB. An UOB can be a function, decision, action, activity, process, operation, or an event. Each UOB provides a view of the world in the context of a specific scenario. UOBs can in turn contain decomposition's (which are descriptions in terms of other UOBs) as well as elaborations. Elaborations are descriptions using a set of objects and their relations. In an UOB box, IDEFO activities can be cross-linked to the associated IDEF3 UOBS.

Links or arrows can be used to indicate constraints, temporal precedence or object flow between UOBS. Junctions can be appropriately used as synchronous or asynchronous junctions to describe UOB behavior. UOBs in IDEF3 process descriptions can be decomposed to provide further levels of detail.

An Object State Transition Diagram (OSTD)



provides an object centered view of a process. This provides a view of the transitions of an object (in reference) in a given domain. The two basic entities of an OSTD include:

- State Transition Arcs
- Object States

An object state has associated pre-transition and post-transition constraints which specify the conditions before a transition can begin and conditions that must be satisfied before a transition can be viewed as complete. In an Object State Transition Network (OSTN) diagram, a solid circle is used to represent the actual state. The three requirements necessary to define a state include:

- entry conditions
- exit conditions
- state descriptions

Entry conditions define the conditions that must exist for an object to transition or change to the next state. Exit conditions are for stating the terms for an object to transition out of a state. The state description describe the existing condition when an object is in a specific state.

IDEF3 process descriptions have been used widely in business process re-engineering applications because of their ability to capture cause-and-effect relationships. They have also been used to propose changes to existing business practices or for building new systems. Some recent innovations include building a simulation model directly from a process description. Such valuable tools help the modeler perform a simulation of a 'To Be' scenario before implementing such changes. These innovations help the modeler perform simulating without the requiring advanced simulation knowledge and skills. IDEF3 process descriptions have been used in a wide variety of application domains including studying the steps in servicing military aircraft and re-engineering the manner of performing certain critical operations.

CIM, IDEF, And Data Collection

By Leo J.D. Bernier
President, Bernier & Associates, Inc.

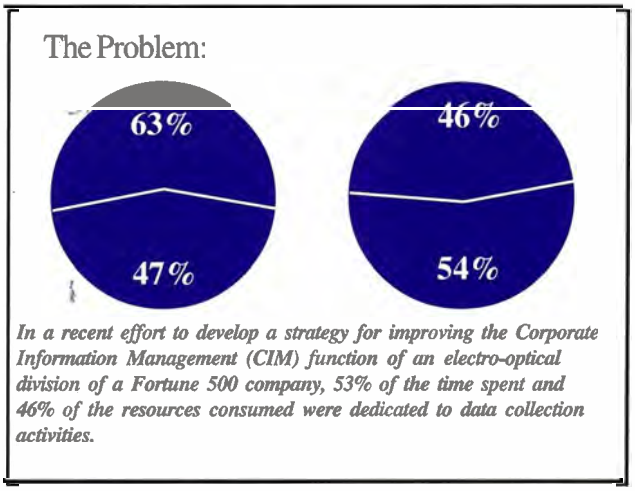
In a recent effort to develop a strategy for improving the Corporate Information Management (CIM) function of an electro-optical division of a Fortune 500 company, 53% of the time spent and 46% of resources consumed were dedicated to collecting information. The remaining resources were used to orient and train personnel, analyze the information collected, prepare documentation, and disseminate results. Experience with similar efforts suggests that this distribution of time and resources is quite common.

Given these facts, if you were asked to reduce the cost of developing a CIM strategy for this Division, where would you concentrate your efforts? Although the answer to this question seems obvious, traditionally there has been little attention given to developing methodologies and supporting tools for improving the data collection process.

This paper suggests a strategy for more efficiently creating and managing IDEF models by improving the data collection function. We begin by establishing the relationship between IDEF and CIM. It will be shown that IDEF models are used within the context of System Engineering Methods (SEM) to support strategic planning which, in turn, is used to manage changes to functions within an enterprise. CIM is one such function.

What is CIM?

Peter Drucker, in a recent article in the Harvard Business Review (Nov-Dec. 1991), suggests that the greatest challenge facing managers in developed countries of the world is to raise the productivity of knowledge and service workers. He presents facts to support his contention that the productivity of hard technology, which is typically the domain of manufacturing, has improved 360% - 480% over the last 120 years in most developed countries. He also cites additional statistics to suggesting these findings are fairly constant across developed countries. This suggests there has been a significant shift in the distribution of labor hours. It appears that knowledge and service workers are progressively using more of the total resources available to the enterprise. Mr. Drucker postulates further that countries, companies, and organizations with the best CIM functions will continue to gain the competitive advantage in the coming years.



In a recent effort to develop a strategy for improving the Corporate Information Management (CIM) function of an electro-optical division of a Fortune 500 company, 53% of the time spent and 46% of the resources consumed were dedicated to data collection activities.

There are several reasons why companies find it difficult to manage corporate memory. Databases that do exist within companies are deficient for a variety of well documented reasons, documentation is often obsolete and incomplete, and information residing in the minds of the company personnel is difficult to access and use. There is also a tremendous loss of information due to normal attrition of personnel. Resulting in information that is available to a company at any particular point in time, for any particular purpose, is often inadequate.

What is Information?

Information is knowledge. Information that might be of interest to a company can be classified as being either business in nature or technical. Examples of technical information are engineering drawings, design rationale, test results, and process plans. Company policies,

competitor profiles, and financial information are examples of business information.

Most organizations within a company both use and produce information, some more so than others. For example, the company printed circuit board group may be employed primarily to stuff printed circuit boards. To perform this function properly, the group must access and use a variety of technical information, to say nothing of completing time cards, and participating in the company suggestion program, and filling out requisitions for new equipment. Other functions, like the design function and the business planning function, are even more information intensive.

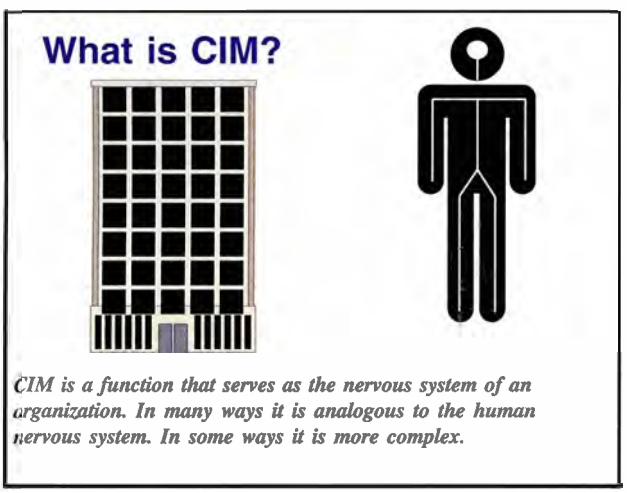
The simple fact is that *all* company personnel are involved in the management of corporate information. This suggests just how important the CIM function really is!

Good CIM/Bad CIM

The aggregate of all CIM activities within an enterprise is what constitutes the CIM function. Every company has one, but not all perform this function equally well. What then differentiates the good performers from the average performers, from the poor performers?

The answer lies in two key capacities-- strategy and execution. Strategy is a plan of action for implementing and using a correct set of CIM resources to serve as the nervous system of a company. Strategy also involves assuring the information needed to support the CIM infrastructure is available when needed. Execution involves the effective implementation of the strategy.

A CIM strategy that is properly tuned to the business goals of the organization and is implemented with maximum efficiency and effectiveness is a "good" CIM function. Others are, to varying degrees, "bad".



CIM is a function that serves as the nervous system of an organization. In many ways it is analogous to the human nervous system. In some ways it is more complex.

Developing a "Good" CIM Strategy

The question then is: How can a company develop a "good" CIM strategy? Good strategies are usually the product of careful planning. Careful planning typically involves:

1. Developing a clear set of business goals
2. Developing a set of CIM goals fully supporting the business goals
3. Developing a clear understanding of how the CIM function works "today"
4. Assessing current CIM activities within the context of the CIM goals
5. Identifying and ranking areas of needed improvement
6. Formulating CIM improvements addressing the most important needs.

Developing a CIM strategy typically requires the support of two seemingly unrelated disciplines, Long-Range Planning and Systems Engineering. It is worth taking a moment to review each of these areas.

CIM and Long-Range Planning

The concept of long-range planning emerged in the late 195 Os. The need was triggered by an extraordinary business boom that occurred after World War II. Over the next two decades, considerable emphasis was placed on developing strategic planning methodologies.

As Peter Lorange points out in *Corporate Planning: An Executive Viewpoint*, strategic planning is performed at three levels within a typical corporation. At the corporate level, the primary purpose of the planning activity is to provide a portfolio of business activities

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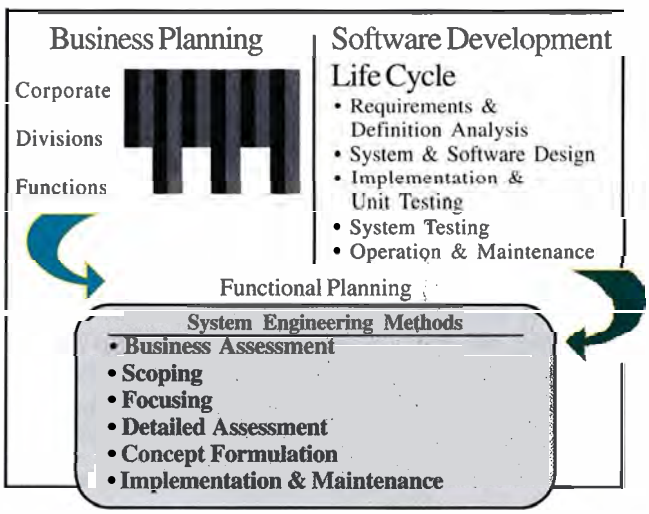
that will provide the business with a favorable set of "legs" for the company to stand on. At the divisional level, the primary purpose of the strategic planning activity is to determine how a particular business can succeed. And at the functional level, the purpose of the strategic planning activity is to contribute to the strategic success of the business by focusing on strategic variables falling within the domain of each functional manager. Although there is ample evidence of strategies to support the first two levels, less guidance seems available to support the third. Even in literature acknowledging the need for functional strategic planning, the tendency is to describe the relationship between functional and business strategic planning, rather than describing specific methodologies for implementing this important component of planning.

It is also common knowledge that within most companies functional managers do not extend their planning activities beyond a 1 - to 2- year horizon. Most functional managers typically participate in the annual capital planning process, then quickly turn their attention to operational issues.

CIM and SEM

System Engineering Methods (SEM) are methods being used to support the System Development Life Cycle (SDLC). The SDLC, in turn, is a term used to connote an orderly process for developing useful systems. Since the late 1960s, many variations of this process have been documented. According to Sommerville in *Software Engineering*, most - if not all - of these models have a structure similar to that proposed by W.W. Royce:

- Requirements Definition and Analysis
- System and Software Design
- Implementation and Unit Testing
- System Testing
- Operation and Maintenance



Software engineers were the first to develop methods for applying this model. It is interesting to note that in detailing methodologies and supporting tools, software engineers started in the middle of the Royce model. Developing methods for "cutting code" better has always been a high priority of the software engineering community. Validation, implementation, and maintenance are next in priority because these functions are positioned down-stream in the SDLC process. Moving upstream seems to be less of a priority.

However, the software engineering community is credited with developing a number of requirements and specification methodologies during the late '60s and early '70s. Decomposition diagrams, dependency diagrams, data flow diagrams, action diagrams, data structure diagrams, entity-relationship diagrams, data navigation diagrams, decision trees and tables, and state transition diagrams are examples of methods developed to help software engineers to define requirements and specifications better. In fact, these are the very methods that the SEM community has adapted and used to assist in planning strategic improvements in functional areas.

In the mid '70s, programs like the ICAM (Integrated Computer-Aided Manufacturing) Program began to advocate using these software requirements methods to support functional strategic planning. This point is significant, because it marked the beginning of what is now popularly referred to as enterprise analysis.

During this period, the concept of top-down planning and bottom-up implementation were popularized. The notion of developing an "AS-IS "representation of a function, analyzing this representation within the context of related functions, and forming a "TO-BE" concept based on the results of the assessment seemed like a logical way to devise strategies for managing change to a function, or for groups of functions forming an enterprise.

Over the last 15 years, programs such as IMIP (Industrial Modernization Incentives Program) continued to encourage the use of SEM to support functional strategic planning. A wide array of supporting methodologies was developed and tested during this period. Following is the framework of one such methodology:

Business Assessment:

includes the collection and assessment of the mission, vision, goals and objectives of the business. The business assessment is used to tie the

functional strategic plan to the business strategic plan.

Scoping:

generally involves the following high-level assessments of the enterprise: product/market, organizational, operational, functional, and cost. Enterprise-level function and information models are often developed during this phase.

Focusing:

involves identifying functional areas of greatest opportunity. This phase is used to determine general areas of greatest improvement opportunity.

Detailed Assessment:

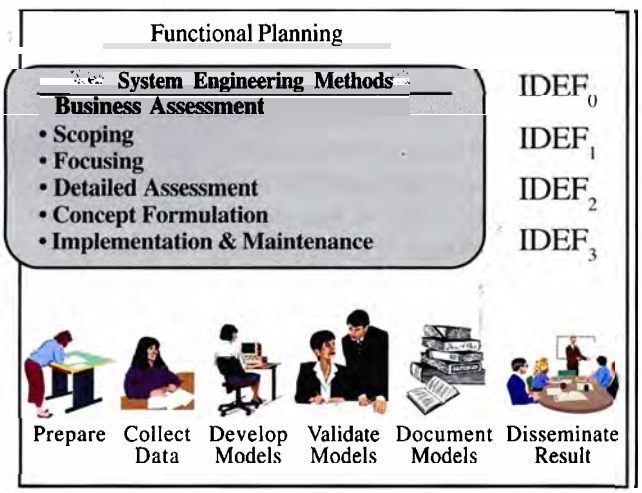
involves examining the areas of greatest opportunity to determine the most important problems and needs. Function models, information models, dynamic models, and process models are often developed in support of this activity.

Concept Formulation:

the process of developing and evaluating possible improvements addressing the more important problems and needs. This activity involves assessing the cost and benefits of each candidate improvement. Once again, models are often developed of individual concepts and groups of concepts.

Implementation and Maintenance:

the process of implementing improvement concepts thought to be of greatest value to the enterprise. Also involves collecting and addressing user feedback, and assessing the degree of success of each implemented concept.



Some Plusses and Some Minuses

The most obvious benefit of SEM to CIM is SEM provides an orderly process for planning and managing change to the CIM function. Properly applied, SEM will assure that a correct set of user requirements is defined, priorities are properly set, and that requirements are effectively communicated to the implementors of CIM improvements. Properly applied, SEM also provides a framework for measuring progress against the functional improvement plan.

One observation worth noting is the application of SEM involves more than modeling. Although this point may seem obvious to experienced practitioners, inexperienced users of SEM often have a tendency to equate the two. Models are effective in capturing information needed to support the planning process. Models are also an effective way of communicating important information from these same views. But to be of real value, these models must be analyzed and they must support the other activities of the SEM process. Experience suggesting as a whole we are improving our ability to develop models, but we are only beginning to understand how to analyze and use these models.

Another observation is using SEM to support functional planning takes a considerable amount of calendar time and consumes considerable resources. For the participants, it often requires a strong time commitment. This issue of time quickly translates into an issue of cost. The bottom line is that current SEM are not only prohibitively time-consuming to apply, they are also costly.

This unfortunate fact has slowed the acceptance of SEM as a viable way of performing functional planning. What is needed are strategies increasing the efficiency of applying SEM without sacrificing any of the inherent robustness of the process. Following are some areas that are not currently being adequately addressed. These include methods for:

a) aligning functional plans to business plans
b) assessing goals across an organization
c) collecting and appending value added information to models
d) establishing and using baselines other than cost
e) involving company-wide participation in the planning process
f) analyzing the semantic content of models
g) analyzing information from different viewpoints
h) forecasting problems and needs of an enterprise
i) improving the quantification of benefits
j) measuring systems to evaluate progress in imple-

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k) disseminating results throughout the enterprise
l) keeping the strategic planning knowledgebase

m) collecting and managing user feedback on improvement concepts

SEM Cost Drivers

Why is SEM so costly to implement? One reason is the information needed to support the process is not readily accessible. This means the required information must be extracted manually from company documentation and from company personnel. Another reason is the amount of information collected to support SEM is so considerable that it is difficult to manage manually.

One approach to solving this problem has been to simplify the SEM process and to make it less information intensive. Such strategies, tend to avoid the real issues rather than solve them. An alternate solution is to improve those processes within SEM which are most costly to perform. Modeling is one such process.

The IDEF Factor

IDEF is a set of modeling languages developed by the DoD (Department of Defense). IDEF is being used to support such activities and programs as Industrial Modernization Incentives Program (IMIP), Total Quality Management (TQM), and Process Action Teams (PAT). Without a doubt, IDEF is an integral part of the SEM being applied within the DoD.

IDEF0 and IDEF1 models are often used to document the static properties of the "AS-IS" and "TO-BE" representations of an enterprise. IDEF2 and IDEF3 are used to document dynamic properties. These models, used within the context of SEM, assist in evaluating the current processes of a company, in identifying where improvements should be made, and in assessing the effectiveness of proposed improvements.

To date, IDEF has been used mostly to document complex systems. The graphical formats being used have proven useful in communicating these complex systems to a variety of audiences. This ability to improve communication between individuals having different backgrounds and interests is one reason for the popularity of these modeling methods.

Less attention has been given to using the models to support the analysis of complex systems. IDEF2 may be an exception to this general statement. In addition to areas cited earlier that arc not being addressed, it is not clear how one might use an IDEF0 to:

a) identify critical activities
b) examine the cause-and-effect relationships between problems experienced in different functions
c) assess the overall performance of a function against a set of business goals
d) understand the relative importance of the ICOMs that are collected
e) support statistical methods
f) support analytically deriving the "TO-BE" from the "AS-IS"

Other examples can be cited. The point is for the last fifteen to twenty years we have become enamored with the process of "creating" models. It is now time to move on and begin to emphasize how these models can be used to support a broader SEM strategy.

Creating IDEF Models

Depending on the particular application, the activity of creating IDEF models can easily account for over half of the time and resources used in applying SEM. The basic components of modeling include: preparing for data collection; collecting the information; developing, validating, and documenting the models; and disseminating the results. Depending on the modeling strategy used, any of the functions can be extremely costly to implement. For example, if broad-based data collection is considered to be important, the data collection activity can quickly become the dominant modeling activity.

Over the last several years there has been some effort to automate the process of developing IDEF models. Most of these systems use graphical user interfaces that permit end-users to generate the models interactively. Some of these systems simply are graphics systems that permit users to easily create and label boxes and arrows. Others are slightly more sophisticated in that they support the IDEF syntax, but not the modeling rules. A third class of modelers support the generation of IDEF models and evaluate the syntax to assure that no modeling rules had been violated. Some of these systems provide for configuration management of the models. Others even share, to some degree, information between IDEF models.

All of these systems share a common characteristic. They all attempt to automate the manual process. A piece of paper is essentially replaced by a computer screen. Using a mouse and a keyboard, users generate models in much the same way they always have. Without a doubt, automation has made it easier to document and update models, but these systems remain extremely labor intensive. Neither do they address the issue of data collection. What if it were possible to automate the collection of information and, using the knowledge base that is created, completely automate the generation of the actual models? The concept being introduced in this paper addresses this possibility.

In the sections that follow, a concept will be introduced for automating the data collection and consensus building process. We begin by reviewing current data collection methods. This is followed by a description of the proposed concept and an example application.

Current Methods

Three of the more popular methods for collecting information are: questionnaires, interviews, and brainstorming. As might be expected, each of these methods has its own set of strengths and weaknesses.

Questionnaires offer a structured approach to collecting information. One benefit is that they can be easily configured to collect information for any purpose on any topic. Questionnaires are also one of the least costly ways to collect information. However, questionnaires are inflexible and impersonal. Once a questionnaire is issued, it is difficult to make changes should they be needed. This sometimes encourages developers of questionnaires to ask for more information than is really required. Also, the fact that questionnaires are often delivered impersonally, by mail, makes them easy to ignore. A 10% return is often considered to be exceptional using this form of data collection. 2.5% is typical.

Interviews are another method used to collect information. One benefit of this form of data collection is that participants are captive to the data collection activity. Moreover, a skilled interviewer can vary the line of questioning during an interview based on the feedback received. On the other hand, interviews are difficult to schedule, can be stressful on the participant, and are usually time consuming. All of these factors can have a dramatic impact on the quality of the information that is collected. Because interviews are time-consuming, the number of individuals from whom information is collected is necessarily kept to a minimum. Limiting the number of sources, however, introduces bias into the data collection activity.

Group brainstorming methods are a third method used to collect information. The most dbvious benefit to this form of data collection is that the participants can benefit from one another. Techniques like the Improved Nominal Group Technique (INGT)4 have provided strategies for reducing bias in information collected in this manner. This form of data collection, however, is the most difficult to schedule. It also requires a skilled facilitator to maintain control of the group during the data collection activity. Finally, most brainstorming sessions are designed to address a single topic. This limitation has some rather significant implications in the ability of this technique to support SEM.

Impact of "Groupware"

Technologies have emerged that have had a positive impact on this situation. For example, E-Mail and computer tele-conferencing have the capacity to reduce some of the problems currently being encountered. There is also an emerging family of software products, called "Groupware", intended to improve group-thinking and consensus building. Most of the "Groupware" products currently in the marketplace are targeted to such applications as project management, documentation, and consensus building (in seminar settings).

A group of researchers at the University of Arizona, led by Dr. J.F. Nunamaker, were among the first to recognize the need for better data collection and consensus building tools. This group began developing the concept of an Electronic Meeting System (EMS) in 1984.

Experiments conducted by the University of Arizona in conjunction with IBM6 indicate that automated data collection and consensus building tools have the potential for reducing the time required to collect and synthesize information by more than *50%*. If such tools could be developed, and if they could "feed" algoritlims to automatically layout IDEF models, the cost and the quality of generating IDEF models could be improved dramatically. The cost would decrease because it would take less time to collect the information and it would take little or no time to generate the models. Quality would increase because information could be collected and validated more

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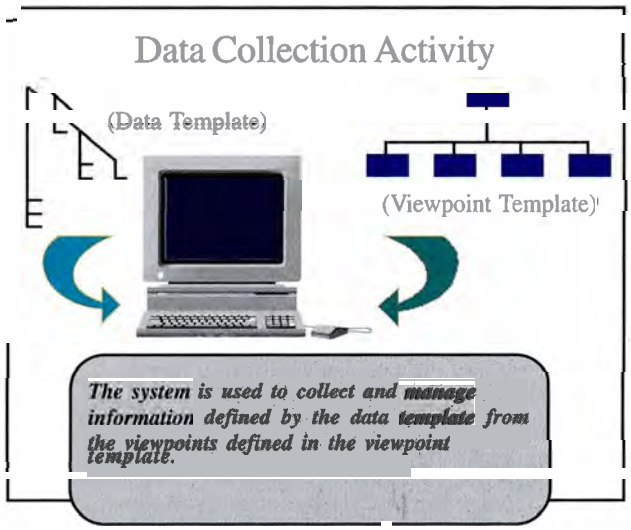
easily from more sources. Models could also be more easily updated and maintained over time.

Based on what appears to be an obvious need, and buoyed by recent advances in "Groupware" concepts and related computer technology, we have formulated and tested a concept for improving the data collection process. The research, which is being sponsored by the Air Force Computer Resource and Technology Program and the Small Business Innovation Research Program, was initiated to find better ways to collect and manage user requirements. In the course of developing the design concept, it became apparent that, with few alterations, the system could serve as a general purpose data collection system.

Rank Information

Ranked Product List

Rank	Project Name
1	Requirements Tracking System
2	Control Room Project
3	Concurrent Engineering Project
4	Design Review Project
5	Technology Integration Project
6	Manufacturing Assessment Project
7	Merit Reward System



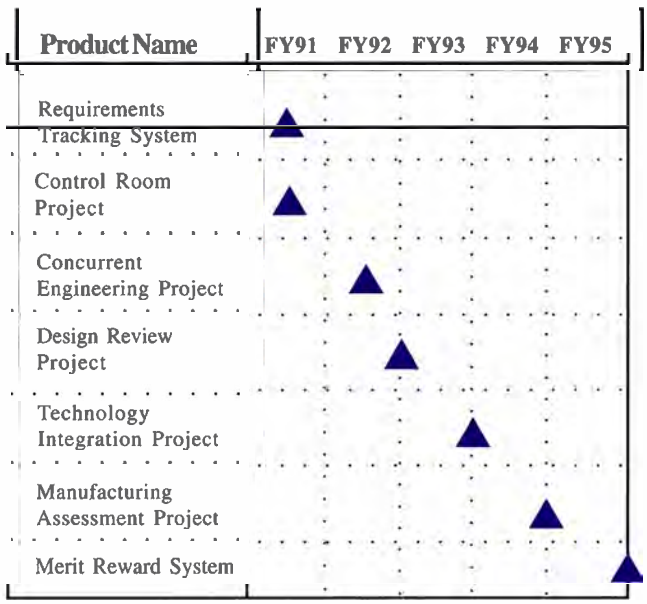
Prototype System

A prototype system, known as INFORUM® has been developed to demonstrate the data collection concept. The prototype is currently being used to collect, organize, correlate, and rank information. The system is unique in that it can easily be configured to collect information on any topic and for any purpose. The system also permits information to easily be collected from any number of different individuals (or groups) who may be geographically dispersed. The system may be used in either a "synchronous" or an "asynchronous" mode. Synchronous data collection requires the participants to participate in the data collection activity all at the same time. Asynchronous data collection permits participants to contribute at different times. Another major advantage of the system is that users of the system can supply information at any time it is convenient for them to do so -- either all at once, or a little at a time.

When completed, the system will consist of six major modules. Together these modules provide for data collection, information analysis, database interrogation, database management, documentation, and the pro-active dissemination of information that has been collected. To date, emphasis has been placed on developing the data collector module.

The six system modules are briefly introduced in the remainder of this section:

- The ***Data Collector*** is used to collect information from individuals in a very user friendly manner. The module provides the ability to collect information from individuals who may be geographically dispersed, or from individuals who may wish to provide information in a more traditional seminar setting. This module is currently the most fully developed module in the system.



- The ***Analyzer*** is used to evaluate the collected information. This module provides general purpose tools that are used to perform a variety of objective and subjective assessments. The current capability permits collected information to be easily correlated and ranked.
- The ***Interrogator*** 15 a user-friendly capability for interrogating the database. This module permits information to be accessed using both structured and natural language query capabilities.
- The ***Documentor*** is a capability to generate customized reports and documents. A report is viewed simply as any formatted information, whereas a document is viewed as a ollection of these reports with supporting narrative. A first generation capability is urrently in development.
- The ***Disseminator*** is a capability that will distribute information pro-actively to e data collection participants. Based on an individual user's profile, this module will continuously search the database, identify information of potential interest to that user, automatically generate a report containing that information, and send the report to the user through an E-Mail capability.
- Finally, the ***Utilities*** module provides a variety of support capabilities, including an E-Mail capability and a set of system support capabilities.

IDEF Modeling Example

This section describes how the prototype system can be used to support IDEF modeling. Assume, for a moment, that your company has decided to institute a TQM Program specifically to improve the CIM function. Assume further that the president wishes to encourage broad participation in this activity. To demonstrate his support, he assigns three of his best managers to lead the effort. Further, he makes it known that he will be an active participant throughout the process.

After carefully reviewing the company business plan and available strategic planning information, the steering group decides to begin the process by using IDEF to develop a functional representation of the current CIM function. (The steering group also decides to use INFORUM® to collect and manage modeling infbrmation.)

The group has already taken the important first step'in using the system by deciding the purpose of the data collection activity. This information is immediately loaded into the system.

Next, the group decides to collect and manage the information from an organizational perspective. This organizational perspective represents the viewpoints, determined by the focus group, to be most appropriate for collecting, organizing and evaluating the information that is collected. The organizational structure also describes important relationships between these viewpoints.

(When such a hierarchy of viewpoints is entered into INFORUM®, it is referred to as a viewpoint template.) The ability of the system to capture and manage data that is organized hierarchically is a powerful feature of the system.

Next, the steering group must decide what information is needed to create an IDEF0 model. After some discussion, it is decided that the group must collect the answers to the following questions from personnel within each organization:

a. What are the important CIM activities in your organization?
b. For each CIM activity, what are the few most important outputs?
c. What activities use this output?
d. For each output, what are the important supporting inputs?
e. What activities supply this input?
f. For each output, what are the important supporting controls?
g. What activities supply this control?
h. For each activity, what are the few most important mechanisms?

A brief review of these questions suggests that the steering group wishes to collect the following classes of information: activities, outputs, inputs, controls, and mechanisms. There is also an implied relationship between these classes of information. That is,

a. Each activity has one or more corresponding outputs;
b. Each output is supplied by one or more activities;
c. Each output is supported by one or more inputs;
d. Each input is supplied by one or more activities;
e. Each output is supported by one or more controls;
f. Each control is supplied by one or more activities; and
g. Each activity has one or more supporting mechanisms.

(When such a hierarchy of information is entered into INFORUM®), it is referred to as a data **template.** Figure 1 is a visual representation of a the IDEF0 data template prepared by the steering group.

Continued

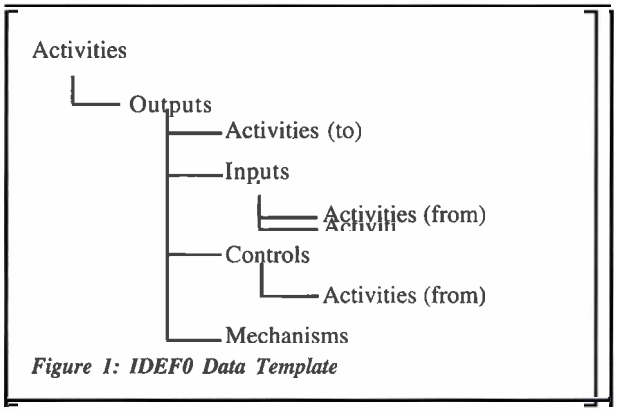


Figure 1: IDEF0 Data Template

The purpose of the data collection activity, therefore, is to collect the information represented in the data template for each viewpoint depicted in the viewpoint template. In our example, the data collection activity involves capturing activities, outputs, inputs, controls, and mechanisms from each group represented in the organizational chart. Capturing information in this manner assures consistency in data collection and permits information captured from different viewpoints to be easily combined, correlated, compared, and analyzed.

Before starting the data collection activity, the steering group can configure the system to collect additional value-added information. For example, it may be desirable to ask the personnel to indicate the relative importance of the information being provided. This is easily accomplished by establishing a criteria called "importance" for each data class in the data template. The criteria will be entered by the data collection participants according to a scale established by the steering group. **Criteria** are used to rank order information. Information can be ranked from any viewpoint defined in the viewpoint template.

The system is now ready to collect information. The focus team publishes a data collection schedule using a utility in the system and invites the participants to begin entering information. Some participants may choose to enter information by accessing the system over a network. Others may choose to enter information as part of a group.

During data collection, participants are permitted to view information entered by others, although the source of all information is kept anonymous. Permitting the participants to share information makes it easier for individuals to participate and encourages using a common dictionary of terms and phrases.

Once the data is collected, the steering group can rank order information from any organizational point of view. This activity can be helpful in identifying that is considered to be most critical. Assuming that an IDEF0 modeler has an import capability and a layout algorithm, the information collected can be exported to the modeler which, in turn, can automatically generate the model.

This application of INFORUM® would result in an IDEF0 model of the CIM function being automatically generated and updated. More importantly, the system could be used to support "what-if" scenarios, to document changes to the model, and to permit regeneration of the model on demand.

User Requirements Example

Earlier, it was suggested that models alone are not sufficient to guide the management of change. This section demonstrates how, using the prototype system, the IDEF0 model can assist in deriving a set of user problems and user needs. This can be demonstrated by extending the example started in the previous section.

Assume that the steering group has been monitoring the model development, and that the model appears to be stabilizing. At this point, the group decides that the model can be used as a basis for collecting user requirements.

The process begins by extending the data template. This is accomplished by adding the following three data classes to the data template: problem, source and need. Notice that problems are related to the outputs that were collected as part of the modeling activity. In establishing this relationship, the user requirements data collection activity is integrated with the modeling data collection activity. The revised data template is illustrated in Figure 2.

The user requirements portion of the revised data template is structured to collect information in response to the following questions:

a. What are the important activities in your organization?

b. For each activity, what are the few most important **outputs?**

What are the most significant problems for each output?

d. What is the source of each problem?

e. What is the solution to the source problem?

This data class is shared by both data collection activities

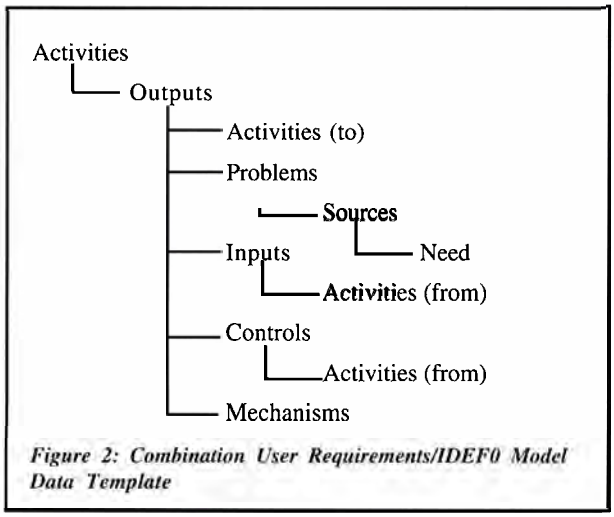


Figure 2: Combination User Requirements/IDEF0 Model Data Template

After the information has been collected, problems and needs can be rank ordered. At this point, the steering group would have established where the most pressing problems and 'needs are in the organization, at least from an end-user perspective.

TQM Example

After permitting the user requirements data collection activity to proceed for a while, user "requirements begin to stabilize. The steering group now feels that the user requirements knowledgebase is sufficiently robust to attempt to develop a functional strategic plan.

Once again, the data template is modified. This time the steering group adds the following eight classes of information: mission, goals, Critical Success Factors (CSF), objectives, management indicators, strategies, milestones, and tasks. The revised data template is illustrated in Figure 3.

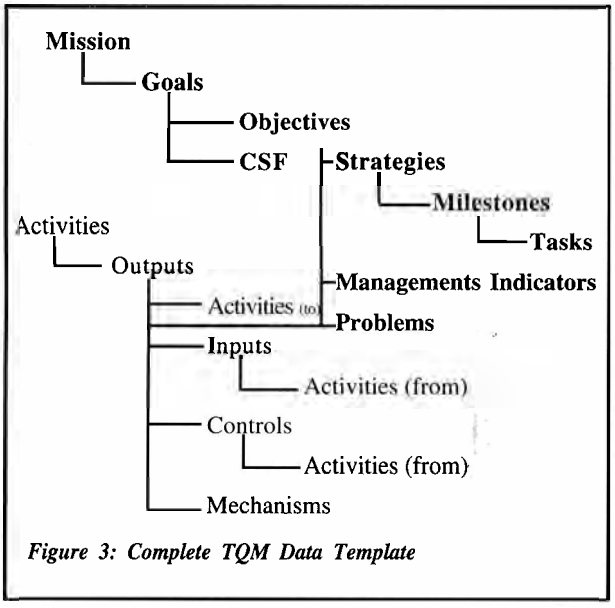


Figure 3: Complete TQM Data Template

Management is then asked to provide mission, goals, CSFs, and objectives. Management is also asked to correlate the objectives set to the problems identified during the capture of user requirements. The TQM portion of the revised data template is structured to collect information in response to the following questions:

a. What is the mission of your organization?
b. What are the 4-8 most important goals of your organization?
c. For each goal, what are the CSFs?
d. For each goal, what are the objectives?
e. **For each objective, what are the problems** being addressed?
f. For each objective, **what management indicators being used?**
g. For each objective, what are the supporting strategies?
h. For each strategy, what are the key milestones?
i. For each milestone, what are the supporting tasks?

This data class is shared by TQM and User Requirements data collection activities.

Once the objectives have been collected and correlated the steering group can collect strategies, milestones and plans. Goals can also be correlated between the different levels in the organization, and additional project management information can be collected as attributes to the milestone and task data classes. At this point the steering group can assess goal congruence throughout the organization, rank order strategies, milestones and projects; set up a program control system using the management indicators; and export the project scheduling attributes to a commercial scheduler who, in turn, would use the information to create Gantt Charts and PERT diagrams to support the planned TQM initiatives.

Summary

This paper began with a review of CIM. CIM was described as being the nervous system of a company. CIM provides the important pathway by which information is shared between the decision makers and the "do-ers" in an organization. It was also suggested that planning and execution are equally important for implementing and maintaining a proper CIM function.

We then examined more closely the process of developing a good CIM plan. Here we found that two seemingly unrelated disciplines played important roles in developing a CIM strategy. We learned that current long-range planning methods are not as well developed

Continued

at the functional levels, which led to the current emphasis that is being placed on SEM.

We then examined the general structure of SEM and concluded that these methods, at least as they apply to functional strategic planning, are currently inadequate. It was also noted that modeling methods such as IDEF have made a significant contribution within SEM, but remain under-utilized.

Some time was also spent discussing how IDEF models are currently generated. It is within this context that data collection was identified as a critical function. It was also suggested that little attention has traditionally been given to improving this function. Current data collection methods were then reviewed and all were found to be lacking.

It is against this backdrop that a new data collection concept was examined. A computer system concept was proposed that suggests a better way to collect information and build consensus. The concept was demonstrated by discussing how it might be used to build IDEF models, collect user requirements, and prepare a TQM plan. More importantly, it showed how to integrate these three important activities.

INVESTIGATOR'S CORNER

Civil Penalty for Failure to Implement a Drug Testing Program

Marine employers are reminded that the Coast Guard Authorization Act of 1996 contained provisions for a civil penalty for those failing to implement or conduct required chemical testing for the use of dangerous drugs or alcohol.

The Authorization Act provides for a penalty of $1,000.00 for each violation. Each day of a continuing violation constitutes a seperate violation.

For additional information, please contact LT Jennifer Ledbetter, Drug and Alcohol Program Administrator at Coast Guard Headquarters, Commandant (G-MOA), (202) 267-0684 or your local Coast Guard Drug and Alcohol Program Inspector.

INVESTIGATOR'S CORNER

Drug and Alcohol Program Inspectors

As a marine employee, do you understand the Department of Transportation (DOT) require ments for chemical testing specified in 46 code of Federal Regulations (CFR) part 16? Do you know if you are in compliance? Do you have a specific question regarding the DOT chemical testing requirements and 46 CFR 16? Your area Coast Guard Drug and Alcohol Program Inspector (DAPI) can help answer your questions.

There is a Coast Guard DAPI located in each Coast Guard district. DAPI responsibilities include reviewing chemical testing programs as well as training the marine industry on the federal chemical testing requirements. The scope of a review of a chemical testing program includes reviewing required records and reports, specimen collection, Medical Review Officer activities, employee assistance program, designation of crewmembers for testing, and proper testing procedures.

For a DAPI nearest your location, please call LT Jennifer Ledbetter, Drug and Alcohol Program Administrator, Coast Guard Headquarters, Commandant (G-MOA), (202) 267-0684.

Adopt A Sensitive Area Program (ASAP)

What Is ASAP?

ASAP is a voluntary program providing an opportunity for facilities and oil spill contractors to validate information in the Strategy Matrix of the area contingency plan and develop protective booming strategies for environmentally sensitive areas.

Why ASAP?

OPA '90 regulations require facilities and Oil Spill Response Organizations (OSRO) to deploy and operate certain amounts of their response equipment annually and semiannually. This requirement is not going to change in the foreseeable future. Therefore, we would like to capture the data from these drills to complete the Sensitive Area Summaries developed by NOAA.

What Is A Sensitive Area Summary?

Ed Levine, the area Scientific Support Coordinator from NOAA, is developing Sensitive Area Summary sheets for each environmentally sensitive area listed in the area plan. These summaries supply detailed information about each site to allow for better management of response resources, reduce contractor response time, and provide a recommended response strategy evaluated by members of the Area Committee. This information includes general site information, contact persons, site description, resources at risk, response considerations, and protection strategies.

How Does the Program Work?

1. A facility or OSRO schedules an equipment deployment drill and elects to participate in ASAP. They

chose an environmentally sensitive area listed in the area plan. The area selected should be one they would reasonably expect to protect in the event of an actual spill.

2. Once the area is chosen, contact the Activities New York Preparedness staff at (212) 668-7920. Let them know which area you are interested in and they will provide you with an ASAP information packet for the site. The packet includes a Sensitive Area Summary, ASAP forms, nautical chart, and a copy of the Strategy Matrix from the area plan.
3. The adopting organization forms a planning team and works with Natural Wildlife Trustees, as well as Federal, state, and local agencies to develop a protective booming strategy for the targeted area. The team also identifies potential staging areas, access points, equipment and personnel needs, along with other response considerations. This information is captured on the two page ASAP form.
4. The formulated strategy is tested during the drill and evaluated for effectiveness by everyone involved. Information listed in the Strategy Matrix of the area plan is verified, and any critiques or general comments are added to the ASAP form. After the evaluation is completed, the information gathered from the drill is given to the Preparedness staff.
5. The Preparedness staff reformats the information and adds it to the sensitive area summary.

What Will the Final Product Look Like?

When completed, the Sensitive Area Summaries will provide a lasting corporate memory accessible to everyone in the port. This memory will become a reference tool that captures lessons learned in the past and identifies how to better protect the environment in the future. As a reference tool, it will provide a common starting point when representatives from the responsible party, contractor, Federal, state, and local groups work together to mitigate the threat from a potential or actual spill.

The final format of this information has not been determined. It is a subject for discussion in the upcoming months.

If you have questions or comments about the New York & New Jersey Area Contingency Plan or ASAP program, please contact the Preparedness staff at (212) 668-7920.

The Integrated Shipboard Information Technology (ISIT) Platform

Introduction

The maritime industry's requirements for shipboard information technology are changing dramatically, due to new international regulations, pollution liability, and need to stay competitive. The present state of shipboard information technology and data communications are insufficient to meet tomorrow's requirements to provide a secure, reliable, remotely manageable environment aboard the vessel, to integrate various "islands of information" aboard the vessel, and allow simple, cost effective communications between the vessel and management ashore.

The solution to these maritime information technology problems is the Integrated Shipboard Information Technology (ISIT) platform, and a team is now working to develop that platform. There is wide support from industry through both the development team and an Industry Advisory Board, as well as an ASTM F-25 committee working with ISO TC8 on international standards. This article will give you an understanding of the design objectives and actual implementation of the ISIT platform.

Changes in the Maritime Industry

Over the past two decades, ship crew sizes have dropped dramatically - in the range of 60 or 70 percent for large ocean going ships. At the same time, ship sizes have increased dramatically and the use of technology has grown dramatically, so the operation of those ships has gotten more complex for the smaller and smaller crews.

As a result of the Exxon Valdez and other pollution incidents, there has recently been dramatic changes in the regulatory environment. Both the IMO SOLAS and MARPOL regulations, including ISM, will require more inspections and verification as well as shipboard plans that can be monitored and audited. Although the regulations are silent on implementation, it will be nearly impossible to effectively comply using traditional paper methods, and computerized document storage, distribution and updating capabilities will be required. The ISM and ISO 9000 Certification require a much higher level of document control as well as process certification. In addition to the need to use technology to cost effectively comply, these regulatory changes now add up to the fact that management now has clearly defined legal responsibilities for ships at sea.

Ship operations in general have changed to reflect the increased globalization and competition of other industries. Ship operators now focus management attention on productivity, and minimizing down-time. Typical port turnaround time is now measured in hours, rather than days not long ago. Ships today operate as remote "offices" of the shore facilities, with regular reporting of operations, purchasing, and other "paperwork" flowing between ship and shore.

This trend toward more extensive and frequent communication and sharing of information will continue to increase.

In order to meet the ISM code, to be certified as ISO 9000 compliant, and simply efficiently manage today's ships, there is a tremendous need for information. Information that in many cases, is needed both shipboard and ashore. Some of the data, such as standard safety procedures, is created shoreside and must be distributed to the fleet. In other cases, such as machinery operations, data is generated shipside, and is needed by management ashore. Although there are significant amounts of key information in the navigation, machinery, and cargo control systems, that data is not currently accessible from outside those independent systems. These systems represent "islands of information", since the data is there, but management can't get access to it readily or easily.

Information Technology Requirements

The technology today: limited ship to shore communications, limited availability of shipboard data from shore, and no standards for collecting and sharing data, will simply not meet industry requirements in the future. There will

need to be a much tighter coupling of ship and shore to meet the distributed data requirements in the future.

In order to integrate the shipboard and shoreside information, two key things are needed. First, all the data on the ship must be consolidated in a single place — to connect those "islands of information". In addition we need to provide a common environment for all shipboard applications to run, with an open architecture to provide for tomorrow's applications that don't yet exist. Once all the shipboard systems and data have been integrated, that data must be easily and reliably shared with shore based management. This requires computer to computer links via satellite to share information digitally. This communication needs to be done cost effectively, by taking advantage of the increased competition in the satellite services marketplace. Lastly, and possibly most importantly, this common shipboard technology environment must allow owners and operators to effectively administer and manage the shipboard systems from their offices ashore.

The cost effective and reliable integration of all shipboard systems, and integration of ship with shore are the design objectives of the ISIT platform.

Standards

Standards are key to the successful implementation of a project like ISIT. The design objective of open architecture, to allow support of today's varied applications as well as tomorrow's, requires standards for these applications to interface with the platform and with each other. Standards will need to be developed for the software operating environment, the format for linking the various shipboard control systems, the user interface to the data, the satellite interface (at both the ship and shore ends), and the linkages to land-based telephone networks. Standards for each of these areas need to be identified if existing, or established, to effectively meet the design goals of the platform.

The international standards process starts at the national level, where proposed standards are drafted and approved, then passed along to the international organization. In the U.S., the American Society for Testing and Materials (ASTM) is where many standards are actually created. The ASTM has a committee called F25 - Ships and Marine Technology. Within F25 are subcommittees for ship structures, piping, electrical, and this topic: Computer Applications. The ASTM has recognized the need to address the "integration" issue, and has created a new section, F25.05.05, called "Shipboard Data Management and Communications". This group, Chaired by Gene Story of Marine Management Systems, is tasked with developing the industry consensus standards in this area.

Within ISO, there is an organization which closely parallels the U.S. structure. A committee on Ships and Marine technology, called Technical Committee 8 (TC8), along with a subcommittee on Computer Applications. The ASTM task group on Shipboard Data Management and Communications has developed strong working relationships at the ISO TC8 level, and there is consensus that the ASTM-developed standards in this area will form the basis of the ISO standards as well.

In order for consensus standards to come to life, there should be a testbed environment to prove the standards. The testbed project needs to be have clear achievable goals, for which industry has voiced a need. The platform should also be viable long term as a commercial product in order to get the industry support. Given those criteria, ISIT is an ideal testbed platform for the types of consensus standards needed to address today's maritime information technology issues.

The ISIT Team

Once requirements for this Integrated Shipboard Information Technology (ISIT) platform have been defined, we need to decide how to go about developing the platform, with the overriding objective that it meet current and future industry requirements. To do that, a contribution from a number of organizations is key to success. In order to ensure industry needs are met, there must be participation by owner/operators and shipyards. To ensure an open system, as discussed above, ASTM and ISO standards must be developed. To facilitate the installation and use of the platform, implementation guidelines from class societies will be needed. Participation of naval architects will be needed to design the physical shipboard installation. To build the platform itself, expertise is required in shipboard management systems and communications software. Satellite service integration skills are key to the communications component. The linking of the "islands of information" in the shipboard control systems requires the participation of manufacturers of those systems. And lastly, project management and integration expertise are necessary to make sure all the parts come together and work correctly.

No single one of these areas of expertise can ensure successful development of the ISIT platform. Participation from each of these areas, however, is the key to success. There are actually three teams of organizations associated with the ISIT project: an Industry Advisory Board, the standards committee, and the development team.

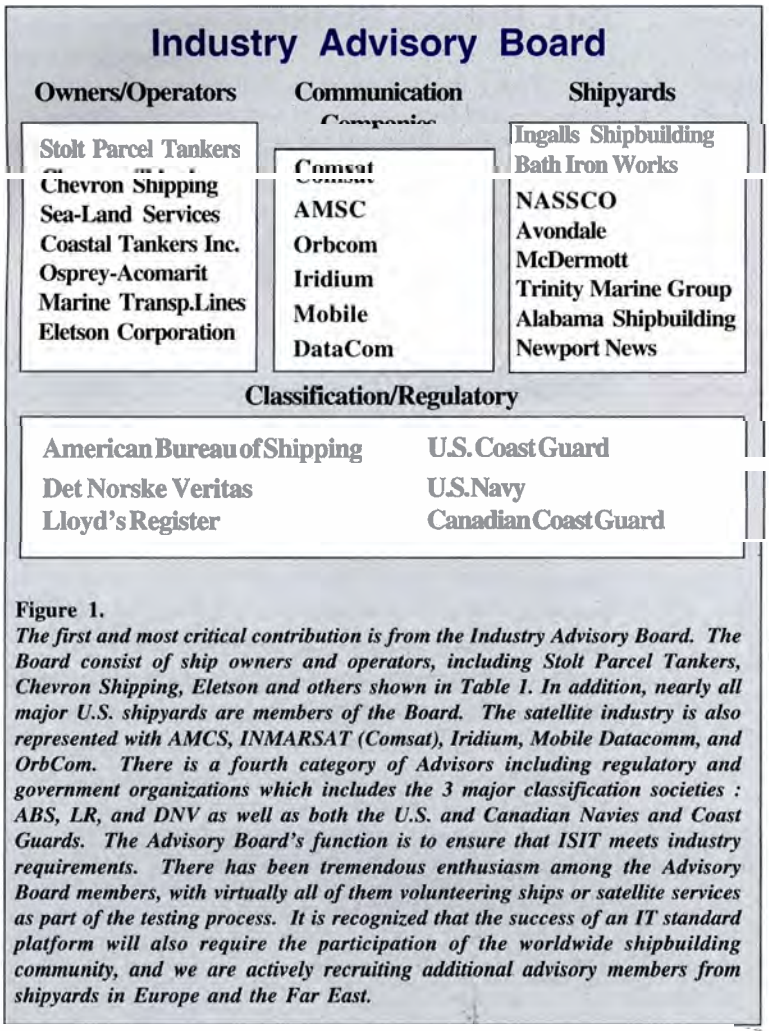


Figure 1.
The first and most critical contribution is from the Industry Advisory Board. The Board consist of ship owners and operators, including Stolt Parcel Tankers, Chevron Shipping, Eletson and others shown in Table 1. In addition, nearly all major U.S. shipyards are members of the Board. The satellite industry is also represented with AMCS, INMARSAT (Comsat), Iridium, Mobile Datacomm, and OrbCom. There is a fourth category of Advisors including regulatory and government organizations which includes the 3 major classification societies : ABS, LR, and DNV as well as both the U.S. and Canadian Navies and Coast Guards. The Advisory Board's function is to ensure that ISIT meets industry requirements. There has been tremendous enthusiasm among the Advisory Board members, with virtually all of them volunteering ships or satellite services as part of the testing process. It is recognized that the success of an IT standard platform will also require the participation of the worldwide shipbuilding community, and we are actively recruiting additional advisory members from shipyards in Europe and the Far East.

The ASTM process calls for industry consensus standards, so the ASTM F25.05.05 working group has over fifty members including many providers of shipboard systems. These committee members are actually creating the standards for the ISIT platform.

Once a team is in place to define requirements, a team must be assembled to actually build the platform. The ISIT development team consists of eight companies, each a leader in their field, and each contributing in their area of specialization. Marine Management Systems, a leading provider of ship-to-shore communications and shipboard operations management software, is the project leader. Ultimate Data Communications will provide satellite communications technologies, including development of a Virtual Earth Station. Radix Systems will contribute maritime systems integration, and project management. ABS Marine Services, an affiliate of the American Bureau of Shipping, will help develop standards and implementation guidelines. General Electric Marine Systems will contribute to the development of standard data interfaces to machinery and cargo control systems. Sperry Marine will contribute to the development of standard data interfaces to navigation and ship control systems. M. Rosenblatt & Son, naval architects and marine engineers, will provide shipboard design and installation services, coordinate the shipboard installation, and work to develop dual use (commercial and military) applications of the technology. The MITS project, part of SINTEF Automatica Controls from Norway, have also joined the development team to bring their expertise in the integration of control systems.

ISIT Participants 4/96

Development Team

Marine Management Systems, Inc.
Ultimate Data Communications, Ltd.
Radix Systems, Inc.
M. Rosenblatt & Son, Inc.
Sperry Marine Inc.
General Electric Marine Systems
ABS Marine Services, Inc.
SINTEF Automatic Control (MITS)

Advisory Board

Shipowners & Operators

Chevron Shipping
Coscol Marine Corporation
Eletson Corporation
Marine Transport Lines, Inc.
Sea-Land Services, Inc.
Stolt Parcel Tankers, Inc.
Osprey-Acomarit Ship Management
American Automar
Acomarit (UK) Ltd.
Denholm Ship Management (UK) Ltd.
Canadian Coast Guard

Communications Companies

American Mobile Satellite Corporation
Comsat Mobile Communications
Iridium, Inc.
Mobile Datacom
Orbital Communications Corporation
NewEast Wireless Telecom, Inc.

Shipyards

Alabama Shipyard, Inc.
Bath Iron Works Corporation

Continued

NASSCO
McDermott Shipbuilding
Avondale Shipyards
Ingalls Shipbuilding, Inc.
Trinity Marine Group
Newport News Shipbuilding
U.S. Military Sealift Command

Classification Societies/Regulatory Bodies

American Bureau of Shipping
Det Norske Veritas
Lloyd's Register
Canadian Naval Defense Headquarters
Canadian Coast Guard
United States Coast Guard

Standards Committee

American Bureau of Shipping
ABS Marine Services, Inc.
AMADIS, Inc.
Canadian Coast Guard
Canartic Shipping Company
Chevron Shipping
Cooper Industries, Inc.
Det Norske Veritas
Eletson Corporation
General Electric Marine Systems
Herbert Engineering Corporation
IDAX
Litton-Fiber Corn
Lockheed Martin
Lloyd's Register
Marine Management Systems, Inc.
M. Rosenblatt & Son, Inc.
Newport News Shipbuilding
Radix Systems, Inc.
Satellite Telemetry
Sea-Land Services, Inc.
SINTEF Automatic Control (MITS)
Stolt Parcel Tankers, Inc.
Ultimateast Data Communications, Ltd.
U.S. Coast Guard
U.S. Military Sealift Command
U. S. Navy
U.S. Merchant Marine Academy
U.S. Maritime Administration (MARAD)
Wartsila Diesel Xeno Technix

Table 1: ISIT Participants

ISIT Project Status

Today, the ISIT project is well underway, approximately halfway through a 21 month development cycle. The first shipboard test is scheduled to start early in 1997. As indicated earlier, the ISIT platform project has been chosen for shared expense funding under the ARPA/MARITECH program promoting the development and application of technology to the maritime industry.

What is ISIT?

The concept of ISIT as a platform, and not simply another computer application, can be illustrated using a personal computer analogy. Microsoft sells an operating system/user interface called Windows. Once Windows is installed on a PC, you can install any of a number of word processors, such as Microsoft's own MS Word, or other vendor's products such as WordPerfect and others. In addition, you can install any of a number of spreadsheet tools, graphics packages, and so on. In this example, Windows represents the platform, and all the other software represents applications. The platform provides common services, such as the graphical user interface, that are used by all other applications. Windows also provides a standard interface to various hardware components, such as printers, display screens, backup devices, etc.

The ISIT platform is designed to have an open architecture, allowing an unlimited number of applications to run in that environment. On board a ship, you need a maintenance management system, or application, possibly a cargo loading and balancing application, and parts requisitioning system, as a few examples. As long as those applications are designed to be compatible with the ISIT platform (based on the standards which are being developed as part of this project) any number of applications, including those we don't yet envision, will run on the ISIT platform.

This platform must be designed and built to the "industrial strength" standards needed for a ship at sea, where local support is virtually non-existent. ISIT will provide owners and operators with the capability to support the growing technology base aboard ship from a single location ashore for their entire fleet. One of the main limitations of current shipboard systems is the ease of access by shipboard personnel to the "operating system" level of the overall system. While most operating companies have established rules for access on board, it is still not foolproof and many companies have suffered at one time from unauthorized or accidental access. The ISIT platform will have a very high level of shipboard system security, auditability, and stability,

with the ability to actually control shipboard system configuration management from the shore office (fleet systems IT manager).

The ISIT Architecture

Aboard ship today, as we noted, there are typically a number of management computer applications, including maintenance management, cargo loading, parts requisitioning. These systems typically reside as stand alone, on individual PCs, but are in some cases reside on a network. In addition, we have the separate, independent systems for navigation, machinery and cargo control that are the "islands of information".

ISIT first adds a network "backplane", to which all other systems are connected in a client/server configuration. The existing management systems will be moved to the platform. There are three core "services" provided by the shipboard ISIT platform:

Executive Services, providing the secure reliable, remotely manageable environment from which shipboard computer systems are run.
Data Acquisition Services, providing links to allow integration of shipboard data, including navigation control, machinery control and cargo control systems.
Communications Services, ensuring shipboard data is available to shore management. This will include capabilities to use any of the new upcoming satellite communications services, as well as cellular and HFNHF

The Virtual Earth Station is connected on the shore side to the management offices of the owner/operator. The ISIT platform at the shore offices will replicate the data stored aboard each and every ship in the fleet. The communications component of ISIT is designed to continually update data in both directions - updating the shore systems with current operating data and communications from the ship, and updating the databases on the fleet as changes are made ashore, for example, to distribute updated ISM procedures documentation.

The ISIT platform can be extended further, however. Once shipboard data is at the management offices, it can be shared and made available in any way the owner/ operators deem appropriate. For example, maintenance data can be shared with class societies, emergency

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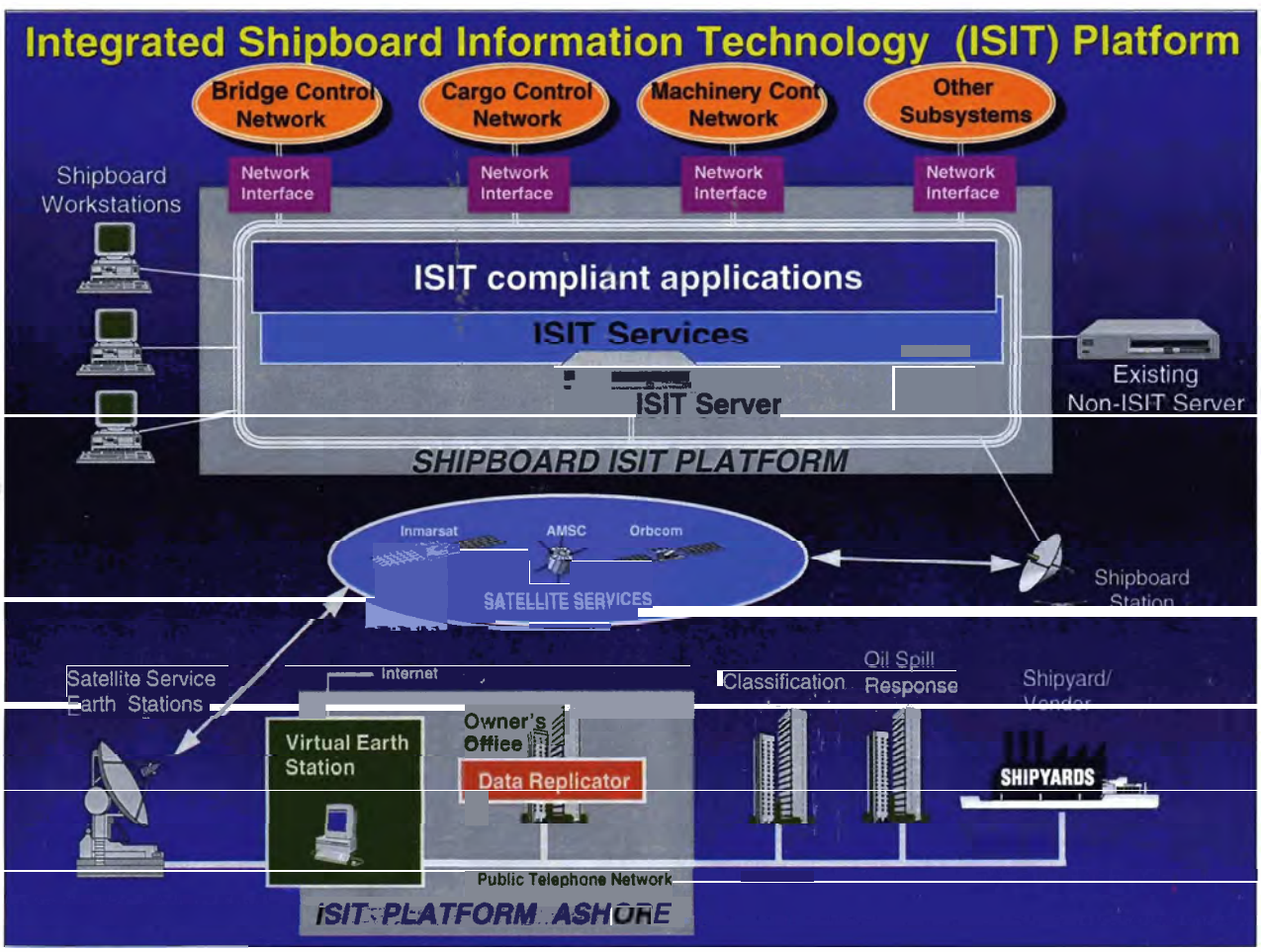

procedures communication can be made with oil spill response units, and vendors can be connected for machinery monitoring or ordering of supplies. In addition, the infrastructure ISIT provides can be used to improve the regulatory inspection process. The Integrated Shipboard Information Technology (ISIT) platform project sets a foundation upon which users of shipboard data can build applications that, for the first time, integrate data from shipboard control systems, shipboard management systems, and shore based management. This repository of data contains a wealth of information that could be used for regulatory screening of vessels. It would not replace or eliminate inspections, but would allow more effective insurance of compliance. In order for an electronic inspection/screening to happen, there must first be agreement on what constitutes key safety and environmental data.

Standard Ship Safety Record

There is currently an international initiative underway to define a "standard ship safety record". This initiative includes ISO's TC-8 Committee on Ships and Marine Technology, the U.S. ASTM F-25 committee (also Ships and Marine Technology), the European Maritime STEP Association (associated with the ISO) and the US Coast Guard. The objective of these efforts is to define a standard set of data which could be used by port state authorities and others, such as class, to electronically screen a vessel before entering port to more effectively determine which vessels to board, allowing port state authorities to most effectively deploy their inspector resources.

This "standard ship safety record" would potentially include data normally found on the "Notice of Arrival", as well as more detailed information: vessel certificates, inspection histories, ISM non-conformities, crew information, maintenance history for shipboard equipment, and similar data. The objective is to provide the port state authority the data needed to make a well-informed boarding decision.

It is believed by those participating in this process that the availability of such a "standard ship safety record" would allow port state authorities to more effectively identify vessels not in compliance, and take appropriate action. It would allow the most effective utilization of limited inspector resources. This position is supported also by major ship owners and operators, who believe the useage of a standardized screening tool will cause non-complying vessels to be identified more readily, and create a more equitable business environment while raising overall levels of ship safety and environmental protection.

ISIT's Benefits to the Industry

To recap, the ISIT platform will mean a number of things to operators. It will open up the shipboard systems to many vendors through the open architecture software platform. An example is the whole area of expert systems diagnostics from various specialists, which will facilitate condition-based maintenance. Subsequently, replacing or repairing equipment when really necessary, instead of at some periodic frequency. This will result in reduced maintenance costs, but first, requires access to the ship's operating data. Ship operators will have better access to the operating data on all ships, allowing them to better optimize their fleet operations. They'll pay lower costs to buy and install an ISIT platform than trying to cobble together some custom mix of systems. Lastly, although the ship to shore communication capability will dramatically increase, communications costs will decrease. Overall, operations will become more efficient and costs will go down.

Shipyards will be able to offer the right technology solution to owners, and be more competitive in the bidding and contracting process. The use of a standardized platform, installed using Classification guidelines, will dramatically lower design and installation costs versus assembling a custom solution. Standardized test and checkout programs will put the ISIT platform into service faster. Once in place, the platform can be used to monitor and feedback performance data to speed up the commissioning process for the entire ship. ISIT will make shipyards more competitive by allowing them to deliver what the customer needs faster and more cost effectively.

Overall, ISIT will allow a number of things that the maritime industry can't do today. The platform will support the increasing regulatory reporting requirements today and in the future, in a cost and time effective manner - without adding extra manpower to shuffle paper. ISIT will allow operators of small or large fleets to most effectively manage their operations. Perhaps most importantly, ISIT provides a platform to support the next generation of manager and operator requirements by integrating the shipboard systems with each other and with the shore.

MARINER'S SEABAG

The Coast Guard is dedicated to the continued improvement in licensing and certification process of U.S. Merchant Mariners. The following changes have been implemented, or will soon be implemented, to improve the way the Coast Guard interacts with the U.S. Maritime industry.

In the last year significant changes have been made to Title 46 of the Code of Federal Regulations. These changes have been made to clarify regulations or reduce the burden on the mariner, while striving to improve safety. As a result, revisions have been completed to subchapter W lifesaving equipment, subchapters T and K small passenger vessels, and subchapter J electrical engineering. The National Maritime Center's Examination Administration Branch has conducted a search of the merchant marine question database to review questions affected by these revisions and modified them as necessary. Modified questions will be placed into the active database upon receipt of the copies of 46 CFR dated 1 October 1996 at the Regional Examination Centers and should coincide with the update of Examination Questions on the World Wide Web (WWW).

The Coast Guard has also modified 46 CFR Part 10, by removing the requirement to administer only written examinations as part of the certification process. This action will permit assessment for licensing by computer based delivery of examinations in addition to practical demonstration by the mariner. Although the Coast Guard, at present, will be unable to examine computer stations at the Regional Examination Centers, independent testing centers have shown an interest in offering examinations by computer to qualified mariners. The Coast Guard is developing guidelines for approving and overseeing fourth party testing

Continued

Traditional merchants mariner's license and seaman's document for deck and engineering officers. New merchant mariner's documents and stew certificates are only a few changes being implemented.

services.

This revision will also permit new assessment methods to be used in lieu of the current examination scheme as the IMO Standards for Training and Certification of Watchstanders (STCW) are implemented through revised Coast Guard regulations. These new requirements will begin being implemented using an Interim Final rule in early 1997. The National Maritime Center anticipates a significant increase in course approval requests as a result of new STCW requirements. The new approved courses will cover leadership courses, and courses for qualified instructors among others. Courses approved and in effect prior to August 1, 1998, will remain in effect, but will need to be modified to comply with the STCW during the next renewal cycle. Courses that expire or are not in place before August 1998 must fully comply with STCW standards prior to being submitted to the RECs.

NVIC 5-95 "Guidelines for Organizations Offering Coast Guard Approved Course", is being updated to clarify requirements for course format and submittal process.

The Electronic Marine Employer Information System (MEIS) is being tested and will provide the marine industry with the electronic means to track and update mariner information including Shipping Articles, Master's Report, and sea service, as well as filing Certificates of Discharge, by computer, with the Coast Guard. This system will speed up mariner processing, provide a permanent record of each voyage, improve data accuracy, eliminate mail delays and allow for the use of the Magstripe Merchant Mariner's Document (MMD) card. No cost software for the MEIS should be available in the later part of 1997.

The National Maritime Center's publications branch is working to place the Merchant Marine Examination Question Illustration Books onto the World Wide Web (WWW). All Merchant Marine Examination Question and Illustration books should be available on the WEB by the end of February, 1997. The illustrations will be provided in "Adobe Acrobat" format and information on down loading the use of the free reader can be found in the file format section of the Home Page. The WWW address for Merchant Marine Examination Questions is: http:/www.dot.gov/dotinfo/uscg/hq/g-m/gmhome.htm.

The National Maritime Center welcomes comments on any questions appearing on this web site can be addressed to:

Director, (NMC-4B)
National Maritime Center
4200 Wilson Blvd.
Suite 510
Arlington, VA 22203-1804
Attn: Engineering or Deck (as appropriate)
or
Fax to (703) 235-1062

Although problems with updating the WWW questions have occurred over the past year, these problems will be rectified by mid-January 1997. New questions will be posed on the WEB at that time and will be used on newly generated examinations by the end of January 1997.

NAUTICAL QUERIES

Engineering

1. When whistle signals are used as commands for launching the lifeboats, one short blast means _____.

A. use the float-free method only
B. lower all boats
C. raise all boats
D. drill is over, secure all boats

2. If the fuel oil temperature flowing to the burners is too low, the _____.

A. fuel service pump will lose suction
B. boiler will produce heavy black smoke
C. boiler will produce dense white smoke
D. fuel service strainers will become clogged

3. In a four-stroke/cycle diesel engine, after the completion of the power stroke, the piston will move _____.

A. up and draw in a fresh air charge
B. down to burn off fuel
C. down to compress the fuel air charge
D. up and force out the exhaust gases

4. Which of the listed colors properly describes a DC motor commutator when correct commutation is taking place?

A. Shiny blue
B. Burnished green
C. Brick red
D. Chocolate brown

5. Low velocity water fog is used in firefighting as a _____

A. cooling agent
B. smothering agent
C. barrier against radiant heat
D. all of the above

6. Inspection of the water-sides of chillers and condensers for leaking tubes should be conducted on a regular basis. How frequently on a minimum basis should these inspections be conducted?

A. once a month
B. once every six months
C. once a year
D. once every other year

7. Coast Guard Regulations (46 CFR) for materials, design, and construction of main propulsion machinery state that design standards shall be at least equivalent to the standards of the _____

A. American Society of Mechanical Engineers (ASME)
B. American National Standards Institute (ANSI)
C. American Bureau of Shipping (ABS)
D. American Society for Testing and Materials (ASTM)

8. On an automatically fired boiler, the loss of a forced draft fan will result in which of the listed actions to be carried out?

A. Stopping of the feed pump
B. Stopping of the fuel oil service pump
C. Closing of the master fuel oil cutoff
D. All of the above.

9. Which of the listed features does the Coast Guard Regulations (46 CFR) require of a motor controller which must be manually re-started following a power failure?

A. Overload protection
B. Low voltage release
C. Low voltage protection
D. Reverse current protection

10. Why is superheated steam used in the main propulsion turbines instead of saturated steam?

A. Less specific energy available per pound of steam.
B. Greater heat energy available per pound of steam.
C. Higher pressure available than saturated steam.
D. Lower required specific volume than saturated steam.

Engineering Answers

1-B, 2-B, 3-D, 4-D, 5-D, 6-B, 7-C, 8-C, 9-C, 10-B

Continued

Deck

1. Which abbreviation refers to the horizontal distance between the forward-most and the after-most points on a vessel's waterline?
A. LWL
B. LOA
C. LOD
D. LLL

2. A great circle crosses the equator at 157x W. It will also cross the equator at what other longitude?
A. 157xE
B. 57xE
C. 23xE
D. 57x W

3. The first AMVER position report must be sent within how many hours of departure?
A. 12
B. 24
C. 36
D. 48

4. You are on an ice-reinforced vessel about to enter pack ice. You should _____.
A. enter the pack on the windward side where there is a well defined ice edge
B. trim to an even keel or slightly down by the bow to take maximum benefit of the ice reinforcement
C. take maximum advantage of coastal leads caused by offshore winds
D. look for areas of rotten ice and enter perpendicular to the ice edge

5. A holder of a license as Operator of Uninspected Towing Vessels may work each 24 hours for a period not to exceed_____
A. 6 hours
B. 12 hours
C. 18 hours
D. 24 hours

6 A pillar buoy is indicated by which letter in illustration D044NG?
A. A
B. B
C. C
D. D

7. You must make a written application to obtain or renew your "T-Boat's" Certificate of Inspection _____.
A. on form CG-835
B. at the shipyard where you are hauled out
C. on form CG-3752
D. Everytime your boat is hauled out

8. A stability test may be dispensed with if the _____
A. Coast Guard has the approved stability test results of a sister vessel
B. Projected cost is unreasonable
C. Coast Guard does not have a qualified inspector available
D. Vessel is of a proven design

9. Which item do you NOT have to provide for the Coast Guard representative at the time of a stability test?
A. A stability letter
B. Tank sounding tables and draft mark locations
C. Capacity plans showing the vertical and longitudinal centers of gravity of stowage spaces and tanks
D. General arrangement plans of decks; holds and inner bottoms

10. The maximum number of passengers a "T"-Boat may carry _____
A. is sated on the vessel's Certificate of Inspec
B. is the number authorized in the Navigation I
C. depends on the number of lifejackets you ca
D. is the number authorized by your license

Deck Answers

1-A, 2-C, 3-B, 4-D, 5-B, 6-C 7-C, 8-A 9-A,

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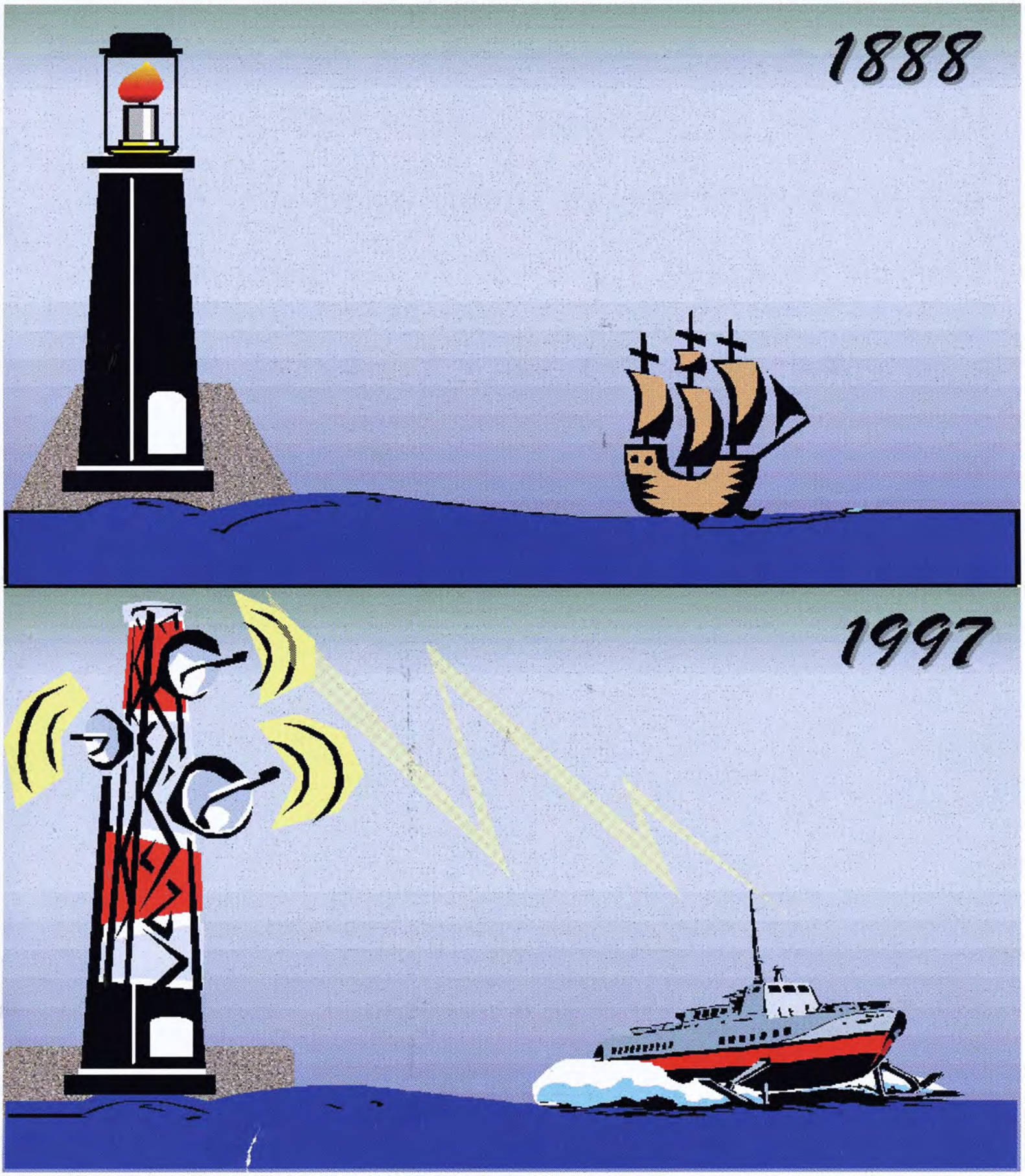
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**United States
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