GAO

United States
General Accounting Office
Washington, D.C. 20548

Information Management and
Technology Division

B-247050

March 20, 1992

The Honorable Earl Hutto
Chairman, Subcommittee on Readiness
Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

The Department of Defense developed the Defense Distribution System (DDS) as a prototype to support its efforts to consolidate management of all military supply depots. DDS is intended to automate the receiving, storage, and shipping functions typical of these supply depots. It was developed and deployed as part of the Defense Logistics Agency's (DLA) prototype consolidation project at three depots in the San Francisco Bay area at a cost of over $20 million. At the same time, under the Department's Corporate Information Management (CIM) initiative, DDS was evaluated against other alternatives to become the standard system for all 30 military supply depots. In February 1992 the Department rejected DDS and selected the Army's Area-Oriented Depot System as the standard distribution system to be implemented across the Department.

This report responds to your request that we evaluate DDS as a case study of the Department's efforts to standardize automated systems under CIM. Our objectives were to determine if (1) the Department demonstrated that DDS's potential benefits exceed its costs, (2) DDS's functional and technical merits justified its consideration as a Departmentwide standard system, and (3) DDS illustrates any significant problems that the Department's other automated system standardization efforts may encounter. Appendix I details our objectives, scope, and methodology.

Results in Brief

As a case study, DDS illustrates the importance of fully evaluating the cost and technical aspects of a proposed system before implementing it or considering it as a candidate for a CIM standard system. The Department initiated development of DDS without knowing whether its potential benefits exceeded its costs or whether it was the best alternative for automating supply depot operations. As it was being developed, a Department evaluation found that DDS offered no functional or significant technical superiority over other automated systems. Indeed, it is a combination of two existing systems that use dated hardware and software technology and whose documentation deficiencies will complicate maintenance and integration with other systems. The Department

contended that DDS was a valuable learning experience. Nevertheless, it has spent in excess of $20 million on a system that will be replaced.

In addition, DDS illustrates a major problem that will complicate the Department's system standardization efforts under CIM—the lack of standard data definitions and formats. Over the years, the military components have developed numerous logistics systems having differing codes and formats for the same data. To achieve standardization, these differences will have to be overcome. Interfaces will have to be designed for systems that were never intended to be integrated. The lack of adequate data standards will substantially increase the technical difficulty and cost of accomplishing this task.

Background

The Department continues to have problems in managing its secondary item inventory of nearly 5 million different items valued at approximately $101.9 billion, as of September 30, 1990, including unrequired inventory of nearly $30 billion. The Comptroller General has designated Defense inventory management as a high-risk area needing special review. The Department has also recognized the importance of this issue and has established an inventory reduction program to address its inventory management problems. This program identifies two initiatives as key to addressing these problems—CIM and supply depot consolidation. Both of these initiatives were included in a July 1989 report entitled Defense Management Report.

In October 1989, the Deputy Secretary of Defense established the CIM initiative to improve business practices and the quality and consistency of data in all functional areas, including inventory management. It is also intended to reduce spending on multiple systems aimed at the same functional requirements and aid in the development of common data requirements and formats. Distribution centers, or supply depots, became one of the first functional areas addressed by CIM.

Also included in the July 1989 Defense Management Report was an initiative for consolidating management of all military supply depots under DLA. In April 1990, the first such consolidation began in the San Francisco Bay area, placing under DLA management supply depots formerly operated by the Army, Navy, Air Force, and DLA. To support this operational consolidation, DLA recommended that a single automated system be developed to replace those of the separate military components.[1]

[1]Component refers to the Army, Navy, Air Force, Marine Corps, and major Defense agencies.

Status of DDS Development

DDS was based on a joint DLA and Navy undertaking, in which the DLA Warehousing and Shipping Procedures (DWASP) system and the Naval Integrated Storage, Tracking, and Retrieval System (NISTARS) were integrated into a single system. The undertaking envisioned capitalizing on existing software and improving overall functionality. DDS integrated these two core systems with portions of other warehousing systems from the Army and Air Force. Its functions are to track the receipt, storage, and shipment of goods at distribution centers, commonly called supply depots. DDS must also exchange information with other logistics systems, such as those used by inventory item managers, and with finance, transportation, and other systems.

DDS has required extensive systems development to integrate its various subsystems. As of September 30, 1991, about $20 million had been spent on DDS and the system had been installed at two of the three supply depots in the Bay area. DLA officials estimate that an additional $15 million will be needed to complete implementation of DDS in the Bay area and over $60 million more would be needed if it was deployed beyond the Bay area.

While development and implementation of DDS was continuing as part of the Department's efforts to consolidate supply depots, study groups were formed under CIM to determine how best to standardize automated systems. In November 1990, the Defense Materiel Management Board designated DDS as an interim standard system and intended it to replace component-specific systems at all 30 supply depots if it proved cost effective. However, in early 1991, the Director of Defense Information, one of the senior officials responsible for CIM, eliminated the concept of interim standard systems. Instead, executive agents were appointed in each of several function areas to evaluate how best to achieve system standardization in each area. The executive agent responsible for distribution center automation assessed DDS and other candidate systems.[2] In February 1992 the Army's Area-Oriented Depot System was selected as the standard distribution system. A Major Automated Information System Review Committee review is scheduled in October 1992 for the selected system. Appendix II contains additional information on the Department's efforts to standardize logistics systems.

[2]There are three other candidate systems: the Air Force's Stock Control and Distribution System, coupled with the Navy's NISTARS warehouse control system; the same Air Force system, coupled with DLA's Integrated Materiel Complex warehouse control system; and the Army's Area Oriented Depot System.

Defense Did Not Substantiate the Economic Merits of DDS

Defense directives require an economic analysis comparing the cost and benefits of a proposed automated system before proceeding with development of the system.[3] Similarly, the Defense Comptroller issued CIM guidance in December 1990 stating that benefits of proposed standard or "best of breed" systems must exceed the costs of transition and implementation. However, the Department did not meet either criterion and continued to develop and deploy DDS without having substantiated its economic merits.

Defense logistics officials acknowledge that they did not perform a cost-benefit analysis prior to selecting DDS as the standard system for the Bay area prototype consolidation. Nor did they provide a cost-benefit or other formal economic analysis to justify DDS as a interim CIM standard system. Defense officials cited the lack of time and the urgency for implementing the depot consolidation as obstacles to completing such analysis. They added that, in any case, no analysis was needed because (1) DDS was not a new development and the systems being integrated to form DDS had been individually economically justified and (2) it was a prototype system. However, DDS is a complex systems integration project requiring a substantial investment. Without an economic analysis, the Department had no assurance that DDS was the most cost-effective alternative.

The Department did not develop an overall implementation plan or detailed cost estimate for DDS. However, the Department provided summary cost information which showed that, if fully deployed at all 30 supply depots, DDS could cost nearly $100 million.

It is difficult to determine the validity of these cost estimates because of the Department's uncertainty about DDS development and deployment issues. For example, while DDS was described as a "standard" system for the Bay area depots, its actual technical configuration could vary significantly from site to site. The NISTARS warehouse control component, for example, may not be used at all the sites, but could be replaced by another warehouse control system specific to that site. If this was the case, then the interfaces recently developed between DWASP and NISTARS would have to be re-engineered for the substitute systems. In addition, the cost estimates did not identify all costs for integrating DDS with the various financial, transportation, and other related logistics systems with which it will exchange data.

[3]Defense Directive 7920.1, Life-Cycle Management of Automated Information Systems, and Instruction 7041.3, Economic Analysis and Program Evaluation for Resource Management.

Defense Did Not Demonstrate DDS to Be Functionally or Technically Superior to Other Candidate Systems

The Department completed one technical evaluation comparing DDS and other alternative systems in November 1990 as part of the CIM interim standard system selection process. However, the results of this evaluation were inconclusive. In addition, several technical problems arose that brought DDS's suitability as a standard system into question.

In June 1990, the CIM authority established criteria for interim standard systems that required them to be comprised of "the best system in the Department . . . ."[4] Such systems were to be nominated to the CIM authority based upon their functional and technical superiority over other systems in the Department. A review team evaluated alternative systems and found no significant functional or technical difference between DDS and other candidate systems. As a result, the evaluation did not support a specific alternative, nor could consensus be obtained from team members. The Department's decision to continue with DDS was based on the fact that the DDS integration was well underway, DDS components were operational while other candidate systems were not, and a system was urgently needed to support the ongoing Bay area prototype consolidation project. However, the CIM criteria stated that no system need be implemented as a standard system if it was not economically advantageous.

Several technical problems with DDS made us question whether it even should have been considerate as a standard system. For example, DLA acknowledged that it would have to modify DDS to provide a "ship from receiving" function to accommodate the combined supply and maintenance operations typical of the Air Force's Air Logistics Centers. Unlike the other services, which first place parts in storage bins, the Air Force moves parts directly from a receiving dock to an aircraft repair site.

There were also technical problems with both main DDS component systems—NISTARS and DWASP. For example, one expert study commissioned by DLA found the NISTARS system technically inferior to another candidate warehouse control system.[5] At the implementation level, management officials at DLA's central design activity, responsible for developing DDS, cited lack of NISTARS documentation as a continuing hindrance in developing and installing software interfaces with NISTARS.

In addition, the DWASP component of DDS is largely based on batch, flat-file software written and used only by DLA, rather than commercially available,

[4]Authority for CIM was transferred in November 1990 from the Comptroller to the Assistant Secretary for Command, Control, Communications, and Intelligence, who is supported by the Director of Defense Information.

[5]Defense Distribution System Warehouse Control System Study, Nov. 6, 1990, Koh Systems, Inc.

modern, on-line database software, which is kept up to date and widely used. Thus, DDS is based on aging technology that may prove increasingly expensive to maintain and upgrade. In contrast, today's state-of-the-art automated systems are moving toward transaction-based, on-line processing. The Department's own effort to upgrade its data standards is based upon moving from batch processes to commercially accepted on-line processes. There are other supply center systems currently in use within the Department that use such modern database software.

DDS Illustrates Significant System Integration Problems Facing Proposed Standard Logistics Systems

The CIM criterion for technical feasibility requires that standard systems be able to interface with other systems. However, as illustrated by DDS, this could prove to be a formidable task. The DDS design team encountered disparities between the data and transaction structures used by the systems being integrated to form DDS and by other related systems with which DDS would have to interface and communicate. For example, DWASP used a six-digit bar code to identify a packed container and NISTARS used a five-digit bar code for the same data element. Each such disparity had to be overcome to make the systems work together.

These system integration problems are exacerbated by the lack of data standards, that is, common data definitions and formats. Over the years, systems have been developed separately within each military component by numerous design teams using different data definitions and formats. It was never envisioned that these systems would have to be integrated. As a result, there was no need to develop standard data definitions and formats. However, in trying to develop and implement standard systems, system developers will have to design interfaces to connect dissimilar systems. For example, the standard system for supply depots must provide for information exchange between depots. But, it must also provide for information exchange between depot managers and item managers who make purchase decisions based on knowing stock levels at the depots. Thus, "custodial" records in a depot system like DDS must correspond with "accountable" records maintained on separate computer systems. Similarly, the depot system must also provide for data interfaces with separate computer systems containing transportation and finance records.

Although the Department has had a logistics data standards program in place since 1962, the resulting "MILS"[6] standards are not sufficient to alleviate these systems integration challenges. These standards address the high-level exchange of data between systems rather than data definitions

[6]MILS is short for military standard. These standards prescribe a set of standard data formats for transmitting data between automated logistics systems.

and formats within systems. In addition, the standards that have been developed have not in all cases been consistently implemented within the separate components. Defense officials managing the standards program state that individual components often interpret updated standards requirements differently. This incorrect interpretation can delay implementation of the updated standard—incorporation of the standard into the component's own software—for as long as 2 years. In addition, standards have not yet been developed in key information areas such as procurement.

Thus, as illustrated by DDS, the lack of sufficient data standards will present problems in integrating proposed standard systems with other logistics and financial systems with which they must exchange data. System developers will be confronted with key integration issues, such as (1) how to standardize data elements and formats to allow proposed standard systems to interface with other logistics systems; (2) how to determine the cost, risk, and feasibility of developing these interfaces; and (3) how data standards currently in use and under development will be introduced into both existing and planned logistics systems.

Defense recognizes the importance of strengthening the development and use of logistics data and standards. The Department's 1991 Inventory Reduction Program placed priority on improving logistics standards by implementation of the Modernization of Defense Logistics Standard Systems (MODELS) initiative. MODELS seeks to establish new data standards based on modern variable-length record formats, rather than the obsolete 80-character card formats the MILS standards were based on. The Department also established the Center for Data Administration Operations in September 1991 as part of its CIM program. The Center will be responsible for establishing standard data definitions and formats for all systems. Appendix III contains additional information on the Department's efforts to establish data standards.

Conclusions

DDS has been a costly learning experience for the Department. Development of DDS was initiated as a prototype to support the Department's supply depot consolidation initiative. With the advent of CIM, the Department established criteria for evaluating existing systems and selecting standard systems for common business or functional areas, including supply depot management. The process for selecting candidate systems should ensure that the best alternative system from a cost and technical standpoint is selected. In light of significant system integration

problems facing all proposed departmentwide standard systems, the process should also ensure that it is feasible to implement the system. To do otherwise increases the risk that money will be wasted to develop and deploy a system that will eventually be replaced.

The DDS experience also highlights the importance of a fully developed and implemented data standards program to the success of CIM. Without such a program, the cost and technical risks of integrating systems are greatly increased and the feasibility of implementing standard automated systems—one of CIM's primary goals—is reduced.

Agency Comments

The Department of Defense generally agreed with our findings, concurred with the recommendations in a draft of the report, and provided comments to clarify its position on issues raised in the report. These comments have been incorporated where appropriate. As a result of positive actions to this draft report, we have removed all recommendations.

The Department advised us that on February 5, 1992, it selected the Army's Area-Oriented Depot system as the standard supply depot system and eliminated DDS from consideration. The Department has also directed DLA to prepare a full functional economic analysis and site implementation plan for the Army system by September 1992 and submit the system to the Major Automated Information Systems Review Committee for review and approval in October 1992. In addition, Defense is curtailing further deployment of DDS beyond the Bay Area sites where it is currently deployed. We believe these are appropriate steps. Accordingly, we have deleted the recommendation in our draft report that the Secretary of Defense discontinue further development and deployment of DDS. However, we believe that the Secretary must also ensure that further development of other supply depot systems be curtailed while the Department validates the selection of the Army system. In addition, we believe that the validation process for the selected standard distribution system should ensure that (1) the system's benefits clearly justify its costs, (2) its functional and technical features justify it as the best alternative for a standard, and (3) the significant system integration problems facing the proposed system have been adequately addressed.

The Department also told us that the issuance of the Department of Defense Directive 8320.1, "DoD Data Administration," on September 26, 1991 established a coordinated program for developing data standards. We are encouraged by this action and believe that, if properly carried out by

Defense and the services, it will respond to our concerns. Accordingly, we have also deleted the recommendation in our draft report that the Secretary establish an aggressive data standards program. However, the newly established program for data standards should at a minimum include (1) a process for developing and controlling standard data definitions and formats and (2) a mechanism for ensuring that these standards are uniformly and consistently implemented in all CIM standard systems. The Department's comments are reprinted in appendix IV.

Our audit work was performed in accordance with generally accepted government auditing standards, between August 1990 and February 1992.

Unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days after the date of this letter. At that time we will send copies to the Chairmen, Senate and House Committees on Appropriations; the Chairman, Senate Committee on Armed Services; the Secretaries of Defense, Army, Navy, and Air Force; Director, Defense Logistics Agency; and other interested parties. Please contact me at (202) 336-6223 if you or your staff have any questions concerning this report. Other major contributors are listed in appendix V.

Sincerely yours,

Samuel W. Bowlin
Director, Defense and Security
Information Systems

Contents

Figures

Abbreviations

ANSI	American National Standards Institute
CIM	Corporate Information Management
DDS	Defense Distribution System
DLA	Defense Logistics Agency
DWASP	DLA Warehousing and Shipping Procedures
EDI	Electronic Data Interchange
MILS	Military Standard
MILSTAMP	Military Standard Transportation and Movement Procedures
MILSTEP	Military Supply and Transportation Evaluation Procedures
MILSTRAP	Military Standard Transaction Reporting and Accounting Procedures
MODELS	Modernization of Defense Logistics Standard Systems
NISTARS	Naval Integrated Storage, Tracking, and Retrieval System

Objectives, Scope, and Methodology

In January 1990, the Comptroller General designated inventory management within the Department of Defense as one of 14 areas at high risk of waste, fraud, and abuse. We undertook this review of DDS because, according to Defense officials, it is critical to the Department's efforts to consolidate its supply depots and distribution centers and, thus, improve inventory management. The House Committee on Armed Services asked that we review DDS as a case study to identify issues the Department was encountering in its efforts to consolidate automated systems under its CIM initiative. Our specific objectives were to determine if (1) the Department has demonstrated that DDS's potential benefits exceed its costs, (2) DDS's functional and technical merits justify its consideration as a Departmentwide standard system, and (3) DDS illustrates any significant problems the Department may encounter as it tries to standardize automated systems for other logistics functions.

To address our objectives, we interviewed senior Defense officials, as well as technical and industry experts. We interviewed the Principal Deputy Comptroller, the Deputy Comptroller for IRM, the CIM Director, the Deputy Assistant Secretary for Logistics, the Director of Supply Management Policy, the DLA Assistant Director for Telecommunications and Information Systems, and the DLA Executive Agent for Distribution Systems. We also met with numerous program and technical officials. These included managers responsible for DDS design at DLA headquarters and the central design activity in Utah; DDS implementing officials at Army, Navy, Air Force, and DLA sites in the San Francisco Bay Area; Army, Navy, Air Force, and DLA managers at supply depots in Utah, Virginia, and Pennsylvania; industry experts in inventory automation; and Office of the Secretary of Defense staff responsible for modernizing logistics data standards.

To further assess actions to design and implement standard automated inventory systems, we reviewed Defense studies and memoranda establishing criteria for CIM standard systems, the Inventory Reduction Program, and the supply depot consolidation initiative. We also reviewed past reports on problems in Defense inventory management, development of various Defense logistics automation systems, and information-sharing between logistics and financial information systems. We reviewed DDS cost estimates, as provided to us by the Department, but did not attempt to validate the reasonableness of these estimates.

Our audit work was performed in accordance with generally accepted government standards, between August 1990 and February 1992.

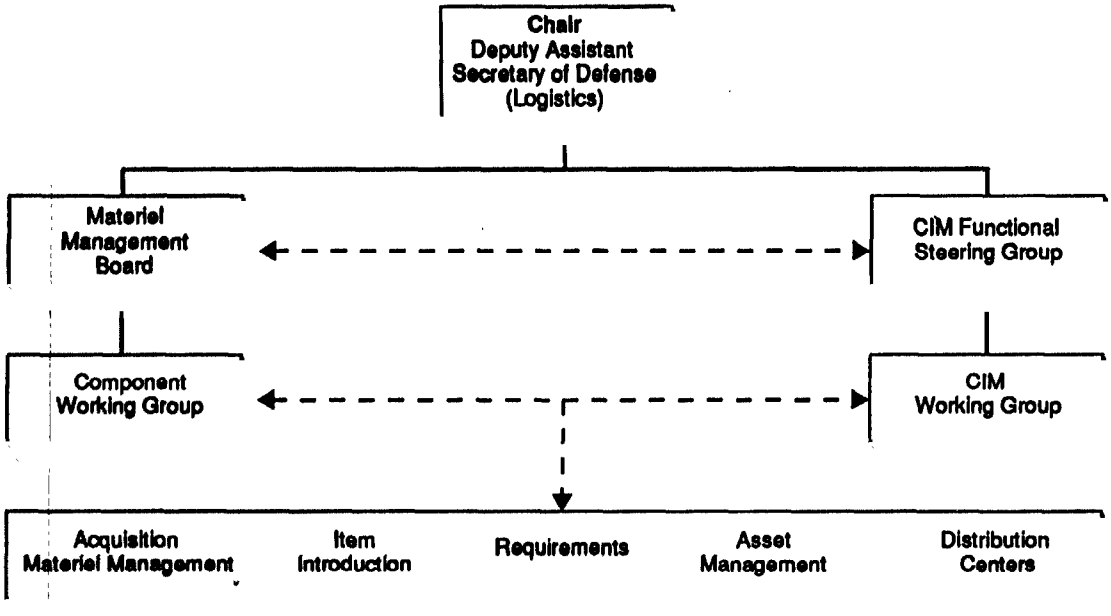
Background on Department of Defense Efforts to Standardize Automated Logistics Systems

The Department's Materiel Management Board exercises functional oversight and management direction of Defense-wide inventory management initiatives, programs, resources, and automated systems. In November 1990, the Board approved a plan of action for interim standard systems covering five interrelated logistics areas:

- acquisition materiel management,
- item introduction,
- requirements,
- asset management, and
- distribution.

The Board recommended DDS as the logistics interim standard system serving distribution centers and supply depots. A Component Working Group was established under the Materiel Management Board direction to provide day-to-day management of the Department's standardization efforts. Figure II.1 depicts the relationships between the Office of the Secretary of Defense organizations responsible for materiel or inventory management and CIM.

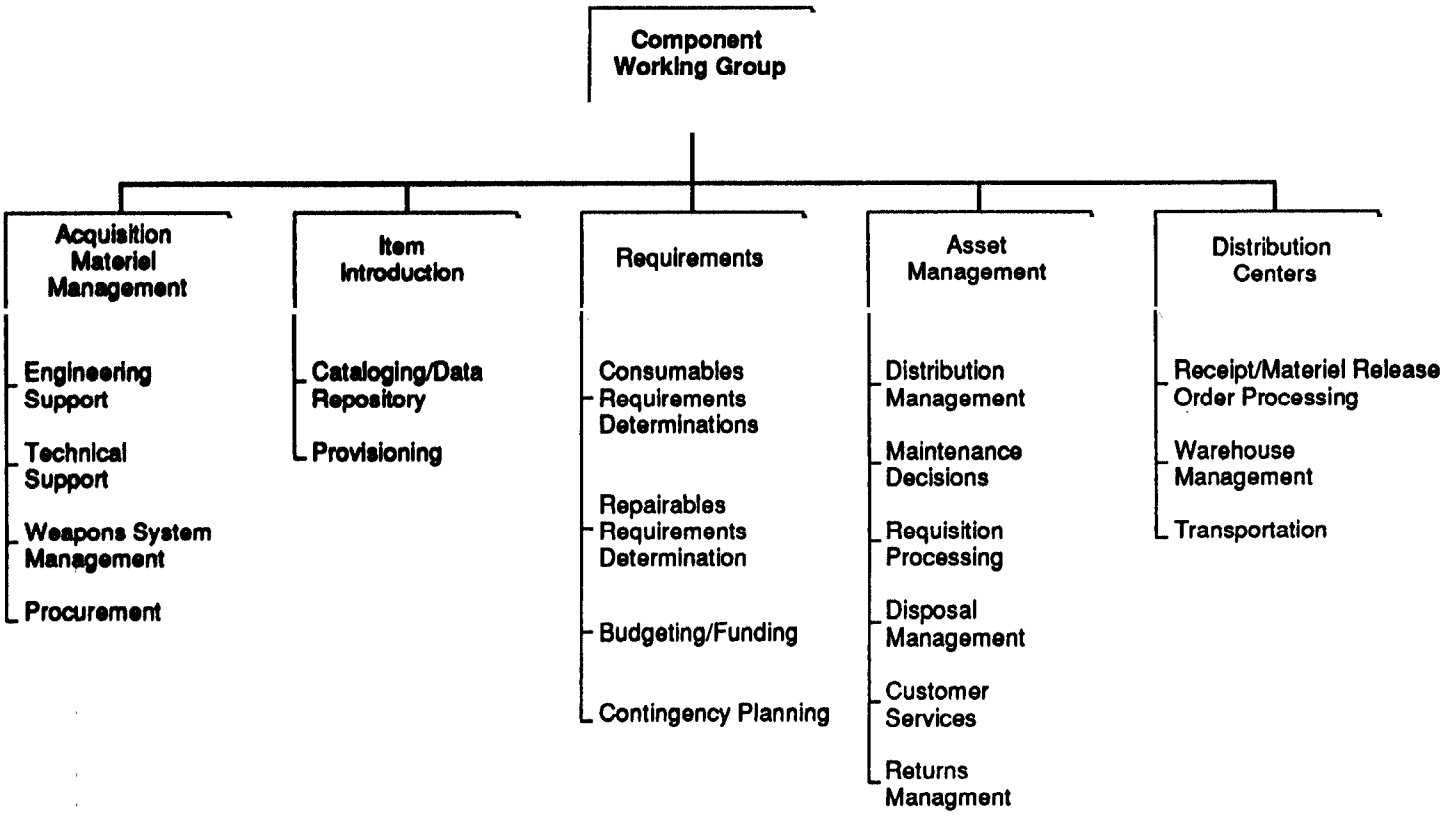
Figure II.1: Defense Materiel Management Board "Interim" Systems Development



Source: DOD
CIM—Corporate Information Management

In considering systems for the role of a standard, Departmentwide distribution system, the Group evaluated automated systems supporting such functions as materiel receipt, release order processing, warehouse management, and associated transportation. Figure II.2 depicts the relationship between the Department's various logistics functional areas.

Figure II.2: Interim Systems Structure



Source: DOD

Candidate systems from each of the military components were evaluated against a list of 17 desirable features. In November 1990, the Board reported that three candidate systems (DLA's Defense Distribution System, Air Force's Stock Control and Distribution System, and Army's Standard

Depot System) possessed relatively equal functionality, and technical differences were insufficient to further differentiate them for evaluation. According to its November 1990 report, the Board recommended DDS as an interim standard system based upon the urgent need for a system to support the already ongoing Bay Area depot consolidation prototype. In early 1991, with the appointment of the Director for Defense Information, the concept of interim standard systems was replaced with the concept of migration systems. According to Defense officials, this change was made to remove the notion that systems selected as Departmentwide standards, "best of breed," would eventually be replaced. Instead of being replaced, these systems would, where feasible, become the starting point for evolving to the Departmentwide standard.

With this change, DDS was no longer considered an interim standard system, and the Department under CIM continued to evaluate military component systems to select a Departmentwide standard. In June 1991, the CIM executive agent published a report calling for a standard distribution system. It defined a strategy for evaluating DDS and other candidate systems. The candidates were:[1]

- DLA's Defense Distribution System,
- Air Force's Stock Control and Distribution System,
- Army's Area-Oriented Depot System,
- DLA's Warehousing and Shipping Procedures/Integrated Materiel Complex.

On February 5, 1992, the Department selected the Army's Area-Oriented Depot System as the standard supply depot system.

According to Defense officials, the selection of a standard system was supported by a full business case and technical analysis and will undergo a review by the Major Automated Information System Review Committee in October 1992.

[1]According to Defense officials, the current candidate systems under evaluation vary somewhat from those listed in the original plan.

Background on Department of Defense Efforts to Develop Logistics Data Standards

In 1962, the Department of Defense instituted the first of a series of data standards for logistics systems. These standards are referred to collectively as Defense Logistics Standard Systems and constitute an effort to define

- uniform terminology,
- standard transaction formats,
- standard data elements, and
- uniform procedures and rules governing data interchange.

These standards are published in a series of "MILS" documents, including Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP), Military Standard Transportation and Movement Procedures (MILSTAMP), Military Supply and Transportation Evaluation Procedures (MILSTEP), and others.

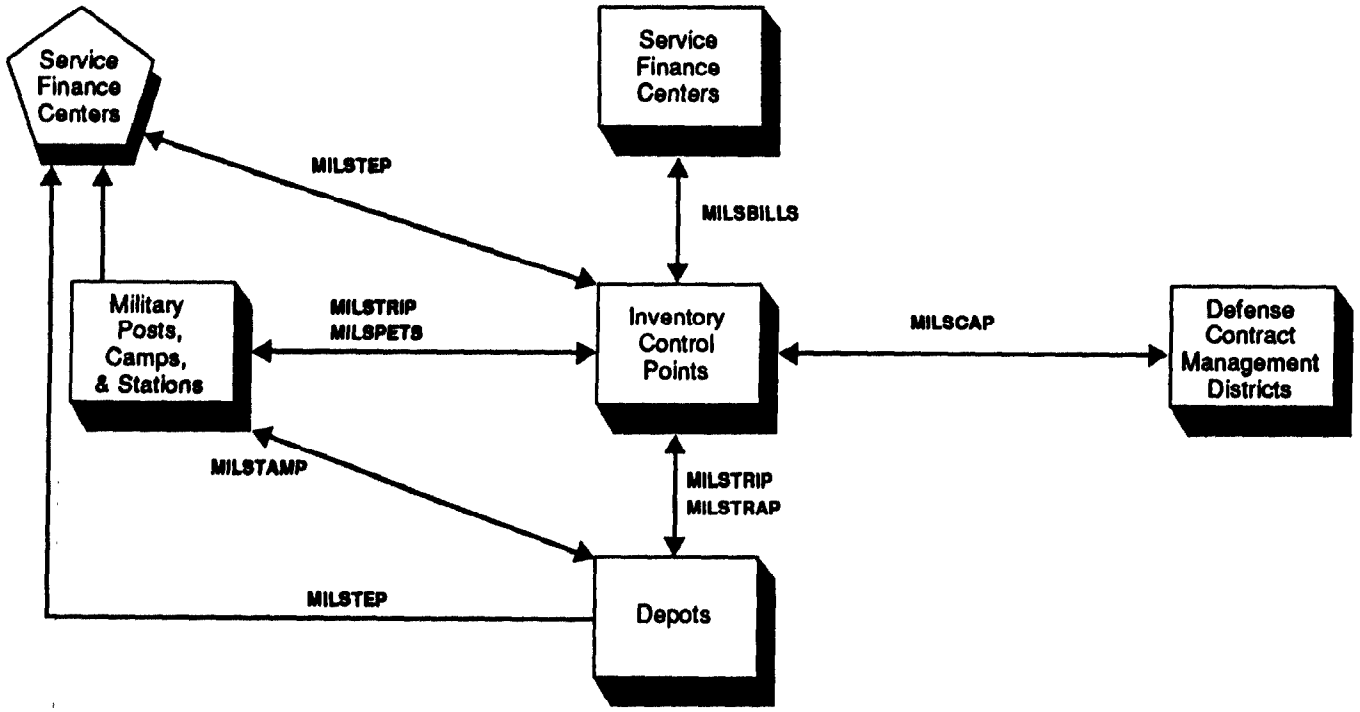
In 1984, Defense undertook a program called Modernization of Defense Logistics Standard Systems (MODELS). Defense officials note that MODELS was intended to address various problems the Department was experiencing in trying to develop and implement standard logistics systems, as well as to take advantage of new technical opportunities.

Some of the problems MODELS was intended to address included the fact that MILS standards were not prescribed in every data area, allowing the different military components to introduce many unique data and transaction formats into their systems. Where MILS standards had been prescribed, they were not uniformly implemented across the components. When receiving a standards update, for example, the military software centers were to take the written standard and translate it into updated software for the various systems required to comply with the standard. In many cases, the military components interpret the standards differently. They also schedule this software work according to their own design schedules, so that full implementation across the Department awaits the slowest component. According to MODELS officials, some implementations have taken as long as 2 years after the standard was published.

MODELS was also intended to allow the Department to take advantage of new technical opportunities, including the transition from batch-oriented, fixed-field technology to modern on-line, variable-length records for transaction processing. Accordingly, MODELS sought to develop new data and transaction standards that would comply with up-to-date Electronic Data Interchange (EDI) standards now coming into commercial use. Defense expects that this will provide increased responsiveness to

requirements changes, as well as improved speed and reliability in exchanging information between systems. Figure III.1 depicts the various organizations that would use standard logistics systems and the various programs aimed at establishing data and transaction standards among these organizations.

Figure III.1 Defense Logistics Standard Systems Organizations and Related Data and Transactions Standards Programs



MILSTRIP — Military Standard Requisitioning and Issue Procedures
MILSTAMP — Military Standard Transportation and Movement Procedures
MILSTRAP — Military Standard Transaction Reporting and Accounting Procedures
MILSPETS — Military Standard Petroleum System
MILSTEP — Military Supply and Transportation Evaluation Procedures
MILSBILLS — Military Standard Billing System
MILSCAP — Military Standard Contract Administration Procedures

Source: DOD

According to Defense officials, MODELS has established the fundamentals of a new structure called Defense Logistics Management Systems to implement revised standard procedures compatible with the American National Standards Institute (ANSI) commercial standards. However, the

Department has conducted limited testing of the software to support this set of systems.

MODELS has received high-level policy support in Defense but has played only a small role in specifying actual CIM standard systems. In May 1990, the Under Secretary of Defense for Acquisition recognized the importance of MODELS to improving inventory management; his Inventory Reduction Program called for accelerated modernization of logistics automation, specifically emphasizing MODELS. MODELS officials report, however, that they received only preliminary interest, with no direct technical input, prior to Materiel Management Board recommendations of logistics interim standard systems, such as DDS.

In September 1991, the Department established the Center for Data Administration and Operations from various Army initiatives to improve data standards. Defense officials agree that a comprehensive logistics data standards program will greatly improve the Department's ability to integrate and standardize systems. However, the relationship between the MODELS program and the new data center has not been clearly established. MODELS officials emphasize the importance not only of modernizing standards, but of creating a configuration management process ensuring standards are expeditiously and uniformly implemented. However, it is not yet clear how or who would be responsible for developing and controlling these standards and ensuring that they are uniformly implemented for all CIM standard systems.

Comments From the Department of Defense

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, DC 20301-8000

PRODUCTION AND LOGISTICS
(L/SD)

February 14, 1992

Mr. Ralph V. Carlone
Assistant Comptroller General
Information Management and Technology
Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Carlone:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "DEFENSE ADP: Lessons Learned From Development of Defense Distribution System," dated December 20, 1991 (GAO Code 510608), OSD Case 8838.

While the Department generally agrees with the draft report findings and recommendations, the following items should be clarified and included in the report:

The prototype Defense Distribution System has provided invaluable knowledge and experience that will reduce future risks as the Department develops and deploys a standard system to support supply depot functions.

Inter-system logistics information communication between functional activities is not a problem due to the Defense Logistics Standard Systems which prescribe and mandate the use of standard transaction formats and data definitions.

The most important lesson learned from the Defense Distribution System development effort is that interfaces can be developed to overcome the differences in the inter-module communication processes used within the different Service and Agency systems.

The Department is pleased that the draft report recommendations endorse the DoD ongoing actions. The rigorous functional, technical, and cost analysis of the candidate systems for selection as the standard distribution system has been completed, and the Major Automated Information System Review Council will conduct an in-process review of the selected system during Calendar Year 1992. The detailed DoD comments on the report findings and recommendations are provided in the enclosure. (Suggested technical corrections were provided separately to the GAO staff.)

Sincerely,

David J. Berteau
Principal Deputy

**GAO DRAFT REPORT - DATED DECEMBER 20, 1991
(GAO CODE 510608) OSD CASE 8838**

"DEFENSE ADP: LESSONS LEARNED FROM DEVELOPMENT OF DEFENSE DISTRIBUTION SYSTEM"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

- **FINDING A: Basis For And Status Of The Defense Distribution System.** The GAO reported that the DoD is developing the Defense Distribution System as a prototype to support the overall DoD efforts to consolidate management of all military supply depots. The GAO explained that the System is intended to automate the receiving, storage, and shipping functions typical of the supply depots--and is being developed and deployed at five depots in the San Francisco Bay area.

  The GAO explained that the Defense Distribution System was based on a joint undertaking between the Defense Logistics Agency and the Navy, in which the Defense Logistics Agency Warehousing and Shipping Procedures system and the Naval Integrated Storage, Tracking, and Retrieval System would be integrated into a single system. The GAO noted that the undertaking envisioned capitalizing on existing software and improving overall functionality. The GAO reported that the Defense Distribution System was expanded to integrate those two core systems with portions of other warehousing systems from the Army and the Air Force.

  The GAO observed that extensive systems development has been required to integrate the various subsystems. The GAO reported that, as of September 30, 1991, about $20 million had been spent, with the System installed at two of the five designated supply depots. The GAO also found, however, that the System is not operational at any site. The GAO reported Defense Logistics Agency officials estimate that an additional $15 million will be needed to complete installation of the System at the remaining three depots--and over $60 million more if it is deployed beyond the San Francisco Bay area. (pp. 1-5/GAO Draft Report)

  DoD RESPONSE: Partially concur. The Department agrees that the report presents a largely accurate description of the basis upon which the prototype Defense Distribution System was developed, i.e., to automate the receiving, storage, and shipping functions in support of the supply depot consolidation of the Bay Area Prototype depots. The Department does not, however, agree with

the GAO statement that the Defense Distribution System is not operational at any site. The Defense Distribution System is fully operational at the Oakland Site in the Defense Distribution Region West and has been since May 1991; the non-Warehouse Control System portion of the Defense Distribution System is fully operational at the Sharpe Site and has been since July 1991; and the Warehouse Control System portion of the Defense Distribution System has been fully operational for an initial increment of materiel at the Sharpe Site since September 1991.

The GAO statement is apparently based on a misinterpretation of what was intended to be operational in the Defense Distribution System at the various sites. The capability to fill backordered items during the receiving process was always intended to be built into the system to meet Air Force requirements for this feature; however, it was never intended that the feature would be included at all sites initially. Thus, the Defense Distribution System at Oakland and Sharpe does not include the feature to free backordered items, nor was it intended to be included. Similarly, the Defense Distribution System at Oakland does not include the Container Consolidation Point module derived from the Army Standard Depot System, which is operational at the Sharpe Site. That is because Defense Distribution Region West is centralizing its Container Consolidation Point at the Sharpe Site; therefore, the functionality is not required at Oakland.

It should also be pointed out that, at the time of the original April 1990 decision to proceed with the Defense Distribution System, the plan called for initial installation at the three San Francisco Bay Area supply depots, to be followed by deployment at the two Sacramento supply depots. The plan was revised to deploy the Defense Distribution System to only the three San Francisco depots, due to the planned closure of the Sacramento Army Depot and the analysis that was ongoing to select the recommended standard system.

In January 1992, the Executive Agent for Distribution completed the evaluation of the candidate automatic data processing systems. The candidate systems were evaluated against technical, functional, cost, and schedule criteria to determine the system that best supports the DoD distribution mission requirements and the supply depot consolidation initiative. The Executive Agent for the distribution system development has certified that the selected system, Area-Oriented Depot/Modernization, is developed, operational, and fully meets the requirement of Section 313 of the National Defense Authorization Act for Fiscal Years 1992 and 1993.

- **FINDING B: Relationship Of The Defense Distribution System To The Corporate Information Management Initiative.** The GAO reported that, in October 1989, the Deputy Secretary of Defense established the Corporate Information Management Initiative to improve business practices and the quality and consistency of data in all functional areas, including inventory management. In addition, the GAO reported that the Initiative is also intended to reduce spending on multiple systems aimed at the same functional requirements and develop common data requirements and formats. The GAO noted that distribution centers, or supply depots, became one of the first functional areas addressed by the Initiative. The GAO reported that also stemming from the July 1989 Defense Management Report was an initiative for consolidating management of all military supply depots under the Defense Logistics Agency.

  The GAO found that, while development and implementation of the Defense Distribution System was continuing as part of the DoD efforts to consolidate supply depots, study groups had been formed under the Corporate Information Management Initiative to determine how best to standardize automated systems. The GAO reported that, in November 1990, the Defense Materiel Management Board designated the Defense Distribution System as an interim standard system for supply depot automation, pending development of single standard systems. The GAO explained that the Board intended that the System replace component-specific systems at all 30 supply depots, if it proved cost effective.

  The GAO further reported that, in early 1991, however, the DoD eliminated the "interim" standard system concept in favor of selecting systems that could be "migrated" to a standard. According to the GAO, Executive Agents were selected to manage and oversee the system standardization process. The GAO reported that the Defense Logistics Agency Executive Agent responsible for distribution center automation is assessing the Defense Distribution System and other candidate systems and expects to select one as a standard system in early 1992. (p. 1, pp. 3-6/GAO Draft Report)

  DoD RESPONSE: Concur. As stated in the DoD response to Finding A, the Executive Agent for Distribution has completed its evaluation of the candidate automatic data processing systems and selected the Area-Oriented Depot/Modernization as the standard system.

- **FINDING C: The Economic Merits Of The Defense Distribution System Have Not Been Substantiated.** The GAO reported that DoD directives require an economic analysis comparing the cost and benefits of a proposed automated system before proceeding with development. In addition, the GAO reported that in December 1990, Corporate Information Management guidance was issued

stating that the benefits of proposed standard or "best of breed" systems must exceed the costs of transition and implementation. The GAO found, however, that the DoD did not perform a cost benefit analysis for the Defense Distribution System prior to development and implementation for the Bay Area consolidation, nor did the DoD provide a cost benefit or other formal economic analysis that might be used to assess the System as a Corporate Information Management standard.

According to the GAO, DoD officials cited the lack of time and the urgency of implementing the depot consolidation as obstacles to completing the analysis. The GAO further reported the officials also claimed that no analysis was needed, because (1) the Defense Distribution System was not a new development, (2) the systems being integrated to form the System had been individually economically justified, and (3) it was a prototype system. The GAO pointed out, however, that the Defense Distribution System is a complex systems integration project that will require a substantial investment. The GAO concluded that without an economic analysis the Department has no assurance that it is pursuing the most cost effective alternative. (p. 2, pp. 6-7/GAO Draft Report)

DoD RESPONSE: Partially concur. The Department agrees that a detailed cost benefit analysis of the type and detail normally expected for a "new start" system was not performed for the Defense Distribution System. The urgency to support the supply depot consolidation is not why the typical cost analysis was not preformed; it was because the Defense Distribution System was not a classic "new start" project. All portions of the systems being adopted had been through their separate approval processes and were operational. One of the objectives for the Defense Distribution System prototype was to gain technical, functional, and cost knowledge. That knowledge was employed effectively in the standard system selection process, which was completed in January 1992, in accordance with the Corporate Information Management guidance. A Major Automated Information System Review Council in-process review will be conducted during Calendar Year 1992, to review the recommended Distribution Standard System. The in-process review will include an examination of the functional, technical, and economic merits of the recommended standard distribution system.

- **FINDING D**: **Estimated Costs Of The Defense Distribution System**. The GAO reported that the DoD has not developed detailed site implementation plans or cost estimates for the Defense Distribution System. According to the GAO, however, the DoD estimates that if fully deployed at all 30 supply depots, the System will cost nearly $100 million. The GAO pointed out that at this time it is difficult to determine the validity of those

cost estimates, because of the uncertainty about both development and deployment issues.

Regarding development, the GAO explained that, while the System is described as a standard system for the Bay Area centers, the actual technical configuration may vary significantly from site to site. As an example, the GAO reported that the Naval Integrated Storage, Tracking, and Retrieval System warehouse control component may not be used at all the sites, but rather replaced by another control system specific to that site. As a result, the GAO observed that the interfaces recently developed between the two underlying systems may have to be re-engineered.

The GAO reported that the DoD has not yet completed its evaluation of the Defense Distribution System, and other candidate systems and, therefore, there is no overall implementation plan or cost estimate for the System. The GAO noted that the cost estimates prepared thus far by the DoD do not identify all costs for installing the System at supply depots outside the Bay Area, or for integrating the Defense Distribution System with various financial, transportation, and other related logistics systems. The GAO observed that the cost of the integration could be high and should be considered when the DoD makes the standard system selection. According to the GAO, the DoD is preparing detailed cost estimates as part of the ongoing evaluation of the Defense Distribution System and other alternatives, expected to be completed in early 1992. The GAO noted that at the same time, the DoD is continuing System development, as part of the prototype consolidation initiative, from funds originally dedicated to upgrading the two underlying systems. (p. 2, pp. 7-9/GAO Draft Report)

DoD RESPONSE: Concur. It should be pointed out, however, that the $100 million for deployment at all 30 supply depots is irrelevant and could be misleading, since the Department has no plans to deploy the Defense Distribution System beyond the three sites where it is currently operating. In January 1992, the Executive Agent for Distribution selected the Area-Oriented Depot/Modernization as the Distribution Standard System. An overall implementation plan, including the total cost and implementation schedule, is being developed for the selected system.

- **FINDING E**: **The Functional Or Technical Superiority Of The Defense Distribution System Has Not Been Demonstrated**. The GAO observed that the June 1990 criteria for interim Corporate Information Management standard systems required them to be comprised of the "best system in the Department," and such systems were to be nominated based upon their functional and technical superiority over other systems. The GAO reported that

the DoD assembled a review team to evaluate alternative systems, but the team found no significant functional or technical difference between the Defense Distribution System and other candidate systems. As a result, the GAO reported that the evaluation did not support a specific alternative.

According to the GAO, the decision to proceed with the Defense Distribution System was based on (1) the fact that the System integration was well underway, (2) System components were operational, while other candidate systems were not, and (3) a system was urgently needed to support the ongoing Bay Area consolidation project. The GAO also pointed out, however, that the Corporate Information Management criteria clearly stated that no system need be implemented as a standard system, if it was not economically advantageous.

The GAO also identified several technical problems, which bring into question the suitability of the Defense Distribution System as a standard system. The GAO reported, for example, that the Defense Logistics Agency acknowledges it will have to modify the System to provide a "ship from receiving" function to accommodate the combined supply maintenance operations typical of Air Force Logistics Centers. In addition, the GAO found there are technical problems with both the underlying systems. The GAO also pointed out that the underlying Defense Logistics Agency component of the System is based on aging technology, which may prove increasingly expensive to maintain and upgrade. In contrast, the GAO noted that state-of-the-art automated systems are moving toward transaction-based on-line processing.

The GAO concluded that it is not prudent for the DoD to continue to develop and deploy the Defense Distribution System, or any other candidate system, pending selection of a standard system in 1992. As bases for its conclusion, the GAO cited the following:

- the absence of an economic analysis as compared with other possible alternatives (Finding C); and
- questions regarding the functional or technical superiority of the System.

In summary, the GAO concluded that pending the selection, continuing the Defense Distribution System or any other candidate system development and deployment increases the risk that money will be wasted to develop and deploy a system that will eventually be replaced. (p. 2, p. 6, pp. 9-12, p. 15/GAO Draft Report)

DoD RESPONSE: Partially concur. The GAO statement that it is not prudent for the DoD to continue to develop and deploy the Defense Distribution System leads to the conclusion that the DoD

intends to do so. That is not the case. The Defense Distribution System was one of four systems that were evaluated as the potential standard for deployment to all distribution centers. Now that the Area-Oriented Depot/Modernization has been selected as the Distribution Standard System, the Defense Distribution System will not be deployed beyond the three sites where it is currently operating.

The Department also does not agree that the development of the Defense Distribution System or its continued maintenance increases the risks, or has wasted or will waste money. The prototype Defense Distribution System has provided valuable knowledge and experience that should reduce future risks. Even though the Defense Distribution System was not the selected standard system, it will have to operate and be maintained until the selected standard system is deployed to the three sites where the Defense Distribution System is now operating.

- **FINDING F: System Integration Problems Will Face Other Proposed Logistics Standard Systems**. According to the GAO, the Corporate Information Management criterion for technical feasibility requires that interim standard systems be able to interface with other systems. The GAO reported, however, that this proved to be a difficult task for the Defense Distribution System design team. The GAO explained that the design team encountered disparities between data and transaction structures used by the systems being integrated into the System and other related systems with which the Defense Distribution Systems must interface and communicate.

  In addition, the GAO reported that the lack of data and transaction standards presents further problems in integrating proposed standard systems like the Defense Distribution System with other logistics and financial systems. As an example, the GAO reported that the standard system for supply depots, whether it be the Defense Distribution System or some other candidate system, will provide for information exchange between depots, but depot managers must also exchange information with military managers. The GAO observed, therefore, that the Defense Distribution System "custodial" records should closely correspond with "accountable" records maintained on separate computer systems. The GAO noted that this problem is compounded because systems serving those functions have been developed separately within each Service component.

  The GAO reported that the DoD has had a logistics data standards program in place since 1962, but those standards do not address all data areas. The GAO explained that the standards address the high level exchange of data between systems, rather than data definitions and transaction formats. In addition, the GAO

reported that the standards have not been consistently implemented in all cases, or developed in key information areas, such as procurement. The GAO further reported that, according to DoD officials, components often interpret updated standards requirements differently, which can delay implementation of the updated standard for as long as two years.

The GAO reported that, in principle, the DoD recognizes the importance of strengthening the use of logistics data and transaction standards. In that regard, the GAO cited the recent Inventory Reduction Program priority placed on improving logistics standards. In addition, the GAO acknowledged the establishment in September 1991, of a new Center for Data Administration and Operations as part of the Corporate Information Management Initiative, responsible for establishing standard data definitions and formats for all systems.

The GAO concluded that, as a case study, the Defense Distribution System illustrates a major problem that will complicate DoD system standardization efforts under the Corporate Information Management--the lack of adequate data standards. The GAO further concluded that, since the Services have developed numerous logistics systems over the years, standardization differences will have to be overcome and interfaces will have to be designed for systems that were never intended to be integrated. Overall, the GAO concluded that the lack of adequate data standards will substantially increase the technical difficulty and cost of accomplishing the task. (pp.2-3,pp. 12-15/GAO Draft Report)

DoD RESPONSE: Partially concur. The Department agrees that the Defense Distribution System design team encountered integration problems; however, those problems were anticipated and were solved. It must be pointed out, however, that the problem revealed by the Defense Distribution System effort is not in the context of communication between systems, but rather in the context of communication within systems. The several modules that make up the Defense Distribution System were essentially sections of larger systems. The standards for the internal linkage of sections of a system are determined by the activity designing the system. No one previously has attempted to pull apart modules of different systems, designed by different design activities, and then interface the modules to form a new system.

The difficulties in linking the several modules of the Defense Distribution System stem from the differences in the inter-module communication processes used by the different Service and Agency systems from which the modules were taken. The most important lesson learned from the Defense Distribution System development effort is that the internal interfaces can be developed and

accomplished successfully and that, while presenting a challenge, it is not insurmountable.

The Department does not agree that data definition and transaction standards do not exist. They exist where they have been needed, for the exchange of logistics information between systems. There are approximately 150 standard transaction formats (with accompanying data element definitions) that prescribe logistics data interchange between Inventory Management, Supply Depot, Transportation, Maintenance Depot, and other customer systems. The standards are mandatory for external systems communication. Inter-system communication is not a problem. All of the Department distribution systems can and do communicate effectively with all other Department systems where an interface is required, via standard transactions.

* * * * *

RECOMMENDATIONS

- **RECOMMENDATION 1**: The GAO recommended that the Secretary of Defense discontinue further development and deployment of the Defense Distribution System until the Department completes its evaluation of candidate supply center systems in early 1992, and selects a DoD-wide standard system. (pp. 15-16/GAO Draft Report)

  DoD RESPONSE: Concur. The Department has no plans to deploy the Defense Distribution System beyond the Bay Area sites where it is currently deployed and operating. As discussed in the DoD response to Finding A, the Department recently completed a rigorous analysis of candidate systems. The Defense Distribution System was not selected. Instead, the Executive Agent for Distribution selected the Area-Oriented Depot/Modernization to serve as the standard system for DoD-wide distribution depot automation. While the Defense Distribution System was not the selected system, until replaced, it will require continued maintenance to support those sites in the Bay Area where it is currently deployed.

- **RECOMMENDATION 2**: The GAO further recommended that the Secretary of Defense pursue no such candidate system unless the Director of Defense Information validates that:

  -- the benefits of the proposed system clearly justify its costs;

  -- the functional and technical merits of the proposed system justify it as a DoD-wide standard; and

-- the significant system integration issues facing the proposed system have been addressed adequately. (p. 16/GAO Draft Report)

DoD RESPONSE: Concur. The DoD analysis, completed in January 1992, included the validation of the three areas covered by this recommendation. Additionally, a Major Automated Information System Review Council in-process review will be conducted during Calendar Year 1992.

- RECOMMENDATION 3: The GAO recommended that the Secretary of Defense ensure that the Department has underway, a coordinated program for developing and controlling data and transaction standards, including a mechanism for ensuring that the standards are implemented uniformly and consistently in all Corporate Information Management standard systems. (p. 16/ GAO Draft Report)

DoD RESPONSE: Concur. The issuance of Department of Defense Directive 8320.1, "DoD Data Administration," dated September 26, 1991, established a coordinated program for developing and controlling data and transaction standards.

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