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Report to the Chairman, Subcommittee  
on Military Readiness, Committee on  
National Security, House of  
Representatives

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# DEFENSE MANAGEMENT

## Selection of Depot Maintenance Standard System Not Based on Sufficient Analyses







United States  
General Accounting Office  
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Accounting and Information  
Management Division

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The Honorable Herbert H. Bateman  
Chairman, Subcommittee on Military Readiness  
Committee on National Security  
House of Representatives

Dear Mr. Chairman:

This report responds to the Committee's request that we evaluate the Department of Defense's (DOD) justification for developing and deploying the Depot Maintenance Standard System (DMSS). DOD is developing DMSS to support its efforts to streamline depot maintenance operations and manage resources more efficiently at its repair depots. Annually, the Department spends about \$13 billion to manufacture, overhaul, and repair equipment, such as airplanes, ships, and tanks and reparable parts of this equipment, such as radios and engines.

DMSS is being developed and deployed as a migratory information system<sup>1</sup> under the Department's Corporate Information Management (CIM) initiative. DOD expects to spend more than \$1 billion to develop and deploy DMSS over 10 years from fiscal years 1993 through 2003. In its report on the National Defense Authorization Act for Fiscal Year 1995, the Committee expressed concern that despite spending billions of dollars for information technology over the last few years, DOD had not achieved significant quality improvements, cost savings, and productivity gains in service operations. The Committee directed the Secretary of Defense to conduct a study to determine the best prototype depot maintenance system and directed GAO to assess the soundness of the study's conclusions.

The Department, however, has not done a study in response to this requirement. DOD officials stated that, in their opinion, two studies done by the Logistics Management Institute during 1994 comparing the services depot maintenance automated systems would meet the legislative requirement. These studies, however, focused on only one of the eight system components of DMSS and did not address reengineering alternatives for improving depot maintenance operations. Therefore, in response to the Committee's concerns, our objectives were to determine whether DOD had (1) based its selection of DMSS on convincing analyses of costs and benefits

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<sup>1</sup>A migratory system is an existing information system or systems designated to replace each of the many service-unique systems now supporting similar business functions.

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as well as economic and technical risks and (2) selected a strategy that would dramatically improve depot maintenance operations.

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## Results in Brief

Defense has little real assurance that it can achieve even the relatively modest projected improvements and cost savings in depot maintenance operations from DMSS. The Department did not base its decision to develop and implement DMSS on sufficient analyses of costs and benefits or on detailed assessments of economic and technical risks. Also, Defense did not obtain project milestone reviews by Defense's Major Automated Information System Review Council (MAISRC) and approvals from the Milestone Decision Authority (MDA). These reviews and approvals are designed to ensure that system development and implementation decisions are consistent with sound business practices and to better manage risks inherent in large information system projects.

Even if successfully implemented as envisioned, DMSS will not dramatically improve depot maintenance in DOD. Defense did not reengineer its business processes, which could provide dramatic improvement and cost savings. Instead, it is currently making a major investment, totaling more than \$1 billion, to develop and deploy DMSS, designed to incrementally improve depot maintenance processes while migrating from service-unique supporting information systems toward a DOD-wide integrated corporate system. These improvements are intended to reduce depot maintenance operational costs by \$2.6 billion or less than 2.3 percent over a 10-year period. Defense has achieved incremental improvements through initial implementation of DMSS system components. However, by focusing first on developing and deploying a standard depot maintenance information system designed to incrementally improve depot maintenance processes, DOD will not achieve any immediate dramatic cost reductions and may make future reengineering efforts more difficult by entrenching inefficient and ineffective work processes.

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## Scope and Methodology

We based our review on an assessment of DOD's implementation of its own directives and instructions for new automated information systems or the selection and implementation of standard migratory systems under the CIM initiative, as these projects relate to the depot maintenance business area. These directives, referred to as Life-Cycle Management,<sup>2</sup> contain the same

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<sup>2</sup>Defense Directive 8000.1, Defense Information Management (IM) Program; Defense Directive 8120.1, Life-Cycle Management (LCM) of Automated Information Systems (AISs); and Defense Manual 8020.1-M, Functional Process Improvement (Functional Management Process for Implementing the Information Management Program of the Department of Defense).

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steps and milestones as GAO's own methodology for reviewing large automated information systems/projects.

Our audit was performed between April 1994 and March 1995 in accordance with generally accepted government auditing standards. We performed our work primarily at the offices of the Deputy Under Secretary of Defense for Logistics in Washington, D.C., and the Joint Logistics Systems Center, Wright-Patterson Air Force Base, Ohio. Appendix I details our scope and methodology. The Deputy Under Secretary of Defense for Logistics provided written comments on a draft of this report. These comments are discussed at the end of this report and presented, along with our evaluation, in appendix II.

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## Significant Problems in DOD Depot Maintenance

Each year DOD spends about \$13 billion to manufacture, overhaul, and repair more than 2 million items at its more than 27 maintenance depots. The depots have primary responsibility for the maintenance, overhaul, and repair of large items, such as tanks, ships, and airplanes, and small and intricate ones, such as communications and electronic components. Depot maintenance consists of three basic business processes: project management (maintenance of major-end items, such as airplanes, ships, and tanks), reparables management (maintenance of items, such as engines, transmissions, and radios), and specialized support (various individual functions, such as tracking hazardous materials, tools, and test samples).

For years, GAO and DOD have reported on major problems facing the depot maintenance area, principally that DOD's depot management structure has not resulted in substantial competition, interservicing, or reduction of excess capacity and duplication of effort. For example:

- In 1983, GAO testified<sup>3</sup> that DOD had not moved quickly to eliminate duplicate capability and excess capacity within depot maintenance because of (1) parochial interests, (2) lack of central authority, and (3) absence of DOD-wide planning.
- In 1993, the Joint Chiefs of Staff reported that closing a significant number of depots was needed to reduce excess capacity and that significant savings could come from consolidating depot workload across service boundaries. In May 1993, we testified,<sup>4</sup> that the Joint Chiefs of Staff

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<sup>3</sup>Depot Maintenance: Issues in Management and Restructuring To Support a Downsized Military (GAO/T-NSIAD-93-13, May 6, 1993).

<sup>4</sup>See footnote 3.

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identified 25 to 50 percent more depot capacity than will be needed in the future and that this problem had been exacerbated by (1) the end of the cold war, (2) reduction of defense systems and equipment, (3) retirement of less reliable and more maintenance-intensive systems, and (4) the private sector's push for a greater share of the depot maintenance workload.

- In 1993,<sup>5</sup> we reported that internal controls at Army depots did not adequately safeguard millions of dollars of weapons and equipment during the maintenance processes. Specifically, we reported that poor storage practices increased maintenance costs, depot inventory records were not accurate, and the Army's depot cost accounting system did not capture actual job costs.
- In 1995, DOD reported to the Congress that its financial systems and databases were inadequate to provide the type of information to determine the cost-effectiveness of greater public-private competition for providing depot maintenance services.

Over the last several years, DOD has taken a number of actions to correct these problems. One of these actions is its Corporate Information Management initiative, which was established to prepare DOD for future budget reductions and post-cold war readiness requirements through (1) streamlining business processes, (2) integrating essential data systems, and (3) eliminating duplicate or redundant information systems across the Department. The DMSS project was undertaken as part of this effort.

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## Strategy for Addressing Depot Maintenance Problems

To improve its depot maintenance operations and manage its resources more efficiently, the Principal Staff Assistant (PSA)<sup>6</sup> for logistics,<sup>7</sup> in November 1991, established the Joint Logistics System Center (JLSC). JLSC is to facilitate the improvement of depot maintenance processes by identifying business process improvements and managing the development and deployment of a standard depot maintenance system to replace service-unique systems currently used.

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<sup>5</sup>Financial Management: Poor Internal Control Has Led to Increased Maintenance Costs and Deterioration of Equipment (GAO/AFMD-93-8, January 25, 1993).

<sup>6</sup>PSAs include the Under Secretaries, Assistant Secretaries, General Counsel, Inspector General, Comptroller, Assistants to the Secretary of Defense, and the Office of the Secretary of Defense Directors or equivalents, including the Chairman of the Joint Chiefs of Staff, who report directly to the Secretary or Deputy Secretary of Defense.

<sup>7</sup>When JLSC was created, the PSA for logistics was the Assistant Secretary of Defense for Production and Logistics. Following a reorganization in the Office of the Secretary of Defense, the PSA for logistics is now the Deputy Under Secretary of Defense for Logistics.

In January 1994, JLSC prepared an economic analysis recommending development and deployment of a standard depot maintenance information system—called the Depot Maintenance Resource Planning (DMRP) system, which consisted of four system components.<sup>8</sup> Currently, the standard information system consists of eight components and is called DMSS. The following table identifies the core depot maintenance business processes and the eight system components selected to support them.

**Table 1: Depot Maintenance Core Business Processes and Their Supporting DMSS System Components**

<b>Business Process</b>	<b>Supporting System Component</b>
<b>Project management</b> planning and allocating labor, material, and capital resources for repairing major-end items, such as airplanes, ships, and tanks	<ul style="list-style-type: none"> <li>•Baseline Advanced Industrial Management System</li> </ul>
<b>Reparables management</b> activities for making labor and equipment more productive on the shop floor	<ul style="list-style-type: none"> <li>•Depot Maintenance Management Information System</li> <li>•Interservice Material Accounting and Control System</li> </ul>
<b>Specialized support</b> various individual functions, such as tracking hazardous materials, tools, and test samples	<ul style="list-style-type: none"> <li>•Enterprise Information System</li> <li>•Facilities and Equipment Maintenance</li> <li>•Depot Maintenance Hazardous Material Maintenance System</li> <li>•Laboratory Information Management System</li> <li>•Tool Inventory Management Application</li> </ul>

Note: See appendix III for brief descriptions of each of these eight system components.

By implementing DMRP, DOD expected a return on its investment of \$2.6 billion through business process improvements and savings derived from replacing more than 60 service-unique automated depot maintenance information systems. Specifically, these benefits are to be derived from (1) reduced direct and indirect labor costs, (2) reduced direct and indirect material costs, (3) reduced costs associated with shutting down old information technology (legacy) systems, (4) shorter cycle time for certain types of maintenance and inspections, and (5) automation of many currently paper-based work processes.

Our concerns with this strategy are twofold. First, DOD did not base its decision to develop and deploy DMSS on convincing analyses of expected system development and deployment costs or detailed assessments of

<sup>8</sup>One DMRP system component, the Programmed Depot Maintenance Scheduling System, is a module of the DMSS system component called Baseline Advanced Industrial Management System.

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DMSS's economic and technical risks. Further, Defense did not obtain the independent reviews by the MAISRC and approvals by the MDA of the project's milestones, which are designed to ensure the decision was consistent with sound business practice. Second, we believe that DOD needs to consider reengineering entire processes before implementing system changes if it is to achieve the dramatic reductions in operational support costs called for by CIM.

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## DUSD(L) Did Not Use Sufficient Analyses in Selecting DMSS

In selecting DMSS as DOD's initial step toward improving defense maintenance depot operations, the Deputy Under Secretary of Defense for Logistics (DUSD(L)) did not base its decision on sufficient analyses of expected system development and deployment costs or detailed assessments of DMSS's economic and technical risks. Further, DUSD(L) did not obtain independent milestone reviews and approvals which are designed to ensure (1) decisions are consistent with sound business principles and (2) risks inherent in large information systems projects are adequately managed. Thus, even the marginal improvements Defense expects from DMSS may never be achieved.

Defense directives<sup>9</sup> require that decisions to develop and deploy information systems be based on convincing, well-supported estimates of project costs, benefits, and risks. These directives establish a disciplined process for selecting the best projects based on comparisons of competing alternatives.

Defense's principal means for comparing various alternatives is a functional economic analysis. For each alternative, it identifies resource, schedule, and other critical project characteristics and presents estimates of the costs, benefits, and risks. The Office of the Assistant Secretary of Defense for Program Analysis and Evaluation is required to validate these estimates to help ensure that the economic analysis presents compelling quantitative data for each of the alternatives being evaluated. Once an alternative is chosen, the analysis becomes the basis for project approval. Any significant change in the project's expected costs, benefits, or risks requires that the project selection and direction be reevaluated.

Also, DOD directives established the Major Automated Information System Review Council (MAISRC) to provide oversight of individual major

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<sup>9</sup>See footnote 2.

information system projects.<sup>10</sup> At each development milestone<sup>11</sup> for proposed information system projects, MAISRC reviews these projects to determine if they are consistent with DOD policies and directives. MAISRC then recommends continuation, redirection, or termination of each project to the project's Milestone Decision Authority (MDA). DOD's current policy is to ensure that funds are not obligated for any automated information system until the MAISRC milestone review and MDA approval are complete.

In January 1994, following the logistics CIM migration strategy, the JLSC evaluated three alternatives for improving the core Defense depot maintenance functions. The alternatives considered involved (1) maintaining status quo by allowing each service to continue to operate its own information system with some new development under JLSC's purview, (2) choosing a corporate information system from among the services and establishing it as the DOD-wide standard system—deploying it either immediately and then enhancing it over a 3-year period or deploying it after enhancements, and (3) developing a new system.

In selecting an alternative, DUSD(L) did not evaluate sufficiently accurate cost data and detailed assessment of risks, nor did it obtain milestone reviews and approvals designed to ensure automated information systems are selected consistent with sound business practices.

## DUSD(L) Selected DMSS Without Sufficient Cost Data

DUSD(L) selected DMSS without analyzing the system's full development and deployment costs. Instead, it relied on a functional economic analysis of a previously proposed project—the Depot Maintenance Resource Planning (DMRP) system. This analysis significantly understated DMSS costs by including costs for only some components, and it understated costs for the components it did include. In early 1994, the JLSC Commander recognized that the DMRP economic analysis did not reflect DMSS as defined.

According to JLSC officials, DUSD(L) used the DMRP functional economic analysis as a basis for selecting DMSS because it was the best available at the time. The DMRP analysis estimated project costs at \$988 million—\$582 million to develop and deploy and \$406 million to operate and support over a 10-year period. These officials stated that the DMRP analysis fairly represented the DMSS project. However, the Office of

<sup>10</sup>Major information system projects are those with estimated development and deployment costs in excess of \$25 million in any 1 year, \$100 million in total, or are designated as being of special interest.

<sup>11</sup>Under DOD's life-cycle management process, system development projects are divided into five phases with corresponding decision points, called milestones, where project progress is assessed and documented.

the Assistant Secretary of Defense for Program Analysis and Evaluation reviewed this analysis and found its level of detail insufficient to validate either cost or benefit estimates.

Although we also found insufficient details supporting cost and benefit estimates, we believe that DMSS will cost significantly more than the DMRP. As shown in table 2, the DMRP economic analysis included costs for only three of the eight DMSS system components. Therefore, the analysis understated DMSS costs by the amount necessary to develop and deploy the five additional system components. As of February 1995, JLSC had not completed a cost estimate for these five additional components.

**Table 2: Comparison of DMRP and DMSS System Components**

System Components	DMRP	DMSS
Baseline Advanced Industrial Management		√
Depot Maintenance Hazardous Material Management System	√	√
Depot Maintenance Management Information System	√	√
Enterprise Information System		√
Facilities and Equipment Maintenance		√
Interservice Material Accounting and Control System		√
Laboratory Information Management System		√
Programmed Depot Maintenance Scheduling System	√	√ <sup>a</sup>
Tool Inventory Management Application	√	√

<sup>a</sup> Under DMSS, this system is a module of the Baseline Advanced Industrial Management System.

In addition, the DMRP economic analysis underestimated costs for system components common to both DMRP and DMSS projects. Specifically, it underestimated licensing costs for using commercially owned software, costs to exchange data with other information systems, and costs to install the system.

One example of underestimated licensing costs is in a key DMSS component—the Air Force’s Depot Maintenance Management Information System (DMMIS). Over the last 10 years, the Air Force spent over \$200 million to develop DMMIS for use in its maintenance depots. Originally designed around a core of commercially available application and database software, the Air Force chose to extensively modify this proprietary software to better meet its unique depot maintenance requirements. However, all software versions remain the sole property of

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the commercial developers. As a result, to use the DMMIS system, DOD will have to pay license fees to several commercial software developers.

Although the DMRP economic analysis did not specify DMMIS license fee costs, JLSC officials stated that \$1.6 million per site was included in the deployment cost totals. In February 1995, JLSC estimated that DMMIS license fees for just the development facility and two operational sites would exceed \$13 million, including a one-time payment of over \$5 million and nearly \$850,000 each year over the system's life. As of April 1995, JLSC expected to run DMMIS at three additional sites. Licensing agreements had yet to be negotiated for these sites.

The DMRP analysis also underestimated costs to develop interfaces needed to allow system components to exchange data with the information systems currently used by the services to accomplish their missions. While the analysis recognized that system components must interface with other systems, it did not include the full cost of these interfaces. According to JLSC officials, some costs to interface the DMMIS and Programmed Depot Maintenance Scheduling System were included in the \$37.7 million estimate for developing the system's software applications. However, they did not specify these costs.

Although JLSC has yet to identify them, DMSS will require numerous system interfaces if it is to be the corporate depot maintenance system. For example, prior work done by the Air Force to deploy DMMIS, before it was selected as a DMSS component, identified 73 required interfaces just to meet Air Force requirements. As a DMSS system component, additional DMMIS interfaces will be needed to meet Army, Navy, and Marine Corps requirements. Further, interfaces for the remaining seven DMSS system components must be identified and developed. In February 1995, JLSC's Deputy Director for Depot Maintenance estimated that \$70 million not included in the DMRP economic analysis would be needed to develop the DMSS interfaces.

Finally, the DMRP economic analysis underestimated costs for deploying the system. The analysis estimates \$497 million for system deployment. This estimate includes nonrecurring costs of \$17 million to install the system at each operational site. Since DMSS was initiated, JLSC has identified that an additional \$60 million would be needed to deploy the system.

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In May 1994, the JLSC Commander told the DOD Comptroller about the DMRP economic analysis. The Commander stated that the economic analysis briefed to DUSD(L) in December 1993 and submitted for the DOD Comptroller's review in early 1994 did not reflect DMSS as it was then defined. Further, he stated that to accommodate changes requested by the Comptroller and the office of Program Analysis and Evaluation and to reflect the current DMSS, JLSC was developing a new analysis. According to JLSC officials, the final economic analysis is expected to be completed in July 1995. However, by this time Defense will have spent more than \$200 million to develop and deploy DMSS.

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### DUSD(L) Selected DMSS Without Fully Assessing Risks

Although any large automated information system development project is inherently a high-risk venture, DUSD(L) decided to develop and deploy DMSS without first fully assessing the risks to the project's success. Without a detailed risk assessment, DOD has no assurance that DUSD(L) selected the best information system alternative for improving defense depot maintenance operations, nor can it plan actions designed to avoid or lessen the potential for project delay, overspending, or failure.

DOD has long recognized that project success relies on its ability to manage risk. The Defense Systems Management College guide on risk management states that, as a minimum, a prudent manager should attempt to understand system specific risks and quantify their potential impact for each alternative. While the earlier DMRP analysis identified several potential risks associated with each alternative being considered, it did not quantitatively or qualitatively compare these risks. Additionally, it did not contain any plans to mitigate potential project risks.

After DUSD(L) selected DMSS, JLSC convened a customer advisory team in April 1994 to identify and generate ideas on how to mitigate DMSS risks. This team, with membership from all the military services, identified a number of risks facing DMSS, such as (1) incomplete design and testing of the two core DMSS systems—Depot Maintenance Management Information System and the Baseline Advanced Industrial Management System, (2) not enough personnel to implement and maintain the system, (3) inability to obtain service cooperation needed to successfully build and deploy the system, (4) numerous external and internal interface issues, and (5) depot maintenance workers' reluctance to work with an entirely new system.

JLSC requested another high-level risk analysis of the depot maintenance standard system strategy from the Defense Information Systems Agency's

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Center For Integration & Interoperability (CFI&I). In a July 1994 briefing to JLSC, CFI&I said that program management posed the greatest risks to DMSS success. CFI&I said the project lacked (1) integrated detailed planning specifying the activities and milestones to be achieved at each depot and (2) coordination of events necessary to implement the system, and that, as a result, there was no assurance that DMSS could meet cost, schedule, and performance expectations.

In addition, CFI&I identified a number of technical risks to DMSS implementation, including (1) no encompassing data migration strategy, (2) incomplete and inadequate understanding of the requirement to interface DMSS with other current service systems, (3) difficulties associated with maintaining modified commercially owned software, and (4) incomplete development and testing of two of the system components.

In October 1994, JLSC began an iterative detailed assessment of DMSS to quantify risks, identify possible mitigation or avoidance steps, and develop a risk management plan. As of April 1995, JLSC was continuing this assessment.

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## Project Milestone Reviews and Approvals Not Obtained

Although Defense directives establish MAISRC review and MDA approval procedures to ensure that decisions to develop major automated information systems are based on sound business principles, as of February 1995, DUSD(L) had not scheduled a date for an initial milestone review of the entire DMSS project. Under MAISRC guidelines, a project should be reviewed and approved at each of five decision milestones<sup>12</sup> before substantial funds are obligated. Despite this DOD policy, DUSD(L) spent nearly \$180 million in fiscal years 1993 and 1994 on DMSS, and budgeted \$111.2 million in fiscal year 1995 and \$95.1 million in fiscal year 1996. These budgeted amounts are for the development and deployment of DMSS and do not include amounts to maintain and operate the current systems.

According to the director of logistics systems development within DUSD(L), DMSS will be submitted for MAISRC review and MDA approval during 1995. However, we found that as of February 1995, DMSS was on the MAISRC review schedule for 1995 but no date for the review had been established. The director also indicated that continued implementation of DMSS at selected prototype sites is justified based on past MAISRC reviews and MDA

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<sup>12</sup>DOD Instruction 8120.2, *Automated Information System (AIS) Life-Cycle Management (LCM) Process, Review, and Milestone Approval Procedures*, describes five milestone decision points: Concept Studies Decision, Concept Demonstration Decision, Development Decision, Production Decision, and Major Modification Decision.

approvals of the DMMIS component of the project. However, Defense directives<sup>13</sup> require programs which consist of a number of component systems to be reviewed by MAISRC and approved by MDA as a single project. Without these reviews and approvals, DOD has less assurance that the decision to select DMSS was consistent with sound business practices. Also, DOD did not have an opportunity afforded by the MAISRC review and MDA approval to redirect or terminate DMSS before investing significant amounts of money.

## DUSD(L) Did Not Consider Reengineering Depot Maintenance Processes Before Selecting DMSS

In evaluating alternatives to improve depot maintenance operations, DUSD(L) did not consider reengineering alternatives which offer opportunities to dramatically improve depot maintenance business processes and greatly reduce the costs of operations. Even if successful, DOD's strategy to develop and deploy an information system designed to incrementally improve depot maintenance processes will only provide marginal cost reductions and productivity increases rather than the fundamental and dramatic changes needed to meet the challenges of maintaining military readiness in the 1990s.

## Reengineering of Business Processes Can Offer Dramatic Improvement

DOD recognizes that business process reengineering holds the greatest potential for meeting the demands of a changing Defense environment with dramatic increases in effectiveness and efficiency. In the DOD Enterprise Model,<sup>14</sup> the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence stated:

The defense community must make fundamental changes in the way it performs its activities if it is to provide the nation with the defense it requires and demands. ... Incremental improvements...will not shift the Department to a higher plateau of performance. Breakthrough innovation and change—a new paradigm for defense activities—is needed to meet the challenges of the 1990's.

In January 1991, the Deputy Secretary of Defense endorsed a CIM implementation plan in which DOD would “reengineer,” or thoroughly study and redesign, its business processes before it standardized its information systems. The Deputy Secretary understood that DOD would have to

<sup>13</sup>Defense Directive 8120.1, Life-Cycle Management (LCM) of Automated Information Systems (AISs) and Defense Instruction 8120.2 Automated Information System (AIS) Life-Cycle Management (LCM) Process, Review, and Milestone Approval Procedures.

<sup>14</sup>The DOD Enterprise Model, Volume II: Using the DOD Enterprise Model - A Strategic View of Change In DOD - A White Paper, January 1994, Office of the Secretary of Defense, Assistant Secretary of Defense for Command, Control, Communications, and Intelligence.

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improve the way it does business to achieve dramatic cost reductions and productivity increases and that it could not merely standardize old, inefficient processes and systems. Simply stated, doing the same thing faster will not provide dramatic improvement.

Though reengineering efforts in DOD have been limited in scope and represent a small portion of operations, significant improvements have been achieved through reengineering specific logistics business areas. For example,<sup>15</sup> in 1980, the Defense Construction Supply Center established a contractor-operated parts depot program that reduced order and delivery time from 70 to 35 days—a 50-percent reduction.

In addition, the private sector, which also has major industrial centers that use similar maintenance and repair supplies for regularly scheduled maintenance of equipment, has undergone successful reengineering efforts when faced with increasing costs associated with acquiring supplies, spare parts, and raw materials. For example,<sup>16</sup> since 1986, through customized agreements with suppliers and the use of new inventory management practices, an Ohio steel firm, Timken Company, reduced maintenance and repair inventories by \$4 million (32 percent). The company also eliminated six inventory storerooms, improved inventory availability, and increased the accuracy of physical inventories.

We have also reported that by adopting certain commercial practices, Defense could similarly dramatically improve depot maintenance. In 1993, for example, we found<sup>17</sup> that a number of private firms provide third-party logistics transportation services, such as freight bill processing, pre-auditing, verifying, and generating management reports with freight payment. Two of these firms proposed to perform transportation services for DOD at a cost ranging to \$.75 to \$1.25 per government bill of lading. DOD spends about \$5.70 per freight bill to provide these same services. If DOD used these firms or changed its process to obtain similar performance, it could reduce costs for these services by more than 75 percent.

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<sup>15</sup>Commercial Practices: DOD Could Save Millions by Reducing Maintenance and Repair Inventories (GAO/NSIAD-93-155, June 7, 1993).

<sup>16</sup>See footnote 12.

<sup>17</sup>Defense Transportation: Commercial Practices Offer Improvement Opportunities (GAO/NSIAD-94-26, November 26, 1993).

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## Reengineering Not Considered for Improving Depot Maintenance

Instead of first considering opportunities to reengineer business processes, DUSD(L) chose a strategy that focuses on the development and deployment of a DOD standard depot maintenance information system. Under this strategy, business processes are to be incrementally improved as DMSS is deployed. Reengineering of these processes will be considered only after system deployment. Currently, DMSS deployment is expected to be completed by fiscal year 1999. Accordingly, fundamental and dramatic changes to the depot maintenance processes will be delayed for years.

According to DOD officials, the vast number of different logistics processes and supporting information systems across the Department must be reduced before significant improvements can be made. These officials further stated that, once fully deployed, the Defense standard information systems will form the foundation upon which significant improvements to current depot maintenance practices can be made. This foundation will eliminate the need to implement major changes across a multitude of information systems and business processes that exist throughout the services.

Additionally, JLSC officials emphasized that improvements are being made to depot maintenance processes as DMSS is being deployed. According to these officials, benefits being achieved from these improvements include (1) cost reductions of \$7 million in shop floor material recovered at the Air Logistics Center in Ogden, Utah, and a \$8 million reduction in purchase of hazardous material at Hill Air Force Base and (2) performance increases from a 30-percent reduction in labor hours for overhauls of the Los Angeles class submarine, and two additional B-1 bombers processed through the Oklahoma City Air Logistics Center.

While these examples show that incremental improvements are being made, JLSC estimated that, overall, the DMSS project would reduce depot operational costs by \$2.6 billion over a 10-year period ending in fiscal year 2003 from \$112.9 billion to \$110.3 billion over this period—a net cost reduction of about 2.3 percent.

We believe that standardizing existing information systems and incrementally improving business processes will not position DOD for reengineering its processes or dramatically improve their operations. Government and private industry have learned that initial focus on information system deployment may make future reengineering efforts more difficult by entrenching inefficient and ineffective work processes.

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Accomplishing order-of-magnitude improvements in both government and private organizations requires reengineering—fundamental redesign—of critical work processes. Information system initiatives that do not first reengineer business processes typically fail or attain only a fraction of their potential. In addition, case studies of private organizations presented in Reengineering The Corporation - A Manifesto For Business Revolution,<sup>18</sup> revealed that companies often commit a fundamental error in viewing automation as the answer to enhancing or streamlining their business operations. They spend billions of dollars to automate existing processes so they can perform the same work faster. Companies that initially focused on information technology managed only to entrench inefficient processes and made future change to these processes more difficult.

Additionally, our case studies of government organizations show that simply automating existing processes will not likely provide significant cost reductions or productivity increases. For example, in February 1995, the Comptroller General of the United States testified<sup>19</sup> that this has been a hard lesson for federal agencies to learn. Specifically addressing the efforts of the Department of Defense, the Comptroller General also stated:

...Defense has focused on trying to pick the best of its hundreds of existing automated systems and standardizing their use across the military components without thoroughly analyzing the technical, cost, and performance risks of this approach. As a result, Defense may lock itself into automated ways of doing business that do not service its goals for the future and cannot provide promised benefits and cost savings.

Our review of DUSD(L)'s depot maintenance standard system strategy confirms this. The benefits it expects from implementing DMSS are relatively meager when compared with results other organizations are achieving through reengineering.

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## Conclusion

We agree with DOD's concern over depot maintenance operations. Further, we agree that accurate information on depot operations and costs is critical to improving this important readiness-related support process. However, the decision to develop DMSS was based on insufficient cost data and with little consideration of identified risks. Efficient, cost-effective depot maintenance operations are important to supporting the

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<sup>18</sup>Reengineering The Corporation - A Manifesto For Business Revolution, Michael Hammer and James Champy, 1994.

<sup>19</sup>Testimony before the Senate Committee on Governmental Affairs, Government Reform: Using Reengineering and Technology to Improve Government Performance (GAO/T-OGC-95-2, February 2, 1995).

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Department's military operations. Major investment decisions—such as DMSS—represent significant opportunities to make dramatic improvements in core business processes. Further, DOD's proposed solution was made without due consideration of reengineering alternatives which offer dramatic improvements and greatly reduce costs of depot operations. DOD's failure to consider reengineering alternatives and to fully consider the costs and risks associated with DMSS will likely limit those opportunities.

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## Recommendations

To achieve the dramatic improvements in effectiveness and efficiency of its depot maintenance operations that Defense has stated are critical to meet the challenges of the 1990s and beyond, we recommend that the Secretary of Defense direct the Deputy Under Secretary of Defense for Logistics to complete the following actions.

- Prepare a full set of project documentation that describes the project and validates that it is the best alternative for improving depot operations. At a minimum, this documentation should include the following.
  - A final functional economic analysis containing a comprehensive evaluation of information system alternatives. This analysis should formulate and compare estimates of the total costs and benefits of each alternative.
  - Identification of economic and technical risks associated with success of each project alternative and development of a plan to avoid or mitigate these risks.
  - A comprehensive implementation plan that identifies actions to be taken, schedules, and milestones for these actions, and performance measures to be used to manage the system deployment.
- Obtain the Major Automated Information Systems Review Council review and Milestone Decision Authority approval of the project documentation prior to spending any fiscal year 1996 funds on DMSS development and deployment.
- Conduct a thorough study of opportunities to reengineer the depot maintenance business processes. Reengineering alternatives identified by this study should be analyzed as part of the final functional economic analysis and submitted for MAISRC review and MDA approval.

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## Agency Comments and Our Evaluation

The Department of Defense provided written comments on a draft of this report. The Deputy Under Secretary of Defense for Logistics generally disagreed with our findings, but partially concurred with our

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recommendations. Defense's specific comments are summarized below and presented, along with our rebuttals, in appendix II.

In its comments, Defense took the following positions.

- The DMSS functional economic analyses of March 1993 and January 1994 provided sufficient cost, benefit, and risk information to select the best alternative for improving depot maintenance business processes.
- DMSS is not one system requiring MAISRC oversight and that the individual system components meeting MAISRC oversight criteria have been reviewed and approved.
- Process reengineering is being accomplished concurrently with DMSS development and deployment. Defense asserts that by following this strategy, it has achieved substantial depot maintenance improvements yielding significant cost reductions. Defense expects even more dramatic improvements and savings in the future.

We disagree with Defense's positions on these matters. Specifically:

- The March 1993 and January 1994 FEAS were insufficient because they did not include cost and benefit estimates for the DMSS, contained cost estimates of questionable accuracy, and did not include cost and benefit estimates for five of the DMSS system components.
- Defense CIM guidance specifically directs that information system projects be reviewed and approved in accordance with Defense life-cycle management directives. Under these directives DMSS is required to be reviewed by MAISRC and approved by the MDA at five milestone decision points before any funds are spent to develop the system. Further, these directives state that projects consisting of several components shall be considered as a single automated system.
- Defense's approach to improving depot maintenance business processes focuses on the selection of the best currently operating information systems and implementation of these selected systems across all Defense components. While this approach may improve overall DOD business processes and may provide incremental benefits, it cannot be construed as reengineering. DMSS is designed to provide only incremental improvements to existing business processes and it is clear from Defense's own benefit projections that it will not result in the dramatic improvements that are possible by considering reengineering-based solutions. While it claims that DMSS has improved depot maintenance processes and resulted in some reductions in operational costs, DUSD(L)'s focus on information system

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selection and implementation may inhibit reengineering efforts by entrenching current work processes.

Although Defense disagreed with our findings, it agreed with our recommendation to prepare a full set of project documentation that describes DMSS and validates that it is the best alternative to improve depot maintenance. It partially concurred with our recommendation on obtaining MAISRC review but specifically disagreed with our recommendation concerning thoroughly studying opportunities to reengineer depot maintenance business processes. Our recommendation for MAISRC review is consistent with review requirements established in Defense life-cycle management directives. Further, because reengineering offers order-of-magnitude improvement and cost reductions, Defense cannot afford to deploy DMSS beyond the first five prototype sites until it has fully assessed reengineering alternatives.

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We are sending copies of this report to the Ranking Minority Member of the Subcommittee, the Chairmen and Ranking Minority Members of the Senate and House Committees on Appropriations, the Senate Committee on Armed Services, the Senate Committee on Governmental Affairs, and the House Committee on Government Reform and Oversight; the Secretaries of Defense, the Army, the Navy, and the Air Force; the Director of the Office of Management and Budget; and other interested parties. Copies will be made available to others on request.

If you have any questions about this report, please call me at (202) 512-6240 or Carl M. Urie, Assistant Director, at (202) 512-6231. Major contributors to this report are listed in appendix IV.

Sincerely yours,



Jack L. Brock, Jr.  
Director, Information Resources Management/  
National Security and International Affairs

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# Contents

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Letter	1
Appendix I Objectives, Scope, and Methodology	22
Appendix II Comments From the Department of Defense	24
Appendix III Description of DMSS Component Systems	44
Appendix IV Major Contributors to This Report	46
Related GAO Reports	47
Tables	
Table 1: Depot Maintenance Core Business Processes and Their Supporting DMSS System Components	5
Table 2: Comparison of DMRP and DMSS System Components	8

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**Abbreviations**

AIS	automated information system
CFI&I	Center For Integration & Interoperability
CIM	Corporate Information Management
DMMIS	Depot Maintenance Management Information System
DMRP	Depot Maintenance Repair Planning System
DMSS	Depot Maintenance Standard System
DOD	Department of Defense
DUSD(L)	Deputy Under Secretary of Defense for Logistics
FEA	functional economic analysis
IM	information management
IPR	in-process review
JLSC	Joint Logistics System Center
LCM	life-cycle management
MAISRC	Major Automated Information System Review Council
MDA	Milestone Decision Authority
OSD	Office of the Secretary of Defense
PSA	Principal Staff Assistant
SDP	system decision paper

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# Objectives, Scope, and Methodology

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We based our review on an assessment of DOD's implementation of its own directives and instructions for new automated information systems or the selection and implementation of standard migratory systems under the CIM initiative, as such projects relate to the depot maintenance business area. These directives, referred to as Life Cycle Management, contain the same steps and milestones as GAO's own methodology for reviewing large automated information systems/projects.

Specifically, to determine whether the Department based its selection of DMSS on convincing analyses of costs and benefits, we reviewed policies, procedures, directives, and memoranda establishing criteria for the successful acquisition of automated information systems under the CIM initiative. We compared the Department's actions and plans for selecting and implementing DMSS with these criteria. To further assess the adequacy of the selection, we examined the cost and benefit data available to senior Defense officials responsible for selecting DMSS. Because the level of detail was insufficient, we did not evaluate these cost and benefit data. Also, we interviewed Defense logistics officials to obtain the rationale behind the DMSS selection. To identify expected DMSS costs and benefits, we analyzed available functional economic analyses (FEA). We did not validate the costs and benefits presented in the FEA used to justify DMSS since (1) our objective was to examine DOD's decision given the cost and benefit information available to it at the time and (2) the FEA was based on a different project—the DMRP. We interviewed JLSC officials to determine changes made to project scope, costs, or benefits occurring since early 1994 and any additional analyses currently being done. We also met with numerous program and functional officials, including JLSC managers responsible for implementing the eight DMSS system components, and depot officials at the Air Force's repair depot in Ogden, Utah, and the Army's depot in Tobyhanna, Pennsylvania.

To determine whether the Department had fully assessed economic and technical risks threatening the successful implementation of DMSS and identified actions to avoid or mitigate these risks, we reviewed risk assessments available when DUSD(L) decided to develop and deploy DMSS. Additionally, we examined risk analyses conducted by the Joint Logistics Systems Center, other Defense organizations, and industry experts completed since the DMSS selection was made. We interviewed program and technical officials to obtain opinions on the potential impact of risks identified by these analyses on project success and to identify actions for avoiding or mitigating those risks most likely to result in project failure, delay, and overspending.

To determine whether the Department selected a strategy that would dramatically improve depot maintenance processes, we reviewed DOD documents detailing challenges of meeting the defense mission in the post-cold war environment, CIM goals and objectives to meet these challenges, and the plans and strategies for implementing CIM across the Department. We compared these DOD strategies and plans to the Logistics Migration Approach established to implement the CIM initiative in the logistics business area. We then compared the level of improvement expected from a standard depot maintenance information system to the DOD stated requirement to meet the challenges of the future defense environment. To identify alternatives to information system approaches, we reviewed private industry studies and past GAO reports of lessons learned by private and public organizations that have successfully improved their business processes. We compared these lessons learned and case studies with the approach being implemented through the development and deployment of DMSS.

Our work was performed between April 1994 and March 1995 primarily at the offices of the Deputy Under Secretary of Defense for Logistics in the Pentagon, Washington D.C., and the Joint Logistics Systems Center, Wright-Patterson Air Force Base, Ohio. We also performed work at the offices of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence in Washington D.C.; the Center for Integration & Interoperability, Defense Information Systems Agency, Blacklick, Ohio; the Air Force Air Logistics Center, Hill Air Force Base, Utah; and the Tobyhanna Army Depot, Tobyhanna, Pennsylvania.

# Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



ACQUISITION AND TECHNOLOGY

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000



30 MAY 1995

Mr. Gene L. Dodaro  
Assistant Comptroller General  
Accounting and Information  
Management Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Dodaro:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, 'DEFENSE MANAGEMENT: Selection of Depot Maintenance Standard System Not Based on Sufficient Analysis,' dated May 12, 1995 (GAO Code 511276/Case 9905). The DoD generally disagrees with the report.

As stated in the May 2, 1995 DoD response to the GAO final report "DEFENSE MANAGEMENT: Impediments Jeopardize Logistics Corporate Information Management" (OSD Case 9660), "The clear intent of the Corporate Information Management (CIM) initiative is to revolutionize, change, and take the steps necessary to improve the way the DoD does business all across the Department...The DoD cannot justify costly, separate, independent systems for each of the Military Services and for each function. Accordingly, the DoD is taking sound and reasoned approaches to business process reengineering, migration systems, data standardization, information infrastructure, and enterprise integration". In the subject draft report, the GAO discusses one of those CIM systems - the Depot Maintenance Standard System (DMSS). The DoD specifically disagrees with the GAO draft report recommendation to conduct a thorough study of opportunities to reengineer the depot maintenance business processes before initiating full deployment of any Defense standard information system for depot maintenance. The GAO assessment is inaccurate regarding the fundamental issues addressed to reach this recommendation. For example, the GAO states that the DoD did not base its decision to develop and implement DMSS on sufficient analysis of costs and benefits or on detailed assessments of economic and technical risk. The DoD disagrees. The selection of the individual DMSS processes and systems resulted from extensive analysis of DoD depot maintenance cost, benefits, return on investment, schedule, risk, Automated Data Processing costs, potential savings, and performance to meet improved functional baseline requirements. These factors were addressed in the DMSS functional economic analyses (FEA) of March 1993, January 1994, and are currently being updated in a new economic analysis. In addition, the new economic analysis will include an independent cost estimate (ICE).



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**Appendix II**  
**Comments From the Department of Defense**

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The DoD also disagrees that “Defense did not obtain project milestone reviews by Defense’s Major Automated Information System Review Council (MAISRC) and approvals from the Milestone Decision Authority (MDA).” The DMSS is not one system requiring MAISRC oversight. Rather, it is an environment of eight automated information systems (AIS). Of these eight systems, three are of sufficient size to have MAISRC oversight: the Baseline Advanced Industrial Management (BAIM) system, the Programmed Depot Maintenance Scheduling System (PDMS), and the Depot Maintenance Management Information System (DMMIS). DMMIS, for example, had a Milestone III review and a System Decision Memorandum (SDM) by the MAISRC on June 10, 1994. The eight DMSS systems are tied together to achieve an overall depot maintenance focus. The Department will continue to manage those information system programs under all appropriate acquisition policies.

In addition, the DoD disagrees with the GAO that “Defense has little real assurance it can achieve even the relatively modest projected improvements and cost savings in depot maintenance operations from DMSS.” The DoD has chosen and developed the DMSS suite of systems to improve DoD business processes dramatically. Successes to date include a total estimated savings through FY94 of \$175 million from applications fielded. Cost avoidance from the elimination of redundant development efforts for the same time period is \$166 million, for a total benefit of \$341 million. Substantial process improvement savings will continue to accrue. For example, the Oklahoma City Air Logistics Center estimates \$17.5 million savings in FY95 from the Programmed Depot Maintenance Scheduling System due to reduced flow days on B-1 workload. The Baseline Advanced Industrial Management system is on track to save \$1.6 billion by 1998 in Navy shipyards due to a complete reengineering of work processes. The Depot Maintenance Hazardous Material Management System has reduced material acquisition costs by \$16.2 million over two years at Hill Air Force Base.

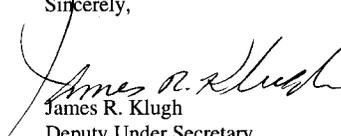
While the Department appreciates the GAO acknowledgment of process improvements achieved to date in depot maintenance, the draft does not recognize the magnitude of achieving a 30% reduction in the cost of ship overhaul or processing two additional B-1 bombers through an Air Logistics Center. Reducing the cost of overhaul, as dramatic as it is, still does not capture the entire savings. By shortening the time spent in overhaul, weapon systems are expedited to the warfighter, increasing mission readiness. In addition, fewer systems in the repair cycle potentially equates to fewer systems needed overall, thereby achieving even more dramatic savings. The DoD strategy is to combine initial reengineering efforts with continuous process improvement. The DMSS will provide the information technology tool to facilitate the iterative process.

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**Appendix II**  
**Comments From the Department of Defense**

The detailed DoD comments on the draft report findings and recommendations are provided in the enclosure. The Department appreciates the opportunity to comment on the draft report.

Sincerely,



James R. Klugh  
Deputy Under Secretary  
of Defense (Logistics)

Enclosure  
As stated

Appendix II  
Comments From the Department of Defense

GAO DRAFT REPORT--DATED MAY 12, 1995  
(GAO CODE 511276) OSD CASE 9905

"DEFENSE MANAGEMENT: SELECTION OF DEPOT MAINTENANCE  
STANDARD SYSTEM NOT BASED ON SUFFICIENT ANALYSES"

DEPARTMENT OF DEFENSE COMMENTS

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FINDINGS

FINDING A: Significant Problems in DoD Depot Maintenance.

The GAO reported that each year the DoD spends about \$13 billion to manufacture, overhaul, and repair more than 2 million items at its more than 27 maintenance depots. For years, the GAO and the DoD have reported on major problems facing the depot maintenance area, principally that the DoD's depot management structure has not resulted in substantial competition, interservicing, or reduction of excess capacity and duplication of effort.

The GAO found that over the last several years, the DoD has taken a number of actions to correct these problems. One of these actions is its Corporate Information Management initiative, which was established to prepare the DoD for requirements through (1) streamlining business processes, (2) integrating essential data systems, and (3) eliminating duplicate or redundant information systems across the Department. The GAO pointed out that the Depot Maintenance Standard System (DMSS) project was undertaken as part of that effort. (pp. 2-7/GAO Draft Report)

DOD RESPONSE: Concur. As reported by the GAO, the DoD has taken a number of actions to correct problems in depot maintenance. Significant progress has been made to reduce excess capacity and promote interservicing. The DoD calculates that previous Base Realignment and Closure (BRAC) rounds have resulted in decisions to close 14 percent of DoD major bases. Implementation of BRAC 95 will increase that total to an overall 21 percent. These reductions have been compared to a 39 percent budget reduction since 1985. The depot maintenance business area has been very aggressive and successful in pursuit of infrastructure reductions. For example:

- There were 35 maintenance depots in 1988. That number had been reduced to 24 prior to the start of BRAC 95 - a reduction of 31 percent. Approval of the BRAC 95 recommendations will

Enclosure  
Page 1 of 12

**Appendix II**  
**Comments From the Department of Defense**

reduce the number to 20, for an overall reduction of 43 percent.

These depot maintenance infrastructure reductions are in balance with the reductions in budget and force structure and far exceed the DoD overall infrastructure reduction of 14 percent.

There has been significant interservicing accomplished outside of the BRAC process. This has been primarily accomplished through the auspices of the Defense Depot Maintenance Council (DDMC). Approximately 2.8 million direct labor hours were being interserviced prior to BRAC 95. Some examples include:

- Army Communications/Electronic workload from Sacramento Army Depot to Air Force Sacramento Air Logistics Center (ALC).
- Air Force J79 engine workload to Naval Air Depot (NADEP) Cherry Point.
- Navy TF30 engine workload to Oklahoma ALC.
- Navy C130 workload to Ogden ALC.
- Marine Corps Hawk missile workload to Letterkenny Army Depot.
- Navy H-60 and AH-1W workload from NADEP Pensacola to Corpus Christi Army Depot.
- Navy and Air Force Sidewinder and Sparrow missile workload to Letterkenny Army Depot.
- Marine Corps M1 Tank workload to Anniston Army Depot.
- Air Force F-4 workload from Ogden ALC to NADEP Cherry Point.
- Navy F110 engine workload from NADEP Norfolk to Oklahoma City ALC.
- Navy F/A-18 workload from NADEP North Island to Ogden ALC.
- Navy T56 engine workload to San Antonio ALC.

During the BRAC 95 process interservicing initiatives were somewhat reduced in order not to prejudice the BRAC deliberations. Immediately following the conclusion of that process the DDMC will once again become active in this area. The information developed by the Joint Cross-Service Group will be a valuable resource as the DDMC seeks to increase interservicing following the BRAC process.

**FINDING B: The Deputy Under Secretary of Defense for Logistics Did Not Use Sufficient Analyses in Selecting the DMSS.** The GAO stated the Deputy Under Secretary of Defense for Logistics (DUSD(L)) selection of the DMSS was not based on sufficient analyses of expected system development and deployment costs or

Enclosure  
Page 2 of 12

**Appendix II**  
**Comments From the Department of Defense**

detailed assessments of the DMSS's economic and technical risks. The GAO found that the selection significantly understated the DMSS costs by including costs for only some components, and it understated costs for the components it did include. Based on insufficient details supporting cost and benefit estimates, the GAO concluded that the DMSS will cost significantly more than the Depot Maintenance Resource Planning (DMRP) system. Specifically, the GAO stated functional economic analysis underestimated licensing costs for using commercially owned software, costs to exchange data with other information systems, and costs to install and startup the system.

The GAO also found that the DUSD(L) did not obtain independent milestone reviews and approvals which are designed to ensure (1) decisions are consistent with sound business principles and (2) risks inherent in large information systems projects are adequately managed. As a result, the GAO concluded that the DoD did not have an opportunity afforded by the Major Automated Information System Review Committee (MAISRC) review and the Milestone Decision Authority (MDA) approval to redirect or terminate the DMSS before investing significant amounts of money. (p. 2, pp. 7-14/GAO Draft Report)

DOD RESPONSE: Nonconcur. The selection of the individual DMSS processes and systems resulted from an intense joint Service review conducted to improve the DoD functional requirement. That evaluation entailed an extensive review of existing government and commercial processes and systems to determine which could best meet the DoD's requirements. That effort yielded the "best of breed" processes and systems being used to develop the DMSS. The selected processes and systems were further evaluated in the initial economic justification of the DMSS package. The Phase I functional economic analysis (FEA), dated March 1993, assessed four selected processes and systems to determine if the selected depot maintenance's improved functional baseline (IFB) requirements would lead to improved performance. The systems evaluated were Maintenance Resources Planning (MRP II) based production management, project management of major end items, hazardous material management and depot financial management. The Phase I FEA documented the decision analysis process used to determine the best alternative for meeting the IFB requirements. The analysis considered DoD depot maintenance cost, benefits, return on investment (ROI), schedule, risk, automated data processing (ADP) costs, and potential savings. The Phase I FEA clearly demonstrated that the DMSS benefits include savings in material and direct and indirect labor costs associated with the process improvements supported by the DMSS applications. The

Enclosure  
Page 3 of 12

See comment 1.

**Appendix II**  
**Comments From the Department of Defense**

Joint Logistics Systems Center Depot Maintenance (JLSC/DM) characterized the Phase I FEA's findings as conservative. All projected benefits, however, were based on either the actual experiences of deployed DMSS processes and applications (such as project management of major end items using the Programmed Depot Maintenance Scheduling System (PDMSS)) or estimates based on demonstrated industry experience.

Depot Maintenance Resource Planning (DMRP) was the initial terminology given to the resulting collection of processes selected to support the depot maintenance IFB. The DMRP approach was chosen to indicate that the selected processes were more than just manufacturing resources planning (MRP II) practices for production management, but also addressed project management improvements for major end items, hazardous material management, and depot financial management. The Depot Maintenance Standard System (DMSS) was later chosen as the supporting suite of automated information systems (AIS) for the selected processes. Hence, the FEAs were done on DMRP processes and DMSS systems.

The DMSS processes and systems have grown from 4 processes and systems in the Phase I FEA to 8 processes and systems in the new economic analysis (final version due July 1995). However, in terms of cost, the ADP investment in FY93 dollars was estimated at \$667 million in the Phase I FEA. The new economic analysis estimate of investment costs is \$670 million. Therefore, DMSS today does not represent a significantly larger cost.

The additional 4 processes and systems contribute to filling out functionality defined in the IFB. For example, one of the four systems, Baseline Advanced Industrial Management (BAIM), addresses the need for project management in the repair of major end items. In the original 4 selected systems of DMRP, it was thought PDMSS could address this requirement. However, in February 1994, the joint Services' analysis team selected BAIM (with PDMSS as a module of BAIM) as the selected system for delivering a somewhat more robust solution for project management of major end items. Again, the functional requirement did not change, but the selected system did change as the knowledge base improved. The DMSS provides the supporting AIS to implement DMRP processes.

The DUSD(L) Memorandum of March 1994 documented the selection of the baseline DMSS processes and systems. That selection was based on analysis of alternative processes and systems for depot maintenance management documented throughout 1992 and 1993, and on the Functional Economic Analyses (Phases I and II) published

Enclosure  
Page 4 of 12

Appendix II  
Comments From the Department of Defense

in March 1993 and January 1994. An updated economic analysis (EA) which has been rebaselined to budgeted cuts is due July 1995. In addition, an independent cost and operational effectiveness analysis will be conducted to assess and quantify the effectiveness of selected systems on mission support.

The MAISRC has reviewed the DMSS initiative from a life-cycle management and implementation strategy perspective, and DMSS remains on the MAISRC oversight list. The MAISRC, however, is currently not chartered to "approve" selection of migration systems. Per Deputy Secretary of Defense direction, each Office of the Secretary of Defense (OSD) Principal Staff Assistant is responsible for accomplishing the analysis leading to, and the designation (approval) of, a migration system within his or her respective functional area. In the case of DMSS, the Deputy Under Secretary of Defense for Logistics (DUSD(L)), not the MAISRC, was responsible for approving the selection of DMSS as a migration system. On March 16, 1993, the MAISRC reviewed DMSS and issued direction to the DUSD(L), JLSC, and Air Force in the form of a system decision memorandum. Since that time, several meetings have been held between the OSD principals to discuss appropriate methods of adapting the traditional life-cycle management review process and requirements for DMSS and similar migration efforts and guidance provided the DUSD(L) and JLSC regarding such requirements. This issue is also being addressed by the ongoing effort of the Office of the Assistant Secretary of Defense for Command, Control, Communications and Intelligence (OASD(C3I)) to reengineer the MAISRC process, which is expected to result in revised guidance for the life-cycle management and review of the Department's migration, incremental and evolutionary systems. Further, the MAISRC is responsible for reviewing life-cycle management issues associated with information systems which comprise the DMSS, such as the Depot Maintenance Management Information System (DMMIS). The MAISRC reviewed DMMIS in June 1994 and issued a decision memorandum which addressed the deployment of DMMIS in the context of the overall DMSS migration initiative.

FINDING C: The DUSD(L) Did Not Consider Reengineering Depot Maintenance Processes Before Selecting the DMSS.

The GAO found that instead of first considering opportunities to reengineer business processes, the DUSD(L) chose a strategy that focuses on the development and deployment of a DoD standard depot maintenance information system. Under that strategy, business processes are to be incrementally improved as the DMSS is deployed. The GAO noted that reengineering of those processes

Enclosure  
Page 5 of 12

See comment 2.

**Appendix II**  
**Comments From the Department of Defense**

will be considered only after system deployment. The GAO reported that the DMSS deployment is expected to be completed by FY 1999. Accordingly, fundamental and dramatic changes to the depot maintenance processes will be delayed for years. The GAO concluded that even if successful, the DoD strategy to develop and deploy an information system designed to incrementally improve depot maintenance processes will only provide marginal cost reductions and productivity increases, rather than the fundamental and dramatic changes needed to meet the challenges of maintaining military readiness in the 1990s.

The GAO reported that according to DoD officials, the vast number of different logistics processes and supporting information systems across the Department must be reduced before significant improvements can be made. The GAO stated the DoD officials indicated that, once fully deployed, the Defense Standard information systems will form the foundation upon which significant improvements to current depot maintenance practices can be made. This foundation will eliminate the need to implement major changes across a multitude of information systems and business processes that exist throughout the Services. The GAO noted that the Joint Logistics System Center (JLSC) estimated that, overall, the DMSS project would reduce depot operational costs by \$2.6 billion over a 10-year period ending in FY 2003. The GAO stated that standardizing existing information systems and incrementally improving business processes will not position the DoD for reengineering its processes or dramatically improve its operations. The GAO concluded, however, that benefits the DoD expects from implementing the DMSS are relatively meager when compared with the results other organizations are achieving through reengineering. (p. 2, pp. 14-18/GAO Draft Report)

DOD RESPONSE: Nonconcur. The premise of the GAO report is that reengineering is not currently occurring with DMSS. That assertion is not accurate. On October 13, 1993, the Deputy Secretary of Defense directed OSD staff and Components to select migration systems to support business areas concurrent with process reengineering efforts. This required the acceleration of planned process reengineering. The Navy's Baseline Advanced Industrial Management (BAIM) program, the Project Management module of DMSS, was a process reengineering effort which is dramatically improving depot operations at Navy shipyards. Approved automation tools were then applied to the reengineered process to realize greater efficiency and effectiveness of depot operations.

See comment 3.

Enclosure  
Page 6 of 12

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**Appendix II**  
**Comments From the Department of Defense**

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The DMSS processes and systems were selected as "best of breed" to support achievement of all five Corporate Information Management (CIM) goals (as outlined in DoD manual 8020.1-M), including migrating depot maintenance to a DoD standard set of processes and systems and achieving benefits through business process improvements. Reengineering is defined as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed". The Department has already made great strides in reengineering DoD depot maintenance processes. For example, implementing MRP II philosophy in the depot maintenance commodities arena is a fundamental change in the way business has been conducted. Instead of "pushing" work onto the shop floor based on periodic workload negotiations, work will be scheduled, prioritized, and supported based on due date to the customer. Thus, work will be "pulled" rather than "pushed" through the shops, resulting in a number of dramatic efficiencies, such as improved throughput and workload leveling (resulting in less overtime expenditures). That change is not merely an incremental process improvement; it is a fundamentally different way of doing business based on industry best practices. In this case, significant benefits come from implementation of MRP II and project management practices in the depot that are supported by DMSS and which were not represented in the Service legacy environment before CIM. The return on investment calculation used in the FEA and new economic analysis are essentially driven by the benefits achieved through system-driven business process reengineering. Additional benefits in terms of reduced cycle time, improved asset visibility, and improvements in the logistics pipeline directly impacting force readiness are also achieved with DMSS. These benefits are in addition to the economic gains quantified in the FEA.

The logistics CIM has achieved real returns from early-on deployments of selected processes and systems, and these achievements are being used to quantify and estimate the benefit rates necessary to build the overarching economic analysis and support the DoD decision process on DMSS. The results from reengineering and standard system deployment indicate DMSS is off to a good start. A summary of those results follows:

**BAIN**

- \$18 million reduction in 688 class overhaul for USS Providence (SSN719).

Enclosure  
Page 7 of 12

**Appendix II**  
**Comments From the Department of Defense**

- Increased shipyard productivity by 12%, reduced labor (26,000 people).
- Reduced costs of ship overhaul by 30%.
- Reduced actual labor rate - shipyard man-day rate reduced from \$411(FY92) to \$345(FY94).
- USS Roosevelt man-days reduced from 101,174 to 86,413.
- 20% reduction in USS Saipan overhead.
- 30% reduction in man-days for Los Angeles class submarine overhauls.
- On track to save \$1.6 billion by 1998.

**PDMSS**

- Two additional B-1s through Oklahoma City ALC, reduced flow days resulting in savings of \$11.8 million (FY93), \$12.8 million (FY94), \$17.5 million (FY95).
- Blackhawk helicopter reduced cycle time by 10 days, saving \$160,000 per aircraft.
- Supports side-by-side Paladin/M109A6 Howitzer production with contractor at Letterkenny Army Depot.
- Savings of \$46,000 per aircraft from items returned to supply and reduced flow time.
- Reduced flow time 10 days on helicopter refurbishment at Corpus Christi Army Depot, resulting in \$800,000 (one month) cost avoidance.
- Automated Work Request application at Ogden ALC reduced 250 hours/aircraft, resulting in savings of \$400,000 per year.
- Turn-Around-Time improvement of 30% and reduced production cost by 15% at NADEP North Island, resulting in savings of \$1.5 million.

**DMMIS**

- \$7 million of shop floor material recovered at Ogden ALC.
- \$1 million of shop floor material recovered at Warner Robbins ALC.
- Gyro flow days reduced from 16 to 12 days at Warner Robbins ALC.

Enclosure  
Page 8 of 12

**Depot Maintenance Hazardous Material Management System  
(DM-HMMS)**

- Hazardous material acquisition reduced by \$16.2 million over two years at Hill Air Force Base.
- Hazardous material acquisition reduced by \$400,000 in one year at Tooele Army Depot.

The DoD long-term strategy is to combine reengineering efforts with continuous process improvement. This is an iterative process which will be ongoing. By deploying standard systems, the DoD will have the technology tools in place to enable process changes to be made more quickly, easily, and less expensively.

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RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommended that the Secretary of Defense direct the Deputy Under Secretary of Defense for Logistics to prepare a full set of project documentation that describes the project and validates that it is the best alternative for improving depot operations. At a minimum, that documentation should include the following:

- A final functional economic analysis containing a comprehensive evaluation of information system alternatives. That analyses should formulate and compare estimates of the total costs and benefits of each alternative.
- Identification of economic and technical risks associated with success of each project alternative and development of a plan to avoid or mitigate those risks.
- A comprehensive implementation plan that identifies actions to be taken, schedules, and milestones for those actions, and performance measures to be used to manage the system deployment. (p. 19/GAO Draft Report)

DOD RESPONSE: Concur. Efforts have been ongoing to satisfy these requirements. An updated economic analysis is being accomplished for the DMSS, which is scheduled to be completed by

Enclosure  
Page 9 of 12

**Appendix II**  
**Comments From the Department of Defense**

July 31, 1995. In addition, a complete risk assessment of DMSS alternatives and work plans is already being prepared by the Joint Logistics Systems Center (JLSC). The risk assessment will include technical, functional, cost, schedule and deployment risks and mitigation actions. Specific metrics, including schedules and milestones, have been developed to evaluate deployment progress against the DMSS program plan. The Depot Maintenance (DM) Functional Configuration Control Board (FCCB) is the joint service forum overseeing the effort to satisfy those requirements.

RECOMMENDATION 2: The GAO recommended that the Secretary of Defense direct the Deputy Under Secretary of Defense for Logistics to obtain the Major Automated Information Systems Review Council (MAISRC) review and Milestone Decision Authority approval of the project documentation prior to spending any FY 1996 funds on DMSS development and deployment. (P. 9, p. 68/GAO Draft Report)

DOD RESPONSE: Partially concur. The DMSS consists of eight major subsystems. Those subsystems which are appropriate for MAISRC guidance, due to automated information system importance and funding level, have been under MAISRC oversight. Reviews will continue to be conducted when appropriate and directed by the MAISRC.

RECOMMENDATION 3: The GAO recommended that the Secretary of Defense direct the Deputy Under Secretary of Defense for Logistics to conduct a thorough study of opportunities to reengineer the depot maintenance business processes before initiating full deployment of any Defense standard information system for depot maintenance. (p. 19/GAO Draft Report)

DOD RESPONSE: Nonconcur. The DM FCCB sponsors a joint service process reengineering work group which has defined a reengineered DM process. The DM Improved Functional Baseline (IFB) is the documented display of the reengineered DM process. A configuration management structure is in place to oversee and stabilize the DM process and system solutions supporting DM operations. The Department has chosen and developed the DMSS suite of systems to improve business processes dramatically, as outlined in the DoD responses to Findings B and C. Through the DM FCCB, business process and cultural change will be managed by site specific implementation teams.

Enclosure  
Page 10 of 12

See comment 2.

See comment 4.

**Appendix II**  
**Comments From the Department of Defense**

While the Department appreciates the GAO acknowledgment of process improvements achieved to date in depot maintenance, the GAO fails to realize the magnitude of achieving a 30% reduction in the cost of ship overhaul or processing two additional B-1 bombers through an Air Logistics Center. To illustrate, due to the complete reengineering of work processes and the use of BAIM, the Navy has reduced overhaul time for the 688 class submarine from 24 to 20 months, and now estimates all future 688 workload will take 18 months. To put that change in perspective, the previous average for similar work was \$81 million per submarine. However, reducing the cost of overhaul, as dramatic as it is, still does not capture the entire savings. By shortening the time spent in overhaul, weapon systems are expedited to the warfighter, increasing mission readiness. In addition, fewer systems in the repair cycle equates to fewer systems needed overall, thereby achieving even more dramatic savings.

The DoD cannot afford to stop deployments which improve depot business processes to reaccomplish a lengthy study. Capital improvement funding can best be utilized by deploying migratory systems, rather than "fixing" broken legacy systems. Early on in the CIM process the decision was made to cease upgrades and improvements to legacy systems (since they were to be replaced by standard systems) and to concentrate resources on DMSS development. Therefore, many legacy systems are quite outdated and marginal. The Department simply cannot afford to continue maintaining legacy systems longer than absolutely necessary; DMSS must be deployed and existing systems replaced. Once a standard system is deployed, further improvements are much less costly and can be implemented quickly.

As reported by the GAO, "DMSS deployment is expected to be completed by fiscal year 1999. Accordingly, fundamental and dramatic changes to the depot maintenance process will be delayed for years". Implementation of the GAO recommendation would delay deployment beyond that timeframe.

Finally, the GAO places great emphasis on industry re-engineering strategy. Investigation of current commercial activities (such as Walmart and American Express) does not support the GAO recommendation to cease all system deployment and conduct a study. Rather than stopping their current environment to totally reengineer, those companies are infusing technology change and incremental process improvements into their business environment. Reengineering The Corporation - A Manifesto For Business Revolution, (Michael Hammer and James Champy, 1993), is cited by the GAO in reference to the error companies make "in viewing

Enclosure  
Page 11 of 12

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**Appendix II**  
**Comments From the Department of Defense**

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automation as the answer to enhancing or streamlining their business operations. They spend billions of dollars to automate existing processes so they can perform the same work faster". The assumption is made by GAO that this is, in fact, the same error Defense has made in developing DMSS. That view reflects a fundamental lack of understanding by the GAO about the depot maintenance CIM system. The DMSS does not merely automate existing processes. The core production systems, BAIM and DMMIS, both represent dramatically different ways of conducting business for defense depots. Further, the entire suite of DMSS systems provide a wide array of decision support tools which will facilitate decision-making at the shop floor level, allowing problems to be resolved as soon as they occur. A more appropriate citation from the same book, Reengineering the Corporation, et al, is as follows: "Modern, state of the art information technology is part of any reengineering effort, an essential enabler, since it permits companies to reengineer business processes...the real power of technology is not that it can make the old processes work better, but that it enables organizations to break old rules and create new ways of working - that is, to reengineer." With DoD logistics CIM implementations, new business philosophies are being implemented which change the old processes. The DMSS enables and sustains this process change, and its proven benefits include increasing readiness by speeding assets through the logistics pipeline. The DMSS is the essential enabler for reengineering DoD depot maintenance processes.

Enclosure  
Page 12 of 12

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The following are GAO's comments on the Department of Defense's letter dated May 30, 1995.

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## GAO Comments

1. The March 1993 Phase I Functional Economic Analysis (FEA) and January 1994 Phase II FEA for the DMRP processes did not provide well-supported estimates of project costs, benefits, and risks upon which to approve the Depot Maintenance Standard System (DMSS). As stated in our report, there are three reasons why these FEAs did not sufficiently support the DMSS selection.

First, these FEAs did not include cost and benefit estimates for the DMSS. The DMSS was not defined as a project until March 1994—more than a year after the Phase I FEA was completed and 2 months after the Phase II FEA was submitted for review. The Commander of Joint Logistics Systems Center told the DOD Comptroller that the functional economic analysis briefed to DUSD(L) and submitted for the Comptroller's review in early 1994 did not include DMSS. The Commander also stated that JLSC was developing a new economic analysis to (1) accommodate changes requested by the Comptroller and the Office of Program Analysis and Evaluation and (2) reflect the current DMSS.

Secondly, the analyses contained estimates of questionable accuracy. The Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, which is required to validate automated information system project estimates to help ensure that the economic analyses present compelling quantitative data for project selection, found that the level of detail was insufficient to validate either cost or benefit estimates. Even with this limitation, we determined that the Phase II FEA underestimated the cost to develop and deploy the three system components that later became part of DMSS by at least \$100 million.

Finally, the Phase I and II FEAs were incomplete. They included cost and benefit estimates for only three of the eight system components forming the DMSS. DUSD(L)'s contention that the larger DMSS does not represent a significantly larger cost than the smaller suite of systems identified in the Phase I FEA is unfounded. The scope of the projects differ significantly. The DUSD(L) improperly equates expected costs and benefits of the DMRP project to develop and deploy a suite of three system components at 27 maintenance depots over a 7-year period to the DMSS project to develop and deploy eight system components at no more than 20 depots over a 3-year period, including 5 prototype sites over the next 2 years.

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2. Contrary to DUSD(L)'s position, the Major Automated Information System Review Council (MAISRC) is chartered to approve selection of migratory systems, but has not reviewed the DMSS initiative from a life-cycle management and implementation strategy perspective. DOD 8020.1-M, Functional Management Process for Implementing the Information Management Program of the Department of Defense, which DUSD(L) states it is following to implement its DMSS initiative, states:

Information system options and opportunities that support the functional management strategy and process improvement efforts are evaluated based on technical feasibility, cost, schedule, performance, risk, and conformance to architectural guidelines and standards. Information system development/modernization must comply with life cycle management policy...The SDP [System Decision Paper] will be part of the approval decision package supporting the designation of the AIS [Automated Information System] as a migration system by the OSD Principal Staff Assistant. The SDP will also support an in-process review (IPR) or milestone review, as appropriate, by the designated milestone decision authority (MDA)...When AIS changes are part of the process improvement alternative(s) selected for more detailed analysis, the Functional Activity Program Manager's evaluation decision is a filter that precedes other reviews required by DoDD 8120.1...The Functional Activity Program Manager is responsible for ensuring that the AIS-related aspects of the process improvement proposal are reviewed and approved in accordance with DoDD 8120.1, in addition to being reviewed and approved by the OSD Principal Staff Assistant as part of the complete process improvement proposal.

As stated in our report, Defense Directive 8120.1, Life-Cycle Management (LCM) of Automated Information Systems (AISS); and Defense Instruction, 8120.2, Automated Information System (AIS) Life-Cycle Management (LCM) Process, Review, and Milestone Approval Procedures, establish MAISRC review and MDA approval procedures to ensure that decisions to develop or modernize major automated information systems are based on sound business principles. Under these procedures, a project should be reviewed and approved at each of five decision milestones before substantial funds are obligated. Despite this policy, DUSD(L) spent over \$200 million to implement the DMSS initiative without receiving approval for even the initial milestone decision point.

Also, DUSD(L)'s claim that the MAISRC did review the DMSS initiative on March 16, 1993, is not accurate. On this date the MAISRC completed an In-Process Review (IPR) of the overall Logistics CIM strategy. An IPR is defined as "An LCM review between LCM milestones to determine the current program status, progress since the last LCM review, program risks and risk-reduction measures, and potential program problems." Further, as

admitted by DUSD(L), the DMSS initiative was not approved until early 1994—more than a year after this review.

Finally, DUSD(L)'s contention that the MAISRC milestone reviews of the Depot Maintenance Management Information System (DMMIS) or any other single system component of the DMSS initiative satisfies the Defense life-cycle management review and approval requirements is inaccurate. Defense's life-cycle management directives define an automated information system program as "A directed and funded AIS effort, to include all migration systems, that is designated to provide a new or improved capability in response to a validated need." Further, the directives state:

For the purpose of determining whether an AIS is major, the separate AISS that constitute a multi-element program, or that make up an evolutionary or incremental development program, or make up a multi-component AIS program, shall be aggregated and considered a single AIS.

Based on these directives, DUSD(L) is required to obtain MAISRC review and approval for the entire DMSS initiative at each of five milestone decision points before any additional funds are spent.

3. DUSD(L) officials contend that reengineering of depot maintenance processes is occurring concurrently with the deployment of the DMSS. Further, they assert that these reengineering efforts will provide dramatic economic benefits, and cite cost savings and productivity increases accrued from initial implementation of four DMSS system components as support. DUSD(L)'s approach focuses on the selection of the best currently operating information systems and implementation of these selected system across all Defense components. While this approach may improve overall DOD business processes and may provide incremental benefits, it is not the fundamental rethinking and radical redesign of depot maintenance processes and will not provide the dramatic cost reductions and productivity gains available from process reengineering. At best, it will allow DOD to accomplish current depot maintenance processes faster and more efficiently. At worst, DUSD(L)'s focus on information system selection and implementation will make future reengineering efforts more difficult by entrenching current work processes.

In January 1991, the Deputy Secretary of Defense endorsed a Corporate Information Management initiative implementation plan that directed business processes be reengineered before information systems are standardized. However, DUSD(L) did not consider reengineering

opportunities as alternatives to the DMSS initiative. As discussed in the report, the functional economic analysis used by DUSD(L) to approve the DMSS initiative compared only three alternatives. All three of these alternatives focused on using automated information systems to improve current depot maintenance functions.

Further, as stated in DMSS documentation, the initiative is designed to provide only incremental improvements to existing business processes. It is clear from Defense's own benefit projections that DMSS will not result in dramatic improvements possible from consideration of reengineering-based solutions. DUSD(L) projected DMSS would reduce the costs to DOD depot maintenance operational costs over a 10-year period from \$112.9 billion to \$110.3 billion. A cost reduction of \$2.6 billion or only 2.3 percent over this period does not constitute a dramatic increase in efficiency.

In late 1994, the Office of the Secretary of Defense for Command, Control, Communications, and Intelligence, responsible for CIM initiatives across DOD, found major flaws in the overall implementation. It concluded that, as opposed to the private sector which uses a very different approach, "DOD has virtually no chance of making high impact/quantum changes using the current approach." Further, the Commission on Roles and Missions of the Armed Forces, charged by the Congress to provide an independent review of the roles and missions of the armed services, has found that "[r]ather than reengineering its processes, DOD has spent its energies in closing excess capacity (base and facilities) and in standardizing its management information systems" and concluded that DOD will achieve a more compact, more standardized version of its traditional logistics approach.<sup>1</sup> The Commission confirmed that DOD must radically reengineer its logistics processes to achieve meaningful improvements.

4. While information technology is critical to any reengineering effort because it provides a tool for breaking old rules and creating new ways of working, it should not be the driver of the reengineering effort. Such an approach may make future reengineering efforts more difficult by entrenching inefficient and ineffective work processes. Reengineering offers order-of-magnitude improvement compared to the incremental improvements DMSS is designed to provide. DUSD(L) can not afford to deploy DMSS departmentwide beyond the first five prototype sites until it has first determined which old rules need to be broken and what new ways of

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<sup>1</sup>Logistics Issues Case Studies for the Roles and Missions Commission of the Armed Forces, February 8, 1995.

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accomplishing depot maintenance are most efficient and effective. The Commission on Roles and Missions of the Armed Forces has identified a number of alternatives for changing the way DOD conducts its depot maintenance. These alternatives could serve as a starting point for a thorough study by DUSD(L) of its reengineering opportunities.

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# Description of DMSS Component Systems

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This appendix provides brief descriptions of the eight information systems selected as Depot Maintenance Standard System components to support the DOD-wide depot maintenance function.

Baseline Advanced Industrial Management System: Supports allocation decisions on resource application, schedules, and job management of maintenance projects. It allows timely review of cost and schedule performance at any level of the work breakdown structure. One of this system's major modules, Programmed Depot Maintenance Scheduling System, provides project schedules of individual maintenance operations and critical path of work requirements for maintenance of major end items.

Depot Maintenance Management Information System (DMMIS): Provides depot maintenance managers with an automated capability to forecast workloads; schedule repair activities; track and control inventories; program staffing, materials, and other resources; and track and manage production costs.

Enterprise Information System: Provides the ability to interface to existing data sources, extract relevant data, and package the information to support decisionmakers with timely summary information.

Facilities and Equipment Maintenance: Provides an integrated tracking and control system for equipment and facility maintenance, preventive maintenance, and calibration of precision measurement equipment.

Depot Maintenance Hazardous Materiel Maintenance System: Records the receipt and issue of all hazardous material within a maintenance depot. Provides inventory visibility of all hazardous material to control the issue of hazardous material to authorized users.

Interservice Material Accounting and Control System: Provides the tracking of Depot Maintenance Interservice Support agreements and visibility and control for interservice workloads.

Laboratory Information Management System: Provides the monitoring and control of laboratory data such as sample order status, order tracking, backlog, scheduling, location tracking, workload prediction, pricing, and invoicing. Automates tracking and archiving for depot material samples and test results.

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**Appendix III**  
**Description of DMSS Component Systems**

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Tool Inventory Management Application: Provides total inventory tracking and accountability of both hard and perishable (consumable) tools and tooling assets. Tracks issues and receipts of assets to both individuals and in tool kits.

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# Related GAO Reports

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Government Reform: Using Reengineering and Technology to Improve Government Performance (GAO/T-OGC-95-2, Feb. 2, 1995).

Defense Management: Impediments Jeopardize Logistics Corporate Information Management (GAO/NSIAD-95-28, Oct. 21, 1994).

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Executive Guide: Improving Mission Performance Through Strategic Information Management and Technology (GAO/AIMD-94-115, May 1994).

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Defense ADP: Corporate Information Management Must Overcome Major Problems (GAO/IMTEC-92-77, Sep. 14, 1992).

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Commercial Practices: Opportunities Exist to Reduce Aircraft Engine Support Costs (GAO/NSIAD-91-240, Jun. 28, 1991).

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**Related GAO Reports**

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Defense Logistics: Observations on Private Sector Efforts to Improve Operations (GAO/NSIAD-91-240, Jun. 13, 1991).

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