ADDENDUM TO THE REPORT OF THE

DEFENSE SCIENCE BOARD

TASK FORCE

ON

DEPOT MAINTENANCE MANAGEMENT

OCTOBER 1994

OFFICE OF THE UNDER SECRETARY OF DEFENSE
FOR ACQUISITION & TECHNOLOGY
WASHINGTON, D.C. 20301-3140

This report is a product of the Defense Science Board (DSB). The DSB is a Federal Advisory Committee established to provide independent advice to the Secretary of Defense. Statements, opinions, conclusions and recommendations in this report do not necessarily represent the official position of the Department of Defense.

This document is UNCLASSIFIED.

Security review completed 8 November 1994 by OASD (Public Affairs) directorate for Freedom of Information and Security Review Case number 94-S-4814.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-3140

DEFENSE SCIENCE
BOARD

28 SEP 1994

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Addendum to the Report of the Defense Science Board (DSB) Task Force on Depot Maintenance Management

Attached is the Addendum to the report of the DSB study on Defense Depot Maintenance Management. The original study was conducted in response to the Fiscal Year 1994 National Defense Authorization Act and addresses nine specific Congressional tasks. The Terms of Reference for the Task Force called for it to address two additional tasks not required by legislation. This addendum to the original report addresses those two tasks:

> *TASK A: Approaches to improve the overall efficiency of depot maintenance in organic and private industrial facilities, including strategies with the greatest potential for achieving significant improvements through new technology applications, process improvements, modern business practices, reliability improvements and other appropriate means.*
>
> *TASK B: Depot maintenance plans for new items of equipment and compare relative cost effectiveness of organic and private industry facilities, including major weapon systems, missile systems, electronics, software, etc.*

The Task Force endorses using an acquisition Decision Tree Process (DTP) encompassing readiness, sustainability, and economic factors as the basis for designing the workload allocation between organic and private industry facilities. However, revision of appropriate DoD directives as well as the existing Service DTPs is necessary to achieve consistency with the CORE concept and revised competition policy. Inherent in these changes must be adoption of a new philosophy that precludes automatically acquiring organic depot capability for new weapon systems. The revised guidance and DTPs should provide for:

- Consistent with the CORE concept, organic depot duplication of plant equipment investments already present in the private sector only when there is a proven and compelling need for readiness or sustainability risk reduction.
- Incorporation of the maintenance concept of a new weapon system, to include the proper mix of public/private maintenance, as an essential component of the acquisition strategy.

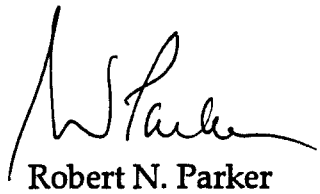
- Service top-down depot maintenance strategy guidance review as part of each new weapon system's milestone decisions.
- Reexamination of the depot maintenance strategies of weapon systems as they progress in the acquisition process. While it is obviously valid to make the basic organic/contract strategic decision early on, the best risk-reducing balance between contract and organic support may need to change over time.

The Task Force further found that an essential underpinning of efficient depot maintenance operations is accurate understanding of the costs of doing business. Studies and reviews indicate that the Department's and the Services' financial management systems and data bases are not capable of supporting the determination of the actual cost of specific depot workloads - a basic management need. This fundamental flaw virtually eliminates management's abilities to make sound business-like decisions. The DoD needs to develop depot maintenance cost accounting systems which accurately reflect the cost of doing business and that are consistent with standards applied to industry. These systems must include adequate internal controls to ensure compliance with underlying standards.

The reliability of systems/components is a major factor in the cost of the DoD maintenance system. It is a critical determinant of mission capability, repair frequency, facilitization, technician training, spares procurements, and a host of other factors. It is essential therefore for both organic and commercial repair activities to improve reliability and sustainability of components. The Task Force recommends a basic redesign of the reliability improvement process to provide an effective implementation structure, to include improvement identification, evaluation, funding and execution. Recognizing that implementation of reliability improvements often falls outside the arena of traditional depot maintenance funding, the Task Force believes that DoD should consider focusing specific funds on such improvements through either a dedicated program or some other "fencing" mechanism.

The results of this Task Force's work will serve as the starting point for a second phase for the new Task Force on depot maintenance that you asked me to chair. The first meeting of the new Task Force is being planned for late September 1994. The Task Force will delve into some of the areas that were time constrained for this report. I believe reliability improvement impacts on depot maintenance is worth further work as is the ongoing corporate information management modernization program. Both initiatives will be areas of review by the new Task Force.

Attachment



Robert N. Parker
Task Force Chairman

ADDENDUM TO THE REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DoD DEPOT MAINTENANCE MANAGEMENT

INTRODUCTION

The Depot Maintenance Management Task Force was convened in response to Section 341 of the National Defense Authorization Act for Fiscal Year 1994. The Task Force effort is a follow-on to earlier Department of Defense (DoD) reviews of depot maintenance undertaken in conjunction with recent force structure changes. Nine of the eleven tasks in the Terms of Reference (TOR) were congressionally-mandated and have been completed, and a report of the results submitted to Congress in April, 1994.[1] The Under Secretary of Defense for Acquisition and Technology (USD (A&T)) directed the Task Force to address two additional subject areas within the constraints of available time and resources.[2] Specifically, the TOR asked the Task Force to look at:

> *Approaches to improve the overall efficiency of depot maintenance in organic and private industrial facilities, including strategies with the greatest potential for achieving significant improvements through new technology applications, process improvements, modern business practices, reliability improvements and other appropriate means.* ***(Task A).***
>
> *Depot maintenance plans for new items of equipment and compare relative cost effectiveness of organic and private industry facilities, including major weapon systems, missile systems, electronics, software, etc.* ***(Task B).***

This report presents the results of the Task Force's work on the two additional subject areas. Immediately below are the Task Force recommendations. Following the recommendations is a fuller discussion of the tasks.

---

[1] Transmitted to the Congress by DepSecDef cover letter dated April 7, 1994.

[2] USD (A&T) Memorandum for Chairman, Defense Science Board, January 14, 1994; subject: TOR — DSB Task Force on Depot Maintenance Management.

TASK FORCE RECOMMENDATIONS — TASK A

Reliability Improvement

- DoD focus on reducing overall depot maintenance requirements through continued, enhanced weapon systems and equipment reliability monitoring and improvement programs.

Personnel

- DoD institute flexible personnel practices to allow efficient downsizing to CORE and efficient response to workload fluctuations.

- DoD and industry provide educational and training opportunities with each other to enable a cross-flow of modern business practices.

Materiel Management

- DoD re-engineer the depot parts requirements and procurement processes to incorporate minimal inventory methods.

Lean Manufacturing

- DoD apply lean/agile manufacturing concepts, as described by the 1993 Defense Science Board Task Force on Defense Manufacturing Enterprise Strategy, to depot maintenance.

Reinventing Government Program

- DoD introduce, in depot maintenance, innovative management concepts and business practices under the "Reinventing Government" program.

Depot Investment

- DoD reorient the depot investment philosophy to emphasize maintenance of a technically modern maintenance structure sized to CORE.

Management Information Systems

- DoD ensure there is a continued, if not enhanced, focus on reliability information tracking and that there is reliability information available at the system, component, and serial number levels.

- DoD continue improvement of the depot maintenance corporate information management (CIM) system to provide the depots the required tools for efficient management, and to provide them a system that will interface with the materiel management, financial management, and distribution CIM systems.

- **DoD continue to develop and implement financial management systems that are consistent with industry standards and that can accurately provide comparable costs.**

TASK FORCE RECOMMENDATIONS — TASK B

Implementation of CORE Concept

- **DoD revise Directives 4151.18, *Maintenance of Military Materiel,* and 5000.2, *Defense Acquisition Management and Procedures,* to incorporate the CORE and competition policies.**

- **The Services revise their Decision Tree Processes (DTPs) in accordance with the above, revised directives.**

Acquisition Concepts

- **DoD and industry redesign reliability improvement processes to provide effective incentives for continuous reliability improvement.**

- **DoD implement single, digital engineering database for the entire life-cycle of each weapon system.**

- **DoD depot maintenance support the use of best commercial practices in lieu of MILSPEC parts, special materiels handling procedures, unique quality control and testing mandates, and associated recordkeeping.**

DISCUSSION — TASK A

Task A is focused on ways to make depot maintenance operations more efficient. Specifically, the TOR asked the Task Force to look at . . .

> *Approaches to improve the overall efficiency of depot maintenance in organic and private industrial facilities, including strategies with the greatest potential for achieving significant improvements through new technology applications, process improvements, modern business practices, reliability improvements and other appropriate means.*

Depot maintenance's efficiency challenge, public and private, results from two major systemic factors. The first factor, already addressed in the basic Task Force Report, is an infrastructure too large for the post-Cold War environment. The second is

the need to adapt management precepts and methods to the radical changes occurring in areas such as information technology, transportation cycle times, and customer quality expectations.

Depot maintenance is a product of the national technical environment and, as such, shares with the private sector both the historical management methods and the opportunities to benefit from innovations. As has been widely reported in the contexts of downsizing (or rightsizing), total quality management, business process re-engineering, reliability improvement, and other broad-based movements, U.S. industry has had considerable success in adopting new management methods to re-establish its competitiveness in the global market. For that matter, DoD is not without its comparable successes. The question is: Of the wealth of possible innovations, what are those actions that depot maintenance should take now that provide the best leverage for efficiency improvement?

The Task Force, working within its four established panels (Fixed Wing Aircraft, Ground Forces Equipment, Missiles and Electronics, and Shipyards), developed over 20 recommendations worthy of further consideration. The recommendations fall into seven broad categories (reliability improvement, personnel, materiel management, business modernization-lean manufacturing, business modernization-reinventing government, business modernization-depot investment, and management information systems) and are discussed below within those categories. An important point before proceeding with detailed discussion is that each of these recommendations has an empirical basis. The commercial sector, the government sector, or both have already demonstrated their efficacy in an industrial setting. Where possible, the Task Force has identified relevant initiatives as examples to be expanded or emulated. Although the Task Force strongly believes that the recommendations should be implemented, most will require more detailed examination than possible here in order to do so. Inherent in the detailed formulation is the necessity for organic retention of CORE capabilities and the means to carry out Title 10 responsibilities.

Reliability Improvement

Reduced Depot Maintenance Requirements. The Task Force recognized that one of the keys to achieving depot maintenance efficiencies is to enhance the reliability and maintainability of weapon systems and equipment. The major life-cycle cost driver within maintenance and support is often reliability. For many modern systems, depot maintenance support requirements have, in fact, been eliminated or reduced because of reliability improvements. But, more can and should be done. As reliability is improved, depot maintenance infrastructure (both government and industry), including facilities, equipment, and workforces, can be downsized with concomitant savings and efficiencies. DoD needs to sharpen the focus of programs to more effectively monitor reliability performance and to target improvements in reliability factors that impact depot maintenance requirements, both during new systems acquisition and for those systems currently in the inventory that drive on-going significant depot maintenance programs. Further, since implementation of reliability improvements often falls outside the arena of traditional depot maintenance funding (through the Defense Business Operating Fund), the Task Force believes that DoD should develop specific funding techniques for reliability improvements.

The Department and industry continue to focus on reliability improvement, both during production as well as during systems ownership and operation. For example, the Army developed a new method for stating and assessing its reliability, availability, and maintainability (RAM) requirements. The purpose of the new approach is to assess reliability performance during given missions as well as to determine the quality of the product with more all-inclusive logistics overtones in order to cover all aspects of reliability concerns.[3] Other Services have taken similar initiatives to enhance on-going reliability improvement programs. The Task Force believes that a specific focus of reliability improvement efforts should be the effects on depot maintenance programs. To that end, efforts should be made to appropriately define and quantify depot

[3] Jokubaitis, L. K. and Quinn, M. F., *New Army Method in Stating and Assessing RAM Improvements,* Annual Reliability and Maintainability Symposium, 1992 Proceedings, The Institute of Electrical and Electronics Engineers.

maintenance requirements that can be specifically affected by reliability initiatives. Trade-off analyses should be conducted to identify programs with the greatest potential for return. The Department should consider such reliability improvement efforts and depot maintenance program requirements from an integrated perspective, i.e., total costs for both the reliability improvements and related depot maintenance programs should be visible and controllable. Savings from reliability improvements should be overall savings to the Department--not just cost avoidances from programs that ultimately add costs to total Department expenditures. The total depot maintenance bill must be constrained and reduced.

Personnel

Flexible Personnel Practices. DoD needs to downsize efficiently and in a timely manner to CORE and, at the same time, be able to rapidly respond to changing demands and workloads. Specific initiatives to consider — or expand — include use of overtime, temporary hires, contractor augmentation, and the consolidation of job skills to increase the flexibility and efficiency of the workforce. In addressing the reduction of overhead, it is recognized that DoD's flexibility is limited since large, rapid workforce reductions may destabilize the organic workforce to a degree that would entail increased risk to readiness and sustainability. This does not mean, however, that the government should not take the necessary steps to downsize: downsizing can be achieved through attrition, freezes, early outs, and selected reductions in force, all of which are within DoD's authority.

Beyond reducing the workforce, the most important objective should be revision of DoD civil service personnel guidelines. Flatter organizational and team structures are possible if job descriptions and grade levels are based on value-added job content as opposed to, for instance, the number of personnel supervised. Further, it is critical that approval times for changes such as these and for other necessary personnel actions be shortened to make the process as efficient as possible.

Various DoD organizations, both inside and outside the depot community, have been dealing with the tough personnel issues as they transform their operations to adjust to the realities of the post-Cold War era. Several successful results exist in Service acquisition commands—while operating within the current laws and Civil Service regulations. Those examples need to be understood and emulated. As one such example, the Aeronautical Systems Center at Wright-Patterson Air Force Base, Ohio, successfully reduced its personnel by approximately 3,000 employees (1/4 of the total). These employees were placed on a surplus list and encouraged to move to other geographic locations or retire. The early-out incentives offered by Congress were critical to the success of this downsizing effort. Equally critical was an understanding and acceptance of the need for a lean workforce that made the downsizing problem more manageable while minimizing impact on the mission.

Education/Training. DoD should provide educational/training opportunities with industry for middle- and upper-level managers to assist them in staying current on innovations developed by industry, on improving technical understanding, and in enhancing overall communication. It should explore the feasibility of the reverse as well. A robust, effective training system for depot middle- and upper-level managers is often neglected during periods of tight budgets. This is short-sighted savings, because the knowledge gained from exchange programs with industry can pay for itself several times over.

Materiel Management

Depot parts requirements and procurement processes should be streamlined to take much greater advantage of modern information technologies, distribution methods, and product reliability. Present DoD practices are a continuation of historical methods, developed in an era when large inventory buffers were needed to mitigate the risks imposed by fragmented demand data, uncertain quality, long transportation cycles, and similar factors. In recent years, industry, both domestically and

internationally, has demonstrated the investment, operating cost, and time savings of minimal inventory, just-in-time methods (e.g., direct vendor delivery, contractor item/subsystem management, vendor inventory management, and vendor repair). DoD should expand its direct-vendor and just-in-time pilot programs to take full advantage of these modern, commercially-demonstrated practices. One attractive approach is to use the contract type as a vehicle to improve efficiency (e.g., by incentivizing minimization of overhead, turnaround times, costs, etc.)

An important challenge in adopting any new method will be to mitigate DoD cyclic funds availability (e.g., end-of-quarter, end-of-year). The parts procurement system at present is very sluggish—if funds become available in the last quarter of the fiscal year it may take months to actually complete the process.

The Defense Logistics Agency (DLA) must be a participant in experimental or permanent streamlining processes. This will not only guarantee inclusion of DLA's expertise but also ensure that the benefits of improvements enjoy broader application while precluding establishment of redundant acquisition processes.

In the context of improved parts procurement methodologies, the Army has already demonstrated a "full spectrum" contractor materiel management approach that may be worthwhile for application to other programs. The Army contracted with a private repair company committing that it (the Army) would return a specified number of helicopter parts for repair. The contractor was told to structure for that number, plus an additive surge capability. The contractor had responsibility for managing the item, repairing the item, and maintaining the surge inventory for the item—the Army would not provide any government furnished materiel. The procurement itself was competitive, and, although the winner was not guaranteed the program for life, the contract was for a reasonably long time. This procurement minimized organic investment in the manpower and resources required to manage and repair system components while at the same time providing the commercial sector the program stability to create a responsive, assured source of repair.

Business Modernization - Lean Manufacturing

Lean Manufacturing. In its September, 1993, report, the Defense Science Board Task Force on Defense Manufacturing Enterprise Strategy identified a number of acquisition and manufacturing changes that have proven singularly successful in both government and industry.[4] These methods, collectively termed "lean manufacturing," included:

- Focusing on process improvement,
- Eliminating non-value-added activities,
- Developing long-term and real partnerships,
- Empowering teams, and
- Integrating product and process development.

The September, 1993, report, addressing defense acquisition and manufacturing, demonstrated how these changes enable continuous improvement in costs, quality, cycle time, production flexibility, and performance. The present Task Force reaffirms the value of these changes to improving the overall efficiency of the rework and repair that is the business of depot maintenance.

DoD Manufacturing Initiatives. There are a number of DoD "lean manufacturing" initiatives already underway that are a basis for productivity gains.

- **The Joint Logistics Commanders Flexible Computer Integrated Manufacturing (FCIM)** is an initiative which includes DoD and industry cross-functional teams conducting experiments in process improvement and cycle-time reduction.

- **Air Force Lean Aircraft Initiative (LAI)** includes academia (Massachusetts Institute of Technology), industry, and the government, and is making a dynamic change toward lean practices and processes. The *Manufacturing 2005* initiative establishes pilot programs to demonstrate the combined efforts of manufacturing technology and lean acquisition practices. The *Manufacturing Development Initiative* (MDI) focuses on concurrent development of product and process during the acquisition of a weapon system.

---

[4] Report of the Defense Science Board Summer Study Task Force on Defense Manufacturing Enterprise, September, 1993.

- **Army Integrated Development Team Acquisition Initiative** is a series of training and education briefs to encourage formation of integrated development teams.

- **Navy Best Manufacturing Practices (BMP)** links government, industry, and academia to exchange information on benchmarking, problem solving, quality, productivity, and competitiveness by sharing proven best practices.

- **Defense Logistics Agency (DLA) Corporate Contracting** is a prototype to combine DLA requirements into long-term contracts with major suppliers.

The significant reduction of DoD procurement for new weapon systems and depot maintenance parts and products is causing excess to close down. There are indications that the business base for second tier parts and components may have to be (and perhaps to some extent, by market forces, is being) restructured to provide viable sources for low rates of manufacturing. The Task Force recognized that, in addition to the initiatives outlined above, there is a need to expand lean manufacturing technologies to address problems created by the loss of critical manufacturing sources of supply and maintenance. This may be accomplished through centers of excellence for critical or low demand items.

Business Modernization - Reinventing Government Program

The National Performance Review has proposed a series of management reforms that would make the federal government more efficient, responsive, and market-oriented. Collectively, these reforms are intended to foster an entrepreneurial, customer-oriented business culture within the government that benefits from innovative practices developed in the private sector.

The major organic maintenance depots provide a promising setting in which to implement new management concepts and business practices. Unlike most government operations, the depots are industrial facilities that use many of the same products and processes employed in private manufacturing and distribution companies. They, therefore, readily lend themselves to implementation of innovations developed by industry or within other organic depots.

These new management concepts and business practices should be exempted from most of the regulatory, legal, and accounting constraints that impede entrepreneurial behavior. Following the Packard Commission emphasis on centralized policies but decentralized execution, depot managers should be granted considerable latitude in determining how best to achieve their operating goals. Business assumptions and practices could be tailored to the unique requirements of the service, system, application, and technology being addressed. The most important aspect of such initiatives would be to create an incentive structure — a system of rewards and sanctions — that gives management and workers a direct stake in performing well. This structure of incentives would do more than merely promote efficiency and accountability; it would seek to transform the business culture of depots to create organizations that encourage initiative and creativity. The end result would be a more cost-effective and agile organization that is also a highly positive work environment. The manager and the worker would be "empowered" by the awareness that his or her special skills are both rewarded and fully used.

To provide motivation for innovation and action, implementation should include retention and reuse of savings (within reasonable bounds), as well as emulation of industry approaches to depot maintenance plant equipment upgrades and modernization (including modern, open-architecture test equipment concepts).

Business Modernization - Depot Investment

Depot investment budgets have historically been developed with a predisposition toward, ultimately, supporting most weapon systems with organic depot capabilities. In hindsight, this philosophy probably resulted in some inappropriate facilitization (e.g., the development of organic capability that duplicated industry capability for a low density item). At the same time, the sustaining investment in facility modernization and upgrades (~ 1-2 percent of budget) has been low by average industry standards (~ 5-10 percent). During the current post-Cold War period of contraction, however, industry's investment level has been much lower than

the historical average. This pattern of investment should be re-oriented toward maintaining a technically modern maintenance infrastructure that is sized to CORE requirements. Only in this way can the risks attendant to providing combat readiness and contingency support be minimized.

Management Information Systems (MIS)

Reliability Information Management. Each of the Services gathers a variety of performance-related information for weapon systems, equipment, and materiel. Unfortunately, this information often resides in a number of disparate databases with a wide range of characteristics. The integration of such information can, however, be a key to identifying reliability improvement targets. The Army, for example, has developed a system approach that provides top-down views into a number of databases which, when viewed together, can help them focus reliability improvement efforts supported by in-depth logistics and performance data. DoD needs to ensure there is a continued, if not enhanced, focus on reliability information tracking and that there is reliability information available at the system, component, and serial number levels.

Corporate Information Management. The Task Force supports improvement of the depot maintenance corporate information management (CIM) system to provide depots the required tools (e.g., system capabilities, accurate and timely information, and data that is comparable across the Department) for efficient management, and to implement a system that will interface with the materiel management, financial management, and distribution CIM systems.

The Department is in the process of replacing over 120 existing data systems in the maintenance depots with the Depot Maintenance Standard System (DMSS). The DMSS presently consists of nine sub-systems that will support the major functions of the maintenance depots. The majority of the current depot maintenance data systems were built upon pre-1980's software development methodologies and older computer technology that is becoming obsolete and prohibitively expensive to maintain or

PREFACE

This addendum supplements the original report of the Defense Science Board Task Force on Depot Maintenance Management. The study was undertaken to meet the requirements of the Secretary of Defense and Section 341 of the Fiscal Year 1994 National Defense Authorization Act.

This addendum to the original report addresses two specific taskings in the Task Force Terms of Reference that were not included as requirements of the Authorization Act. These two taskings were addressed by the entire Task Force and recommendations for administrative action by the Department are provided.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-3140

DEFENSE SCIENCE
BOARD

01 OCT 1994

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE (ACQUISITION & TECHNOLOGY)

SUBJECT: Addendum to the Report of the Defense Science Board (DSB) Task Force on Depot Maintenance Management

I am pleased to submit to you the Addendum to the DSB report on Depot Maintenance Management, dated April 1994. The original report was in response to the 1994 National Defense Authorization Act, specifically, nine Congressional taskings. This Addendum addresses two tasks not requested by Congress.

The Addendum focuses on ways to make depot maintenance operations more efficient and on the need for and effectiveness of the transition of initial depot maintenance support from commercial sector sources to organic depot facilities.

The basic recommendation endorses using an acquisition Decision Tree Process to allocate workload between Government and private facilities. However, changes to DoD directives are needed to incorporate the CORE concept and revised competition policy.

I support the recommendations of the Task Force and recommend that you forward the Addendum to the Secretary of Defense.

Paul G. Kaminski
Chairman

upgrade. These existing systems reside on multiple hardware platforms, are supported by a variety of operating systems, and utilize many different databases and programming languages. In addition, the current systems lack data standardization, have a large degree of data redundancy, and have significant amounts of Military Service unique data. The Department determined that it was necessary to replace the existing depot maintenance information systems and even the data structures because of significantly changing and more complex depot maintenance business process requirements. The Joint Logistics Systems Center (JLSC) reviewed all depot maintenance system development plans and selected the best systems for Department-wide adoption. This process enabled the Department to retain some of the Services' existing technologically proven systems and to integrate them as part of the DMSS. New sub-system development for DMSS considers open systems structure and contemporary information systems technical architecture requirements. The systems replacement process is well underway and several of the sub-systems of DMSS have been successfully implemented at Defense depots.

The Department's analysis indicates that the DMSS, the business process changes it supports, and the resulting reduced system support requirements will be of considerable benefit to DoD in both improved management capabilities and reduced costs for depot maintenance operations. The JLSC estimates savings of approximately $2.7 billion during FY 1994 through FY 2003 from implementing the DMSS in the Defense depots. If these estimates prove to be accurate, the depot maintenance CIM effort will have achieved great success.

The Task Force supports improving the depot maintenance CIM systems to achieve lower costs and improved management at the maintenance depots. The Task Force recommends that the Department continue to ensure that the successes and failures of private industry in making corporate information management systems improvements are considered in DoD depot maintenance CIM management. This experience indicates that adopting "open" architectures and decentralized business

information systems that integrate or provide interface capabilities among existing systems is most cost effective.

Financial Accounting Systems. An essential underpinning of efficient depot maintenance operations is accurate understanding of the costs of doing business. Studies and reviews indicate that the Department's and the Services' financial management systems and databases are not capable of supporting the determination of the actual cost of specific depot workloads — a basic management need. This fundamental flaw virtually eliminates management's ability to make sound business-like decisions. The DoD needs to develop depot maintenance cost accounting systems that accurately reflect the cost of doing business and that are consistent with standards applied to industry. These systems must include adequate internal controls to ensure compliance with underlying standards.

The Task Force recognizes that DoD is already working to enhance accounting practices, performance measures, and information systems for depot maintenance within the larger framework of Department-wide business processes and corporate information management changes. The point to be made here by the Task Force is to reemphasize the essentiality of common systems for collecting and displaying accurate, complete, and comparable depot maintenance cost information.

DISCUSSION — TASK B

Task B is focused on the need for and effectiveness of the transition of initial depot maintenance support from commercial sector sources (usually the system developer or producer) to organic depot facilities. Specifically, the TOR asked the Task Force to look at . . .

> *Depot maintenance plans for new items of equipment and compare relative cost effectiveness of organic and private industry facilities, including major weapon systems, missile systems, electronics, software, etc.*

As with Task A above, the Task Force identified a number of issues worthy of consideration. Those issues are addressed below.

Consistency With the CORE Concept

Recent policy decisions involving CORE capabilities and competitions, as well as past and future Base Realignment and Closure (BRAC) actions, will define the large-scale shape of the depot base. The acquisition process, however, is also an important focus of key decisions that impact depot maintenance. Although acquisition decisions are made program-by-program, their effects are cumulative and long-lasting. The Task Force endorses using an acquisition Decision Tree Process (DTP) encompassing readiness, sustainability, and economic factors as the basis for designing the workload allocation between organic and private industry facilities. However, revision of DoDD 4151.18, *Maintenance of Military Materiel,* DoDI 5000.2, *Defense Acquisition Management and Procedures,* as well as the existing Service DTPs is necessary to achieve consistency with the CORE concept (illustrated in Figure 1) and new competition policy. *Inherent in these changes must be adoption of a new philosophy that precludes automatically acquiring organic depot capability for new weapon systems.* The DepSecDef recently stated: "Efficient depot maintenance support of new weapon systems is of utmost importance. However, the paradigm must change; we should no longer assume new weapon systems and equipment will transition to organic depot support. In many cases, there is neither a strong economic case nor risk control requirement for establishing organic depot support."[5] The revised guidance and DTPs should provide for:

- Organic depot duplication of plant equipment already present in the private sector only when there is a proven and compelling need for readiness or sustainability risk reduction.
- Incorporation of the maintenance concept of a new weapon system, to include the proper mix of public/private maintenance, as an essential component of the acquisition strategy.

---

[5] DepSecDef May 4, 1994, memorandum; subject: Depot Maintenance Operations Policy.

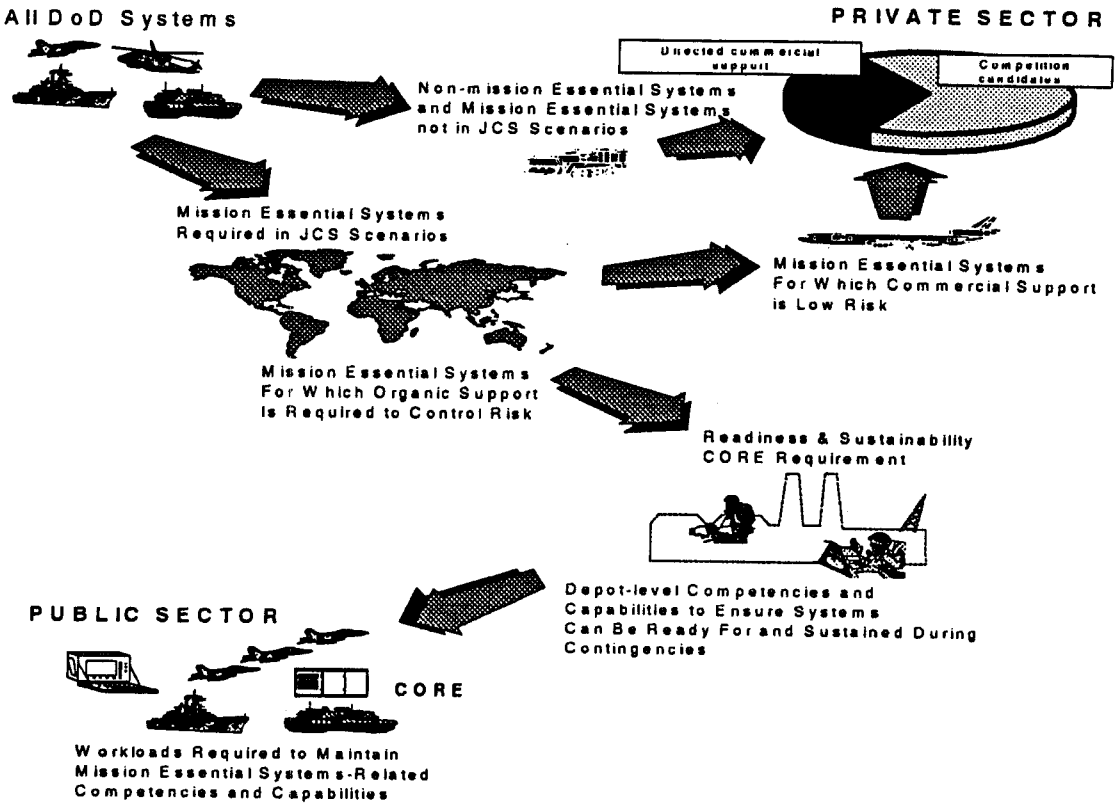


Figure 1. ***Deriving CORE and Allocating Workloads***

Note: While Figure 1 is not descriptive of the current decision process of each Service, it is nonetheless representative of the approach that should be used to revise these processes to reflect the CORE policy.

- Service top-down depot maintenance strategy guidance review as part of each new weapon system's milestone decisions.
- Re-examination of the depot maintenance strategies of weapon systems as they progress in the acquisition process. While it is obviously valid to make the basic organic/contract strategic decision early on, the best risk-reducing balance between contract and organic support may need to change over time. (An obvious example is use of interim contractor support during early fielding.) Further, changes in the procurement strategy (e.g., radical reduction in production quantity) may also invalidate the basis on which early source of repair decisions were made.

The DTPs themselves should incorporate the following considerations:

- Is there a JCS contingency requirement for this weapon system?
- Is the weapon system in production? If so, for how much longer?
- What quantity is being procured?

- What is the level of technological complexity of the system? What is the expected "half life" of that technology? What is the plan for pre-planned product improvements and/or for technology insertions? Are configuration changes anticipated?
- What are the technology capabilities required to support this system? Does the organic structure already provide adequate CORE capabilities in these technologies?
- What is the level of investment required to acquire a new or modify an existing depot maintenance capability? How much of this capability already exists in the public or private sectors?
- What is the expected/desired service life?
- What is the depot pipeline?
- What is the potential of commercial application?

Acquisition Concepts

System Reliability. The reliability of systems/components is a critical determinant of mission capability, repair frequency, facilitization, technician training, spares procurements, and a host of other factors. It is essential, therefore, for both organic and commercial repair activities to improve reliability and sustainability of components. Such reliability improvements have a multiplier effect in reducing costs. Methods for improving reliability, such as pre-planned product improvement (P^3I), are available and well understood. There is, however, a near absence of organizational incentives to vigorously pursue continuous reliability improvement in practice. As a result, depot maintenance (whether organic or contract) largely responds to only the worst of the field-identified "bad-actors." The Task Force recommends a basic redesign of the reliability improvement process to provide an effective implementation structure, to include improvement identification, evaluation, funding, and execution. Recognizing that implementation of reliability improvements often falls outside the arena of traditional depot maintenance funding, the Task Force believes that DoD should consider focusing specific funds on such improvements through either a dedicated program or some other "fencing" mechanism.

Single, Integrated Digital Database. The Task Force recommends a single, integrated digital database be developed and maintained for each new weapon system

as it proceeds through R&D, production, and support phases of its life cycle. The database would normally be originated and maintained by the OEM under the oversight of the weapon system manager. Consistent with the Continuous Acquisition and Life Cycle Support (CALS) concept, this approach, in essence, would eliminate the Level III technical data package as we know it and use the manufacturer's digital drawings in conjunction with form/fit/function to support competition and breakout, if desired. It would be available to all contractors/vendors involved in supporting the weapon system through its life cycle. As an example, the F-22 program has a common, computerized database system. It is a three-dimensional, spatially correct digital system which allows the manufacturer to do the design and manufacturing process in three geographically separate locations (Ft. Worth, Texas; Marietta, Georgia; and Seattle, Washington). Engineers can communicate in real time between the various locations. To manufacture a part, the information is electronically downloaded into digital tape or electronically programmed into numerically controlled machines. The Services need to adopt this concept in order to support future weapons systems. Any product improvements to the weapon system should be made through this database, and it would be made available to those involved in sustaining the system.

Use of Best Commercial Practices. Unique government specifications, processes, and practices impose inefficiencies in the current acquisition system that need to be addressed and either eliminated or reduced. DoD depot maintenance should support the use of best commercial practices in lieu of MILSPEC parts, special materiels handling procedures, unique quality control and testing mandates, and associated recordkeeping. Alternatives exist, such as reducing oversight requirements for those public or private sector depot maintenance sources that are quality-level certified. Case studies suggest that current requirements add from 20 percent to more than 50 percent to the cost of the product compared to best commercial practices.