DEFENSE SYSTEMS MANAGEMENT COLLEGE

MODERNIZATION IN LEAN TIMES: MODIFICATIONS AND UPGRADES

Report of the
DSMC 1994-1995
Military Research Fellows

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PREFACE

This report summarizes an 11-month research fellowship by three Military Research Fellows. This program is sponsored under the auspices of the Under Secretary of Defense for Acquisition and Technology (USD(A&T)). The program has two primary goals: first, it provides an advanced professional education for selected military officers from the Army, Navy and Air Force; second, it provides an independent report in an area of interest to the Department of Defense (DoD) acquisition community. The Defense Systems Management College (DSMC), in keeping with its role as the center for systems management education within the DoD and cooperating with the Harvard Graduate School of Business, provided the means for conducting this fellowship. The fellowship program included the 12-week resident Program for Management Development (PMD) course at Harvard University in Boston, Massachusetts.

Our report topic for this year is modifications and upgrades. As the replacement cycle for weapon systems grows and the turn-over in technology shortens, one answer to maintaining an effective weapon system is through modifications or upgrades. This report will provide you a concise top level review of the DoD regulations, policies and guidance pertaining to major weapon system's Modification and Upgrades. Since modification and upgrades are normally handled at the Service level, we offer a review of each Service's policies and procedures. The report was not constrained to the DoD only; we studied the modification and upgrade procedures for industry, other countries and one other government agency in an effort to provide an insight into how others perform this process. This report is a snapshot in time; it only addresses the guidance and policies effective as of 1 March 1995.

We could not undertake a study of this magnitude without the help, cooperation and contributions of many people. The faculty and staff at Harvard University and DSMC were extremely helpful with their encouragement, insight and support. A number of people have been particularly helpful. Dr. James Price, Dean for Research, Consulting and Information Division at DSMC, served as our mentor providing helpful advice and guidance throughout the research effort. Special thanks to LtCol Charles L. Houston, a former member of the DSMC faculty, for his valuable insights into the acquisition processes used by our allies. We owe our gratitude to the DSMC librarians for their outstanding support throughout our effort.

This report would not have been possible without a few key players outside the DSMC. We conducted more than 50 interviews with key personnel from academia, government, industry and allied nations involved in the modification and upgrade process. All our interviews were conducted in a non-attribution environment. Therefore, we can not thank these key people by name but they have our special thanks.

The Research Fellows extend a special note of thanks to Ms. Joan Sable, DSMC Military Research Fellowship Coordinator. Ms. Sable's efforts were invaluable to the project. She

ensured we received adequate administration support at Harvard and DSMC. She was instrumental in coordinating the reviews of our report. She knew where the “show-stoppers” were and kept us and the project on track and on schedule. Ms. Sable was tireless in her efforts to ensure that we were free to concentrate our efforts toward providing a product that is useful and meaningful to the reader.

There are many others that deserve recognition but in fairness to all, there are too many to mention. The three fellows would like to thank all of those people that helped make this report possible. We hope this report is as helpful to you as you were to us—thank you.

EXECUTIVE SUMMARY

Since the end of the cold war, there has been an increased emphasis on acquisition reform. This is due, in part, to the fact that the defense budget is getting smaller. With readiness as the priority, there are fewer dollars available for procurement. In an attempt to maintain a viable fighting force, the Services are initiating fewer new programs and are looking to modifications and upgrades as a method to take the Armed Forces into the twenty-first century.

With technology advances being made in just a few years, the DoD needs to continue to insert new technologies and improvements into existing weapon systems and platforms. What this report attempts to capture is the execution of the existing modification or upgrade process used by the Services. To that end, three chapters are dedicated to covering a different service department's process, both in acquiring the modification or upgrade and implementing the change to the affected system.

In an attempt to identify better ideas for the modification and upgrade process, the report looks at the National Aeronautics and Space Administration (NASA), Germany and the United Kingdom (UK). NASA probably has the smallest oversight bureaucracy, within the agency itself. However, there is still considerable oversight from Congress. The modification and upgrade processes for Germany and the UK have several points in common. They tend to lock the design early in the process and limit changes to safety related items only. Both procurement systems have clear separation of the buying community and their users. The user agrees on the requirements and turns them over to the buying organization for execution of the procurement. Change requirements, after weapon system fielding, are returned to the beginning of the acquisition process for review. The early agreement on the requirement and the separation of user and buyer assure both nations maximize their limited defense funds.

In addition, a chapter is devoted to a comparison between the government procurement process and that of commercial industry. This chapter is based on work done previously by DSMC Military Research Fellows and our experience at Harvard Business School.

During our research, some remarkable discoveries were made about the DoD. For example, the number of Office of the Secretary of Defense (OSD) personnel in the acquisition arena exceed the total number of acquisition staff personnel from all the services combined. This is a less than optimal pyramid. There are too many people who can delay a program without adding any value to the oversight process.

During the interview process, we discussed, with high level DoD acquisition community leadership, some specific proposals that could improve the acquisition process. Subsequent to the writing of this report, Dr. Paul Kaminski, USD(A&T), promulgated reforms to the

acquisition process that included some of the points pursued in this report. The deletion of Milestone IV directly impacts this work (see Appendix B). However, there is more to this report than a reaffirmation of the “old” Milestone IV acquisition process. Significantly, the report looks at how the Services effect these changes, the problems encountered and some initiatives for improvement.

1

INTRODUCTION

The end of the Cold War was projected to bring an era of greater worldwide stability, however, just the opposite seems true. Deployment of the U.S. military to more places and more conflicts is greater than at any time since World War II. Adding to the U.S.' demanding global involvement, the Department of Defense (DoD) itself is undergoing its widest breadth of changes ever. Our force structure and budgets are down about 33 percent since 1985 and procurement is down 65 percent. This reduction, in the investment dollar available, has forced the DoD leadership to find more innovative ways to maximize each defense dollar. Leveraging advance technologies into our current systems through modifications and upgrades offers a cost effective solution.

We chose this subject because it is apparent that modifications and upgrades will play a greater role in today's and tomorrow's DoD modernization plans. Several reasons appear causal:

- Today's weapon systems are very complex making each one expensive.

- The time required to develop and produce new systems has grown so exhausting that often pieces of these new systems are obsolete or nearly ineffective at their fielding.

- The speed of technology growth increases the risk of system obsolescence but offers new opportunities for using an incremental improvement philosophy.

- Declining DoD budgets preclude buying large amounts of new equipment.

- Several old systems could remain viable weapon systems with continuous modest improvements.

Also, our interest was piqued because there is little published information or research on the modification and upgrade processes or procedures. Thus, our goal is to provide the reader with fresh and useful insights into how DoD and the components intend to manage this potential growth area.

Purpose

This report will help the acquisition community understand the current modification and upgrade process. As the service life for weapon systems grows and the half-life of technologies shorten, one answer to maintaining effective weapon systems is through

modifications or upgrades. This report provides a concise, top level review of DoD regulations, policies and guidance pertaining to the modification and upgrade of weapon systems. Since the Services handle modification and upgrades, this report offers a review of each Service's policies and procedures. This report extends beyond the DoD, by looking at the modification and upgrade procedures for industry, other countries and one other U.S. governmental agency. This report is not designed to be a "how to guide" for modifications and upgrades. It is however, a starting point for a future study of the processes. This report offers DoD and Service policy makers an opportunity to review the policies and procedures of their sister Services with an eye to improving the overall modification and upgrade process.

Methodology

We approached this project from three different vantages. While attending the Harvard Graduate School of Business, we discussed our topic with faculty members and with our fellow classmates from U.S. and international companies. Generally speaking our classmates were middle level managers responsible for making their companies' processes work. Our discussions, with our classmates, were focused on product life extension programs within their corporations. We concentrated on what decision points were used and how the programs were developed. We were also very fortunate to have classmates working for U.S. Defense contractors. We focused these discussions on their management processes and tried to identify differences between the management process for a new product and upgrade/modification. Our time at Harvard University offered a unique opportunity to discuss management processes with classmates and friends, whom are currently managers for some of the world's leading corporations.

Upon returning to the Defense Systems Management College (DSMC) we began an extensive literature review. Identifying over two hundred related writings including books, periodicals, research reports, government policy letters, instructions and regulations; we distilled this number to 50 key documents. We heavily relied upon these documents for the development of this report. Our research indicates an interesting timing sequence for articles on modifications and upgrades. The documents normally fall into two distinct time frames, prior to 1979 and later than 1994, which coincide with the last reductions in DoD funding. The search also indicates there has been no comprehensive study of the Modification and Upgrade process within the DoD, as of this report.

Finally, we conducted more than 50 interviews with key personnel from academia, government, industry and allied nations involved in the modification and upgrade process. These interviews lasted from one hour to several days, covering most aspects of the modification and upgrade process. We spoke with senior acquisition officials, Program Executive Officers (PEOs), Program Managers (PMs), Program Logistics Managers, Weapon Systems Managers, Force Developers, Fleet Maintenance Officers and Item Managers (IMs). We collected as much information as possible from these individuals using their experiences, both bad and good, with the modification and upgrade processes.

Assumptions

The following assumptions established a

common starting point for this modifications and upgrades report:

- Modifications and Upgrades will continue to be accomplished using the acquisition process established by DoD Directive 5000.1, *Defense Acquisition,* dated February 1991 and DoD Instruction 5000.2 with Change 1, *Defense Acquisition Management Policies and Procedures,* dated February 1993.

- DoD funding for its investment account will not increase in the near future.

- Acquisition Streamlining process will continue to affect the Modification and Upgrade process.

Using these three fundamental assumptions, we began our report of the DoD's Modification and Upgrade Process.

Objective

The Research Fellows corporately defined, researched and contemplated the issues of modifications and upgrades in order to offer this work as a primer for the acquisition leaders who will chart the future course for these activities. We strongly feel that this report arms the decision maker with the background information necessary to design surgical changes to an already functioning process. This will further enhance the DoD's ability to capitalize on technological advances, while living on meager resources. If decision makers are able to distill from our work those "knowledge nuggets" which persuade to "best effect" as opposed to "wholesale changes" and their associated confusion, then we confidently offer that this effort will have value to the DoD beyond the "opportunity costs" to our individual services for the fellowship year.

2

DEPARTMENT OF DEFENSE

Introduction

This chapter provides a brief overview of the Office of the Secretary of Defense (OSD) and Joint Chiefs of Staff (JCS) organizations, processes and procedures that have the greatest effect on the Services' modification and upgrade programs. It describes the current environment and furnishes some working definitions. Next it describes the impact by requirements generation and acquisition systems on modifications and upgrades. It concludes with a summary of recent policy changes that affect the Services modification and upgrade programs.

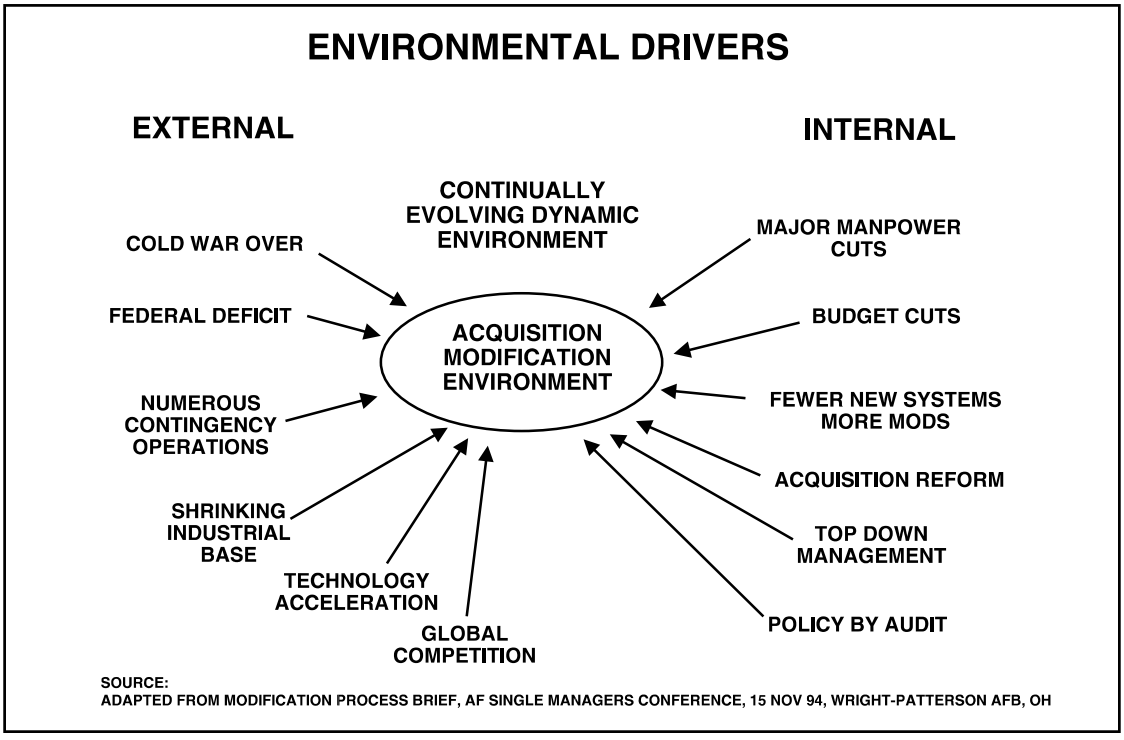

Figure 2-1. Environmental Drivers

Environment

The end of the Cold War was projected to usher in an era of greater worldwide stability; however, just the opposite seems true. The U.S. military is deployed in more places and involved in more conflicts now than at any time since World War II. Superimposing itself on a more demanding global environment, DoD itself is undergoing its widest breadth of change ever. The DoD force structure and budgets are down about 33 percent since 1985 and procurement is down 65 percent.[1] At the same time all Soldiers, Sailors, Marines and Airmen are facing greater demands. Concurrently, scrutiny and changes are occurring in investment and business practices. The U.S. military strategy of technological supremacy in arms is now challenged by the global marketplace. This suggests that, in the future, critical defense technologies may only be found outside the U.S. military industrial complex. What will be the U.S. access to these technologies? Quoting from General John Shalikashvili, Chairman of the JCS, "Today, those of us who serve in the Armed Forces are caught up in the coincidence of three revolutions...the end of the Cold-War...defense budgets are declining along with military resources...the military technical revolution...."[2] He makes the point that the loss of the U.S. preeminent threat, i.e., the Soviet Union, coupled with a defense budget that at the turn of this century will be half its 1988 high-water mark, and the acceleration of technology and its global availability, mean drastic changes to how the DoD plans, programs and executes its investments for the future.[3] This is the context we found as we started to examine the business practices of how DoD does modifications and upgrades.

DoD Perspective

In the past, modifications and upgrades seemed to be of minor interest to the DoD leadership but that interest is markedly increasing. To illustrate the point, one of the most far reaching acquisition reforms that took place in the early 1990's, the issuance of the DoD 5000 series, did not specifically address modification or upgrades. A myriad of other policies, directions and instructions became obsolete with the February 1991 release of the DoD 5000 series. The idea was to put all the important top-level direction in one place, thus hopefully streamlining acquisition management. These documents detailed the department's overall strategy for acquiring or improving a weapon system by "...integrating the efforts and products of the Department's requirements generation; acquisition management; and planning, programming and budgeting systems."[4] Still, by not containing specific instructions on modifications and upgrades the policy produced confusion among the components. The DoD attempted to clarify the series intent by adding definitions and acquisition process and procedure instructions in Change One to DoD Instruction (DoDI) 5000.2 (Part 3), February 1993, titled *Milestone IV Major Modification Approval*. For a complete review of this partial instruction see Appendix A.

DoDI 5000.2 Definitions

> **Modification:** A modification is a change to a system (whether for safety, to correct a deficiency, or to improve performance) that is still being produced. [5]
>
> **Upgrade:** An upgrade is a change to a system (whether for safety, to correct a deficiency, or to improve performance) that is out of production. Upgrades are part of

the Milestone 0 decision process.[6]

Major Modification: A modification that in and of itself meets the criteria of acquisition category I (ACAT I) or ACAT II or is designated as such by the milestone decision authority (MDA). Major modifications require a Milestone IV decision. Unless the decision to modify results from one of the alternatives, it is considered part of the Milestone I decision process.[7]

Implications

Adding these definitions for modifications, upgrades and major modifications did not allay all the components' concerns. Many of the interviewees felt the new instruction made doing upgrades too onerous. Since the upgrade definition does not distinguish between "major & minor", all upgrades regardless of size or complexity now have to start at Milestone 0. This seems odd at a time when the service life of more and more systems is being extended because no replacement systems are on the horizon. This "one size fits all" process for upgrades does not allow managers to use their common sense. It clearly adds administrative workload and delays the fielding time for upgrades.

Modifications and Upgrades, Part of the DoD Investment Strategy

Modifications and upgrades programs have always been an investment option available to DoD. The importance seems to ebb and flow in proportion to the strength of the DoD budget. In lean times, when investment dollars are scarce for major new programs, modifications and upgrades grow in precedence. Also, as defense dollars dry up, the military looks for low cost ways to extend the lives of existing systems. Today, DoD is spending a smaller portion of the budget on investment with more dollars flowing into operations and readiness. Reducing the cost of operating existing force structures can turn this flow around. Dr. Paul Kaminski, Under Secretary of Defense for Acquisition and Technology (USD(A&T)), makes this point when he says, "...As we purchase new and modified systems, we will stress reduction of overall life-cycle cost [LCC].... To the extent DoD maintains systems longer, we must increase the focus on reducing the cost of ownership for the remaining service life of our current systems."[8]

Resource Allocation in DoD

The three key decision making processes that lead to or result in resource allocation for modifications and upgrades are Requirements Generation, the Acquisition System and the Planning Programming Budgeting System (PPBS). As the DoDD 5000.1 states an effective interaction of these systems is essential.

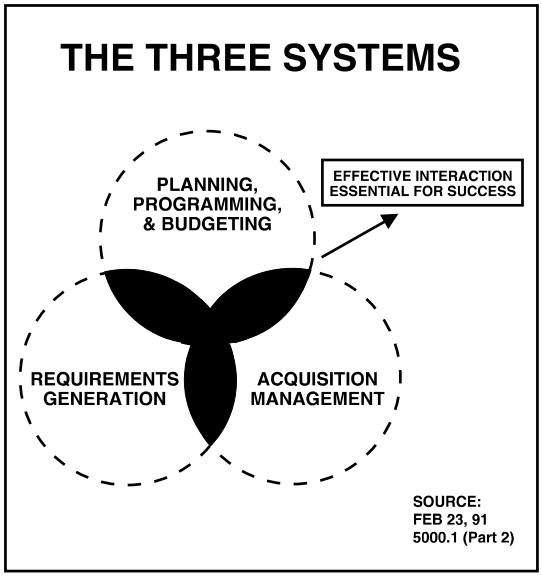

Figure 2-2. The Three Systems

Requirements Generation

At the top of the requirements generation process in DoD is the Joint Requirements Oversight Committee (JROC). The JROC membership includes the Vice Chairman, JCS and the Vice Chiefs of Staff from the Services. The JROC charter is to review all (ACAT I, or potential ACAT I) Mission Need Statements (MNSs) and review major programs prior to acquisition milestone decisions. Consequently, for the purposes of this report, JROC involvement or influence apply primarily to major modifications or ACAT I upgrade MNSs. Until recently, this group met monthly and either approved or disapproved MNSs and sent them on to USD(A&T). If the JROC recommends approval the documents are forwarded with a joint priority designation. Ostensibly, the JROC was a rubber stamp, it approved individual Service requests as long as the need could not be met with a non-material solution. This has changed.

Expanded JROC Duties

Recently, the Chairman, JCS (CJSC), charged the JROC with greater involvement in the resource allocation process. Specifically the JROC now includes recommendations that effect both planning and programming. The CJSC goal was to tap the corporate wisdom and expertise of the Senior Military Officers to find the best way to meet DoD's needs and to achieve a clearly expressed consensus about where DoD is going.[9] The JROC responded by setting up a more structured review process for examining needs. By changing the structure, the

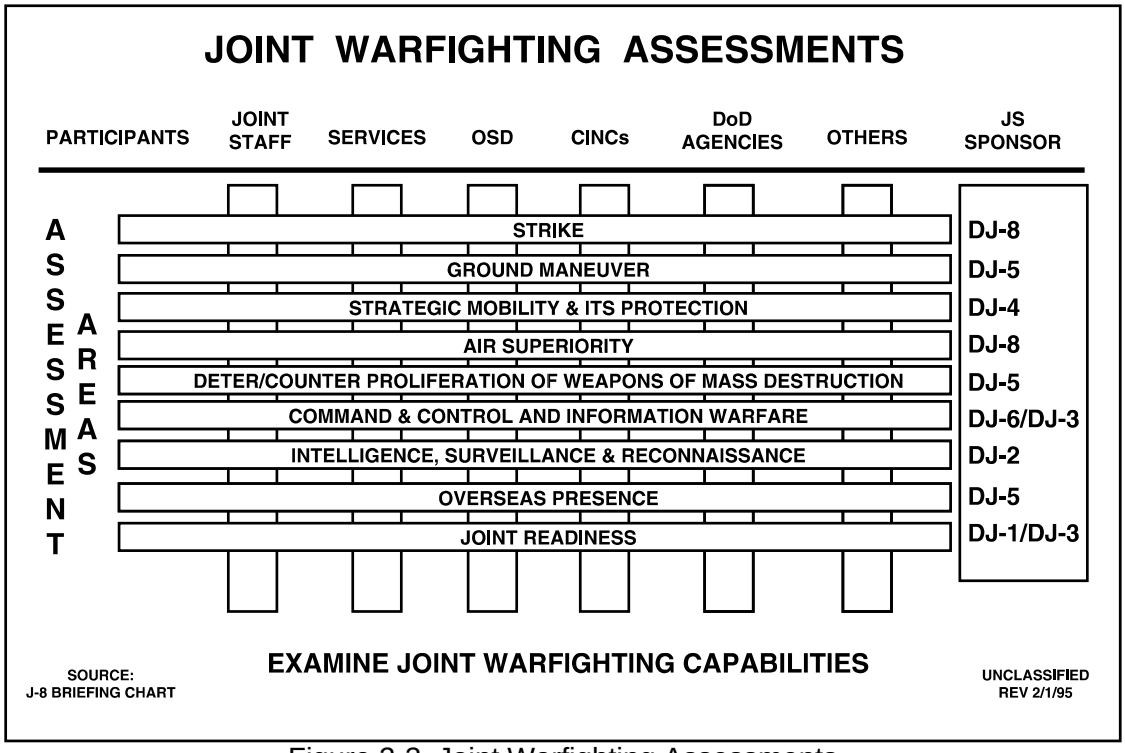

Figure 2-3. Joint Warfighting Assessments

JROC wants to cut down service rivalries, eliminate unnecessary duplication of effort and/or redundant systems and to bubble up the best possible requirements to meet current and future threats. The new structure divides military missions into nine Joint Warfare Capability Assessment (JWCA) areas. Each assessment area has a primary Joint Staff advocate/sponsor(s) (see Figure 5-3). It is the sponsor's job to, twice a year, draft the area's assessment issues and formulate options for meeting current and future needs. These issues and options are coordinated with the joint staff, services, OSD, and other defense agencies. Then briefings are presented to the Commander-in-Chief(s) (CINCs), specified commanders and service chiefs for feedback, revision and consensus. In one half of the cycle, the final product is submitted as the Chairman's Program Recommendation with a goal of influencing the Defense Planning Guidance (DPG). In the other half of the cycle the final product is submitted as the Chairman's Program Assessment (CPA) with a goal of influencing the President's budget submission. These agreed-to issues and options become the microscope through which new MNSs or operational requirements documents (ORDs) are examined. For example, now, before the JROC looks at a service MNS, the sponsor must have coordinated it with the other components and Joint Staff. For approval, it must clearly benefit DoD's overall warfighting capability and be affordable. The CJSC provides a good summary when he says, "...we have expanded the scope and significance of the JROC discussions and linked them to CPA which, in turn, will fulfill its Congressionally mandated destiny to articulate the joint, collective position of the Services with respect to joint requirements and readiness."[10]

The expanded JROC duties described above were a cause of concern to some of the people interviewed. One of their concerns was that the Joint Staff might start interjecting themselves into the decision making process for less than major programs. A consensus of feelings were the JROC involvement in less than ACAT I programs would slow down an already slow process and tend to centralize decision making when it should be further decentralized.

USD(A&T) responsibilities

The USD(A&T) receives the MNSs from the JROC and decides when to hold a Defense Acquisition Board (DAB) and whether to approve a Milestone 0 (Concept Studies decision), or a Milestone IV (Major Modification program). At Milestone 0, this decision marks the first interaction between requirements generation and the acquisition system.[11] Today, program afford-ability is a critical issue for a new start or major modification approval.

Acquisition System

Big changes are stirring in acquisition management policy and procedures. Modifications and upgrades use acquisition procedures, which will also change. It is easy to understand why, when one reads what the current Secretary of Defense (SECDEF), the Honorable William J. Perry, has to say about the DoD Acquisition System, "...DoD has been able to develop and acquire the best weapon and support systems in the world. DoD and contractor personnel accomplished this feat not because of the system, but in spite of it."[12] This indictment of the acquisition system has everyone in the DoD acquisition community scrambling to revisit their practices. The OSD reen-gineering method of choice for the acquisi-

tion system is the Process Action Team (PAT). These teams are comprised of a crossfunctional group of subject experts chartered to propose changes to reduce acquisition costs, streamline the acquisition process and/or eliminate non value added tasks. To date, there have been six SECDEF, USD(A&T) or Deputy Under Secretary of Defense, Acquisition Reform (DUSD(AR)) commissioned PATs, each looking at a different acquisition process. All PAT reviews have completed and some of the recommendations are being or will be implemented. The components are also using PATs to bubble up reform initiatives to OSD or to reform component processes. Still, the PAT process is only one tool necessary for reengineering. General (Retired) Bill Creech, a highly regarded military leader and business consultant, makes the point that to be a world-class organization requires excellence in the management of five interlocking areas (pillars): product, process, organization, leadership and commitment.[13] The current emphasis on using process as the catalyst for reengineering DoD is a good starting point, but it will fail if the other elements General Creech talks about are not reengineered.

How will the implementation of the PAT recommendations affect modifications and upgrades programs? It is too early to tell. Still, one thing the components do not want is an increase in OSD oversight. In fact, most of the interviewees consider the current limited OSD involvement in ACAT II, III & IV modification and upgrade programs an advantage.

The OSD acquisition oversight of ACAT II, III & IV programs that does occur usually takes the form of budget reviews. The OSD comptroller's staff examines the obligations and expenditure rates for these programs against the OSD goals. If either the obligation or expenditure rate is below the OSD goal, then the service must provide rationale and "get well" plans. Traditionally, modification and upgrade programs have done poorly in meeting the OSD goals. This puts modification and upgrade programs funds at risk because Congress takes a dim view of DoD not using the funds they have appropriated in a timely manner. If modifications and upgrade programs are to continue to be viewed as a cheaper, less risky and faster way to meet a deficiency, then the services need to improve the execution of funds.

Summary

During the writing of this chapter, DoD changed the key tenets of the policy that governs major modifications and upgrades. These changes are included in a Memorandum titled, *Reengineering the Acquisition Oversight and Review Process*, 28 Apr 95 (see Appendix B for a complete text). While the timing of these changes were inconvenient to the authors, they seem to offer some substantial benefits to the acquisition workforce in general over the previous policy. However, because this new policy is directly applicable to ACAT I programs, exactly how it will be implemented is a guess. Still, two changes pertinent to modifications and upgrades programs are worth mentioning. These changes are the deletion of Milestone IV, Major Modification Approval decision, and a flexible milestone starting point for modifications and upgrades, i.e., Milestone 0, I, II, or III depending on which milestone the MDA believes best fits the work to be completed.[14] The impact of deleting Milestone IV decisions for "Major Modifications" per se seems minor, however, allowing the PM to recommend and the MDA to choose the right place (milestone) to begin an **upgrade** is

considerable. This change allows the services to cut significant amounts of administrative burden and time consuming workload by starting an upgrade at the "right place". The interviewees describe many of the upgrade Milestones 0 and 1 efforts and decisions as "paper chase" activities. They view the relative value of these activities as extremely low. Cutting low value workload is exactly what is needed as resources continue to decrease.

ENDNOTES

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3

DEPARTMENT OF THE ARMY

Modernization remains critical to the future of the United States Army. Although procurement dollars are not projected to increase for several years, we continue to develop new systems by leveraging and adapting technology from the private sector. Improvements to our existing systems are the best way to achieve the greatest returns for scarce resources and to leverage technology to the extent possible.

Statement by The Honorable Togo West Jr. to
House Appropriation Committee, March 30,1995

Introduction

This chapter provides a clear understanding of the Army's current modifications and upgrades process. The Army defines modifications and upgrades in the same manner as the OSD. The Army's modification and upgrade policies, like the DoD, have undergone major changes in the last two years. These were due, not only to Change 1 of DoDI 5000.2, but DoD's recent drive to streamline the acquisition process.

This chapter is divided into six sections. First is a discussion of the environment that has shaped the Army's current policy and decision process. The second section explains why the Army conducts modifications and upgrades. The third section provides the definition of key terms used in the modification and upgrade process. Section four covers the Army's force development process. The understanding of this process is critical to the execution of any modification and upgrade program. Section five is the heart of the chapter. This section addresses the current Army guidelines for the material developer. The final section addresses new initiatives in the modifications and upgrades process. The Army's policies on modifications and upgrades continue to be dynamic and evolving. These traits ensure these policies keep pace with the environment in which they must operate.

Environment

Today the U.S. Army faces the challenging mission of maintaining "land force dominance" in an ever changing world. The Army's fundamental charter, as Secretary of the Army West, stated "...is to win our nation's war and to protect its vital interest."[1] The environment in which the Army

finds itself has changed in three basic ways. First, the strategic environment in which the Army is developing and producing weapon systems today differs greatly from the world of only a few short years ago. Second, the expectations and plans at the end of the Cold War prove inaccurate for land force requirements. Third, the expected reductions in funding prove to be even greater in the areas of research, development and procurement.

The U.S. no longer faces a well defined and technologically sophisticated threat posed by a single massive power, the former Soviet Union. The threats against which the U.S. designs and builds weapon systems are often unpredictable and numerous, because of access to a worldwide sophisticated weapons market. Such changes in the threat forces changes in doctrine, force deployment and weapon system development. The U.S. Army has moved from a large "forward presence" force in Europe and elsewhere to a "power projection" force based in the U.S. Weapon system development has changed from a design and development cycle, focused on remaining inside the development cycle of former Soviet Union, to a program based on continuous modernization.[2]

As the Cold War ended, the Bottom Up Review (BUR)started by the DoD hoped to reshape military force for the post-Cold War world. The BUR designed a force with emphasis on air and sea forces in anticipation of fewer land force requirements.[3] This anticipated requirement for fewer ground forces proved to be inaccurate, given the mission of today's Army. The Army is now faces the challenge of meeting increased requirements for troop deployment with a smaller force structure. The effect on the Army was a 300 percent increase in opera-

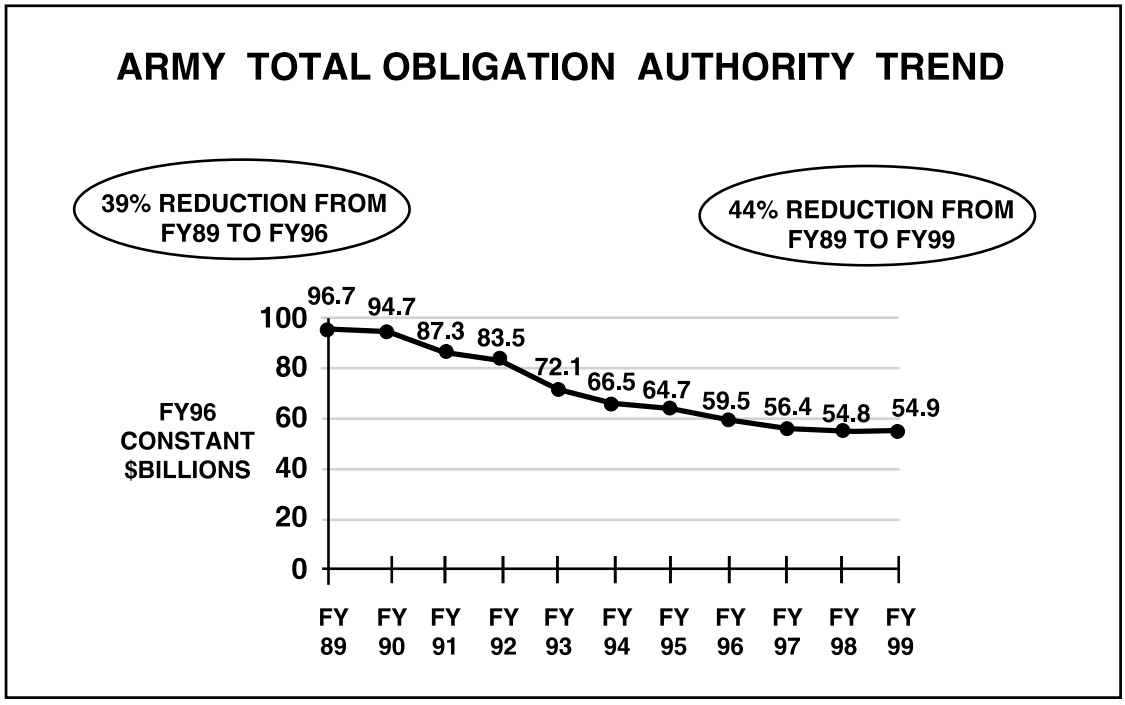

Figure 3-1. Army Total Obligation Authority Trend

tional deployments since 1989.[4] The increase in deployments coupled with a higher readiness requirement, has had a predictable impact on the Army's investment accounts, given a fixed overall budget.

Because of the Cold War ending, funding impacts are quite dramatic. The Army's total obligation authority (TOA) (constant FY 96 dollars) has fallen 39 percent from FY89 to FY96.[5] These reductions are projected to continue until at least FY99 when the total reduction in TOA will have reached at least 44 percent since FY89.[6] Most of the Army reductions occurred in the investment accounts. Procurement funds were reduced from 14.4 billion dollars in FY89 to a projected 7.1 billion by FY99.[7] The research, development test and evaluation (RDT&E) account is projected to be 3.7 billion by FY99 down from a FY89 figure of 5.1 billion.[8] These funding reductions force the Army to revisit its modernization process. The Army can longer afford business as usual in the area of modernization.

The Army modernization focus is no longer about systems; it is about capabilities.[9] The days of the major new starts have all but ended. The Army's predominant method of modernization of its equipment, in the near future, will be by modifications and upgrades.

Army Perspective

The reasons for modifications or upgrades are as varied as the sources, but they all have one thing in common; they correct an identified deficiency. The correction of an identified deficiency may take the form of any of the following:

- Changes in performance

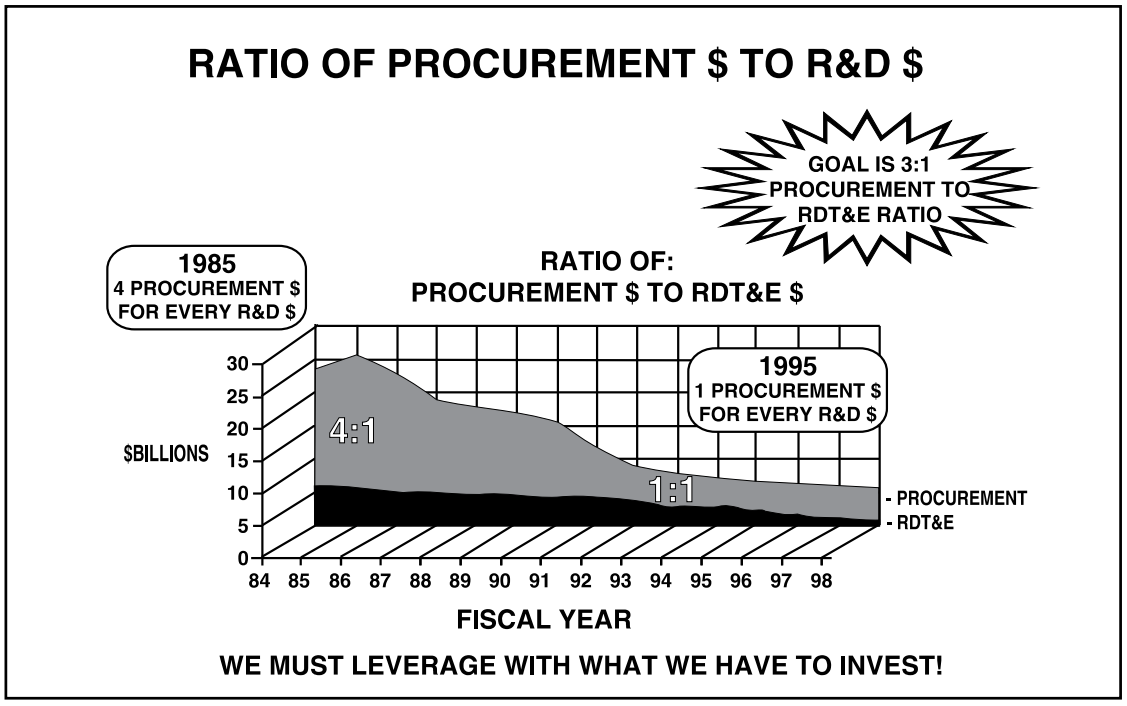

Figure 3-2. Ratio of Procurement $ to R&D $

- Changes in interface
- Compatibility
- Correction of deficiency
- Operational or Logistics
- Production stoppage
- Cost reductions
- Safety
- Value Engineering

The bulk of the Army's modifications and upgrades is in the area of performance improvement.[10] Confirmation of this fact by the Army's Material Change Information System shows performance improvements account for over 70 percent of the funding spent for weapon system modifications or upgrades.[11]

Suggestions for modifications and upgrades can originate from industry, an allied country or the DoD. Interviews with senior Army leadership ranked the material developer and industry as the primary source for modifications and upgrades. This, on the surface, would seem to be counter to the Army's user driven enhanced requirement process, but material developer and industry do understand the state of given technology.

Modification and upgrade programs offer the additional advantage of more accurate projection of resource requirements. Studies have shown product life extension programs are ten times more effective at predicting funding requirements than new production.[12]

Definitions

In discussing the process of modifications and upgrades, it is important to have a common point of reference. Such a common reference point must be based on a common understanding of the terms being used to describe the process. The lack of this understanding was very evident in the individuals interviewed. In most cases the terms are used interchangeably without regard for the impact on required documentation.

- **Horizontal Technology Integration (HTI):** Provides for the application of common technology across multiple systems or items to improve the warfighting capability of the force. It is a modernization requirement and acquisition process that simultaneously integrates technology into different weapon systems.[13]

- **Host System:** A system or end item that includes (but is not limited to) tracked and wheeled vehicles, aircraft, watercraft, missiles, ammunition, communication equipment or medical equipment designated to accept a mounted system or end item. The host system program retains configuration control of the single system resulting from the combination of the two (host and mounted) system.[14]

- **Mounted System:** A subsystem/end item designated to be incorporated into a host/end item. The mounted system program office normally retains configuration control over its item but does not retain configuration control over the single system resulting from the combination of the host and mounted systems.[15]

- **Combat Developer(CBTDEV):** Command or agency that formulates doctrine, concepts, organizations, material require-

ments and objectives. Represent the user community in the material acquisition process.[16]

- **Component Modernization:** A process by which a part, subassembly, assembly or accessory is replaced by an improved item when the old version fails. Form, fit, function and support requirements of the component are changed.[17]

- **Materiel Developer:** Research, development and acquisition command or agency assigned mission area responsibility for the system under development or production.[18]

- **Block Modification:** A grouping of modifications for the purpose of achieving economies in funds, personnel, equipment and time with the additional benefit of improved configuration management. A block modification includes several modifications in engineering, procurement and/or application that are managed as a single modification.[19]

- **Pre-planned Product Improvement (P3I):** Planned future evolutionary improvement of developmental systems for which design considerations are accomplished during development to enhance future application of projected technology.[20]

Force Development Process

The Army's force development process is the important first step of the modification and upgrade process. This process, coupled with the Army's Scientific and Technology communities, provides the requirements, priority, funding guidance and promising technologies to the force development process. This process is especially important for all upgrades since they return to Milestone 0 for evaluation.

The Enhanced Concept-Based Requirement System (ECBRS), and its accompanying mission area analysis, are the CBTDEV's current processes for determining battlefield requirements. The ECBRS is the latest evolution of the Concept-Based Requirement System(CBRS) developed in the 1970s. An ECBRS is the Army's disciplined approach to identify and prioritize doctrine, training, leader development, organization, material, and now, science and technology initiatives (S&T) in support of the National Military Strategy (NMS). The ECBRS moves away from the Cold War approach of the CBRS by emphasizing time and resource constraints.

The ECBRS is a three stage process. Stage 1 begins with strategic guidance in the NMS, DPG, Total Army Plan, CINCs' Integrated Priority Lists and the Army Modernization Plan (AMP), from which the Army develops its vision. Headquarters, Training and Doctrine Command (TRADOC) issue guidance based on analysis of the strategic guidance to the branches and proponents for the initiation and execution of the ECBRS cycle.

In stage 2, the branch or proponent schools develop their individual vision of the future battlefield. They determine the critical battlefield system within their area of responsibility. This is the phase in which the material developer and the technology base provide inputs to the ECBRS. The technology base conduit is the Battle Labs (BLs). The PMs and Materiel Commands use the TRADOC System Manager as entry into the ECBRS during this stage. The branch or proponent schools identify the critical battlefield system issues and determine required capabilities. Material solution approvals are one major component of this review process. Selection of acquisition alternatives for material solutions occur in the

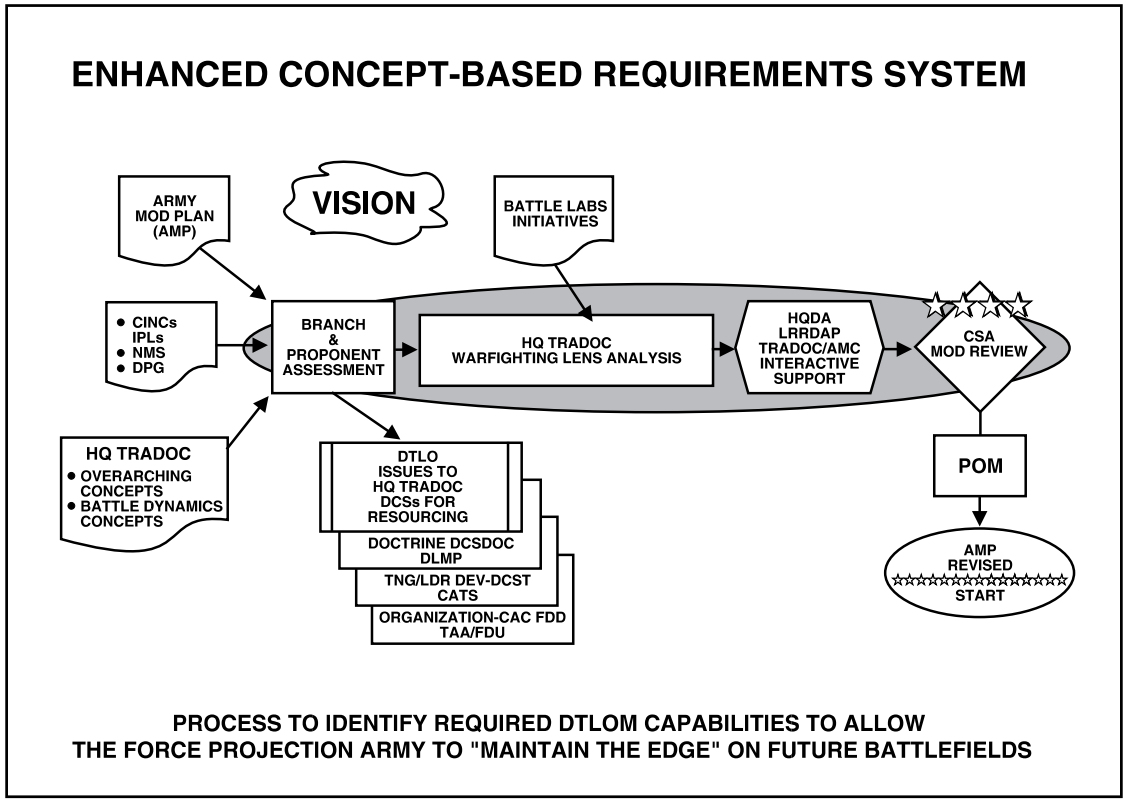

Figure 3-3. Enhanced Concept-Based Requirements System

following order: product improvement, non development item and new development. Examination of the alternative must include an evaluation of LCCs, affordability and force structure implementation. CBTDEVs are responsible for the development or updating the system requirement documentation. Initially, all major modifications, ACAT I and II, had to have a new ORD addressing the modification or upgrade.[21] ACAT III or IV programs could use an updated requirement document.[22] The approval process, for ACAT I or II, could take up to a year depending on the level of final approval. However, a recent memorandum signed by Mr. Noel Longuemare, Principal Deputy USD(A&T), has authorized the MDA, for ACAT II, III and IV programs, greater latitude in streamlining the acquisition process for each program.[23] This allows the MDA, for ACAT II programs, the opportunity to use an updated requirements document instead of a new ORD. The branch or proponent schools also develop a prioritized list of all modifications and upgrades for weapon systems within their area of responsibility. The schools forward the requirement capabilities to TRADOC for integration.

During stage 3, TRADOC conducts an analytical assessment of the current modernization strategy through a process called Warfighting Lens Analysis(WFLA). The WFLA identifies systems that provide the best required capabilities based on their synergistic effect on the battlefield. The ECBRS products are input into the Long-

ACQUISITION CATEGORIES (ACAT) AND MILESTONE DECISION AUTHORITY

ACAT	SELECTION CRITERIA	DESIGNATION AUTHORITY	MILESTONE DECISION AUTHORITY
I	• A program not classified as highly Sensitive by the Secretary of Defense that has: •• Been designated by the Under Secretary of Defense (Acquisition) as an acquisition category I program or is •• Estimated by the Under Secretary to require: – An eventual expenditure for research, development, test, and evaluation of more than $200 Million in fiscal year 1980 constant dollars (approximately $300 million in fiscal year 1990 constant dollars); or – An eventual expenditure for procurement of more than $1 billion in fiscal year 1980 constant dollars (approximately $1.8 billion in fiscal year 1990 constant dollars).	• Under Secretary of Defense (Acquisition) • Acquisition category I programs are further designated by the Under Secretary of Defense Acquisition as either requiring decision by the: •• Under Secretary - ACATID •• Component Head - ACATIC	• ACATID - Under Secretary of Defense (Acquisition) • ACATIC - DoD Component Head or, if delegated, the DoD Component Acquisition
II	• A program not meeting the criteria for category I that has: •• Been designated by the DoD Component Head as an acquisition category II or is •• Estimated by the DoD Component Head to require: – An eventual expenditure for research, development, test, and evaluation of more than $75 million in fiscal year 1980 constant (approximately $115 million in fiscal year 1990 constant dollars); or – An eventual expenditure for procurement of more than $300 million in fiscal year 1980 constant dollars (approximately $540 million in fiscal year 1990 constant dollars).	• DoD Component Head or if delegated, the DoD Component Acquisition Executive	• Executive DoD Component Head or, if delegated, the DoD Component Acquisition
III	• Programs not meeting the criteria for category I and II that have been designated category III by the DoD Component Acquisition Executive.	• DoD Component Acquisition Executive	• Executive Lowest level deemed appropriate by the
IV	• All other acquisition programs for which the milestone decision authority should be delegated to a level below that required for category III.	• DoD Component Acquisition Executive	• designation authority Lowest level deemed appropriate by the designation authority

Figure 3-4. Acquisition Categories (ACAT) and Milestone Decision Authority

Range Research, Development and Acquisition Plan (LRRDAP) by proposing revisions to the AMP and the Army Science and Technology Master Plan (ASTMP). Each ECBRS includes programmatic data, based on the schools' assessments and the TRADOC WFLA; and a prioritization of modifications and upgrades based on the branch or proponent assessment.

The DA Deputy Chief of Staff for Operations and Plans (DCSOPS), in close coordination with the Office of the Secretary of Army for Research, Development and Acquisition (OSARDA), develops the AMP. The AMP translates the modernization vision

into a strategy for near, mid-term and long-term modernization. The AMP links future joint warfighting capabilities with the Army's modernization objectives. The AMP, as the principle product of the ECBRS, codifies programs and major modification or upgrades required by the LRRDAP and Program Objective Memorandum (POM).

The approval, of modifications and upgrades, is the critical first step in the process. The material developer's understanding and execution of the modification and upgrade process is the means in which the soldier receives the material solution to an operational deficiency.

Guidance and Execution

The Army handles modifications differently than upgrades. Guidance on modifications is under the control of the OSARDA, while DCSOPS controls upgrade guidance. The Army's modification guidance has evolved from an Interim Operating Instructions (IOI), September 1990, to a newly written guidance letter, dated 26 July 1994. The final version will be published in DA PAM 70-3, expected in mid 1995. The IOI reference to upgrade guidance is not included in either the modification guidance letter or the final version of the DA PAM. OSARDA, acquisition policy writers for the Army, believe upgrades, because of the requirement to return to Milestone 0, are under the oversight of the DCSOPS. To date, there is no formal guidance on upgrades from DCSOPS to the field. The lack of formal guidance, coupled with the fact that the material developer does not control all the assets needed to change, makes modification and upgrade programs more challenging than new starts.

The guiding principle behind the Army's modification program is the close and effective coordination between the material developer (producer) and CBTDEV (customer). The material developer receives a proposal for modification from any source. They take the proposal and conducts a study on the feasibility of the modification. If the change addresses only contractual factors, the material developer is the sole approving authority. The originator receives all rejection proposals with a rationale for the action. Proposals that affect form, fit, function and logistics supportability are jointly reviewed by the material developer and CBTDEV. Rejected proposals follow the same process as above. For ACAT I or II level modification, the CBTDEV and material developer forward the recommendations to the DA for approval and prioritization. Approval action for ACAT I or joint interest ACAT II belongs with the JROC for approval. Approval and prioritization of ACAT III and IV modifications belong to the CBTDEV level. When either DCSOPS or the CBTDEV validates, prioritizes and funds the modification, it is returned to material developer for execution.

The Acquisition Strategy (AS) is the PM's controlling document for all modifications. The AS contains the framework for planning and managing the acquisition program. The modification portion of the AS includes all modifications approved and prioritized by CBTDEV. The material developer is responsible for the integration of all approved modifications on the program. The AS replaces the System Improvement Plan as the controlling document for modifications. The AS is the key building block for the Integrated Program Summary (IPS).

Major modifications, ACAT I, milestones are approved at Defense or Army Acquisition Executive (AAE) levels, unless del-

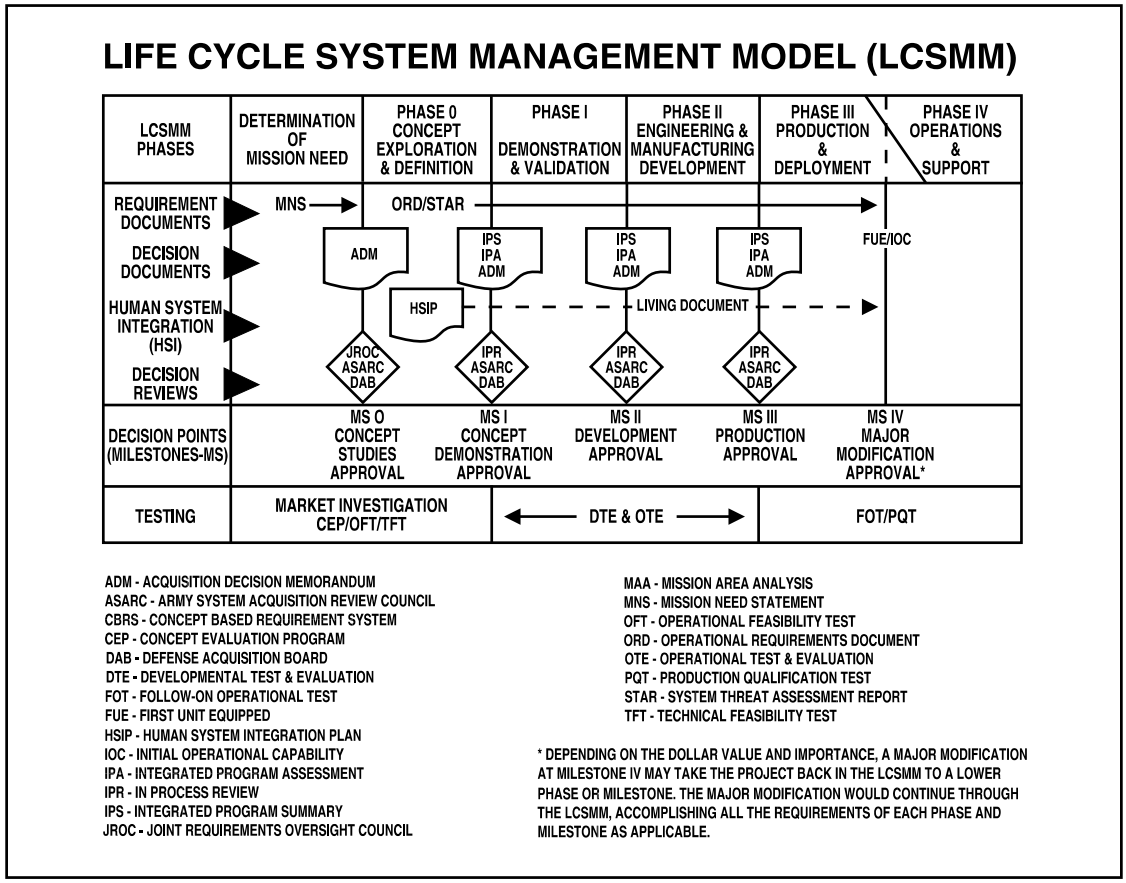

Figure 3-5. Life Cycle System Management Model (LCSMM)

egated lower. These programs require a Milestone IV decision with all it's accompanying documentation. ACAT II, III and IV approvals are normally at the AAE, PEO or System Command level. The current policy for ACAT II, III and IV system documentation states the material developer should only prepare the documents necessary to obtain a favorable milestone decision.[24] This provides the material developer the maximum flexibility in the preparation of the IPS. This does not relieve the functional support staff at the milestone decision level from preparing an integrated program assessment.

Upgrades are different from modifications because of the point of entry into the Life-Cycle Systems Management Model (LCSMM). Upgrades return to Milestone 0 for evaluation and are treated, for the most part, as a new start. In theory, upgrade programs require an even closer and more effective coordination between the material developer and CBTDEV. Upgrade programs are usually driven by changes in mission needs since the item is no longer in production. Once the CBTDEV validates the mission need and updates the ORD, the upgrade is returned to the material developer for action at the appropriate milestone decision level and phase of the LCSMM. For ACAT I and II programs, a Special Task Force or Special Study Group normally con

ducts Phase 0, concept exploration.

The Engineering Change Proposal (ECP) process is used to formalize and incorporate approved modifications and upgrades into the systems technical data package. These approved changes are applied to fielded systems in three ways, depending on the nature of the change. First, component modernization is the method in which subassemblies are improved and fielded through the supply system as part of the normal replenishment system. Form, fit, function and support requirements of a component cannot change when using this method. The second method is the use of the Equipment Improvement Recommendation Digest Technical Bulletin to allow the user to accomplish minor alterations on the fielded system. These minor alterations must be accomplished in less than two hours and be within the capability of the using unit. The third method is the retrofit of fielded systems by an application of a Modification Work Order (MWO). These MWOs are used whether the change is applied in the field, depot or contractor's facility. There are three classifications of MWOs: emergency, urgent and routine. Emergency MWOs have the highest priority and immediate deadline, not capable of performing its operational mission, all affected systems. They require the material developer and CBTDEV to reallocate funding. Emergency MWOs are used to correct immediate operational/safety conditions and must be applied when the kit is available. Urgent MWOs are used when the condition is less critical but operational restriction must be applied to the system. Urgent MWOs must be applied as soon as practicable but not later than two years. Routine MWOs address all other factors and must be applied within four years.

Acquisition and combat development communities easily understand the funding guidance for modifications and upgrades. The type of funding (color of money) used to accomplish the change is based on two factors. Does the change increase the demonstrated performance envelope and is the end item in production? The RDT&E funds will be used to finance redesign of an item to increase the current demonstrated performance envelope.[25] This includes both systems in production and the operational inventory.[26] Procurement funds are used to procure the kits and install them for systems in and out of production.[27] Non-recurring engineering, for the changes that do not increase the performance envelope, use different colors of money based on system production status. Procurement funds are used for non-recurring engineering if the system is in production.[28] Systems out of production use operations and maintenance, Army (OMA) funds, to pay for non-recurring engineering.[29] The use of two definable criteria, to determine the color of money required to accomplish a material change, has simplified the funding portion of the upgrade and modification process.

The test and evaluation policy for modifications and upgrades are, in theory, even clearer than the guidance for funding. The draft Army Regulation (AR) 73-1, scheduled for publication in mid 1995, focuses the testing program level based solely on the impact of the change on the operational community. Changes, after Milestone III, responding to changes in new or revised operational requirement, or a P^3I to fill an existing operational requirement, must have an independent development and operational evaluation to support the decision to apply the change.[30] This is not the only instance there this level of independent development and operational evaluation will

MODIFICATION FUNDING TABLE
(Appropriation vs Program Status)

APPLICABLE APPROPRIATION	PROGRAM STATUS: IN PRODUCTION		PROGRAM STATUS: OUT OF PRODUCTION	
	Increase to the then current performance envelope.	No increase to the then current performance envelope.	Increase to the then current performance envelope.	No increase to the then current performance envelope.
RDTE	YES Non-Recurring Cost	NO	YES Non-Recurring Cost	NO
PROCUREMENT	YES Recurring Cost	YES Non-Recurring and Recurring Cost	YES Recurring Cost	YES Recurring Cost
OMA	NO	NO	NO	YES Non-Recurring Cost

Figure 3-6. Modification Funding Table

occur. If the CBTDEV feels the change has an operational impact, the request is sent to the Test Integration Work Group (TIWG) principals for additional testing. The TIWG will determine the level of independent development and operational evaluation needed to support the decision to apply the change. The material developer has the responsibility to determine the level of testing needed to support the decision to apply changes that do not have an operational impact. In theory, the need for and intensity of testing required to support the decision is weighted against the impact of incorporating the change.

The management of modifications and upgrades at the program level is, for the most part, the same as a new start. Modification and upgrade programs build on the existing structure of the original program. Configuration control, integrated logistic support,

information systems and business management are normally modeled along the same design of the base program. These areas are able to maximize the management commonality between the old and new systems. The modification and upgrade programs' engineering design is not as lucky. Such designs are constrained by the existing systems design and accessibility. For example, design changes to the Army's TOW missile are limited by original design of the missile that restricts access only to internal components in the warhead and aft section. Physical restriction may not be the only problem; older generation systems normally had restricted architecture and limited modularity. Newer systems, driven by greater complexity and lower rates of production, tend to offer a more open architecture and modular design.

New Trends in Modifications and Upgrades

The Army, in an effort to maximize its limited modernization dollars, has initiated three programs: HTI, Operating and Support Cost Reduction Program (OSCR), and Warfighter Rapid Acquisition Program (WRAP). These three programs are designed to provide the Army the latest technology, across the greatest number of systems, at the lowest LCC and with a limited initial investment.

HTI is one of the Army's five enabling strategies for modernization. The goal of HTI is to rapidly exploit leading edge technologies across multiple systems. HTI's objective is to break away from the traditional vertical stovepipe approach to system acquisition. It provides a method to simultaneously integrate and field new technologies across platforms by a method of component level upgrades and modifications. This concept may not be new but current HTI programs have brought integration to a higher level than any previous Army attempt. HTI systems increase operability across the force structure. They have lower overall development cost than individual programs because the development costs are shared by multiple plat-

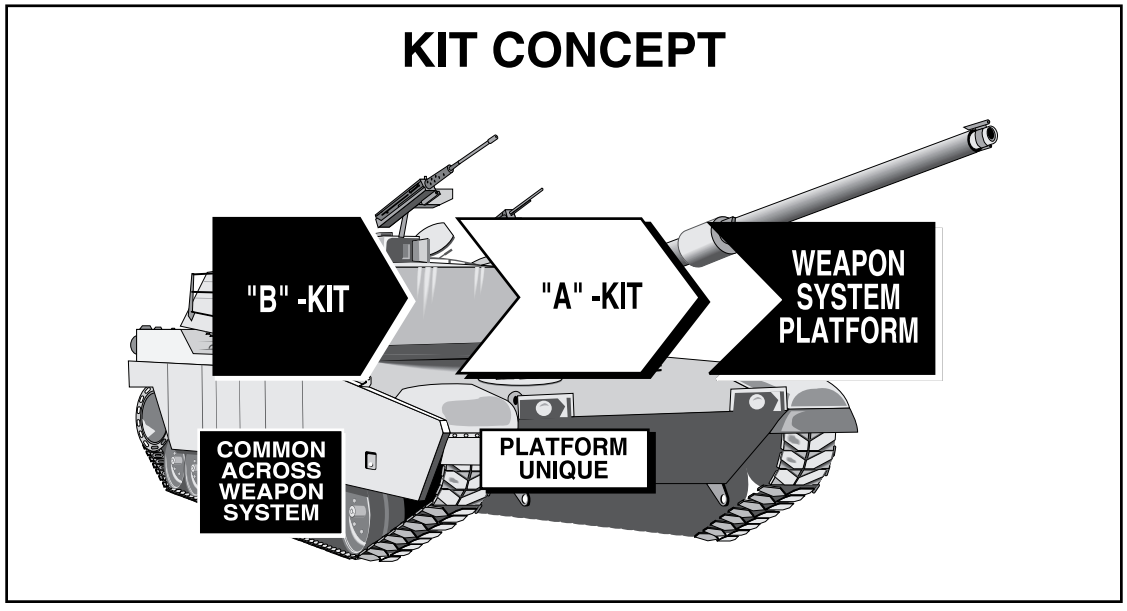

Figure 3-7. HTI Kit Concept

forms. The commonality of HTI components reduce procurement cost by affording economies of scale on the common component. Fielding a common subsystem reduces operational and support cost by allowing standardization of components, simplified maintenance and more efficient use of personnel by concentrating critical operator and support skills.

HTI is not a panacea. It is difficult to coordinate multiple components over multiple platforms with a stove pipe management structure. PMs are chartered to manage their individual program. Breaking this paradigm is the most challenging part of HTI. The PEOs have become even more important because of their ability to look across systems. In addition, HTI programs may not achieve the projected Research, Development and Acquisition (RDA) cost savings. Life-cycle savings should be achieved by common components but the initial cost of platform integration has shown to be higher than planned.[31] Though HTI will be difficult, it may be the Army's only way to incorporate leading edge technologies across multiple systems.

OSCR is an Army program focused on reducing operating and support(O&S) costs. The Army spends nearly half its budget, directly or indirectly, on the O&S of its mission equipment.[32] These include the cost of items ranging from spare and repair parts for equipment to the facilities and people involved in training operators and mechanics. OSCR provides a procedure for submitting unfunded O&S cost reduction initiatives to HQ, Army Materiel Command, or DA. OSCR programs may range from focusing the technology base on a generic costs' drivers to technology insertion (TI) in defense business operations fund (DBOF) processes at component levels. Each TI in the DBOF process allows the IM at the National Inventory Control Point to manage the future availability of spares. DBOF funding may be selectively used to apply "state of practice" technology as long as the change does not enhance performance or capability. The IM can use this process to eliminate high cost, high maintenance, obsolete, unique and/or long-lead time components. This program began three years ago but low funding levels prevent its full implementation. During this POM cycle, a recent U.S. Army Audit Agency report revitalized the program. The report shows the need for a system to level the playing field for O&S based modifications and upgrades. Currently, O&S based modifications and upgrades do not compete on equal terms for funding with performance-based improvement.[33] Both PMs and CBTDEVs are, for the most part, focusing on winning the war not on savings in future years. Prior to OSCR, PMs were forced to use scarce RDA dollars to achieve long-term savings of OMA dollars, of which they had no control. The OSCR program removes this disincentive for the PM by funding the investment in O&S cost improvement.

Warfighting Rapid Acquisition Program (WRAP) is the newest of the Army's programs with the goal of putting modern equipment in the hands of the soldier. WRAP is a process designed to accelerate procurement of equipment that was successful in a BL Advanced Warfighting Experiment (AWE). One purpose of WRAP is to integrate product and process design, taking AWE validated concepts to an abbreviated development cycle. The Battle Technology Team is key to this transition. The team consists of the Chief BL, advance concept manager, tester, cost analysts, program analysts and contracting. The team is responsible for preparing the management plan using a streamlined acquisition ap-

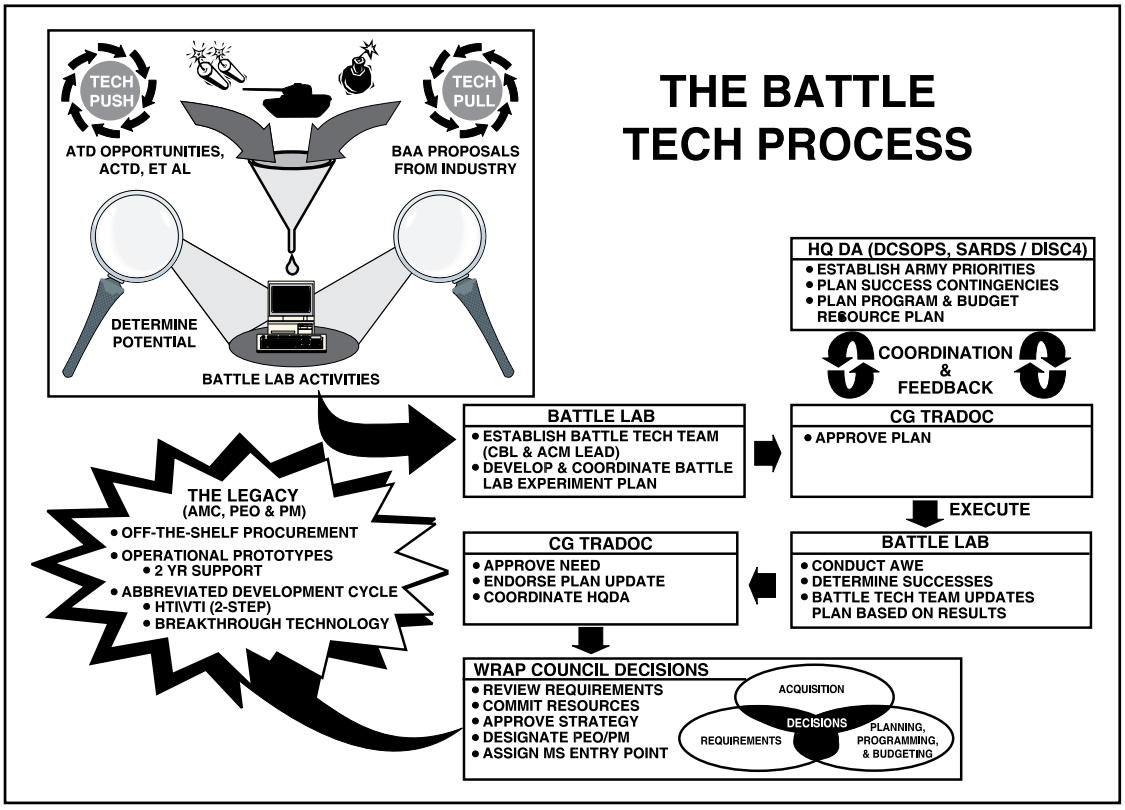

Figure 3-8. The Battle Tech Process

proach. If successful in AWE, the program is forwarded to the WRAP Council for approval. This executive level documentation contains the programs' vital objectives, TRADOC approved requirement, technical approach, critical events, transition options, schedule, funding and participants. This document can be no longer than 25 pages. The WRAP council is co-chaired by the DCSOPS and Military Deputy to Assistant Secretary of the Army (Research, Development and Acquisition). The council consists of the senior members of testing, logistic, financial management, operational and RDA communities. The council reviews the requirement, commits resource, approves the strategy, designates PEO/PM and assigns milestone entry point. The goal of the program is to take an AWE validated technology and rapidly transition it into an accelerated acquisition program.

Summary

The Army's modification and upgrade processes are still evolving and benefiting from acquisition reform. The drive to lower the milestone decision authority should reduce development time and documentation load on the PM. New processes such as HTI, OSCR, and WRAP provide opportunities to reduce life-cycle costs and quickly provide new technology to the soldier. The lack of new starts has driven weapon design to focus more on open architecture and modular components in an effort to achieve these required improvements. Reductions in RDA funding have forced the Army to focus the

modernization and S&T effort. In the past, modifications and upgrades were applied without user input.[34] These improved processes are designed to prevent this from happening. In today's environment, the PM must never forget whom he supports, the soldier.

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4

DEPARTMENT OF THE NAVY

Introduction

The Department of the Navy (DON) is a complex organization consisting of elements of Air, Submarine, Surface Warfare and the Marine Corps. This chapter discusses the requirements, and modification and upgrade processes in the context of these four areas of warfare.

Environment

The modernization plan for the Navy is based on the strategic vision outlined in ...*From the Sea* and more recently in *Forward...From the Sea*, and the results of the BUR conducted by the DoD. In its *Force 2001*, the Navy published a synopsis of the programming process used to make decisions on the future modernization of the Navy and Marine Corps.

When the reorganization of the headquarters staff—Office of the Chief of Naval Operations (OPNAV)—occurred in 1992 (Figure 4-1), the Navy created the Deputy Chief of Naval Operations (DCNO) for Resources, Warfare Requirements and Assessment (N8). By so doing, it subordinated the three major resource sponsors for surface, submarine and air warfare. The Navy thus created a structure that places program direction under a single "Navy voice."[1] Figure 4-2 shows the new N8 organization.

Prior to the reorganization, the resource allocation of the Navy's TOA was divided primarily among the major resource sponsors (surface, submarine and air). This approach resulted in little coordination among the three major resource sponsors and very little with the Marine Corps. Now there is a very different approach. The establishment of the Expeditionary Warfare Division (N85), headed by a Marine Corps General, ensures the naval expeditionary/amphibious needs are incorporated into the budgetary and programming process of the Navy Department.[2] "We have changed our approach by going back to basics—to the fundamentals used to build our forces. We have discarded the 'platform domination' approach involving competition among ships, aircraft, and submarines. We make the tough decisions first, then allocate funding based on a program's relevance and contribution to our ...*From the Sea* strategy, thereby avoiding unbalanced and unresponsive programs."[3]

How are these "tough decisions" made? Against what criteria are they made? What is the process?

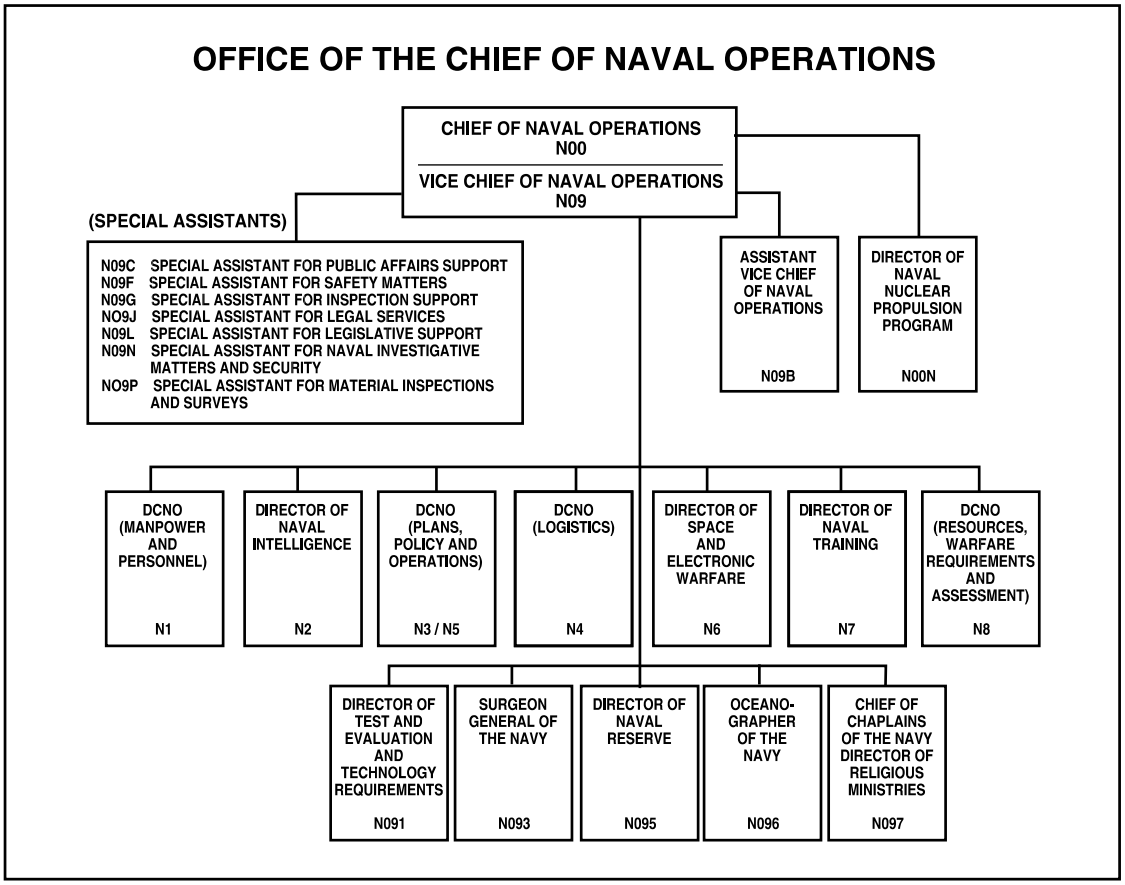

Figure 4-1. Office of the Chief of Naval Operations

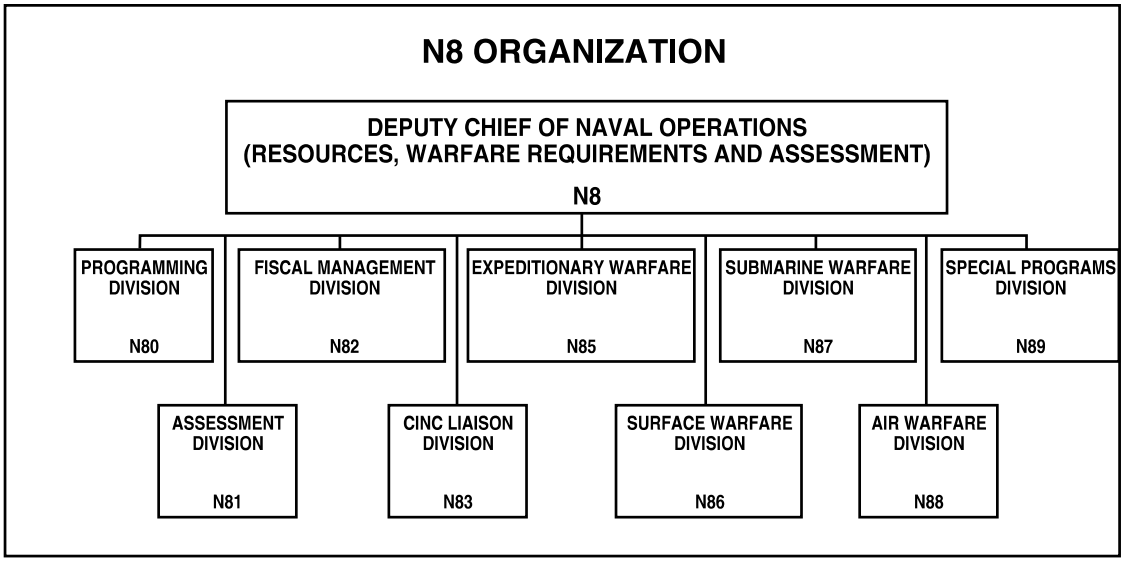

Figure 4-2. N8 Organization

JOINT MISSION AREAS
KEY OPERATIONAL CAPABILITIES MATRIX

KEY OPERATIONAL CAPABILITIES	JOINT MISSION AREAS						
	JOINT STRIKE	JOINT LITTORAL	JOINT SURVEILLANCE	JOINT SEW/ INTELLIGENCE	STRATEGIC SEALIFT/ PROTECTION	STRATEGIC DETERRENCE	FORWARD PRESENCE
COMMAND, CONTROL & SURVEILLANCE	C3, I, OS, SEW, NSW	C3, I, OS, SEW, NSW	C3, I, OS, SEW, NSW	C3, I, OS, SEW, NSW	C3, I, OS, SEW, NSW	C3, I, OS, SEW, NSW	C3, I, OS, SEW, NSW
BATTLESPACE DOMINANCE	STK, ASUW, AAW, SEW, ASW, MIW, OS, C3, I, NSFS, TBMD	ASW, AAW, MIW, SEW, AMW, ASUW, OS, STK, NSW, C3, I, NSFS, TBMD	OS, SEW, AAW, ASW, ASUW, NSW, MIW, C3, I	SEW, OS, NSW, ASW, C3, I, MIW	ASW, AAW, ASUW, MIW, SEW, OS, NSW, LOG, TBMD, C3, I	STRATEGIC, ASW, OS, AAW, SEW, MIW, AMW, ASUW, C3, I, TBMD	AAW, ASUW, ASW, AMW, NSW, SEW, MIW, STK, C3, I, OS, NSFS, TBMD
POWER PROJECTION	STK, ASUW, SEW, NSW, NSFS, TBMD, C3, I	AMW, MIW, STK, SEW, NSW, ASUW, C3, I, NSFS, TBMD	SEW, NSW, OS, C3, I	SEW, NSW, C3, I	LOG, ASUW, STK, AMW, SEW, C3, I, TBMD	STRATEGIC, STK, AMW, ASUW, SEW, C3, I, TBMD	AMW, STK, NSW, AAW, ASUW, ASW, C3, I, SEW, NSFS, TBMD
FORCE SUSTAINMENT	LOG, C3	LOG, C3	LOG, C3	LOG, C3	LOG, ASW, ASUW, AAW, AMW, MIW, OS, C3	STRATEGIC, LOG, C3	LOG, C3

FUNDAMENTAL WARFARE TASKS

STK - STRIKE
AMW - AMPHIBIOUS WARFARE
NSFS - NAVAL SURFACE FIRE SUPPORT
ASW - ANTISUBMARINE WARFARE
AAW - ANTIAIR WARFARE
MIW - MINE WARFARE
TBMD - THEATER BALLISTIC MISSILE DEFENSE
ASUW - ANTISURFACE WARFARE

SUPPORT WARFARE TASKS

SEW - SPACE & ELECTRONIC WARFARE
C3 - COMMAND, CONTROL, COMMUNICATIONS
I - INTELLIGENCE
OS - OCEAN SURVEILLANCE
LOG - LOGISTICS
NSW - SPECIAL WARFARE

Figure 4-3. Joint Missile Areas Key Operational Capabilities Matrix

The Navy uses a matrix of seven Joint Mission Areas (JMAs) and three Support Areas (SAs). All programs and platforms, whether new or existing are assessed against their usefulness in a joint service environment.[4] Figure 4-3 illustrates the matrix formed by the JMAs and the key operational capabilities.

The assessment process is designed to link the Navy-Marine Corps capabilities with the Mission and Support areas in a joint environment. The assessment teams are chaired by Navy Flag or Marine Corps General Officers; they provide a broad view of senior officers from across OPNAV, while bringing special warfare expertise and experience to the assessment process. The teams also include Fleet Commanders in Chief (CINCs) and representatives from Headquarters, Marine Corps.[5]

The assessment process results are then integrated into a single investment strategy, called the Investment Balance Review. Code N81 receives this tasking function. Figure 4-4 outlines the assessment process. The objective of the Navy's integrated investment strategy is to provide coordinated planning that will ensure that the Navy is capable to

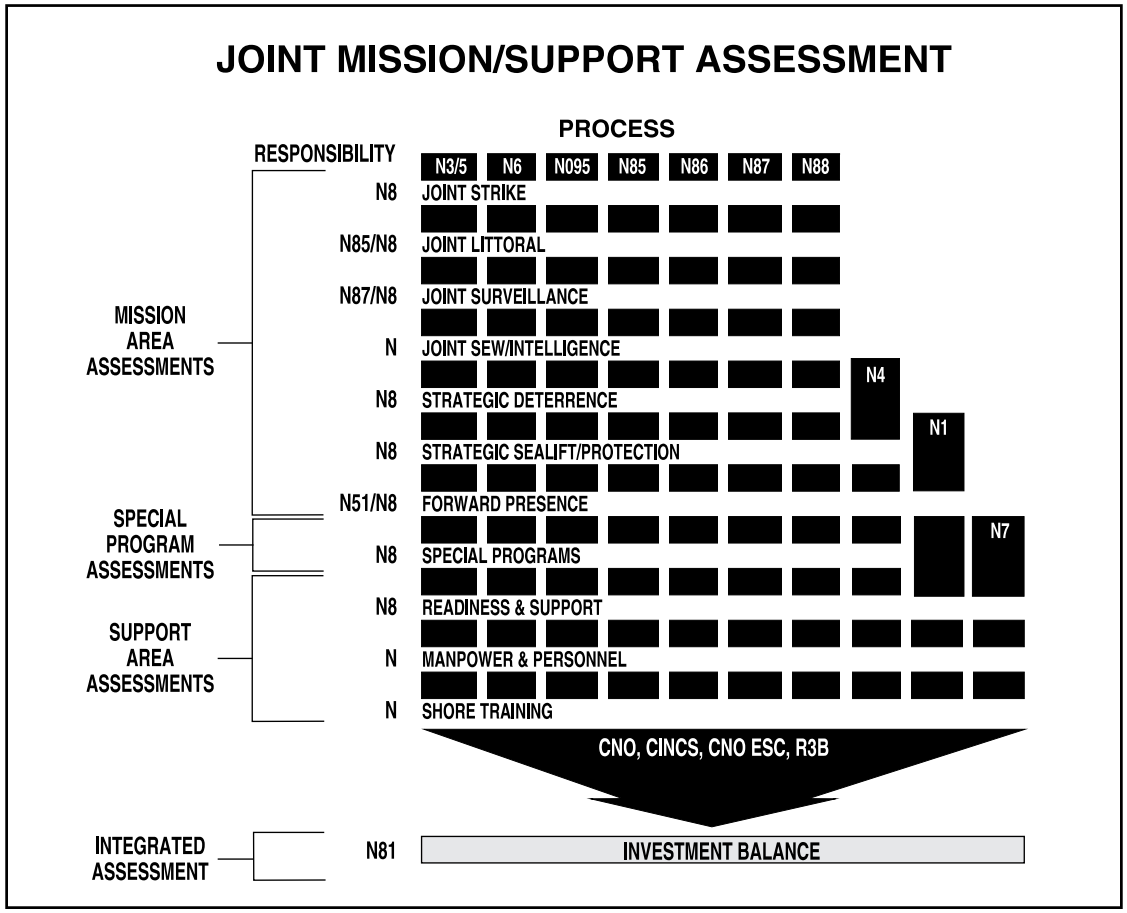

Figure 4-4. Joint Mission/Support Assessment

carry out its mission in the future.[6]

The primary review forum for the Navy is the Resource and Requirements Review Board (R^3B). The membership of this board is shown in Figure 4-5. For the DON this forum is the Integrated R^3B (IR^3B) which includes the Marine Corps leadership. The decision on whether to pursue a major modification and upgrade is based on the Navy's ability to meet current and emerging warfare requirements. The cost of the change and how it fits into the strategic plan is also considered. The R^3B sets direction and provides guidance on the recommendations that come out of the assessment teams.[7]

Figure 4-6 illustrates the new framework for OPNAV decision making. There is a similar planning process for the DON that involves the IR^3B and the Commandant of the Marine Corps along with the CNO and the Secretary of the Navy (SECNAV). Although the three major resource sponsors have been subordinated in the OPNAV organization, each is still responsible for POM recommendations, including modifications and upgrades for their specific warfare area.

Navy

This section describes the process used by the different warfare areas to develop and

RESOURCES, REQUIREMENTS, REVIEW BOARD (R3B)

- **CHAIRED BY N8**
- **MEMBERS**
  - **OPNAV N-CODES**
  - **SYSCOMS**
  - **CHINFO**
  - **OLA**
  - **OPA**
  - **MARINES**
  - **SEA 08**

Figure 4-5. Resources, Requirements, Review Board (R3B)

NEW FRAMEWORK FOR OPNAV DECISION MAKING

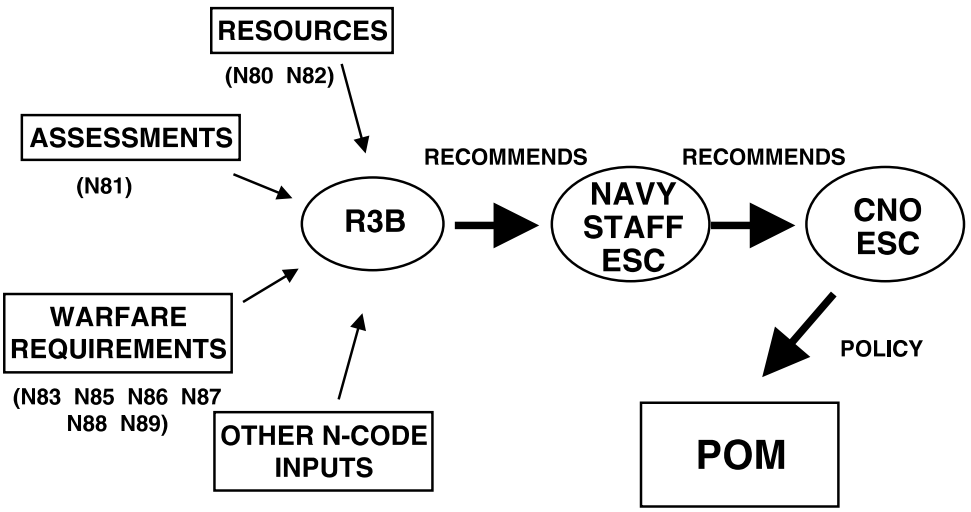

Figure 4-6. New Framework for OPNAV Decision Making

prioritize requirements used in making decisions on modifications and upgrades.

The surface warfare section describes the process used to effect the modifications and upgrades on ships. This is an important aspect of the modernization process. Without an efficient system by which modifications and upgrades are installed on ships, any time gained in the acquisition process will have little effect on how fast the changes are implemented in the Fleet. In the Navy's system, one cannot divorce acquisition from fleet maintenance and support.

Air Warfare

Naval Aviation (N88) has a process to review and validate perceived requirements and deficiencies, thus recommending program derived solutions. This process is conducted parallel to the budgeting process. The first step is the Operation Analysis Group (OAG) which defines requirements by platform model. The membership of the OAG consists of representatives from the aircraft type Wings and Squadrons, and the Type Commanders (TYCOMs) (i.e., Commander Naval Air Forces Atlantic and Commander Naval Air Forces Pacific). The product of each platform group is a message that prioritizes deficiencies and thus prioritizes the war fighting requirements. This level does not consider cost effectiveness.

A new level to the aviation review process is under development. In this process, each type of aircraft has an Executive Steering Committee (ESC) whose membership consists of senior level people from Naval Air Systems Command (NAVAIR), N88 requirements group, and the TYCOMs. These committees consider cost by taking the OAG product and adding some level of cost effectiveness and cost reality. This group has not yet had sufficient time to develop its first product.

The Naval Aviation Liaison Group (NALG), whose membership consists of 06/07 Naval Aviators and the Commander, Naval Air Systems Command (COMNAVAIR), meets early in the budget cycle and prioritizes the naval air requirements.

The basis for this prioritization is a Memorandum of Agreement signed by the Director, Air Warfare Division (N88) and COMNAVAIR in January 1995 that delineates the Naval Aviation requirement categories and priorities. The decisions are based on three major program issues:

- Safety, basically anything that will ground an aircraft;
- Readiness and maintainability; and
- Mission performance.[8]

Once the proposed prioritization is complete, the Aviation Flag Board, comprised of senior members of Naval and Marine Corps aviation, meets to finalize the sponsor program proposal for input into the Navy POM. The Flag Board makes major programmatic decisions based on the OAG and the NALG recommendations.

Naval Air Systems Command (NAVAIR) is an integral part of this decision process. Because of this, the warfare fighting needs and the modification and upgrade acquisition process are inextricably linked.

Submarine Warfare

The Director Submarine Warfare Division (N87) is the resource sponsor for programs related to submarines and submarine war-

fare. The submarine community is a small force and the process for determining requirements for modifications and upgrades is well controlled, as is the configuration of the submarines.

Submarines use nuclear propulsion and the Director of Naval Nuclear Propulsion Program (OPNAV code N00N) has complete cognizance over the modification and upgrades to the power plant. These types of changes are called nuclear ship alterations. The Fleet knows that the nuclear part of the boat is untouchable and is very tightly controlled. This is true for all classes of submarines.

The fast attack submarines (SSNs) are included in the Fleet Modernization Program (FMP) for non-nuclear alterations. The Ship Alteration (SHIPALT) program would be used to effect modifications on board submarines. (The FMP and SHIPALT process will be discussed in more detail in the surface warfare section.) Because of the SubSafe program, there is a policy of no deviation from the original design. However, if there is to be a change, the design shipyard must be involved. The proposed SHIPALTs come through Naval Sea Systems Command (NAVSEA) with a recommended prioritization, and N87 makes the final call to pursue the modification or upgrade. For the non-nuclear parts of the SSN, the submarine Fleet knows a change cannot be made without going through the process. This is important because there are certain types of SHIPALTs (Title D and F) that are approved and funded by the TYCOM, e.g., Commander, Naval Submarine Forces, U.S. Atlantic/Pacific Fleet (SUBLANT/SUBPAC). Even for these smaller alterations, the Submarine Force knows it must go through the TYCOM in order to effect the change. Commander, SUBLANT and SUBPAC have quite a bit of engineering experience because of the nuclear trained officers. This provides a better opportunity for the alterations to be done in an orderly and technically correct way.

The ballistic missile submarines (SSBNs) are not included in the FMP and have separate processes to effect change. Changes to the strategic weapon systems are controlled by Strategic Systems Programs (SSP) under its SP Alteration (SPALT) system. The remainder of the boat is under the TRIDENT Alterations system, controlled by the Strategic Submarine Program (PMS396); which is part of NAVSEA. (The TRIDENT alteration system is discussed later in this chapter.)

For both of these submarine types, the long range investment plan is predicated on Fleet input from the TYCOM, as to the needs of the user and maintainer. These inputs are essential in the prioritization of the proposed modifications and upgrades. Another fundamental ingredient is the close working relationship and information flow among the user, NAVSEA (for SSNs) or NAVSEA/SSP (for SSBNs) (along with the prime contractors) and the sponsor (N87). This allows the submarine community to act as a team in determining which modifications and upgrades are needed and are affordable, in order to meet submarine related mission needs.

Surface Warfare and the Fleet Modernization Program

The Director, Surface Warfare Division (N86) is the resource sponsor for surface ships (less aircraft carriers that belong to N88, Air Warfare Division). NAVSEA processes proposed modifications and upgrades within the appropriate program office. The

acquisition part of the modification and upgrade process is done in accordance with DoD Instruction 5000.2. Modernization of surface ships, which involves the installation of modification and upgrades, is generally accomplished in conjunction with a maintenance overhaul or availability. During this time, a ship, with its crew, is taken out of operational service and is an unusable asset for the CINC. Changes incorporated aboard ships are part of the FMP, using the SHIPALT process. Fleet modernization and maintenance is not controlled under the acquisition process. However, the subsystem that is being put on the ship may be under the milestone process. In fact, an upgrade to a ship's capability may require a milestone decision. Figure 4-7 is an illustration of where the acquisition process stops and fleet support begins.

The FMP is a structure for planning, programming, budgeting and installing improvements to ships of the active and reserve fleets. A SHIPALT is defined as: "Any change in the hull, machinery, equipment, or fittings which involves change in design, materials, number, location, or relationship or the component parts of an assembly."[9] There are other types of alterations that are part of the FMP. These are ordnance alterations (ORDALTs) and machinery alterations (MACHALTs).

An ORDALT is defined as: "A Change effected on naval ordnance equipment or their computer programs by the addition, deletion, rework, or replacement of parts in assemblies or equipment, or by change in assembly procedures."[10] A SHIPALT may require accomplishment of one or more ORDALTs

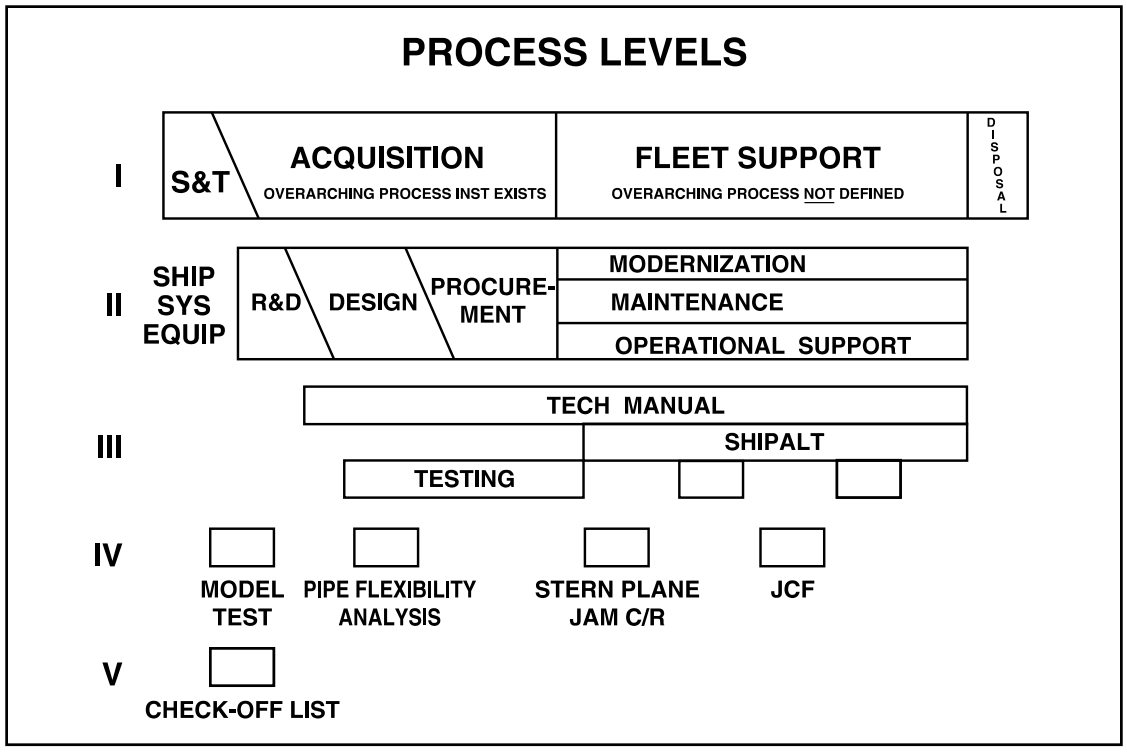

Figure 4-7. Process Levels

in conjunction with the SHIPALT. On the other hand, a MACHALT is: "A kit concept which enables HM&E (Hull, Machinery and Electrical) changes to be accomplished in an expeditious manner eliminating these changes from the formal SHIPALT process. A MACHALT is defined as a planned change, modification, or alteration to any HM&E equipment in service (shipboard or shore activities) when it has been determined by the MACHALT Configuration [Change] Control Board (CCB) that the alteration of modification meets all of the following conditions:

- Can be accomplished without changing an interface external to the equipment or system.

- Is a modification made within the equipment boundary or is a direct replacement of the original equipment design.

- Can be accomplished without the ship being in an industrial activity.

- Will be accomplished individually and not conjunctively with a SHIPALT or other MACHALT."[11]

Although ship modernization is generally accomplished in conjunction with a maintenance availability or an overhaul, there are some distinctions between modernization and maintenance. These differences are compared in Figure 4-8.

The system is set up so that anyone can submit a proposed SHIPALT. All proposed SHIPALTs are reviewed for technical merit. Those considered feasible and desirable are screened by the CCB, during which a decision is made for further SHIPALT development. Factors under consideration in the decision include:

- Advantages gained commensurate with cost;

- Mission needs;

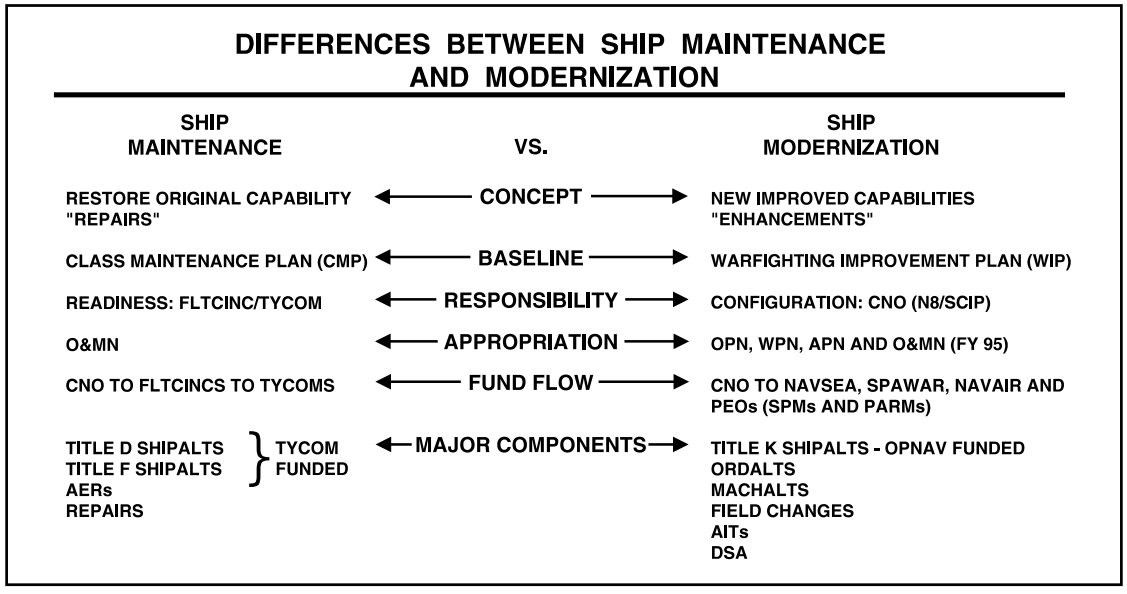

Figure 4-8. Differences Between Ship Maintenance and Modernization

- Relative priority of alteration; and

- Method of implementation (type of SHIPALT)

An annual FMP Prioritization Conference is held each summer to review all applicable SHIPALTs. Based on the recommendations and inputs from the Fleet CINCs, TYCOMs and the NAVSEA Ship's PM, the resource sponsors from OPNAV decide the relative priority of the alterations. The decision as to which Title K SHIPALTs will be accomplished on which ships and during which availability belongs to the OPNAV platform sponsor.[12] A Title K SHIPALT is the most complex of SHIPALTs; it requires depot level expertise to install and usually requires headquarters centrally provided materials (HCPM). The SHIPALT development process is illustrated in Figure 4-9. As the figure shows, the process can be lengthy. However, the process time can be significantly accelerated to accommodate emergent installations.

Four cost elements comprise the FMP:

- Procurement of HCPM;

- Title K SHIPALT execution and advanced planning funding;

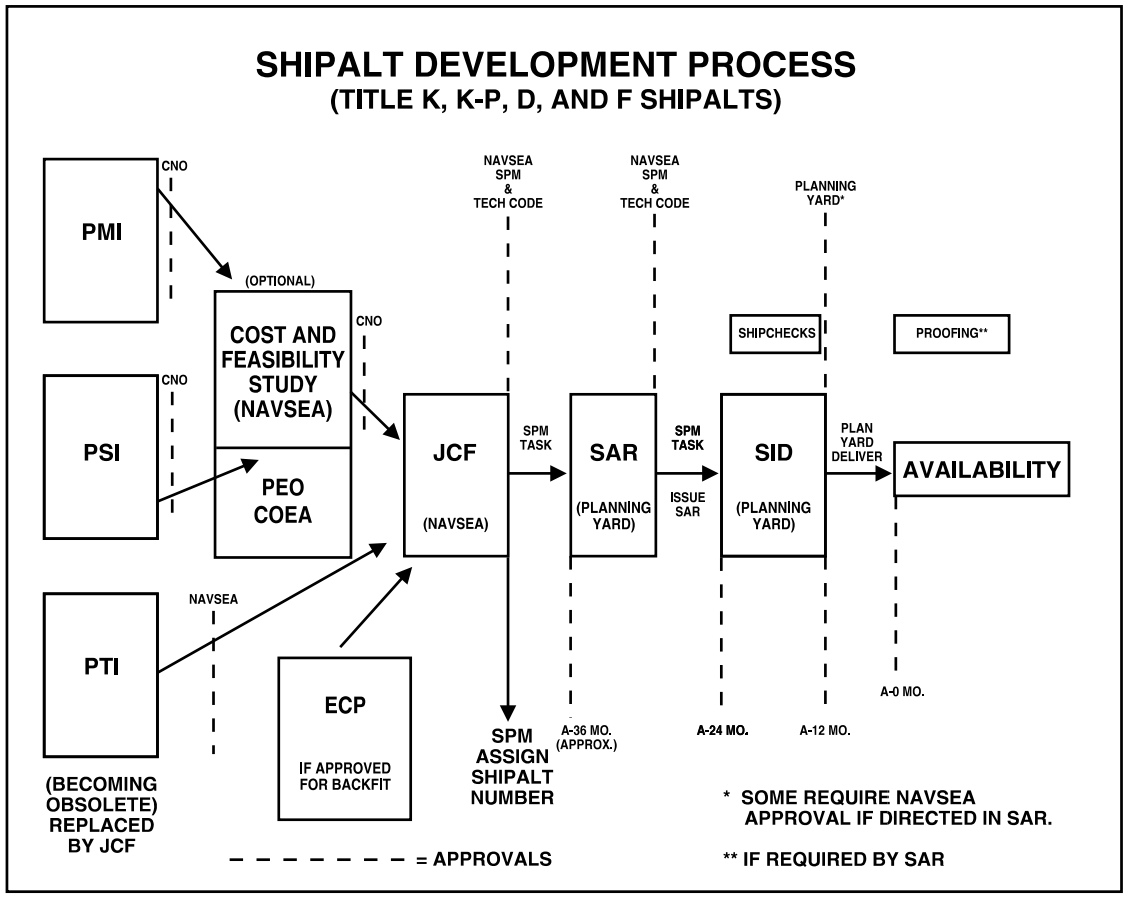

Figure 4-9. Shipalt Development Process

- Design support (DSA); and

- Alteration Installation Team and program support.

One of the complexities of the FMP is the series of financial policy changes occurring over the past 5-6 years. Prior to 1990, operation and maintenance, Navy (O&MN) annual funding was used to install the SHIPALTs. There were three lines of accounting with the funding split out by platform sponsor. The problem was the lack of linkage between the procurement money (OPN) and the installation money (O&MN). In 1990, Congress directed the budgeting of all FMP procurement and installation costs into the OPN/WPN/APN appropriations. These "fully funded" appropriations have a three year obligation authority; and equipment procurement and installation were thus put into the same appropriation line and year. As a result, FMP installation funds appear in more than 85 separate budget/accounting (P-1) lines. As of FY 1995, the Navy Comptroller (NAVCOMPT) directed the annualization of the FMP budget. What this means is that the requirements are funded in the year in which the installation takes place and not funded in the year the HCPM is procured. These requirements include advance planning and installation. Also, as of FY 1995, all SHIPALT installation design efforts (including OPN/WPN), as well as accomplishment of alterations which do not require HCPM, were moved to the O&MN line.[13]

The FMP process is so important to the Navy's modernization strategy that the Navy has nominated it for cycle time reduction. NAVSEA is reviewing ways to improve the program. Part of the review includes the results from a FMP Visionary Working Group, formed to explore the root problems and recommend solutions. This working group includes representatives from NAVSEA, OPNAV, Space and Naval Warfare Systems Command and the Fleet. Their findings, as to the root problems in the system, focused on such areas as infrastructure, the funding process and the supporting Automatic Data Processing (ADP) systems.

The current infrastructure for FMP is fragmented; there is no single advocate on the OPNAV staff for this program, for both requirements and funding. The FMP funding process is very complex and there is a lack of documented NAVCOMPT procedures. It seems that the budget process has overtaken the modernization process and has become more important than the ships and the Sailors. The Fleet Modernization Program Management Information System (FMPMIS) requires upgrading to reflect the current changes in budget, planning and reporting requirements; it is not currently structured to provide consolidated and timely information. One other comment was that the development and the design of the alterations themselves are not organized around the process. The Ship's PM (SPM) has the responsibility for the life cycle support of the ship. However, the SPMs really have no control over all aspects of the SHIPALT process.

There were several recommendations from this group and some recommendations from the Surface Ship Directorate (SEA 91) of NAVSEA (FMP Program Management Division (SEA914) is part of SEA 91). The recommendations regarding infrastructure included the establishment of one OPNAV FMP sponsor for ship modernization. Today, both N8 (DCNO (Resources, Warfare Requirements and Assessment)) and N6 (Director of Space and Electronic Warfare) are responsible for this function. The rec-

ommendation would combine N6 (for FMP only) and N8. This would cause the FMP funding to flow from one source. The planning, programming and budgeting of FMP should be through a single appropriation. NAVCOMPT should be required to issue a policy on FMP. In developing this policy, an executive board for Sponsors and NAVCOMPT should be established to resolve major issues. The SPMs should be made totally responsible for platform modernization; having "cradle to grave" responsibility. (Other comments from outside this visionary working group have supported the FMP Visionary Working Group recommendation that the funding should be controlled by the SPMs and thus would establish more centralized control.) There should be a single path for the flow of funds and the process/organization should be reorganized to focus on platform requirements. The last recommendation, regarding the FMPMIS, is that the recommended ADP improvements be implemented.

Recommendations by NAVSEA 91 involve continuing the work begun by the Visionary Working Group through the initiative of reducing FMP cycle time and implementing the approved recommendations. NAVSEA 914 will continue with the redesign of the FMPMIS and implement Working Group recommended ADP improvements.

This working group is a step in the right direction, but there is more work to do. In other discussions the indication was too many people touch the design with little value added. There needs to be some discipline in the development process to minimize the engineering accomplished on a proposed SHIPALT before the alteration gets to the decision process and is disapproved.

The Navy is working to make FMP better. One of the things that seems to be necessary is good communication among the Systems Commands, Resource Sponsors and the Fleet. This is not always the case. Certainly, establishing a team with the primary goal of supporting the Fleet needs and that of the Sailor is essential. There are many constraints in the system that drive portions of it to be inflexible. However, when it comes to ship schedules, flexibility is an essential part of any system that is used to implement shipboard modernization. Because of current budget requirements, when a SHIPALT is not executed on schedule, it costs the Fleet money and the Sailor suffers in the long run. One perspective from the Fleet maintenance community is that there is no FMP process, despite the existence of the FMP Manual. This would suggest a total overhaul of the system and in times of declining budgets, this seems to be the right course of action. (This is being reviewed via the cycle time reduction initiative.)

While the consensus is that the modification and upgrade approval process is fairly straight forward, the process that puts them on ships is far from being such. Improvements need to be effected in the FMP if the Fleet is to reap the benefits of any efficiencies in the acquisition process.

Exemptions from the Fleet Modernization Program (FMP)

There are certain programs that are exempted from the FMP.

- "Strategic Systems Program Alterations (SPALT) affecting configuration and capabilities of systems and equipment under the cognizance of the Director, Strategic Systems Programs (DIRSSP).

- Technical Directives affecting ship configuration of Marine Gas Turbine Engines and Gas Turbine Engineering Control Systems under the cognizance of the Naval Sea Systems Command (NAVSEA 03X3).

- Alterations under the cognizance of the Director, Naval Nuclear Propulsion Program...

- Alterations affecting configuration of hardware, software and support equipment of TRIDENT System under the cognizance of NAVSEA PMS 396. The TRIDENT system comprises OHIO Class submarines; dedicated maintenance, training and logistics facilities; and replacement equipment pools.

- Temporary modifications authorized by the Type Commander required for test and evaluation, research and development programs or in support of mission or exercise requirements."[14]

Since its purpose is the same as that of the FMP, it is useful to compare the TRIDENT system established for the OHIO class submarines with the FMP.

In the TRIDENT program, alterations are a part of the whole configuration management scheme. Up front planning intended it to be a "cradle to grave" program, managed and funded through the program office, PMS 396, working in conjunction with the DIRSSP. What makes TRIDENT different from other ship classes is that new construction, alteration and operational support for the submarines and the associated funding are all managed through the same office.

The configuration management plan runs through the life cycle of the submarine. It applies, not only to the submarine itself, but also to the training facilities and any other shore based evaluation sites. It includes everything except the strategic weapon system and nuclear propulsion. Budgeting for all costs is through the program office. In most cases, funding documents are issued to participating managers in other activities to procure equipment for the alteration. The process allows for the system design to be done in parallel to the submarine design. Although TRIDENT has more than one sponsor (e.g., N86 funds command and control training), all the money is funneled through the program office.

In the review process for proposed SHIPALTs, the program office receives the Justification Cost Form (JCF) submitted by whomever is proposing a change. That form is then sent to the TYCOMs for both the SUBLANT and SUBPAC. The TYCOMs submit comments on the change proposal. They comment on whether or not to implement the change if given the opportunity, give an opinion of the SHIPALT, and assign it a relative priority. Fleet feedback is done early in the process, prior to the approval of the JCF. When the proposal goes to the Change Control Board (CCB), the Fleet's comments are included along with the man-hour and material cost. (Figure 4-10 illustrates this process.) The program office then assigns a Ship Alteration Manager (SAM) who is responsible for getting the entire package together. The SAM is the single point of contact for the particular SHIPALT and is responsible for getting the alteration through the process.

TRIDENT also has the luxury of having TRIDENT Refit Facilities, one at Submarine Base, Silverdale, Washington, and one at Submarine Base, Kings Bay, Georgia. These two facilities complete most of the

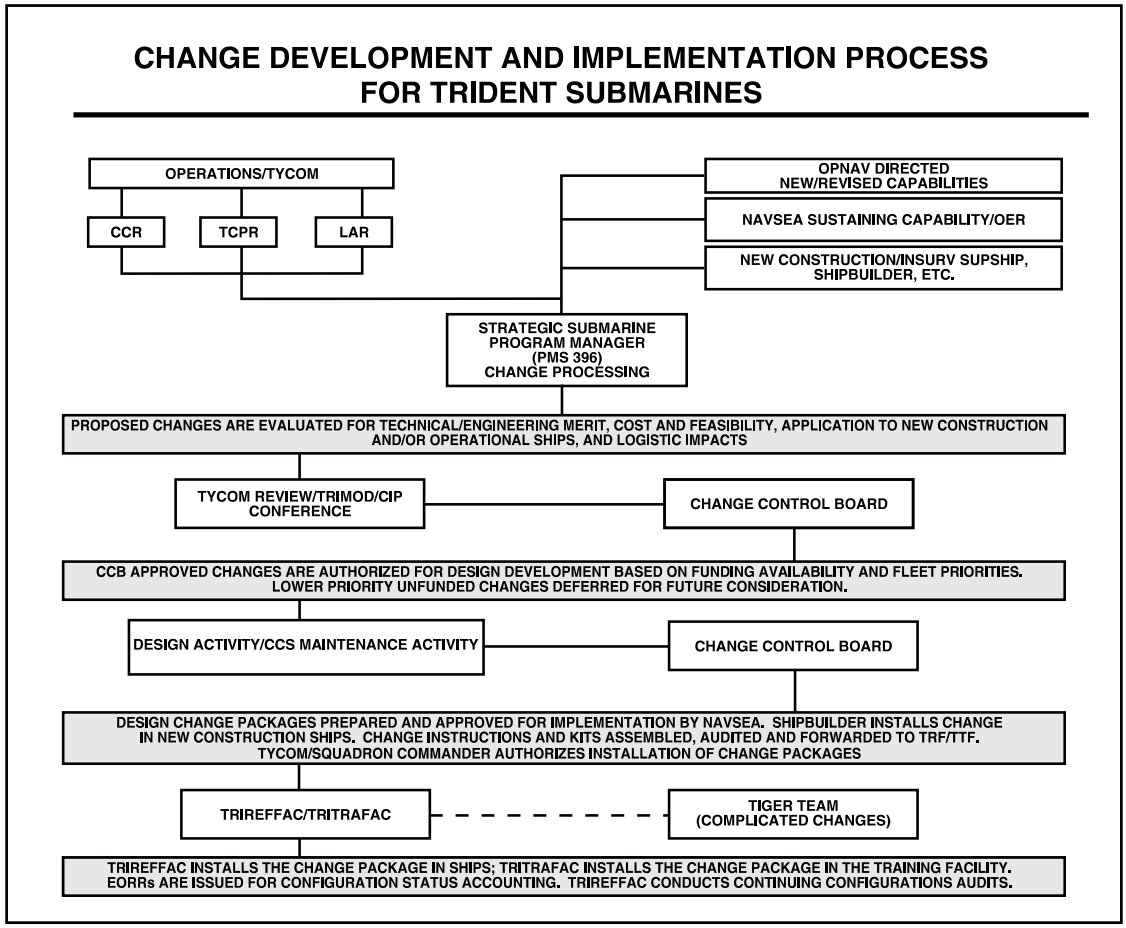

Figure 4-10. Change Development and Implementation Process for Trident Submarines

alteration work, except for those requiring an extended availability or overhaul. TRIDENTs have a fixed operating cycle, and that, along with the dedicated facilities, makes a difference in planning for the accomplishment of alterations. By having these refit periods and designing the submarine for a progressive overhaul (there are logistic hatches designed for easy access without having to cut the hull), alterations take a relatively short time.

Another program that is exempt from the FMP is the SSP (SSP). Management and control of any changes to the systems under the cognizance of DIRSSP fall under the Strategic Systems Programs Alteration (SPALT) process. DIRSSP is a life cycle manager and has total “cradle to grave” responsibility for the strategic weapons system. All the budget for procurement, training, operations and support of the program comes through DIRSSP. Since the PM has control of the logistics support, this provides an advantage to make decisions on the cost effectiveness of modifications and upgrades. For example, the TRIDENT Navigation Commonality Program was approved by N8, with a budget adjustment from NAVCOMPT, based strictly on a cost sav-

ing for the life cycle support of the TRIDENT I (C4) program. It would be more cost effective to replace the C4 navigation system with the TRIDENT II (D5) navigation system than it would have been to try to support an obsolescent system. This change was accomplished through the SPALT process; the entire approval process to getting on contract took about four months. As with the PMS 396 system, the SPALT process makes changes to everything affected by the alteration, including logistics support, training, maintenance manuals and publications. The key here is total life cycle responsibility and accountability.

Two common aspects of TRIDENT program and SSP are the centralized funding control and life cycle support responsibilities. Both of these allow the PMs to make better decisions when a modification or upgrade is proposed.

In comparison, the FMP program is more complex and thus more confusing. It has grown bureaucratically and the Navy is taking the right steps to improve the system.

Marine Corps

Marine Corps Systems Command (MARCORPSYSCOM) is responsible for the research, development and acquisition (RDA) for the Marine Corps ground forces. Marine Aviation is integrated into the N88 process for Naval Aviation. The Marine Corps Combat Development Command (MCCDC) handles the mission requirements and writes MNSs and ORDs. The MARCORPSYSCOM is responsible for fulfilling those requirements through acquisition programs. This is done for new developments as well as modification and upgrades. The MCCDC, along with the rest of the Marine Corps, sets the priorities for the MARCORPSYSCOM budget execution.

There are presently no modification programs that the Marine Corps manages as the lead service. During the interview with the Marine Corps, it was noted that eighty-five percent of the Marine Corps procurement money goes to joint service programs or non-developmental commercial off-the-shelf. The Marine Corps treats upgrades in accordance with DoD Instruction 5000.2 and they go to Milestone 0. This has caused some administrative heartache, especially when you have a low cost, low risk upgrade. An example was an upgrade program that put a new trigger guard on a small weapon; the program cost $100K. As written today, the 5000 series does not give any latitude on this; it must go to Milestone 0.

In an attempt to improve the acquisition process, the MARCORPSYSCOM proposed a change to the DoDI 5000.2 through the Assistant Secretary of the Navy (RDA). This proposal tries to correct the deficiency in DoDI 5000.2 that fails to distinguish between a major and minor upgrade. In essence it defines a minor upgrade ACAT:

"The minor upgrade acquisition category would consist of upgrades that meet the following criteria:

a. Cost less that $5M Research, Development, Test & Evaluation and less than $15M Procurement (PMC, O&M,MC).

b. Do not require a new Mission Need Statement (MNS) or a new Operational Requirements Document (ORD).

c. Provide no new capability beyond that required in the approved ORD.

d. Have low technical risk and low programmatic risk."[15]

(Subsequent to writing this chapter, Dr. Kaminski, USD(A&T), deleted Milestone IV, Major Modification Approval (see Appendix B).)

Summary

The DON is attempting a more coordinated approach in establishing requirements, as evidenced by the reorganization of the OPNAV. Requirements are an integral part of the Navy's acquisition process. In this process, the PMs and PEOs continue to work within the framework of the DoDI 5000.2 for modifications and upgrades.

During the interview process many PEOs and PMs expressed a concern about the lack of definition of a major upgrade. Any upgrade, whether or not it is high cost and high risk, must go to a Milestone 0 decision. This adds time to the process and thus also adds cost. A distinction between major and minor upgrades needs to be included in the 5000 series; this should reflect a definition similar to that used for major modifications.

For the Navy, one cannot look at streamlining an acquisition process without looking at the system used to modernize and maintain the Fleet. The system that the Navy uses to put the modifications and upgrades on ships, SHIPALTs, needs restructuring. The Navy recognizes the need to make improvements in this area and is actively looking at this process.

ENDNOTES

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5

DEPARTMENT OF THE AIR FORCE

Introduction

This chapter provides a top-level view of how the Air Force initiated, defends and manages modifications and upgrades. It starts by briefly describing the current operating environment and defining some of the frequently used "modification process" terminology. Next, it highlights the key processes involved in starting a modification program; those of requirements generation, resource allocation, and modernization planning. It concludes with a summary of some on-going activities and efforts in the modification community that target improving Air Force business practices.

Environment

To paraphrase a Yogi Berra style witticism, The Air Force environment; it is the same only different from DoD and the other components. It is the same in that, like the DoD and the other components, the Air Force is always searching for a better way to do business, to get more "bang" for the buck. The Air Force recognizes the need to be more effective and efficient with its dwindling resources. Since acquisition personnel are often criticized for poor management and/or waste, acquisition practices are prime targets for reform. Major acquisition reform initiatives in the Air Force focus on producing quality weapon systems more quickly with lower cost. Assistant Secretary of the Air Force (Acquisition), the late Clark Fiester reinforced these points in his briefing to all Air Force acquisition professionals:

- Adopt world class business practices
- Increase the use of commercial state-of-the-art technology
- Integrate commercial and military industrial bases
- Greater use of performance and commercial specifications and standards
- Bottom line—equal or improve combat effectiveness at reduced cost and cycle time.[1]

These challenges are quickly emerging as imperatives vice platitudes because relatively fewer resources are now channeled into modernization than at any time in the recent past. Quoting Norman Augustine, former Chief Executive Office (CEO) of Martin Marietta, "...I calculated recently that we are now on a replacement cycle of

about 54 years, meaning that the average item of equipment provided the Armed Forces has to last 54 years ... in a world where technology has a half-life of from 2 to 10 years...."[2] With no real resources growth projected for new equipment, DoD must strongly emphasize service life extension and improving the capabilities of existing equipment. During the interviews with senior leaders, they speculated that modifications and/or upgrades will be a mainstay of acquisition activities well into the future. The Air Force is like its sister components in its need to cut overhead, facilities and support costs. How does one reduce the cost of owning systems while retaining the ability to carry out a national defense strategy that emphasizes equipping the forces with the most technologically advanced weapon systems in the world? Preserving a strategy based on having the best weapons systems, while DoD budgets decrease by 33 percent and procurement decreases by about 65 percent,[3] forces the Services to optimize every aspect of its operations. Today, sustaining the O&S for major aircraft weapon systems alone requires 25 percent of the Air Force TOA.[4] If the Air Force achieved a 10 percent annual reduction in the O&S costs from just these mainstay systems, it would free up enough resources to double the entire Air Force modification and upgrade budget: an increasingly important avenue for introducing new technology.

Air Force Definitions

Interestingly, the Air Force does not use the same terminology as DoD or other components concerning modifications and upgrades. Air Force personnel do not differentiate in speaking or action between modifications and upgrades. When asked why, most personnel that work with modifications confess they see no value in the distinction. This is probably because the documents used to request funding and notify OSD and Congress of planned modifications and upgrades do not distinguish between the two. Consequently, throughout this chapter, the term modification refers to both "modifications and upgrades." An Air Force definition for modifications is: **Modifications** are changes made to a system, equipment or material (including imbedded software) with the intent of enhancing, improving, changing or adding to the capability or performance of the system, equipment or material being modified. Modifications change the fit or function of a configured item. Modifications are accomplished to fielded systems and are, at least in part, funded with modification procurement appropriations.[5] This definition does not match the DoDI 5000.2 definitions for either modifications or upgrades because it defines changes to "fielded systems" not changes to systems that are in or out of production. Also, this definition does not apply to major modifications programs on the Major Defense Acquisition Programs list. For major modifications use the DoDI 5000.2 definitions in chapter two.

Sustainment Activities

Also, it is important to point out that modifications should not be confused with sustainment actions. In the Air Force, sustainment activities are done to maintain specified or required operational capabilities of the weapon system, equipment, material or product. Sustainment actions are not directed or managed by unique program documentation, rather they are undertaken as part of the overall mission of the Single Manager (SM) to meet the system's required Reliability, Availability and Maintainability (RAM) parameters. Also, while sustainment actions are not intended as a means to improve or enhance operational

capability, this can, and does, occur as a by-product of new production methods, equipment, technology and processes.[6] In some instances when the expected cost and risk are high, sustainment actions can be handled as an acquisition, i.e., managed by its own acquisition documentation.

Modification Types and Classes

In the last couple of years, the Air Force reduced the number of distinct classes of modifications. Previously, there were five classes, now with two classes the major commands (MAJCOMs) job of prioritizing is simplified, speeding progress in the needed modifications. Now, there are two classes: temporary and permanent.

Temporary Modifications

Temporary modifications are used as an interim correction of an operational deficiency, to support or accomplish a special mission, or test proposed changes to a system. Temporary modifications are supposed to be short-lived and accomplished on a limited number of assets; therefore they are not treated as acquisitions. They are:

- Only done on sufficient systems to adequately complete the special mission or test;

- Primarily use existing commercial off-the-shelf or stock listed systems, equipment, spares or material to accomplish the modification;

- Typically accomplished at the unit requesting the change with 3400 Operations & Support Funding (for special missions) and 3600 Research & Development Funding (for testing);

- Not funded with the "modification" procurement appropriations; and

- Removed within 12 months of installation or upon completion of testing or mission accomplishment.

Permanent Modifications

Permanent modifications are used to meet updated operational requirements, correct unsafe conditions or upgrade the sustainability of a system. They are also used to accomplish retrofits to fielded systems previously produced before the approved change was incorporated. The majority of modification resources are spent on permanent modifications. Permanent modifications for safety have a separate set of guidelines for the processing, coordinating, funding and documenting. This is because safety modifications have priority and precedence over all other permanent modifications. Permanent modifications are:

- Done to enhance or improve performance or add a capability;

- Accomplished on finite blocks or series of the system, equipment or material;

- Funded at least in part with modification procurement appropriations; and

- Accomplished by depot maintenance, depot field teams, contractor maintenance, contractor field teams or the gaining unit.

Air Force Organization

The Air Force splits the oversight and management of modification and upgrade programs into two parts. Policy and oversight management for the piece of acquisition concerned with research, development and

procurement reside with the Assistant Secretary of the Air Force for Acquisition (ASAF/AQ) and the support piece resides with the Headquarters Air Force, Deputy Chief of Staff for Logistics (HQ USAF/LG). Air Force policy and oversight flows from these two sources depending on the funding source and whether or not the change is being made for support. The good news is that both groups traditionally coordinate polices and actions with each other.

One level down, the Air Force Materiel Command (AFMC) personnel control the day-to-day execution of most modifications. In 1990, the Air Force merged the Air Force Logistics Command and the Air Force Systems Command into a unified AFMC. The primary goals in this merger were to reduce staff (overhead), cut excess infrastructure (overhead) and change to an Integrated Weapon System Management (IWSM) style of management. An IWSM is defined as, "...a management philosophy for acquiring, evolving and sustaining our products. It empowers a single manager with the authority over the widest range of decisions and resources to satisfy customer requirements throughout the life cycle of the product...."[7]

This restructuring put a premium on knocking down the walls existing between the system developers and the maintainers. In the past, when the developer was "done producing a weapon system," one would transfer management responsibility for the system to the maintainer. This program management responsibility transfer (PMRT) was often a very contentious event or period. Maintainers complained about supportability problems, and the developers complained that supportability problems lacked documentation early or well enough to fix before PMRT. Now, when a system is fielded, the team that managed its production remains fully responsible for its support. The IWSM organization operates with critical processes integrated across the product life cycle. The goal is to have no process seams between organizations, locations and program phases.[8] The core processes are: product management, requirements, systems engineering/configuration management, financial management, contracting, technology master process, logistics, and test and evaluation.[9] This cross-functional interdisciplinary approach to weapon systems management brought with it a need for uniform policies and procedures. Now, one set of policies and procedures applies to the product centers (development), logistics centers (support) and research labs staff. Thus, today most modifications and upgrades are treated just like development programs and use the same management documents and approval processes as non modification acquisition programs.

Another important change required for IWSM, was a shift to an integrated product focused team management philosophy. Consequently, AFMC reorganized around integrated product teams (IPTs). By definition, any modification will have a domino effect: modifications require funds; most possibly new or modified support equipment; spares; software; personnel; etc. Therefore, the modifications' success generally depends on the inputs and participation of many organizations and people including commercial industry. To provide seamless management of a system from Milestone 0 to its eventual disposal, the IPT is headed by a SM who has the day-to-day management responsibility and authority for a given product. The SM could be any one of the following people:

- **System Program Director (SPD)**. The individual responsible and accountable for

decisions and resources in overall program execution of a military system, ...charged with all the cost, schedule, performance and sustainment aspects of a directed program. The SPD's primary customer is the using command.

- **Product Group Manager (PGM).** The individual responsible and accountable for decisions and resources in overall product group management ...charged with all the cost, schedule, performance aspect of a product group and related sustainment activities. The PGM's product is in direct support of one or more SPDs.

- **Materiel Group Manager (MGM).** The individual responsible and accountable for decisions and resources in overall materiel group management ...charged with all the cost, schedule and performance aspect of a materiel group. The MGM's primary customers for daily sustainment products, services and new equipment acquisitions are the using MAJCOMs. However, the MGM's customers for integration of new development and technology transition are the SPDs & PGMs.[10]

This organizational structure provides reasonably clear accountability for most defense products. In the case where a product, such as a subsystem or subassembly of a system, is used in multiple systems, then a consignment agreement between the SPD and the PGM/MGM documents management and support responsibilities. The SM is directed to form a mod-IPT with the appropriate cross-functional representation necessary to plan and execute the proposed modification.[11] The mod-IPT participants develop plans to satisfy each deficiency and recommend technology investments to support these modifications, upgrades and new developments.[12] Formation of mod-IPTs usually occurs upon receipt of a valid need or requirement. However, often mod-IPTs are convened earlier to provide the user with preliminary cost, schedule, performance and risk assessments. The IWSM approach gives the user a single point of contact, the SM, for all issues concerning a specific weapon system's life cycle management.

Air Force Resource Allocation Process

The Air Force resource allocation process links directly to its parent DoD process, PPBS, as DoD Directive 7045.14 describes. At each phase in the DoD process, the Air Force submits it's input to the OSD for review (see Figure 5-1). While this is not new, the undergirding philosophy the Air Force uses to prepare its input is changing. Air Force Instruction (AFI) 16-501, Control and Documentation of Air Force Programs, contains a description of this process. An amended AFI 16-501 is in draft, which includes additional corporate level reviews to ensure, "Air Force at-large interests are considered on key issues."[13] The primary goal of the Air Force PPBS process is to achieve the defense objectives established by the President and SECDEF in the DPG.[14] The POM develops and presents the Air Force's adaptations to program specific changes in investment strategy. The POM represents the balanced, total Air Force program recommendations within the OSD guidance limitations and directions contained within the DPG.[15] While the PPBS process affects all Defense related appropriations, the focus of this chapter is to concentrate on the investment piece, called modernization.

Air Force Modernization Planning Process

In October 1994, the Air Force adopted a new modernization planning process. It is an analytically based process that ties the

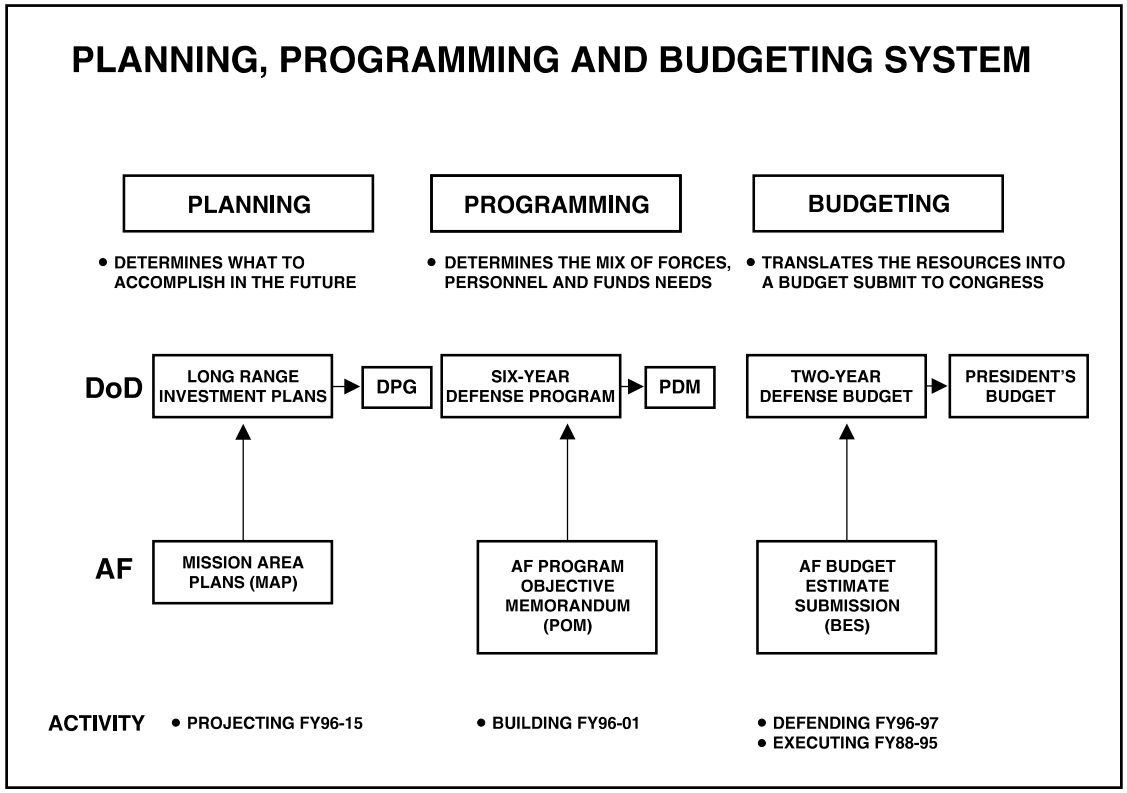

Figure 5-1. Planning, Programming and Budget System

operating commands (users) directly to the developers, maintainers and technologists.[16] The process looks up to 25-years into the future. This long-range planning model is necessary because in the past the Air Forces' planning never adequately addressed future needs beyond the next ten-years: a time frame shorter than the traditional time investment to develop many of its weapon systems.

There are three primary products from this Air Force Modernization Planning process: the Mission Area Plan (MAP), the Development Plan (DP) and the Technology Investment Recommendation Report (TIRR). These products are foundational guides for changing doctrine, tactics, procedures and investing scarce dollars. They guide force modernization by linking critical technologies to mission areas, acquiring new and modified systems, directing national and Air Force laboratory efforts(laboratory technology research), and focusing independent research and development (industry basic research).[17]

Mission Area Assessment (MAA)

The first phase of the process is the MAA. In this phase, National Goals, National Security Strategy and NMS are translated into a list of operational objectives and tasks necessary to achieve those goals and strategies. This phase, like all the phases, is complicated by the fact that both national goals and strategies change. Ideally, by developing alternative futures, i.e., best or worst case (and degrees of each along that spectrum); conducting thorough modeling and simula-

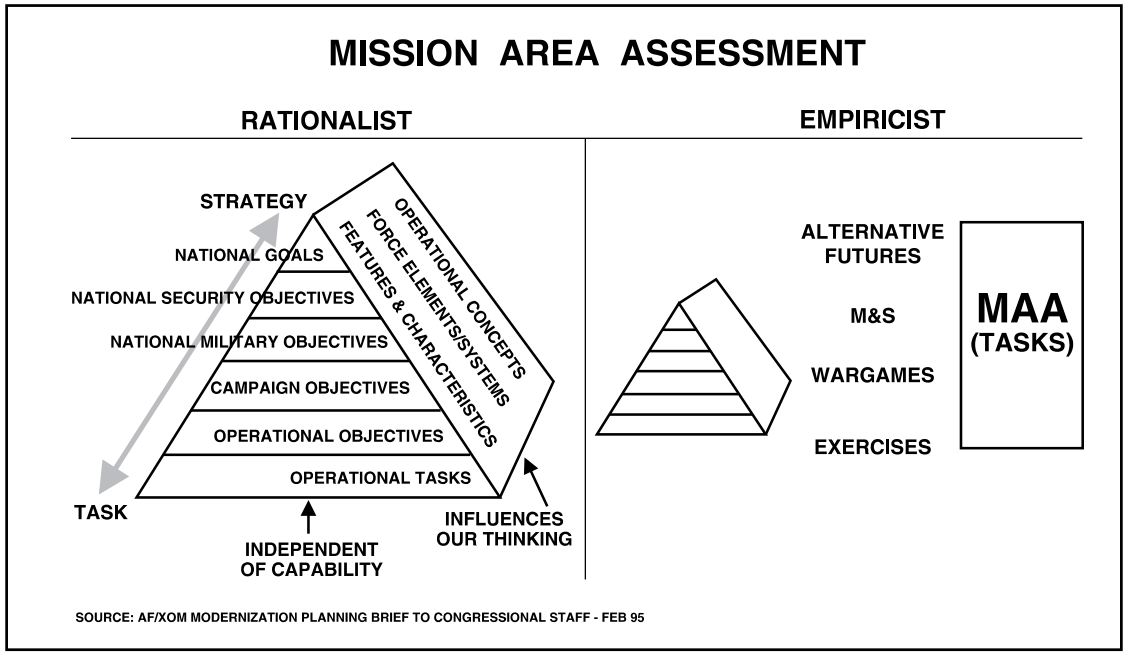

Figure 5-2. Mission Area Assessment

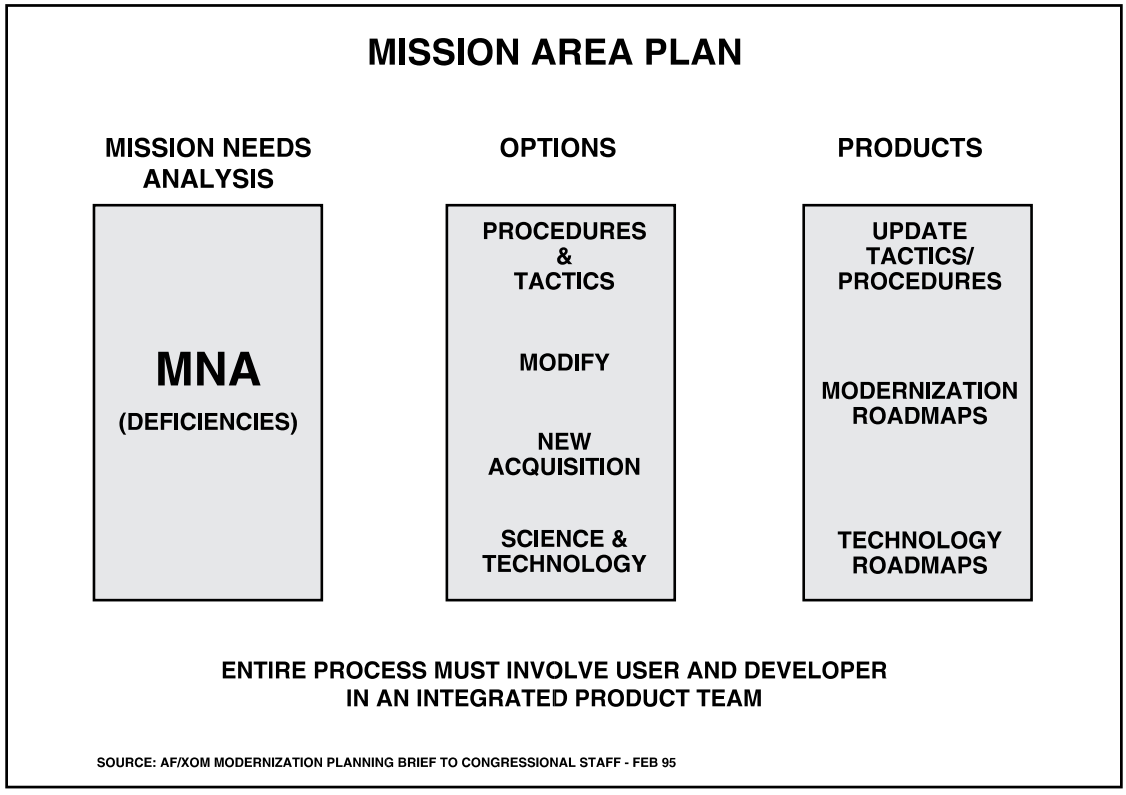

Figure 5-3. Mission Area Plan

tion, wargames or exercises, most likely MAA tasks can be identified.

Mission Need Analysis (MNA)

Deficiencies in the Air Forces' ability to meet the tasks necessary to achieve National Security objectives show up as the product of the second phase called MNA. The MAA and MNA processes provide the users tools to continuously evaluate current and programmed capabilities in the context of changing threats, policy or guidance, military strategy and assigned missions to identify deficiencies.[18] One or more of the Air Forces' thirty-six MAPs categorizes the output of this effort (deficiencies).

MAPs

The Air Force mission areas for the most part are simply a subdivision of the nine JWCA areas. The MAPs provide the overall modernization strategy for a given mission area and specifically address all the deficiencies that can not be met by non-material means.[19] The priority of any given MAP deficiency is based on the concept of "best perceived value." For example, Air Combat Command uses a Quality Functional Deployment model to rate the importance of correcting MAP deficiencies. It charts the cost to fix deficiencies against the estimated increase in combat capability fixing the deficiency provides. In a simplified sense, those deficiencies whose correction provides the most capability for the investment get the highest priority.

DPs

Each DP documents the best concepts or solutions to satisfy the MAP deficiencies. The DP contains a review of the candidate technologies for proposed concepts or solutions and identifies the relative priority of technology needs where the technology is not fully developed. Ideally, the DPs identify concepts or solutions in near-term (POM years), mid-term (post POM to 15 years) and far-term (16-25 years).[20] When the MAPs and DPs are integrated, prioritized and fiscally constrained, the science and technology community, with industry's participation, build the TIRR.

TIRR

The TIRR provides an analysis of technology needs across all mission areas and DPs.[21] It tries to identify the optimum technology investment plan by identifying the high payoff areas that link to the MAPs' prioritized deficiencies. These linked and prioritized deficiencies (requirements) will then show up as newly generated MNSs or ORDs and are the key bridge between planning and requirements.

MNSs and ORDs

Lead commands for the respective mission area prepares MNSs and ORDs and forwards them to HQ USAF for coordination and approval. Headquarters Air Force, Deputy Chief of Staff for Operations personnel staff the MNS or ORDs to the cognizant air staff organizations and to the appropriate Mission Area Director (MAD), who works for the ASAF/AQ. The next step, recently added, is to send these MNSs and ORDs to the Air Force Requirements Oversight Council (AFROC).

AFROC

The AFROC is a board made up of the principal senior officers from each functional area. This board performs the final review of MNSs and ORDs before they are sent to

the Air Force Chief of Staff for approval. Some of the AFROC responsibilities include:

- Oversee the mission need determination and requirements process;
- Develop a corporate position on operational requirements;
- Ensure clear articulation of needs or requirements;
- Review the priority and funding of programs;
- Resolve cross-service issues for joint requirements; and
- Review all warfighting deficiencies that may evolve into acquisition programs and validate that such deficiencies cannot be satisfied by other than materiel solutions.[22]

Modernization Planning Process Summary

Modernization starts with identifying deficiencies. Options for meeting these deficiencies include changing procedures and tactics, modifying existing equipment, new acquisition and/or investments in science and technology.[23] The products of the planning process are tactics or procedures update, modernization roadmaps and technology roadmaps. Throughout each phase, integrated teams composed of users, developers, maintainers, labs and industry provide the expertise and knowledge for the analy-

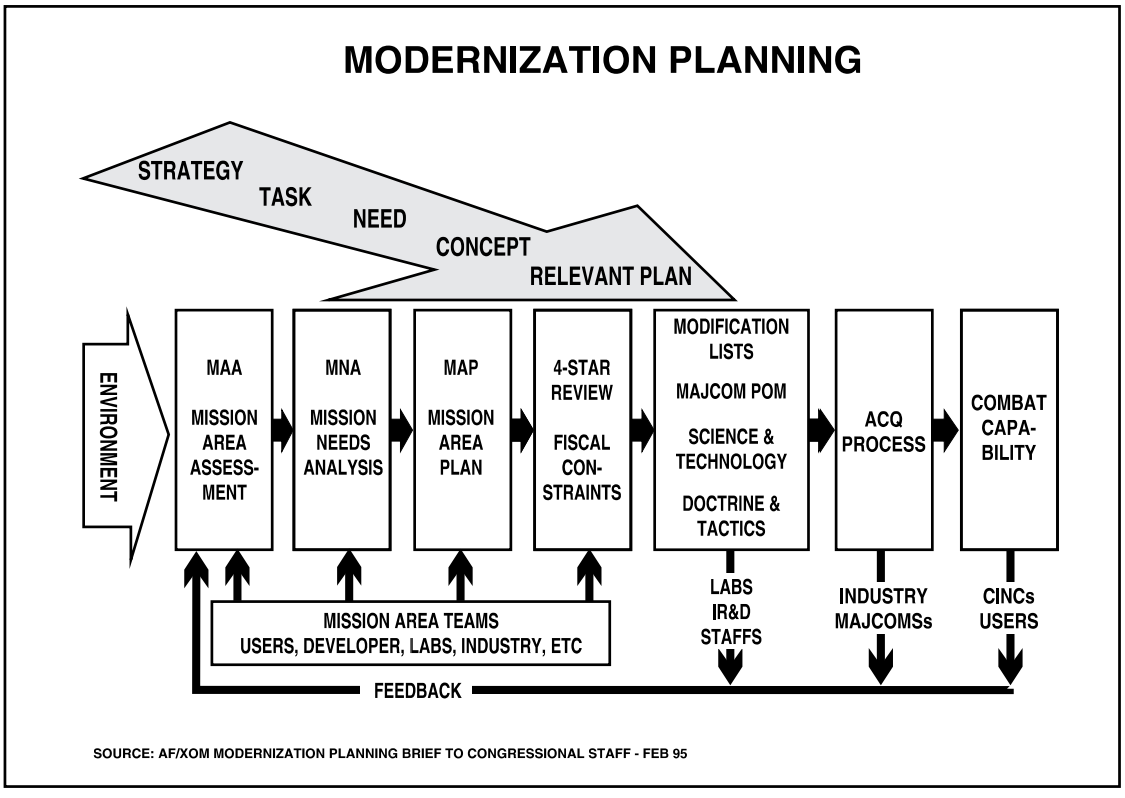

Figure 5-4. Modernization Planning

sis. Application of fiscal constraints to the validated needs, mean each MAJCOM prepares a prioritized POM input covering the mission areas for which they are the designated lead command. Per AFI 16-501, these inputs flow to the HQ USAF Resource Allocation Teams. This process is now influencing the FY97 Budget Estimate Submission and is slated to become the baseline for the FY98 POMinput. This time-phased approach allows all the process participants to know their respective roles in the planning process, investment strategy and future direction of the Air Force.[24]

Weapon System Master Plan (WSMP) and Weapon System Program Assessment Review (WSPAR) (see AFI 63-107)

Two logistically focused tools that dove-tail nicely into the modernization planning process described above, are the WSMP and WSPAR. These tools also identify potential deficiencies. The WSMP is a long-range planning document developed for each weapon system and used by SMs to manage current and future acquisition and support activities. A WSMP can be linked to one or more MAPs. For example, an F-15 fighter aircraft supports taskings and objectives in several mission areas. Thus, support deficiencies in the WSMP show up in several MAPs. The WSMP goal is to assess the operating commands proposed wartime taskings against the logistics capabilities and extrapolate future support needs. As such, the WSMP includes recommendations on candidate solutions for known deficiencies and projects the costs. The WSPAR takes the form of a SM briefing to the Air Force Council, chaired by the Vice Chief of Staff on ones' weapon system. In brief, the SM gets an opportunity to convey concerns about the weapon systems' support posture to senior leadership. It is evident these two tools, while focusing primarily on sus-tainment, provide another important feedback loop for force modernization.

AFMC Resource Management and Allocation Processes

AFMC employs complementary processes to the Air Force Modernization processes described above. It ensures appropriate use of infrastructure and residual procurement funds, not transferred to the operating commands. Explanations of these processes are in Air Force Materiel Command Regulation 500-2, Strategic Planning Process; 500-10, Corporate Management Process; and 500-16, A Model for Acquisition and Sustainment Under IWSM. Instead of looking at mission areas as the Operating Commands do, AFMC looks at five mission elements and functional areas: systems acquisition, sustainment, science and technology, test and evaluation, and base operating support. The goal of these processes is to provide the SM and users the best possible procedures, training and tools to do their job.

Why the Air Force Does Modifications

There are several reasons for doing modifications but most are the fruit of a formally documented deficiency. Senior Air Force leaders cited the following prioritized reasons for embarking on modifications:

- Improve combat capability
- Respond to a changing threat
- Insert (exploit) new technology
- Improve a system's Reliability & Maintainability (R&M) (Most R&M system improvements are sustainment actions)

They also view modifications as a cost effective and relatively low risk method of correcting known deficiencies. This is particularly true of weapon systems with many years of projected service life remaining. Quoting Togo West, Secretary of the Army, "...Improvements to our existing systems are the best way to achieve the greatest return for scarce resources and to leverage technology...."[25] Because many modification programs tend to involve lower risk than new acquisitions, there is strong emphasis on using streamlined acquisition procedures.

Cost and Risk Factors in Modification Management

A draft Air Force policy directs the SM to evaluate both cost and risk before starting a modification program (see Air Force Policy Directive (AFPD) 63-11 and AFI 63-1101. This policy directs the use of a combined cost and risk assessment and for the SM to recommend the appropriate MDA and documentation preparation requirements. This shift from looking only at cost is grounded in the philosophy of lowering management involvement to the appropriate level. It is a shift away from risk avoidance practices to risk management practices. A recent memorandum from the USD(A&T) office echoes this philosophy, "...each MDA is responsible for tailoring the application of DoDI 5000.2 and DoD 5000.2-M (including the references in both documents) based on a program's status, risks, and adequacy of proposed risk management."[26] The idea behind these policies is value. Each increase in the level of oversight, control or documentation results in an increase in the cost, schedule or human resources needed. Therefore, the goal is to eliminate oversight or documentation requirements that are without tangible benefits, e.g., maximize the value from limited amounts of funding and personnel.

Facts about the Scope and Size of the Modification and Upgrade Budget

The size of the modifications portion of the Air Force investment budget has remained relatively constant over the last 17 years. Figure 5-5 shows that historically, modifications have accounted for approximately 3 percent of the Air Force TOA in any given year. In 1994 the actual figure was closer to 2 percent. Breaking down the numbers further, 80 percent of these modification programs require less than 20 percent of the funds. Therefore, the majority of modification programs (80 percent) require only 0.6 percent of the Air Force annual TOA. Figure 5-6 shows the percentage of modifications by program cost.

Additionally, the acquisition workforce available to manage modifications is shrinking. Between 1989 and 2001, AFMC is projected to cut 39 percent of its overall workforce (military and civilian) and lose 47 percent of its product management personnel.[27] Putting these facts into perspective, it is easy to see why the Air Force modification policy is shifting. With reduced resources and a stated goal of being more effective and efficient, it simply does not make sense, nor is it practical, to continue forcing time and resource intensive reviews and documentation preparation for most of these limited liability and lower risk programs.

Future of Modification and Upgrade Budgets

In interviews with Air Force senior leadership, they stated, that they expected to see modifications grow as a proportion of the investment budget. Figure 5-5 shows the growth projection of modifications. One rea-

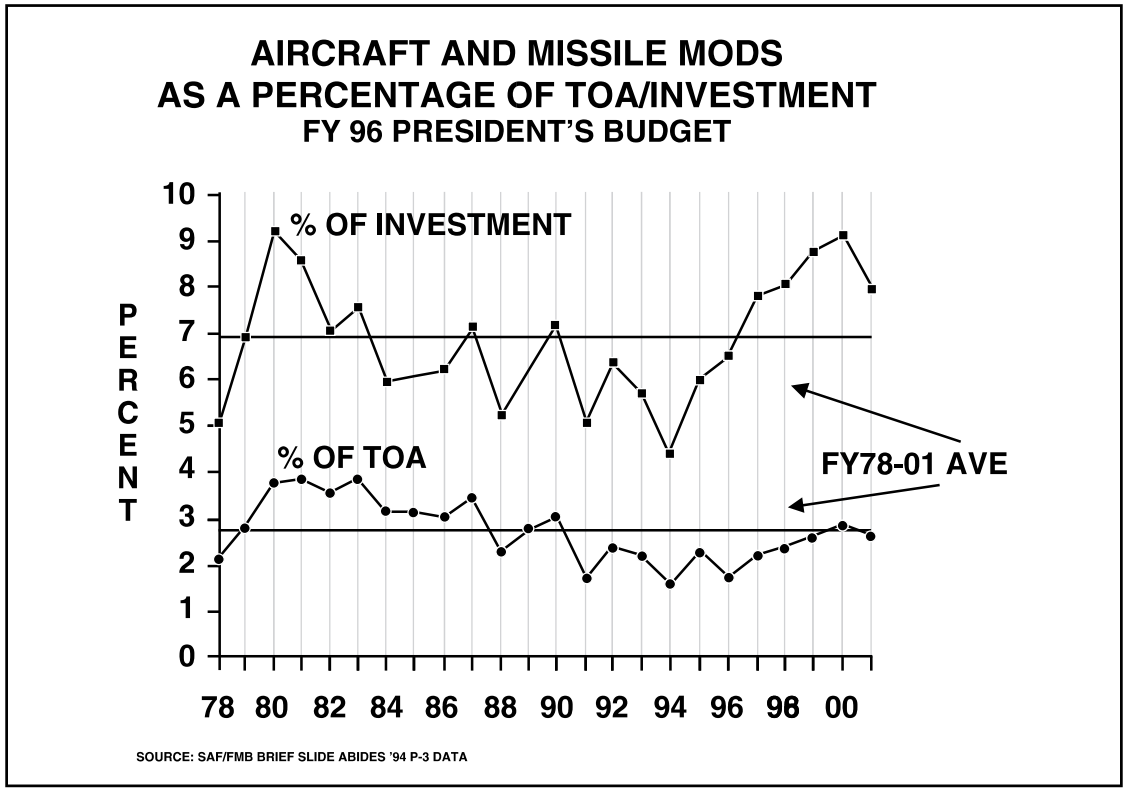

Figure 5-5. Aircraft and Missile MODS as a Percentage of TOA/Investment

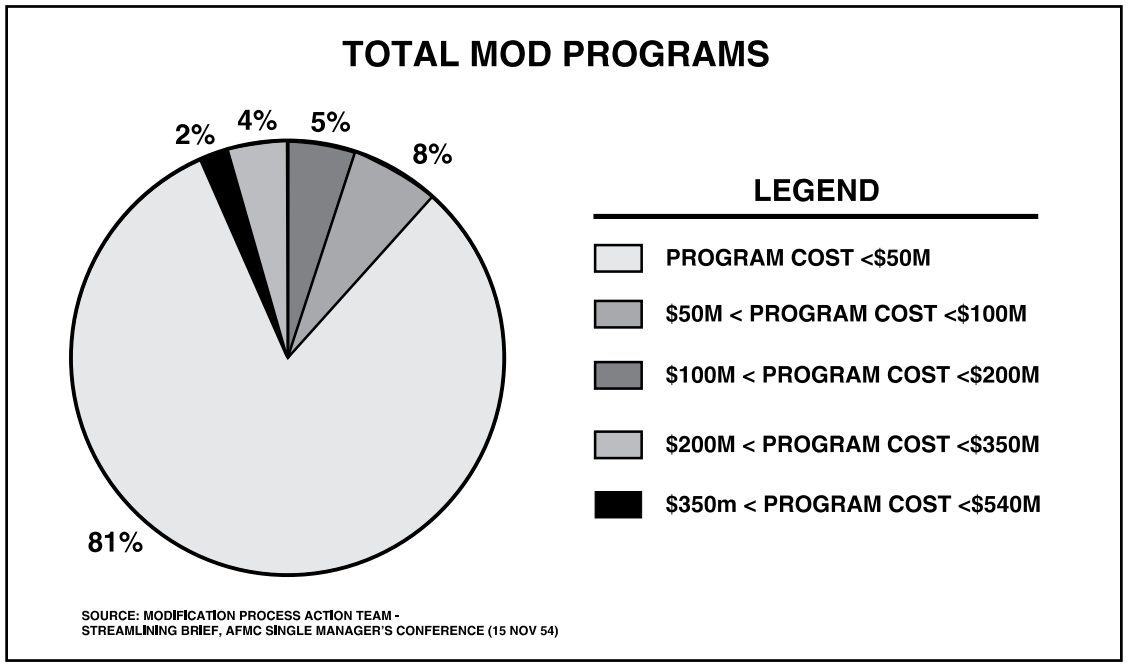

Figure 5-6. Total MOD Programs

son for the anticipated growth is that few (and fewer!) new major weapon systems (ACAT ID or IC programs) are underway (60 ACAT ID programs in 1994 down from 40 in 1992).[28] Thus in the foreseeable future, improvements in combat capability will be realized from TI into existing weapon systems. Senior leadership comments are substantiated by looking at a subset of the aircraft inventory, average aircraft age, and projected aircraft age at retirement date in Figure 5-7. Like in humans, as the hardware ages it requires more medical attention. Hence, even without modifications to improve combat capabilities, modifications become a necessity to replace obsolescing equipment or subsystems.

Non-Material Alternatives to the Modification Process

As the DoDI 5000.2 explains, the first alternative when trying to solve a military deficiency is to assess whether or not a change in tactics or operational procedures could remedy the deficiency. After exhausting these options, material solutions are sought.

Material Alternatives to the Modification Process

While all modifications start in response to formally documented deficiencies, many deficiencies do not require modifications. Resolution of the majority of reported deficiencies or problems occurs by the smart use of preferred spares, buying new items (item

AVERAGE AIRCRAFT AGE
(AS OF 1994)

AIRCRAFT TYPE	NUMBER OF AIRCRAFT	AVERAGE AGE NOW	PROJECTED RETIREMENT	AGE AT RETIREMENT
C/KC-135	638	33	2040	79
B-52	94	34	2030	70
C-5A	77	25	2021	52
C-141	248	29	2010	45
C-130 (20 YRS OR OLDER)	439	30	2030	66
F-15	940	12	2020	38
F-16	1727	7	2020	33

SOURCE: AF SCIENTIFIC ADVISORY BOARD (1994 SUMMER STUDY)

Figure 5-7. Average Aircraft Age (As Of 1994)

replacement), maintenance and repair procedures (technical order) or software-only changes. AFMC has a program titled Improved Item Replacement Program (IIRP) that governs preferred spares and improved items. One advantage of the IIRP is it allows the Air Force avenues to correct deficiencies or introduces, through TI, state-of-the-art components, shop replaceable units and line replaceable units. These then become normal supply items. Procedures levied on IIRP are primarily concerned with the LCC implications of the change. Generally, they are undertaken when the change produces a significant LCC advantage.

Sources of Modification Requirements

Modification requirements can come from several sources. The following non prioritized list represents where most requirements come from:

- Mishap Report
- Quality Deficiency Report (two types I & II)
- AF Form 1000 (suggestion program)
- Unsolicited proposals
- DoD or other agency modification proposal
- High demand rate
- Analytical Condition Inspection
- Aircraft Structural Integrity Program
- Technical Order System Publication Improvement Report
- Product Improvement Program
- Modification Proposal and Management, AF Form 1067
- MNS (MNS)
- Modification Improvement Program

There are many ways to start a need for a modification. Most important is the formalization of modification programs when documenting and researching the deficiency, while using various Air Force processes to validate the need and requirement. AFI 10-601 contains complete instructions on the process and procedures for preparing, validating and approving Air Force mission needs and operational requirements.[29]

Modification Documentation

Documentation and oversight requirements for modifications are typically less structured than are those for major new programs. The guiding principle from the USD(A&T) office and Air Force leadership is to keep documents to the minimum necessary for sufficient oversight and auditing. The premise behind reduced documentation and oversight is the idea that modifications generally involve less risk than major acquisitions. The core documentation requirements for non major modifications are:

- Need approval (see AFI 10-601 for specific documents and limitations)
- Requirements approval (see AFI 10-601 and AFI 10-602)
- Baseline cost, schedule and performance parameters (AF Form 3525, Acquisition Program Baseline or equivalent)

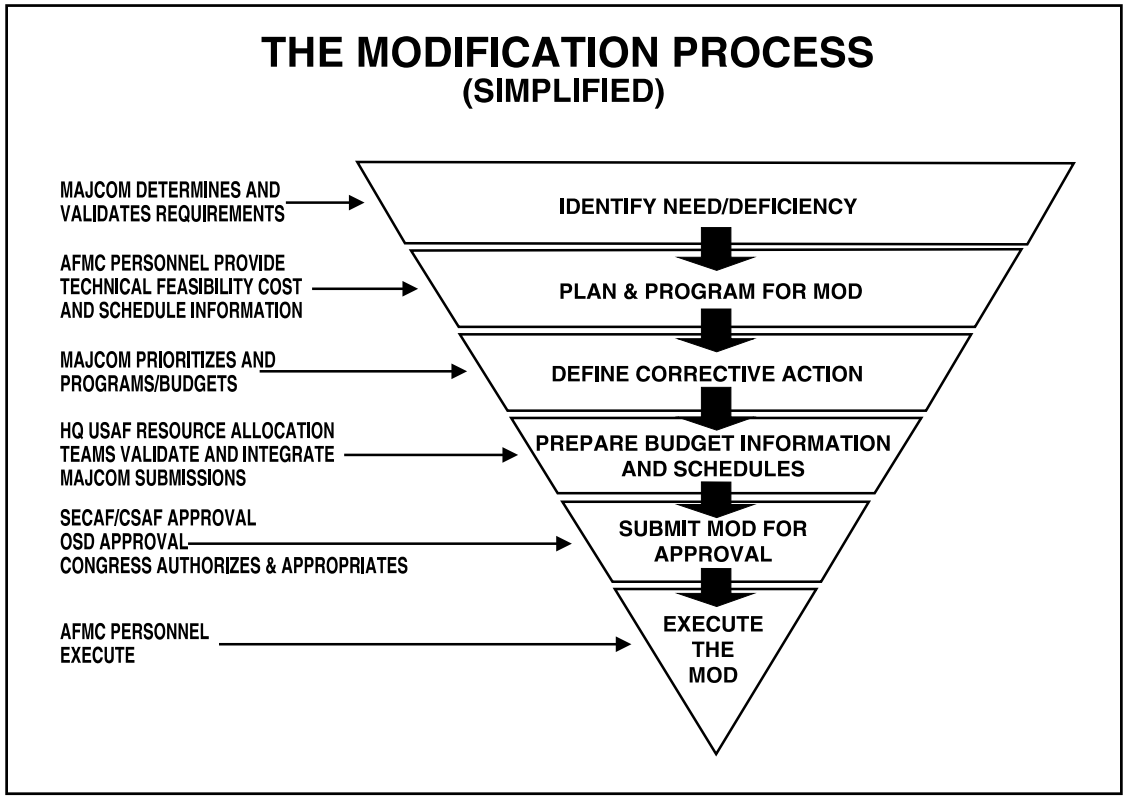

Figure 5-8. The Modification Process (Simplified)

- A management plan that encompasses the key functional areas (AFI 63-107 may be helpful)

Modification Process

In the past, with many ways to establish and fund a requirement, too much time was spent planning modifications that were never accomplished. Modification staff personnel view this as wasting time on planning modifications that are never implemented. Today the user controls the funds for all modifications regardless of requirement origination. Thus, having a commitment to the need is the single most important step in starting a modification program. Currently, the operating commands (users) have the authority to validate requirements below $10M with HQ USAF validating requirements above $10M. If the modification results in an ACAT I or joint interest program then JROC approval may also be required. Ultimately, the user must decide whether to pursue the modification. That signature (validation) signifies a desire by the customer to remedy the deficiency. With a validated need in hand, the SM initiates modification planning. This usually takes the form of a preliminary engineering review. Some of the main steps in this review are as follows:

- Identification of the expected impacts on the Configuration Item (CI)—system—being modified

- Description of the solution, including

replacements, modifications or redesigning to include the magnitude of the change (form and fit)

- Preliminary justification of need

- List of options or tradeoffs including ignoring the deficiency

- Develop a preliminary cost estimate and proposed schedule for the program

- Identify (scope) other issues that might technically or programmatically impact the project.

Modification Planning

In the interviews with working level modification personnel, thorough, up front planning was reiterated at every turn, as a most critical activity. The Air Force "lessons learned" database (Automated Lessons Learned Capture And Retrieval System (ALLCARS)) corroborates that planning is often the Achilles heel activity of less than successful modification programs.[30] It is easy to understand why careful planning is so critical when schedule drives the process. Validating the need and requirement process takes, on average, 6-8 months to complete. The average time to bring a validated requirement to a contract award takes an additional thirty-two months. Thus, if the modification planning documentation and coordination are either incongruent or incomplete it can add an entire year to get funding programmed. Also, because literally hundreds of requirements can show up at each SM's staff for evaluation, it is essential to know which one(s) to work and their relative priority. Another piece of modification planning includes ensuring how to accomplish logistic support. Also, LCCs are a criterion in modification planning and every effort should be made to drive down the O&S cost of ownership.[31]

Operating Command (User) Review and Approval Prior to Milestone 0

For modifications the goal at this preliminary stage is to determine the best value solution based on analysis of a deficiency generated by a new or changing requirement. Once the preliminary engineering and initial planning are complete the SM provides the results to the user. After approval of the project or program it is then submitted to the MDA for a Milestone 0 decision.

Milestone Decision Authority (MDA) Determination

The emerging Air Force policy is to recommend program decision authority to the lowest level MDA commensurate with the proposed program's correlated cost & risk for all but major modifications.[32] See AFMC Pamphlet 63-101, for instructions on developing the specific risk assessment. The intent is to ensure that each program gets the appropriate management focus without non value added burdens. Programs with higher risk generally have more challenges and will require more senior leadership assistance/ oversight. Using the proposed policy, (for non major modifications) the correlated cost or risk assessment results help drive the MDA recommendation. This policy would result in a MDA/ACAT matrix as follows:

- Program Level MDA

- ACAT IV SM

- ACAT III PEO/DAC

As a program moves through the various Milestones the cost and risk assessment may

change. Therefore, the MDA designation remains flexible depending on the needs of the program or when directed by higher authority.

Milestone 0 Concept Exploration and Definition (CE/D)

With the establishment of the need or deficiency and the determination that it can not be satisifed with a non-material alternative, the project moves next to (CE/D). Aggressive tailoring of the documentation, oversight and review is essential because this is a modification of an existing system. The value in this step is to explore the potential alternatives and select the most promising. This in-turn may lead to the alternatives to modifications previously mentioned, i.e., preferred spares, maintenance and repair actions or software-only changes. However, if a hardware and/or software modification is required, then a determination must be made as to whether the end item has sufficient service life (five-years) remaining to justify the modification. This guideline does not apply to safety modifications.

Another guideline to consider is a "best practice" adopted from world-class commercial industries. Their practice is to expect modifications, except those for safety or legal compliance, to result in a reduction in the cost of ownership. Industry expects this because for most types of equipment, new generations of hardware products are cheaper than the previous generation of similar equipment. The key point is that while cost is not the only variable to consider in picking a modification alternative, it should be a heavily weighted variable in the tradeoff analysis to ensure the user gets best value.

Engineering Change Proposal (ECP)

When a most promising solution is found, the most typical vehicle for a material solution is an Engineering Change Proposal (ECP). Explanation of an ECP preparation is in MIL-STD 973, Appendix D. With the recent policy shifts away from MIL SPECs and MIL STDs to performance specifications, MIL-STD 973 is merely a guide. For approval, the ECP must be acceptable in terms of technical fidelity, cost, schedule, logistics factors and agreeable to the system's operational users. In cases where no modification solution is agreeable, then a new start activity may be initiated. Either way, availability of funds is a necessity at this point. Assuming no additional study requirements and approval of the ECP, then the user is responsible for prioritizing resources so as to fully fund the needed modification in the POM. The approved ECP will form the basis for building the CCB package.

Configuration Control Board (CCB)

In the Air Force, the SM CCB is the sole technical committee that recommends approval to the SM to change the configuration of government equipment. Operating commands (users) review and concur or non concur with the proposed engineering change, but cannot grant approval to change the equipment.[33] This is an important point because under the AFMC IWSM management philosophy each system or item's configuration management falls under the responsibility of the SM. Since changing a CI is by definition a modification or upgrade, solid configuration management is crucial to maintaining an effective and efficient modification program.

Configuration Control

During interviews with modification management personnel, configuration control came up over and over as a "critical to success" activity. They cited numerous occasions when the absence of a well-documented configuration "technical data package" or incorrect data on the equipment's configuration resulted in cost, schedule or performance breaches in a modification program. This function is likely to be even more challenging in the future. Changes instituted by the SECDEF last year fundamentally changed how the Air Force controls configurations, "To the extent practicable, the Government should maintain configuration control of functional and performance requirements only, giving contractors responsibility for the detailed design."[34] The SECDEF memo further states, "Performance specifications shall be used when purchasing new systems, major modifications, upgrades in any ACAT."[35] This new paradigm radically changes how the Air Force will control configurations in the future. Essentially, now industry retains configuration authority over the engineering/ configuration baseline commonly referred to as the detailed design. In the past, the Air Force controlled the configuration of the detailed design following a successful Physical Configuration Audit. Now contractors can continually change the detailed design as long as one meets the functional and allocated requirements. Thus, these changes put a premium on carefully managing the interfaces between systems, subsystems or commodities to ensure the appropriate functional, performance and physical characteristics exit at common boundaries.

Interface Control (IC)

An Interface Control Working Group (ICWG) accomplishes IC. The ICWG is the forum used by the participants (government, contractors, or other agencies) to resolve interface problems, maintain clear communication channels and document interface requirements. The ICWG establishes the functional and physical interface characteristics and documents them in Interface Control Documents.

Air Force Modification Management System (MMS)

One of the tools added to improve modification management is MMS. A MMS is an information management system developed to provide an automated capability to collect, maintain and display modification information for the user and AFMC personnel. One of its important outputs is a P-series funding document (the P-3A) that is used to request modification funding. Currently, several other similar systems are in use for keeping track of modifications. A long-term goal is to migrate all users and AFMC organizations to MMS.

Modification Funding

Unfortunately, the rules and policies governing modification funding can be confusing. Still, it is worth mentioning some general rules. First, the type of funds used to develop a modification depend on whether or not the proposed change results in an increased performance envelope for the fielded system. If it does, then RDT&E funds (3600) are used for the activities preceding production/retrofit. If the system is out of production and does not increase performance, then O&M (3400) funds are used for the activities preceding production/retrofit. For systems still in production, the appropriate procurement account (3010, 3020, 3080)is used. In all cases, procurement funds are used to procure the modification kits and install them.

Also, the policy of "full-funding" applies to the use of procurement funds, basically, all the items necessary to complete a major end-item or system must be funded from a single year's appropriation. Another wrinkle on modification funding is the requirement of Congressional approval before initiating any modification requiring >$10M in total funding. If it is a safety modification >$10M then it can be started out of cycle with congressional notification. The reprogramming threshold with the procurement account is <$10M.

Where to Go From Here

Joining in is the best way to stay abreast of these or contemplated changes. Empowerment is a key tenet of the Air Force Total Quality program and IWSM philosophy. Many of the changing processes described here have bubbled up from the lower levels of the DoD acquisition workforce. When modifications management began to mirror traditional acquisitions many people in the logistics community said, "how about training us in acquisition and providing us with how to templates." This non trivial need was fulfilled with the release of the Air Force Modification Process Description (test). A dedicated group of working level modification personnel and users took the Air Force Total Quality program seriously and formed an IPT to revisit modification processes and policies. The group was sanctioned by the Assistant Secretary for Acquisition, policy group (SAF/AQX) and the HQ USAF/LG policy to put together a "how to" guide for modifications and to chart the modification process so that it might be better understood and improved. The Modification Process Description is an eight volume compilation of all facets of completing a modification or upgrade. The structure provides even relatively inexperienced staff with enough detail to successfully accomplish a modification. Another goal of the IPT was to get the description out quickly and proactively seek feedback for its improvement. The initial issue is a test, allowing individuals to use it without making it mandatory. Throughout the test period the IPT will be looking for suggestions to improve its product. More information on the Modification Process Description can be found at Appendix E. Hopefully, this encourages the user. If you have a lower cost or more efficient way to get a quality product to the user, pursue it. Included in Appendix E are some additional points of contact for the processes discussed. They are a ready source for up-to-date information on education, training and pending changes.

Summary

The Air Force's modification and upgrade policies and procedures are quickly evolving to take advantage of the mammoth changes in DoD. Reduced funds, fewer people, less infrastructure and fewer new starts drive modifications and upgrades to the forefront of the US Air Force investment strategy. The Air Force is meeting this management challenge by refining the requirement generation process, improving its modernization planning process and increasing the use of best commercial practices. The key to making these process improvements work is an integrated management approach using integrated product teams with a clear focus on meeting the users needs.

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6

NASA

Introduction

As a means of comparison with another government agency, this report looks at NASA's implementation of modifications and upgrades. The purpose of the comparison is to explore an equivalent to the DoD milestone decision process and the level of approval oversight. NASA's Space Shuttle safety, obsolescence and performance upgrades provided the basis for an excellent comparison.

Overview

The Agency's Deputy Administrator serves as the Agency Acquisition Executive. The Agency is sub-tiered into Program Associate Administrators (PAAs). For example, the head of the space flight office is the PAA for both the Space Shuttle and Space Station. One could consider the PAAs to be similar to the DoD's Component Acquisition Executives. NASA tends to do business at a lower level than the DoD. The decision process is much more compartmentalized by systems and much more teamed within systems.

NASA used the DoD 5000 series as the model for their NASA Handbook (NHB) 7120.5, Management of Major System Programs and Projects. "This Handbook applies to program/projects for the purpose of development and operation of a major system... Program Associate Administrators (PAAs) shall determine how these policies and procedures should be tailored, and selectively applied, to non-major systems consistent with their size, complexity and sensitivity."[1]

In monetary terms, NASA considers a major program or project one in which the development cost commitment exceeds $200M. NASA does not make a distinction between modifications and upgrades. Since 1971, when the space shuttle program (SSP) began, the program has experienced numerous expensive modifications. There are also upgrades for safety, obsolescence or performance reasons; the performance upgrades are those that will enhance the shuttle's performance (i.e., lift capability) in order to use it in the assembly of the space station. Shuttle upgrades are budgeted at approximately $700M a year out of a total FY95 Shuttle budget of $3.1B.

There is not a requirement for small programs, those under $200M, to use the policies and procedures outlined in the NHB. However, since this document covers cradle

to grave program management, NASA is incorporating these kinds of processes, techniques and functions into all new and existing projects. Center Directors (center examples being Johnson Space Center, Kennedy Space Center and Marshal Space Flight Center), who are one tier down from PAAs, have management responsibility and authority over these smaller programs. Program directors, at the PAA level, manage major programs.

NASA expects tailoring of the NHB; however, agencies do very little tailoring. The DoD encounters a similar situation with published guidelines. Auditors, both in the DoD and NASA, are driving the process to be very rigid because of all the details for which they ask. (Significantly, in the DoD, there is no requirement for auditors to be acquisition literate.)

NASA does not have a DAB equivalent. However, NASA performs the same review functions without the kind of oversight staff that exists in DoD. NASA places its oversight responsibility for major programs with two entities: The Program Management Council (PMC) and the Comptroller's Office. The PMC, chaired by the Deputy Administrator, is comprised of the PAAs and headquarters staff. The PMC provides oversight through a quarterly status review. Also, detailed annual reviews are conducted by the comptroller and independent technical personnel and the results are presented

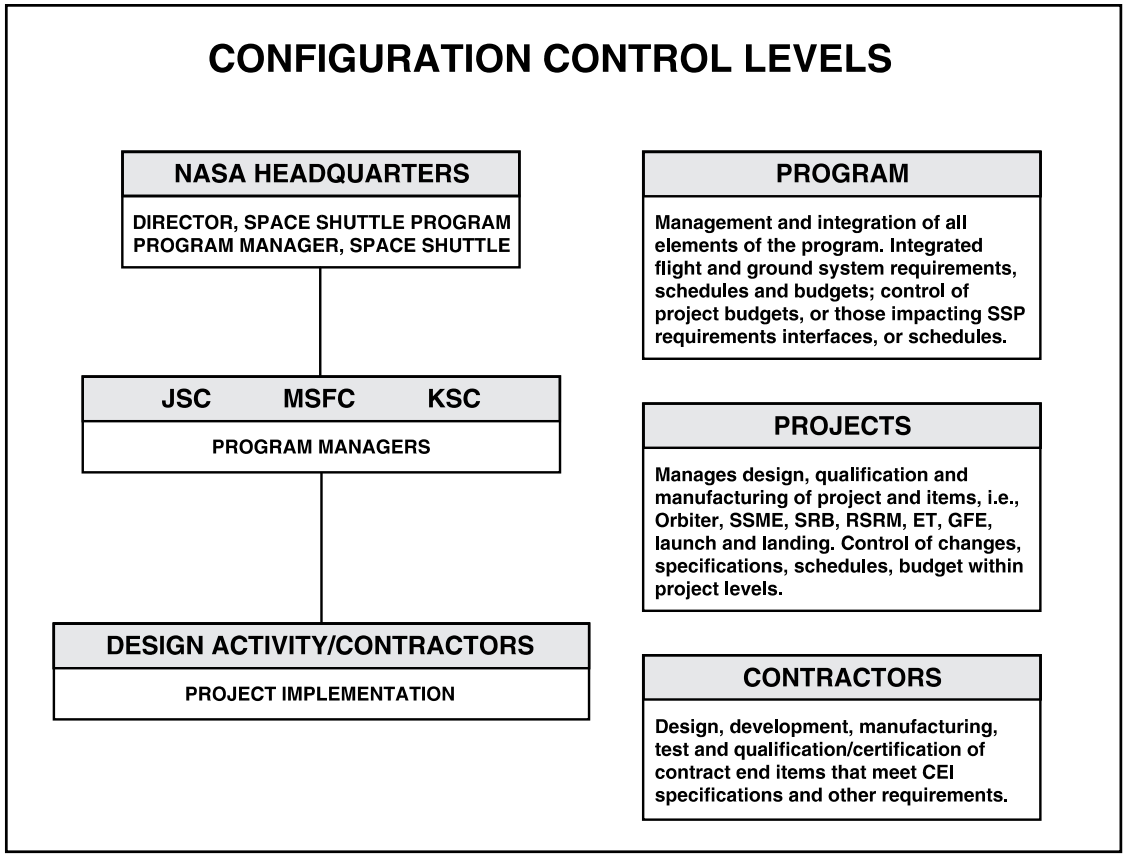

Figure 6-1. Configuration Control Levels

to the PMC. Thus, the primary audit function is performed by the Comptroller's Officer. This leads back to the auditing issue of having people who are not trained in acquisition significantly impacting a program.

Figure 6-1 shows NASA's configuration control levels. In the example, Director, SSP is level 1; the PM, Space Shuttle is level 2; the Project Managers at the Centers are level 3; and Project Implementation is level 4. Levels 1 and 2 constitute a program. NASA is trying to minimize level 1 and focus more program direction at level 2, the PMs. Actually, the PMs for space flight are in the field; not in Washington.

Anyone associated with the SSP can propose a change, as outlined in Figure 6-2. In the annual budget each project has a fiscal year operating plan with dollars associated for discrete contract items. Level 3 projects are free to spend funds as long as there is no deviation from the approved plan. Once deviation occurs, level 2 must approve any changes requiring additional funds or reprogramming. When presenting the request for changes, level 3 must provide justification, documentation and fiscal

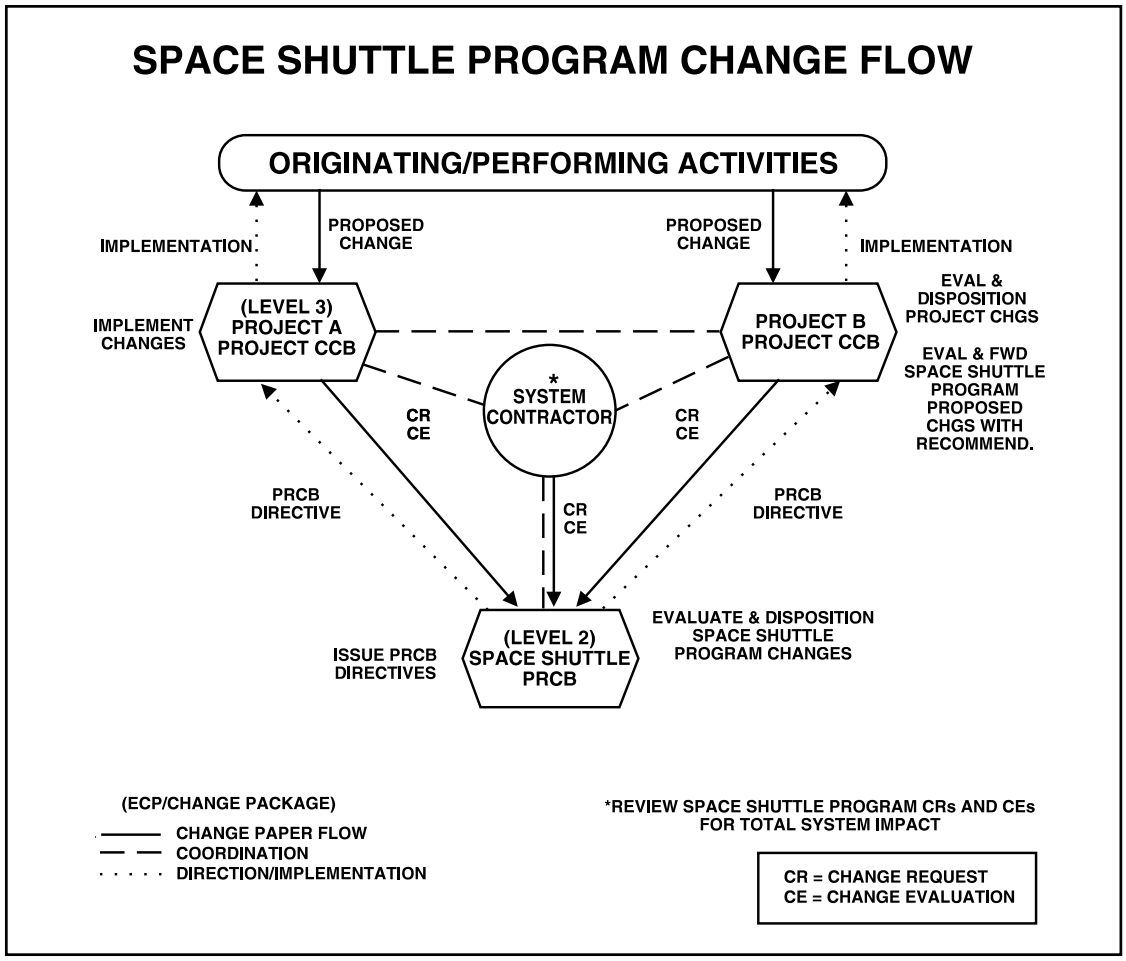

Figure 6-2. Space Shuttle Program Change Flow

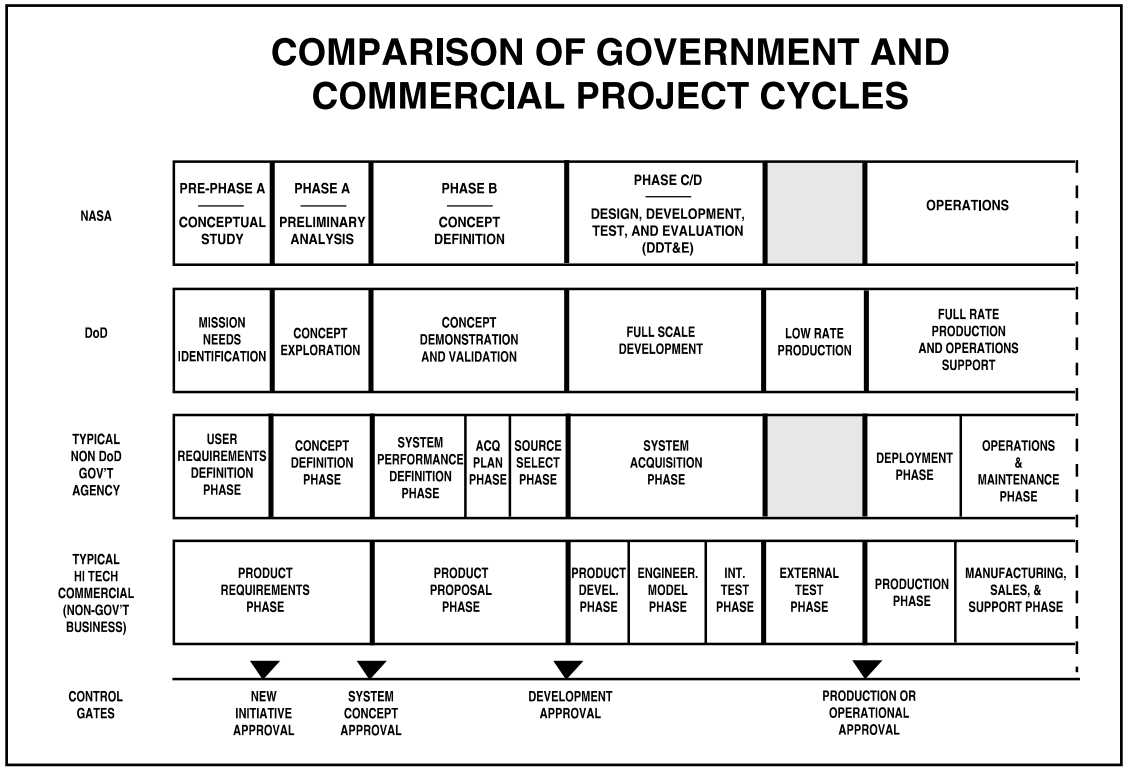

Figure 6-3. Comparison of Government and Commercial Project Cycles

year phasing. The level 2 approval process can take 6 months.

Figure 6-3 illustrates a comparison of government and commercial project cycles. For NASA, Phase B needs Congressional approval to go to Phase C/D for new starts and major upgrades. This is usually done through the normal appropriations' cycle. Also, it should be noted that a Preliminary Design Review is required at the beginning of Phase C/D. If there are major changes during the year, NASA notifies Congress by letter. There is a close working relationship with the staffers and informal notification is usually done prior to a formal notification. After formally notifying Congress, NASA waits 30 days and if there has been no reply then the change is implemented. Congress may notify NASA after the 30 day period to request further changes or nullify the changes implemented.

Summary

NASA has the same Congressional oversight as the DoD. However, NASAs' internal review and approval process are at a lower level than the DoD. They are focusing more of the decision making process at the Program Manager level and for smaller programs the decisions are made at the project level.

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7

INTERNATIONAL VIEW

Introduction

The U.S. is not the only nation faced with the problem of maintaining a modern force in a changing world. Our allies face the very same environment. A decline in defense spending, a change in threat and the ever increasing availability of advanced technology to the highest bidder, also affect the U.S. allies. In this new environment, the allies are being forced to make the same hard decisions on weapon system modernization but their approaches to modifications and upgrades are quite different from those of the U.S.

Given the time constraints to prepare this report and the huge amount of information available, the focus of this chapter lies with the Republic of Germany and the United Kingdom (U.K.). The report focuses on these nations because of the U.S.' long standing cooperation on defense matters and the local availability of information on each nations' defense acquisition process. Though the external environment is similar for these two nations, the internal environments that they face are quite different. Each nation's acquisition process operates within the framework of their own governmental bureaucracy and is affected by that bureaucracy. In an effort to understand each nation's modification and upgrade process, one must first understand the acquisition bureaucracy. This report briefly addresses each nation's acquisition process and their general policy on modifications and upgrades. European allies, with lower defense budgets, tend to be more rigid in the executions of their respective procurement programs.

The Republic of Germany

The Republic of Germany's acquisition process is similar to the U.S. in many ways. Parliament performs legislative oversight and conducts a selective item review.[1] Parliament approves all contracts greater than 50 million deutsch marks (DM) before contract award.[2] The Armament Directorate within the Ministry of Defense directs the Federal Office for Defense Technology (BWB) to research, define, develop, test and evaluate, and produce and procure weapon systems. The BWB has total control of the procurement process.[3] The Service staffs provide input throughout the process by determining the requirement, logistical support and service acceptance.

The BWB uses a five-phase acquisition process: preliminary phase, definition phase, development phase, procurement phase and

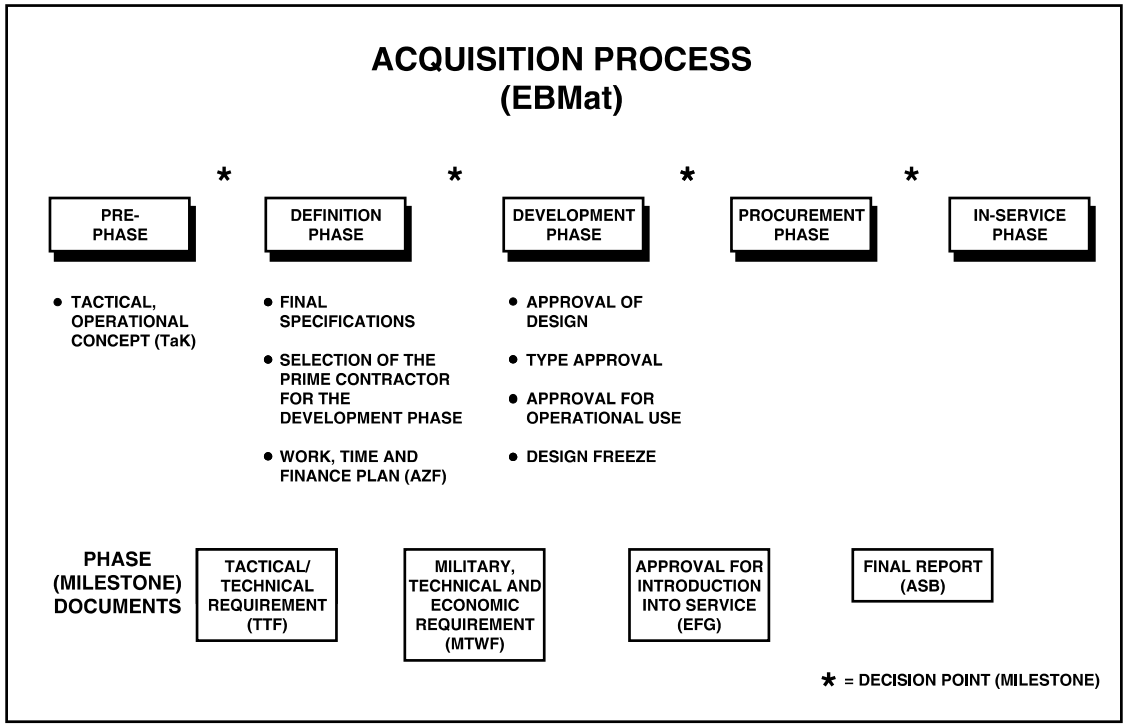

Figure 7-1. German Acquisition Process (EBMat)

in-service phase. A preliminary phase takes the need and searches for potential acceptable solutions. Developing an initial formal statement of operational need and the milestone decision approval of the tactical/technical requirement document is the key to this phase. Phase two, the definition phase, develops the final specifications. Final specifications fully define the projects' financial, technical and operational terms. In addition, phase two selects the prime contractor for the Development Phase. The development phase is the next phase in the cycle. During this phase, the design is approved and frozen. The critical milestone is the approval for introduction into service(EFG) document. The EFG approval is critical because, after this point, only safety related modification may be applied to the weapon system. In the procurement phase, the defense contractor produces and fields the weapon system with very little oversight from the BWB. In-service phase, is the final phase where the uniformed services take possession and maintenance responsibility for the weapon system.

The German acquisition process only has, by a U.S. definition, one type of modification, safety. They do not change the design of the weapon system once the weapon system receives EFG approval. Changes to the weapon system are possible after acceptance by the service. If the weapon system requires additional capabilities, the service forwards the request and funding, for combat improvement measures, to the BWB for planning and execution. The BWB starts the review of this new requirement at the preliminary phase and begins the cycle again. The BWB decides if the new requirement can be met by an upgrade to the present system or a new

start. If an upgrade is approved, the BWB will negotiate with the service on how the change will be applied; by contractor, depot or the service. The BWB is responsible for the design and contracting of the change. The services are responsible for the funding, requirements and equipment. This separation of responsibilities controls the requirement growth during its procurement process.

The United Kingdom (U.K.)

The U.K. has a slightly different procurement structure from Germany, although there are some common aspects. The unique role each member of the acquisition system plays in the process is the basis of the differences. Like Germany, the Parliament provides the legislative oversight. The advantage of a parliamentary form of government is the majority party is always the head of the government. This normally ensures the magnitude of changes made by parliament is lower than you would see in our process. The Parliament approves the total defense budget and does not have a line-item review. The Parliament does have two committees that overlook the defense budget. The House of Commons Defense Committee reviews defense policy and program issues. The House of Commons Public Account Committee reviews the economy and efficiency of defense expenditure. These two committees normally do not make adjustments to the proposed defense budget.[4]

The U.K. has a six-phase approach to weapon system acquisition.[5] The key to understanding their approach is to understand who is the primary driver in the process during each phase. Although the users (operational commands and Branch Sponsor at the Defence Staff), the Office of the Chief Scientific Adviser, the Office of Chief Defence Procurement and the Logistic Branch are involved in all phases of the acquisition process, each group takes the lead in different phases of the process. The Defence Staff, with the help of the Chief of Scientific Advisor, decides what to buy. This decision is made during the first three phases of the

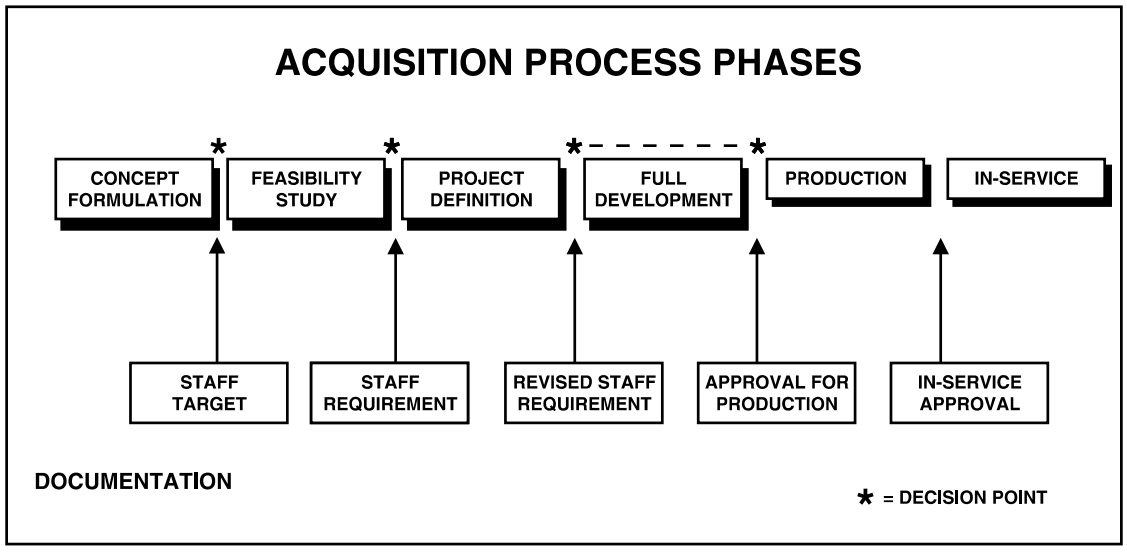

Figure 7-2. U.K. Acquisition Process Phases

process (concept formulation, feasibility study and project definition).[6] The final products of these phases are a formal approved requirement and decision to proceed to full development. The Procurement Executive does the selection and procurement of the system during the full development and production phase. Full development phase locks in the final system specifications. The only changes permitted after the end of this phase is safety and no cost manufacturing or performance improvements.[7] The Procurement Executive transfers control of the system to the service once "in-service approval" has been given for the weapon system. During the in-service phase minor deficiencies and enhancements may be done by the services. Major changes to the system must begin the acquisition process all over again.

Modifications and upgrades, by the U.S. definition, are done in the British procurement process. Modifications and upgrades are limited to only safety and no cost improvements. They are initiated by the user and return to the initial phase of the acquisition process and compete with all programs for funding and priority. The separation of control during the phase seems to limit requirement growth in the British acquisition process.

Summary

The modification and upgrade processes for Germany and the U.K. have several points in common. They tend to lock the design early in the process and limit changes to only safety-related items. Both procurement systems have clear separation of the buying community and the services. The user agrees on the requirements and turns them over to the buying organization for execution of the procurement. The buying community is evaluated only on schedule and cost. Changes required, after weapon system fielding, are returned to the beginning of the acquisition process for review. They undergo all the required analysis based on the level of risk and cost of the program. The early agreement on the requirement and the separation of user and buyer ensure both nations maximize their limited defense funds.

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8

COMMERCIAL INDUSTRY

Today, businesses either evolve or perish!

Anonymous

Introduction

This chapter brings to the forefront work previously done under the topic of DoD's adaptation of "commercial practices," specifically as it applies to this study of modifications and upgrades. The interview process focused primarily on collecting information from DoD personnel such as headquarters staff, PEOs, PMs and modification staff, limiting the time spent on researching the commercial industry. However, our Harvard experience provided ample opportunity to poll our classmates (who were by-and-large middle managers in large multi-national companies) concerning their companies' commercial practices. Thus, our research observations heavily leverage these experiences.

This chapter briefly describes the current business environment, provides a working definition for "commercial practices" and highlights some of the inherent "motivational" differences between a commercial enterprise and government "business." Next, it describes some commercial practices which seem to merit DoD attention and adaptation. It concludes by reiterating key points.

Environment

There is overwhelming evidence that DoD is inefficient and much too bureaucratic regarding its purchase of goods and services. This has led to an almost mantra like chant in the media of, "DoD needs to do business like world class companies." Well, that may be good advice but what are world class companies' practices? Interestingly, but not surprisingly, what was a successful business practice when the idea of DoD adopting commercial practices came into vogue in the early 1970's, may not remain viable today. The commercial world is experiencing the same pressures as DoD: they need to improve their practices and products or they disappear. Read any newspaper and one quickly sees that global competition and technology availability are forcing even successful companies to reengineer. Therefore, the practices the DoD chooses to emulate will be critical if the government is to suc-

ceed in its quest to reengineer the DoD acquisition system. Two points that world renowned Harvard business professor Michael Porter makes may offer DoD some clues; 1) a company's competitive advantage comes from its capacity to improve and innovate and 2) to sustain a competitive advantage requires that it (the company) be relentlessly upgraded.[1]

Definition

For the purposes of this chapter the term "commercial practice" means the full range of activities (entire process) by which commercial companies conduct their business. Thus, to adapt commercial practices for DoD use, the government needs to focus on the processes they use.

Commercial versus DoD Differences

If adapting or adopting commercial practices is such a good idea, why is it taking DoD so long to do it? The most obvious reason is that something or someone is holding DoD back. When a previous group of DSMC Research Fellows examined the issue of adopting commercial practices in 1989, they reported the following impediments to the government using commercial practices.[2] The report points out that key motivators for a company's management in the commercial marketplace are the shareholders, process efficiency and profit.[3] DoD's leadership has a much longer list. In DoD there are multiple constituencies, each with a different interest and focus on where the government should go. Also, unlike a commercial company which can mea-

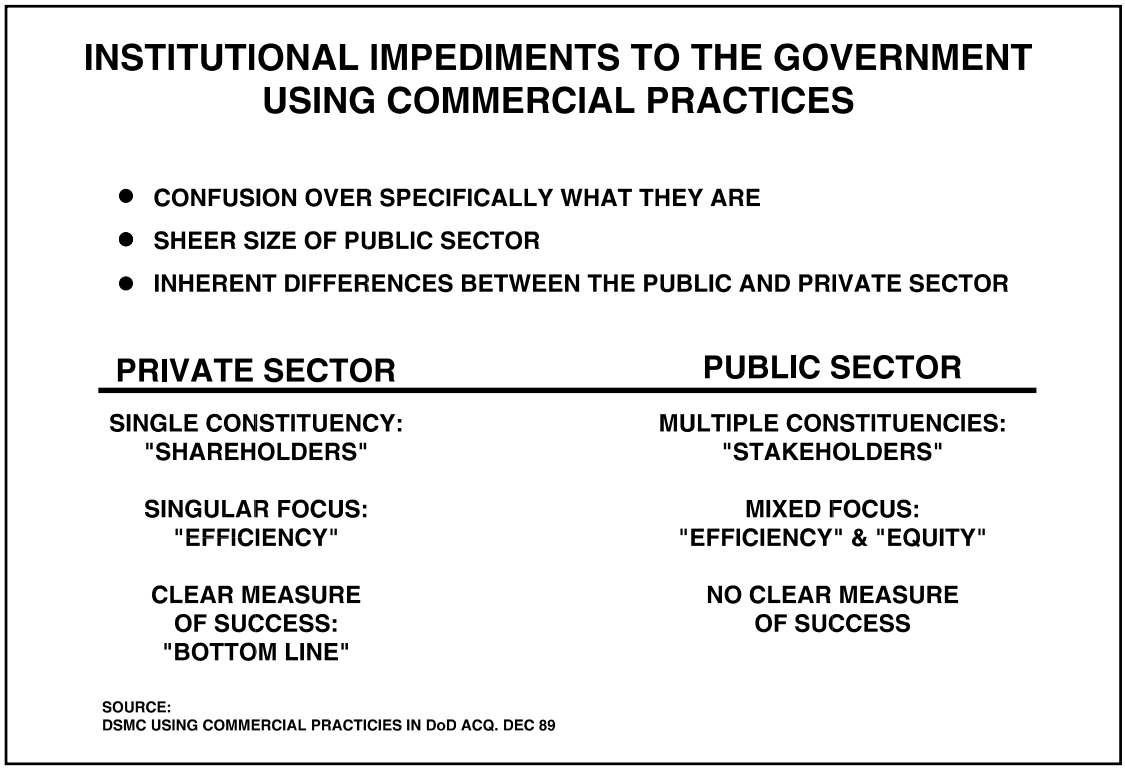

Figure 8-1. Institutional Impediments to the Government Using Commercial Practices

sure its success by profitability, DoD has no obvious (repeatable) yardstick to measure its performance. Finally, DoD, as a steward of public funds, has the additional burden of ensuring equity to the detriment of efficiency in its business dealings. The priority that equity has been given shows up as regulatory and statutory limitations to procurement actions.

Notwithstanding these impediments to DoD pursuing its business as does commercial industry, our leadership is trying to move smartly toward adopting commercial practices. One of the five planks in the draft DoD vision statement is the reengineering of the acquisition system to procure the best-value goods and services. Its three sub tenents are 1) eliminate DoD unique product or process specifications that inhibit the purchase of commercial items or services or dictate how to provide the goods and services, 2) use commercial practices to acquire military unique items as well as commercial items to the maximum extent possible, and 3) establish and maintain more effective working relationships with industry using integrated product and process teams.[4]

Commercial Practices Applicable to Modifications and Upgrades

One overarching business trend affecting commercial industry which appears relevant to DoD is product customization. If one reflects for a moment, one can think of numerous examples where the products sold today have been customized (modified) to meet the unique needs of a group of consumers. This customization does not spring from an altruistic motivation, rather it is being done to remain competitive. An example of this trend is found in the automotive industry. In the not too distant past, U.S. auto makers offered few models with a modest number of (expensive) options. In order for the consumers to get what they wanted, they had their cars "modified" by someone other than the original manufacturer. Today, these same U.S. auto companies offer many models which change frequently and offer a bevy of (less expensive) options. Why did this happen? First, it seems the model of "one size fits all" has lost its appeal to customers when the price differential between getting exactly what one wants and something less has shrunk. Second, once U.S. auto makers finally achieved a quality parity with foreign manufacturers, to make their products more attractive they needed to change styling and models more frequently, offer more individually tailored (customized) cars, and design better creature comforts that customers would perceive as high value. This trend should be important to DoD managers because to a large degree it defines how a successful company must organize, train and equip to remain viable. Also, as DoD attempts to purchase more equipment from non military industrial base companies DoD needs to understand their motivations. Briefly, some of the commercial practices that seem most important in enabling products to be tailored to the customers' needs:

- Quality product and services
- Customer(user)driven product development
- Short product development and production cycle
- Rapid decision making cycle

Quality Products and Services

In discussions with business managers, they listed quality as the dominant characteristic

required to make a sale in today's market. Most would rather be second to market with a new product or service if it meant quality was sacrificed for speed. This translates to, only adding new features or customizing (new technology) when the product or service quality can be retained/improved. As a major buyer with a much smaller purse, DoD should take heed. The DoD may be able to leverage its resources more effectively by co-opting contractors to deliver evolutionary product enhancements instead of revolutionary products that tend to have high costs and high risks.

Customer (User) Driven Product Development

Having the customers (users) drive product development goals is critical if one is going to meet their unique needs. Quoting from a special edition of Fortune magazine dedicated to the customer, "The customer isn't King anymore. The customer is dictator."[5] A good example of this analogy was the development of the Boeing 777 aircraft. Speaking with Boeing personnel, they stated that in the past Boeing used the philosophy that "we know airplanes so we will build them and the customer will buy them." The Boeing 777 was built with a new philosophy, *total customer involvement*. In these efforts customers of all types (pilots, airline management, flight attendants, mechanics, passengers, etc.) participated in all phases of the product design and development. This radical shift in focus serves both the developer and customer well. The developer cuts out costly redesign when the customer's needs are better met. Customer focus and involvement seems to be an area in which DoD leadership is on-track. In each of the services, there was evidence of strong examples of direct customer involvement. Also, the services' practice of putting the resources in the hands of the operating commands for distribution definitely facilitates better developer attention to the user. One of the best commercial practices, mentioned by several industry managers, is ensuring that anyone who has the ability to influence the product's success should be represented when the product is developed. The DoD is definitely moving in this direction by advocating greater use of IPTs, refer to Chapter Five for more details.

Short Product Development and Production Cycle

Shortening of the development and production cycle of a product pays important dividends—no pun intended. Reminiscent of the proverbial "chicken versus egg" dilemma, a short development process goes hand-in hand with customization. First, as the availability of new technology and global competition accelerate those companies that take a long time to develop and produce a product run the risk of product obsolescence upon delivery. Second, if one has the shortest development time, then costs are usually lower and more time is available to promote the products before market competition catches up. Most of the processes DoD uses to buy goods and services actually force the suppliers into long development and production cycles. In his book, *Skunk Works*, Ben Rich, a top designer and leader in the field of military aircraft, eloquently validates this fact when he states,

> *Military aircraft were so expensive and complex and represented such a sizable investment of taxpayers' money that no manufacturer expected to win a contract without first jumping through series of procurement hoops, culminating in the flight-testing phase, that under nor-*

mal circumstances stretched nearly ten or more years. From start to finish, a new airplane could take as long as twelve years before taking its place in the inventory and becoming operational on a flight line after it was already obsolete.[6]

In effect DoD's policies and procedures cause them to be less efficient and probably make them less competitive for the future. Thus, given the way DoD currently operates, can suppliers afford to do business with the DoD? The footnote here should read; trim, reengineer or eliminate any process or policy not legally required, that slows product development. The phrase "time is money" is just part of the problem with slow development. Today, slow product development means the user will most likely end up with less than world-class warfighting equipment.

Rapid Decision Making Cycle

Rapid decision making goes hand-in hand with having a short product development cycle. To almost every person, our Harvard classmates mentioned their company's efforts to streamline company decision making as a preferred way to improve efficiency and cut product or service development time. The primary tactic to speed decision making is to decentralize the authority for making a decision down to the person responsible for developing the product or service. This makes sense since the project manager is the person with the most direct access to meaningful information. This strategy also complements the goal of customer responsiveness. The strategy allows (forces) the project manager, in most cases, to make timely changes without heavy corporate involvement, as long as there is no requirement for additional resources. It cuts the layers of management and functional staff involved in decision meddling. Another by-product of this approach is lower overhead burdens to the product or service. Also, this leaner approach to decision making usually results in more direct and effective communication.[7] All these benefits free up time for generating "good ideas" about how to best tailor a product or service to unique customer needs. These thoughts are succinctly stated by noted business professors C.K. Prahalad and Gary Hammel in their article on *The Core Competence of the Corporation*, "In the long run, competitiveness derives from the ability to build, at lower cost and more speedily than competitors, the core competencies that spawn unanticipated products."[8]

Speeding up the decision making cycle is an area ripe for DoD harvest in acquisition reform. One way of slowing the PM's decision making is through DoD's Byzantine oversight process. On paper there is not supposed to be more than two levels of review between a PM and their designated MDA.[9] While this is technically true, in fact there are several other actors whose oversight review has the effect of adding burdensome management or review layers. Congress, Office of Management & Budget (OMB) staff, auditors to name a few, insert themselves into the decision making process. Therefore, for the purposes of trying to emulate the "world class" commercial practice of rapid decision making, it is incumbent on DoD to continue to scrutinize its own oversight and review processes for further streamlining.

Summary

The DoD will continue to be well served by looking to successful commercial industries for "commercial practices" that it can adapt. Much of the specific practices industry uses clearly is not appropriate for adoption be-

cause the DoD serves different constituencies and therefore operates under different legal rules. The practices listed here, however, are practical for adaptation to DoD's business realm. The need for commercial industries to be able to customize products in order to remain competitive drove wholesale changes in their practices: quality products and services, customer driven product development; short product development or production cycles; and rapid decision making. These practices are very reasonable for DoD to adopt.

ENDNOTES

1. Porter, M. E. (1986). *Competition in Global Industries* Boston, MA: Harvard Business School Press.

2. Perkins, C.A., LTC, Spencer, A.C, LTC, & Sweeny, B. D, LTC. (1989). *Report of the Defense Systems Management College 1988-89 Military Research Fellows, Using Commercial Practices in DoD Acquisition: A Page from Industry's Playbook*, Fort Belvoir, VA: Defense Systems Management College. (NTIS No. ADA 265-694).

3. Ibid.

4. Preston, C., DUSD(AR). (1995, April 6). Statement to the Acquisition and Technology Subcommittee, Senate Armed Services Committee.

5. McManus, J. (1993, Autumn/Winter). Meet the New Consumer, *Fortune Magazine Special Issue* 128 (13), 6-7.

6. Rich, B. R. & Janus, L. (1994). *Skunk Works: A Personal Memoir of My Years at Lockheed*. New York: Little, Brown and Company (Canada) Limited.

7. Prahalad, C. K. & Hamel, G. (1990, May-Jun). *The Core Competence of the Corporation*. Harvard Business Review, pp 79- 91.

8. Ibid.

9. Department of Defense. DoDD 5000.1, Part 1, page 1-7

9

CONCLUSIONS

In the world of acquisition reform, it is evident that changes can move at a rapid pace. When we chose our topic, Modifications and Upgrades, in August 1994, very little had been written about it in recent years. On 28 April 1995, Dr. Kaminski, USD(A&T), signed a memorandum changing the acquisition review and oversight process which precipitated changes in the Modification and Upgrade Policy. The summary and conclusions presented here are based on the information gathered and written prior to his memorandum. Although some of our conclusions foreshadow changes in the memorandum, the text was not rewritten to reflect any of the ordered changes.

Introduction

The preceding chapters provided a concise, top level review of DoD regulations, policies and guidance pertaining to the modification and upgrade of weapon systems. Since modification and upgrades are normally handled at the Service level, we reviewed each of the Service's policies and procedures. This report looks at the modification and upgrade procedures for industry, other countries and one other U.S. governmental agency. Written documents, interviews and personal experiences are the basis of this report.

Here, the authors wish to express a few opinions based on our overall experience in preparing this report. Many of our beliefs were developed during numerous interviews and by taking bits and pieces of information identified during our research.

Upgrade Requirement to Return to Milestone 0

Currently, the process forces the return of all upgrades to Milestone 0 for approval. Not every upgrade needs to go the Milestone 0. In fact, upgrades really should go to the most appropriate milestone as determined by the milestone decision authority. Most of the upgrades that change the military characteristics of a system are evolutionary and not revolutionary. Milestone 0 objectives are "to identify the minimum set of alternative concepts to be studied to satisfy the need"[1] and "to determine if a documented mission need warrants the initiation of study efforts of alternative concepts."[2]

Most upgrades focus on changes to the operational requirement of weapon systems and not changes to the mission needs. If there is a technology that is being introduced that is revolutionary, then perhaps milestone 0 would be appropriate. When a new capability is introduced, it probably has already gone through an Advance Technology Demonstrator process and there is some level of maturity in the technology. No one wants to introduce a major upgrade (this is really a new program) unless it's going to be successful. Because of this and in the spirit of trying to remove those areas that do not add value to the decision process, the MDA should determine the starting point within the LCSMM for all upgrades.

Failure to Distinguish Between Major and Minor Upgrades

Throughout the process of gathering information, opinions and recommendations on the subject of modifications and upgrades, one thing seems to be clear—the process, used to implement modifications, is fairly straight forward. Many modifications are implemented through ECPs and are handled within the program office. One of the advantages here is that the DoDI 5000.2 actually discriminates between major and minor modifications. However, the problem seems to be that it fails to distinguish between major and minor upgrades. This and the requirement to return to milestone 0 takes the decision authority for the execution of minor changes to fielded weapon systems away from the project manager. This added oversight increases cost and schedule for even the most minor changes to a weapon system. The use of the same criteria to determine major and minor upgrades as modifications would return the decision authority to appropriate level.

Lack of Program Tailoring

One of the points made by the OSD staff on the requirements in the DoDI 5000 series is that the instruction was written so that the PMs could tailor it to fit their programs. However, there is tendency in the acquisition system, that seems to lack trust, to do everything possible to make sure one has covered all the bases. Another problem with tailoring, or the lack of it, is that the auditors may expect a PM to comply with "the letter of the law" rather than the spirit. This creates a situation where PMs are reticent to tailor their programs to a lesser requirement than outlined in the 5000 series. The two groups that directly affect program implementation, auditors and comptrollers, have no requirements to be acquisition literate. Requirements of both auditors and comptrollers should include the same education and training as those individuals in the acquisition community and some program office experience.

Indirect Oversight

If one wants to streamline the process, one needs to look at the number of people that have the ability to delay, stall or ask questions. It is not a question of whether these inquiries are good or bad, but whether there is value added to the decision making process. If changes to a system are for logistics reasons, it is a form, fit and function change, and it can be done within the current funding envelope, whether it is a modification or an upgrade, the PM should just do it. When one brings something like this to a higher level of scrutiny, one drives up the cost. The programs that are in the best position to do this are those that have life cycle responsibility for their systems (e.g., DIRSSP). One of the reasons for this is that the PM knows where the dollars are; good

decisions on a LCC trade can be made. So many other systems have costs hidden in other funding lines. It is essential that approval be kept at the lowest possible level, as long as the PM is living within the historical support cost of the system.

Execution of Horizontal Technology Integration (HTI) Programs

The rapid exploitation, of leading edge technologies, is a major objective of all the Services. The Army's choice of HTI as its method to leverage technologies across multiple systems breaks away from the traditional "stovepipe" approach of the acquisition process. HTI does offer an opportunity for increased inter-operability across the force structure. HTI expects to lower overall development costs by distributing them over multiple platforms. The commonality of HTI components should reduce procurement unit cost by affording economies of scale on the common components. However, if HTI becomes the predominant method of modernization for all the services, they must resist the urge to reduce the platform (Host System) PM's responsibility and control. As the current three HTI systems (Combat Identification, 2nd Generation Forward Looking Infrared and Digitized Battlefield) gain in priority, it is conceivable that the funding and total control of the integration of HTI system (Mounted System) will fall to a mounted system PM. The platform PM must always maintain configuration and funding control of their system.

Lack of an Adequate Integrated Information Technology Infrastructure

The workforce involved with modifications and upgrades do not have an adequate information infrastructure. This issue transcends any single service. Many of the tools they use today are stovepipe systems unconnected to their customers or headquarters. Currently, the services face an increasing workload, declining budget, and fewer personnel. Also, because the Services are using integrated product teams, which in many instances are geographically separated, communication is inherently more challenging. At the same time, a stated goal of DoD is to meet user requirements more rapidly, i.e., shorten the acquisition cycle. This leaves the services with the dilemma of producing faster results with fewer resources. One way of meeting this challenge is by giving the workforce the appropriate information technology tools to do their jobs smarter. Greater emphasis must be placed on establishing seamless information connectivity. Within this context, the improvements to the information systems must go hand-in-hand with reengi-neering the interfaces between the requirements, PPBS and acquisition system processes. An example from industry that illustrates this point, is the case of Ford Motor Company. Paraphrasing a Harvard Business Review article, Ford was quite pleased to have reduced the staff and expense of its accounts payable system through the use of new information technology automation. They reduced staff by twenty percent cutting down to 400 personnel and simultaneously achieved productivity gains. Then someone pointed out that a competitor Mazda had only five people running their entire accounts payable system. Mazda had reengineered their processes then automated. Ford had automated but not reen-gineered.[3] The lesson is clear: rethink all processes being used and vigorously reengineer them before imposing new information technology on top of them.

Summary

Throughout this process of gathering information, we have discovered that there are very good people working within the acquisition community, and their main goal is to do a good job. The challenge for our leadership is to let them continue to do a good job without excessive oversight. Oversight is useful and good, if not overused. Where the DoD has the opportunity and authority to eliminate confining regulations, it should be done without hesitation. The acquisition process, in its entirety is a good one, but like any process, it needs continuous improvement.

One other final comment (perhaps out of context) is that it became obvious to us that each service is unique in their requirements for fielded systems. "One size fits all" is not an optimal solution to acquisition reform.

The DoD has a responsibility to continue to make improvements to the acquisition process. This is a never ending responsibility and one that will benefit the war fighter as well as the country.

ENDNOTES

1. Department of Defense. (1993, February 26). DoDI 5000.2 Part 3, page 3-8.
2. Ibid.
3. Hammer, M. (1990, July-August). Reengineering Work: Don't Automate Obliterate. *Harvard Business Review*, 104-112

APPENDIX A

DoDI 5000.2, PART 3 SECTION 3.I
WITH CHANGE 1

DoDI 5000.2, PART 3 SECTION 3.I WITH CHANGE 1

i. Milestone IV. Major Modification Approval (As Required). The intent of this milestone is to ensure that all reasonable alternatives are thoroughly examined prior to committing to a major modification or upgrade program for a system that is still being produced.

(1) A "modification" is a change to a system (whether for safety, to correct a deficiency, or to improve program performance) that is still being produced. An "upgrade" is a change to a system (whether for safety, to correct a deficiency, or to improve program performance) to a system that is out of production. A "major modification" to a program is defined as a modification that in and of itself meets the criteria of acquisition category I or II or is designated as such by the milestone decision authority. Major modifications require a Milestone IV decision unless the decision to modify results from one of the alternatives considered as part of the Milestone I decision process. Upgrades are part of the Milestone 0 decision process.

(2) The need for a major modification program may be brought about by one or more of the following factors:

(a) A change in threat or Defense Planning Guidance,

(b) A deficiency identified during follow-on operational testing or operational training and support, or

(c) An opportunity to reduce the cost of ownership.

(3) Prior to committing to a major modification program the milestone decision authority must carefully consider the availability of other alternatives to address the deficiency. This includes the option of entering Phase 0, Concept Exploration and Definition, to evaluate fully these alternatives.

(4) If a major modification program is approved, the milestone decision authority will determine which acquisition phase should be entered. This decision will be based on the level of risk, the adequacy of risk management planning, and the amount of resources to be committed.

(5) The basic objectives, decision criteria, and contents of an acquisition decision memorandum for Milestone IV are highlighted on page 3-29.

MILESTONE IV - MAJOR MODIFICATION APPROVAL

OBJECTIVES

The objectives of Milestone IV are to:

• Determine if major modifications to a system currently in production are warranted and, for a system where such action is warranted,

• Establish an approved acquisition strategy and baseline (Concept, Development, or Production) for the program (see Sections 5-A and 11-A).

NOTE: This Milestone is scheduled as required during Phase III, Production and Deployment.

• When a system is no longer in production, a deficiency resulting from a change in threat, defense policy, or technology must be defined in a new Mission Need Statement.

• The intent is that potential system upgrades should compete with all other possible alternatives during a new Phase 0, Concept Exploration and Definition.

DECISION CRITERIA

A new major modification program may not be established unless the milestone decision authority confirms that:

• The system threat assessment and the performance objectives and thresholds have been validated (see Sections 4-A and 11-B),

• Field experience and results support the need for such a program,

• Reasonable assurance exists that the technologies and processes critical to success have been identified and are attainable in the context of the acquisition strategy and phase being proposed,

• The potential environmental consequences of the program have been analyzed and appropriate mitigation measures have been identified (42 U.S.C. 4321-4347 and 40 C.F.R. 1500-1508 (references (d) and (l)))

• Projected life-cycle costs and annual funding requirements are affordable in the context of long-range investment plans or similar plans (see Section 4-D and 10-A), and

• Adequate resources (people and funds) to support the program have been, or are committed to be, programmed.

ACQUISITION DECISION MEMORANDUM

The Acquisition Decision Memorandum for this decision point should:

• Define the phase of the process the program is approved to enter,

• Approve the proposed or modified acquisition strategy and baseline (Concept, Development, or Production) (see Section 11-A), and

• Establish program-specific exit criteria that must be accomplished.

j. Phase IV, Operations and Support. This phase overlaps with Phase III, Production and Deployment. It begins after initial systems have been fielded.

(1) The beginning of this phase is marked by either the declaration of an operational capability or the transition of management responsibility from the developer to the maintainer. It continues until the system leaves the inventory.

(2) Quality and safety problems will be corrected as identified during this phase.

(3) Fielded systems will be monitored to assess the effects of aging on system capabilities. When appropriate, modifications will be undertaken to extend service life. Care must be taken, however, to minimize proliferation of system configurations.

(4) Post-fielding supportability/readiness reviews will be conducted, as appropriate, to identify and resolve operational and supportability problems.

(5) The basic objectives and minimum required accomplishments of Phase IV are highlighted below.

PHASE IV- OPERATIONS AND SUPPORT

OBJECTIVES

The objectives of Phase IV are to:

• Ensure the fielded system continues to provide the capabilities required to meet the identified mission need and

• Identity shortcomings or deficiencies that must be corrected to improve performance.

MINIMUM REQUIRED ACCOMPLISHMENTS

The following are minimum required accomplishments for this phase:

• Updated configuration baseline(s) (see Section 9-A),

• Attainment and maintenance of required performance characteristics and capabilities, and

• Conduct of service life extension programs, as appropriate.

4. REVIEW, DOCUMENTATION, AND REPORTING REQUIREMENTS

a. Milestone review procedures associated with the acquisition process are described in Section 11-C.

b. The milestone documentation requirements associated with the acquisition process are discussed in Section 11-C.

c. Periodic reporting requirements are discussed in Section 11-D.

5. RESPONSIBILITIES AND POINTS OF CONTACT

The matrix below identifies the offices to be contacted for additional information on this Part. The full titles of these offices may be found in Part 14 of this Instruction.

Points of Contact		
DoD Component	General	Specific
OSD	Dir, AP&PI	DepDir, ASM
Dept of Army	ASA(RDA)	SARD-RP
Dept of Navy	ASN(RDA)	Dep, APIA
Dept of Air Force	ASAF(A)	SAF/AQX
CJCS (Joint Staff)	DJ8	J8/SPED

APPENDIX B

MEMORANDUM, SUBJECT:
REENGINEERING THE ACQUISITION OVERSIGHT
AND REVIEW PROCESS

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-3010

ACQUISITION AND TECHNOLOGY APR 28 1995

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN, JOINT CHIEFS OF STAFF
UNDER SECRETARY OF DEFENSE (COMPTROLLER)
UNDER SECRETARY OF DEFENSE (PERSONNEL & READINESS)
ASSISTANT SECRETARY OF DEFENSE (COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE)
GENERAL COUNSEL
INSPECTOR GENERAL
DIRECTOR OF OPERATIONAL TEST AND EVALUATION
DIRECTORS OF THE DEFENSE AGENCIES

SUBJECT: Reengineering the Acquisition Oversight and Review Process

In Acquisition Reform: A Mandate for Change, the Secretary of Defense concluded, "[DoD] must reduce the cost of the acquisition process by the elimination of activities that, although being performed by many dedicated and hard working personnel, are not necessary or cost effective in today's environment." We must move away from a pattern of hierarchical decision making to a process where decisions are made across organizational structures by integrated product teams. We must shift from an environment of regulation and enforcement to one of incentivized performance.

As one means of accomplishing this goal, the Secretary chartered a Process Action Team to "...develop...a comprehensive plan to reengineer the oversight and review process for systems acquisition, in both the Components and OSD, to make it more effective and efficient, while maintaining an appropriate level of oversight." In its final report, "Reengineering the Acquisition Oversight and Review Process," the Process Action Team provided a roadmap for actions that would bring about the change needed in our oversight and review process while maintaining the DoD acquisition system's guiding principles of providing the warfighter what is needed, when it is needed; matching managerial authority with responsibility; promoting flexibility and encouraging innovation based on mutual trust, risk management, and program performance; fostering constant teamwork; actively promoting program stability; balancing the value of oversight and review with its costs; and preserving the public trust.

The Process Action Team accomplished the challenging and complex task of establishing a specific plan to reengineer the systems acquisition oversight and review process. The team presented the senior leadership of the Department a far-reaching and thought-provoking plan. The recommendations were thoroughly reviewed throughout the Department. I am pleased to accept the Team's report, subject to the clarifications in this memorandum. I commend the members of the Process Action Team, those senior leaders who addressed the Team, and those who assisted in the review process, for their effort.

ACQUISITION PROCESS AND DOCUMENTATION

Although the following direction most directly applies to acquisition category (ACAT) I programs, the concepts are equally applicable to programs in all acquisition categories. These concepts shall be included in the next update to DoDI 5000.2.

Integrated Product Teams (IPTs): I direct an immediate and fundamental change in the role of the OSD and Component staff organizations currently performing oversight and review of acquisition programs. In the future, these staff organizations shall participate as members of an integrated product team or teams, which are committed to program success. Rather than checking the work of the program office beginning six months prior to a milestone decision point, as is often the case today, the OSD and Component staffs shall participate early and on an on-going basis with the program office teams, resolving issues as they arise, rather than during the final decision review. Further, Program Managers (PMs) shall utilize the experience of the OSD and Component staff organizations to develop programs with the highest opportunity for success. Note that the IPTs discussed above are in addition to Program Manager/contractor IPTs established to execute programs.

For ACAT ID programs the number and level of IPTs shall be determined individually for each program by an Overarching IPT, led by the appropriate former DAB Committee Chair. Application of this direction to ACAT ID programs is at Tab A. The Director, Acquisition Program Integration is responsible for providing further implementation of this direction, as required, within 30 days.

Milestones and Decision Authorities: The number of milestone reviews and the milestone decision authority shall be determined by the USD(A&T) for each individual program at program initiation, based upon program risk, and after consideration of the PM's recommendations. These determinations shall be examined at each milestone, in light of then-current conditions. The acquisition process model shall retain the current milestones with the following exceptions. There shall be no Milestone IV, Major Modification Approval. Modifications and upgrades shall be initiated at the milestone appropriate to the work to be completed. Also, there shall normally be no more than one production milestone review (i.e., for low-rate initial production or full-rate production) at the DAB level. Application of this direction to ACAT ID programs is at Tab A. Milestone decision authority shall remain within the acquisition community for all milestones. The Director, Acquisition Program Integration is responsible for providing further implementation of this direction, as required, within 30 days.

Documentation: The documents applicable to a particular program at a specific milestone shall be determined individually for each program through the IPT process and approved by the Milestone Decision Authority (MDA). Required documents shall be determined using the concept of "tailoring in" documents (i.e., there is no set minimum number of documents beyond those statutorily required). Documents that are determined to be applicable shall be incorporated into a single document, similar to the Single Acquisition Management Plan (SAMP) used for the Space-Based Infrared System program, to the maximum extent practicable. Formats for documents

shall be models, except for those formats established in statute and the Acquisition Program Baseline format. The list of documents that may be applied is at Tab B. Exit criteria shall be retained in their present form and usage. Application of this direction to ACAT ID programs is at Tab A. The Director, Acquisition Program Integration is responsible for providing further implementation of this direction, as required, within 30 days.

With the exception of program plans requiring approval at the OSD level by statute, program plans are PM and IPT working tools and shall not be required as reports to the OSD or Component Headquarters staff organizations.

The Component Acquisition Executives (CAEs) shall review the documentation required for existing acquisition programs by their Component (including headquarters and subordinate organizations) and shall eliminate all such documents, unless the document adds value by supporting a Service-unique need and the information to support that need cannot be obtained by tailoring existing documents. The CAEs shall report the results of their review to me within 90 days.

The Director, Acquisition Program Integration shall direct a comprehensive programmatic and legal review of all statutory documentation, reports, and certifications and shall recommend appropriate changes, including elimination, for submission to Congress. The goal of the review shall be to further reduce required documentation to only those documents necessary to manage and oversee programs. The Director, Acquisition Program Integration shall report the results of his review to me within 90 days.

The Principal Deputy Under Secretary of Defense (Acquisition & Technology) shall charter a group as part of the Automated Acquisition Information effort to develop near real time flow of appropriate information to officials requiring program data, including the Program Executive Officer (PEO), CAE, and Defense Acquisition Executive (DAE). The goal of this group shall be to reengineer the entire acquisition management information and reporting system so that the PM is not creating data for reporting purposes only, but rather that the PM is reporting management data that already exists. Reports should be automatically generated from the data collected by the PM.

Contracts: Program Offices shall rely on the Defense Contract Management Command (DCMC) for routine information. Plant representatives shall independently assess contractor performance, but these independent assessments shall be provided to the PM for comment in addition to the Commander, DCMC. While the PM may comment on the independent assessment, the PM cannot block the submission of the independent assessments to the Commander, DCMC.

Effective for requests for proposals released on or after July 1, 1995, past performance shall be considered a factor in all source selections. The particular weight given to past performance shall be determined in each case by the source selection authority. The Past Performance Council shall be responsible for recommending policies to ensure the appropriate weighting of past performance as a selection criterion prior to July 1, 1995.

Once a contractor has demonstrated a system of stable, compliant processes leading to performance as contracted, the Government shall rely almost exclusively on contractor self-governance, rather than Government inspectors, auditors, and compliance monitors, to ensure that these processes continue to result in a system producing goods and services which meet contract terms and conditions.

Automated Information Systems: The Automated Information System (AIS) process should be integrated into the systems acquisition process, to the maximum extent practicable, while maintaining Assistant Secretary of Defense (C3I) as a milestone decision authority for AISs. The

Director, Acquisition Program Integration shall work with the Deputy Assistant Secretary of Defense (C3I Acquisition) to determine how to accomplish this integration and shall report to both the Assistant Secretary of Defense (C3I) and me about this matter within 90 days.

ACQUISITION WORKFORCE AND ORGANIZATION

Program Managers: The Acquisition Management Functional Board (AMFB) shall examine increasing the experience requirements for ACAT I PMs and Deputy PMs (DPMs) to at least eight years of acquisition experience with at least four years in a program office, including experience as a PM or DPM (or equivalent) of a non-major program and shall report their findings to me by June 30, 1995. If the AMFB determines that it is impractical to increase experience requirements, it shall explain why it is impractical, given typical preferred career progressions, and provide an alternative or explain why existing requirements are satisfactory.

OSD and Component Staff: The Director, Acquisition Education, Training, and Career Development shall structure and conduct a demonstration or "proof of concept" program for flexible rotational assignments between PM/PEO organizations and OSD/Component staff organizations. The demonstration shall begin no later than October 1, 1995. The Director shall subsequently make a recommendation, by December 1, 1996, on how to implement a rotational program beyond the demonstration, including the percentage of rotational assignments. Implementation of the rotational program shall begin not later than January 1, 1997.

Acquisition Executives: Each Acquisition Executive shall determine if, in order to preserve continuity, a career civilian principal deputy position should be established to be filled by a senior executive with extensive acquisition experience, including service as a PEO or ACAT I PM, in lieu of a political appointee or a military officer. The Acquisition Executives shall report their decision to the USD(A&T) within 90 days. The Deputy Assistant Secretary of Defense (C3I Acquisition), the Director of Strategic and Tactical Systems, and an equivalent position in the Office of the Deputy Under Secretary of Defense (Space) shall provide this continuity for the Under Secretary of Defense (Acquisition & Technology).

The President, Defense Acquisition University (DAU) shall develop within 90 days and offer an orientation course for newly appointed senior acquisition executives. Newly appointed acquisition executives are encouraged to attend such a course.

Joint Program Management: The management and oversight of joint programs shall remain as practiced today. However, the Director, Acquisition Program Integration shall establish a team to consider the problems of joint program management and develop solutions. The team shall be established not later than August 1, 1 995, and shall provide its recommendations to me within 120 days of being established.

PM-PEO-CAE Management: The Director, Acquisition Program Integration, together with the CAEs, shall establish a team to assess the advantages and disadvantages of aligning all acquisition programs, regardless of ACAT, into the PM-PEO-CAE management chain, wherein the PEO is a full-time acquisition manager who reports directly to and receives guidance directly from the CAE. The team shall be established no later than July 1, 1995, and shall provide recommendations to me within 90 days of being established.

Requirements Summits: The Secretaries of the Military Departments and Directors of the Defense Agencies may, if they desire, institutionalize a formal developmental requirements "Summit" process for appropriate programs. The purpose of the summit is to allow consideration of opportunities for cost, schedule, and performance trade-offs. If the senior leadership agrees with proposed trades, the established requirements for the program would be formally adjusted.

Audits: DoD Inspector General (IG) and Component audits and inspections shall be scheduled well in advance, to the maximum extent practicable, and in coordination with the Under Secretary of Defense (Acquisition & Technology) and the CAEs. Cyclic audits and inspections of any one program shall generally be done no more than biennially, except when necessary to evaluate allegations of fraud, waste, and abuse, in order to minimize turbulence in acquisition programs. The DoD IG, in coordination with Component inspection and audit organizations, shall study the feasibility of consolidating all acquisition management audits and inspections at the OSD level. The DoD IG shall provide the results of that study to me within 180 days.

The DoD IG and heads of Component inspection and audit organizations should enhance the qualifications of their acquisition management auditors and inspectors by requiring that the auditors and inspectors have DAWIA certification appropriate to grade and functional area, with inspection and audit team leaders having level III certification within two years. The President, Defense Acquisition University shall provide appropriate course quotas for auditors and inspectors. Failure to have appropriate DAWIA certification shall not be used as a basis to restrict or deny DoDIG access to records.

IMPLEMENTATION

Stretch Goals: Measuring the attainment of changes in the oversight and review process is critical to achieving actual reengineering. The key to metrics is to establish the appropriate criteria to be measured and to establish the appropriate direction that change should take. So-called "stretch goals" provide both the criteria and the direction while challenging the acquisition community to make meaningful changes. I direct the Deputy Under Secretary of Defense (Acquisition Reform), along with the Deputy Under Secretary of Defense (Space), the Director, Acquisition Program Integration, the Director, Strategic and Tactical Systems, and the Deputy Assistant Secretary of Defense (C3I Acquisition) to meet within 90 days to define and establish appropriate stretch goals. The stretch goals established by the Process Action Team should be taken into account. Once this group has determined appropriate stretch goals, the goals shall be briefed to me, my Principal Deputy, and the CAEs, in order to obtain corporate commitment. Once stretch goals have been established, the Acquisition Reform metrics team shall implement a process for measuring progress toward the goals.

Education and Training: I direct the President, Defense Acquisition University to develop and implement an education program, including updates to current DAU courses, that will train current and future PEOs, PMs, DAU faculty, and OSD and Component acquisition staff to apply the changes in the acquisition process directed above. Appropriate course quotas shall be provided to OSD and each Component to accomplish this education program.

Implementation Team: I direct the Deputy Under Secretary of Defense (Acquisition Reform) to immediately establish an implementation team led by a member of that office and composed of one representative each from the Military Departments, DLA, USSOCOM, and the offices of the Deputy Under Secretary of Defense (Space), the Director, Acquisition Program Integration, the Director, Strategic and Tactical Systems, and the Deputy Assistant Secretary of Defense (C3I Acquisition). The purpose of this implementation team is to facilitate the implementation of the recommendations and ensure that progress is being made. The team leader shall report regularly to the Deputy Under Secretary (Acquisition Reform) who shall report to me biweekly on implementation progress.

Customer Surveys: The Director, Acquisition Program Integration shall commission periodic customer satisfaction surveys involving users, PMs, PEOs, and OSD and Component staffs to assess the reengineered process and to find improvement opportunities that emerge as the oversight and review process evolves over time.

Reengineering our oversight and review process and practices is one of the most difficult issues we will face in acquisition reform. It means we will have to create a climate of reasoned, well-informed risk-management by our PMs and PEOs. Your leadership and good judgment will be critical to successful implementation of this reform. I encourage you and your leadership teams to be active participants in establishing the environment essential for implementing this change.

Paul G. Kaminski

Attachments
as stated

cc:
CINC, USSOCOM
ASD(Economic Security)
DUSD(Space)
D, API
D, DP
D, S&TS
D, TSE&E
DASD(C3I Acquisition)

TAB A

OVERSIGHT AND REVIEW OF ACAT ID PROGRAMS

OVERSIGHT AND REVIEW OF ACQUISITION CATEGORY (ACAT) ID PROGRAMS

In the future, OSD and Component staff organizations currently performing oversight and review of ACAT ID programs shall participate as members of integrated product teams (IPTs) to build successful, balanced programs; facilitate the identification and resolution of issues early in the process; and more efficiently prepare for review of programs. These teams shall operate under the following principles:

• Open discussions with no secrets,
• Qualified, empowered team members,
• Consistent, success-oriented, proactive participation,
• Continuous, ìUp-the-line" communications,
• Reasoned disagreement, and
• Issues raised and resolved early.

NEW PROGRAMS

A broad, inclusive team, the Overarching IPT, shall be formed. The Overarching IPT shall be led by the appropriate former Defense Acquisition Board (DAB) Committee Chair, and shall be composed of all the Program Manager (PM), the Program Executive Officer (PEO), and Component and OSD staff principals, or their representatives, involved in oversight and review of a particular ACAT ID program. The Overarching IPT shall structure and tailor functionally oriented IPTs to support the PM, as needed, and in the development of strategies for acquisition/contracts, cost estimates, evaluation of alternatives, logistics management, etc. The Overarching IPT shall meet immediately upon learning that a program is intended to be initiated to determine the extent of IPT support needed for the potential program, who should participate on the IPTs, the appropriate milestone for program initiation, and the documentation needed for the program initiation review. The functional IPTs shall meet as required after this determination to help the PM to plan program structure and documentation and to resolve issues. Those issues which cannot be resolved at the lowest level shall immediately be raised to a level where resolution can be achieved.

After submission of final documentation for a review, the Overarching IPT, together with the Component Acquisition Executive (CAE), shall hold a formal meeting, chaired by the Overarching IPT Leader, to determine if any issues remain that have not been resolved earlier in the process, to assess the PM's recommendations for future milestone reviews and documentation, and to determine if the program is ready to go forward for a decision. The expectation is that the IPT Leader and CAE will agree on whether to go forward; however, in the case of a disagreement, both positions will go to the USD(A&T) to decide whether to hold the DAB. The final IPT meeting will be followed by a DAB Readiness Meeting (DRM) to prebrief the USD(A&T) prior to a DAB. In some cases, the DRM will suffice, and an Acquisition Decision Memorandum will be coordinated without holding a DAB meeting.

Through the use of IPTs, the Overarching IPT Leader will be able to provide an independent assessment to the USD(A&T) at major program reviews and/or major decision points. There should be no surprises because all team members should have been addressing the issues throughout the program phase, and should be knowledgeable of the information needed for a program decision.

EXISTING PROGRAMS

In order to move from the current process to the future process, I direct that all ACAT ID programs be "rebaselined" by the Overarching IPT Leader and the CAE. This rebaselining shall recommend the IPT approach to be taken. the next and future review points and the appropriate

level of decision authority for those reviews, and the documents needed for the next review. Within 30 days, each CAE with ACAT ID programs shall determine the order among those programs for rebaselining. The Overarching IPT Leader, working through the overarching IPT, shall begin the rebaselining in the order provided by the CAEs. Rebaselining shall be completed within 180 days.

DAB Committees are replaced by Overarching IPTs as described above as of the date of this memorandum. All new and rebaselined programs shall operate in accordance with the procedures for new programs discussed above. Programs for which rebaselining does not make sense shall use the IPT process to the maximum extent practicable.

TAB B

DOCUMENTATION FOR REVIEW OF ACAT I PROGRAMS

DOCUMENTATION FOR REVIEW OF ACQUISITION CATEGORY (ACAT) I PROGRAMS

The documents applicable to an individual ACAT I program at each particular review point shall be determined by the Milestone Decision Authority through the IPT process. Documentation shall be limited to the minimum necessary for the decision. Documents shall be "tailored-in," i.e., there is no set minimum number of documents (beyond those statutorily required). Except for those formats required by statute and the format for the Acquisition Program Baseline, formats in DoD 5000.2-M are models only. To the maximum extent practicable, information should be provided in a single document.

TO BE PROVIDED BY THE PM/COMPONENT

STATUTORY:

Acquisition Program Baseline (APB)	10 U.S.C.2435
Test and Evaluation Master Plan (TEMP)	10 U.S.C.2399
Live Fire Test and Evaluation Waiver Certification	10 U.S.C.2366
Operational Test and Evaluation Report	10 U.S.C.139
Low-Rate Initial Production Report for Ships and Satellites	10 U.S.C.2400
Environmental Analysis	42 U.S.C.4321-4347

REGULATORY:
Mission Needs Statement (MNS)
Operational Requirements Document (ORD)
System Threat Analysis Report (STAR)
Cost and Operational Effectiveness Analysis (COEA)
Integrated Program Summary (to include system security and manpower estimate)[1]
Program Structure Chart
Acquisition Strategy Report (ASR)[2]
Program Office Estimate (POE)
Cost Analysis Requirements Document (CARD)[3]
Component Cost Analysis (CCA)[4]
Test Results (early operational assessment, development test and evaluation, etc.)
Exit Criteria

TO BE PROVIDED BY OSD STAFF

STATUTORY:

Cooperative Opportunities Document (COD)	10 U.S.C. 2350a
Independent Cost Estimate (ICE)	10 U.S.C. 2434
Live Fire Test and Evaluation Report	10 U.S.C. 2366
Beyond Low-Rate Initial Production Report	10 U.S.C. 2399

REGULATORY:
Staff Assessments[5]
Overarching IPT Leader's Report
Acquisition Decision Memorandum

1 The manpower estimate is a statutory requirement in 10 U.S.C. 2434.
2 Consideration of the national technology and industrial base in development of acquisition plans is a statutory requirement in 10 U.S.C. 2440.

3 The CARD is required whenever an ICE is done. However, the CARD shall be flexible, tailored, and make reference to information available in other documents available to the cost estimators rather than repeating information.
4 Component Acquisition Executives are to determine the need to retain this document by April 14, 1995.
5 Staff assessments include integrated logistics support, producibility and industrial base, logistics and support, technical maturity and performance, and Joint Staff assessment.

APPENDIX C
ARMY MODIFICATION POLICY

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
RESEARCH DEVELOPMENT AND ACQUISITIO
103 ARMY PENTAGON
WASHINGTON DC 20310-0103

SARD-RP 2 6 JUL 1994

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Modification Guidance

The attached document is effective immediately and provides guidelines to accomplish actions necessary to modify Army weapon systems. This guidance will be included in DA Pam 70-XX when published and supersedes Interim Operating Instructions for Materiel Change Management dated September 6, 1990.

Point of contact for this action is LTC Almond, DSN 225-0506, Fax 703-697-4603.

KEITH CHARLES
Deputy Assistant Secretary
for Plans, Programs and Policy

Attachment

DISTRIBUTION:
ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)
ASSISTANT SECRETARY OF THE ARMY (FINANCIAL MANAGEMENT) ATTN: SAFM-BU
ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS &
LOGISTICS)
ASSISTANT SECRETARY OF THE ARMY (MANPOWER & RESERVE
AFFAIRS)
ASSISTANT SECRETARY OF THE ARMY (RESEARCH, DEVELOPMENT AND
ACQUISITION), ATTN: SARD-ZB/SARD-ZT/SARD-ZD/SARD-ZP/SARD-ZS/SARD-ZCS/SARD-ZCA/SARD-ZAC
DEPUTY GENERAL COUNSEL (ACQ)
ADMINISTRATIVE ASSISTANT, ATTN: SAAA
DIRECTOR OF THE ARMY STAFF, ATTN: DACS-ZD/DACS-DMP
DIRECTOR OF INFORMATION SYSTEMS FOR COMMAND, CONTROL, COMMUNICATIONS AND COMPUTERS, ATTN: SAIS-ZB/SAIS-SP/SAIS-AE
DIRECTOR OF PROGRAM ANALYSIS AND EVALUATION
DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS,
ATTN: DAMO-FDZ/DAMO-FDR

PART 12

SECTION D

MODIFICATIONS

References: (a) DOD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," with Change 1, February 26, 1993
(b) DOD-STD-1467, "Software Support Environment," March 15, 1991
(c) DOD-STD-2167, "Defense System Software Development," February 29, 1988
(d) MIL-STD-973, "Configuration Management," with Interim Notice 1, December 1, 1992
(e) AR 11 -12, "Logistics Priorities, " February 1, 1982
(f) AR 11-18, "The Cost and Economic Analysis Program," May 7, 1990
(g) AR 70-1, "Army Acquisition Policy," March 31, 1993
(h) AR 71-9, "Materiel Objectives and Requirements," February 20, 1987
(i) AR 71-2, "Basis of Issue Plans (BOIP), Qualitative and Quantitative Personnel Requirements Information (QQPRI)," July 16, 1990
(j) AR 73-1, "Test and Evaluation Policy," October 15, 1992
(k) AR 95-3, "Aviation: General Provisions, Training, Standardization and Resource Management," September 27, 1990
(l) AR 385-16, "Systems Safety Engineering and Management," May 3, 1990
(m) AR 602-2, "Manpower and Personnel Integration in the Materiel Acquisition Process," April 19, 1990
(n) AR 700-127, "Integrated Logistic Support," July 17, 1990
(o) AR 700-142, "Materiel Release, Fielding and Transfer," April 27, 1988
(p) AR 725-50, "Requisitioning, Receipt and Issue System," August 28, 1989
(q) AR 750-6, "Ground Safety Modification System," September 21, 1992
(r) AR 750-10, "Modification of Materiel and Issuing Safety-Of-Use Messages and Commercial Vehicle Safety Recall Campaign Directive," December 1, 1992
(s) Draft DA PAM 73-1, "Test and Evaluation Guidelines," October 16, 1992
(r) U.S. Army Systems Integration and Management Activity (SIMA) Automated Data Systems Users Manual Number ADSM 18-R24-LEI-ZZZ-UM-03, January 14, 1992

1. PURPOSE.

This section provides guidelines to accomplish actions necessary to modify all Army weapons systems, including hardware and software. It provides guidance for initiation, coordination, review and analysis, approval, establishment of priorities, programming and budgeting, reporting and recording of modifications to all Army weapons systems, including hardware and software. These procedures implement policy described in DODI 5000.2, AR 70-1 and supersede Interim Operating Instructions for U.S. Army Materiel Change Management, 6 September 1990.

2. GENERAL DISCUSSION.

a. This section deals with modifications as discussed in DODI 5000.2 (w/C1), Part 3, paragraph 3i(1). The DODI states that "A 'modification' is a change to a system (whether for safety, to correct a deficiency, or to improve program performance) that is still being produced." A modification is defined as a configuration change to a configuration item. A configuration item is an aggregation of hardware, firmware, or computer software or any other discrete portions, which satisfies an end use function and which the Government designates for separate configuration management. Any item required for logistics support and designated for separate procurement is a configuration item.

b. The management level for an approved modification depends on whether the modification requires a change to the type classification of the system/end item to be modified. This level of management is discussed in paragraph 10.

3. EXCLUSIONS. Efforts excluded from these procedures are:

a. Investigation, examination, research, study, review, analysis or evaluation of ideas or suggestions for modifications. The Configuration Control Board (CCB) may review these actions as a proposed modification.

b. Class II Engineering Change Proposals (ECP) as defined in MIL STD 973.

c. A modification to materiel that is type classified Generic, Contingency or Obsolete by Supply Bulletin 700-20.

d. A modification to materiel for a special purpose or special mission. This type of modification is temporary for a specific duration of time or specific use. In either case, the modified materiel will be returned to its original configuration after the special purpose/special mission is accomplished.

e. Repairs to hardware/software that is under warranty.

f. Maintenance of materiel.

g. National Security Agency and U.S. Army Intelligence and Security Command owned materiel.

h. Research, Development, Test and Evaluation (RDTE) programs that do not result in reconfiguration of operational hardware.

4. ACQUISITION STRATEGY.

a. An Acquisition Strategy (AS) is prepared for all acquisition programs. The AS is the framework for planning, directing and managing a program providing a master schedule for research, development, test, evaluation/assessment, production, fielding, sustainment, disposal and other activities essential for program success. The AS is the primary document the MATDEV uses to update the Acquisition Program Baseline (APB) and is a key element of the Integrated Program Summary (IPS). It records the evolution of a given system and provides the Enhanced Concept Based Requirements System (ECBRS) an indication of current and planned capabilities and/or deficiencies for the development of needs and solutions for future battlefields. The MATDEV prepares the modification portion of the AS coordination with the CBTDEV and includes those modifications approved and prioritized by both the Deputy Chief of Staff for Operations and Plans (DCSOPS) and the CBTDEV. The MATDEV integrates the total modification list. Funding of modifications is provided in accordance with HQDA assigned priorities. The AS replaces the System Improvement Plan (SIP).

b. The CBTDEV, in coordination with the MATDEV, generates a list of proposed modifications including a recommended priority. For ACAT I and II modifications, the CBTDEV forwards this list to the DCSOPS to validate and establish a priority for the modification. The CBTDEV establishes the priority for ACAT III and IV modifications. This priority represents the urgency of the modification relative to all other modifications for a particular system.

c. The MATDEV and CBTDEV jointly review and the MATDEV updates the AS through a program's life cycle as required, but at least annually as part of the budget preparation cycle. A copy of the updated AS should be forwarded to the U. S. Army Safety Center for review.

5. REASONS FOR A MODIFICATION.

A proposed modification can originate from any of several sources, e.g., U.S. Government, industry or allied country. The proposed modification could be to technically upgrade the system or for any of the following reasons: (See MIL-STD-973, Configuration Management, para 5.4.2.3.2 for a description of these terms)

(1) Interface.

(2) Compatibility.

(3) Correction of deficiency.

(4) Operational or logistics support.

(5) Production stoppage.

(6) Cost reduction.

(7) Safety.

(8) Value Engineering.

6. MULTI-SYSTEM MODIFICATIONS (INCLUDING MODIFICATIONS FOR HORIZONTAL TECHNOLOGY INTEGRATION (HTI) PROGRAMS).

a. Definitions

(1) Horizontal Technology Integration (HTI): Provides for the application of common technology across multiple systems or items to improve the warfighting capability of the force. It is a modernization requirements and acquisition process in which technology is simultaneously integrated into different weapon systems.

(2) Host System: A system/end item that includes (but is not limited to) tracked and wheeled vehicles, aircraft, watercraft, missiles, ammunition, communications equipment, or medical equipment designated to accept a mounted system/item. The host system program retains configuration control of the single system resulting from the combination of the two (host and mounted) systems.

(3) Mounted System: A subsystem/end item/component (e.g., a radio, "black box," optical device, vehicle, trailer) designated to be incorporated into a host/end item. The mounted system program is the office which, although it normally retains configuration control over its item, does not retain configuration control of the single system resulting from the combination of the host and mounted systems.

(4) Modification Kit: That assemblage of hardware and software necessary to modify the host system to accept the mounted system. The modification kit is a permanent part of the host system and remains with it.

(5) Installation Kit: That assemblage of hardware and software that interfaces between the modified host system and the mounted system. The installation kit is intended to be removed from the host system upon disposition. The installation kit is not a permanent part of the host system.

(6) Installation Harness. A combination of items such as controls, mounts, amplifiers, cable assemblies, brackets and hardware installed in a host system at a contractor facility prior to issue. The harness is designed for use with a specific host system. It is an integral component of the vehicle and is not removed by the using unit.

b. Requirements definition and approval of multi-system and HTI modifications.

(1) The modification requirement for a mounted system in a host system will be stated in an approved requirements document of the mounted system. The CBTDEV must amend the host system requirements document to include the new configuration item.

(2) There may be a separate requirements document developed for an HTI mounted system when the complexity of development and integration warrants such action. Under these special conditions the Army Acquisition Executive in coordination with the ADCSOPS, Force Development may appoint leadership and staffing for a Special Task Force (STF) with a charter to develop the evolutionary requirements definition and a preliminary acquisition strategy for the first milestone decision. This STF will consist of appropriate membership from the combat and materiel development communities.

(3) A team approach is essential between the CBTDEV and MATDEV if HTI efforts are to be successfully accomplished. Once HQDA is assured that the complexities of the HTI requirements definition and acquisition strategy are resolved and a clear course is set, HQDA may dissolve the STF as an established body, leaving the actual acquisition to the acquisition community.

c. Program Management of multi-system and HTI modifications.

(1) One approach is to assign a Mounted System MATDEV to manage the HTI with the Host System MATDEV retaining the responsibility to integrate the specific technology to their system. In a case where the integration is a complex task and must deal with multiple CBTDEVs and MATDEVs - program oversight may be assigned to a Mounted System MDA while existing Host System MDAs maintain cognizance over the HTI integration effort into their systems via memoranda of agreement.

(2) With a multi-system HTI program, the Mounted Systems MATDEV must document the acquisition approach of the HTI in the Integrated Program Summary as part of the Acquisition Strategy prior to Milestone I. The acquisition strategy must identify integration responsibilities, programmatic performance events and plans to reduce risk. Additionally, the Host System MATDEV must update the AS with required host system specific integration responsibilities. This, combined with a thorough risk assessment, should improve the HTI technical interoperability and system unique configuration control.

(3) Some modifications, especially HTls, may carry significant HQDA and potentially DOD oversight. For systems with this level of oversight, Mounted System MATDEVs will be expected to present Host System status along with their routine and regulatory program reviews. Similarly, Host System MATDEVs will be expected to present the status of their HTI involvement as part of their program reviews.

d. Funds management guidance for HTI and modifications will be published separately.

7. BLOCK MODIFICATION. A grouping of modifications for the purpose of achieving economies in funds, manpower, equipment and/or time to enhance configuration management. A block modification includes several modifications in engineering, procurement and/or application that are managed as a single modification. Block modifications will be accomplished whenever possible.

8. PREPLANNED PRODUCT IMPROVEMENT (P3I). Planned future evolutionary improvement of developmental systems for which design considerations are accomplished during development to enhance future application of projected technology. Includes improvements planned for ongoing systems that go beyond the current performance envelope to achieve a needed operational capability.

9. SOFTWARE MODIFICATION. Software for Army weapon systems can be developed during any phase of the acquisition cycle. This pamphlet does not in any way exclude or supersede DOD and Army standards or guidance concerning the development and acquisition of software. Class I ECPs to software should be processed in the same manner as hardware ECPs. Care should be taken to ensure that the difference between maintenance actions and modifications is clearly understood, and that all actions are properly classified according to the definitions of maintenance and modifications. The vehicle to arrive at a new software version is a "Software Release." A Software Release may have one or many individual changes as described in the description document for that release. Documentation in support of a change to software will be provided by updating the current product baseline and provisions of the standard used for development, and the provisions of this pamphlet as applicable. The software engineering process described in DOD-STD-2167 and DOD-STD-1467 should be followed when making modifications regardless of which standard(s) was used during development. If a change to a system results in the software being rewritten in Ada language, the provisions of DODI 5000.2 and current DOD Ada policy will apply.

10. PROCESS TO APPROVE A MODIFICATION.

a. Major modifications (Acquisition Category (ACAT)I or II) or modifications to ACAT III DOD oversight programs that require approval by the Defense/Army Acquisition Executive will follow the guidance for Milestone IV decisions (see DODI 5000.2, part 3, paras 3i and 3j). For ACAT III (no DOD oversight) and IV modifications the documentation required to obtain a favorable milestone decision will be streamlined to the maximum extent possible using the criteria of AR 70-1, para 1-5a. (See attachment 1.)

b. Class I modifications can generally be categorized as one of two types. The modification either affects form, fit, function and/or logistics supportability as specified in the approved requirements document or it affects contractual factors such as cost to the government (incentives and fees) or contract guarantees. The MATDEV usually approves Class I modifications affecting contractual factors. Other Class I modifications follow the procedures described below.

(1) The MATDEV receives a modification recommendation from any source and evaluates it. If the MATDEV rejects the recommendation, the MATDEV provides the originator the rationale for rejection and no further action is necessary provided the recommended change does not affect form, fit, function and/or logistics supportability. When form, fit, function and/or logistics supportability are affected, the MATDEV and CBTDEV will evaluate the recommendation jointly. If the recommendation is accepted, the CBTDEV approves and prioritizes ACAT III and IV modifications or, for ACAT I and II modifications, forwards a recommendation to DCSOPS for approval and prioritization.

(2) Once either DCSOPS or the CBTDEV validates and prioritizes the modification request, the MATDEV updates existing documents. The MATDEV should change those portions of the Integrated Program Summary (IPS) affected by the modification (eg., AS), and any other documents affected by the proposed modification (eg., TEMP). The MATDEV should also prepare a DD Form 1692, Engineering Change Proposal. This initial DD Form 1692 is recommended not only to record known information, but also to highlight those areas where

additional information is needed. See paragraph 12 below for guidance on the appropriate funds used for development and documentation of the modification.

(3) When the IPS update is complete, the MATDEV staffs it with the functional directors and CBTDEV to obtain an Integrated Program Assessment (IPA). If the modification reduces or eliminates a safety hazard, a copy of the IPS should be staffed with the U.S. Army Safety Center, ATTN: CSSC-SE for review and evaluation.

(4) Once the ECP is prepared, the MATDEV convenes a Configuration Control Board (CCB) to review the ECP. The CCB consists of representatives identified in MIL-STD-973 and the CBTDEV. The CCB may review the modification proposal several different times depending on the maturity of the proposal. The MATDEV forwards the IPS and CCB evaluation of the proposed modification to the appropriate MDA. The MDA will review these documents as well as the IPA to reach a decision on incorporating the modification.

c. A significant revision to an approved modification that exceeds the level of authority of the MDA who initially approved it should be approved at the next higher level of authority.

d. An approved modification may be cancelled, usually because the original requirement for the modification has changed or technical problems render the modification impossible. Pending approval of the cancellation, the MATDEV should suspend all programming and budgeting until the final decision is made. The requirements validation authority or MDA that approved the modification approves the cancellation. Cancellation of a safety modification requires a system safety risk assessment approved by the appropriate risk decision authority.

e. Appeals to modification decisions of the MDA may be made through the acquisition chain of command.

11. MODIFICATION WORK ORDER APPLICATION COMPLETION SYSTEM (MODACS). This is a database containing information associated with the application of Modification Kits and Data Collection. Instructions on how to use MODACS are detailed in the SIMA Automated Data Systems Manual No. ADSM 18-R24-LEI-ZZZ-UM-03. The purpose of MODACS is to provide an interactive method of updating modification work order (MWO) data and to provide the ability to automatically produce hard copy MODACS reports.

12. FUNDING FOR MODIFICATION PLANNING.

a. Funding the modification. The cost to develop, prepare, assemble, reproduce and coordinate a modification for submission to the CCB is not charged to the cost of the proposed modification. These efforts will be funded by the following appropriations:

(1) RDTE Activity 6.7 will fund redesign of an item to increase the current performance envelope, including related development, test and evaluation effort (DOD Financial Management Regulation, Ch. 1, para 7a(1)).

(2) The appropriate Procurement Appropriation will fund engineering services and related efforts by the producing contractor or manufacturing installation, applied to an item currently in production for the purpose of extending the useful military life of such items within the then current performance envelope (DOD Financial Management Regulation, Ch 1, para 7a(2)).

b. The method used to determine the appropriations used to fund engineering effort, the procurement of modification kits and the application of the modification kits/data collection should be coordinated with the MATDEV's business manager.

(1) A modification to software that causes a modification to hardware should be processed and funded as a hardware modification. In a case where there is a modification to only the software of a system/end item, costs are funded with the same appropriation that funded engineering of the modification.

(2) When a modification to an investment item causes a change to an expense/secondary component of that investment item, then all costs of the change to that component are funded with the same appropriation that funded the modification to the investment item.

13. EMERGENCY/URGENT/ROUTINE MODIFICATION. A modification will be designated Emergency, Urgent or Routine based on the criticality (e.g., threat change, security compromise, warfighting capability or safety condition). A modification is considered Routine unless justified otherwise.

a. Emergency Modification. An emergency priority shall be assigned to a modification proposed for any of the following reasons:

(1) To change the operational characteristics which, if not accomplished without delay, may seriously compromise national security;

(2) To correct a hazardous condition which may result in fatal or serious injury to personnel or in extensive damage or destruction of equipment. (A hazardous condition will require a System Safety Risk Assessment per AR 385-16.);

(3) To correct a system halt (abnormal termination) in the production environment such that Computer Software Configuration Item mission accomplishment is prohibited. (MIL-STD-973, para 5.4.2.3.4a)

b. Urgent Modification. An urgent priority shall be assigned to a modification proposed for any of the following reasons:

(1) To cause a change which, if not accomplished expeditiously, may seriously compromise the mission effectiveness of deployed equipment, software, or forces;

(2) To correct a potentially hazardous condition, the uncorrected existence of which could result in injury to personnel or damage to equipment (A potentially hazardous condition will require a System Safety Risk Assessment.);

(3) To meet significant contractual requirements (e.g., when lead time will necessitate slipping approved production or deployment schedules if the change was not incorporated);

(4) To accomplish an interface change which, if delayed, would cause a schedule slippage or increase cost;

(5) To accomplish a significant net life cycle savings to the Government, as defined in the contract, through value engineering or an integral component of the host system and is not removed by the using unit.

(6) To correct unusable output critical to mission accomplishment;

(7) To correct critical configuration item files that are being degraded;

(8) To cause a change in operational characteristics to implement a new or changed regulatory requirement with stringent completion date requirements issued by an authority higher than that of the functional proponent (MIL-STD-973, para 5.4.2.3.4b).

c. Routine. A routine priority shall be assigned to a proposed modification when emergency or urgent is not applicable (MIL-STD-973, para 5.4.2.3.4c).

d. An Emergency/Urgent safety modification is usually preceded by a Safety-of-Use Message or Safety-of-Flight Message IAW AR 750-6 or AR 95-3, respectively. To initiate an Emergency/Urgent modification, the MATDEV should obtain concurrence from HQDA (ODCSOPS) and the CBTDEV, and from the Army Safety Center for safety related changes. Complete follow-on documentation should be provided within 30 calendar days after initiation of the modification. A Safety-of-Use/Safety-of-Flight message is not required for modifications that require correction of an operational deficiency (warfighting). The level of urgency of this modification is approved by ODCSOPS.

14. DETERMINING QUANTITY OF SYSTEM/END ITEMS TO BE CHANGED.

a. The MATDEV should ensure that the quantity of end items requiring application of an approved modification is estimated as accurately as possible when preparing the AS. CBTDEV will ensure that the requirements are validated and approved. Procurement of kits and other supporting items (expendable) for application is planned according to priorities and procedures as stated in AR 11-12 and AR 725-50.

b. The Army modification policy embraces the principles of configuration management and requires, whenever possible, application of modifications to the entire inventory of a system/end item rather than to a portion of the inventory.

15. TEST AND EVALUATION (T&E). Testing and evaluation will be performed and documented in accordance with DODI 5000.2, AR 73-1, AR 70-1 and DA PAM 73-1.

16. POINTS OF CONTACT.

OASA(RDA), ATTN: SARD-RP, Washington, D.C. 20310-0103

HQ AMC, ATTN: AMCRD-AR, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001

Attachment- 1

1. Modification Approval Criteria

PART 12 SECTION D

ATTACHMENT 1

MODIFICATION APPROVAL CRITERIA

ACAT	SELECTION CRITERIA	MDA	NEW ORD
I	DESIGNATE BY USD(A&T) + > $300M in RDTE@ >$1.8B in PROC >$50M in AIS*	DAE	YES
II	DESIGNATE BY DAE/AAE >S115M in RDTE > $540M in PROC >$10M less $50M in AIS	AAE	YES
III	DESIGNATE BY AAE PEO/SYSCOM <$115M in RDTE < $540M in PROC >$2.5M less $10M in AIS	NO#	
IV	DESIGNATE BY PEO/SYSCOM as delegated for RDTE&PROC < $2.5M in AIS	PM/ITEM MGR	NO#

NOTES:

+ Per DODI 5000.2, page 2-3.
@ Funding criteria in FY 90 constant dollars.
* Per DODI 8120.1.
# Coordination with CBTDEV required for modifications involving operational, logistical or safety considerations.

Section D
OPERATING AND SUPPORT COST REDUCTION

Section D
OPERATING AND SUPPORT COST REDUCTION

7-D-1. References

a. DOD Directive 5000.1, "Defense Acquisition," February 23, 1991.
b. DOD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," February 23, 1991.
c. AR 70-1, "Army Acquisition Policy," March 31, 1993.
d. "DA Cost and Economic Analysis Manuals," August 1992.
e. AR 71-9, "Materiel Objectives and Requirements," February 20, 1987.
f. Memorandum, Secretary of the Army/Chief of Staff of the Army, "Operating and Support Cost Reduction Initiatives," October 30, 1991.
g. Memorandum, Assistant Secretary of the Army (Research Development and Acquisition)/Vice Chief of Staff Army, "Operating and Support Cost Reduction," November 6, 1991.
h. Memorandum, Deputy Chief of Staff for Logistics (DCSLOG), Technology Insertion (TI) Policy Goal for the Defense Business Operating Fund (DBOF), Supply Management, Army," January 7, 1992.

7-D-2. Purpose of operating and support cost reduction section

The purpose of this section is to provide procedural guidance to all Army agencies involved in Army materiel acquisition on the implementation of the Operating and Support Cost Reduction (OSCR) Program. This section outlines the procedures used to assure that the reduction of operating and support (O&S) costs is effectively addressed in materiel acquisition.

7-D-3. General discussion

a. The world-wide political changes at the turn of this decade combined with domestic economic crises have manifested themselves in severely reduced Defense and Army budgets. Cutbacks in the Army's total budget can be expected to continue and may become even larger. If the Army leadership is to maintain a trained and ready force, continue the modernization of the force to counter changing threats in a world of quickly evolving technologies and enhance the quality of life of the soldier, they must find more effective ways to use the Army's Total Obligational Authority (TOA). Therefore, the Army must find all areas where costs can be effectively eliminated or reduced.
b. The Army spends over half of its budget, directly or indirectly, on the O&S of its mission equipment. O&S cost drivers are numerous and diverse. They include the costs of items ranging from spare and repair parts for equipment to the facilities and people involved in training operators and mechanics. This section describes procedures designed to reduce them.
c. Significant reductions in O&S costs require action at all levels and across the entire life cycle. The OSCR program involves broad participation throughout the Army and its supporting industrial base. To assure that both short and long term benefits are realized, methodologies which focus on reducing selected O&S costs through management action and through insertion of technology at relevant points in the systems' life cycle are prescribed.
d. Responsibility for implementation of this program at the Headquarters, Department of the Army (HQDA) level rests with the Assistant Secretary of the Army for Research, Development and Acquisition (ASA(RDA)) who has responsibility for RDA policy and with the Deputy Chief of Staff for Operations and Plans (DCSOPS) who has overall staff responsibility for needs, priorities and Army Operational TEMPO (OPTEMPO). Responsibility for execution of the program rests with those responsible for each process (see paragraph 7-D-6).
e. Definition of pertinent O&S costs are contained in the latest version of the DA Cost Analysis Manual.

7-D-4. OSCR program

The Army established the OSCR program to assure the referenced policies and procedures are effectively implemented. The OSCR program consists of actions considered under any of the following processes which when implemented will result in a savings of O&S costs. All such actions are OSCR initiatives.
a. TECHNOLOGY BASE INVESTMENT - A process focused on generic cost drivers to identify potential for reducing the cost of ownership.
b. ADVANCED TECHNOLOGY DEMONSTRATIONS - A process which quantifies the impact of new technology on life cycle costs.
c. TECHNOLOGY INSERTION - A process which uses the Defense Business Operating Fund (DBOF) to re-engineer spare parts which have high O&S costs.
d. MODIFICATION - A process to review, approve and implement modifications for various reasons. Three reasons coded RV (Reduction in Total Net Cost (Value Engineering), RP (Reduction in Total Net Cost (Production) and RS (Reduction in Total Net Cost (O&S) are directly applicable to O&S cost savings.
e. MAJ MODS/NEW STARTS - A process to assure that life cycle costs are properly measured, analyzed, presented and considered at major milestone reviews.
f. VALUE ENGINEERING - An organized effort directed at analyzing the function(s) of systems to achieve only the necessary function(s) at minimum overall cost without degradation of system function(s).
g. OSCR REPORTING - A process for preparing an annual report to estimate the impact of OSCR initiatives on future Army O&S accounts.

7-D-5. Procedures

a. General.
(1) DODD 5000.1 describes the acquisition process as translating operational needs into stable affordable programs which can be sustained given projected resource constraints. It makes clear that life cycle costs are to be included in the definition of affordability and requires that life cycle costs be considered at each milestone review. These general policy statements are clarified in the companion DODI 5000.2 which states that "acquisition programs shall be managed with the goal to optimize total system performance and reduce the cost of ownership."
(2) AR 70-1 provides Army implementing procedures for DODD 5000.1, DODI 5000.2, and assigns responsibilities and functions for the OSCR program to Army organizations. DCSOPS serves as the functional proponent for the OSCR program. AR 70-1 also requires that an annual report be prepared to estimate the impact of OSCR initiatives on future Army O&S accounts.
b. OSCR initiatives. OSCR initiatives are to be budgeted/funded through the normal processes for funding as with any other program. These savings are to be identified and retain visibility in the process in which they are generated.
c. Submission of Unfunded OSCR initiatives
(1) Upon submission into the funding processes, proponents (Major Subordinate Commands (MSCs), Program Executive Officers (PEOs) and Program Managers (PMs)) of all OSCR initiatives should submit documentation of their OSCR programs as follows to Headquarters, U.S. Army Materiel Command (HQ AMC):
(a) A cover letter with the commander's signature.
(b) A quad chart which provides a description of the initiative, the reason for the initiative, an explanation of how the initiative will save O&S costs, cost by Fiscal Year (FY), type of funds required, Program Element (PE)/PROJ/Standard Study Number (SSN), if known, Savings to Investment Ratio (SIR), and break even point. For OSCR purposes, the SIR can be modified to extend over the economic life of the program up to a maximum of 10 years. A SIR of greater than 1:1 is required before data is reported as an OSCR initiative. A PC-based software tool is available through the OSCR point of contact (POC) at each MSC to assist in producing this chart.
(c) A validated economic analysis including supporting documentation.

(2) Coordination with other MACOMS/activities to support assumptions such as: projected usage rates/costs, OPTEMPO, force structure, equipment replacement/retirement, etc.
(3) Each HQ AMC MSC has trained OSCR POCs who are available to guide and assist the submitter in developing the above required documentation.
(4) HQ AMC will perform a timely validation review of all OSCR initiatives. For initiatives submitted by activities reporting to HQ AMC, an attempt will be made to find in-house funds for qualifying projects.
(5) In cases where the magnitude of the OSCR initiative investment required is so great that funding by the initiating MACOM, MSC or PEO is infeasible (requiring more than $1 million investment in one or more FYs), the documentation and economic analysis validation may be submitted to HQDA for special consideration.
d. Specific methodologies.
(1) Technology Base Investment Process.
(a) The leading generic O&S cost drivers are listed below. These cost drivers are used by the U.S. Army Research Laboratory (ARL), and Research, Development and Engineering Centers (RDECs) of AMC to generate projects which respond to these factors. Projects are reviewed and approved at the laboratory/center level.
1. Electrical/mechanical components and spares replacement.
2. Training ammunition/munitions/missile costs.
3. Tire/track replacement and repair costs.
4. Power consumption and power generation/storage (battery) costs.
5. Ammunition/munitions/missile logistics costs (including disposal).
6. Fuel/fuel distribution costs.
7. Software maintenance/support costs.
8. Food, water, field clothing and equipment.
(b) A listing of the ongoing projects, including current FY funding, status and potential application, is provided to HQ AMC who monitors the level of effort. The MSC commanders and the applicable director determine if their organizations are doing an appropriate amount of work to help reduce future O&S costs. Completed technology projects are handed off to other processes to assure that the technology is fielded.
(2) Advanced Technology Demonstration (ATD) Process.
(a) ATDs may include O&S costs during the presentation to the Army Science and Technology Working Group (ASTWG) which gives preliminary ATD approval; in the Advanced Technology Demonstration Plan (ATDP); and in the ATD final report.
(b) The presentation to the ASTWG includes preliminary analysis of the O&S applicable impact of the technology being proposed, as well as, the O&S cost/performance trade-offs expected. The ATDP will, if needed, contain plans for refining the preliminary analysis, either with additional analyses or experimentation or both, during the demonstration. The completeness, adequacy and credibility of the O&S portion of these two products can be a factor in ATD selection. Where applicable, the final report of the ATD includes an updated O&S cost analysis providing the best available estimate of the O&S cost implications of the technology and the basis for O&S cost/performance trade-off.
(c) This information is useful to the materiel developer planning to incorporate the new technology into the system and facilitates preparation of Cost and Operational Effectiveness Analyses (COEAs)/Program Office Estimates (POEs). It also assists the PM in the preparation of the Integrated Program Summary.
(d) A listing of on-going projects, including current FY funding, status and potential application is provided to AMC headquarters who monitors the level of effort. No savings for OSCR is claimed until a project has matured to the point of being adopted by a PM for insertion into a system or until the technology has been introduced through one of the other processes.
(3) Technology insertion (TI) in DBOF process.
(a) The TI in DBOF process allows the product line manager at the National Inventory Control Point (NICP) to proactivity manage the future availability of spare and repair parts by the selective application of "state of practice" technology. The selection criteria for application of TI to

a component would generally, include one or more of the following listed below. Enhanced performance or capability is NOT an allowable reason for funding TI with DBOF. Performance-based TI is a minor or major modification process.
—Obsolete or difficult to obtain components.
—Elimination of high cost components.
—Demonstrated poor reliability.
—Demonstrated high maintenance item.
—Replacement of a unique item with a common item.
—Elimination of long lead time components.
—Increased durability of component.
(b) The TI process in its essence is quite simple. Users, item managers, production or maintenance engineers, or others identify candidate items to the TI manager. The TI manager conducts a feasibility analysis to verify if a TI is possible. If no technical problems are noted, an economic analysis is conducted to determine savings and benefits. The depth of the economic analysis will be based on the requirements of the MSC's DBOF manager. After funding approval and coordination with the items configuration manager, the reengineering effort is initiated. At this point the TI item becomes an engineering change proposal (ECP) and follows the procedures for approval and implementation of an ECP; e.g., testing requirements, technical manual and other documentation change, implementation methodology if other than attrition, etc.
(c) MSCs will report estimated maintenance savings due to TI initiatives to HQ AMC in the same manner as other OSCR initiatives.
(4) Modification process.
(a) To increase investment in projects which reduce O&S costs, the modification process includes identifying OSCR modifications and the establishing of priorities by the combat developer for every approved modification. O&S SIR modifications are second only to critical safety modifications and equal to performance enhancements in the funding and approval process.
(b) The following procedures are incorporated into the modification process. OSCR projects compete for resources through the normal process for approval of modifications but maintain identification as OSCR initiatives and are reported to HQ AMC. Back-up data include the cost/savings information and the estimated SIR. The PEO, PM or the Army Acquisition Executive (AAE), or their equivalents for non-major systems approve these projects within the guidelines of the modification policy, if they have available funds. Headquarters, U.S. Army Training and Doctrine Command reviews and prioritizes these projects along with other modifications within a given Management Decision Package (MDEP).
(5) Major Modification/New Start Process.
(a) This process assures that all new start or major product improvement programs consider O&S costs. It begins with a review of the requirement document to assure that O&S costs are balanced with performance.
(b) OSCR technology can be inserted into the system development in two ways. If the PM is satisfied that the technology previously demonstrated in an ATD or other technology base program was mature enough, he or she could tailor the technology and use it as a part of the original design. In some cases, new technology may be available which can significantly reduce O&S costs, but which the PM believes is too high a risk for incorporation into the baseline program. To preserve the option of incorporating this technology into the system while maintaining visibility as an OSCR initiative, the PM could propose the new technology for competition in a separate funding line within the materiel system development. The O&S cost saving technology development schedule would have to be such that the new technology would mature in time to be incorporated into the materiel system, in sufficient time to realize an overall cost savings.
(c) At each major milestone, the PM is required by DODI 5000.2 to submit an Integrated Program Summary. This document must include an analysis of the systems life cycle costs. Since the life cycle costs are dominated by O&S costs, this assures that the decision body, Defense Acquisition Board (DAB), Army Systems Acquisition Review Council (ASARC), or In-Process

Review (IPR), carefully examines the O&S implications of the system. Assuming approval, the program implements the next phase and then repeats the cycle for the next milestone.
(d) A listing of those on-going programs which have current or projected OSCR savings will be forwarded to HQ AMC and will include the status and projected/actual savings.
(6) Value Engineering (VE) Process.
(a) The current VE process provides for reduction in life cycle costs. In recent years the VE policy and VE clauses have been structured in such a way that the majority of the VE actions have focused on reducing production costs. Appropriate modifications to the VE policy and procedures will expand the practice to also increase attention to projects which primarily reduced O&S costs. This is being done by seeking a Federal Acquisition Regulation (FAR) revision which will assure that the sharing of so called collateral savings incentivizes contractors to submit O&S Value Engineering Change Proposals (VECPs). In addition, funding provisions must be identified to pay the contractor's share of O&S savings. Finally, methods for computing the savings which are practical and which properly share risk are being developed. Once these changes are in place, a significant increase in O&S VE activity is anticipated.
(b) The O&S VECP process would be similar to the current VECP process, differing only in the identification of O&S savings to HQ AMC. Costs to test and demonstrate that savings had been achieved would be included, e.g., if reliability improvement is the parameter causing the savings, a reliability demonstration test would be proposed. The VECP clause will incorporate the new procedures for sharing O&S cost savings.
(c) VE initiatives which reduce O&S costs will be reported to HQ AMC as any other VE initiative except that the portion of the overall savings which is identified as O&S savings will be displayed as such in the VE Report.
(7) OSCR Reporting Process.
(a) AMC is charged by HQDA to estimate the impact of OSCR actions on future Army O&S accounts. These methodologies described above encourage investment in projects which reduce O&S costs. The methodologies result in considerable savings and cost avoidance. They do not, however, achieve any actual savings in the sense of funds recovered from the benefiting accounts. This process introduces additional steps which may make these funds available for other purposes, such as meeting Army TOA goals, paying for inflation, investing in new equipment for Army modernization, or improving training.
(b) In order to verify that savings are being achieved, actual cost data on the fielded system or modification should be collected and reported if it is economically feasible to do so. In cases where actual data is not available or would be too costly to collect, savings may be reported based on the estimated savings in the economic analysis. The cost of data collection and reporting will be included in the economic analysis.
(c) AMC then consolidates and formats the data which has been submitted in the various reports.
(d) AMC then prepares an annual report on the actual/expected OSCR savings from funded projects and the projected savings of unfunded OSCR initiatives.
(e) Prior to issuance of guidance by HQDA for preparation of the next Command Operating Budget or POM, the OSCR report is sent to HQDA ASA(FM), DCSOPS and ASA(RDA) for consideration of possible plowback of actual achieved savings into RDTE, Procurement, DBOF and OMA programs during the prioritization process. No formal procedures are necessary for these actions. ODCSOPS has been assigned the overall HQDA lead for the OSCR program.

7-D-6. Points of contact

a. HQDA Staff is as follows:
(1) Deputy Chief of Staff for Operations and Plans, Force Development, 400 Army Pentagon, ATTN: DAMO-FDR, Washington, D.C. 20310-0400.
(2) Office of the Assistant Secretary of the Army (Research, Development and Acquisition), 103 Army Pentagon, ATTN: SARD-RP, Washington, D.C. 20310-0103.

b. General Guidance, Modification Process, and Data and Reporting Process—U.S. Army Materiel Command, ATTN: AMCRD-AD-R, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.
c. Technology Base Investment Process and Advanced Technology Demonstrations Process—U.S. Army Materiel Command, ATTN: AMCRD-IT, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.
d. Major Modifications and New Starts Process—Office of the Assistant Secretary of the Army (Research, Development and Acquisition), 103 Army Pentagon, ATTN: SARD-ZBA, Washington, D.C. 20310.
e. Value Engineering Process—U.S. Army Materiel Command, ATTN: AMCRD-IEE, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.
f. Technology Insertion through the Defense Business Operating Fund Process—U.S. Army Materiel Command, ATTN: AMCLG-SA, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.

APPENDIX E
DEPARTMENT OF THE AIR FORCE SOURCES OF INFORMATION FOR MODIFICATIONS AND UPGRADES

DEPARTMENT OF THE AIR FORCE SOURCES
OF INFORMATION FOR MODIFICATIONS AND UPGRADES

This appendix contains information on various Air Force organizations that are involved in Modification and Upgrade activities. It provides office symbols, phone numbers and addresses to assist readers in making contacts. Also, it provides a list of documents and tools available to help anyone interested or involved with modification work.

Points of contact: This list was put together to assist in finding knowledgeable personnel to discuss questions about Modification and Upgrade activities.

HQ USAF/LGM Room 4E278 (703) 697-8741
Directorate of Maintenance DSN 227-8741
1400 Air Force, Pentagon
Washington D.C. 20330-1400

HQ USAF/LGMM Room 4A264 (703) 697-8247
Maintenance Policy Division DSN: 227-8247
1030 Air Force Pentagon
Washington D.C. 20330-1030

HQ USAF/LGSY Room 4A312 (703) 697-1846
Aircraft & Missile Support Division DSN: 227-1846
(Modification Programs)
1030 Air Force Pentagon
Washington D.C. 20330-1030

HQ USAF/LGSR Room 4A336 (703) 695-7743
Combat Support Division DSN: 225-7743
(Spares & Modifications)
1030 Air Force Pentagon
Washington D.C. 20330-1030

SAF/AQX Room 4E975 (703) 697-9494
Management Policy & Program Integration DSN: 227-9494
1060 Air Force Pentagon
Washington D.C. 20330-1060

SAF/AQXA Room 4C331 (703) 693-3212
Acquisition Management Policy Division DSN: 223-3212
1060 Air Force Pentagon
Washington D.C. 20330-1060

SAF/FMBI Room 4D132 (703) 695-9737
Budget Investment Directorate DSN: 225-9737
1030 Air Force Pentagon
Washington D.C. 20330-1030

SAF/FMBIA Room 5C129 (703) 614-4600
Aircraft & Technology Programs DSN: 224-4600
(Aircraft & Missile Modification Funds)

1130 Air Force Pentagon
Washington D.C. 20330-1130

HQ USAF/XORD Room 5D286 (703) 695-7107
Policy & Requirements Division DSN: 225-7107
1480 Air Force Pentagon
Washington D.C. 20330-1480

HQ AFMC/DRMP (513) 257-5591
Directorate for Requirements DSN: 787-5591
Product Management Division
4375 Chidlaw Rd. Suite 6
Wright-Patterson AFB, OH 45433-5006

HQ AFMC/FM-I
Financial Management & Comptroller Directorate
Budget Policy Division
4375 Chidlaw Road (513) 257-7366
Wright-Patterson AFB OH 45433-5006 DSN: 787-7366

Air Force Tools, Guidance and Information useful for personnel working Modification and Upgrade projects:

Air Force Acquisition Model
Version 2.1, released March 1995
ASC/CYM Bldg 17 (AFMC) (513) 255-0423
2060 Monahan Way DSN: 785-0423
Wright-Patterson AFB OH 45433-6503

Automated Lessons Learned Capture And Retrieval System (ALLCARS) - an Air Force lessons learned database
Version 2.1.4, released July 1994
ASC/CYM Bldg 17 (AFMC) (513) 255-0423
2060 Monahan Way DSN: 785-0423
Wright Patterson AFB OH 45433-6503

AF Modification Process Description (Test), 31 Mar 95
ìA How to Guide for Modificationsî
(for a copy contact)
HQ USAF/LGMM Room 4A264 (703) 697-8247
Maintenance Policy Division DSN: 227-8247
1030 Air Force Pentagon
Washington D.C. 20330-1030

Air Force Modification Process Working Group
(A Process Action Team working on improving the modification process) Membership includes AF/LGM, SAF/AQX, HQ AFMC, Air Logistics Centers, Product Centers, and user personnel. For a current POCs list contact:

HQ USAF/LGMM Room 4A264 (703) 697-8247
Maintenance Policy Division DSN: 227-8247
1030 Air Force Pentagon
Washington D.C. 20330-1030

or
SAF/AQXA Room 4C331 (703) 693-3212
Acquisition Management Policy Division DSN: 223-3212
1060 Air Force Pentagon
Washington D.C. 20330-1060

Guide to the Modification Management Process, 30 Oct 92
(for a copy contact)
HQ AFMC/DRMP (513) 257-5591
Directorate for Requirements DSN: 787-5591
Product Management Division
4375 Chidlaw Rd. Suite 6
Wright-Patterson AFB, OH 45433-5006

Air Force Supplement 1 to DoDI 5002,
Aug 93, Chapter Five, Modification Approval & Management

Air Force Policy Directive 63-11 (Draft), Modification System, 15 Jan 95

Air Force Instruction 63-1101 (Draft), Modification Management, 1 Dec 94

Air Force Instruction 16-501, Control and Documentation of Air Force Programs, 3 Mar 95

Air Force Instruction 10-601, Mission Needs and Operational Requirements Guidance and Procedures, 31 May 94

Air Force Instruction 63-107, Integrated Weapon System Management Program Planning & Assessment, 5 Aug 94

APPENDIX F

GLOSSARY

GLOSSARY

AAE	Army Acquisition Executive
ACAT	Acquisition Category
ADP	Automatic Data Processing
AFI	Air Force Instruction
AFMC	Air Force Materiel Command
AFPD	Air Force Policy Directive
AFROC	Air Force Oversight Council
AIT	Alteration Installation Team
ALLCARS	Automated Lessons Learned Capture and Retrieval System
AMP	Army Modernization Plan
APN	Aircraft Procurement, Navy
AR	Army Regulation
AS	Acquisition Strategy
ASAF/AQ	Assistant Secretary of the Air Force (Acquisition)
ASTMP	Army Science and Technology Master Plan
AWE	Advanced Warfighting Experiment (Army)
BL	Battle Lab (Army)
BUR	Bottom-up Review
BWB	Federal Office for Defense Technology (Germany)
CBL	Chief Battle Lab (Army)
CBRS	Concept-based requirement system
CBTDEV	Combat Developer
CCB	Contract Change Board (NASA) or Configuration/Change Control Board (DoD)
CCR	Configuration Change Request
CEO	Chief Executive Officer CI Configuration Item (Air Force)
CINC	Commander in Chief
COMNAVAIR	Commander, Naval Air Systems Command
CPA	Chairmanís Program Assessment
DA	Department of the Army
DAB	Defense Acquisition Board
DAC	Designated Acquisition Commander
DCNO	Deputy Chief of Naval Operations
DBOF	Defense Business Operations Fund
DCSOPS	Deputy Chief of Staff for Operations and Plans (Amry)

DIRSSP	Director, Strategic Systems Programs
DoD	Department of Defense
DoDI	Department of Defense Instruction
DP	Development Plan (Air Force)
DPG	Defense Planning Guidance
DSA	Design Services Allocation
DSMC	Defense Systems Management College, Ft. Belvoir
DUSD(AR)	Deputy Under Secretary of Defense for Acquisition Reform
ECBRS	Enhanced Concept-Based Requirement System (Army)
ECP	Engineering Change Proposal
EFG	Introduction into Service Document (Germany)
EORR	End of Refit Report
ESC	Executive Steering Committee
ET	External Tank (NASA)
FMP	Fleet Modernization Program
FMPMIS	Fleet Modernization Program Management Information System
HCPM	Headquarters Centrally Provided Material (Navy)OPN
HM&E	Hull, Mechanical and Electrical (Navy)
HTI	Horizontal Technology Integration (Army)
IC	Interface Control
ICWG	Interface Control Working Group (Air Force)
IIRP	Improved Item Replacement Program
IM	Item Manager
IOI	Interim Operating Instructions
IPS	Integrated Program Summary
IPT	Integrated Product Team
IR^3B	Integrated Resource and Requirements Review Board
IWSM	Integrated Weapon System Management
JCF	Justification Cost Form (Navy)
JCS	Joint Chiefs of Staff
JMA	Joint Mission Area
JROC	Joint Requirements Oversight Committee
JSC	Johnson Space Center
JWCA	Joint Warfare Capability Assessment
KSC	Kennedy Space Center
LAR	Liaison Action Request (Navy)

LCC	Life-Cycle Cost
LCSMM	Life-Cycle Systems Management Model
LRRDAP	Long-Range Research, Development, and Acquisition Plan (Army)
MAA	Mission Area Assessment
MACHALT	Machinery Alteration (Navy)
MAD	Mission Area Director
MAJCOM	Major Commands
MAP	Missionl Area Plan (Air Force)
MARCORPSYSCOM	Marine Corps Systems Command
MCCDC	Marine Corps Combat Development Command
MDA	Milestone Decision Authority
MGM	Materiel Group Manager (Air Force)
MILDEP	Military Deputy
MMS	Modification Management System
MNA	Mission Need Analysis
MNS	Mission Need Statement
MOD	Ministry of Defense (Germany)
MSFC	Marshall Space Flight Center
MWO	Modification Work Order
NALG	Naval Aviation Liaison Group
NASA	National Aeronautics and Space Administration
NAVAIR	Naval Air Systems Command
NAVCOMPT	Navy Comptroller
NAVSEA	Naval Sea Systems Command
NHB	NASA Handbook
NMS	National Military Strategy
O&M,MC	Operations & Maintenance, Marine Corps
O&MN	Operations & Maintenance, Navy
O&S	Operations and Support
OAG	Operation Analysis Group
OMA	Operations and Maintenance, Army
OPN	Other Procurement, Navy
OPNAV	Office of the Chief of Naval Operations
ORD	Operational Requirements Document
ORDALT	Ordnance Alteration (Navy)
OSARDA	Office of the Secretary of the Army for Research, Development and Acquisition

OSCR	Operating and Support Cost Reduction Program (Army)
OSD	Office of the Secretary of Defense
P^3I	Pre-planned Product Improvement
PAA	Program Associate Administrators (NASA)
PAM	Department of the Army Pamphlet
PAT	Process Action Team
PCRB	Program Requirements Change Board (NASA)
PEO	Program Executive Officer
PGM	Product Group Manager (Air Force)
PM	Program Manager
PMC	Procurement, Marine Corps or Program Management Council (NASA)
PMRT	Program Management Responsibility Transfer
POM	Program Objective Memorandum
PPBS	Planning, Programming and Budgeting System
PTI	Proposed Technical Improvement
R&M	Reliability and Maintainability
R^3B	Resource and Requirements Review Board (Navy)
RAM	Reliability, Availabliity and Maintainability
RDT&E	Research, Development, Test and Evaluation
RSRM	Redesigned Solid Rocket Motor (NASA)
S&T	Science and Technology
SA	Support Areas
SAM	Ship Alteration Manager
SECDEF	Secretary of Defense
SECNAV	Secretary of the Navy
SHIPALT	Ship Alteration
SID	Ship Installation Drawing
SM	Single Manager (Air Force)
SPALT	Strategic Systems Programs Alteration (Navy)
SPD	System Program Director (Air Force)
SPM	Shipís Program Manager
SRB	Solid Rocket Booster (NASA)
SSBN	Ballistic Missile Submarine
SSME	Space Shuttle Main Engine
SSNs	Attack Submarines
SSP	Space Shuttle Program (NASA) or Strategic Systems Programs (Navy)

SUBLANT	Submarine U.S. Atlantic Fleet
SUBPAC	Submarine U.S. Pacific Fleet
TCPR	TRIDENT Command and Control Systems Problem Report
TI	Technology Insertion
TIRR	Technology Investment Recommendation Report (Air Force)
TIWG	Test Integration Working Group (Army)
TOA	Total Obligation Authority
TRADOC	Training and Doctrine Command (Army)
TRIREFFAC	TRIDENT Refit Facility
TRITRAFAC	TRIDENT Training Facility
TYCOM	Type Commander (Navy)
USAF/LG	Deputy Chief of Staff for Logistics
USAF/LGM	Deputy Chief of Staff for Logistics Policy
USD(A&T)	Under Secretary of Defense for Acqisition & Technology
WFLA	Warfighting Lens Analysis (Army)
WPN	Weapons Procurement, Navy
WRAP	Warfighting Rapid Acquisition Program (Army)
WSMP	Weapon System Master Plan (Air Force)
WSPAR	Weapon System Program Assessment Review (Air Force)

APPENDIX G

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