

# NAVAL POSTGRADUATE SCHOOL Monterey, California



## THESIS

**TEN YEARS WORTH OF PROCUREMENT REFORMS  
WITH SPECIFIC ATTENTION TO SELECTED DON  
PROGRAMS**

by

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December 2002

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE December 2002	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE: Ten Years Worth of DOD Procurement Reforms with Specific Attention to Selected DON Programs.			5. FUNDING NUMBERS	
6. AUTHOR(S)				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words) DOD reduced force structure after the Cold War ended. More efficient and sophisticated weapons are necessary to support a smaller force. Acquisition reform legislation is designed to capture savings and usher in a Revolution in Business Affairs. Today a wide array of rogue nations, transnational actors, and domestic terrorism demand weapons procurement reform that is effective against a smaller and much less visible foe. The Department of Defense's goal is to deliver modern, high performance weapons systems at lower cost, on schedule and with higher performance. Better weaponry drives the reality that the nation and the Department find themselves in, an era of highly unpredictable security challenges. This research paper explores major procurement reforms and their effect on decreasing the amount of time and funds expended on current and future weapons systems. It looks for evidence of how the Department of the Navy's budget is impacted and what controls, if any, these reforms will have on future weapons procurement. The link between the Executive and legislative branches, DOD and program managers are examined to determine if procurement reform has helped.				
14. SUBJECT TERMS Acquisition, Procurement Reform, MDAP, ACAT, Weapons, Budget			15. NUMBER OF PAGES 137	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

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**TEN YEARS WORTH OF PROCUREMENT REFORMS WITH SPECIFIC  
ATTENTION TO SELECTED DON PROGRAMS**

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**MASTER OF SCIENCE IN MANAGEMENT**

from the

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## **ABSTRACT**

DOD reduced military force structure after the Cold War ended. More efficient and sophisticated weapons are necessary to support a smaller force. Acquisition reform legislation is designed to capture savings and usher in a Revolution in Business Affairs. Today a wide array of rogue nations, transnational actors, and domestic terrorism demand weapons procurement reform that is effective against a smaller and much less visible foe. The Department of Defense's goal is to deliver modern, high performance weapons systems at lower cost, on schedule and with higher performance. Better weaponry drives the reality that the nation and the Department find themselves in, an era of highly unpredictable security challenges. This research paper explores major procurement reforms and their effect on decreasing the amount of time and funds expended on current and future weapons systems. It looks for evidence of how the Department of the Navy's budget is impacted and what controls, if any, these reforms will have on future weapons procurement. The link between the Executive and legislative branches, DOD and program managers are examined to determine if procurement reform has helped.

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# TABLE OF CONTENTS

<b>I.</b>	<b>INTRODUCTION.....</b>	<b>1</b>
	<b>A. PREFACE.....</b>	<b>1</b>
	<b>B. RESEARCH OBJECTIVE .....</b>	<b>1</b>
	<b>C. RESEARCH QUESTIONS.....</b>	<b>2</b>
	<b>1. Primary Research Questions .....</b>	<b>2</b>
	<b>2. Secondary Research Questions.....</b>	<b>2</b>
	<b>D. SCOPE OF THE THESIS.....</b>	<b>2</b>
	<b>E. LIMITATIONS OF SCOPE .....</b>	<b>3</b>
	<b>F. LITERATURE REVIEW AND METHODOLOGY.....</b>	<b>3</b>
	<b>G. BENEFITS OF RESEARCH.....</b>	<b>4</b>
	<b>H. NPS FACULTY RESEARCH QUESTIONS .....</b>	<b>4</b>
	<b>I. CHAPTER SUMMARY.....</b>	<b>5</b>
<b>II.</b>	<b>OVERVIEW OF NAVY PROCUREMENT REFORM .....</b>	<b>7</b>
	<b>A. INTRODUCTION.....</b>	<b>7</b>
	<b>B. PROCUREMENT REFORM.....</b>	<b>8</b>
	<b>1. Federal Acquisition Streamlining Act of 1994 .....</b>	<b>8</b>
	<b>2. Federal Acquisition Reform Act/Clinger-Cohen Act .....</b>	<b>9</b>
	<i>a. Federal Acquisition Regulations, Part 12 (FAR).....</i>	<i>10</i>
	<i>b. Cost as An Independent Variable.....</i>	<i>10</i>
	<i>c. Single Process Initiative.....</i>	<i>12</i>
	<b>3. Major Defense Acquisition Program (MDAP).....</b>	<b>12</b>
	<i>a. Reduce MDAP Acquisition Costs.....</i>	<i>13</i>
	<i>b. Director of Acquisition Program Initiative.....</i>	<i>14</i>
	<b>4. Acquisition Category (ACAT) I.....</b>	<b>16</b>
	<i>a. DOD’s Effect on Navy Procurement Reform .....</i>	<i>16</i>
	<i>b. Life Cycle Costs (LCC) .....</i>	<i>17</i>
	<b>C. CHAPTER SUMMARY.....</b>	<b>17</b>
<b>III.</b>	<b>PERENNIAL ISSUES IN NAVY WEAPONS PROCUREMENT .....</b>	<b>19</b>
	<b>A. INTRODUCTION.....</b>	<b>19</b>
	<b>B. PERENNIAL ISSUES IN WEAPONS PROCUREMENT.....</b>	<b>23</b>
	<b>1. The President’s Budget.....</b>	<b>23</b>
	<b>2. Congressional and Industry Testimony on Defense Programs.....</b>	<b>23</b>
	<b>3. Rising Operation and Maintenance Costs .....</b>	<b>27</b>
	<b>4. Congressional/Industry Lobbying: Increased Procurement</b>	
	<b>Funds Necessary.....</b>	<b>29</b>
	<i>a. FYDP Funding Bow Wave .....</i>	<i>31</i>
	<i>b. Low Rate Initial Production (LRIP) Begun Too Soon.....</i>	<i>33</i>
	<i>c. Insufficient Operational Test and Evaluation .....</i>	<i>33</i>
	<i>d. Overestimated Funding.....</i>	<i>34</i>
	<i>e. Unreasonable Assumptions .....</i>	<i>34</i>
	<i>f. Systems Do Not Match Requirements.....</i>	<i>36</i>
	<i>g. Alternative Weaponry Should Be Considered .....</i>	<i>37</i>

C.	OUTDATED FINANCIAL SYSTEMS.....	38
D.	CHAPTER SUMMARY.....	39
IV.	MANAGEMENT TECHNIQUES OF ACAT I PROCUREMENT ACCOUNTS.....	41
A.	INTRODUCTION.....	41
1.	Establishing the Process .....	42
2.	OMN Funding (Revisited).....	45
B.	PROGRAM MANAGEMENT TECHNIQUES .....	47
1.	Requirements Determination.....	47
2.	Pressure to Produce Weapons .....	48
3.	Pressure to Deliver Weapons .....	50
4.	Tension in Managing Programmatic Cuts .....	51
5.	Tension to Provide Accurate Cost Estimates .....	54
6.	Tension in Managing Funds.....	56
7.	Tension in Tracking Program Costs .....	59
8.	Savings and Cost Overruns.....	63
9.	Special Techniques.....	65
C.	CHAPTER SUMMARY.....	68
V.	COMPARATIVE ANALYSIS OF TWO ACAT I PROGRAMS .....	71
A.	INTRODUCTION.....	71
1.	Establishing a Start Date.....	72
2.	Congressional and Industry Influence .....	75
B.	INITIAL DESIGN .....	76
1.	Design Complexity .....	77
2.	Emphasis on Life Cycle Savings .....	78
3.	Design Challenges .....	82
C.	PRODUCTION .....	84
1.	Programmatic Quantity Changes.....	84
2.	Advance Procurement .....	87
3.	Program Cost Reduction and Funding Concerns.....	88
4.	Memorandum of Understanding .....	90
5.	Integrated Product Teams .....	91
6.	Operational Testing .....	92
D.	CHAPTER SUMMARY.....	94
1.	Unreasonable Assumptions.....	94
2.	FYDP Funding Bow Wave .....	94
3.	Alternative Weaponry Should Be Considered .....	95
4.	Overestimated Funding.....	95
5.	Insufficient OTE.....	95
6.	LRIP Begun Too Soon .....	96
7.	Systems Do Not Match Requirements.....	96
VI.	CONCLUSIONS AND RECOMMENDATIONS.....	97
A.	INTRODUCTION.....	97
B.	PRIMARY INTERESTS FOR CHANGE.....	98

<b>C. CONCLUDING RECOMMENDATIONS.....</b>	<b>100</b>
<b>APPENDIX A: DEFINITIONS, ABBREVIATIONS AND ACRONYMS .....</b>	<b>103</b>
<b>BIBLIOGRAPHY .....</b>	<b>107</b>
<b>INITIAL DISTRIBUTION LIST .....</b>	<b>117</b>

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## LIST OF FIGURES

Figure 1.	Increased Cost of Doing Business .....	15
Figure 2.	DOD TOA by Service Constant FY03\$M.....	20
Figure 3.	Navy O&M and Procurement Outlays in Constant FY03\$M.....	20
Figure 4.	O&M and Procurement Outlays in Constant FY03\$M .....	22
Figure 5.	DON TOA - Then and Now.....	22
Figure 6.	Recapitalization Rate for Shipbuilding Programs.....	24
Figure 7.	O&M Spending Per Capita Continues to Grow.....	26
Figure 8.	Expected Average Ship Age .....	27
Figure 9.	Resource Distribution (Contant Year \$M).....	28
Figure 10.	Average Aircraft Age (DON) .....	30
Figure 11.	Estimates Indicate Large Investment Increase Required .....	32
Figure 12.	USAF Average Age of Aircraft Increasing .....	35
Figure 13.	Fielded and Replacement System Cost Comparison .....	36
Figure 14.	Assignment Procedures/Requirements for ACAT I Program Managers.....	43
Figure 15.	Exhibit OP-31: Report on Spares Submitted to Congress on 6/01 .....	60
Figure 16.	Exhibit OP-31: Report on Spares Submitted to Congress on 2/02 .....	61
Figure 17.	Recent OMN, RDTEN, APN, and WPN Budget Trends .....	63
Figure 18.	Design for Ownership (LPD 17).....	74
Figure 19.	DDG 51 SCN Program Manager's Profile.....	78
Figure 20.	New Shipbuilding Market Sectors.....	81
Figure 21.	FY03 Budget Item Justification Sheet (DDG 51).....	85
Figure 22.	FY03 P-5B Exhibit - Analysis of Ship Cost Estimates (DDG 51).....	86
Figure 23.	FY03 P-27 Exhibit - Ship Production Schedule .....	87

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## LIST OF TABLES

Table 1	Total Program Costs for DOD's Most Expensive Programs.....	72
Table 2	Reduced Procurement of DDG 51 Destroyers.....	89

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## **ACKNOWLEDGMENTS**

First, I would like to thank God, who is sovereign. Without him, this thesis would not have been possible. Second, a very special thank you goes to my wife Paula for taking the trip with me. I pray that wherever we go, our journey will be full of joy. Thanks Mom, for always believing in me. Finally, I would like the superb faculty and staff of NPS for making this a truly enriching experience. I am particularly grateful for the “fabulous five” for your honesty, energy, patience and time.

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## EXECUTIVE SUMMARY

DOD reduced force structure after the Cold War threat disappeared, including reductions in civilian and military personnel and facilities associated with the armed forces. Weapons designed to combat the Soviet threat made weapon development easier. The 1990s capped a decade of unprecedented economic growth of the stock market and individual wealth. There was less emphasis on DOD funding in general and weapons procurement in particular. As DOD reduced programmed procurement in successive FYDPs, it has reprogrammed some procurement to the years beyond the FYDP, creating a bow wave of demand for procurement funds. More efficient and sophisticated weapons are necessary to support a smaller force. Acquisition reform legislation was designed to capture savings and usher in a Revolution in Business Affairs. Today, the Department of Defense's goal has been to deliver modern, high performance weapons systems at lower cost, and with higher performance. Better weaponry drives the reality that the nation and the Department find themselves in, an era of highly unpredictable security challenges. Today a wide array of rogue nations, transnational actors, and domestic terrorism demand weapons procurement reform that is effective against a smaller and much less visible foe. DOD has been unable to follow through with planned funding increases for modern weapon systems. This occurred in part due to DOD repeatedly shifting planned funding increases for modern weapon systems further into the future with each succeeding future years defense plan (FYDP). This research paper explores major procurement reforms and their effect on decreasing the amount of time and funds expended on current and future weapons systems. It will look for evidence of how the Department of the Navy's budget is impacted and what controls, if any, these reforms will have on future weapons procurement. The link between the Executive and legislative branches, DOD and program managers are examined to determine if procurement reform has helped.

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# **I. INTRODUCTION**

## **A. PREFACE**

This thesis deals with the acquisition reforms of the late 1980s and early to mid-1990s driven by a smaller military industrial complex, a need for quicker, more efficient acquisition and limited acquisition funding. This thesis will examine ten years of acquisition reform by exploring major procurement laws and their effect on decreasing the amount of time and funds expended on current and future weapon systems. It will look for evidence of how the Department of the Navy's budget is impacted and what controls, if any, these reforms will have on future weapons procurement. This thesis cites major procurement laws and examines their relevance to Navy weapons procurement. There is a thorough focus on expert testimony from Congressional hearings, GAO reports, industry and DOD witnesses and program managers to examine the effectiveness of procurement changes. This thesis provides two Case Studies focused on Major Defense Acquisition Programs budgets to support or counter the significance of procurement reform in the Navy.

## **B. RESEARCH OBJECTIVE**

This thesis looks at DOD procurement reforms that occurred in the last ten years and their effect on Navy weapons procurement. The primary objective of this analysis will be to analyze the Navy's acquisition of major weapons systems before and after the advent of major reforms. Acquisition strategies at the program managers' level emphasizes and identifies methods of weapons procurement management employed to maximize the program's effectiveness. This thesis has a secondary objective of determining whether DON acquisition reform has been universal in its success or failure as revealed in the Case Studies.

## **C. RESEARCH QUESTIONS**

### **1. Primary Research Questions**

What effect has Department of Defense procurement reform had on Navy weapon procurement accounts?

### **2. Secondary Research Questions**

- A. Has Navy weapon's procurement realized improvement in real dollars with the advent of acquisition reform?
- B. Were cost savings in Navy weapons systems procurement programs realized?
- C. Have funding trends in ACAT I programs matched procurement dollars over the last ten years?
- D. Has the Major Defense Acquisition Program (MDAP) enabled more effective acquisition management of scarce dollars?
- E. How do the Navy weapons procurement dollar budgeting and performance measures compare with those of the Army and Air Force?
- F. How are weapon accounts affected by decreased procurement dollars?
- G. Has the Program Manager realized programmatic success in defense procurement reform?

## **D. SCOPE OF THE THESIS**

This thesis provides an overview of the Federal Budget Process and its specific relationship to procurement accounts. This thesis examines the effects of diminished procurement funding on other DOD and Navy accounts. This thesis will provide historical graphs and displays illustrating procurement trends. This thesis briefly discusses Budget Authority, Total Obligation Authority and Outlays over the procurement reform period. This thesis provides an analysis of the program office's role

in defending its procurement dollars to determine its effectiveness in procurement reform. It also provides an analysis of procurement funding management techniques employed by two ACAT I (MDAP) program offices. The procurement programs Case Analyses are cross-compared to determine if they support or disprove the effectiveness of acquisition reform.

## **E. LIMITATIONS OF SCOPE**

Due to time constraints and the availability of data, this thesis will not provide an in depth analysis of the Federal Budget process, including PPBS and DOD budgeting. It will not provide an in depth analysis of contract management and acquisition reform. It will not provide an in depth analysis of simplified acquisition reform; or an in depth analysis of the Federal Acquisition Streamlining Act of 1994 (FASA); or an in depth analysis of the Federal Acquisition Reform Act of 1996 (FARA). It will not provide an in depth analysis of ACAT I or Major Defense Acquisition Programs.

## **F. LITERATURE REVIEW AND METHODOLOGY**

The methodology used in this thesis consisted of the following steps:

1. A literature search of books, magazine articles, trade journals, World Wide Web, DOD references, DON references and other library information sources.
2. An examination of Congressional hearings, GAO Reports, DOD IG reports and statements of DOD witnesses.
3. Personal interviews of NPS faculty with program management and weapons procurement experience. This thesis provides a list of questions for NPS faculty.
4. Identification of major procurement laws in contracting and acquisition reform over the past ten years.

## **G. BENEFITS OF RESEARCH**

This thesis is primarily intended to benefit students of the weapons procurement process by providing insight on procurement reform trends and a cross analysis of two ACAT I programs. This study will provide acquisition professionals with anecdotal information on the successes and failures of weapons procurement from their contemporaries, and will elicit open discussion and analysis on the efficiency of acquisition processes.

## **H. NPS FACULTY RESEARCH QUESTIONS**

- A. How does the PM lobby funding for support for his program?
- B. What documents in the POM process do you receive to request program funding?
- C. After budget approval from Congress, how do you receive funding?
- D. How does the PM determine his/her program funding (budget)?
- E. How does the PM execute his/her budget?
- F. Does the Program Manager buy more items than necessary, rather than manage to need?
- G. Does the PM return excess funds?
- H. Is the PM able to determine how much money he/she is managing and where that money is going on a real time or near real time basis? Specifically, does the PM interface with MOCAS? How well are funds tracked in MOCAS?
- I. Should there be a better solution to MOCAS?
- J. Is the PM's initial cost estimate optimistic? Why or why not?
- K. Are subsequent cost estimates optimistic?
- L. Does the contractor make up costs with suggested contract modifications?
- M. How does the PM manage cost overruns?
- N. Does the PM proceed with LRIP without completely demonstrating the weapon system works? If yes, under what circumstances? If yes, is cost the main driver?
- O. How does the PM manage programmatic cuts?

- P. If the program is a “lemon”, does the PM continue to support it?
- Q. Are projected program savings used to justifying a program’s existence? In your experience, have projected savings, if any, enhanced the program’s life?
- R. Is there a military culture to produce weapons whether needed or not?
- S. Has MDAP helped acquisition/procurement at the PM level?
- T. Have FARA/FASA, CAIV, DOD 5000.2R policy changes etc., helped the PM manage his program?
- U. What special techniques are employed by the PM to ensure current year funding meets minimum requirements?

## **I. CHAPTER SUMMARY**

Chapter I outline the methodology used, approaching DOD procurement reform with specific attention to DON Major Defense Acquisition Programs. Today’s DOD faces myriad challenges that had not existed in the past and/or were not as significant as today. Rogue nations, transnational actors, global and domestic terrorism coupled with shrinking defense procurement dollars replaced the Soviet threat. The nation and DOD find themselves in an era of new highly unpredictable security challenges. A shrinking defense industrial complex with limited competition for weapons procurement and a changing global environment drove weapon procurement reforms. DOD repeatedly shifted planned funding increases for modern weapon systems resulting in a bow wave of procurement in the out years.

The challenge is capturing the appropriate funding to acquire the proper weaponry in the future. An examination of improved methods of conducting weapons procurement results in greater US security. This thesis hopes to promote further discussion and offers recommendations on controls affecting DON’s budget. Specifically it looks to determine if ten years of procurement reform has helped or hindered weapons acquisition in a rapidly evolving world.

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## **II. OVERVIEW OF NAVY PROCUREMENT REFORM**

### **A. INTRODUCTION**

Acquiring weapons for military forces is central to accomplishing the Department of Defense's (DOD) mission. However, pervasive problems persist in the process of acquiring weapons, including cost, schedule, and performance estimating errors; accurate estimates of program affordability; and acquiring weapons based on optimistic assumptions about the maturity and availability of enabling technologies.<sup>1</sup> The existence of outdated legacy systems makes the ability to accurately track and measure procurement costs even more difficult. Thus, weapons procurement reform is driven by a myriad of factors borne out of DOD's desire to acquire the best weaponry at the least cost. Tension exists between top-level players like Congress, Defense Acquisition Executives and mid-level officials like program managers and comptrollers because of limited resources. Before discussing existing programmatic tensions, this chapter provides background information on major procedural, regulatory and legislative reforms. Some of the reforms discussed have historical implications, but are no longer substantive as a stand-alone requirement. For example, the Federal Acquisition Reform Act (FARA) and the Federal Acquisition Streamlining Act (FASA) have been incorporated into other instructions. DOD 5000.2R is being revised as well.

In each case, these policy documents or legislation address significant acquisition reform initiatives. Program managers are provided tools, in the form of regulations and funding which enable them to procure weapons. This chapter lays the foundation for further discussion of techniques employed by program managers. Discussion of these initiatives does not necessarily correlate with their applicability to day-to-day program management. It merely identifies and clarifies tools available to the program manager.

## **B. PROCUREMENT REFORM**

Increasing procurement costs led to increased reliance on commercial products and processes.<sup>2</sup> Moreover, the Defense Department's limited investment budget is constrained by a relatively stable top-line budget and squeezed by increased operations and support costs from aging weapon systems.<sup>3</sup> The Defense Department is in the midst of a revolution in business affairs (RBA) with 3 goals in mind. First, it wants to field high quality defense products to reduce average acquisition systems cycle time for all MDAPs by 25 percent (132 months to 99 months). DOD wants to lower total ownership costs (TOC) of defense products, with the goal of minimizing cost growth in MDAPs to no greater than 1 percent annually. Finally, reduced overhead costs will result in less expensive weapons platforms.<sup>4</sup>

### **1. Federal Acquisition Streamlining Act of 1994**

DOD issued an update to its regulations governing the acquisition of major weapon systems on 13 October 1994. Among other things, the update incorporated new laws and policies, including the Federal Acquisition Streamlining Act, separated mandatory policies and procedures from discretionary practices, and reduced the volume and complexity of the regulations.

FASA required the SECDEF to define cost, schedule and performance goals for all of the Major Defense Acquisition Programs (MDAP) and for each phase of their acquisition cycle. Highlights included streamlined proposal information or page count; shortened proposal submission time; shortened evaluation team size or evaluation time; and limited source selection factors pertaining to cost, past experience, performance or quality of content. FASA called for full and open competition, which is obtained when "all responsible sources are permitted to submit sealed bids for competitive proposals"<sup>5</sup> (FAR). Full and open competition is achieved through open specifications<sup>6</sup>.

FASA established a clear preference for acquisition of commercial items in federal procurement. It requires agencies to reduce impediments to and train appropriate personnel in the acquisition of commercial products. One such impediment is the use of design specifications, which restrict competition and make acquisition of commercial products difficult. Design specifications typically tell a vendor how a product is to be made or how a service is to be performed. A commercial vendor, whose product has been developed for public use, seldom conforms to the government's design specifications. FASA instilled flexibility, and timeliness into the acquisition process.

## **2. Federal Acquisition Reform Act/Clinger-Cohen Act**

The major pieces of legislation affecting the acquisition and information technology world were the Federal Acquisition Reform Act and the Information Technology Management Reform Act. While originally passed as two separate initiatives, their impact on each other made it impossible to enact each singularly. The two acts were later combined and renamed the Clinger-Cohen Act.

The major impact on information technology was the repeal of the Brooks Act and its associated restriction on procurement of resources. Clinger-Cohen encourages the acquisition of commercial off the shelf (COTS) IT products and allows the Office for Federal Procurement Policy (OFPP) to conduct pilot programs in federal agencies to test alternative approaches for acquisition of IT resources. The Act directs agencies to use "modular contracting" based on successive acquisitions of "interoperable increments".<sup>7</sup> The Act created the Chief Information Officer and for the Department of Defense, it combined life cycle approvals for weapon systems and information technology systems into a single instruction, the DOD 5000.1 series.

FARA and FASA have been overtaken or superseded by other reform documents, processes or legislation. For purposes of this thesis, research was limited to those directly applying to MDAPs and weapons procurement. Additional reforms involve fostering the

development of measurable cost, schedule, and performance goals and incentives for acquisition personnel to reach those goals. Among other things, program managers (as well as senior DOD and Departmental officials) must establish cost, schedule, and performance goals for acquisition programs and annually report on their progress in meeting those goals. They must establish personnel performance incentives linked to the achievement of the goals. Program Executive Offices must submit recommendations for legislation to facilitate the management of acquisition programs and the acquisition workforce.

*a. Federal Acquisition Regulations, Part 12 (FAR)*

FAR applies to all contracting regulations. The pertinent part of the FAR with regard to commercial off the shelf reforms (COTS) is part 12. Essentially, organizations (DOD in this case) should perform market research to maximize the use of commercial products. Weapon programs must purchase commercial or non-developmental items (CNDI) when they are available and when they meet the organizations needs. Contractors are required to incorporate CNDI to the maximum extent possible.

Leading commercial firms are getting the kinds of outcomes from their development of new products that the Department sought. Specifically, firms were developing increasingly sophisticated products in significantly less time and at lower cost than their predecessors. The quality and credibility of cost information available to DOD decision-makers remain a problem. For example, the Navy's reported costs for ships under construction did not include all relevant costs, such as those for outfitting and post delivery.<sup>8</sup>

*b. Cost as An Independent Variable*

DOD Directive 5000.1 communicates operational needs into stable, affordable programs like Cost as An Independent Variable (CAIV). System performance

and target costs are determined on a cost-performance tradeoff basis. The acquisition process will make cost more of a constraint and less a variable thus ensuring effectiveness and suitability of the system. CAIV reduces procurement costs. After Desert Storm and before the Terrorist Attacks on September 11, 2001, threats were not increasing in perceived capability at as fast a rate. DOD's acquisition budget decreased accordingly. It was more appropriate to make cost a stronger driver in system design due to decreased budgets. Such an approach is also more consistent with commercial practices in new system developments, where market forces drive the price of a new system.

The research firm Coopers and Lybrand identified over 120 regulatory and statutory "cost drivers" that, according to the contractors surveyed, increases the price DOD pays for goods and services by 18 percent<sup>9</sup>. Some of the more egregious cost drivers included government imposed accounting and reporting standards and systems such as Cost Accounting Standards (CAS) and complex contract requirements and statements of work (SOW).<sup>10</sup>The basic principles of the study were to develop a more "commercial-like" defense procurement process. This includes reducing regulatory burden; transferring more program cost, design and technology control authority and responsibility to the contractor; exploiting commercially developed parts, components, technologies and processes; and making cost/price a key requirement.<sup>11</sup> This study was used to support the Revolution in Business Affairs. Free and open competition, CAIV, and streamlined procurement procedures and more effective program management are some of the substantial changes in the last ten years of procurement reform. Establishing free and open competition is just part of procurement reform. Changes in IT procurement from the Clinger-Cohen Act included using cost as an independent variable as a means of reducing procurement costs is another.

*c. Single Process Initiative*

The Secretary of Defense directed DOD to change the management and manufacturing requirements of existing contracts and unify them within one facility, where appropriate. This initiative is called the block change or single process initiative (SPI). PMs are tasked with ensuring SPI reduces weapon procurement costs.

Allowing defense contractors to use a single process in their facilities is a natural progression from the contract-by-contract process of removing military-unique specifications and standards initiated in FASA. Contractors will incur transition costs that equal or exceed savings in the near term. Moving to common, facility-wide requirements will reduce government and contractor costs in the long term, however<sup>12</sup>.

**3. Major Defense Acquisition Program (MDAP)**

To be considered a MDAP, an acquisition program must either be designated by the Under Secretary of Defense for Acquisition, Technology and Logistics (USD (AT&L)) as an MDAP or estimated by the USD (AT&L) to require an eventual total expenditure for RDT&E of more than \$365M in FY00 constant dollars or more than \$2.190B in procurement in FY00 constant dollars. DOD 5000.2-R applies primarily to major acquisition programs. It's recommended during program definition, principally regarding requirements evolutions and system supportability that integrated process teams (IPT) are used. Program structure recommendations include an acquisition strategy of open systems. The program manager, to maximize the program's effectiveness, should use commercial sources, risk management, and CAIV. The PM should use program design incorporating integrated product and process development (IPPD) and by placing system engineering emphasis on producibility, quality, acquisition logistics and open system design<sup>13</sup>.

SECDEF recently directed DOD 5000.2R conversion from a regulatory document into a functional and more flexible policy document. The 5000 series requires important user requirements like the operational requirements document (ORD) and initial operational capability. The 5000.2R procurement requirements are firm and not subject to change<sup>14</sup>. SECDEF, the services and program managers need flexibility to manage procurement funds. The old 5000.2R made sense because it expressed a preference for logisticians to be more involved in procurement. DOD estimated that it is spending about \$59B a year on logistics support to operate and sustain weapon systems. Logistician involvement is designed to save O&M dollars by providing feedback on designing effective systems and how to improve procurement delivery times<sup>15</sup>. Weapon systems program offices are responsible for analyzing the cost-effectiveness of contractor support approaches in developing life-cycle support plans, in accordance with DOD 5000.2R. The new document promises to piggy-back on recent procurement reform, allowing greater flexibility and control for procurement leadership.

*a. Reduce MDAP Acquisition Costs*

Weapon programs establish an Acquisition Program Baseline (APB) to document the cost, schedule and performance objectives and thresholds of that program beginning at program initiation. The program manager prepares the APB at program initiation for acquisition category programs, and at each subsequent major milestone decision, and following a program restructure or an unrecoverable program deviation. APBs contain objectives for cost, schedule and performance parameters. The specificity and number of performance parameters evolve as the program is better defined. The schedule parameters include program initiation, major milestone decision points, initial operating capability and any other critical system events. These critical events are proposed by the PM and approved by the Milestone Decision Authority (MDA) for each program.

***b. Director of Acquisition Program Initiative***

Annually, the Director of Acquisition Program Integration determines if each MDAP has reached 90 percent or more of its cost, schedule, and performance parameters when compared to acquisition program baseline thresholds. The appropriate decision authority must make a similar determination for non-major acquisition programs. If 10 percent or more of a program's parameters are missed, a timely review is required. The review addresses any breaches in cost, schedule and performance and to recommend suitable action, including termination. Major acquisition defense program baselines must be coordinated with DOD's Comptroller before approval<sup>16</sup>.

Cost parameters are limited to RDT&E costs, procurement costs, the costs of acquisition of items procured with operations and maintenance funds, total quantity and average unit procurement cost. (Average unit cost equals total procurement cost divided by total procurement quantity). As the program progresses through later acquisition phases, procurement costs are refined based on contractor actual costs from program definition and risk reduction (PDRR), engineering, manufacturing and development or from initial production lots.

Cost, schedule and performance objectives are used through the cost as an independent variable (CAIV) process<sup>17</sup>. Cost, schedule and performance may be traded-off by the PM, within the range between the objective and the threshold without obtaining MDA approval. If not managed well, cost overruns will occur. Today, there are increased costs for weapon replacement. Figure 1 illustrates the cost to improve the AAV. The AAV is the Marine Corps only ACAT I program, consuming the bulk of the Marine Corps' procurement dollars when it begins full rate production. The question is not so much how much it costs but whether the Marine Corps can afford it.<sup>18</sup> Dramatic increases in specifications, like increased water speed of 25 knots from 7 knots; the ability to keep up with the main battle tank at 30 mph versus 20 mph for the AAV; increased range on water of 65 miles versus 45 miles, contributed to AAV's higher cost as compared to its predecessor.<sup>19</sup>

## Increased Cost of Doing Business

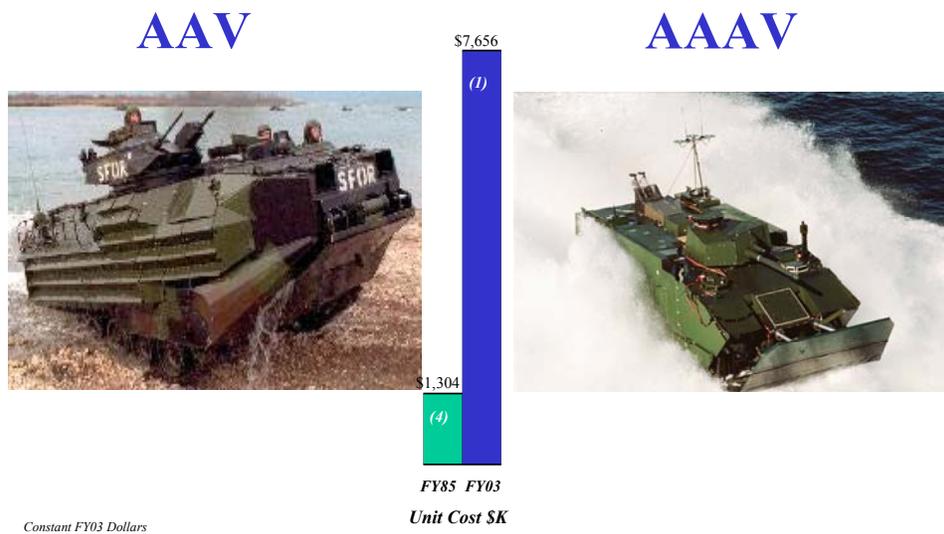


Figure 1. Increased Cost of Doing Business

CAIV helps the PM recognize that the majority of costs are determined early in a program's life cycle. The best time to reduce life-cycle costs is early in the acquisition process. Cost reductions are accomplished through cost and performance tradeoff analysis, which is conducted before an acquisition approach is finalized. Incentives are applied to both government and industry to achieve the objectives of CAIV<sup>20</sup>. Awards programs and "shared savings" programs are used creatively to encourage generation of cost-saving ideas for all phases of life-cycle costs. Incentive programs target individuals and government and industry teams. The PM works closely with the user to achieve proper balance among cost, schedule and performance while ensuring that systems are both affordable and cost-effective. The PM, together with the user, proposes cost objectives and thresholds for MDA approval, which will then be controlled through the APB process<sup>21</sup>. The PM searches continually for innovative practices to reduce life-cycle environmental costs and liability.

#### **4. Acquisition Category (ACAT) I**

ACAT I programs are Major Defense Acquisition Programs (MDAPs). An MDAP is defined as a program estimated by the Under Secretary for Defense (Acquisition and Technology) (USD (A&T)) that requires eventual expenditure for RDT&E of more than \$365M (FY00 constant dollars) or procurement of more than \$2.190B (FY00 constant dollars), or those designated by the USD (A&T) to be ACAT I. There are three major acquisition categories, ACAT I, ACAT IA and ACAT II governed by DOD<sup>22</sup>. ACAT ID (defense) and ACAT IC (component or individual service) are discussed in more detail in Chapter IV. ACAT IA and ACAT II programs are not relevant to the thesis and will not be discussed.

##### ***a. DOD's Effect on Navy Procurement Reform***

Milestones are major decision points for weapons systems. The milestone review process is predicated on the principle that systems advance to higher acquisition phases by demonstrating that they have met prescribed technical specifications and performance thresholds. For all ACAT I programs, a life cycle cost estimate is prepared by the program manager in support of program initiation and all subsequent milestone reviews. The Navy PM establishes, as a basis for life-cycle cost estimates, a description of the salient features of the acquisition program and of the system itself<sup>23</sup>. The Navy's Component Acquisition Executive, Assistant Secretary of the Navy (Research, Development and Acquisition) (ASN (RD&A)) prepares the budget estimate for ACAT I programs in support of Milestones II and Milestone III. ASN (RD&A) exercises line management over Program Executive Offices (PEOs) and direct reporting program managers.<sup>24</sup> The PEO generally relies on hardware systems commands for administrative support, including comptroller functions for financial management. The fund-flow for both PEO and hardware systems commands funds are within single conveyance, via a normal path for appropriations. The PEO exercises control of designated resources within the hardware systems command's allocation. For purposes of this thesis, the Navy ACAT I programs will be examined from the PM's perspective.

***b. Life Cycle Costs (LCC)***

The LCC estimate plays a key role in the management of an acquisition program. At each milestone decision point, including the decision to start a program, life-cycle costs, cost, performance, and schedule tradeoffs, cost drivers and affordability constraints are major considerations. Its primary purposes include providing input to acquisition decisions among competing major system alternatives. LCC helps determine requirements. Cost Drivers are identified among alternatives. LCC also provide an index of merit for trade-off evaluations in design, logistics and manufacturing and the basis for overall cost control.

**C. CHAPTER SUMMARY**

In terms of "what to buy," DOD's efforts have focused on greater reliance on commercial products and processes and more timely infusion of new technology into new or existing systems. COTS usage is implemented with an understanding of the complex set of impacts that stem from use of commercial products<sup>25</sup>. Solicitation requirements are being described in performance terms. If military specifications are necessary, waivers must first be obtained. Solicitations for new acquisitions that cite military specifications typically encourage offerors to propose alternatives.<sup>26</sup> DOD has made significant progress in disposing of the huge inventory of military specifications and standards through cancellation, consolidation, conversion to a guidance handbook, or replacement with a performance specification or non-government standard. The Defense Acquisition Corps has increased education and training requirements for key positions such as those found in the Critical Acquisition Position (CAP). CAPs are the most senior positions in the defense acquisition workforce, including program executive offices, program managers, deputy program managers of MDAP ACAT I defense acquisition programs and the program managers of significant non-MDAP ACAT programs<sup>27</sup>.

Maximizing the PM's and contractor's flexibility to make cost/performance tradeoffs without unnecessary higher-level permission is essential to achieving cost objectives. Therefore, the number of threshold items in requirements documents and acquisition program baselines is strictly limited. This thesis examines the impact of weapons procurement reform at the program manager's level. The Navy's MDAP list includes DDG 51 and LPD 17 among others. These two ACAT I MDAPs are examined to determine if procurement reform has helped or hindered ongoing reform initiatives. The next chapter looks at techniques used by program managers to effectively manage weapon programs.

### **III. PERENNIAL ISSUES IN NAVY WEAPONS PROCUREMENT**

#### **A. INTRODUCTION**

This chapter covers basic budgeting and funding authority pertaining to weapons procurement. It begins with a review of budget authority, total obligational authority and outlays, DOD-wide and Navy-specific, from 1988 to 2000. There will be specific background information related to procurement, research and development, and operation and maintenance dollars. A top-level look at DOD weapons procurement is undertaken. Perennial issues are discussed and are incorporated in Chapters IV and V as a relevance test for program management techniques.

Budget Authority (BA) is the authority to incur legally binding obligations on the government that result in immediate or future outlays. Congress provides BA in the form of enacted appropriations. Total Obligational Authority (TOA) is a DOD financial term that expresses the value of the direct defense program for a fiscal year. Figure 2 shows TOA by service in constant FY03 dollars. The chart shows TOA decreasing from FY88 to FY94 where it leveled off until FY99 where it increased slightly. TOA differs from BA for several reasons, including BA lapsing before obligations were incurred; proposed or enacted legislation transferring unobligated balances for which the purpose of the balances has changed; reappropriations; rescissions; Net Offsetting Receipts, which are collections from the public. Figure 3 shows Navy Operations & Maintenance (OMN) and Procurement dollars in constant FY03 dollars. OMN and procurement dollars trended downward from FY88 to FY94, with a few spikes upward in FY95 and FY98. The gap in OMN and procurement funding increased significantly after FY92 and widened further until FY98 when procurement dollars were added back at a larger rate than OMN. The OMN and procurement log equivalent lines show a steady decline in operations and maintenance and procurement funding over the past 14 years. Data for figures 1, 2 and 3 were derived from the FY03 National Defense Budget Tables.

## DOD TOA BY SERVICE: CONSTANT FY03\$K

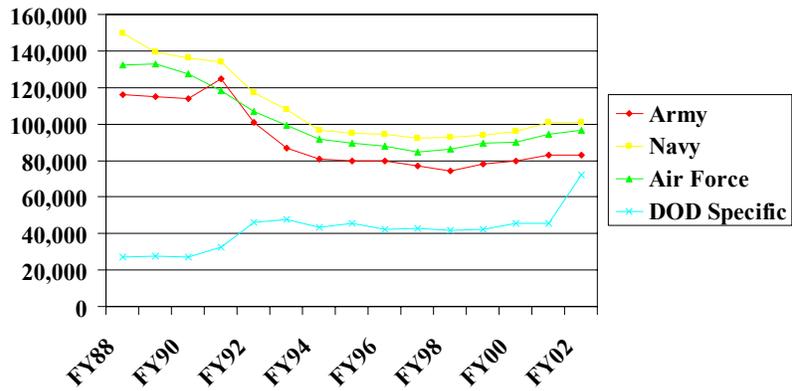


Figure 2. DOD TOA by Service in Constant FY03\$K

## Navy O&M and Procurement BA in Constant FY03\$M

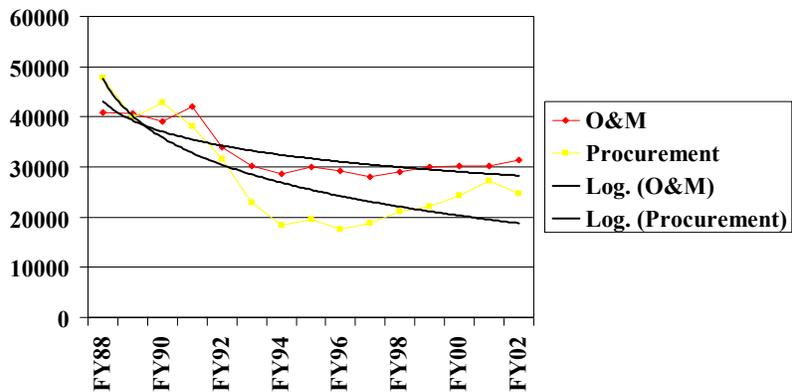


Figure 3. Navy O&M and Procurement Outlays in Constant FY03\$M

Net off-setting receipts are deducted from BA but have no effect on TOA. Outlays or expenditures are the liquidation of the government's obligation, generally

representing cash payments.<sup>28</sup> Before the amended FY89 budget submission, prior year unobligated balances were reflected as adjustments against TOA in the applicable program year only. However, since then, both the Congressional Budget Office (CBO) and Office of Management and Budget (OMB) score such rescissions as reductions to the current year BA. Previously, reappropriations were scored as new budget authority in the year of legislation. However, in presenting the amended FY89 budget, CBO and OMB directed scoring of reappropriations as budget authority in the first year of availability.<sup>29</sup>

Figure 4 shows procurement decreased from FY88 to FY96, remaining relatively flat for three years while O&M costs increased to support older ships and aircraft in FY96 to FY99. There was some recovery of procurement and funding in FY00, but the gap in OMN and procurement remained steady. The executive and legislative branches, special interest groups, Department of Defense, Department of the Navy and program managers are linked to the means of acquiring defense weapons. Specific attention is placed on the actions and responses of program managers to their external, political and fiscal environment. Figure 5 shows the components of DOD TOA and how it changed from 1988 to 2003. Figure 5 also shows OMN and procurement as a percentage of TOA. Here OMN is seen as roughly flat as a percentage of TOA and procurement declining from the low 30<sup>th</sup> percentile in 1988 to just below the 20<sup>th</sup> percentile in 1994 before rebounding. The percentage TOA shows consistency of historical share but provides no information as to whether this is enough or too little funding.

### O&M and Procurement Outlays in Constant FY03\$M

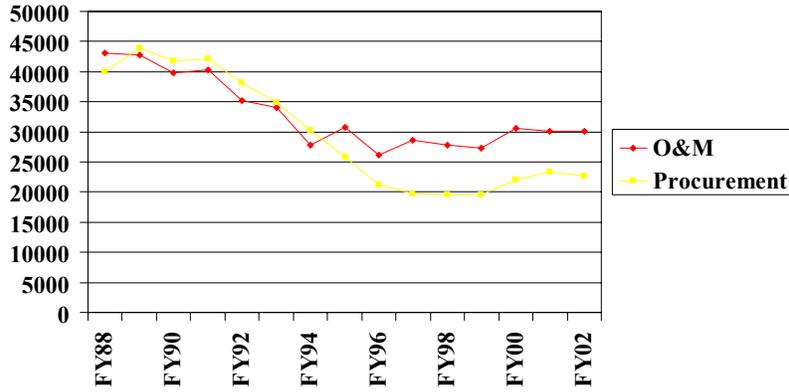


Figure 4. O&M and Procurement Outlays in Constant FY03\$M

### DON TOA - Then and Now

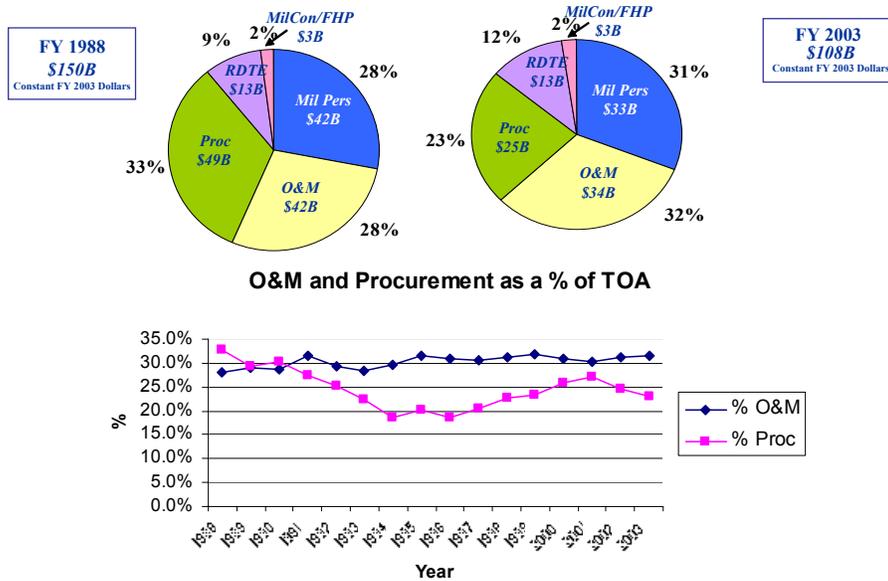


Figure 5. DON TOA – Then and Now

## **B. PERENNIAL ISSUES IN WEAPONS PROCUREMENT**

### **1. The President's Budget**

The president's budget is submitted to Congress each February. Because of the prior planning and programming involved during the PPBS process, the final budget submission has few surprises. Congress uses the budget as a baseline to address the country's and its constituents' needs. The budget is debated and modified before the final reconciliation is done, starting a new fiscal year. The FY03 budget proposed an additional \$48 billion for defense, representing a 13 percent increase in constant dollars—the fastest growth since the defense build-up of the 1980's<sup>30</sup>. Defense outlays approached 3.5 percent of GDP in FY03, the highest levels since 1995. (During the 1980s, defense spending averaged nearly 6 percent of GDP.) Included in that request was \$10 billion designated as “wartime contingency” for combating terrorism in Afghanistan or other, as-yet-to-be-determined locations; that amount will not be requested for later years. Members of Congress made their thoughts clear that the President's proposed \$48B defense spending increase provided insufficient funds for defense. After 2003, the President's budget envisions a much slower growth in budget authority for defense – for an average annual rate of 3.2 percent through 2012<sup>31</sup>.

### **2. Congressional and Industry Testimony on Defense Programs**

Concerns over the President's defense procurement spending plan, coupled with earlier defense spending cuts from stratospheric levels of the Cold War, drew concerns from industry groups, including Former Assistant Navy Secretary John Douglass, president of the Aerospace Industries Association; retired Air Force LTGEN Larry D. Farrell, president of the National Defense Industries Association; and former Congressman Dave McCurdy, president of the Electronic Industries Alliance.

Douglass, the former assistant Navy secretary, "You can't maintain a defense base on five ships a year." Douglass and Farrell rolled out figures on what they see as a disappearing defense industrial base. The lobbyists' concerns were based on projected

build rate of five ships per year. They said that the nation needs a viable defense industry in time of war, pointing to the reduced number of makers of major defense platforms. To combat the decline in ship building and maintain a force of 310 ships, the Navy must build an average of nine ships per year. Proposed increased recapitulation rates are shown in figure six. The “\” found in the President’s Budget (PB) column represent the number of ships proposed in the president’s budget. DOD’s proposed figure found is in the column labeled “now” for each program.

The Shipbuilding Association wanted Congress to add \$935 million to the budget to procure a third DDG-51 in FY '03 and fund advance procurement for a third DDG-51 in FY '04. Such an increase would "move the Navy closer" to the requirement that it procure four DDG-51s a year, the rate needed to sustain a fleet of 116 destroyers and other surface combatants, the association wrote in an issue paper. A third DDG 51 was added to the FY03 budget.

### *Shipbuilding Programs*

	FY 03		FY 04		FY 05		FY 06		FY 07		FY 08	FY 09
	PB	Now	PB	Now	PB	Now	PB	Now	PB	Now	Now	Now
CVNX	-	-	-	-	-	-	-	-	1	* 1	-	-
SSN 774	1	1	1	1	1	1	1	1	1	2	2	2
DDG 51	2	2	3	2	3	2	2	1	2	-	-	-
DDX	-	-	-	1	* 1	-	-	* 1	-	1	2	3
LCS	-	-	-	-	* 1	-	* 1	-	-	-	2	4
LPD 17	1	1	1	1	1	1	2	1	2	2	2	-
LHA (R)	-	-	-	-	-	-	-	-	1	-	-	-
JCC	-	-	-	-	-	1	-	2	-	-	-	-
MPP(F) (NDSF)	-	-	-	-	-	-	-	1	-	-	1	1
T-AKE (NDSF)	1	1	2	2	2	2	2	3	1	-	-	-
T-AOE (X) (NDSF)	-	-	-	-	-	-	-	-	-	-	-	2
<b>Total New Construction</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>8</b>	<b>11</b>	<b>8</b>	<b>9</b>	<b>12</b>	
SSGN	2	2	2	-	-	-	-	-	-	-	-	-
Cruiser Conversion	-	1	1	2	2	4	3	4	3	3	3	3
T-AGS	-	-	-	-	-	1	-	-	-	-	-	-
<b>Total Conversions</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
CVN RCOH	-	-	-	1	1	-	-	-	-	-	-	-
SSN/SSBN refueling	1	2	-	1	2	3	2	4	3	2	1	
LCU (R)	-	-	-	5	3	5	3	5	3	3	3	3
LCAC SLEP	3	4	3	4	5	6	6	6	6	6	6	6

\*Funded in RDT&E,N

**Recapitalization Rate to Maintain 310 Ships is: 9 Ships per Year**

Figure 6. Recapitalization Rate for Shipbuilding Programs

Consolidations, mergers, and bankruptcies have limited the number of major weapons systems contractors. Contractors making Navy surface ships shrank from eight to three from 1990 to 2000, as did the number of companies producing fixed-wing military aircraft.<sup>32</sup> There still are two makers of submarines, though that is because Northrop won a bidding contest with General Dynamics Corporation. Rotorcraft makers (such as helicopters and the V-22 Osprey tilt-rotor airplane) declined from four to three, while makers of strategic missiles contracted from three to two.<sup>33</sup>

The number of companies filling contracts in the undersea warfare area fell by two-thirds, from fifteen to five, while producers of torpedoes slipped from three to two. Douglass and Farrell estimated that "shipyards are operating at 50 percent of capacity," which is inefficient, and costs the Navy "hundreds of millions of dollars annually," compared to costs of operating shipyards at higher, more efficient output levels.

Rep. Norm Dicks (D-Wash.), a member of the House Appropriations Defense subcommittee, charged that the administration's budget fell short of what several studies have shown is needed to make up for years of under-funding procurement. The most conservative analysis, which was done by the Congressional Budget Office recently, found that procurement should rise to at least \$94 billion.<sup>34</sup> "The Defense Department procurement budget is in crisis," Dicks wrote in a recent paper on his proposal. The Congressman said procurement levels are not only inadequate to sustain the force structure but are driving up operation and maintenance costs because aging weapon systems are not being replaced quickly enough.<sup>35</sup> For instance, he said the Navy's aging F-14 Tomcats experienced a 227 percent increase in maintenance hours per flying hour from 1992 to 1999.<sup>36</sup> Aging equipment, increased equipment complexity and quality of life issues have driven increased O&M spending. Figures 4, 5 and 7 show recent O&M spending trends. Figure 7 shows the President's Budget (PB) figures lag the actual figures Congress appropriated.

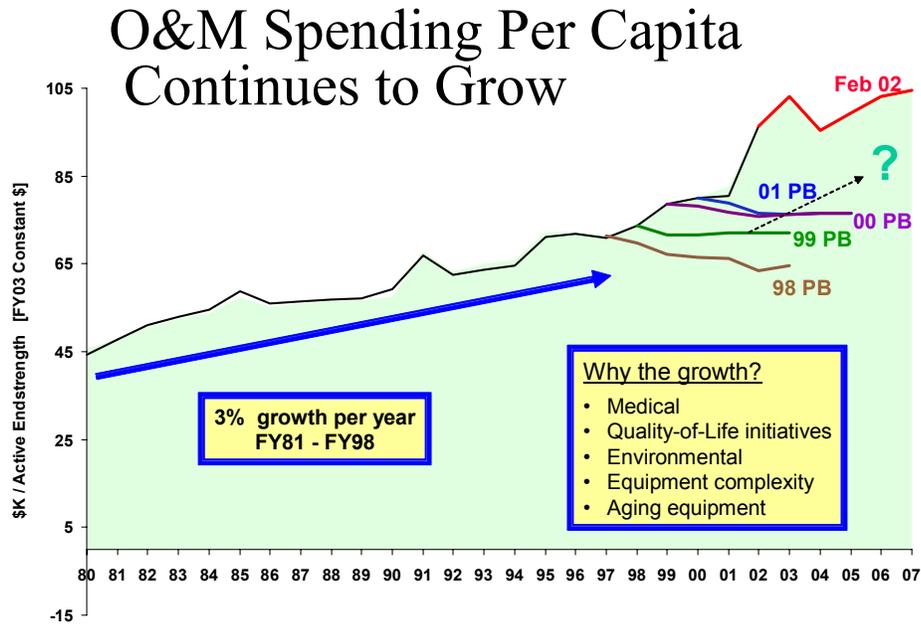


Figure 7. O&M Spending Per Capita Continues to Grow

Secretary of Defense Rumsfeld said that the low rate [of ship production] is not a problem in the near term [due to] the relatively young age of the fleet, which averages 16 years.<sup>37</sup> The expected average ship age will increase under the current procurement rate, as shown in figure 8. Mr. Rumsfeld’s testimony supports the President’s budget however the trend is toward supporting an aging defense force. Congressional testimonials for recapitulation are directed towards reducing an aging fleet that directly affects O&M costs. The Navy had to make choices in its budget and fully fund spare parts, munitions and steaming hours, as well as adding capability with the SSGN conversions, he said. The Future Years Defense Plan calls for a build rate of five ships in FY04, seven in FY05, seven in FY06 and ten in FY07, according to a statement by Rumsfeld.

Rumsfeld also said that contractor problem and more realistic weapons cost estimates by DOD contributed to the low ship request in FY03. The military services traditionally have underestimated contract costs, Rumsfeld said. In FY03, the Navy is paying \$600 million for past shipbuilding bills were not paid because of the

underestimating of costs, he said. Rep. Gene Taylor (D-Miss.) told Mr. Rumsfeld "I don't quite buy your argument" and said that the problem was not enough contracts and not enough money for shipbuilders. Taylor told Rumsfeld that no company would try to build a shipyard given the poor return on current shipyards<sup>38</sup>

### *Expected Average Ship Age*

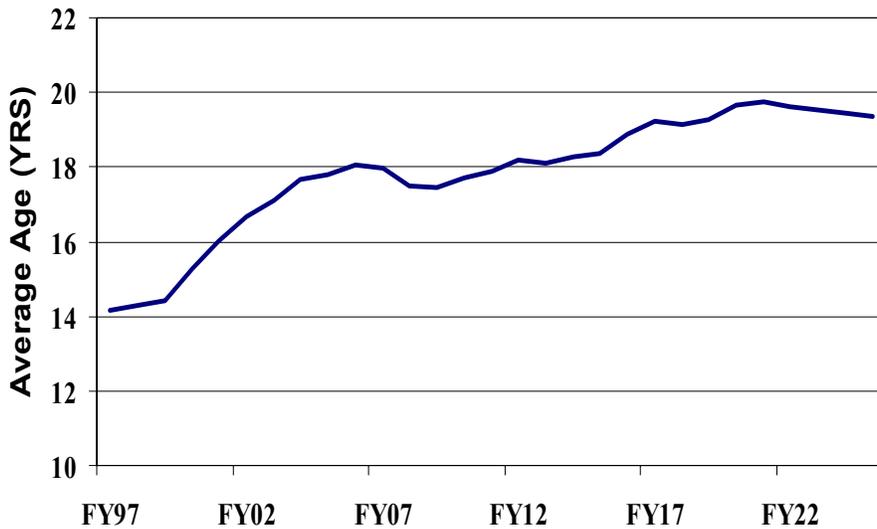


Figure 8. Expected Average Ship Age

### 3. Rising Operation and Maintenance Costs<sup>39</sup>

According to the GAO, DOD's 2001 Future Years Defense Plan consistently understates cost and overstates savings projections for operations and maintenance.<sup>40</sup> Planned spending increases for procurement may be used to pay for operations and maintenance funding shortfalls.<sup>41</sup> For example, there is a gap between the Army's stated requirements and DOD's planned missile procurements for the Patriot Advanced Capability-3 missile. Detailed analyses of the costs, benefits, or available alternatives for defending U. S. forces and assets are lacking.<sup>42</sup> Such analyses are needed to allow decision-makers in the Department and the Congress to make better decisions on the number of missiles to buy. Similar issues regarding the vulnerability of surface ships may not be reflected in the budget for ship self-defense programs. Threat drives the

budget. Weapons procurement funding for FY97-FY02 was relatively flat (fluctuating between \$719 million and \$1 billion) until the War on Terror began. Figure 9 shows an increase in procurement dollars after the September 11, 2001 terrorist attacks. Procurement increased but its percentage of overall defense spending decreased and weapons research and development funding declined from \$517 million to \$218 million<sup>43</sup>. Figure 9 shows O&M as percentage of expenditures increased from the Cold War years.

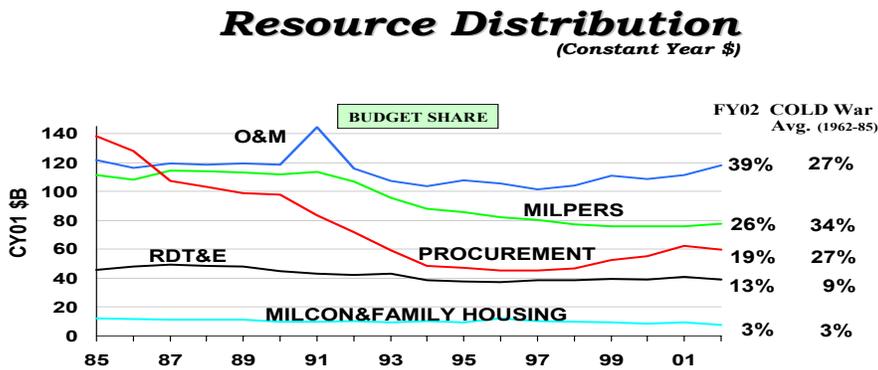


Figure 9. Resource Distribution (Constant Year \$M)

According to OMB, the Navy’s active ship depot maintenance budget supports 95.5 percent of the notional O&M requirement and 100 percent of the SCN refueling overhaul requirement in FY03. There is evidence that OMB’s statement is optimistic and does not accurately reflect the fleet’s state of readiness. With the decline of battle force ships, maintaining current OPTEMPO on an aging force averaging 16 years in FY02 is realized by increasing depot maintenance requirements.<sup>44</sup> In 1993, the Navy had 108 ships forward deployed or 24 percent of its 458-ship battle force. In 2003, the Navy projects 87 of its 308 ships will be deployed or 28 percent of the battle force.<sup>45</sup> This high utilization, along with aging assets, results in depot maintenance availabilities that increasingly exceed notional costs.<sup>46</sup> Reductions in operations and maintenance and

military personnel appropriations are necessary to generate the infrastructure savings required to fund modernization efforts.<sup>47</sup>

#### **4. Congressional/Industry Lobbying: Increased Procurement Funds Necessary**

Navy VADM Michael Mullen, Deputy Chief of Naval Operations (CNO) for Resources, Requirements and Assessments, testified before the Senate Armed Services Committee that he agreed with a recent assessment by ADM Vern Clark, CNO that the Navy needs \$12B more a year to procure its aircraft, ships and other major weapons systems<sup>48</sup>. ADM Clark acknowledged the Navy must make a \$12 billion a year commitment in the shipbuilding business to have an adequate Navy in the future. “We can’t undo what has happened over the course of years in under-funding acquisition accounts,” Clark said, agreeing that procurement accounts must grow over the course of the FYDP. “We must buy more ships and aircraft to meet the needs of tomorrow’s Navy,” he said. Figure 10 shows the average age of Navy aircraft increasing. Years of under-funded weapons procurement programs have contributed to aging aircraft.

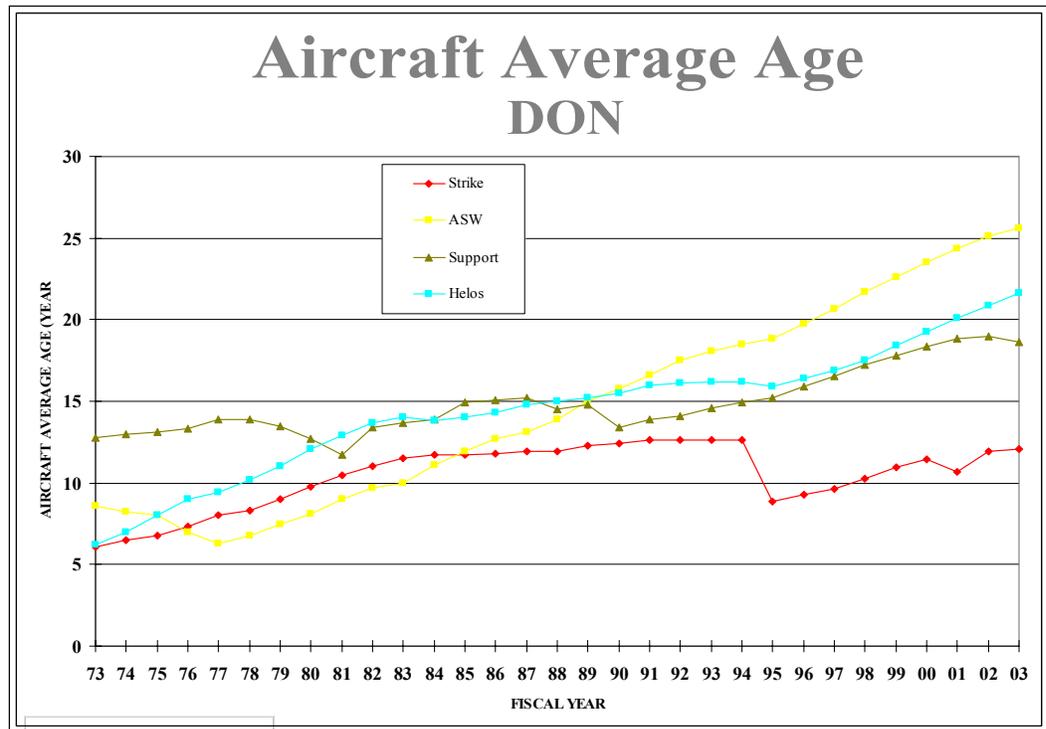


Figure 10. Average Aircraft Age (DON)

The Joint Strike Fighter competes for each service’s dollars. Its funding comes from each service’s budget, thereby shifting scarce funding to support its development and delivery. Secretary of the Navy, Gordon England told the Senate Armed Services Committee the Navy is ensuring it adequately funds future joint aircraft programs. The Navy provided \$1.7 billion to the Lockheed Martin Joint Strike Fighter (JSF) when it could have bought other aircraft like F/A-18s or more ships. JSF is on target and will make a “dramatic difference” in the future war-fighting force<sup>49</sup>.

The Navy’s shipbuilding program is aging too. Representative Jo Anne Davis (R-VA) said slipping the CVN(X) future carrier procurement by one year and turning the DD-21 acquisition program into a DD(X) research and development program may [mean] a “huge dip” in the future work force at Northrop Grumman’s Newport News

Shipbuilding. “Right now, they’re having problems with their work force,” she said, adding that it is difficult to hire specialized shipyard workers again once they are let go. Congressman Rob Simmons (R-CONN.) said that laid off workers at General Dynamics’ (GD) Electric Boat submarine facility often require at least two years to get their security clearances back once they are rehired<sup>50</sup>.

Congressman Reed, whose state is home to GD’s Electric Boat facility, said that buying one attack submarine a year will not be adequate to sustain the fleet of 55 attack submarines called for in the 2001 Quadrennial Defense Review. An attack submarine’s life is about 30 years. Reed said the procurement rate of two attack submarines has been proposed for years but keeps getting put off due to budget constraints. He warned that further delays in increasing the rate would create a deeper procurement shortfall that will be even harder to overcome. The shipbuilding association proposed adding \$415 million to the Administration’s budget to fund advance procurement that would allow the Navy to reach a procurement rate of two attack submarines a year in FY05.

*a. FYDP Funding Bow Wave*

Many opportunities to reduce and streamline DOD infrastructure could generate savings to modernize weapon systems, reduce the deficit, and address long-standing DOD financial management problems<sup>51</sup>. DOD officials have repeatedly recognized the importance of using resources for the highest priority operations and investment needs. Infrastructure reductions are a difficult and painful process because achieving significant cost savings requires up-front investments, closure of installations, and the elimination of military and civilian jobs. Promised infrastructure savings have not materialized, however. The 1988, 1991, and 1993 base realignment and closure (BRAC) rounds produced decisions to fully or partially close 70 major domestic bases and resulted in a 15-percent reduction in plant replacement value. Between FY96 and FY01, no significant savings resulted from infrastructure reforms because the proportion of infrastructure spending in DOD budgets remained constant.<sup>52</sup> The 1995 BRAC was supposed to reduce the overall domestic base structure by a minimum of another 15

percent, for a total 30-percent reduction in DOD-wide plant replacement value. However, the 1995 closures and realignments only increased the total reduction to approximately 21 percent, or 9 percent short of DOD's goal<sup>53</sup>.

The rise and fall of DOD's procurement spending follows the movement of the total budget. As DOD reduced programmed procurement in successive FYDPs, it has reprogrammed some procurement to the years beyond the FYDP to create a bow wave of demand for procurement funds. Optimistic planning provides an unclear picture of defense priorities because tough decisions and trade-offs is avoided.<sup>54</sup> Figure 11 shows that a large investment increase is required to make up for deferred funding. The challenge for senior DOD officials and program managers is how best to maximize weapons procurement in a decreased funding environment.

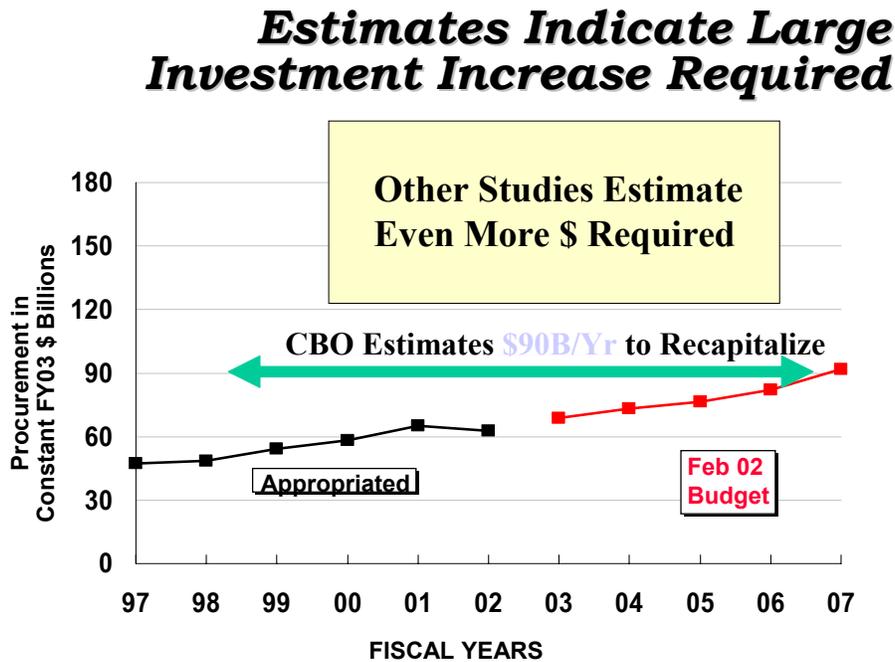


Figure 11. Estimates Indicate Large Investment Increase Required

***b. Low Rate Initial Production (LRIP) Begun Too Soon<sup>55</sup>***

PMs proceed with low-rate initial production (LRIP) without sufficiently demonstrating that a weapon system works as designed. DOD still begins full-rate production of major and secondary weapons without first ensuring that the systems will meet critical performance requirements. For example, the F-22 aircraft program involves considerable technical risk because it embodies technological advances that are critical to its operational success. Nevertheless, DOD began production of the F-22 aircraft well before beginning initial operational testing and committed 70 aircraft at a cost of \$14 billion before initial operational testing was completed<sup>56</sup>.

GAO reported that DOD's policy to begin low-rate initial production of weapons without doing any (or little) operational testing and evaluation (OTE) resulted in procurement of substantial quantities of unsatisfactory weapons<sup>57</sup>. OTE is the primary means of assessing weapon system performance in a combat-representative environment. It is defined as the field test, conducted under realistic conditions, to determine an item's effectiveness and suitability for use in combat by typical military users and the evaluation of the results of such test. The options available to DOD and Congress are significantly limited when a system proves deficient. Used effectively, OTE can be a key internal control to ensure that decision-makers have objective information available on a weapon system's performance.<sup>58</sup> The decision to proceed with production should be made at the start of OTE because, in many cases, LRIP is also the de facto full-rate production decision<sup>59</sup>.

***c. Insufficient Operational Test and Evaluation<sup>60</sup>***

Program managers begin production of weapon systems before development and operational testing, and evaluation (OTE) is complete. When this strategy is used, critical decisions are made without adequate information about a weapon's demonstrated operational effectiveness, reliability, logistics supportability, and readiness for production. Rushing into production before critical tests have been successfully completed results in purchased weapon systems that do not perform as

intended. Premature purchases have resulted in lower-than-expected availability for operations and maintenance and have often led to expensive modifications.

*d. Overestimated Funding*

DOD's prevailing culture continually generates and supports acquisition of new weapons. It is usual for incentives and special interests to override the need to satisfy the most critical weapon requirements at minimal cost. A Program manager's tendency to overestimate future funding coupled with the tendency to underestimate program costs, have resulted in the advent of more programs than can be executed. There is an increased cost of doing business despite shrinking budgets. Program managers often have to reduce, delay and stretch out programs, substantially increasing the lifecycle cost of each system. In addition to the higher unit costs caused by program stretch-outs, another downside to the affordability issue is DOD's inability to address valid requirements when available resources are consumed on questionable priorities<sup>61</sup>.

*e. Unreasonable Assumptions*

DOD has a compelling need to accelerate the weapon systems acquisition cycle and reduce average unit costs. DOD Inspector General reported that a significant gap exists between weapon systems modernization requirements and planned funding. DOD has a goal to increase procurement spending by recapitalizing about \$10 billion dollars a year by shifting funds from other discretionary areas. The Inspector General (IG) doubts that planned actions will free up that amount of funds<sup>62</sup>. Program sponsors have used unreasonable assumptions about the pace and magnitude of the technical effort, material costs, production rates and savings from competition to keep cost estimates as low as possible and present attractive milestone schedules.

The fact that a given weapon system costs more than estimated, takes longer to field and does not perform as promised is secondary to fielding a new system<sup>63</sup>. DOD continues to pursue a number of major defense acquisition programs on the assumption that savings will materialize. Weapons procurement is based on optimistic assumptions about the maturity and availability of enabling technologies.

DOD's programmed spending plans cannot be executed with available funds<sup>64</sup>. Numerous problems exist with DOD's budgeting and spending practices for weapon system acquisitions, suggesting that wants and needs are not being balanced with affordability limitations. For example, the availability of several billions of dollars in funding increases that the Air Force has projected for space system expansion is uncertain.<sup>65</sup> Figure 12 shows the average age of its aircraft, demonstrating a need for increased procurement funding or using savings projections to fund new systems. The President and the Congress have not agreed on overall funding increases to DOD for the first 6 years of the 18-year projection (FY00-FY05). Additionally, for the last 12 years of the projection (FY06- FY17), the Air Force relies on planned funding increases for program modernization without identifying funding sources, thus creating additional uncertainty and putting the expansion of space systems in jeopardy for affordability reasons. Current procurement spending might be reduced to fund potential operations and maintenance shortfalls.

### ***USAF Average Age Increasing***

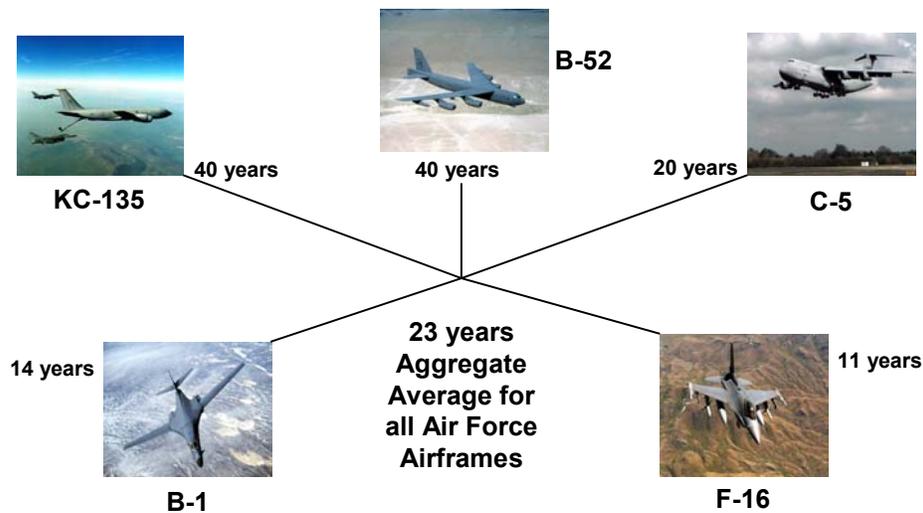


Figure 12. USAF Average Age of Aircraft Increasing

*f. Systems Do Not Match Requirements<sup>66</sup>*

Some weapon systems are being developed and produced, even though the Soviet threat upon which they were justified has diminished. Pervasive problems persist regarding questionable requirements and solutions that are not the most cost-effective available and involve unrealistic cost, schedule and performance estimates; and questionable program affordability<sup>67</sup>. Acquisition of new weapon systems that do not satisfy the most critical weapon requirements at minimal cost and commit more procurement funds to programs than can reasonably be expected to be available in future defense budgets remain despite efforts to reform defense procurement.<sup>68</sup> Many new weapon systems cost more than their predecessor and do less than anticipated. Delivery schedules delays are common. Figure 13 shows that the average cost of weapon replacement rising.

### **Fielded and Replacement System Cost Comparison**

<b>Fielded System Unit Cost*</b>		<b>Replacement System Unit Cost*</b>		
		<b>Service Est</b>		<b>CAIG Est</b>
F-15C	45.2	F-22	99.8	124.0
SSN 688	845.0	SSN 774	1,615.1	1,620.0
A/V-8B	29.9	JSF	51.6	70.0
OH-58D	9.8	RAH-66	23.3	27.5

\*Average Procurement Unit Cost in Constant Year 2000 \$M

**Bottom Line: New systems are costing significantly more than the systems they are replacing**

Figure 13. Fielded and Replacement System Cost Comparison

DOD's prevailing culture continually generates and supports acquisition of new weapons. Inherent in this culture are powerful incentives and interests that influence

and motivate the behaviors of participants in the process, including DOD components, Congress, and industry.<sup>69</sup> It is not unusual for incentives and special interests to override the need to satisfy the most critical weapon requirements at minimal cost. The Air Force's C-17 aircraft continued production after analysis showed that if the C-17 program were stopped at 40 aircraft, 64 commercial wide-body aircraft would have to be added to the existing airlift fleet for an estimated life-cycle savings of \$6B when compared with a fleet of 120 C-17 aircraft. The Air Force acknowledged there were considerably cheaper alternatives to meet airlift requirements than full production of C-17s but delayed making a decision and launched a new study to determine an optimal mix of aircraft to meet airlift requirements.<sup>70</sup> C-17 continued production despite gross schedule delays, performance shortfalls (wings, flaps and slats) and cost overruns that were due, in part, to Congressional political pressure.

***g. Alternative Weaponry Should Be Considered***

Cultural resistance to change, service parochialism, and public and congressional concern with the economic effects of reduced or cancelled weapons contribute to reluctance to cut programs that may no longer be effective. Program managers press for continued support of their program whether or not it meets the needs of the nation. There are several points supporting the need for deeper research before accepting new weapons programs. The AOA is provided to help determine if the weapon system is needed. The Analysis of Alternatives (AOA) is an analysis of the proposed system's operational effectiveness related to its life-cycle costs compared to various other alternatives to meet the mission area need. Although the military services conduct considerable analyses in justifying major acquisitions can be narrowly focused and may not fully consider alternative solutions.

The PM provides analysis, valuable advice and counsel, particularly regarding the executability of proposed alternatives.<sup>71</sup> Research and technology efforts are not disassociated from weapon programs until they reach the program definition and risk-reduction phase. Historically, the services analyses do not include joint acquisition

of systems with other systems.<sup>72</sup> Previous failed attempts at joint weapons development like the TFX Fighter were due to parochialism, cultural biases and inaccurate requirements determination.<sup>73</sup> Since then, JSF has proven to be a beginning in successful joint acquisition. Because DOD does not routinely develop information on joint mission needs and aggregate capabilities, it has little assurance that its decisions to buy, modify or retire systems are sound.

### **C. OUTDATED FINANCIAL SYSTEMS<sup>74</sup>**

Defense outlays have produced many of the world's most capable weapon systems. Yet its contract administration system has proven costly and inefficient. It continues to rely on a far-flung, complex network of finance, logistics, personnel, acquisition, and other management information systems - 80 percent of which are not under the control of the DOD Comptroller - to gather the financial data needed to support the day-to-day management decision making. The Government Performance and Results Act (GPRA) and the Chief Financial Officer's Act have not proven very effective in forcing departmental procurement reform.

Many of the department's business operations are mired in old, inefficient processes and legacy systems, some of which go back to the 1950s and 1960s. The department still relies on the Mechanization of Contract Administration Services (MOCAS) system - which dates back to 1968. This network was not designed, but rather has evolved into an overly complex and error-prone operation that exists today, including little standardization across DOD components; multiple systems performing the same tasks; duplicate data stored in multiple systems; manual data entry into multiple systems, and a large number of data translations and interfaces that combine to exacerbate problems with data integrity.

Standard Procurement System (SPS) was intended to replace the contract administration functions currently performed by MOCAS. GAO reported that the department had not economically justified its investment in SPS because its latest (January 2000) analysis of costs and benefits was not credible.<sup>75</sup> Although the department committed to fully implementing SPS by March 31, 2000, this target date had slipped by over 3 ½ years to September 30, 2003, and program officials have recently stated that this date will not be met<sup>76</sup>.

DOD's financial systems could not adequately track and report whether \$1.1 billion in earmarked funds that the Congress provided to DOD for spare parts and associated logistical support were actually used for its intended purpose.<sup>77</sup> The vast majority of the funds -92 percent - was transferred to the military services operation and maintenance accounts (O&M). Once the funds were transferred into O&M accounts, the department could not separately track the use of the funds. As a result, DOD lost its ability to assure the Congress that the funds it received for spare parts purchases were used for that purpose. Problems with the department's financial management operations go far beyond its accounting and finance systems and processes. Wasteful contract administration practices add billions of dollars to defense acquisition costs.

#### **D. CHAPTER SUMMARY**

Each year, the President submits his budget. Defense traditionally gets the largest percent of discretionary funding. Threats, perceived or actual, to national security drive the amount of defense funding received in any fiscal year. Congress, industry experts and the nation debate its merits and jockey to receive limited resources. Congress expects DOD to provide quality products that meet the war-fighter's needs and allow for substantial cost reductions, have better program stability, have shorter program cycle times, and use innovative design, manufacturing, support, and contracting approaches. Program managers promote and garner funding for programs. Congress and DOD provide tools to assist its components in weapons procurement. Given the current state of

shrinking budgets and diverse, non-traditional threats, appropriate use of commercially available products is one remedy that might enable the Navy to acquire needed capabilities in a cost effective manner.

## **IV. MANAGEMENT TECHNIQUES OF ACAT I PROCUREMENT ACCOUNTS**

### **A. INTRODUCTION**

Chapters II and III provided background information on legislative, regulatory, and procedural changes affecting defense acquisition over the last 10 years. The defense contracting scandals of the 1980s led to tighter regulations, and the expansion of criminal and civil penalties. This sparked the reforms of the 1990s, which loosened regulations in procurement. At the same time, dollars available for defense procurement declined. Chapter III data show the trend toward decreased procurement funding and higher O&M expenditures. This chapter explores techniques employed by major defense acquisition program managers to manage their programs in today's fiscally constrained environment. There is less quantitative data in this chapter and instead, there is a great deal more qualitative analysis. This chapter's qualitative analysis builds on the substantive data in Chapter III and applies defense reform initiatives to the day-to-day actions of acquisition leaders to help determine if procurement reform helped manage critical dollars.

Interviews of five former program managers (PM) were performed to determine the relevance of procurement reform from their perspective. Their responses were as varied as their programs. Their candid comments reflected their component's culture and influence in programmatic decision-making. Their responses were captured in nine areas covered under the Program Management Techniques section. ACAT I program managers' techniques in an ever-changing threat environment are revealed. PMs interact with the user and Congress to make the best system possible. Caps on new discretionary budget authority and on outlays increasingly constrain defense spending. It is important that congressional decision-makers have accurate estimates of program outlays<sup>78</sup>. More accurate projections provide greater confidence that program funding will be within overall discretionary limits without restricting spending further than necessary<sup>79</sup>. The techniques employed by the program managers are a result of laws, administrative

procedures and federal regulations; they also result from Congressional and DOD cultural influences, and personal style. They may be seen as thematic responses, but in each case, it was clear that the PM's decision reflected his biases and interpretation of regulations.

## **1. Establishing the Process**

The defense acquisition process is based on a disciplined approach for integrating the efforts and products of three major decision support systems: the requirements generation system, the acquisition management system and the Planning, Programming, and Budgeting System (PPBS).<sup>80</sup> The requirements generation system is responsible for identifying and documenting operational mission needs for fixing shortcomings in existing systems or for adding new operational capabilities. The acquisition management system translates the user's needs into an operational system. This process provides the basis for making informed tradeoff decisions based on affordability constraints and user needs. The PPBS system provides the means for planning the funding for the research, development, test and evaluation (RDTE), procurement, fielding, and maintaining of a new or modified weapon system. It is the integration of these three support systems that has caused a lot of the problems found in the acquisition process.<sup>81</sup> The disciplined approach to the entire acquisition process is based on the integration of the requirements, acquisition management and the PPBS to a set of milestone decisions and acquisition phases.<sup>82</sup> Conceivably, a system could meet requirements, but fail to operate properly, or it may be too expensive without superior acquisition management. As the lead procurement official for his program, the program manager is charged with balancing these challenges.

The acquisition process for a major defense acquisition program is the most complicated and has the highest level of oversight for DOD weapons procurement.<sup>83</sup> The ACAT I program manager has to meet even stricter qualification and requirements than non-ACAT I program managers. Figure 14 shows the current requirements to become an ACAT I program manager. The training and experience requirements are designed to select program managers with a broad base of program office experience. An

inexperienced PM could have adverse effects on the program's life. Finally, without proper PPBS planning, a weapon system could be designed and tested and still fall short of expectations if it does not have the funding support to field it<sup>84</sup>. Together, they lay groundwork for analysis of the program manager's techniques to field the most effective weapon system.

<b>ASSIGNMENT PROCEDURES/REQUIREMENTS - ACAT I PROGRAM MANAGERS (PM)</b>			
<b>PROCEDURES:</b> CANDIDATES FOR PROGRAM MANAGER POSITIONS WILL BE SCREENED BY A FORMAL PANEL OF FLAG OR GENERAL OFFICERS AND SES MEMBERS. PANEL WILL INCLUDE REPRESENTATIVES FROM THE ACTIVITIES WITH VACANCIES TO BE FILLED. SLATES FROM EACH VACANCY SHOULD INCLUDE IF POSSIBLE, FOUR CANDIDATES, WITH A MIX OF CIVILIAN AND MILITARY CANDIDATES. THE PANEL SHOULD PRODUCE A MATRIX OF THE BEST QUALIFIED CANDIDATES, IN RANK ORDER WITH A RECOMMENDATION FOR SELECTION, AND INFORMATION SHOWING HOW THE REQUIREMENTS SEEN BELOW (EXCLUDING THE TENURE AGREEMENT) HAVE BEEN MET. THIS MATRIX, WITH A BILLET INFORMATION SHEET ON THE POSITION, MUST BE FORWARDED TO THE DACM WHEN THE CALL FOR ACQUISITION WORKFORCE COUNCIL (AWOC) ITEMS IS MADE FOR AN UPCOMING AWOC MEETING.			
<b>REQUIREMENTS</b>			
8 YEARS OF ACQUISITION EXPERIENCE, 4 OF WHICH WERE PERFORMED IN A PROGRAM OFFICE OR SIMILAR ORGANIZATION. 2 OF THE 4 YEARS MAY HAVE BEEN PERFORMED IN A POSITION OF EQUIVALENT RESPONSIBILITY IN ACQUISITION (1)	PMT-301; <b>OR</b> APMC, PMT-302 (2) ALL NEW PMs MUST TAKE PMT-303 AFTER AWOC APPROVAL.	ACQUISITION PROFESSIONAL COMMUNITY MEMBER (3), (4)	MUST SIGN WRITTEN AGREEMENT (TENURE) TO STAY IN THE ASSIGNMENT THROUGH COMPLETION OF THE FIRST MAJOR MILESTONE CLOSEST TO 4 YEARS <b>OR</b> 4 YEARS IF MILESTONES ARE COMPLETED.
(1) UP TO TWELVE MONTHS OF ACADEMIC TRAINING OR EDUCATION IN ACQUISITION MAY BE SUBSTITUTED FOR ACQUISITION EXPERIENCE URLs MAY COUNT UP TO 18 MONTHS OF COMMAND TOUR EXPERIENCE TOWARD ACQUISITION EXPERIENCE (NOT PROGRAM OFFICE EXPERIENCE)			
(2) PMT-302 MAY BE FULFILLED; PMT-303 MAY NOT.			
(3) ACQUISITION PROFESSIONAL COMMUNITY MEMBERS WHO DO NOT MEET THE EXPERIENCE OR TRAINING STANDARDS MAY BE ASSIGNED FOR UP TO 6 MONTHS WITHOUT WAIVER			
(4) SEE APC STANDARDS ON CRITICAL ACQUISITION POSITION SHEET (INCLUDED IN PACKAGE)			
<b>WAIVERS</b>			
<b>WAIVER PROCEDURES:</b> (QUARTERLY, DACM MUST FILE COPIES OF APPROVED WAIVERS WITH THE DIRECTOR, AET&CD, OSD(A&T))			
<b>FOR REQUIREMENTS OF PM POSITION:</b> APPOINTING AUTHORITY SUBMITS A DD FORM 2595 'DEPARTMENT OF DEFENSE PM AND/OR DPM WAIVER REQUEST (OR EQUIVALENT)' TO THE DACM. IF PROGRAM IS ACAT ID, ASN(RDA) SUBMITS APPROVED WAIVER TO THE USD(A&T) AS PART OF CONSULTATION BEFORE APPOINTMENT OF PM WHO IS REPLACING WAIVED INCUMBENT.			
<b>FOR RELEASE FROM TENURE OBLIGATION:</b> SEE APPENDIX G, SECNAVINST 5300.36 FOR FORMAT AND GUIDANCE.			
<b>AUTHORITY TO GRANT WAIVERS:</b> TENURE OBLIGATION WAIVERS APPROVED BY THE DACM. IF PROGRAM IS ACAT ID, ASN(RDA) SUBMITS APPROVED TENURE WAIVER TO THE USD(A&T) AS PART OF CONSULTATION BEFORE APPOINTMENT OF PM WHO IS REPLACING WAIVED INCUMBENT.			

Figure 14. Assignment Requirements for ACAT I Program Managers

The Program Objective Memorandum (POM) is constructed at each service's headquarters. The Navy's service headquarters is the Chief of Naval Operations Staff (OPNAV). The service component acquisition executives (CAE) compile and review requirements for defense procurement funds before the POM is forwarded to Congress. The military services want more money than they can conceivably get from Congress and the Pentagon wants more money than the President's budget allows<sup>85</sup>. The Senate or

House member wants more for their district than is budgeted<sup>86</sup>. This results in political maneuvering and old-fashioned politicking.

Acquisition programs establish an Acquisition Program Baseline (APB), which is an agreement between the Milestone Decision Authority (MDA) and PM to document the cost, schedule, and performance objectives and thresholds of that program beginning at program initiation. The APB contains the most important cost, schedule and performance parameters and is updated as required. Maximizing the PM's flexibility to make cost, performance and schedule tradeoffs without unnecessary higher-level permission is essential to achieving programmatic objectives. A more complete discussion of cost, schedule and performance criteria follows later in the chapter. An ACAT designation is normally assigned after approval of the operational requirements document (ORD). A proposed ACAT designation is provided on the cover of the requirements document. The criteria for ACAT I programs were discussed in Chapter II. (MDAP and ACAT I are used interchangeably in this thesis.)

The user identifies an operational need that cannot be satisfied by nonmaterial solutions and produces a Mission Need Statement (MNS). Once the MNS is approved by the Service Chief of Staff and validated by the Joint Requirements Oversight Council (JROC), the USD (A&T) convenes the Defense Acquisition Board (DAB). The DAB is the Department's senior level forum for advising USD (A&T) on critical decisions concerning ACAT ID programs. The MDA is the USD (A&T) for ACAT ID programs where the "D" stands for defense. The MDA is the service component for ACAT IC programs, where the "C" stands for component. The Navy's MDA is the Assistant Secretary of the Navy (Research, Development and Acquisition). The DAB is comprised of the Department's senior acquisition officials. The DAB reviews the mission needs statement (MNS) and makes recommendations to the Milestone Decision Authority (MDA), for concept studies of a minimum set of alternative. This review and MDA approval constitutes the Milestone 0 decision, concept studies and approval, and directs

the initiation of Phase 0, concept exploration and definition, with an acquisition decision memorandum (ADM).

## **2. OMN Funding (Revisited)**

Because O&M costs are central to understanding the drivers behind programmatic techniques, they will be discussed from a program manager's perspective. OMN funds can be used to make up for funding shortfalls because they can be switched to other programs. The services have some flexibility as to how they use their O&M funds, which is evident from the O&M obligation patterns<sup>87</sup>. In the 1990's, the amount of O&M funds increased at a faster rate than procurement and RDT&E funding. The service's annual O&M budget requests to Congress are presented in four broad categories referred to as budget activities: operating forces, mobilization, training and recruiting and administrative and service-wide activities<sup>88</sup>. Each budget activity is further broken down into activity groups that, in turn, are broken down into sub-activity groups. The sub-activity groups are further broken down into program element codes. Program element codes are not part of the formal presentation to Congress; but they provide more details on how the services plan to expend appropriated funds.<sup>89</sup>

Because the services do not allocate appropriated funds to the program element level, Congress and the services' headquarters do not have complete visibility over the amounts appropriated, and obligated.<sup>90</sup> There is even less input and tracking of O&M spending. Congress and the services have even less visibility once funds are allocated to the program manager. Program managers prefer less visibility because too much detail would hamper their ability to move funds without higher level authority oversight. The comptroller disagrees with the program manager and prefers stricter accounting of O&M funds because it makes their job easier. Army and Navy program managers generally believe that restricting the use of O&M funds could limit their ability to transfer between various weapons systems budget accounts, and specifically limits their ability to adjust to changing threats or adapting to budget cuts.<sup>91</sup>

PMs are not held responsible for total O&M costs in the way they are held responsible for proper use of RDTE and procurement funds. Because operation and maintenance dollars are more easily tailored to changing funding demands than other colors of money, they are used to make up for funding shortfalls. The PM's use of different colors of money also helps with programmatic cuts. RDTE is more difficult to cut than procurement dollars. Production dollars used for in-service engineering can be cut. If the PM needs more travel funds, he can switch funding internally. Hardware system commands (HSC), like NAVSEA, have to worry about travel limitations on spending, but in some cases, the PM exercises more flexibility.

One PM said there is little pressure for the PM to meet life cycle savings, because life cycle savings focused on longer-term goals. PMs are evaluated on managing procurement costs instead of longer-term life-cycle costs. Because life-cycle costs encompass operation and support contingencies over the long term, it is difficult to hold the PM accountable. There are just too many variables related to changing political and social forces which make de facto accountability of long term cycle costs unrealistic for the PM to effectively reign in. Effective management of procurement and to a lesser extent, RDTE dollar savings are appropriate metrics of an effective PM. The PM relies more heavily on shrinking RDTE and procurement dollars to fill the most critical needs. The PM subsequently got more dependent on ever-increasing (on a percentage basis) operations and maintenance funds because the pool of procurement and RDTE funds shrank over the 1990's. Procurement and RDTE dollars, combined with O&M are critical to weapons programs sustainment. Tension exists between the PM and hardware systems command (HSC) on the best means to utilize scarce procurement dollars. The HSC wants the PM to use funds to procure weaponry and spare parts. The PM's actions conceivably could minimize the HSC's need to purchase greater numbers of spares.

## **B. PROGRAM MANAGEMENT TECHNIQUES**

### **1. Requirements Determination**

A good requirements-generation process provides program managers with critical understanding of the mission needs, planned operational environment, and potential areas for tradeoffs. However, quality leadership makes or breaks a program. Good, timely decisions by key decision-makers have the greatest influence on a program's final cost, performance and schedule. Improvements in regulations and management training have made up a large portion of acquisition reform. The latest changes have been in the areas of chain of command, training, increased user participation, and testing<sup>92</sup>.

Authorization documents are for a stated quantity and associated dollars. Program Managers are restricted from spending more funds than authorized. DOD earmarked \$1.1B for spare parts in the 1999 Appropriations Act. However, current financial information does not show the extent to which the department used these funds for spare parts. DOD transferred 92 percent of these funds to the military services' O&M accounts. The remaining 8 percent was transferred to a Navy procurement account related to spare parts for new equipment.<sup>93</sup> DOD lost visibility of these funds<sup>94</sup>. Once the funds were transferred into the operation and maintenance accounts, the department did not separately track the use of these funds. They could have been used for a variety of purposes, including obtaining new or repaired spare parts.<sup>95</sup>

Creative funds management contributed to the lost visibility. One creative technique employed by a PM to deliver spares to the end user entailed provision contracting. For instance, the PM used non-purchasing contracts as part of a production contract to obligate funds. She used provision contracting to have a ready supply of kits to support the weapon system. Provision contracting employs an equipment specialist to estimate the number of items necessary to support a given system. Next, the contracting officer awards a range of spare and repair parts to meet the needs of the program<sup>96</sup>.

Ideally that equipment specialist has a lot of experience, and operates like an independent assessment team. PMs use equipment specialists in budget determination. Weapon systems are complex and without the benefit of an expert to analyze cost estimates, the PM would be at the mercy of the contractor's estimate.

## **2. Pressure to Produce Weapons**

A program manager stated, "The PM is the program's primary spokesperson and champion." ACAT I program managers commit to serving as PM until completion of the first major milestone or at least 4 years, which helps program stability. A PM said, "Unless they achieve flag rank, follow-on tours are a let down because the level of power, respect and influence exercised as a program manager cannot be duplicated." They regret leaving the job. The PM can become parochial and get too attached to a program. In some cases, he may feel it is his duty to see the program continue at all costs. A former PM felt, "Regardless of the program's current state, the PM can make it the best that he can, then leave it up to the service to decide if the program is good or not." Another PM remarked, "The PM understands that someone will slow him down." He has to be honest and tell the service if the program is not functioning properly. "If a program does not perform as required by the acquisition production baseline, the PM is supposed to be honest and recommend it be killed. The PM has to weigh serving in uniform and succumbing to external pressure to keep the program alive versus his career aspirations in some cases. There is pressure of possibly moving on to a higher promotion if the program is successful."<sup>97</sup>

On balance, job security and promotion are not the driving issues for all PMs. One PM said there are civilian and military PMs and no direct correlation between program loyalty and integrity was indicated or examined in her experience. Four out of five PMs said, that integrity was the most important consideration on how to manage the position. One ACAT 1D aircraft program manager needed ground test equipment to improve its weapon system. The contractor wanted \$107M to test the item. The PM felt it was too much money given the limited success it achieved on similar aircraft. The PM

used special test equipment that proved effective and thus killed the program and saved the government \$77M. In this case, the equipment was ancillary to the program, but it shows that pressure to deliver an effective system is enormous.

Congressional culture to produce weapons is due to pressure to provide results (jobs). Leaner budget years have had a profound effect on the military's culture to acquire weapons, but there still is external pressure applied by Congress to fund some weapons. One program manager said, "bomber pilots take a back seat to the fighters when it comes to aircraft procurement", in the Air Force. Previously, military leaders wanted whatever was new and whatever was best. Congressional influence rears its ugly head on some procurement buys. A PM cited Congressman Newt Gingrich for pressing continued development of the C-17, despite a history of documented performance, schedule and cost problems, because it meant extra jobs in his district. There has been debate over the need for the Air Force's F-22. The budget contributes to the culture to produce weapons. In the last ten years producing weapons whether needed or not has not been prevalent. The program managers interviewed thought there is a greater desire to produce the best weaponry for the most buck. Contractors continue to lobby their hardware to PMs, Congress and other defense officials to gain interest in their products. Yet, requirements have gotten more refined and the days of buying extra equipment are over.

The Sergeant York Divisional Air Defense (DIVAD) Gun is an example of a program that was subjected to intense political pressure from Congress and industry watchdogs. The Army's problem with DIVAD was due to building and producing it while it was being tested. A proper OTE such that a greater amount of errors were eliminated would have prevented excessive re-engineering costs. DIVAD is a classic example of how the military system keeps a weapons system alive that does not match need or is not capable of encountering the threat in the manner specified.<sup>98</sup> The PM is supposed to recommend cancellation if it is a lemon, but that is not always the case. DIVAD's program manager did not. The PM does not have the final say on program

cancellation and can only recommend what course a program should take. The PM did not speak up and admit the A12 was not performing as prescribed and was riddled with cost overruns until it was too late. (The A12 was a firm fixed priced contract. The use of the term cost overrun as defined by the program managers interviewed is considered acceptable in this case.).

### **3. Pressure to Deliver Weapons**

The primary purpose of low-rate initial production (LRIP) is to produce enough units for operational testing and evaluation and to establish production capabilities to prepare for full-rate initial production. Limiting initial production affords the opportunity to confirm the stability and soundness of a new system before producing larger quantities<sup>99</sup>. Procurement regulations encourage proceeding with LRIP without fully testing new equipment. LRIP is limited to ten percent of full rate production. Oftentimes, program managers are too low on funding to properly complete the developmental and operational testing of the systems prior to fielding. Pressure to deliver early or on time exists. This results in systems that do not meet operational needs and requiring expensive modifications to meet specifications.<sup>100</sup>

One PM stated, “You can never fully test a system’s software, otherwise the cost would be too great and it would never be delivered.” The PM takes calculated risks. There are always “unknown unknowns,” which have to be minimized. He added, “Software is arguably the greatest unknown and the most expensive aspect of a weapon to correct.” “Sure”, one PM stated, “The PM commits to LRIP while debugging software. It takes about a year to go from LRIP to the production line.” All of the PMs thought, that in order to stay on schedule the PM has to push for production without fully demonstrating that all software (and hardware) bugs has been removed. One PM said, “In Desert Storm, the Javelin missiles provided were LRIP items. Because it would take a year to deliver the full rate production missiles, there was no time to wait for the production missiles.” Javelin performed very well during Desert Storm.

CENTCOM needed Javelin immediately without benefit of a full OTE. Delivering weapon systems ahead of schedule means that there may be physical differences in the tested product and the end product. There are always post delivery modifications and ECPs to improve the weapon. Realistically, there is no way to eliminate all costs and the pressure to deliver is too great to ignore. Cost is the big driver when the schedule slips. However, a program that does not deliver on time is unacceptable. The program becomes a target for cancellation, if its delivery is delayed. Another challenge for the PM happens because he has to obligate funds two years in advance of delivery. There are many unknown unknowns that may go wrong with such an early fund commitment. Sometimes the PM does not realize his mistake until well into the process. Lessons learned provide excellent feedback after a mistake is realized.

The acquisition strategy for a large industrial truck was flawed because the EMD phase had been eliminated by the Army's acquisition executive. The truck was based on an existing Austrian design. It was decided that because it was designed, tested and built previously, it was deemed a non-developmental item (NDI). This NDI proved to be a completely new vehicle. The new vehicle required an additional axle, air inflatable tires and twelve additional design changes. These changes were significant enough to be a developmental item. For the PM, this was a costly lesson learned totaling \$8M. NDI remains a relevant alternative and can be an effective tool in reducing costs, but this case highlights what happens when short cuts are taken for the sake of marketing the program to Congress. Marking the program as NDI made it easier to sell its initial estimates. In the end, this program encountered cost overruns and schedule delays because of a programmatic decision to label the vehicle as a non-developmental item. Herein lies a flaw of aggressive program development without applying due diligence in milestone 0.

#### **4. Tension in Managing Programmatic Cuts**

Procurement leaders make trade-offs when it comes to deciding on ways to maximize cost objectives. Overemphasis on one value means stinting on others. Cost objectives as defined in this thesis is that amount of funds appropriated to keep the

weapons program operational in the near and far terms. The PM's best system, overall, is one that seamlessly blends contending goals of schedule, performance and cost. In the cost, schedule and performance triangle, schedule is the greatest driver for the program manager. Performance is second in order of significance with cost being the least significant factor for the program manager. This conflicts with Congress' emphasis on cost, which was discussed in paragraph B3 of this chapter. Tension exists with the comptroller because the comptroller, by nature of his position also emphasizes cost over schedule.

Because there are cost, schedule and performance pressures from the acquisition program baseline (APB), the PM ensures all involved are aware of the unknown unknowns involved with his particular weapons systems procurement and development. Cost grows during the engineering, manufacturing and development phase. One PM said the PM is always under pressure to meet schedule deadlines. Another PM said, "Programs are never under cost and ahead of schedule, but instead are the other way around." The need of the war fighter determines how fast an item is procured. Spare parts and repair parts cost more if they are bought in the out years. Program managers are increasingly faced with what/if scenarios to determine what they would do if program funding was cut<sup>101</sup>. They are often called to explain the effects of programmatic cuts to Congressional staffers (or the PEO if the PM is not allowed to visit Congress).

Programmatic cuts extend programs. Extending a program depends to a large degree on the user community requirements. The PM asks, "Does the user want the program completed sooner?" He may look for other money or extend the program. To extend the program longer than the projected delivery period increases costs. Contractors want to extend production because it means the cost per unit increases and it allows them to employ people for more years. Congressmen prefer extended programs rather than a shorter delivery date in their districts because it means more jobs for a longer period. Funding reductions are not necessarily bad for Congress and contractors as long as the program is allowed to survive. Killing a program is invariably bad because that means

lost jobs. Congress hates to take responsibility for killing any weapon system<sup>102</sup>. The ultimate goal of Congress, SECDEF, and the program manager is to reduce acquisition costs but the motivation differs, thereby increasing tension.

The contractor wants the program extended for as long as possible. There is tension between DOD and industry over the possibility of canceling a program. A contractor may believe that due to the service's sunk costs, a program will not be cancelled. That is not so. The service does not weigh sunk costs heavily when determining a program's applicability. Inappropriate, inaccurate and outdated weaponry means lost lives and misdirected resources. If a program is no longer viable, like the Army's Crusader, then it is eliminated. One PM said, "Affected Congressmen staunchly defend a program whether it is still applicable or not." He added, "Lobbying across warfare systems is not universally undertaken however. Some systems rarely are championed and survive nevertheless. Consider the Navy's mine warfare community. Navy mine warfare ships and weapons are perennial budget-cut fodder." Mine warfare is hardly ever championed as a POM priority item. This particular program manager said, "Instead its funding stream looks like a sine wave, traveling up and down in value. It's an important program, but does not have broad appeal. Prime contractors are just not lobbying Congress for additional mine warfare funding to the degree they press for other programs."

Another PM worked his program so he had all his budget years funded for a certain amount. One day this PM was presented with a \$30M cut by his PEO. He was able to determine very quickly that it would mean cutting the fifth year of the program, effectively ending it. Initially, the budget headquarters did not believe him because his response was quick and they felt he was exaggerating. Nevertheless, the PM submitted a contract modification to cancel the contract's fifth year due to lack of program funding. The contractor learned that the program was being cancelled and became upset over the cancellation determination. Initially, the contractor thought the cancellation was due to non-performance, but after learning it was due to decreased funding, he told the PM that

he'd lobby for funding. The contractor lobbied his Congressman to provide funding for an additional \$30M, by fencing the funds for the program. Congress returned the original \$30M and the program continued.

On some occasions, the PEO does not want to choose which of his programs gets cut, so he may use the "gold watch" approach to defend his program. The PEO proposes the "gold watch" program is available to cut in hopes that no one touches it because it is a hot program. This strategy could have disastrous results if the "gold watch" was marked. Should that fail the door is open for cuts. Despite the program manager's best efforts, funding levels are inevitably cut. The program office plans for it. The PEO plans for it. The contractor plans for it. The challenge is to maintain a viable, cost-effective system that has champions to see it through to completion.

## **5. Tension to Provide Accurate Cost Estimates**

One PM said, "The PM does not really 'know' what a program will cost in the out years, but projections are sized to the budget." As the program gets closer to budget execution, it gets better defined. Early in a program's life, the PM has an unallocated budget, but he has no real concrete data on the program until it matures. There are no real work packages; instead there are budget wedges, which are an informal method of fleshing out all work packages until they become more realistic. Bottom up engineering estimates are a good method of estimating costs for the PM. If the program is in its second or third generation, extraction of actuals is used to estimate costs. Estimates are on the high end because of unknown unknowns. For instance, if the system has to change hardware from aluminum to titanium, it may be difficult to properly estimate the cost, particularly if there are no metallurgy technical experts on staff to gauge the estimated costs.

ACAT ID cost estimates are received from the contractor and forwarded to the Defense Acquisition Executive (DAE) for review and approval. The PM is under enormous pressure, particularly early in a program, to present smaller cost estimates,

because high costs may threaten the program. There is a range of estimates, from most-probable, to best-case to worst-case. The best-case estimate is normally chosen. Low initial cost estimates are an effective tool to buy into a program. Contractors submit low bids specifically to get their foot in the door. PMs realize that the costs may be too low, but are left with the most responsive bidder. Before recent acquisition reforms like FARA and FASA, the lowest cost bidder always won, except in the case of ACAT ID programs, which require a more thorough analysis.

The PM's estimate is used to get Congress to accept the program. The PM's estimates are based on the largest buy and the most efficient production rate – which never materializes. If Congress does not give the PM enough money then the PM stretches the program by procuring a lower quantity per year. It is better to get it now because by the time the PM asks for it, it will cost more in the future for the same item.<sup>103</sup> It is more expensive in the out years to stretch a program out, but it is done to meet budget demands. As he looks at the POM, the program manager may review the milestones and determine that because of slow or under-funding, the program may need to be “stretched” to keep the program viable and to get weapons to the end user.

One PM said, “It comes down to schedule, performance and cost.” Cost remains the primary driver for Congress. Congress balks at higher-than-expected bids. Contractors network continuously, and are able to ascertain the ballpark figure and use it as their estimate. PMs use their own organic estimators to get a feel of where the costs fall. PMs intentionally co-opt the estimate of the hardware systems commands hiring in-house experts. The in-house experts provide a more favorable (lower) estimate.

Subsequent cost estimates are also low to demonstrate the program's cost effectiveness to Congress. Some contractors are notorious for increasing program costs. Experienced contractors know that the initial commitment is vital. Once DOD and Congress are on board, the contractor increases costs to make up for the initial low bid.

After a few years, the general and administrative costs increase and so does cost base. Contractors recover cost with contract modifications and engineering change proposals. One PM thought a particular contractor submitted bids at the most optimistic estimate point without due consideration for what it actually cost to win contracts. For example, this contractor's first bid for an equipment upgrade on an existing system came in at \$1.3B, which matched the government's estimate. Congress balked at the bid, however and threatened to cancel the program, so the contractor submitted a second bid for half the original cost, while lobbying to keep the program going because of the low cost. The contractor subsequently made up costs for the low bid through engineering change proposals (ECPs). In the end, the PM said the program cost \$1.3B.

While most contractors are very reputable and do not engage in questionable tactics, there is a small, pervasive culture with questionable integrity. PMs and contracting officers are aware of those contractors that do not provide straightforward cost estimates. A large ACAT ID contractor is famous for its change orders. The contractor identifies a flaw in the government's request for proposal. The flaw or missing information in the original request for proposal is overlooked or minimized during the bid. Leaving unclear specifications allows for lower initial costs. Errors, and/or omissions are then discovered and addressed later in the procurement cycle by engineering change proposals. Thus, contractors bid low to win the initial contract, afterwards becoming tough negotiators on subsequent modifications to make the money back. A few contractors hold the program hostage. There is limited competition in the defense industry as a whole, so oftentimes the winning bidder is the only true performer. Competition throughout the life of a system is required to get the most efficient pricing, but there is little oversight done to make sure this happens<sup>104</sup>. In some cases, a smaller defense infrastructure may not be able to sustain more than one contractor.

## **6. Tension in Managing Funds**

ACAT ID Program managers employ various techniques to effectively manage weapons program. As funding goes so go the program's resources. The Program

Executive Officer (PEO) works with the CAE to gain funding support. To a large degree, ACAT ID programs are more advantaged because of higher Congressional oversight and scrutiny. It is almost unheard of for a major defense weapon program to be cancelled<sup>105</sup>. In many cases, just merely mentioning that a program is a designated ACAT 1D gets it a lot of attention, so there is a train that moves without the PM pushing it. Another advantage of ACAT I programs is having access to power players. The PEO, normally a one star general officer, can get the PM to a three star officer if a two star general has a problem with the program.

Legal constraints and conflicts of interests do not permit program manager lobbying; however, PMs have ways to help the process. Program managers seek indirect support from weapons systems contractors. Lobbying ensures the program's share of funding is maintained and hedges against inevitably deeper budget cuts. Congressional Liaison Office staff consistently lobby support through the POM process. This technique allows the Congressmen to maximize dollars for their district. Proactive Congressmen press for the most weapons funding. One PM relied on Senator Dan Coates, who actively embraced solving weapons procurement issues in his state. Because the program manager is restricted from direct lobbying for his program, he used the contractor to lobby the Senator directly. Senator Coates requested a Congressional inquiry in one case where the program's funding was cut. The funding was subsequently returned.

There is tension between the program office and the budget offices over procurement account management. Often the PM hides money from the comptroller and the comptroller knows it. The PEO knows about it too. If their relationship is not nurtured, the situation deteriorates until there is diminished trust. For example, a particular PEO had ten program managers under his cognizance. There were eight PMs that provided the comptroller with accurate program funding requests. Unfortunately, two program managers' estimating techniques could not be relied upon. The comptroller put them together and deemed all of them untrustworthy program managers. The PM felt the comptroller turned a deaf ear to any requests and was not open to reclaims. Five

percent funding reductions occurred because the comptroller “perceived” the program offices inflated budget numbers. The PM felt if he did not inflate his numbers as everyone else did, his program would be hurt: “Unless some pachyderm (comptroller) comes along and enforces the law forcing the PM to play it straight.” This illustrates this particular PM’s frustration dealing with comptrollers. Another PM shared a different view of her relationship with comptrollers. She wanted the comptroller to know her program projections were sincere. She networked extensively with her comptroller personnel. When budget personnel did a good job they received letters of appreciations, plaques and mementoes for a job well done. Use of email was minimized because it was less personal and was subject to possible misunderstanding. Instead, management by walking around was used to personalize issues. This PM thinks it is more difficult to say no to someone face to face as opposed to on a phone or via an email.

Traditionally, there is tension between the program manager and the hardware systems command. The Navy owns and operates about 4,000 aircraft, containing about 70,000 repairable parts. From FY99 to FY02, the Naval Air Systems Command (NAVAIR) and its components have seen repair parts support increase from \$1.2B to \$1.8B<sup>106</sup>. There are food fights over using particular colors of money. NAVAIR, an HSC, wants the PM to spend more procurement dollars on initial spares. The PM wants to spend fewer dollars on initial spares so he can do more in-service engineering support or system engineering. If the PM spends procurement dollars on initial spares, then that’s fewer dollars the HSC has to spend. The HSC would have greater O&M dollars to apply to other aspects of the organization. The PM fudges the amount of procurement dollars needed to get ahead of the game.

While the end user signs off on the amount needed, often it is the contractor who determines the amount of spares and provisioning needed. The mean time between failure rates determines the amount of spares required. The mean time between failure rates is estimated from initial onset of the program. Another method of ensuring spares are available is to “hide” developmental spares from the item manager. Using RDTE and

procurement dollars to buy spares allowed one PM to buy and hold spares. Having a “kitty” allowed the program manager to continue production quantities for the intended user in the case of an emergency. The program manager wants his program to remain viable and readily supports keeping a certain number of spares available to ensure program testing is not halted due to lack of spares. The Navy’s spare parts shortages are attributed to equipment staying in service longer and requiring more replacement parts than originally anticipated<sup>107</sup>. Funding constraints prevent the necessary spares from being purchased. To get spare parts funding, a program manager sold old equipment to foreign governments. Funding for the program was tracked and decremented dollar for dollar for Foreign Military Sales. The PM’s net gain was zero, but it played well politically, and served as a start for future funding.

#### **7. Tension in Tracking Program Costs**

DON distributes operations and maintenance funding to the HSC, program managers, major commands and other military units. Funding is appropriated and parceled out to PMs to manage as Congress directs. PMs exercise authority to change the color of funds to buy spares. The Secretary of Defense must report how operations and maintenance funding is used during the fiscal year. SECDEF pressures the services for accurate spare parts expenditure numbers because the current procurement system does not adequately track the dollars it receives from Congress<sup>108</sup>. In June 2001, and February 2002, the Department of Defense provided Congress with Exhibit OP-31 reports as an integral part of the fiscal year 2002 and 2003 budget requests for O&M. The OP-31 provides the services a means to report progress on accurately tracking spares and repair parts funding. Copies of Exhibit OP-31 reports are provided in figures 15 and 16.

OP-31 Exhibit	Spares and Repair Parts (Dollars in Millions)			
	FY2000	FY2001	FY2002	FY01/FY02 Change
<b>Depot Level Repairables (DLRs)</b>				
<u>Commodity</u>				
Ships	306.9	310.6	305.4	-5.2
Aircraft Airframe/Engines	1664.5	1743.6	2116.3	372.7
Combat Vehicles	0	0	0	0
Other				
Missiles	13.8	9.5	9.5	0
Communication Equipment	4.2	2.4	4.7	2.3
Other Miscellaneous	55.3	53.5	51.6	-1.9
<b>TOTAL</b>	<b>2041.7</b>	<b>2119.6</b>	<b>2487.5</b>	<b>367.9</b>
<b>Consumables</b>				
<u>Commodity</u>				
Ships	281.4	360.3	372.4	12.1
Aircraft Airframe/Engines	721.3	719.5	829.5	110
Combat Vehicles	0	0	0	0
Other				
Missiles	10	10.2	17.1	6.9
Communication Equipment	10.4	9.9	14.9	5
Other Miscellaneous	292.8	324.5	339.8	15.3
<b>TOTAL</b>	<b>1315.9</b>	<b>1424.4</b>	<b>1573.7</b>	<b>149.3</b>
<p>Increase in Aviation DLRs (AVDLRs) and Consumables is due primarily to increased usage of AVDLRs related to aging aircraft and an increase in Primary Mission Readiness (PMR) from 68 percent to 83 percent. Transfer from the Overseas Contingency Operations Transfer Fund (OCOTF) for all contingency operations costs also contributes to the increase.</p> <p>Increase in Shipboard Consumables is due primarily to the Southwest Asia (SWA) contingency costs.</p> <p>Consumables in the Missiles program increase is due to TRIDENT Extended Refit Periods (ERPs) required as a result of converting Trident I (C4) submarines weapon systems to Trident II (D5).</p> <p>Communication DLRs and Consumables increase due primarily to transfer of the Naval Reserve Information System Office from O&amp;M, NR appropriation and transfer of INMARSAT program from OPN and RDTEN appropriations.</p> <p>Other changes between FY01 and FY02 are due primarily to decreases in Working Capital Fund rates.</p>				
<p>Source: Department of the Navy Fiscal Year 2002 Amended Budget Submission, Justification of Estimates, June 2001</p>				

Figure 15. Exhibit OP-31: Spares Submitted to Congress on 6/01

OP-31Exhibit	Spares and Repair Parts (Dollars in Millions)			
<b>Depot Level Repairables (DLRs)</b>	<b>FY2001</b>	<b>FY2002</b>	<b>FY2003</b>	<b>FY02/FY03 Change</b>
<u>Commodity</u>				
Ships	353.2	301	354.2	53.2
Aircraft Airframe	1153.3	1223.2	1364.2	141.1
Aircraft Engine	768.9	815.4	909.5	94
Combat Vehicles	0	0	0	0
Other				
Missiles	8.5	9.9	9.2	-0.7
Communication Equipment	2.5	2	2.2	0.2
Other Miscellaneous	54.6	59.6	66.7	7.1
<b>TOTAL</b>	<b>2341</b>	<b>2411.1</b>	<b>2706</b>	<b>294.9</b>
<b>Consumables</b>				
<u>Commodity</u>				
Ships	386.2	330.1	371	40.9
Aircraft Airframe	527.6	516.1	525.6	9.5
Aircraft Engines	351.7	344.1	350.4	6.3
Combat Vehicles	0	0	0	0
Other				
Missiles	7.5	14.1	13.1	-1
Communication Equipment	9.1	7.4	16.7	9.3
Other Miscellaneous	321.3	301.9	313.3	11.4
<b>TOTAL</b>	<b>1603.4</b>	<b>1513.7</b>	<b>1590.1</b>	<b>76.4</b>
<p>Increases in AVDLRs and Aviation Consumables are due primarily to increased budget usage of AVDLRs and consumables related to aging aircraft and increases in Working Capital Fund rates.</p> <p>Other changes between FY02 and FY03 are due primarily to decreases in Working Capital Fund rates.</p> <p>Source: DON Fiscal Year 2003 Budget Estimates, Justification of Estimates February 2002.</p>				

Figure 16. Report Op-31: Spares Submitted to Congress on 2/02

In reality, funds cannot be easily tracked. The Navy lacks the detailed information needed to document the amount program managers spend to purchase new and repaired spare parts from the supply systems. During the PM interviews, there was only one PM who identified the DOD contract administration and financial management system, (Mechanization of Contract Administration System) (MOCAS)). He found MOCAS to be cumbersome and difficult to use as a day-to-day management tool. All the others interviewed were unfamiliar with the system. All PMs interviewed were unable to match the program's real time costs to the comptroller's because the financial management system used was slow in updating obligations, expenditures and outlays. PMs could tell pretty much what was happening with their funds, but there was no real time snapshot concurrently available at the comptroller shop. Needless to say, there is tension between OSD and the services for accurate spare parts documentation.<sup>109</sup>

PMs admitted that it was “a bear to get a handle on where the money was” at any one point in time. In house expenditures could be tracked very easily, but they found the external accounting system unsupportive. Not being able to communicate effectively with the comptroller increases tension between the offices. One PM sent a budget analyst off-site, to its weapons test ground to reconcile the amount obligated to date. One PM used a commercially adapted program to track her funds. In each case the PMs had to constantly reconcile their books with the comptroller. One PM's funds were taken because the delay in the amount of funds obligated indicated an under expenditure of funds. Because the funds did not appear in the system as obligated as they actually were, the comptroller took the funds because it looked like the program manager was under-obligating his budget. The error was corrected in a few hours, after budget reconciliation.

The President's FY03 budget incorporated force structure changes that reflected a transformational force<sup>110</sup>. After the Cold War and Desert Storm ended, the nation's peace dividend resulted in declining defense dollars. If not for the war on terrorism, there would be even greater decreases in fiscal year funds. The decommissioning of some older aircraft and ships with high O&M costs relative to their combat capability allowed

funding to flow to programs that may not have been otherwise funded. Examples include the funding of two SSGN conversions and the employment of three frigates dedicated to Homeland Defense. Figure 4 shows recent budget trends for the Navy's O&MN, RDTEN and weapons procurement accounts. FY02 defense supplemental legislation increased FY02 numbers. FY03 defense numbers promises to be higher with the current war on terrorism.

<b>Department of the Navy</b>			
<b>FY 2003 Budget Summary by Appropriation</b>			
(In millions of dollars)			
	<b>FY2001</b>	<b>FY2002</b>	<b>FY2003</b>
Operation and Maintenance, Navy	25600	26949	29123
Operation and Maintenance, Marine Corps	2928	2892	3385
Operation and Maintenance, Navy Reserve	1019	1004	1169
Operation and Maintenance, Marine Corps Reserve			
Aircraft Procurement, Navy	8032	8261	8125
Weapons Procurement, Navy	1439	1426	1858
Shipbuilding and Conversion, Navy	11346	9420	7629
Other Procurement, Navy	3437	4020	4346
Procurement, Marine Corps	1190	980	1298
Procurement of Ammunition, Navy and Marine Corps	543	457	846
Research, Development, Test and Evaluation, Navy	9631	11137	11507
<b>Totals</b>	<b>65165</b>	<b>66546</b>	<b>69286</b>

Figure 17. Recent OMN, RDTEN, APN and WPN Budget Trends

## 8. Savings and Cost Overruns

Another strategy PMs use includes inflating budget requirements to cover potential cost overruns. Old money may be moved from one program to cover the funding shortage on another. Program managers are reluctant to use the term cost overrun. Identifying a program with the term “cost overrun” reflects poorly on the PM’s management and to a broader degree questions his oversight abilities. A cost overrun connotes deep concern for the program’s direction and whispers of the program’s eventual death. One PM said, “The nature of cost contracts is such that the contractor is aware that the government bears the risk and he may not be concerned with meeting the

award or incentive fee thresholds on cost plus incentive/award fee contracts.” He added, “Principally if there are cost contracts, there are no cost overruns.” The possibility of exceeding the cost threshold exists. Unlike having a cost overrun, exceeding the cost threshold is not “bad management” from the program manager’s perspective. The program managers tended to insist that clarifying cost overruns was rare if the government assumes risk on a cost contract.

When the contractor exceeds the cost threshold, the PM informs everyone as soon as possible. If the PM needs to rebaseline the dollars, then he must go to the Defense Acquisition Executive to ask for more money. Depending on the cost, rebaselining may require Congressional approval. The contractor knows he will get his money for the level of effort performed. Unless there is a default for cause (DFC) matter, the contractor is paid and the funding comes from a pool of limited sources. In the case of the A12 contract, it was a fixed price contract and it did have a cost overrun. It was terminated for DFC reasons. Finger pointing between government and industry continues as litigation costs escalate.

Despite positive results of using projected savings as a negotiating tool for additional funding, it remains a nebulous concept. PMs limit their discussions on projected savings during POM budgeting because they are not comfortable defining the savings. It is used by some PMs to demonstrate the usefulness of embracing projected savings however. For example, the Air Force used 14 HF stations around the world, which were manned by several airmen. The overhead to feed and house airmen and to maintain station facilities exceeded several million dollars. By turning the outlying stations into remote bases, which fed functions to one station located at Andrews AFB, the station was able to save \$17M per year. The PM used the savings on the program as justification for future upgrades and to fully fund future programs. Because of an enhanced reputation, the PM received little questions on the other programs and improved the program’s life.

## **9. Special Techniques**

PMs commit and obligate funds as soon as practicable at the start of the fiscal year. One PM said, “The first quarter is just too soon because contracts are not ready.” The second quarter was best. If he waited till the third quarter to obligate and/or commit funds, he left himself open to be raided.” The quicker funds are obligated, the better manager you are perceived because the program does not become a target. MDAPs almost never get cancelled because of their high visibility. Generally, PMs obligate funding by the second quarter of the fiscal year because if they did not obligate funds by then, they would be taken away to fund other programs. This PEO’s ACAT I programs committed its money early and got more visibility. Thus, money was never pulled from this program.

The PM communicates with the user and the contractor. Effective communication with all involved reaps tremendous benefits. A PM’s program is lobbied early and often. Contractors consistently lobby for program support. Three PMs said that during the POM budget process, they walk the halls (of the Pentagon) and talk to the proper people. The PEO of two PMs visited Congress. He must be prepared to defend his program on short notice. A commitment to communicate and teaming with the Pentagon helps to reduce budget-cut risks. One program manager consistently talked to her component’s Pentagon staff to ask for the proper justification needed to keep the program safely away from budget cuts. The PM learns how to provide a good reclama. He must always be prepared. The PM knows where he can give up money. He knows where the hurt is, so he tries not to expose that hurt. This program always got extra funding during the fiscal year.

The PMs said, requests to take program funds “always” come late Friday evening and responses are due 0730 Monday mornings in Washington DC. In cases where the office is located out of the DC area, one PM said his reclaims were required on even shorter notice. This required the PM be particularly adept at meeting deadlines when he received a mark. He always had “War plans” in place to prepare last minute reclaims.

Key personnel were identified in advance to work late Fridays and weekends to stave off the budget cut. The PM authorized overtime at the stroke of the pen to compensate his staff.

Integrated Product Teams (IPT) gives the PM greater flexibility. One ACAT I program manager used integrated product teams to determine costs, measure performance and monitor delivery. The PMs interviewed used IPTs to plan program structure and documentation and resolve issues. Overarching Integrated Product Teams moved milestone phase III decisions up. One PM said, “The goal is to resolve as many issues and concerns at the lowest level possible and to expeditiously escalate issues that need resolution at a higher level. This showed that IPTs worked. The ability to get all the players together to work through a problem saves time and money.” In many cases, introduction of IPTs meant that milestone III meetings have little or no issues because they were addressed during the IPT meetings. The PM briefs the DAB on program progress during scheduled milestones and as requested by the DAB or PM.

Programs may end up with more funding than necessary in a given year for a myriad of reasons including excellent contractor lobbying techniques or under obligating funds because the program slipped. The PM is faced with having to return excess funds. The challenge for the PM is that any funds returned are essentially “lost”. Returning funds means it will be difficult to get fully funded the following year. His POM position would be weakened considerably. Program managers resist turning over funds without getting compromises, compensation or consideration for funds transferred from the PEO. Most likely, he works within the PEO to ensure that the funds are “loaned” instead of returned to OSD or Congress. The PEO directs a program swap, if possible.

Program swaps are made to manage funds in the PEO’s sphere of influence. Here’s how it works. The PM borrows money from another program within his PEO, if his program did not get enough money. He likely needs it to remain viable or to remain on schedule. Funds are paid back to the other program in the next fiscal year. As long as

the program manager stays within \$4M RDTE and \$10M procurement dollars, it does not trigger Congressional oversight and is considered a wash within the PEO. Moving funds greater than \$4M RDTE and \$10M procurement require Congressional approval. The PM requests funds are realigned to another program if it is in the best interest of the program(s). One PM obligated funds early because the contractor's delivery schedule slipped. Because procurement dollars within the PEO are planned and obligated over 5 years, this can easily be lost if that money is not identified.

Managing the funds expenditure rate is fundamental to successfully keeping the initial distribution within the PEO. The comptroller targets under-obligated programs during the fiscal year. PMs have developed ways of hiding money by maintaining a management reserve. Program managers readily deny having a management reserve of funds. In confidence there is an unspoken management reserve they use to effectively manage costs. If Congress, or OSD, or the component find out there is extra money on a program, the money is taken. One PM talked to a business associate at a national range and said that he was going to "other government activity (OGA)" \$8M, but asked that that office not spend more than \$5M. The other government activity in this case was the missile test-range that otherwise received funding from this particular program office. In this case, the program manager intentionally "gave" the OGA more money than necessary to hide those funds from the comptroller. The comptroller was unable to touch the extra \$3M because it was no longer visible to him. The PM and the missile test-range kept their agreement.

Section 845 authority is a way to test creative procurement strategies – such as teaming or consortia – with traditional defense contractors and industry areas not normally associated with government contracts. Under this authority, a new business relationship, involving changes in traditional business processes or intellectual property rights is created to leverage commercial investments and allow the PM to influence the design, development and availability of commercial technologies<sup>111</sup>. It also allows the PM to take advantage of commercial business processes such as using the integrated

product team approach rather than a traditional prime-subcontractor structure<sup>112</sup>. Teaming is an opportunity to use O&M funds to pay for portions or all of the parts, supplies, and administrative support. The more O&M funds used for this purpose the more procurement dollars remain to buy weapons.

Used effectively, teaming government and industry is also an effective means of reducing costs. One PM said, “A contractor and an in-house government contractor proposed a software upgrade in the amount of \$8M. The team approach was intended to save money. In the end, the program cost \$16M, - twice the original amount contracted. Each entity was paid \$8M, because there was no teaming accomplished.” Teaming amongst contractors is encouraged to save funds. Teaming industry partners is more prevalent and is necessary due to a significantly decreased contractor base. Given a smaller base of contractors, teaming enables DOD to realize savings despite little competition. Construction of the first two Virginia Class submarines began in 1998 under the teaming arrangement between General Dynamics and Newport News Naval Shipbuilding.

### **C. CHAPTER SUMMARY**

Program managers are in a challenging position, having responsibility for millions of dollars in military weaponry. Training and qualifications required to get an ACAT I program manager up to speed are designed to ensure the PM is very knowledgeable about acquisition in general and about his program in particular. He must possess extensive program office experience. A novice to major weapon system procurement could cost the Department millions and could effectively end the program. PMs answer to Congress and military superiors to determine program viability and affordability. They engage in a variety of techniques centered on maximizing production at the best cost (or best value) available. The best cost selection does not necessarily equal the lowest cost. It represents the best value for the items produced. The funding stream varies as the threat environment changes. In the War on Terrorism, transformational systems are likely to

receive the best funding at the expense of less “visible” programs. Increased weapons funding does not translate into increased funding across all systems.

The PM maximizes his funds through indirect lobbying of Congress, with his PEO, within the Pentagon and industry. They serve as viable sources of receiving revenue. There is competition and cooperation in and among the entities. Optimistic cost estimates sell the program. Congress wants PMs to deliver the most effective and least costly weapons. Along the way, program managers realize that their program is “taxed” by OSD, the component’s budget office and perhaps the HSC as the funds trickle down from Congress. Program managers plan accordingly by submitting a higher than needed budget.

Cost estimates are used as a gauge of a program’s estimated affordability. Unfortunately cost estimates are “gamed” by the contractor and the PM. Oftentimes, the new system comes in much higher than the initial cost estimate. Ultimately, there is pressure to reign in costs from Congress and through the auspices of the SECDEF. The pressure increases as near-term, low-value, unrealistic cost estimates balloon in the out years. Pressure to produce and deliver weapons quicker and at a lower cost is the trend. Care has to be taken to manage against cost overruns. Being described as a program with cost overruns is reflected as poor management and results in greater Congressional and Departmental scrutiny.

PMs employ various techniques to deliver weapons at the best value. Effective communication, hiding funds in an unauthorized management reserve, and teaming are designed to deliver modern weaponry on schedule and at the lowest cost. Overarching IPTs give the PM greater control over the entire process and cut down on developmental and production errors. OTE is shortened because the PM balances LRIP effectiveness against increased EMD costs. Oftentimes a determination is made well in advance of clear evidence supporting the decision. Projected savings are used to resist deeper cuts

and to promote the program's effective leadership in saving the government money. This chapter built on Chapters II and III. While there are instances where the program managers did not emphasize some reform efforts mentioned in Chapter III, this does not discredit chapter III's information. Analysis of the causes for exception will be examined in Chapter VI. The next step is to analyze two ACAT I programs using the background information of the first three chapters. An analysis of techniques discussed in conjunction with actual programmatic techniques to keep programs viable will ensue to determine if acquisition reform over the last ten years has been good for weapons production.

## **V. COMPARATIVE ANALYSIS OF TWO ACAT I PROGRAMS**

### **A. INTRODUCTION**

This chapter builds on the previous four chapters. Chapter I introduced the thesis question of whether procurement reform has helped weapon acquisition of major defense acquisition programs. Chapters II and III provided detailed background on substantive data discussing procurement reform over the past ten years. Acquisition reform, as defined and discussed in this thesis, is a series of changes incorporated into DOD's procurement system. Procurement reform is fluid, where the end is not defined per se, but instead it is evolving to provide the war fighter with weapons more efficiently at the best value available. Significant legislative, administrative and procedural data were presented. Then, an analysis of perennial issues in procurement reform was undertaken in Chapter III. Building upon the perennial issues in Chapter IV, five former program managers were asked questions to determine if the procurement reform analyses were consistent with their experience.

In Chapter IV, nine programmatic themes were investigated. Incorporating those programmatic themes, this chapter looks at procurement reform from the perspective of two current ACAT I programs, DDG 51 and LPD 17. The chapter's comparative analysis is based on available public information on program funding, procurement success and resourcefulness in dealing with programmatic challenges. Like the previous chapter's comparative analysis, this chapter includes quantitative and qualitative analysis. There is a strong emphasis on empirical and anecdotal comparison as well. Information gathered for these ACAT I programs has higher visibility, in keeping with the high level of attention necessary for programs funded in excess of \$1B annually. Table 1 identifies DOD's most expensive weapons programs. The dollars involved in these programs gain them higher attention than lesser-funded programs. Though approved and funded, the actual number of weapons procured may change from year to year depending on Congressional activity.

<b>Rank</b>	<b>Program</b>	<b>Cost (\$B)</b>
1	Joint Strike Fighter (2,852 aircraft)	250.0
2	Virginia Class Submarine (30 submarines)	65.2
3	F-22 Fighter (341 aircraft)	62.7
4	DDG -51 Destroyer (57 ships)	54.0
5	F/A 18E/F Fighter (548 aircraft)	47.0
6	C-17 Air lifter (134 aircraft)	44.9
7	B-2 Bomber (21 aircraft)	44.4
8	Comanche Helicopter (1,292 helicopters)	43.0
9	V-22 Tilt rotor Aircraft (458 aircraft)	36.2
10	D-5 Trident II Missile (453 missiles)	27.4
11	Seawolf Submarines (3 submarines)	13.4
12	LPD 17 (12 ships)	9.9
13	CVN 77 Aircraft carrier (1 ship)	5.2

Sources: Costs compiled by the Center for Defense Information from DOD selected acquisition reports and Congressional Budget Office cost estimates for the Joint Strike Fighter and Comanche programs.

Note: DDG 51 Qty differs from thesis data. Table does not reflect current costs.

Table 1 Total Costs for DOD’s Most Expensive Programs

### 1. Establishing a Start Date

Before delving into comparison analysis of these two programs, I will provide a baseline date to compare changes in their procurement patterns. Prior research has shown the average length of an Acquisition Category (ACAT) I program in the engineering and manufacturing development (EMD) phase is 7.4 years.<sup>113</sup> DDG 51 is a complex weapon system that took many years to design, test and produce. From contract award to delivery, it took 7 years to be delivered. LPD 17 will be delivered 8 years after contract award, provided there are no further delays. Assuming acquisition reform first became effective within the field of acquisition workforce on or about Jan 96, it could only have an EMD effect on programs whose MS III Defense Acquisition Program Board (DAB) meeting was after July 1996. The MS III date is important because that is the point at which the existing DOD acquisition systems will be measured.<sup>114</sup> Baselineing the start date attempts to describe and capture the level of success of a system. The Milestone III (MS III) decision generally concludes the EMD phase.

This chapter sets a start date (baseline) for procurement reform to determine the level of changes in the acquisition program.<sup>115</sup> DDG 51 completed the EMD phase, but significant programmatic changes were made prior to and since that date. In many aspects, DDG 51 has evolved into a very different ship than originally designed due to extensive upgrades and programmatic changes. LPD 17's MS II date was June 1996. LPD 17's MS III date has yet to occur. LPD 17 employed new development techniques with a heavy emphasis on computer-aided design (CAD) to present a "realistic" ship in the design phase. Start of production of the LPD 17 lead ship follows a 48-month period of design, material procurement and engineering. Through the use of extensive automation, advanced materials and equipment, and reduced crew size, LPD 17 is projected to have the lowest possible operating and maintenance costs over its lifetime. The first ship will be delivered in late 2004.<sup>116</sup> Figure 18 shows the varying approaches to acquisition and procurement that DDG 51 undertook and that which LPD 17 is undertaking. DDG 51 is under the "Update Design after Build" or "Flights" model whereas LPD 17 is "Design for Ownership".

# DESIGN FOR OWNERSHIP

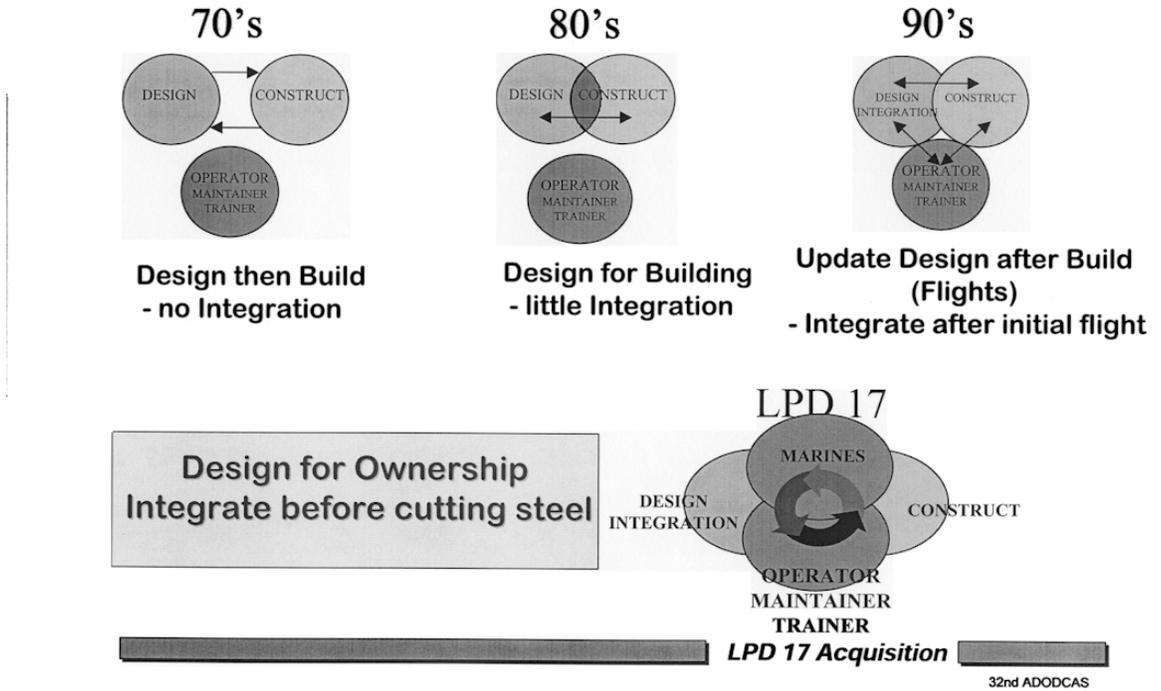


Figure 18. LPD 17 Design For Ownership Diagram

Program managers of newer programs like the Virginia class submarines, DDX and CVNX, make extensive use of teaming and Integrated Product Development (IPD).<sup>117</sup> LPD 17 will be compared with DDG 51 on its use of teaming; life cycle cost savings; and overall design innovations to compare changes in acquisition reforms. Assuming a static environment, program success comes down to the standard parameters of cost, schedule and performance during EMD.<sup>118</sup> Programs are not held in isolation however. The President, Congress, program managers, budgeters, lobbyists and special interest groups play a part in how programs are funded. Funding determines how quickly and how many weapons are procured. Given that DDG 51 began before significant acquisition reforms of the last ten years, there should be clear differences in their programmatic approaches.

## **2. Congressional and Industry Influence**

Select members of Congress, industry watchdogs and lobbyists press for increased weapons production. There has been tension between Congress, the President and industry in the last 10 years, because the executive branch exerted pressure to produce less weaponry. To sustain a 116 surface combatant force structure, four Arleigh Burke Destroyers must be procured annually.<sup>119</sup> For now, the Navy falls short of this goal. Congress appropriated an additional DDG-51 in FY03 (for a total of three) that included advance procurement for a third DDG-51 in FY04. This moves the Navy closer to its goal and sustains the industrial base to meet follow-on surface combatant construction programs.<sup>120</sup>

Industry insiders and lobbyists argue that despite problems in weapons procurement, shipbuilding has to increase to meet minimal defense standards in the out years. The FY03 five-year defense plan drops the Navy to a fleet of only 244 ships as older, technologically obsolete ships reach their decommissioning dates. This force structure is 56 ships below that identified as the minimum required in the 2001 Quadrennial Defense Review (QDR).<sup>121</sup> Some argue newer, more sophisticated weapon systems are more capable, thus eliminating the need for one-for-one replacement. Weapon procurement hawks warn, “No matter how young or technologically capable a ship, it cannot be in two places at the same time.”<sup>122</sup> This excuse also fails to recognize the four to eight year construction lead time of warships, or the fact that further delay in increasing the build rate will make it impossible for a severely weakened and smaller weapons industry to be able to build the significantly larger numbers of ships annually that would be necessary to overcome the ship deficit. The American Shipbuilding Association argues if the Navy began to procure 12-ships a year today, it would take 21 years just to make up the 42-ship shortfall that existed at the end of FY02 in maintaining a 300-ship Navy.<sup>123</sup> The American Shipbuilding Association assumes a 300 ship Navy as identified in the 2001 Quadrennial Defense Review. The actual number of ships in FY02 was 308. Industry experts argue that procurement of two San Antonio class ships per year is required to meet the Marine Corps’ 12 Amphibious Ready Group and fiscally

constrained 2.5 Marine Expeditionary Brigade (MEB) lift force. Though beset with delays, the first ship is ahead of its revised production schedule, according to some industry insiders.<sup>124</sup>

LPD 17 is a clear example of how Congress' influence in defense contracting is politicized. Weapons contracts flow into the states and districts of powerful members of Congress who sit on the Senate and House Armed Services Committees rather than to the companies that can do the best work for the best price.<sup>125</sup> The Congressional delegation that informed Avondale of its award of LPD 17 included House Appropriations Committee chairman, Bob Livingston (R-LA), and Senator J. Bennett Johnson (D-LA) whose committees funded LPD 17 and U.S. Representative William Jefferson (D-LA) whose House National Security Committee authorized LPD 17.<sup>126</sup> Avondale's headquarters is in Louisiana.

## **B. INITIAL DESIGN**

The Arleigh Burke (DDG-51 Class) acquisition program was awarded in 1985. It achieved substantial acquisition program savings over the life of the program. The original plans were for 20 ships, with a potential for up to 60 ships. Current plans are for at least 64 DDG 51 class destroyers through FY04, representing an estimated total program cost of \$45B to \$50B with the last ship scheduled for delivery in 2010.<sup>127</sup> This ship was designed to take advantage of evolving technology while reducing ship construction costs.

Secretary of the Navy Dalton said, "LPD 17 is a first. The Navy is on a frontier of a new way of doing things through teaming with industry partners and streamlining the administration and acquisition process." This statement has proven true as the LPD 17, the first amphibious ship designed for the twenty-first century, continues to be on the leading edge of new product and process innovations in all areas of the acquisition cycle.

A new approach to test program coordination and management has been adopted by the LPD 17 Test Team. Secretary Dalton said, "Current realities such as fiscal constraints, technological leaps, and manpower shortfalls have highlighted the necessity of doing it smarter and getting it right the first time." The LPD 17 Test Team exemplifies a "new test paradigm". It melds the traditionally separate test activities of the government and shipbuilding contractor into one coordinated effort while still allowing each to maintain the responsibilities of their respective domains. The entire LPD 17 Team is committed to the planning, design, and delivery of fully tested and operational ships.<sup>128</sup>

### **1. Design Complexity**

The PM has a demanding job integrating complex weapon systems into one efficient and effective weapon. He is tasked with managing enormous funding and technical resources. Integrating complex weapon systems, like LPD 17, takes an average of 11 years to develop, produce and field.<sup>129</sup> Figure 19 illustrates DDG 51's program manager reporting structure within the hardware systems command (HSC). The PEO relies on the HSC (NAVSEA) for administrative support, including Comptroller functions for financial management. Fund flow for both PEO and HSC funds with single conveyance, via normal path for appropriation. The HSC has limited influence on the PM's funds because of its scope of responsibility. As revealed in programmatic techniques in Chapter IV, the PM has nearly complete control of his budget. Figure 19 shows funding is distributed primarily among the Contractor, NAVSEA field activities, SPAWAR and NAVSEA participating resource managers. The level of responsibility and complexity involved with DDG 51 are similar for LPD 17 with the added responsibility of addressing Marine Corps requirements.

# DDG-51 SCN

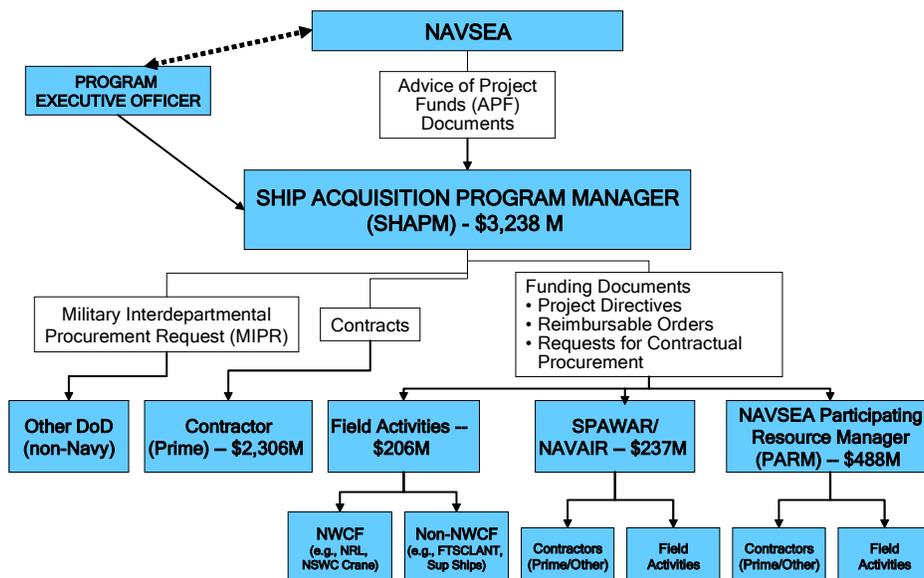


Figure 19. DDG 51 Program Manager's Profile

LPD 17 is projected to have significantly lower cost of ownership due to its reduced manning, use of modular systems, commercial off-the-shelf (COTS) technology, and a high level of systems integration. An Avondale Industries paper states, “The design for LPD 17 incorporates state-of-the-art self-defense capabilities, C4I (command, control, communications, computers, and intelligence) systems, and reduced-signature technologies that will make it the most survivable amphibious ship ever put to sea.

## 2. Emphasis on Life Cycle Savings

DOD has undertaken an effort to reduce the total ownership cost for weapon systems, while improving their performance, reliability, and adopting initiatives that produce significant near term operations and support savings. Life cycle costs grew from peripheral considerations to becoming crucial in measuring both programs' effectiveness. Life-cycle savings are a huge player in programmatic success. Each program office cites the long term savings its program achieves. Life cycle savings initiatives are forwarded to Congress to justify the program's effectiveness in cost savings. Design and cost impact decisions determine more than 80 percent of the total life cycle system costs.<sup>130</sup>

The need for life-cycle savings grows with each weapon's ever increasing cost to field the next generation.

Over the past three budget cycles up-front investment funding has been provided for a broad range of initiatives identified by the Reduction in Total Ownership Costs panel under the chairmanship of AT&L. Five initiatives are recommended for funding in this budget cycle.<sup>131</sup> Since this is the fourth year that up front funding is to be provided, it could be assumed that prior year efforts are beginning to generate results.<sup>132</sup> Reduced Total Ownership Costs (R-TOC) initiatives, like the Army's helicopter RTOC, must show both direct and indirect readiness improvements, as well as O&S cost savings.<sup>133</sup>

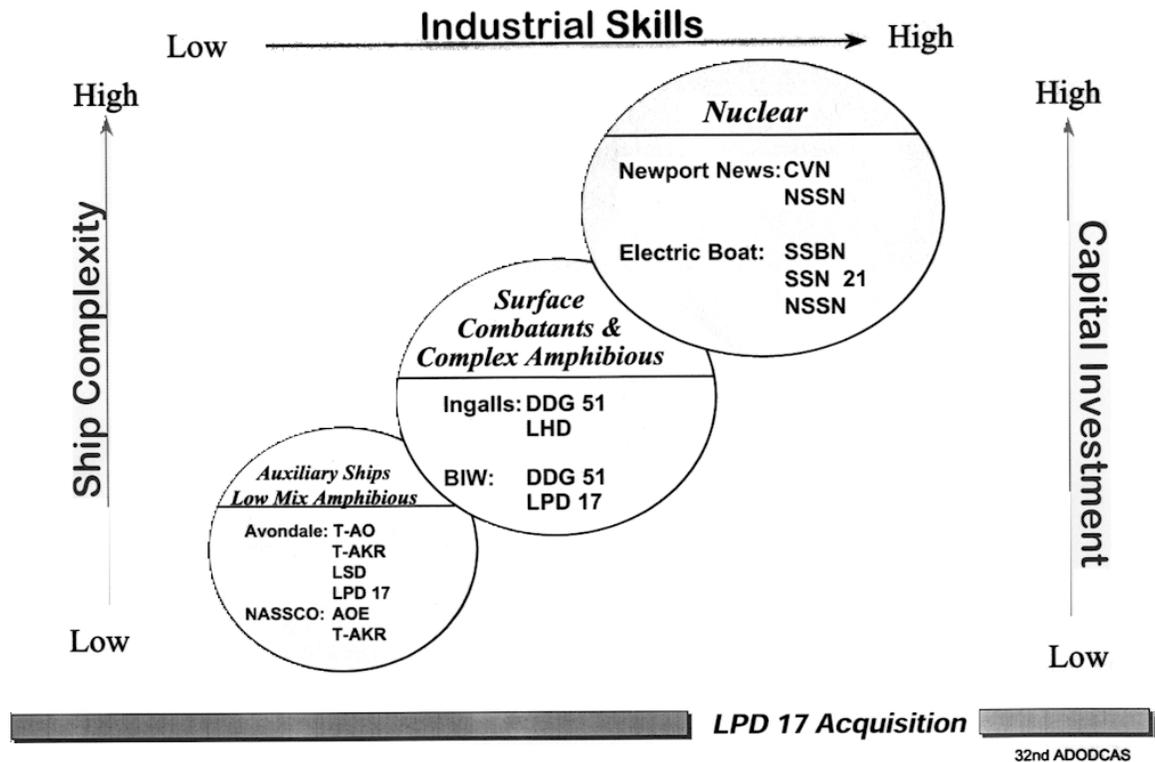
Reductions to the Navy's total ownership costs are a key driver in design decisions associated with LPD 17's projected 40-year service life. Team 17's plan to reduce the TOC of operating and maintaining the ship calls for investments that reduce operating and support costs. For example, key shipboard piping systems carrying saltwater will be made of titanium, which is more expensive up-front but is more durable over forty years. In addition to identifying the best systems and maintenance strategies to reduce TOC, the program manager is working to dramatically reduce crew size, which is a major expense for any ship. Manning levels are twenty percent below preliminary projections (from 450 to 360), and further reductions are being explored in areas that will not degrade the ship's war fighting and organic maintenance capabilities.

In an effort to improve configuration management and reduce the cost of information development, all LPD 17 data is being developed and maintained in electronic form in an Integrated Product Data Environment (IPDE). IPDE is the most complete system used in the shipbuilding industry for the design-through-life cycle management of a ship. It is designed to provide timely, accurate and configuration-controlled information to lower total ownership costs.<sup>134</sup> This collaborative data environment enables the various design specialties on the LPD 17 team to develop,

integrate, and access data in real time. Team 17 has implemented IPDE to facilitate data integration, reduce redundancy, and ensure greater accuracy. This IPDE effort significantly improves Team 17's ability to manage information and to reduce costs.

Furthermore, the Navy's use of alternate shipbuilders with one lead builder is designed to maintain competition and ensures the Navy is not dependent on one contractor. In fact, politics play a role in subsidizing shipyards by keeping two yards when demand is only sufficient to maintain one.<sup>135</sup> Ingalls Shipbuilding and Bath Iron Works have a long history of building USN ships. Using experienced US Navy shipbuilders versus a commercial shipbuilding contractor arguably is a crucial point. There are different cost accounting rules, lessons learned and production quantity differences that specialized USN builders have over commercial shipbuilders. Avondale primarily manufactures ocean-going vessels for both the military and commercial markets.<sup>136</sup> Figure 20 explains current shipbuilding expertise and relative complexity with each shipyard.

# Navy Shipbuilding Market Sectors



32nd ADODCAS

Figure 20. New Shipbuilding Market Sectors

Historically, Avondale’s military-related ships are primarily logistics ships for Military Sealift Command and the far less complicated LSD, thus they are not adept at integrating complex weapon systems because that is not their primary business. Overhead and costing rates are vastly different for the Navy as opposed to the commercial business with which Avondale is more familiar. Commercial enterprises also serve as a “stop gap” measure for Avondale because of the small amount of Navy business it receives. It remains to be seen if diversification into Navy shipbuilding will be a boon or bust for Avondale. Arguably, design delays can be attributed in part to Avondale’s lack of broad experience in this area. Avondale alliance partners, like Intergraph Corporation, help to fill the void in military design and expertise not available on-site.

In support of Milestone II, the Cost Assessment Improvement Group (CAIG) determined that Avondale's teaming costs were ten to fifteen percent more than projected if just one yard was used.<sup>137</sup> This is because the Avondale/BIW split-buy reduced learning at each plant and increased overhead. In the preceding two years, the CAIG has determined that costs have grown an additional nine percent to 24 percent. Furthermore, Ingalls Shipbuilding has a higher yard specific overhead rate that increases costs.<sup>138</sup>

DDG 51 achieves life cycle cost savings through reengineering and improving existing systems and processes. DDG 51's Class Affordability Program is dedicated to evaluating processes and finding ways to do things better. Cost reductions have been achieved through the DDG-51 Class Affordability Program in a cooperative effort among PMS 400, Supervisor of Shipbuilding, shipbuilders, and other defense contractors. The Navy uses a rigorous review process to evaluate the technical and cost reduction merits of innovative ideas while also managing the associated risks. The result is reduced costs to the Navy and shipbuilders through cost reductions achieved on the shipbuilding contract share line.<sup>139</sup> The DDG-51 program realized \$269M in cumulative cost reductions for fiscal years 1985 through 1995 ships (with an additional \$330M projected through FY 01) through the Navy's partnership with industry in the DDG-51 Class Affordability Program.<sup>140</sup>

### **3. Design Challenges**

The program office touts LPD 17's success, but as with any complex undertaking, there have been design problems requiring immediate resolution. LPD 17's CAD benefited from fleet and Marine Corps input to an extent never before achieved during a warship acquisition program. An example of this trend is the ship's new refrigeration system. Concerns rose over the amount of time and training needed to service older refrigeration units due to overcrowded conditions and burdensome maintenance requirements. LPD 17's design was modified following the receipt of numerous valuable suggestions from Fleet Sailors. Instead of relying on four 1.5-ton refrigeration units, two 4.6-ton twin-screw units will be installed to provide greater efficiency and operating

margins. An estimated \$50 million in savings will be achieved as a result of the new systems' reduced manning and training requirements over the program's life cycle.

The PM said that a Production Readiness Review indicated LPD 17's process was on track, but significant design delays have occurred. The Navy attributes the delays to the ship's overall design complexity and to several other factors. First, there are difficulties in design integration: Design is ongoing at three shipyards. For that reason, "a higher level of management attention" is required than if the entire design was being worked in the traditional fashion at one location.<sup>141</sup> Secondly, the CAD environment is more complex than originally expected: The CAD process has presented unique challenges that have inhibited the concurrent development and continuous improvement required: (a) to model such structures as curvatures in thick steel plate and (b) for the modeling of millions of components. Then, there is a shortage of designers: The industry-wide shortage has been a major factor in causing the delays. Intergraph Corporation increased program support by 25 percent, and Avondale increased its support by 70 percent. Intergraph Corporation is responsible for developing an integrated data environment focusing on design, construction and life-cycle data collection for LPD 17.<sup>142</sup> Additionally, the expansion in demand for skilled designers required more time to train them in the new processes. Finally, complications caused by "lofting" requirements have delayed implementation. The CAD process provides a design that is more efficient to build, but the resultant lofting - the process that converts three-dimensional design information into fabrication instructions - is more complex than was expected.<sup>143</sup>

Despite the delays and increased up-front design costs, Navy officials see several long-term benefits and efficiencies for future shipbuilding programs resulting from the steep learning curve experienced in the LPD 17 program. The CAD process has provided a method to significantly lower risk and design costs. CAD also reduces construction errors. Program officials projected an estimated \$4.3 billion savings in operation and support costs because of the new design processes. The program office states

development problems that caused delays and cost overruns in the design and construction schedule have been resolved.<sup>144</sup>

## **C. PRODUCTION**

### **1. Programmatic Quantity Changes**

Figures 3, 4 and 5 in Chapter III showed reduced procurement funding in the 1990's, for weapons and shipbuilding. The Navy, like the other services has to get enough funding to support operations and to get new weaponry. Thus, the total number of DDG 51s and LPD 17s procured per year changes. Figure 4 shows a dip in procurement dollars in the mid-1990's, which directly affected DDG 51 production. To meet the high demand for offsets (prior to September 11), the President's budget removed a ship each year for FY03 through FY06 and removed other critical modernization efforts.<sup>145</sup> Threats, lobbying and Congressional intervention occurred. Thus, Bath Iron Works (BIW) and Ingalls Shipbuilding were recently awarded fixed-price incentive multiyear contracts worth a combined total of \$5 billion for construction of six additional DDG 51-class Aegis Destroyers.<sup>146</sup> Exercising the multiyear contract increases the number of ships from one ship to seven ships total.<sup>147</sup> The additional six ships complete the seven-ship DDG multiyear contract for BIW over the 2002-2005 timeframe. The last ship of the award, DDG 112, is scheduled for delivery to the U.S. Navy in December 2010.

The Milestone IV DAB directed the Navy program for a total of 64 DDG 51s. To date a total of 52 ships have been awarded. Thirty-three ships have been delivered. Figure 21 (DDG 51 production schedule) shows original production levels of four ships per year were reduced to three ships per year and subsequently reduced to two ships per year. Congress added a third ship in the most recent budget. Figure 21, the DD Form 2454, shows two ships per year were programmed in the President's Budget for FY03 to FY06. Figure 22, an Analysis of Ship Estimates, demonstrates the program office's use

of multiyear contracts. Multiyear contracts lower overhead costs by spreading it among a larger ship pool.

Revised Version  
UNCLASSIFIED  
CLASSIFICATION

BUDGET ITEM JUSTIFICATION SHEET (P-40)  
FY 2003 PRESIDENT'S BUDGET  
Shipbuilding and Conversion, Navy  
BA #2 OTHER WARSHIPS

DATE: FEBRUARY, 2002  
Item Nomenclature- DDG Guided Missile Destroyer 212200  
PBO TSC CONTROLLED RESOURCES

Appropriation/Budget Activity	PRIOR YEARS		FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	To Complete	TOTAL PROGRAM
	3	3	2	2	2	2	2	2	2	0	64
Total Funding By Ship	48										
Quantity											
End Cost (\$M)	46982.2	2853.9	3185.5	2417.1	2669.1 **	2493.7	2533.7	2582.4	318.8 ***		60,168.4
Less A.P.	(666.5)	(82.0)	(215.5)	(121.0)	(318.0)	(122.2)	0.0	0.0	0.0	0.0	(1,522.7)
Less FY96 Funding for MYP	(99.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(99.3)
Less FY97 Funding for MYP	(51.8)	(11.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(63.1)
Less Cost to Complete *	(355.0)	(81.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(436.9)
Less Escalation	(48.2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(48.2)
Less FY00 Transfer	(32.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(32.5)
Less FY01 Supplemental	(151.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(151.0)
Less FY02 Transfer Funds (Sec 8130)	(17.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(17.5)
F.F. TDA	39560.1	2678.7	2966.0	2295.5	2298.5	2371.5	2533.7	2582.4	318.8		57,997.2
PLUS A.P.	758.7	452.7	115.0	74.0	122.2	0.0	0.0	0.0	0.0	0.0	1,522.6
PLUS F.F. FOR MYP	162.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	162.4
TDA (\$M)	40481.2	3131.4	3081.0	2369.5	2420.7	2371.5	2533.7	2582.4	318.8		59,482.2
PLUS Cost to Complete *	0.0	0.0	143.7	125.5	59.4	79.2	38.1	0.0	0.0	0.0	436.9
PLUS FY00 Transfer	32.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.5
PLUS FY01 Supplemental	0.0	151.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	151.0
PLUS FY02 Transfer Funds (Sec 8130)	0.0	0.0	17.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.5
PLUS Offsetting Post Delivery	816.3	156.7	178.1	159.3	175.2	201.0	155.9	167.1	607.5		2,617.1
PLUS Escalation	48.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.2
Total	41378.2	3439.1	3420.3	2654.3	2655.3	2642.7	2727.7	2749.5	1118.3		62,785.4
Unit Cost (Avg. End Cost)	853.8	951.3	1061.8	1208.6	1304.6	1246.9	1266.9	1391.2	0.0		940.1

MISSION: DDG 51 will be able to operate offensively and defensively, independently or as units of Carrier Battle Groups and Surface Action Groups, in support of Underway Replenishment Groups and the Marine Amphibious Task Forces in multi-threat environments that include air, surface and subsurface threats. These ships will respond to Low Intensity Conflict/Coastal and Littoral Offshore Warfare (LIC/CALOW) scenarios as well as open ocean conflict providing and engineering power projection and forward presence requirements.

Characteristics:

Hull	FLK07 II	Production Status:	0201	0202	0203	0501	0502
Length overall	466'	Contract Plans					
Beam	59'	Award Planned (Months)	12/01	05/02	05/02	05/02	05/02
Displacement	8900 TONS	Months to Complete					
		a) Award to Delivery	58	59	65	70	76
		b) Construction Start to Delivery	37	40	37	40	37
		Commissioning Date	TBD	TBD	TBD	TBD	TBD
		Completion of Fitting-Out	12/06	6/07	12/07	5/08	11/08

Armament:

ASCS WEAPON SYSTEM (SPY-1D(V))	Major Electronics:
VLS Mk41/SM-2	AN/SQ-89 (V) 15
5"62 Gun/NSF/ERGM	AN/SQ-32 / AEWES
Tomahawk (ATWCS)	AN/SQ-82(FODMS)
MK 32 MOD 7 Torpedo Tubes	EXCOMM
CIWS / ESSM	MK 12 IFF
CEC	COMBAT DP
	JTIDS

\* Additional funding for prior year construction is included in the ECN line item "Cost to Complete" (BA-5; BLS 530000)  
 \*\* Reflects \$18M of FY02's Advanced Procurement in support of an FY01 option ship, in accordance with Congressional direction.  
 \*\*\* Reflects program Completion Costs

CLASSIFICATION: UNCLASSIFIED

DD Form 2454, JUL 88

Figure 21. FY03 Budget Item Justification Sheet (DDG 51)

SHIPBUILDING AND CONVERSION, NAVY  
Analysis of Ship Cost Estimates - Basic/Escalation

Fiscal Year:	2003	Ship Type:	DDG 105-106		
<u>I. Design Schedule</u>	<u>Start / Issue</u>	<u>Complete / Issue</u>	<u>Reissue</u>	<u>Complete / Response</u>	
Issue date for TLR	8/85				
Issue date for TLS					
Preliminary Design	2/81	2/83			
Contract Design	3/83	3/84			
Request for Proposals					
Design Agent	BIW				
<u>II. Classification of Cost Estimate</u>					
Class C Budget Estimate					
<u>III. Basic Construction/Conversion</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>		
a. Assumed Award Date	Mar-98	May-02	May-02		
b. Contract Type	Multiyear procurement Fixed Price Incentive	Multiyear procurement Fixed Price Incentive	Multiyear procurement Fixed Price Incentive		
<u>IV. Escalation</u>					
Base Date					
Escalation Target Cost					
Escalation Termination Date					
Escalation Requirement	Shipbuilding Contracts are forward priced.				
Labor/Material Split					
Allowable Overhead Rate					
<u>V. Other Basic (Reserves/Miscellaneous)</u>					
N/A					

12-5

Figure 22. FY03 Analysis of Ship Cost Estimates (DDG 51)

Multi-year contracts ensure contractor stability and save the government money. Figure 23 shows the use of multi-year contracts and the projected delivery date for future DDG 51's. Design delays and high initial start-up costs for LPD 17 necessitated the Navy initiating a memorandum of understanding between the affected shipyards. Two of the multi-year contract ships awarded to BIW in fiscal 2004 and fiscal 2005 are in accordance with the memorandum of understanding (MOU), "Concerning the Reallocation of LPD-17 and DDG-51 Ship Construction Workload," signed and announced by BIW, Ingalls Shipbuilding and the Navy.<sup>148</sup>

SHIPBUILDING AND CONVERSION, NAVY  
SHIP PRODUCTION SCHEDULE

SHIP TYPE	SHIPBUILDER	FISCAL YEAR AUTHORIZED	CONTRACT AWARD	START OF CONSTRUCTION	DELIVERY DATE
DDG 85	BIW	97	Dec-96	May-98	Mar-02
DDG 86	ISI	97	Dec-96	Nov-98	Feb-02
DDG 87	BIW	97	Dec-96	Nov-98	Nov-02
DDG 88	ISI	97	Dec-96	Jul-99	Aug-02
DDG 89	ISI	98	Mar-98	Mar-00	Mar-03
DDG 90	BIW	98	Mar-98	Apr-00	May-03
DDG 91	ISI	98	Mar-98	Sep-00	Oct-03
DDG 92	BIW	98	Mar-98	Dec-00	Jan-04
DDG 93	ISI	99	Mar-98	Mar-01	Apr-04
DDG 94	BIW	99	Mar-98	Aug-01	Sep-04
DDG 95	ISI	99	Mar-98	Sep-01	Sep-04
DDG 96	BIW	00	Mar-98	Apr-02	May-05
DDG 97	ISI	00	Mar-98	Mar-02	Feb-05
DDG 98	ISI	00	Mar-98	Sep-02	Aug-05

12-6

Figure 23. FY03 Ship Production Schedule (DDG 51)

## 2. Advance Procurement

Like the DDG 51 program, LPD 17's funding fluctuates depending upon whether funds are identified to be taken, programmatic lobbying or due to the threat. Because LPD 17 is still in development, its more significant funding cuts have come in advance procurement. Conversely, its largest funding increases have been advance procurement. For example, in FY00, Congress approved \$460 million for the LPD 17, which is in Senate Majority Leader Trent Lott's home state of Mississippi.<sup>149</sup> Advance procurement of long-lead materials is an important method of keeping subcontractors employed while design and other production related details are worked out. Long lead materials consist of items such as the main engines, generators, controllable pitch propellers, and reduction gears. The use of advance procurement funds has not been sequential nor has Congress identified cuts in a systematic way.

Due to program risk, the Navy delayed ship procurement to one per year from FY03 to FY05. Although DON admits that keeping GFE and CFE procurements on schedule while construction of the ships have been delayed is not justifiable, they still reflect the use of FY01 and FY02 advance procurement funds to buy materials for the LPD 22, which has slipped to FY04. Materials would be purchased up to four years in advance of its 2005 construction start date. Accordingly, the alternative directs the Navy to use all available advance procurement funds in FY01 and FY02 to support LPD 21, the FY03 ship. This will result in a reduction of \$192M in FY03. The LPD 22's FY04 full funding line was adjusted accordingly. The adjustments take into account that a portion of the FY01 funds have already been obligated to support LPD 22 and that FY02 annualized engineering support and Rolling Airframe Missile multiyear procurements are still necessary.<sup>150</sup>

### **3. Program Cost Reduction and Funding Concerns**

Historically, tensions over the amount of DDG 51s to produce have been an issue for this program because of the dollars involved. In 1997, when procurement funding was relatively low, the Congressional Budget Office submitted its proposal to cut back on the amount of ships produced.<sup>151</sup> Table 2, from the Congressional Budget Office, details its findings and recommendations.<sup>152</sup> This option would have bought only 10 DDG-51s from 1998 through 2002 at a rate of two a year. Compared with the Administration's 1997 plan, this option would have bought five fewer ships during CY98-02 period and could have saved about \$551 million in budget authority in 1998 and \$4 billion over five years. (Outlay savings reached \$27 million in 1998 and \$1.4 billion over five years) Of the \$4 billion in budget authority savings associated with this option, about \$3 billion resulted from building five fewer ships and \$1B from consolidating construction at one shipyard.

**REDUCED PROCUREMENT OF DDG-51 DESTROYERS**

Annual Savings Savings from the 1997 Plan	(Millions of dollars)					Five-Year Cumulative Total
	1998	1999	2000	2001	2002	
Budget Authority	551	660	777	879	1,149	4,016
Outlays	27	127	274	431	585	1,444

Table 2 Reduced Procurement of DDG 51 Destroyers (FY97)

There has been greater pressure for programs to demonstrate cost reductions and projected savings in the last ten years. If Congress believes reported savings projections from program officers, OSD, CBO, GAO and/or other governmental bodies, then the program may be identified for a budget cut. For example, Congress assumed that a projected change order totaling \$19.1M, for the DDG 51 program, accurately reflected the savings projected using a decreased learning curve. The learning curve for the change order was three percent. The program manager argued that the change order did not apply because its effects on reducing costs are maximized only if all ships are identical. The reclama stated, “The DDG 51 class ships are implementing their eighth major combat systems baseline upgrade and third major flight upgrade in FY02 alone. The ship is using its second version of the SPY-1 radar, second generation of the five-inch gun, second upgrade to the ship self defense system and several other significant changes.” The program manager added, “These changes are evolutionary and have made the DDG 51 a very different platform over the years. While there are cost savings for those costs directly related to unaffected areas, the major changes have increased R&D and production costs. As each of these upgrades has been processed, the learning curve has resulted in a reduced cost for ships subsequent to that on which the upgrade was first incorporated.”

Furthermore the PM wrote, “These upgrades have been incorporated as baseline requirements in the affected shipbuilding contracts. They were not considered change orders. This maximizes the cost benefit to DON. Likewise these upgrades place

additional pressure on change order budgets.” The PM noted, “since the initial, non-analytical, arbitrary Program Budget Decision 130 from 1992, the PM has indicated that these 3 percent change orders are insufficient to execute follow on flight IIA ships” in his reclama. In this case, the PM’s reclama was due to projected learning curve savings from 10 years prior.

#### **4. Memorandum of Understanding**

The Navy signed a Memorandum of Understanding (MOU) on June 17, 2002, with General Dynamics (Bath Iron Works) and Northrop Grumman Ship Systems (Ingalls Shipbuilding) to transfer ship construction between the two corporations' shipyards. The MOU outlines the terms and conditions for transferring the construction of four LPD 17 ships from Bath Iron Works to Ingalls and Avondale shipyards in exchange for construction of four additional DDG 51-class destroyers at Bath Iron Works. Under this plan, DDG 102, which was to have been built at Ingalls, will be transferred to Bath Iron Works. LPD 19, in the initial stages of construction at Bath Iron Works, will be transferred to Ingalls. As a result of this agreement, the Navy is expected to realize significant net cost savings on these programs. The arrangement is anticipated to provide for increased LPD 17 program stability and cost savings by centralizing production at one shipbuilder, Ingalls Shipbuilding, and improved workload stability at Bath Iron Works, which will build additional DDG 51's in its new, more efficient, land-level facility. Because the cost savings were very optimistic, DAB directed the Cost Assessment Improvement Group (CAIG) to provide a realistic assessment of the projected cost savings. The CAIG estimated the proposed savings were \$118M less than predicted. The LPD 17 CAIG independent analysis was done to provide realistic estimates for Congress<sup>153</sup>.

Speaking about the agreement, Assistant Secretary of the Navy for Research, Development and Acquisition, John Young Jr. said, "The Navy and the shipbuilders have taken a bold step today." Young continued, "This shipbuilding transfer agreement will save the taxpayers money over the life of these two programs by dramatically reducing

the cost and schedule risk in the LPD 17 program. The new FY02-05 DDG multi-year contract pricing and conditions were also negotiated in conjunction with the swap agreement." Concluding, Young said, "The signing of this MOU and the new DDG multi-year contract stabilizes the workload at three shipyards -- Ingalls, Bath and Avondale, and provides a solid plan for almost \$20 billion of Navy shipbuilding. This agreement is a win-win for both shipbuilders and the Navy."

Navy Secretary Gordon England said, "The award of the DDG 51 multiyear contract today is not only a significant milestone for one of the Navy's most successful acquisition programs, but also the cornerstone for the completion of the DDG 51 and LPD 17 workload exchange agreement. The DDG multiyear contract and the workload exchange agreement will save the taxpayers more than \$500M through the life of these two programs and provide for increased workload stability at Bath, Ingalls and Avondale shipyards. This award is a testament to the teamwork, professionalism and value created by our industry and government team. The agreement is also a testament to our partnership with Congress, as a number of key members have been instrumental in shaping and approving the swap and multiyear agreements."<sup>154</sup>

## **5. Integrated Product Teams**

There is a much greater emphasis on teaming with the LPD 17 program. Its teams are co-located, vertically and horizontally integrated and solve problems through teaming. To make the most of an IPPD structured - program, nearly all members of Team 17 have been collocated on the grounds of Litton Avondale's shipyard in New Orleans for nearly two years. For the first time during a shipbuilding program, the Navy and the contractor work side by side at a single location. The IPT allows the PM to benefit from extensive experience from a diverse group of acquisition professionals. Instead of having different contractors coordinating their efforts while the ship is under construction, a team is working to design and integrate the ship's systems at the same site. This environment has reportedly streamlined communication and enhanced decision-making.

In addition to design work begun for the new class, Litton Avondale constructed a series of pilot ship sections to demonstrate the maturity of the design and efficient production processes.<sup>155</sup> The LPD 17 design includes systems configurations that reduce operating and support costs and facilitate operational performance improvements. System engineering and integration efforts have developed further reductions in life cycle costs and integrated performance upgrades.

To gain every advantage from Sailor and Marine expertise, PMS 317 implemented the Virtual Crew. The Virtual Crew conducted fifty-nine Virtual Crew sessions that reviewed over three hundred individual ship spaces. The results were impressive. Better than fifteen percent of the five hundred fifteen recommendations provided by the crew have led to actual changes in the design. Thirty-seven percent of those recommendations validated the design. The most significant achievement is that the team incorporated engineering changes into detailed design more than three years early, when changes can be made more easily and at less cost.<sup>156</sup>

## **6. Operational Testing**

Even before the Arleigh Burke destroyer was completely built, Commander, Operational Test and Evaluation Force was involved in the initial phases of testing. New systems, operated by fleet sailors ashore, were examined at land-based test facilities. The combat system test and the propulsion plant test results supported the acquisition decision to begin limited production of the ship class.

After commissioning, DDG-51 hosted follow-on operational testing throughout 1992. This test revealed engineering problems that required resolution by the design and production groups. An additional phase of testing was added to retest the engineering solutions to those problems. After this test, more follow-on testing was conducted in USS Curtis Wilbur (DDG-54) in 1994. The Curtis Wilbur test focused on antisubmarine

warfare. The 5"/54 gun weapon system merited its own separate test due to the system's complexity.<sup>157</sup>

The value of operational testing and development testing is emphasized in LPD 17's program office. Though it has not reached the OTE phase, OT has been emphasized from the beginning. LPD 17's goal is to eliminate the problems encountered in DDG 51 and earlier platforms. LPD 17 incorporates developmental testing (DT) and operational testing (OT). The LPD 17 Test Team has reinvented the approach used to implement both test philosophies. The primary emphasis of DT is to ensure the ship is capable of performing its mission based on the satisfactory demonstration of established critical technical parameters. OT, on the other hand, is structured to determine the effectiveness and suitability of a system under operationally realistic conditions; and to determine if the minimum acceptable operational performance requirements, as specified in the Operational Requirements Document (ORD), have been satisfied.

The LPD 17 Test Team pulled forward Operational Test requirements in a concept called "Continuous Operational Assessment". Areas of potential risk were identified and corrections to deficiencies developed and incorporated. This concept emphasizes operational considerations as part of the ship design process. Significant benefits continue to be derived from early "Operational Tester" involvement in the program. Potential problems in ship design and construction from the Operator's viewpoint have been identified early in the design process and are being eliminated thus avoiding rework. The team accomplished this through the use of a Memorandum of Agreement (MOA) with Commander, Operational Test and Evaluation Force (COMOPTEVFOR) to conduct Operational Assessments as part of the design cycle. Using this approach, the program manager significantly reduced risk and total ownership costs. Costly rework will also be avoided.

## **D. CHAPTER SUMMARY**

In summary, seven points from the earlier chapters are addressed for “fit”. Do LPD 17 and DDG 51 as major weapons programs, have the same concerns as those expressed by former program managers? There were seven points that served as the basis for the nine programmatic techniques discussed in Chapter IV. The challenge for program managers is that they are forced to make hard choices in a resource-constrained world. When dealing with military weapons procurement, an additional challenge is that at any time resources change or can be taken away through Congressional, or higher departmental action. DDG 51 and LPD 17 appear to be a large growth in efforts to team from the beginning. LPD 17 emphasized teaming and in fact, used teams to tie most of its groups. DDG 51 emphasized teaming through reengineering.

### **1. Unreasonable Assumptions**

LPD 17 advertised \$500M in life cycle cost savings, but upon review by CAIG it was determined that the estimated savings were \$118M less than projected or 24 percent less. For DDG 51, it has performed well and arguably has met expectations. LPD 17 is too new to know the real implications of this ship’s effectiveness.

### **2. FYDP Funding Bow Wave**

Taking a quick look at Table 2, DOD’s Most Expensive Weapon Systems, shows there are more requirements than available funds. DOD cuts and reinstates funds regularly. LPD 17 has been given more advance procurement funds in the last few years. It has had considerable funds taken away too. Lawmakers are providing advance funding for ships upwards of 4 years in advance of need to secure the program’s life and to keep constituents employed. DOD repeatedly shifts planned funding increases for modern weapon systems further into the future with each succeeding future years defense plan (FYDP). As DOD reduces programmed procurement in successive FYDPs, it has reprogrammed some procurement to the years beyond the FYDP creating a bow wave of demand for procurement funds.

### **3. Alternative Weaponry Should Be Considered**

The costs associated with constructing new weapons have increased dramatically over the past few years. More funding will be required to complete construction of several types of ships. The LPD 17 has experienced excessive cost increases partly attributed to design delays and a shortage of experienced personnel. In 2001, DOD estimated that to build twelve ships it would need \$10.6B. Now DOD believes it will require \$15.1B to build these same twelve ships, a forty two percent increase (FY03 Budget).<sup>158</sup> DOD has undertaken a number of initiatives to enhance its ability to monitor and take action on cost growth and schedule delays in the ship construction program. Arguably, Avondale does not have the in-house expertise to integrate the ship's systems.

### **4. Overestimated Funding**

DOD's culture to generate new weapons by overestimating necessary funding and underestimating program costs appears to ring true for these programs. LPD 17's costs are over target. It begs the question of how much of that was due to underbidding by the contractor and the use of the PM's best cost estimate to help sell the program's cost effectiveness.

### **5. Insufficient OTE**

In both cases, there appears to have been concerted efforts to have successful OTE. DDG 51's OTE was evolutionary. DDG 54, USS Curtis Wilbur completed the most thorough OTE, as the fourth ship in the class. Anecdotally, DDG 51, USS Arleigh Burke is nicknamed 'Always Broke' for its record of high maintenance repairs. Follow-on ships in the class do not share in that record and have very high reliability.

## **6. LRIP Begun Too Soon**

Pressure to deliver LPD 17 is growing because of design delays. As the program managers interviewed said, ‘there is a part where costs escalate and you have to deliver the product.’”

## **7. Systems Do Not Match Requirements**

DDG 51 is a cheaper alternative to the CG 47, Ticonderoga Class Cruiser. Its selection was based on evaluating projected savings versus CG 47 upgrades. DDG 51 has proven to be a reliable and successful platform for the Navy. Both programs cost more than predecessor systems. LPD 17 was chosen for its operational flexibility over cheaper, less costly, less complex competition.<sup>159</sup> LPD 17 is designed to replace four amphibious ship platforms.

LPD 17 and DDG 51 make claims of cost savings, but savings may be hard to justify. Problems and hidden costs of untried practices have hampered LPD 17. Nevertheless, positive corrections were made when the MOU was signed between the shipyards to save dollars. For Congress, OSD, DAB and the program manager, there must be a balance between long term savings and near-term investments. The final cost depends on factors beyond the program manager’s control. Unknown factors like Congressional direction; the current shape of the industrial base; and budget priorities and allocation affect funding.

This concludes the data portion of the thesis. The next chapter summarizes the information presented, discusses it and concludes in hopes of determining if DOD acquisition reform in the past ten years has been a help or hindrance for weapons procurement.

## **VI. CONCLUSIONS AND RECOMMENDATIONS**

### **A. INTRODUCTION**

This thesis posed the question of whether ten years of DOD procurement reform has helped or hindered acquisition reform. The answer to that question started with a broader view of DOD, winnowing down to the Navy's program manager, revealing techniques employed by them to manage funds. Simply stated, there are many variables that are central to the question. This chapter gets to the gist of the thesis. After siphoning through mounds of paperwork, websites, interviews, phone calls and emails, etc. the pressure to find a bottom line for the next step for acquisition reform grew. I will start with a short review, followed by analysis of the US' budgetary environment and national interest, and concluding with a discussion and recommendation for continued Navy procurement reforms.

Before acquisition reform, the process of acquiring new weapons was beset with loopholes and excesses. Congress wanted the system reformed because years of excessive specifications and unclear requirements dictated details of how a weapon system "should" perform. This served to increase costs. Cost as an independent variable and allowing commercial off the shelf purchases were designed to lower procurement costs.

Many programs that were introduced in the earlier part of the thesis were not mentioned in later portions. The reasons for this fall into the following categories. The law or regulation proved to have little relevance in day-to-day program management. The program managers interviewed were not familiar with the initiatives and ignored or were not aware of them for practical reasons. Ignoring the regulations discussed earlier is not an admission of irrelevance, but instead is an admission that this thesis may not have captured the essence of programmatic reforms, because the correct questions may not have been asked.

The end game for Congress and the nation is to save resources where possible so that the nation can purchase more of what it needs. Yet, despite acquisition changes enacted by Congress, they (Congress) serve as the single most unpredictable variable when it comes to procuring weapons. Congress intervenes with pork legislation like the advance procurement funds for LPD 17 for ships that are four years away from starting construction. It seems that powerful members of Congress can keep an unnecessary program funded for years.

## **B. PRIMARY INTERESTS FOR CHANGE**

An age of fiscal restraint for the federal government with corresponding ballooning surpluses constantly reminded the defense establishment that the go-go days of the 1980s were over. The years 1989 through 1991 represented a watershed event for the world. The threat changed after the Berlin Wall fell and the Soviet Union broke up into several smaller, diverse republics. Eastern bloc countries embraced capitalism. A new world order was ushered in. A new world order existed that created a void where the Soviets once stood. Some thought the new world order demanded the United States get involved in humanitarian engagements. And the US did - at least for a while. For now, the world does not have bipolar states battling for a desired way of life.

Unipolarity exists with the US as the lead nation, exerting diplomatic and military might to keep national and international peace and economic stability. The US is stretched thin, so the need for weapons procurement savings is greater than before. On balance, with the end of the Cold War, US forces do not need to be kept in the high states of readiness they were before. Then again, how else is the US going to be ready for the next world challenge? National interest questions are not for debate on political hegemony, but speak directly to the weapons needed in a new world order.

On the domestic front, how does the US fare in all this? Despite cuts in the US defense budget since the end of the Cold War, the United States reportedly accounts for one-third of all military spending in the world. As the world's self-appointed policeman (at least in matters that are directly related to the national interest) that number appears reasonable. The US military is far superior to any of its rivals or allies. It is true that some existing weapon systems are in desperate need of repair. It's also true that some existing systems should be retired because they no longer effectively meet the threat.

The challenge for procurement reform is that the US has to be able to defend its national interests with technologically effective weapons. Effective weapons are designed, produced and executed as intended. Technologically "superior" weapons do the same thing and more. It may be overkill to seek "superior" weapons for every eventuality and it costs more. Resources are limited. Why kill a fly with a bazooka when a simple fly swatter would do? US national interests are global and defending its interests demands a military with global reach. Military weapons must be able to reach far corners of the world to meet today's challenges. Today's challenges are for a transformational force that is capable of defeating a stealth enemy. The issues with procurement have been documented and discussed throughout this paper. Given those issues, where do we go from here? Specifically, what is the next step given the fact that despite significant acquisition reform legislation, the military spends even greater funds for newer weapons?

The question of a new world order beckons. Are we in the midst of a new world order or are we transitioning into that new world order? If we are in transition, what will the final outcome be? Seven or eight years ago, experts argued that the new world order encompassed small nations fighting for suppressed liberties and freedom. This is correct. It is also correct to assume that the new world order encompasses non-state actors fighting for a voice through violent means (terrorists). The bottom line for the US is that it has to be prepared to defend its national interests with a weapons procurement policy

that is more flexible, cheaper, more responsive and less hindered by political manipulation to win votes. The US needs acquisition reform that works – better.

### **C. CONCLUDING RECOMMENDATIONS**

There is a military culture to produce the most dynamic weapons with the greatest technology, albeit it is less pervasive than it was 10 years ago. Congress encourages this culture by allowing key committee members (HASC, SASC, Appropriations, etc.) the ability to push pork through for the sake of votes. Congress and DOD must have a determination that the national interest is greater than the need to add pork legislation for the latest technological marvel. Cancellation of Crusader was a solid decision because the need for it was questionable. Additionally, there was the issue of whether or not Crusader could be transported to the battle because of its excess weight. Crusader was designed for an old enemy. The Army has to be more mobile to fully engage in the war on terrorism. The US military, like Crusader, is beset with slow, technologically old, cumbersome weapons that cost much and deliver little for the level of effort required. The weapon procurement system is weighed down. It takes far too long to design, implement and produce weapons. Stating the obvious is easy. Finding a solution that remedies the design, EMD and production phase delays is not so easy. DOD must aggressively pursue breakthrough technology before weapon system research and development. Contractors are creative in designing weapons and should be encouraged to develop lighter, transformational weapons while bypassing excessive milestones that mire the procurement process.

Recommended actions for continued improvements include first planning programs and resources on a joint mission basis to excise service parochialism and to get real cost savings from cross-functional weaponry. DOD needs to make the war-fighters responsible for participating in the selection of weapon systems based on joint mission needs and deciding whether or not a program is affordable. War-fighters, DOD and program managers need to measure schedule, cost and performance tradeoffs among

alternatives more rigorously before a particular approach is chosen. Today's push for transformational weaponry does not equate to the same force in thirty years.

Because funds are not as abundant as before, a cultural change within DOD that actively seeks the best value weapons that meets the needs of the war fighter is necessary. Congress and the Pentagon need to take much stronger actions to effectively control the influence of the acquisition culture, particularly as it generates and supports the acquisition of new weapon systems that do not necessarily satisfy the most critical requirements at minimal cost and willingly commits more procurement funds to programs than can reasonably be expected to be available in future defense budgets. Industry has to partner with DOD to make this happen.

The system needs to be responsive. One possibility is to loosen restrictions on procurement regulations further. With the current re-write and/or dissolution of DOD 5000.2R, this suggestion is far from revolutionary. It could be argued that it is evolutionary. This time, enough regulations must remain to discourage excessive waste of funds, abuse from acquisition professionals and temptations from Congress to appropriate unnecessary weapons. Program decisions must be linked in a more durable way to DOD's long-term budgets. They must maintain continuous competitive alternatives to solve mission needs throughout the acquisition process. The Standard Procurement System (SPS) and other user-friendly funds tracking software must get immediate attention. Finally, DOD must conduct programs in an environment of stable funding and management.

Acquisition reform over the past ten years has helped procure better, more efficient weapons. There are downsides to the system, which have been discussed. Continued reengineering for economical weapons is not optional, it is a must.

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## **APPENDIX A: DEFINITIONS, ABBREVIATIONS AND ACRONYMS**

ACAT – Acquisition Category

ADM – Acquisition Decision Memorandum

APB – Acquisition Program Baseline

ASN (RD&A) – Assistant Secretary of the Navy for Research, Development and Acquisition (CAE for the Navy)

ATN – Alliance Test Network

BA - Budget Authority

C4I – Command, control, communications, computers and intelligence

CAD – Computer Aided Design

CAE – Component Acquisition Executive

CAIG – Cost Assessment Improvement Group

CAIV – Cost as An Independent Variable

CAP – Critical Acquisition Position Description

CNDI – Commercial or Non-Developmental Items

CBO – Congressional Budget Office

CENTCOM – Commander in Chief, Central Command

CFE – Commercial Furnished Equipment

CNO – Chief of Naval Operations

COMOPTEVFOR – Commander, Operational Test and Evaluation Force

COTS – Commercial off the Shelf

CVN 68 – NIMITZ Class Nuclear Powered Aircraft Carrier

CLINGER-COHEN ACT of 1996 – Information Technology Reform Act of 1996

DAB – Defense Acquisition Board

DDG 51 – Arleigh Burke Class Aegis Destroyer

DIT – Design Integration Test

DOD – Department of Defense

DODIG – Department of Defense Inspector General

DON – Department of the Navy

EMD – Engineering, Manufacturing and Development Phase  
FARA – Federal Acquisition Reform Act of 1996  
FASA – Federal Acquisition Streamlining Act of 1994  
FYDP – Future Years Defense Plan  
GAO – General Accounting Office  
GFE – Government Furnished Equipment  
GPRA – Government Performance and Results Act:  
IPDE – Integrated Product Data Environment  
IPPD – Integrated Product and Process Development  
JSF – Joint Strike Fighter  
LBTE – Design Integration in a Land Based Test Environment  
LPD 17 – Amphibious ship used for embarking, transporting and landing support to Marine Landing Force  
LRIP – Low Rate Initial Production  
MDA – Milestone Decision Authority  
MDAP – Major Defense Acquisition Program  
MEB – Marine Expeditionary Brigade  
MOCAS – Mechanization of Contract Administration Services system  
MOU – Memorandum of Understanding  
MS - Milestone  
NDI – Non-Developmental Item  
NOR – Net Offsetting Receipt – Collections from the public  
OGA – Other Government Activity  
OFPP – Office for Federal Procurement Policy  
OMB – Office of Management and Budget  
O&M – Operations and Maintenance Funds  
OMN – Operation and Maintenance, Navy  
O&S – Operation and Support Costs  
OPTEMPO – Operational Tempo  
ORD – Operational Requirements Document  
Outlay – An Expenditure or Liquidation of the Government’s Obligations

PDRR – Program Definition and Risk Reduction

PM – Program Manager

POM – Program Objective Memorandum

PPBS – Planning, Programming and Budgeting System

QDR – Quadrennial Defense Review

Reappropriations – Extending previously appropriated funds

RDT&E – Research, Development, Training and Engineering

Rescissions – Canceling new Budget Authority or Unobligated Balances

RBA – Revolution in Business Affairs

RMA – Revolution in Military Affairs

SECDEF- Secretary of the Defense

SECNAV – Secretary of the Navy

SPI – Single Process Initiative

SPS – Standard Procurement System

SSBN - Strategic Ballistic Missile Submarine

SSGN – Tomahawk Launch Capable Converted Strategic Ballistic Missile Submarine

TOA – Total Obligational Authority – Value of the direct defense program in a given year

TOC – Total Ownership Costs

USD (AT&L) - Under Secretary of Defense for Acquisition, Technology and Logistics

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