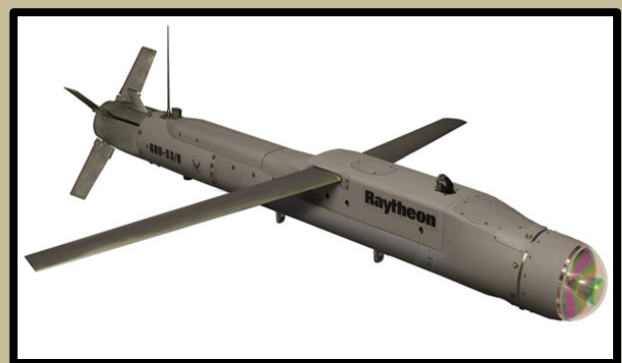
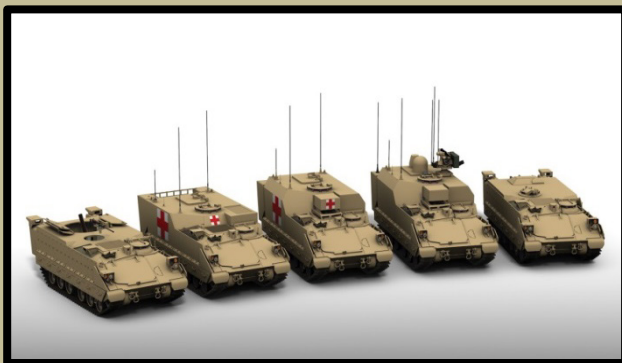




FY 2015 Annual Report on Cost Assessment Activities



February 2016

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FY 2015 Annual Report on Cost Assessment Activities



Director, Cost Assessment and Program Evaluation

February 2016

**The estimated cost of this report for the Department of
Defense is approximately \$65,000 in Fiscal Years 2015-2016.
This includes \$60,000 in expenses and \$5,000 in DoD labor.**

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FOREWORD


The *Weapon Systems Acquisition Reform Act (WSARA) of 2009, Public Law 111-23*, was intended to reform defense acquisition processes and to bring cost growth under control. WSARA established the position of Director of Cost Assessment and Program Evaluation (CAPE) in the Office of the Secretary of Defense (OSD). The Director is responsible for ensuring the Department's cost estimation and cost analysis processes provide accurate information and realistic estimates of cost for the major acquisition programs.

This seventh edition of the annual report describes how the CAPE organization continues to mature in response to the objectives of the landmark legislation.

In light of the current challenging fiscal environment, the need for thorough analyses and rigorous cost assessments has never been greater. Independent, rigorous, unbiased cost and schedule estimates, paired with thorough risk assessments, are essential for effective acquisition decision making and oversight.

Progress of the cost community in the post-WSARA years can be measured by fewer program cost and schedule breaches, increased emphasis on cost reporting, and a better educated cost analysis work force. Though these successes are favorable, work continues to make the cost assessment process more effective, efficient and timely. Our commitment to continually improving our processes requires investments in better cost data, improved analytic methods and tools, and relevant training for the cost assessment community. CAPE continues to invest in the Cost Assessment Data Enterprise project, which is revolutionizing cost data collection by providing the entire cost assessment community with a centralized comprehensive and authoritative database supported by advanced data visualization and other analytic tools. In addition, CAPE and the military department cost agencies are now working with the Defense Acquisition University to conduct a comprehensive review of the entire curriculum and course content provided to the cost assessment community. Several course reviews were completed in 2015 with more scheduled for 2016.

Although CAPE has made significant progress in reforming the cost assessment process for the Department, many challenges remain, and there is more work to be done. Our progress in dealing with these challenges will be described in future editions of this report.



Jamie M. Morin
Director
Cost Assessment and Program Evaluation

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CHAPTER I – INTRODUCTION

As established by WSARA, the Director of CAPE is the principal official for independent cost estimation and cost analysis, ensuring that the cost estimation and cost analysis processes of the Department of Defense (DoD) provide accurate information and realistic estimates of cost for the acquisition programs of the Department.

In this capacity, the Director of CAPE has several responsibilities prescribed by WSARA. Specifically, CAPE conducts independent cost estimates and cost analyses, prescribes policies and procedures for the conduct of cost estimation and cost analyses in DoD, reviews all cost estimates and cost analyses conducted in connection with Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) programs, conducts cost analyses of defense acquisition programs to be carried out using multiyear contract authority, prescribes policies and procedures for the reporting and collection of actual cost data and other information for MDAPs and MAIS programs, and issues guidance relating to the full consideration of life-cycle management and sustainability costs in MDAPs and MAIS programs.

This annual report describes this year's progress in reaching these ambitious objectives. The organization of this report is as follows:

- Chapter II provides an overview of cost analysis in DoD. It describes the types and purposes of cost analysis organizations throughout the Department and explains the procedures for preparing cost estimates that support the defense acquisition process. It also introduces the main DoD systems that collect actual data and information on the contract and government costs of programs.
- Chapter III reviews the Department's Fiscal Year (FY) 2015 cost estimation and cost analysis activities associated with MDAPs and MAIS programs. These activities include independent cost estimates (ICEs) as well as reviews of military department and Defense Agency cost estimates, which inform the DoD decision authorities at milestone reviews and at other acquisition decision points. This chapter also summarizes the degree to which DoD cost estimation and assessment activities in FY 2015 complied with established procedures, and discusses the overall quality and any consistent differences in methodology among the cost estimates. Some of the notable highlights in this chapter are:
 - **MDAP Milestone Reviews.** There were 13 unclassified MDAP milestone reviews or other review events supported by CAPE and the military department cost agencies.
 - **Critical Unit Cost Breaches/MAIS Critical Changes.** The Department had no MDAP unit cost breaches or MAIS critical changes in FY 2015. This is the first year we can report this encouraging news.
 - **Assessment of Compliance, Quality, and Differences in Methodology.** The cost assessment activities complied with the requirements of WSARA and the established procedures described in Chapter II. The overall quality of the cost estimates prepared by the military departments has continued to improve due to increased rigor and better availability

of data. A recent CAPE analysis made a comparison between the CAPE ICEs and the service cost positions, and found that, on average, the difference between the two estimates since the enactment of WSARA in 2009 has narrowed significantly relative to the prior period between 1999 and the enactment of WSARA.

- **DoD Cost Analysis Symposium.** This year, CAPE was able to resume a full-length version of the annual DoD Cost Analysis Symposium at a government facility. This approach provided a valuable forum for the education, training, and improvement of communication within the DoD cost analysis community while complying with restrictions on expenses for conferences and travel.
- Chapter IV describes the status of several ongoing initiatives that will ensure the cost assessment and cost estimating functions of the Department will be improved and modernized as required to meet the expanded roles and responsibilities established by WSARA and the evolving needs of the Department. These initiatives address a wide range of issues and concerns, including cost estimating policies and procedures, cost tools and data systems, and education and training opportunities for the DoD cost community. Some of the notable highlights in this chapter are:
 - **Cost Assessment Data Enterprise.** CAPE initiated the development of the Cost Assessment Data Enterprise (CADE)—the Department’s unified initiative to collect, organize, and use data more efficiently. CAPE is partnering with the military department cost agencies and the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) staff to incrementally work towards its CADE vision of the government cost analyst’s centralized database and virtual library, housing seamless integrated authoritative data sources that are easily searchable and retrievable. The goal is to reduce time spent on *ad hoc* data collection and validation, allowing more time for actual analysis at a much deeper level, and providing a more rapid ability to see how a program is performing between major reviews. This initiative will increase analyst efficiency and will provide a way for analysts to build upon prior work. There are currently more than 1,600 registered CADE users.
 - **Improved Cost Data Collection.** Based on feedback from government users about desired report enhancements, as well as advancements in information systems technology, CAPE and the military department cost agencies are supporting several government management teams and working groups that are seeking to modernize business processes and improve data collection and reporting from contractor and government organizations. These initiatives will improve data quality, compliance, and timeliness, and also reduce reporting burden. One of these initiatives will modernize cost data reporting by enabling the automated submission of detailed cost data directly from the contractors’ accounting systems. Other initiatives are working toward improved software data reporting and the collection of system technical (design and performance) data that would be useful to cost analysts.
 - **Cost Analysis Education and Training.** CAPE and the military department cost agencies formed an Education and Training Working Group. This working group has developed a framework of desired core competencies—for apprentice, mid-level, and senior cost analysts—that are being used to guide education and training standards for course content.

The working group is now working with Defense Acquisition University (DAU) to conduct a comprehensive review of the entire curriculum and course content and to ensure that the desired core competencies are being addressed. CAPE and the military departments are also working to provide more specialized technical training.

- **Policies and Procedures.** CAPE has completed six major documents that provide guidance concerning cost assessment policy and procedures. These documents are:
 - DoD Directive 5105.84, *Director of Cost Assessment and Program Evaluation (DCAPE)*
 - DoD Instruction 5000.73, *Cost Analysis Guidance and Procedures*
 - *Operating and Support Cost-Estimating Guide*
 - DoD 5000.04-M-1, *Cost and Software Data Reporting (CSDR) Manual*
 - DoD Instruction 7041.04, *Estimating the Full Costs of Civilian and Active Duty Manpower and Contract Support*
 - DoD Instruction 7041.3, *Economic Analysis for Decision-making*

These documents are the primary vehicles for implementing the cost assessment provisions of WSARA throughout DoD. The CAPE efforts to develop and publish policies and procedures are now for the most part complete, and these documents are now in compliance with the OSD standard to be reviewed or updated within a five year period. However, some efforts remain ongoing to make further additions and improvements to the overall cost estimating guidance, and in particular, to strengthen the guidance and procedures for cost estimation of MAIS programs and acquisition of services. There will also be an update to the manual concerning cost data collection, and there will be a new guide or manual concerning the treatment of inflation and price escalation in cost estimates.

- **Cost Leadership Forum.** In 2013, CAPE established and continues to convene a periodic meeting with the leaders and senior staff of the military department cost agencies to discuss issues of common interest to the community. The Forum drives greater collaboration among CAPE and the military department cost organizations by sharing analytic best practices and developing a collective vision of the path forward for the cost community over the next five years in meeting WSARA objectives, improving cost analysis, and dealing with the challenges of the current constrained resource environment.
- **Acquisition Reform Proposals.** CAPE is working with the USD(AT&L) staff to develop proposals for changes to statute and regulation concerning cost estimation. The goal is to improve the effectiveness of current processes, while 1) providing more flexibility and agility in the process, and 2) increasing clarity and removing ambiguity in the current statutes. Cost estimation is inextricably on the critical path in the acquisition process. Finding actionable changes to reduce the cycle time will help weapon systems to get in the hands of warfighters sooner.

The report also includes appendices that provide background information relevant to cost assessment activities. Appendix A enumerates the cost analysis organizations in the Department. Appendix B describes MDAP unit cost reporting and unit cost breach thresholds. Appendix C describes MAIS reporting and criteria associated with program deviations that trigger notifications or certifications to the Congress. Appendix D provides additional information on CADE and the supporting cost data collection systems.

CHAPTER II – OVERVIEW OF COST ANALYSIS IN DOD

This chapter provides an overview of the current organizations, policies, procedures, and supporting data systems for cost estimation and analysis in place throughout DoD. Chapter IV of this report describes the efforts to continue to strengthen these institutions to meet the requirements of WSARA and the evolving needs of the Department.

This report assumes the reader has at least a basic familiarity with the defense acquisition process. Readers in need of an introduction to the defense acquisition process are encouraged to refer to the *Defense Acquisition Guidebook* at <https://dag.dau.mil>.

Overview of Cost Analysis Organizations in DoD

Cost organizations are integrated throughout DoD: at the headquarters of the Service Components and Defense Agencies and across the Components' field organizations. Each cost group serves unique programmatic and systematic functions but also compliments the family of cost organizations supporting the defense acquisition process and the broad and diverse operations of the Department. This helps foster best practices within the cost community.

At the OSD level, the Director, CAPE is the principal official for independent cost estimation and cost analysis, responsible for ensuring that the cost estimation and cost analysis processes of DoD provide accurate information and realistic estimates of cost for the major acquisition programs of the Department. The Director, CAPE provides ICEs for both MDAPs and MAIS programs when the Milestone Decision Authority (MDA) for a program is USD(AT&L), under the specific circumstances explained later in this chapter. The Director, CAPE also provides policy for and oversight of preparation and review of DoD Component cost estimates for MDAPs and MAIS programs under other circumstances.

Each military department headquarters has its own cost agency. These cost estimating agencies provide ICEs when acquisition oversight is delegated to the Component and the MDA is the Component Head or Component Acquisition Executive. Also, the military department cost agencies provide policy guidance and specialized cost analyses unique to each of the military departments. The military department cost agencies reside in the financial management organizations of their military departments in order to ensure they remain independent of their military department's acquisition chain of command.

There are also many field-level cost organizations that provide day-to-day support to program office operations. These organizations also provide resources to support higher headquarters cost estimates and analyses such as evaluation of contractor proposals and should-cost analyses; support to competitive source selections; cost estimates in support of the programming and budgeting processes; and cost estimates used in specific analytic studies, such as systems engineering design trades or Analyses of Alternatives (AoAs). Field-level and program office members of the cost community workforce often possess important specialized cost and technical experience unique to specific system types or commodity groups, such as satellites, submarines, or tactical missiles.

Appendix A provides a brief description of the military department cost agencies and field-level cost organizations.

Policies and Procedures for Cost Assessments at Milestone and Other Reviews

This section provides a description of DoD cost assessment policies and procedures for MDAPs and MAIS programs; these procedures were added or modified to meet WSARA requirements.

DoD Directive 5105.84, *Director of Cost Assessment and Program Evaluation (DCAPE)*, was approved on May 11, 2012 and serves as the CAPE charter. The Directive defines overall CAPE roles, responsibilities and authorities in the Planning, Programming, Budgeting and Execution (PPBE); acquisition; and requirements processes. Regarding cost assessment, the Directive establishes the Director of CAPE as the principal official for independent cost estimation and cost analysis for the acquisition programs of DoD.

The framework for DoD policy and procedures for acquisition cost assessment activities is provided in Enclosure 10 (“Cost Estimating and Reporting”) of DoD Instruction 5000.02, *Operation of the Defense Acquisition System*. This instruction was issued by USD(AT&L) in January 2015.

More specific guidance on prescribed policy and procedures is provided in DoD Instruction 5000.73, *Cost Analysis Guidance and Procedures*. This instruction was issued by the Director, CAPE in June 2015 and is the primary vehicle for implementing the cost assessment provisions of WSARA throughout DoD. In particular, it provides guidance to the military departments and defense agencies concerning the preparation, presentation, and documentation of life-cycle cost estimates for major acquisition programs. It assigns roles and responsibilities, and describes the process and timelines for the cost assessment activities that support the various program decision points discussed later in this chapter.

All of these directives and instructions are available on the Defense Technical Information Center (DTIC) website at <http://www.dtic.mil/whs/directives/index.html>.

Chapter IV discusses ongoing efforts to further strengthen and update policies and procedures. CAPE is now assessing the effects of new requirements contained in the National Defense Authorization Act for FY 2016, as well as the new DoD Instruction 5000.74, *Defense Acquisition of Services*, which was issued in January 2016.

Cost Assessment Procedures for Major Defense Acquisition Programs

Pursuant to statutory requirements (section 2334 of title 10, United States Code), CAPE prepares ICEs and conducts cost analyses for MDAPs for which the MDA is USD(AT&L):

- In advance of any Milestone A certification or Milestone B certification under sections 2366a/b of title 10, United States Code.
- In advance of any decision to enter low-rate initial production (LRIP) or full-rate production (FRP).
- For a certification for critical unit cost (Nunn-McCurdy) breaches under section 2433a of title 10, United States Code. Appendix B provides a description of the procedures for MDAP unit cost reporting and the criteria for a critical unit cost breach.
- At any other time considered appropriate by the DCAPE or upon the request of USD(AT&L) or other senior leaders of the Department.

For milestone and other acquisition reviews, when the MDA is delegated to the Component, CAPE either (1) reviews the ICE prepared by the military department cost agency, and provides a written summary of its review and findings to the MDA, or (2) prepares the ICE when considered appropriate by the Director, CAPE or upon the request of USD(AT&L) or the MDA.

Cost Assessment Procedures for Major Automated Information Systems

As required by section 2334 of title 10, United States Code, CAPE prepares ICEs and conducts cost analyses for MAIS programs for which the MDA is USD(AT&L):

- In advance of any certification following a Critical Change under section 2445c(f) of title 10, United States Code. Appendix C provides a description of the procedures for MAIS program reporting and the criteria for a Critical Change.
- At any other time considered appropriate by the DCAPE or upon the request of USD(AT&L) or other senior leaders of the Department.

For milestone and other acquisition reviews, when the MDA is delegated to the Component, CAPE normally reviews the ICE prepared by the military department cost agency, and provides a written summary of its review and findings to the MDA. However, CAPE may prepare the ICE for a delegated program when considered appropriate by the Director, CAPE or upon the request of USD(AT&L) or the MDA.

Currently, for the 33 existing MAIS programs, USD(AT&L) is the MDA for 20 programs, and the various Component Acquisition Executives are the MDAs for the remaining 13 programs.

Role of the Independent Cost Estimate

Both MDAPs and MAIS programs are supported by ICEs at milestone and other program reviews. An ICE for a program in practice is conducted by using a combination of historical precedence, results of extensive site visits, and the actual performance of that program to date. It is a careful and comprehensive analysis that looks at all aspects of a program, including risks.

At a minimal level, the purpose of the ICE is to allow decision makers to ensure that (1) current program cost estimates are reasonable, (2) initial program baselines established for cost and schedule are realistic and achievable, (3) subsequent program baselines remain realistic, and (4) sufficient funding is available in the Future Years Defense Program (FYDP) to execute the program. However, CAPE experience is that the ICE should also support much broader program decisions. The ICE can provide decision makers with insights concerning:

- Unique challenges of each program and options available to address them,
- Balanced requirements based on trade-offs among cost, capabilities, and schedule,
- Alternative acquisition strategies to improve upon ways to do business and avoid risk-prone models, and
- Options to effect better program outcomes along the way as circumstances change or unexpected events occur.

In short, the ICE adds value by being able to tell the program's story and provide decision makers with a wide range of information necessary to make fully informed acquisition decisions.

Component Cost Position and Full Funding Commitment

One important element of current CAPE policy for major acquisition programs requires the Component to establish a formal position on the estimated cost of the program and furthermore to commit to fully fund the program in the FYDP consistent with the Component cost position. The Component establishes a documented Component Cost Position for all MDAPs and MAIS programs prior to the Milestone A, B, and C reviews and the Full-Rate Production Decision (for an MDAP) or Full Deployment Decision Review (for a MAIS program). The Component Cost Position is signed by the appropriate military department's Deputy Assistant Secretary for Cost and Economics (or defense agency equivalent). Each Component has its own process to arrive at the Component Cost Position. In many cases, the Component establishes its cost position by performing a Component-wide corporate-level review, led by the military department cost agency (or defense agency equivalent), after consideration of a program office cost estimate and an assessment of that estimate by the military department cost agency.

At each milestone or other review, the Component must fully fund the program to the Component Cost Position in the current FYDP, or commit to full funding of the cost position in the next FYDP. The Component Acquisition Executive and the Component Chief Financial Officer endorse and certify in a Full Funding Certification Memorandum that the FYDP fully funds (or will fully fund) the program consistent with the Component Cost Position. This Certification Memorandum must be submitted prior to the Defense Acquisition Board (DAB) review.

Multi-Year Procurement Contracts

Public law (section 2306b of title 10, United States Code) establishes several criteria that must be satisfied and certified by the Secretary of Defense prior to the award of a multi-year contract in an amount equal to or greater than \$500 million for a defense acquisition program. Some of these criteria (concerning significant savings, realistic cost estimates, and availability of funding) must be supported by a CAPE cost analysis of the proposed multi-year procurement (MYP) strategy and contract structure, which includes a comparison of the estimated costs of multi-year versus annual contract awards.

For each MYP candidate, CAPE provides a preliminary cost analysis of the potential cost savings that could be obtained through a MYP contract compared to a baseline of annual procurement contracts. This analysis is used to support a DoD decision to seek a multi-year request, submitted for a specific authorization by law to carry out the MYP strategy. Following congressional approval (in the National Defense Authorization Act) for the use of the MYP strategy, the Component and the contractor negotiate and definitize the MYP contract terms. At this point, CAPE updates its previous cost analysis to incorporate the most recent cost information, including actual cost data and experience to date as well as an evaluation of cost realism in the contractor's proposal. The updated cost analysis is provided in time to support a DoD notification to the congressional defense committees of the intent to award the multi-year contract. This notification, by law, must be provided at least 30 days before the contract award.

Confidence Levels in Cost Estimates

Section 2334 of title 10, United States Code requires that cost estimates adopt a confidence level that provides a high degree of confidence that the program can be completed without the need for significant adjustment to program budgets. In general, CAPE satisfies this requirement by ensuring that all of its cost estimates are built on a product-oriented Work Breakdown Structure (WBS), based on historical actual

cost information whenever possible, and most importantly, based on realistic assumptions that are consistent with actual demonstrated contractor and government performance for a series of acquisition programs in which the Department has been successful.

Cost Estimates for Contract Negotiations

Section 2334 of title 10, United States Code requires that for MDAPs and MAIS programs, cost estimates developed for baselines and other program purposes are not to be used for the purpose of contract negotiations or obligation of funds. Section 2334 also states that cost analyses and targets developed for the purpose of contract negotiations shall be based on the government's reasonable expectation of successful contractor performance in accordance with the contractor's proposal and previous experience.

The procedures to implement these statutory requirements were developed as part of the Department's "Should Cost" initiative, which is intended to proactively target cost reduction and drive productivity improvement into major acquisition programs. These procedures are contained in DoD Instruction 5000.02, *Operation of the Defense Acquisition System*. In this instruction, for MDAPs and MAIS programs, it is DoD policy to budget to the CAPE ICE unless an alternative estimate is specifically approved by the MDA. However, program managers are required to develop a "should cost" estimate as a management tool to control and reduce cost. The intention is that the ICE should not be allowed to become a self-fulfilling prophecy. The "Should Cost" initiative challenges managers to identify and achieve savings below budgeted most-likely costs. "Should Cost" analyses can be used during contract negotiations (particularly for sole source procurements) and throughout program execution, including sustainment. Further information on the "Should Cost" initiative is provided in the *Defense Acquisition Guidebook*, section 10.15.2 ("Should-Cost").

In addition, electronic data warehouses of CSDR reports have been used to provide insight and support multiple studies throughout the DoD cost and acquisition communities concerning contract profits and fees for both prime contractors and major subcontractors. Acquisition professionals can review this information in order to assess the extent that realized profits and fees for completed acquisition programs have been compatible with current guidelines contained in defense policy and regulations, and use that information in negotiations concerning ongoing acquisition programs.

Cost Analysis Requirements Description

CAPE requires and provides guidance on the technical content and use of a document known as the Cost Analysis Requirements Description (CARD). The CARD provides a complete, detailed description of the major acquisition program that supports preparation of the Component Cost Position, the ICE, and other cost estimates, as required. The CARD succinctly describes the key technical, programmatic, and operational characteristics of an acquisition program. The foundation of a sound and credible cost estimate is a well-defined program, and the CARD is used to provide that foundation. The CARD, along with supporting data sources, provides all of the information necessary to develop a cost estimate.

CAPE guidance concerning the CARD was issued in a policy memorandum in June 2015. This memorandum is available on the DAU website at <https://acc.dau.mil/CommunityBrowser.aspx?id=723414&lang=en-US>.

As explained in Chapter IV, the CARD will be improved with the addition of a new streamlined data template for the collection of technical data (design and performance parameters) for a system that will replace written narratives and tables. In addition, the CARD is now being used to obtain system manpower estimates that had been provided in the Manpower Estimate Report (which is no longer required by statute).

Operating and Support Cost Estimates

Section 2334 of title 10, United States Code requires that the Director, CAPE issue guidance relating to full consideration of life-cycle management and sustainability costs in MDAPs and MAIS programs. To meet this requirement, CAPE issued the *Operating and Support Cost-Estimating Guide* in March 2014, which explains and illustrates how operating and support (O&S) cost estimates and analyses can support key program decisions throughout the life cycle. The guide also provides a tutorial on the best practices for preparing, presenting, and documenting O&S cost estimates. The guide is now available at http://www.cape.osd.mil/files/OS_Guide_v9_March_2014.pdf.

Guidance and Procedures for Other Cost Assessment Activities

This section provides a description of certain DoD cost assessment procedures, other than cost estimates for MDAPs and MAIS programs.

Cost Comparisons of Military, Civilian, and Contractor Manpower

CAPE issued DoD Instruction 7041.04, *Estimating and Comparing the Full Costs of Civilian and Active Duty Military Manpower and Contract Support*, in July 2013. This instruction establishes policy and provides procedures to estimate and compare the full costs of active duty military, DoD civilians, and contract support. The business rules, potential cost factors, and data sources provided in this instruction are used in cost-benefit analyses or business case analyses in support of workforce mix decisions. This instruction is available on the DTIC website <http://www.dtic.mil/whs/directives/index.html>.

To support the DoD community in performing the numerous calculations required by this instruction, CAPE has made available a web-enabled tool for estimating the Full Cost of Manpower (FCoM), which will automatically calculate all cost elements required to maintain consistency with guidance in the instruction. The FCoM tool is available on the CAPE website (www.cape.osd.mil) and is usable by all personnel who possess a valid Common Access Card (CAC). A classified version of the tool is available on the DoD Secure Internet Protocol Router Network. The tool has been used to compare the costs of military and civilian intelligence personnel, as well as to compare military and civilian manpower costs for the development and expansion of the cyber workforce. The tool will also be incorporated into CADE.

Economic Analysis for Decision-making

CAPE issued DoD Instruction 7041.3, *Economic Analysis for Decision-making*, in September 2015. This instruction is the DoD implementation of Office of Management and Budget (OMB) Circular A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*. The instruction prescribes the application of economic analysis concepts to the evaluation of costs and benefits of investment alternatives. This instruction is available on the DTIC website <http://www.dtic.mil/whs/directives/index.html>.

DoD Cost Data Collection Systems

As noted earlier, CAPE is responsible for prescribing policy and procedures for the reporting and collection of actual cost data that is used throughout the cost community. Systematic and institutionalized cost data collection and validation is critical to the preparation and support of credible cost estimates. DoD has three primary collection systems for cost data for MDAPs. The Cost and Software Data Reporting (CSDR) system serves as the primary source of cost data for major contracts and subcontracts associated with MDAPs and MAIS programs. The Earned Value Management (EVM) Central Repository is used to collect and archive EVM reporting documents (such as Integrated Program Management Reports). The three Visibility and Management of Operating and Support Costs (VAMOSOC) systems (one system for each military department) collect historical O&S costs for fielded major weapon systems.

Chapter IV discusses current CAPE efforts to improve CADE and the CSDR and VAMOSOC systems, and Appendix D provides additional details concerning all of the cost data collection systems.

Summary

This chapter reviewed the cost assessment organizations, policies and procedures, and data collection systems in DoD. These provide the foundation on which the Department is building as it continues to implement WSARA and strengthen its cost assessment institutions. Ongoing efforts toward that end are described in Chapter IV of this report.

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CHAPTER III – DOD COST ASSESSMENT ACTIVITIES IN FY 2015

This chapter provides a summary of the DoD cost estimates and cost analyses that were made in FY 2015 in support of MDAP milestone reviews and other acquisition decision points. Note that for this year, there were no MDAP critical unit cost breaches, and there were no MAIS critical changes.

MDAP Milestone or Other Review Cost Assessment Activities

Table 1 provides a summary of the cost assessment activities in FY 2015 that supported milestone or other reviews. For each MDAP with a milestone review or other event, Table 1 identifies the program name and acronym, the responsible Component, the supporting cost estimate(s) or analyses presented to the MDA, and the review event being supported. There were 13 MDAP milestone reviews or other events supported by cost assessment activities in FY 2015 (excluding any cost assessment activities associated with classified programs, which are not discussed in this unclassified report).

Table 1. MDAP Milestone or Other Review Cost Assessment Activities in FY 2015

Program Name	Acronym	Component	Program Type	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Integrated Personnel and Pay System - Army	IPPS – A	Army	Acquisition Category (ACAT) IAM	CAPE Independent Cost Estimate	17-Dec-14	Milestone B	19-Dec-14
				Army Cost Position	20-Nov-14		
Armored Multi-Purpose Vehicle	AMPV	Army	ACAT ID	CAPE Independent Cost Estimate	8-Dec-14	Milestone B	22-Dec-14
				Army Cost Position	25-Nov-14		
RQ-4B Global Hawk Core Program	RQ-4B	Air Force	ACAT ID	CAPE Independent Cost Estimate	4-Feb-15	Milestone C	10-Feb-15
				Air Force Cost Position	13-Jan-15		
Guided Multiple Launch Rocket System – Alternative Warhead	GMLRS – AW	Army	ACAT IC	CAPE Review and Assessment	27-Apr-15	Full-Rate Production Decision	20-May-15
				Army Cost Position	15-Apr-15		
				Army Independent Cost Estimate	19-Mar-15		
CVN 78 Gerald R. Ford Class Nuclear Aircraft Carrier	CVN 78	Navy	ACAT ID	CAPE Independent Cost Assessment	7-May-15	Program Review	3-Jun-15
				Navy Cost Position	25-Apr-15		

Table 1. MDAP Milestone or Other Review Cost Assessment Activities in FY 2015 (cont.)

Program Name	Acronym	Component	Program Type	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Warfighter Information Network – Tactical Increment 2	WIN-T Inc 2	Army	ACAT ID	CAPE Independent Cost Estimate	8-May-15	Full-Rate Production Decision	3-Jun-15
				Army Cost Position	22-Apr-15		
Small Diameter Bomb Increment 2	SDB II	Air Force /Navy	ACAT ID	CAPE Independent Cost Estimate	8-May-15	Milestone C	4-Jun-15
				Joint Service Cost Position	29-Apr-15		
F-15 Eagle Passive Active Warning Survivability System	F-15 EPAWSS	Air Force	pre-MDAP	CAPE Independent Cost Estimate	22-Jul-15	Milestone A	23-Jul-15
				Air Force Cost Position	9-Jul-15		
Joint Air-to-Ground Missile	JAGM	Army/Navy	ACAT ID	CAPE Independent Cost Estimate	16-Jul-15	Milestone B	29-Jul-15
				Army Cost Position	25-Jun-15		
AIM-9X Block II Sidewinder	AIM-9X Blk II	Navy/Air Force	ACAT IC	Navy Independent Cost Estimate	17-Dec-14	Full-Rate Production Decision	17-Aug-15
				Navy Cost Position	6-Jul-15		
Joint Light Tactical Vehicle	JLTV	Army/Marine Corps	ACAT ID	CAPE Independent Cost Estimate	24-Aug-15	Milestone C	25-Aug-15
				Army Cost Position	24-Aug-15		

Table 1. MDAP Milestone or Other Review Cost Assessment Activities in FY 2015 (cont.)

Program Name	Acronym	Component	Program Type	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Common Infrared Countermeasure	CIRCM	Army	ACAT ID	CAPE Independent Cost Estimate	13-Aug-15	Milestone B	25-Aug-15
				Army Cost Position	29-Jul-15		
Consolidated Afloat Networks and Enterprise Services	CANES	Navy	ACAT IAM	CAPE Review and Assessment	23-Jun-15	Full Deployment Decision	13-Oct-15
				Navy Independent Cost Estimate	14-Apr-15		
				Navy Cost Position	5-Feb-15		

Notes:

The term "ACAT ID" refers to an MDAP for which the MDA is USD(AT&L).

The term "ACAT IC" refers to an MDAP for which acquisition oversight has been delegated to the Component.

The term "pre-MDAP" refers to a program activity that is anticipated to result in an MDAP upon formal program initiation into the defense acquisition management process (which usually occurs at Milestone B).

The term "ACAT IAM" refers to a MAIS program for which the MDA is the USD(AT&L).

The term "ACAT IAC" refers to a MAIS program where acquisition oversight has been delegated to the Component.

Remarks about Specific Programs

- CAPE prepared an ICE for the RQ-4B Global Hawk core program, consisting of Block 30I, Block 30M, and Block 40. This ICE supported a DAB review that was held to grant Milestone C approval and establish a new Acquisition Program Baseline for the core program, following the Nunn-McCurdy critical unit cost breach that occurred in 2011. Since most of the program's acquisition costs are sunk, much of the CAPE effort focused on costs for contractor logistics support and other sustainment activities.
- CAPE provided an independent assessment in support of the CVN 78 Class DAB program review that was held to approve construction of the second ship (CVN 79) in the class. This assessment was requested as a result of significant cost overruns and schedule delays for the lead ship (CVN 78). The scope of this assessment was limited to ship construction costs. A complete life-cycle cost estimate for the entire CVN 78 class will be provided to the DAB at a later date.
- CAPE reviewed the Navy ICE prepared by the Naval Center for Cost Analysis (NCCA) for the Full Deployment Decision of the Consolidated Afloat Networks and Enterprise Services (CANES) program. The CAPE review was an update to the 2014 CAPE independent cost assessment that supported a Critical Change Review last year. Since the time of that earlier review, the actual costs for many of the system installations have been greater than expected. CAPE found that the Navy ICE properly reflected the reasons for the cost growth, and that it was developed using generally accepted cost analysis procedures suitable for a program milestone review.
- In addition to the cost assessment activities shown in Table 1, CAPE worked on an update to its O&S cost estimate for the F-35 aircraft. This work will be completed in 2016.

CAPE Cost Analyses for Multi-Year Procurement

As noted in Chapter II, CAPE prepares a preliminary ICE for a proposed MYP strategy and contract structure to support the Department's certification of significant savings and other criteria, and updates the ICE prior to the award of a multi-year contract for a defense acquisition program. In FY 2015, CAPE updated an ICE for the C-130 MYP to support final negotiations. In addition, in FY 2015, CAPE conducted cost analyses in support of DoD deliberations concerning possible MYP candidates: Standard-Missile 3, H-60, and Apache. The Department chose to not submit a MYP proposal for Standard-Missile 3. At the time of the release of this report, the Department is considering submitting MYP requests for the H-60 and AH-4E Apache consistent with the FY 2017 President's Budget submission.

Assessment of Compliance, Quality, and Differences in Methodology

Compliance with Policy and Procedures

All of the events noted in Table 1 were supported by the appropriate cost estimates or analyses that complied with the requirements of WSARA and the established cost assessment procedures described in Chapter II. In particular, each MDAP and MAIS milestone or other review was

supported by: (1) submission of a CARD, (2) a Component Cost Position and (3) the appropriate CAPE or military department cost agency ICE.

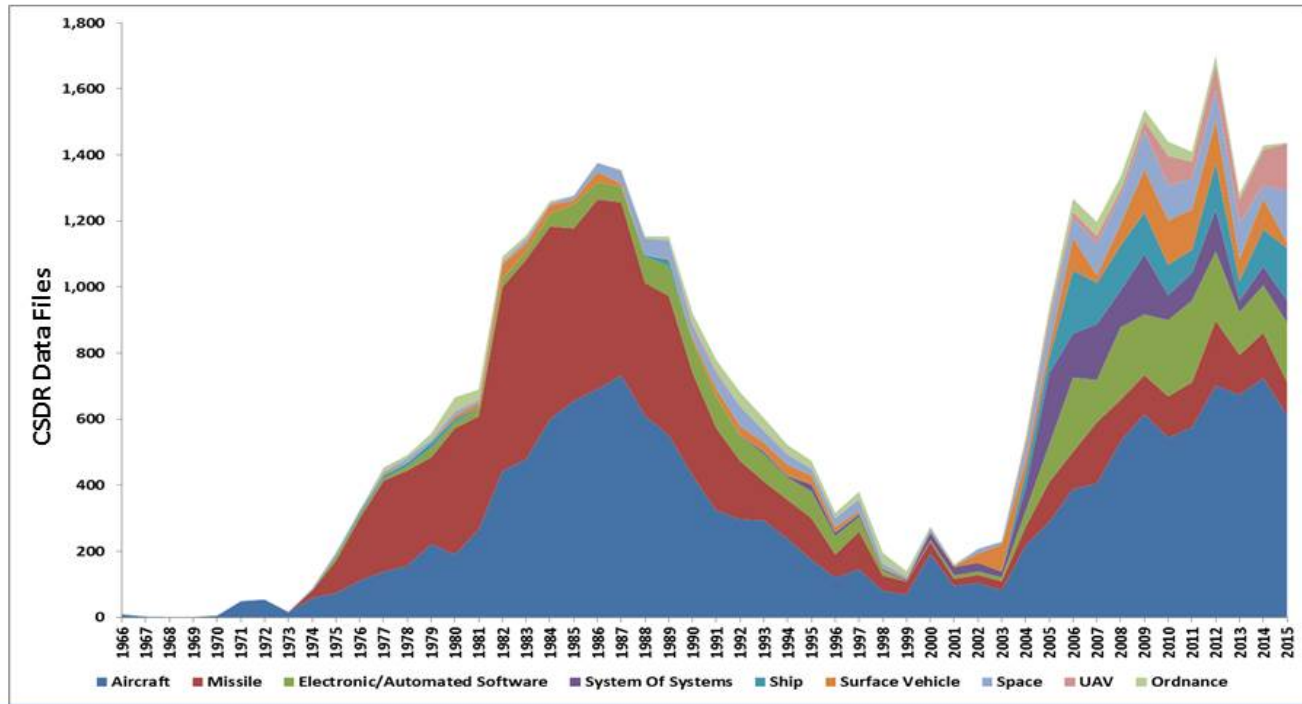
Quality of the Cost Estimates

The overall quality of the cost estimates prepared by each of the military departments has continued to improve due to increased rigor, and improved availability of CSDR data.

As noted in Chapter II, DoD has instituted a policy—currently in place for all MDAPs—requiring that a signed, dated Component Cost Estimate and a Component Cost Position be delivered to CAPE prior to delivery of an ICE, to support each milestone or other review of the DAB. Also, the military department’s financial and acquisition leadership must provide a statement affirming their commitment to fully fund the program to the Component Cost Position during the preparation of the next Program Objective Memorandum (POM) and President’s Budget FYDP.

In addition, an increased management emphasis throughout the Department concerning the importance of cost data reporting has resulted in significant increases in the quantity of cost data reports compared to the acquisition reform era of the 1990s. Figure 1 shows the annual volume of CSDR data reports collected by the Defense Cost and Resource Center (DCARC) for each of the major system commodities. The DCARC is the CAPE field office responsible for administering the CSDR system. Access to CSDR reports from 2006 and later was incorporated into CADE, which resulted in greatly improved and easier access and a significant increase in the use of CSDR data from 2006 to the present.

CSDR Data Collection Over Time



1990s reform efforts limited cost data collection and damaged DoD's ability to produce quality cost estimates

Figure 1. CSDR Data Collection over Time

The emphasis on better data is not limited to the volume of reports. Additional ongoing efforts to improve the content and quality of the specific data reports are described in Chapter IV.

Differences in Methodology

Since enactment of WSARA, any differences in methodology or approach between the cost estimates prepared by the military departments and by CAPE have decreased over time. Generally, the approach employed by the military departments is evolving to become more similar to that employed in CAPE: collect actual cost information from ongoing and historical programs in a product-oriented taxonomy; use that information to prepare cost and schedule forecasts for new programs or programs proceeding to the next milestone in the acquisition process; and review the actual cost information collected, as each individual program proceeds, to update and adjust the cost and schedule forecasts for the program to reflect actual experience. As discussed in the previous section, the goal has been for the Department to improve the systematic collection of actual cost information over time, available to all parties, which has resulted in smaller differences between the cost and schedule forecasts of the military departments and CAPE.

A recent CAPE analysis made a comparison between the CAPE ICEs and the service cost positions (SCPs), and found that the difference between the two estimates since the enactment of WSARA in 2009 has narrowed significantly relative to the period between 1999 and the enactment of WSARA. The results of this comparison are shown in Figure 2.

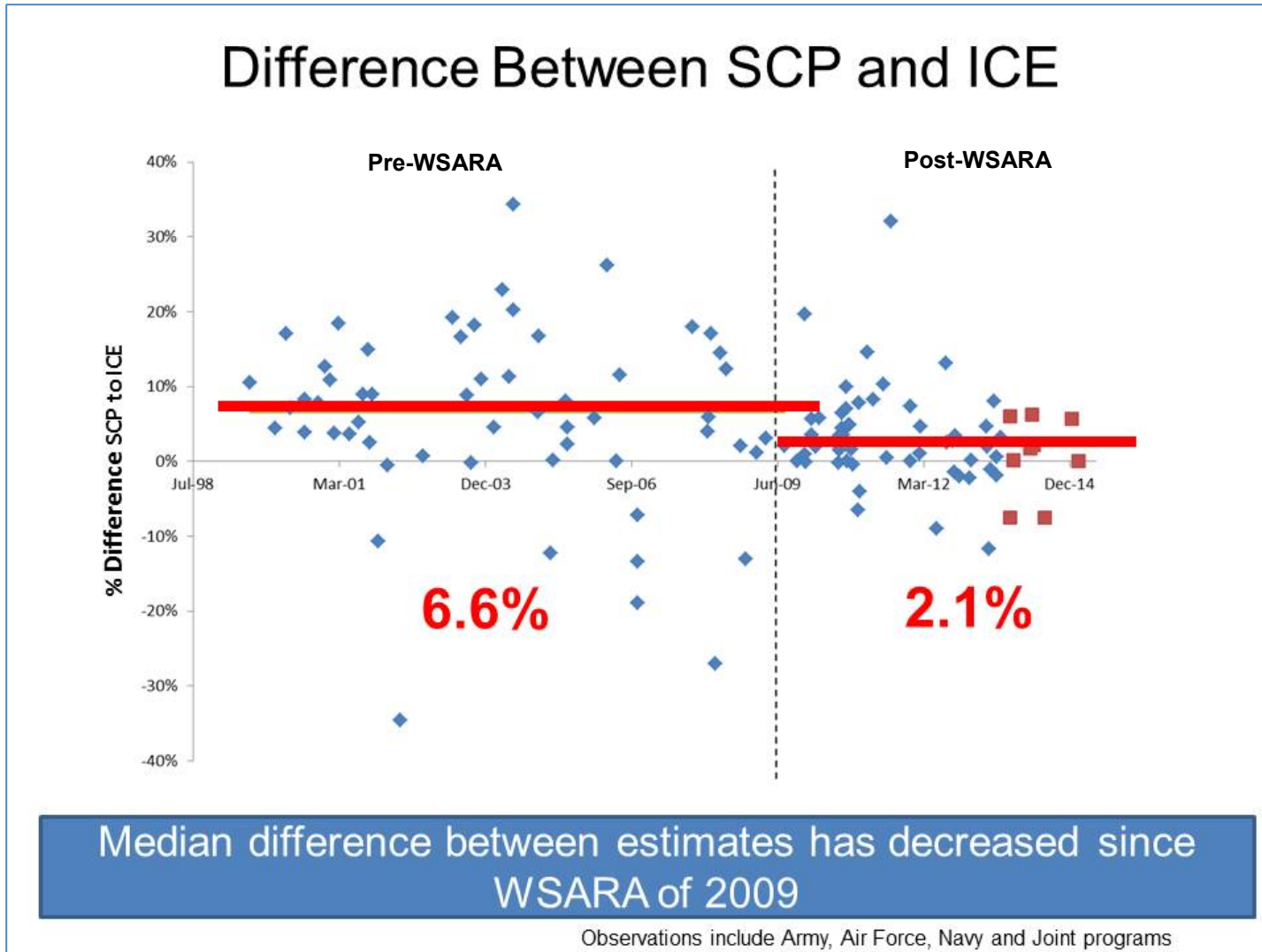


Figure 2. Comparison of Service Cost Positions to CAPE Independent Cost Estimates

The median difference since enactment of WSARA was 2.1 percent, compared to a median difference of 6.6 percent for the prior period. In addition, the statistical variances have also significantly narrowed, meaning that the post-WSARA estimates are more tightly clustered thus reflecting that the SCPs are now more closely aligning with the CAPE ICEs. Despite this narrowing of differences, there have been a few outliers where there was a significant discrepancy (greater than 10 percent) between the SCP and the CAPE ICE. A large difference between the two estimates can be a warning signal to DoD leadership of potential concerns and risks. In such a situation, CAPE and the military department cost agency will meet and assess the reasons for the discrepancy, and determine if there are better data available to reconcile the difference. Failing that, CAPE and the military department will work together to assess how costs can be controlled and managed in the future if the program goes forward.

Acquisition Program Cost Performance

One simplistic measure of acquisition program cost performance is the annual rate of Nunn-McCurdy unit cost breaches that have occurred over time. Figure 3 displays the number of significant and critical breaches by year from 1997 to 2014. Note that these data are shown by the number of breaches in each annual Selected Acquisition Report (SAR) cycle, which nominally equates to calendar year but may reflect updates from early in the following calendar year from the President's Budget Request. The breach counts displayed in Figure 3 are taken from Table 2-2, Official DoD List of Nunn-McCurdy Breaches (1997-2015), provided in the USD(AT&L) publication, *Performance of the Defense Acquisition System, 2015*. This publication contains more sophisticated data-driven analysis of MDAP acquisition cost performance using a wide range of interesting performance metrics. The publication is available at <http://www.defense.gov/Portals/1/Documents/pubs/Performance-of-Defense-Acquisition-System-2015.pdf>.

Nunn-McCurdy Breaches (1997-2014)

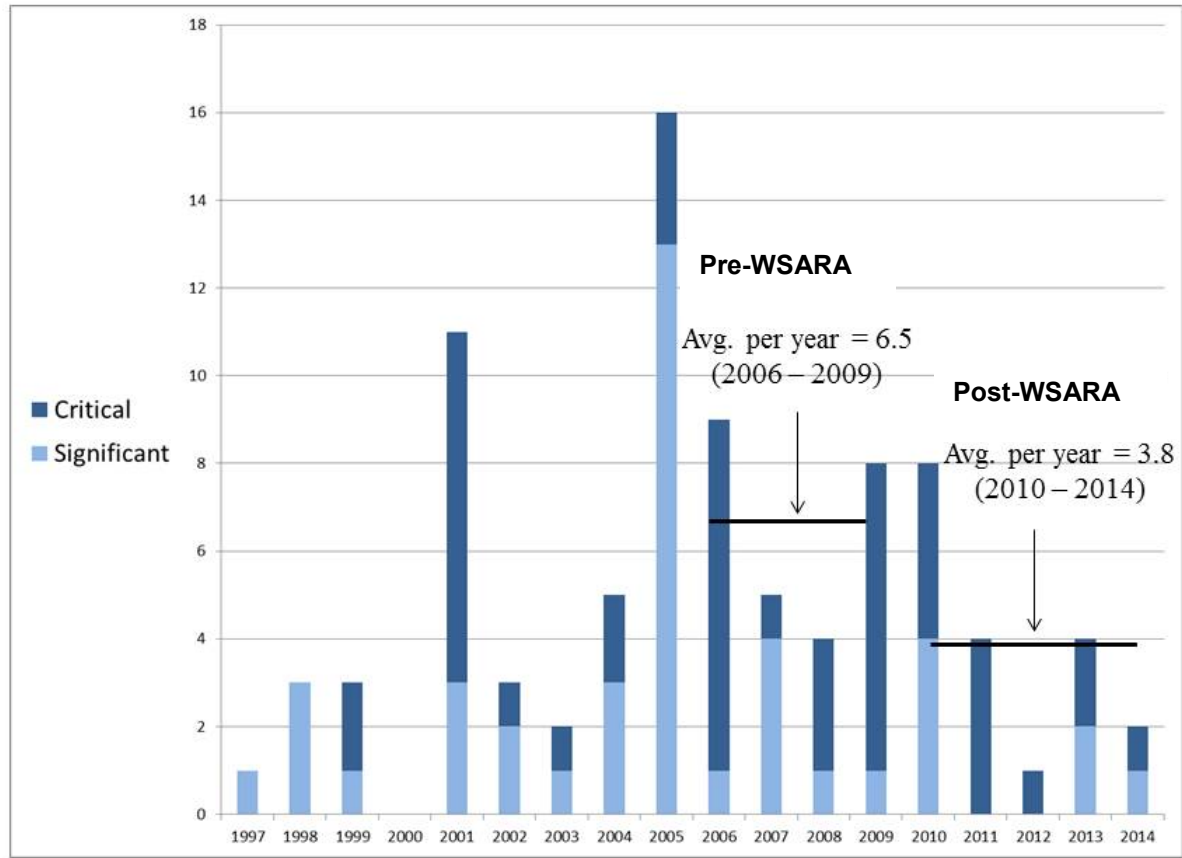


Figure 3. Number of Nunn-McCurdy Breaches by SAR Reporting Year

It is important to note that the National Defense Authorization Act for FY 2006 made changes to the criteria for a Nunn-McCurdy breach by adding a requirement to report unit-cost growth from the original program baseline as well as the current (possibly revised) baseline. This additional requirement caused a large spike in 2005, when 11 programs had to report preexisting significant breaches. Thus, for historical comparisons, the period before 2006 is not comparable to the period after that. For the more recent period, the average annual number of breaches has declined since the enactment of WSARA in 2009.

The improvement in the quality of DoD cost estimates at milestone and other reviews since WSARA has contributed to this improvement in acquisition cost performance. In addition, as discussed in Chapter IV, CAPE has made an emphasis of ensuring continued full funding of MDAPs during the program review.

Areas for Improvement

In a few cases, our cost estimates involved programs that had plans or the potential for foreign military sales (FMS). FMS cases have significant possible benefits in lowering the costs of programs to the United States, since the procurement of additional systems will lead to unit cost reductions for all parties. In some cases, the foreign country may also contribute to the recoupment of prior development costs. However, quantifying these benefits in cost estimates can often be challenging, due to the complexities of issues such as coproduction, tie-ins with United States MYP contracts, and forecasting the effects on contractor business bases and rates. Nevertheless, assessing the implications of FMS provides a better understanding of the complete costs for the United States. For example, for the Small Diameter Bomb Increment 2 program noted in Table 1, the potential for FMS had a significant effect on the costs for the United States, and the CAPE ICE for this program showed the effect of different levels of FMS on program procurement costs. CAPE is now evaluating how to improve the cost community tools, methods, and policies for cases involving FMS.

Prior to this year, due to resource constraints, direct CAPE involvement in preparing cost estimates for MAIS programs for the most part had been limited to those programs for which the MDA was USD(AT&L) and that experienced a critical change. This year, there was some progress made to expand the scope of CAPE involvement in other reviews. There was one CAPE ICE for a milestone review of a MAIS program (IPPS-A), and there was one CAPE review and assessment of a component ICE and cost position for a milestone review for another MAIS program (CANES). Nevertheless, for most other reviews of MAIS programs, CAPE works closely with and relies heavily upon the military department cost agencies in the management and preparation of cost estimates. In addition, contract cost data reporting for the MAIS programs currently is poor, and both quality and compliance need to be improved. There remains much work to be done to improve the management and preparation of cost estimates for the approximately 33 programs now in the DoD portfolio of MAIS programs and automated information systems expected to become MAIS programs in the near future.

Other Cost Assessment Activities in FY 2015

Missile Defense Agency Support

CAPE completed an ICE for the Missile Defense Agency's (MDA) European Phased Adaptive Approach (EPAA) in October 2012 in response to a November 18, 2011 letter from Congressman Turner and Senator Sessions. Since that time, there were several EPAA content changes that prompted the Committee, in the National Defense Authorization Act for FY 2015, to request the Director, CAPE to update the ICE to reflect the current plan. The largest change to the EPAA plan was the cancellation, made in the FY 2014 President's Budget request, of the so-called "Phase IV" effort that included the SM-3 Block IIB missile. The SM-3 Block IIB missiles were to replace the SM-3 Blocks IB and IIA missiles at the two EPAA ashore sites and on the forward-deployed Navy ships. The current EPAA plan will employ the SM-3 Block IIA missile across the entire EPAA architecture. As the SM-3 IIA missile has a shorter expected service life than the previously planned IIB, the number of IIA missiles procured will be higher than the original IIB plan. Additionally, operating and support costs increased due to additional manning required to support the two EPAA ashore sites. Also, the 2012 ICE did not include the full scope of the support infrastructure for the EPAA ashore sites, and the ICE updated in 2015 remedied this deficiency.

National Nuclear Security Administration Support

Section 3112 of the National Defense Authorization Act for FY 2014 directed that CAPE work with the National Nuclear Security Administration (NNSA) leadership to develop a plan for the establishment of a Cost Estimating and Program Evaluation (CEPE) group within NNSA. In accordance with the April 2015 DoD and NNSA Interagency Agreement, NNSA began detailing CEPE analysts to CAPE to receive training on DoD-style ICE policies, procedures, and practices. Currently two analysts have been assigned with the first beginning a detail in May and the second beginning a detail in September. NNSA related projects, including the domestic uranium enrichment and spent fuel handling facility programs have been the initial focus of their efforts. Continued support of NNSA projects in future years is anticipated through requests from the Nuclear Weapons Council chaired by the USD(AT&L) and the development of the CEPE group. Per the interagency agreement, NNSA cost estimating personnel are anticipated to be embedded with the CAPE staff in preparation of future ICEs for NNSA activities.

Congressional Requests

For years, the US Special Operations Command (SOCOM) desired a capability to deliver special operations forces to shallow water harbors and coastal areas while minimizing their exposure to the elements. Two prior attempts to develop this capability--the Advanced Seal Delivery System (ASDS) and the Joint Multi-Mission Submersible (JMMS)--were plagued by requirements growth, cost overruns, and schedule delays which ultimately led to the cancellation of both programs. The National Defense Authorization Act for FY 2012 directed OSD CAPE to develop an ICE for the Dry Combat Submersible (DCS), an Acquisition Category III program, prior to the planned Milestone B decision for the program. CAPE developed an ICE and found from its analysis that an alternative acquisition strategy would have enabled SOCOM to (1) fully test out their prototypes, to (2) achieve cost savings of \$16.2M (in FY10 \$, or \$22.5M in TY \$) and (3)

reduce the time to achieve Full Operational Capability (FOC) by nearly a year. USD(AT&L) elected to not follow the recommendations in the report and instead proceeded with the original plan delegating the program to USSOCOM.

As cost and technical data on ACAT II and III programs is rarely, if ever, collected, development of better estimates and the ability to do analysis of competing acquisition strategies is significantly impeded. There was almost no DCS prototype development and production cost data because the program office did not contract for its collection. For the three planned production vehicles it is extremely important to collect their cost data so better decisions can be made in the future. Apparently this recommendation has also not yet been implemented.

The Senate Committee Report accompanying the FY 2015 Appropriations Act directed the Director, CAPE, to update the ICE for the DDG 1000 program that was reflected in the FY 2016 President's Budget submission. CAPE completed the ICE and briefed staff representatives from the four defense committees on the results and observations. CAPE reported that the DDG 1000 program continues to experience cost growth, and CAPE projects additional funding will be required above the FY 2016 President's Budget request. However, CAPE also observed that the cost growth observed for the first ship (DDG 1000) is less than typically observed for other first-of-class Navy ships. Additionally, DDG 1000's small class size and sustainment strategy (which relies heavily on on-shore maintenance) drives the annual per-ship operating and support costs significantly above that of current surface combatants. With regards to DDG 1000's high degree of automation designed to reduce ship's manpower and save money, CAPE projects that this investment will not turn out to be a net positive given the small class size of only three ships. Lastly, CAPE reported that Navy ship programs are some of the most problematic with regards to cost data reporting, and DDG 1000 was not an exception. Subsequently, Navy and CAPE have established a joint team to improve ship cost reporting that will improve the precision and confidence of future ship program cost estimates. Recent progress on this issue is discussed in the next section of this chapter.

Navy Ship CSDR Compliance

In 2015, CSDR compliance for Navy ship programs was a special point of emphasis. During the period from July 2015 to January 2016, the DCARC—with support from the Deputy Assistant Secretary of the Navy for Ship Programs—made significant progress in resolving compliance issues with current ship production contracts. A summary of the status of CSDR compliance for Navy ship programs is shown in Figure 4.

Navy Ship CSDR Compliance

On a Path to Green (As of 1/13/16)

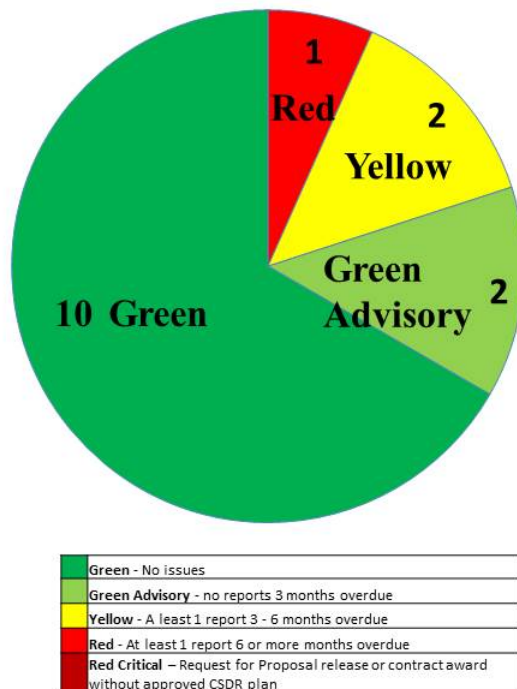


Figure 4. Navy Ship CSDR Compliance (as of Jan 2016)

Three programs that did not have approved CSDR plans last July were able to get acceptable plans approved by January. In addition, during this period the number of late cost reports improved dramatically (from 68 to 28). With continued management attention on cost reporting compliance, the quality of cost data for this important portfolio will continue to improve.

Data on CSDR compliance for the entire set of MDAPs is provided in Appendix D.

Review of Navy VAMOSC

CAPE is responsible for executive oversight of the military department VAMOSC programs. During the FY 2013-14 timeframe, the Department identified several shortfalls in Naval VAMOSC data. In its oversight capacity, the CAPE O&S cost division—in coordination with the military departments, USD(AT&L), the Under Secretary of Defense for Personnel and Readiness (USD(P&R)), and the Joint Staff—led a Resource Management Decision (RMD)-directed task force to identify deficiencies in Naval VAMOSC data and recommend specific improvements to address the weaknesses. The task force identified specific new data sources or other enhancements to remedy known shortfalls in ship modernization and Marine Corps O&S data. In particular, the task force recommended considerable expansion of the capture and reporting O&S and related data for Marine Corps ground vehicles, as well as data for Marine Corps installations and facilities. The task force consisted of four subgroups, three of which addressed data for ships

and ship-board systems, Marine Corps ground vehicles, and aircraft and aviation weapons. These subgroups identified cases where the data were missing or required more detail. The fourth subgroup addressed training requirements for the Naval VAMOSC user community and conducted a survey of the user base to identify and prioritize training needs. The task force completed its review, and the specific recommendations to include additional FY 2017-21 funding were briefed to senior leadership in OSD, the Joint Staff, and the Navy and Marine Corps.

During the preparation of the FY 2017 President's Budget, the Department of the Navy reduced Naval VAMOSC funding across the FYDP by 30 percent. The Navy's rationale for this reduction was to help meet a mandated decrease of 25 percent in management headquarters funding and civilian personnel. This funding reduction would not directly affect government civilians, but would reduce funding for the Naval VAMOSC contract. Absent changes to this funding level proposed by the Navy in the FY 2017 President's Budget, the Naval VAMOSC system will not be viable after FY 2017 and the Navy will struggle to provide defensible data-driven O&S cost estimates. This will hinder the Department of the Navy's ability to provide effective oversight concerning the O&S phase of life-cycle cost estimates. The Department of the Navy is examining options to address the problem.

DoD Cost Analysis Symposium

For several decades, CAPE (and its predecessor organization) has sponsored an annual DoD Cost Analysis Symposium, known as DoDCAS, with attendees drawn primarily from government and private-sector cost research and analysis organizations. DoDCAS provides a valuable forum for the education, training, and improvement of communication within the DoD cost analysis community. The presentations made at DoDCAS facilitate discussion, instruction, and debate concerning cost estimating methods and models, data collection, and contemporary issues of interest to the DoD cost community. In this way, the event leverages the knowledge and experience of the community to increase individual and collective expertise in cost estimation and analysis. DoDCAS also provides members of the DoD cost community the opportunity to hear the insights of senior DoD and other government officials on important topics.

In recent years, DoDCAS has been cancelled or curtailed due to guidance from OMB and the Deputy Secretary of Defense to reduce expenditures for all conferences and travel. However, this year, CAPE was able to hold a three-day session in September 2015—with presentations from speakers throughout the cost community and industry—at a government facility in a low-cost area where virtual attendance was made available to those who could not physically attend. This approach provided essential training while complying with continued restrictions on expenses for conferences and travel. The theme of this year's symposium was "Changes in Defense Acquisition and Cost Analysis." Keynote addresses from USD(AT&L), DCAPE, and the Director of Defense Pricing highlighted the importance of cost analysis within the larger acquisition process and laid the groundwork for closer collaboration between the cost and contracting communities. Additional information is available on the DoDCAS web site, <http://www.dodcas.us/>.

Plans for the next DoDCAS, as well as other conferences and training events, are discussed in Chapter IV.

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CHAPTER IV – THE LOOK FORWARD

Since the enactment of WSARA in 2009, CAPE has made significant progress in implementing the requirements of the legislation and meeting the evolving needs of the Department. This chapter discusses the current status and future plans for several key initiatives that comprise the reform effort.

Cost Leadership Forum

The CAPE Deputy Director for Cost Assessment has established a periodic meeting (known as the Cost Leadership Forum) held with the leaders and senior staff of the military department cost agencies to discuss issues of common interest to the community. The intent is to establish greater collaboration among CAPE and the military department cost organizations by sharing analytic best practices and developing a collective vision of the path forward for the cost community over the next five years in meeting WSARA objectives, thereby improving cost analysis and improving business processes to deal with the challenges of the current constrained resource environment.

The Cost Leadership Forum meets quarterly. Some of the major topics discussed at the Forum include:

- Cost assessment policies and procedures
- Enhanced cost data collection
- CADE project
- Inflation and price escalation
- Training and education for the cost community

The current plans and ongoing initiatives for each of these topics are described in the remainder of this chapter. The Cost Leadership Forum will continue to meet quarterly and provide executive oversight for these and other initiatives.

In addition, the Cost Leadership Forum has established a subordinate body—the Cost Research Board—to provide corporate management of DoD cost research and studies. The goals of the Board are to eliminate any duplication in projects, combine research and studies across organizations to promote integration within the cost community, and align research and studies with senior management priorities. Cost research reports and products will be centrally archived in CADE.

Policies and Procedures

The various guidance documents that were recently completed and issued concerning cost assessment policy and procedures were described in Chapter II. Efforts are ongoing to make further additions and improvements to the overall cost estimating guidance, and in particular, to strengthen the guidance and procedures for cost estimation of MAIS programs and acquisition of services. There will also be a modest update to the *Operating and Support Cost Estimating Guide*.

Additionally, there will be an update to the manual concerning cost data collection (DoD 5000.04-M-1), and there will be a new guide or manual concerning the treatment of inflation and price escalation in cost estimates. The efforts associated with these two topics are discussed later in this chapter.

Enhanced Cost Data Collection

Based on feedback from government users about desired report enhancements, as well as advancements in information systems technology, CAPE and the Cost Leadership Forum have commissioned several working groups that are seeking to improve business processes and quality for data collection and reporting.

FlexFiles Initiative

Today acquisition cost data is collected in the many forms of the legacy CSDR report formats, first created in the 1960s. Contractors currently must make manual allocations from their financial and other accounting systems into these formats. CAPE, partnering with the military department cost agencies, has commissioned a government team to achieve more efficient and better data transfers by working with industry to enable the automated submission of low-level cost data directly from contractors' accounting systems into the government systems. Instead of collecting data annually at best—and in some cases many years apart—the data collections will be available as needed and in some cases aligned with the monthly Earned Value submissions. This means that contractors will no longer have to manually convert one set of data into another structure, eliminating an inevitable source of data errors. This transformation will improve data quality, reporting compliance and timeliness, and also reduce the reporting burden on contractors. This initiative is known in the cost community as FlexFiles.

This year, a draft of the report formats, definitions, and instructions for the proposed FlexFiles reporting was circulated to industry and government cost organizations for comments and suggestions. Five companies have volunteered to support proof-of-concept pilot programs in 2016. It is anticipated that the gradual phase-in of FlexFiles cost reporting will begin on new contracts in 2017.

Improved CSDR Planning

A CSDR plan is submitted for approval when a program begins cost and software reporting. Each plan specifies the required reports and submission frequency for the major contracts and subcontracts. The Air Force is leading an effort to develop formal standards for CSDR plans that provide a template of the reporting structure for each weapon system commodity type (i.e., aircraft, electronic system, missile, etc.). These standards will provide consistency in data reporting across programs within a commodity type, and provide better communication of government expectations to industry. These standard plans are now being placed on an initial set of Air Force contracts where the standards will be tested. The standard plans also will be reviewed by analysts in CAPE and the other military services, so that in the future the standard plans will be refined and incorporated into CSDR reporting for all of the services.

In a related initiative, CAPE and USD(AT&L) are working together to establish a joint planning process for CSDR and EVM reporting. This is intended to ensure more consistent and efficient reporting where all data requirements are simultaneously identified and on contract as early as possible. The format and instructions for a joint CSDR-EVM reporting plan, to be submitted by program offices, is now being developed, and a draft will be circulated for comment and suggestions in 2016.

Software Data Reporting Initiatives

The Cost Leadership Forum has sponsored another working group that is devoted to improved data collection and reporting that supports software cost estimates. This working group reviewed the current software data reporting and determined that there was insufficient standardization for the data reported pertaining to software development size, effort, complexity, productivity, and schedule. Moreover, the data that were reported often were not at the level of detail needed for cost analysis and estimates. The working group also expanded the scope of the data reporting to include software maintenance. The working group has completed the report formats and instructions for reporting contractors using state-of-the-art terms, definitions, and metrics for software development and maintenance. The formats and instructions have been reviewed by industry and government organizations, and the new guidelines are now being incorporated into CSDR reporting.

The software reporting working group also determined that the data being reported are not subjected to complete and rigorous quality control, and has prepared a specific plan for the creation of an institutionalized verification and validation process. This process will be supported by a joint team of subject matter experts from CAPE, the military departments, and the Missile Defense Agency (MDA). This team will follow and enforce a formal, written *Verification and Validation Guide* that was published in 2015.

Beyond the improvement of individual data reports, the long-term goal for the working group is to assemble the data into a comprehensive and authoritative software database with user-friendly tools available for cost analysts. The software database will be incorporated into the overall CADE architecture discussed later in this chapter.

Technical Data

Cost analysts often need technical data for legacy and new systems to make adjustments for complexity or develop cost estimating relationships used in estimates. However, another working group (the technical data working group) has determined that there is no standardized collection of technical data, and that the collection that does exist today is *ad hoc* with many different government organizations using their own unique terminology, definitions, and report formats. To remedy this situation, the working group is developing a way to add system technical (design and performance) data to the cost and software information already collected. The group has created a data template format that identifies the specific technical parameters to be collected in standardized reporting for each weapon system commodity type. This template format will be incorporated into a new report (called the Technical Data Report) that will be incorporated into CSDR reporting on future contracts, and the same template format also will be incorporated into

the CARD document that was described earlier in Chapter II. Both of the changes should be completed in 2016.

Contracts Price Database

Over the past decade, the military department cost agencies have funded the development of a Contracts Price and Schedule Database. Now containing more than five hundred million dollars in contract value across a wide range of commodities, this database is unique in providing information at the Contract Line Item Number (CLIN) level. In cases where CSDR and EVM reporting requirements were not put in place, these CLIN-level data may be the only cost data available to the cost community. Where CSDR and/or EVM data do exist, the database provides useful contextual information (such as contract type or profit margin) and important cross-checks to other cost data. The database can also be used to construct metrics for cost and schedule growth experienced over contract execution.

Cost Assessment Data Enterprise

CAPE is partnering with the military department cost agencies and USD(AT&L) staff to incrementally work towards the CADE vision of the government cost analyst's centralized database and virtual library, housing seamless integrated authoritative data sources that are easily searchable and retrievable. The objectives of CADE are shown in Figure 5, and a high-level framework of the CADE architecture is shown in Figure 6. The CADE architecture is now available to an expansive user community.

CADE Objectives

Improve Analyst Productivity (at all levels: OSD, Services, Program Offices)

- Provide near real-time access to data, more data, and less burden on the analyst to retrieve and process
- Reduce time for analyst to climb the program familiarization learning curve

Effectiveness

- Enable more comprehensive assessments
- Gain insight from previous analysts
- Facilitate telling the program's "story", holistic analysis

Data Quality and Reporting Compliance Improvement

- Includes all the Department's cost data - both EVM and CSDRs

Comprehensiveness

- Having all information at the analyst's fingertips – a centralized virtual library

Source Data Transparency

Figure 5. Cost Assessment Data Enterprise Objectives

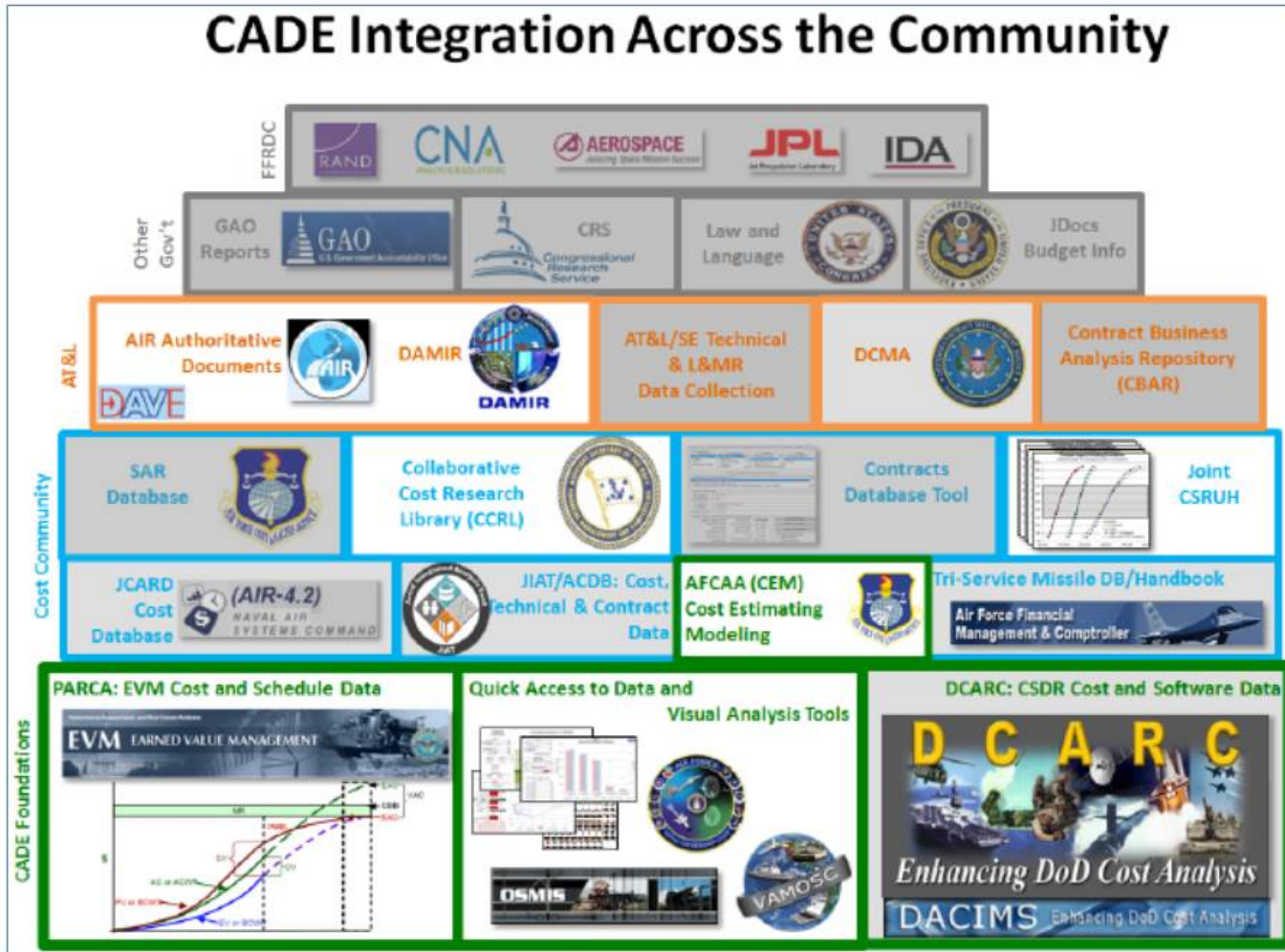


Figure 6. CADE Architecture

CADE will provide immediate analyst access to the complete range of available cost data. Initially, this will include EVM reports, current CSDR reports, and O&S data. CAPE is also working with USD(AT&L) to capitalize on the acquisition data and reports already collected in the various acquisition information systems and to integrate them with the cost data to provide the government analyst with a full view of a weapon program or portfolio. CADE will provide visual analytic tools that can be used to provide automated trend analyses and other views of program performance. Analysts also will be able to retrieve other relevant studies and reports from other government agencies and Federally Funded Research and Development Centers.

CADE not only will store cost, acquisition and technical data, it will also contain the Department's own institutional knowledge for each of the programs, improving communication throughout our cost community and across OSD. This will allow tomorrow's analysts to learn from the experiences of today's, and it will provide today's analysts with a way to save their carefully produced analytics between milestones, so they can return years later and not have to start their analysis all over again with no previous information. It will provide a fuller history capturing previous work, enabling more holistic and comprehensive analyses to be developed.

Ultimately, the goal is to reduce time spent on *ad hoc* data collection and validation, allowing more time for actual analysis at a much deeper level, and quicker ability to see how a program is performing between major reviews. This initiative will increase the productivity of analysts and will also provide a way for them to build upon each other's work, whereas, historically, analysts typically engaged in separate efforts. This will allow the cost community to be a more efficient and productive workforce, which will become more critical in an era of human resource constraints.

The CADE project is being managed using an agile software development process that is supported through an integrated master schedule of the development effort. This year, the CADE project team completed the definition of functional requirements, and developed the associated templates and tables. For next year, the priority will be to incorporate the new data reports (including the FlexFiles cost reports, improved software reports, and technical data reports all discussed earlier) into the CADE architecture as they become available.

Cost Indices

WSARA—as codified in section 2344 of title 10, United States Code—requires that CAPE periodically assess and update the cost indices used by the Department to ensure that such indices have a sound basis and meet the Department's needs for realistic cost estimation. Based on recent studies, which were described in earlier editions of this Annual Report, the current practice in the DoD cost community now makes the distinction between inflation and price escalation.

Inflation refers to an increase in the general price level across the entire economy as a whole. To account for inflation in budgeting and cost estimates, each year the Under Secretary of Defense (Comptroller) issues deflators derived from inflation forecasts made by the administration and issued by OMB.

Price escalation refers to changes in prices of a specific good or service. Escalation accounts for not only inflation, but also any real price growth experienced in a specific industry or commodity group. Escalation may also account for any real price growth associated with a specific contractor (such as costs of direct labor or overhead).

The cost community now considers the use of both inflation and appropriate escalation indices in cost estimates to be a best practice. This approach is intended to provide the most realistic forecast of future prices, taking specific markets, products, and contractors into consideration. The Cost Leadership Forum has commissioned a joint working group to develop specific recommendations to support institutionalization of this practice throughout the Department.

This working group is now working on three aspects of this effort. First, the working group is drafting formal CAPE policy guidance for the treatment of inflation and price escalation in cost estimation. This guidance will establish standard terminology and a consistent approach for this treatment. Second, the working group is also developing a best practices guide that will explain how to implement the formal CAPE policy guidance. This guide will provide specific processes, computations, and data sources that can be used by analysts in the preparation and documentation of inflation and price escalation in cost estimates. Finally, the working group is also working with DAU to incorporate the standard terminology and best practices into current cost analysis training and education.

Cost Analysis Education and Training

In order to improve the education and training of the DoD civilian and military workforce in cost assessment, CAPE and the military department cost agencies formed an Education and Training Working Group that periodically reports its status to the Cost Leadership Forum. The overarching objective of this working group is to develop relevant education and training standards across the cost community.

CAPE, in partnership with USD(AT&L), now co-chairs the oversight group responsible for approval of the curriculum associated with DAU and other courses leading to professional certification in Acquisition Cost Estimating. Initially, the working group developed a framework of desired core competencies—for apprentice, mid-level, and senior cost analysts—that will be used to guide education and training standards for course content. The working group is now working with DAU to review the entire curriculum and course content and to ensure that the desired core competencies are being addressed. In the future, this review of course content, relative to the desired core competencies, will be expanded to other sources of training and education outside of DAU. Once this review is complete, the intent will be to periodically update it to ensure that the curriculum and course content is being updated and remains relevant.

CAPE and the military departments are also working to establish more specialized technical training. The working group has sponsored numerous training events on the increasing CAPE functionality, and there also have been numerous training events on inflation and price escalation. As noted in Chapter III, CAPE was able to resume the full-length version of DoDCAS, and the next DoDCAS event is now being planned. Plans are also being made, in partnership with the Director of Defense Procurement and Acquisition Policy (DPAP), for a joint conference on cost

and price analysis that will benefit both the cost and the contracting communities. In the future, the education and training working group will be conducting a review of VAMOS training.

CAPE has supported the Navy and the Naval Postgraduate School (NPS) in establishing an accredited Master's Degree Program in Cost Estimating and Analysis (MCEA) that began in April 2011. This two-year, distance-learning program is a vital element of the education of the cost estimating community and improvement of cost estimates in both DoD and the defense industrial base. The program is part-time and consists of two courses per quarter, for eight quarters, with courses taken from operations research, systems engineering, and business and public policy. The program blends web-based, online instruction with video-televized education, and is tailored to students whose careers will not allow them to participate in a full-time, traditional, on-campus program. In the final two quarters of the program, each student works on a capstone research project that is sponsored by a government organization in the cost community. Tuition may be paid through the use of the Defense Acquisition Workforce Development Fund. The first four cohorts have graduated. The fifth cohort is now in attendance, and the sixth cohort will start in the spring of 2016.

The Air Force has established its own Master's Degree Program in Cost Analysis (MCA) at the Air Force Institute of Technology (AFIT). This full-time graduate program is designed to advance the knowledge and creative problem-solving skills needed to effectively estimate program resources within the global military, DoD, and Air Force environments. The program curriculum integrates a strong foundation in quantitative concepts and techniques with specific military cost-related topics to prepare students to contribute effectively in a variety of complex and challenging roles in the global military arena. Besides the weapon system cost sequence, the curriculum includes courses in mathematical methods, quantitative decision making, economics, risk, systems engineering, and maintenance and production management. Program graduates are well grounded in course work related to follow-on assignments within the financial management field of cost estimating at the base, major command, and higher levels.

Education and training specific to CADE and its functionality are now being developed for incorporation into the curricula at DAU, NPS, and AFIT.

Tracking to Approved Estimate—Program/Budget Review and Acquisition

The current acquisition process in the Department is event-driven and episodic in nature, and is driven primarily by the key milestone and other review events identified in statute and regulation. CAPE and the military department cost agencies are moving to a more continuous approach in following and tracking program performance, updating cost and schedule estimates, and evaluating new program risks and issues as they are identified.

As part of the Department's program and budget review process, CAPE—in conjunction with USD(AT&L)—reviews each major acquisition program with significant funding changes from the latest baseline or prior year's President's Budget to determine the source of the cost estimate supporting the revised program and to ensure that the program remains fully funded. This process of tracking to the approved estimate will be even more important in the future, as the Department continues to face significant funding constraints and instability, resulting in more frequent and

haphazard reductions in program quantities and annual procurement rates, and more pressures to budget programs at less than full funding.

Acquisition Reform Proposals – Cost Estimation

CAPE, in collaboration with the USD(AT&L) staff, is developing proposals for changes to statute and regulation concerning cost estimation. These changes are intended to improve the effectiveness of current processes, while providing more flexibility and agility. In some cases, these changes would also increase clarity and remove ambiguity in current rules. Some of the topics being addressed include (1) independent cost estimation, (2) cost reporting, (3) contracting and contract negotiations, (4) education and training, (5) inflation and price escalation, (6) confidence intervals and risk management, and (7) system O&S costs. Progress on these reform proposals will be described in future editions of this report.

Summary

CAPE is continuing to develop and refine initiatives for the Department's cost estimating and cost analysis functions. Implementation of these initiatives will ensure that the cost assessment organizations, policies and procedures, tools and methods, data collection systems, and training and education programs will be strengthened and improved as necessary to meet the expanded roles and responsibilities of the DoD cost community.

Appendix A.

Cost Analysis Organizations in the Department of Defense

Independent Cost Assessment Organizations

There are four key offices for the preparation of independent cost estimates (ICEs), one in the Office of the Secretary of Defense (OSD) and three within the military departments. The office within OSD responsible for ICEs reports to the Director, Cost Assessment and Program Evaluation (DCAPE). Within the military departments, the offices all report to their Assistant Secretary for Financial Management and Comptroller. The following paragraphs give a brief description and overview of these four key offices.

OSD – Deputy Director for Cost Assessment

The CAPE Deputy Director for Cost Assessment prepares ICEs for all Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) programs when acquisition oversight has not been delegated to a military department or Defense Agency, and reviews all cost estimates and cost analyses prepared by the military departments and Defense Agencies in connection with other MDAPs and MAIS programs. The Deputy Director for Cost Assessment provides leadership to the entire Department of Defense (DoD) cost community with regard to workforce development and management, policy and procedures, cost data collection, cost analysis education and training, and cost research.

Army – Deputy Assistant Secretary of the Army for Cost and Economics

The Deputy Assistant Secretary of the Army for Cost and Economics (DASA-CE) develops ICEs and Component cost analyses for Army weapon and information systems. DASA-CE conducts independent reviews and validation of business case analyses, economic analyses, and special cost studies of major weapon and information systems, force structure, and Operating and Support (O&S) costs. DASA-CE serves as the Cost and Economics advisor for Army Study Advisory Groups. It chairs and oversees the Army Cost Review Board, develops and approves the Army Cost Position for all major acquisition programs, and conducts in-depth risk analyses of major Army programs and associated costs. DASA-CE also manages the Operating and Support Management Information System (OSMIS).

Navy/Marine Corps – Deputy Assistant Secretary of the Navy for Cost and Economics/Naval Center for Cost Analysis

The Naval Center for Cost Analysis (NCCA) advises the Secretary of the Navy, Chief of Naval Operations, and Commandant of the Marine Corps on cost and economic issues. NCCA leads the Department of the Navy cost community in issues of cost policy and policy implementation, with the goal of increasing the capability and efficiency of the Naval cost community. NCCA prepares ICEs for Department of the Navy MDAPs and MAIS programs, independently reviews MDAP program office estimates, and conducts economic analyses and special studies to support relevant defense issues. The Deputy Assistant Secretary of the Navy for Cost and Economics chairs the DON Cost Review Board and approves all Component Cost Positions. NCCA coordinates all

Department of the Navy cost research. NCCA also manages the Navy and Marine Corps Visibility and Management of Operating and Support Costs (VAMOSOC) data systems. The Executive Director of NCCA is the Deputy Assistant Secretary of the Navy for Cost and Economics.

Air Force – Deputy Assistant Secretary of the Air Force for Cost and Economics/Air Force Cost Analysis Agency

The Air Force Cost Analysis Agency develops ICEs and non-advocate Component cost analyses of Air Force aircraft, space, weapons, command and control, and automated information systems to support acquisition, programming, and budgeting decisions. The Air Force agency also conducts non-advocate business case analyses, economic analyses, and special cost studies of major systems, force structure, and O&S costs supporting multiple Air Force and DoD stakeholders. It manages the Air Force Total Ownership Cost (AFTOC) data system, and develops annual aircraft cost per flying hour estimates to support planning, programming, and budgeting decisions. The Deputy Assistant Secretary of the Air Force for Cost and Economics develops the Air Force Cost Position for all major acquisition programs; conducts and coordinates cost research to develop analytical databases, methods, and tools; and advocates for and manages the Air Force cost analysis workforce ranging from tactical to headquarters levels.

Additional Field-Level Cost Organizations and Activities

There are several field-level cost organizations. These typically are located at a major product center such as the Naval Air Systems Command (NAVAIR) or the Air Force Space and Missile Center (SMC). This section provides a summary of these important organizations.

Army

TACOM Life Cycle Management Command

The TACOM Life Cycle Management Command (LCMC) Cost and Systems Analysis organization is responsible for preparation of program office estimates, life cycle cost estimates, economic analyses, and combat effectiveness modeling that support the development of combat and tactical vehicles. It manages the tools and databases to support cost and systems analysis processes for the TACOM LCMC. The major cost analysis activities are life cycle cost estimating, cost reporting and Earned Value Management (EVM), O&S cost baselines, support to Analyses of Alternatives (AoAs), source selection evaluations, and cost analyses associated with multi-year procurement contracts.

Aviation and Missile Command

The Aviation and Missile Command (AMCOM) Cost Analysis Division provides cost estimation and analysis support to Aviation, Missiles and Space Program Executive Offices and their Program/Project Offices. It manages the AMCOM Cost Analysis Program and develops, updates, or obtains cost estimating relationships, cost factors, and mathematical and computerized cost models for estimating purposes. It also develops cost estimates to support AoAs, tradeoff studies, and force structure cost estimates; develops and prepares life cycle cost estimates; and conducts other related studies in support of weapon system cost analyses. The Division performs cost risk

analyses and cost risk assessments to support weapon system program decisions. It also provides validation/review for cost estimates, economic analyses, and business case analyses.

Communication-Electronics Command

The Communication-Electronics Command (CECOM) Cost Analysis Division provides cost estimation and analysis support to CECOM Program Executive Offices and their Program/Project Offices. It provides several cost analysis services, including life cycle cost estimating, EVM, economic analysis, modeling and simulation, computer software and database support, and review and validation of business case analyses and other cost analyses.

Navy

Naval Air Systems Command

The Naval Air Systems Command (NAVAIR) Cost Department provides a wide variety of cost analysis products and services. Its primary focus is to provide a clear and comprehensive understanding of life cycle cost and attendant uncertainties to be used in developing, acquiring, and supporting affordable naval aviation systems. Besides life cycle cost estimates, the Cost Department provides source selection cost evaluation support, EVM analysis, cost research and databases, and various cost/benefit studies.

Naval Sea Systems Command

The Naval Sea Systems Command (NAVSEA) Cost Engineering and Industrial Analysis Division provides cost engineering and industrial base analysis for ships, ship-related combat systems, and weapons. It provides cost estimates in support of the Defense Acquisition Board (DAB) review process, including AoA studies. It also participates in contract proposal evaluations and the source selection process for builders and suppliers of ships and weapon systems, and it conducts analysis and forecasting of labor, industrial, and technical trends as they affect the overall acquisition of ships, combat systems, weapons, and other equipment.

Space and Naval Warfare Systems Command

The Space and Naval Warfare Systems Command (SPAWAR) Cost Estimating and Analysis Division may—depending on a program’s acquisition category (ACAT)—provide assistance to ACAT I program offices, perform an ICE for ACAT II programs prior to a Milestone B or C review, or independently review a program office cost estimate upon the request of the Program Executive Officer (C4I and Space). The Division also provides more general cost analysis support to the Program Executive Officer (PEO) as needed.

Naval Surface Warfare Center

The Cost and Affordability Group resides within the Warfare Analysis Branch of the Requirements Analysis and Advanced Concepts Division of the Warfare Systems Department at the Naval Surface Warfare Center, Dahlgren Division. The Group produces cost estimates, cost-risk assessments, and affordability analyses for Combat Systems. The Group also develops cost-estimating methodology in support of systems development and production, AoAs, and strategic planning. Particular areas of expertise include model development and maintenance, cost-research databases, technology assessments, life cycle cost estimates, budget and force-level analyses,

performance-based cost models, product-oriented cost models, proposal evaluation, and source selection reviews.

Marine Corps Systems Command

The Cost and Analysis Branch (C&AB) is the Marine Corps Systems Command (MCSC) authority in the field of cost analysis. The C&AB conducts and oversees the development of cost estimates for MCSC weapon, information technology (IT), and non-standard training systems programs. The C&AB advises the Commander, MCSC and PEOs on the historic, current, and emerging trends in all elements of cost estimating and cost analysis. The Branch works for the MCSC Commander as an independent agent that provides cost products to Program Management Offices (PMOs) and PEOs. The Branch is organized into analytical teams in direct cost support of the PMOs and PEOs and a general support studies team for conducting AoAs and other operations research studies and analyses. Through its processes, the C&AB delivers life cycle cost estimates to satisfy the “Will-Cost” estimate, whereas PMOs perform the “Should-Cost” analysis.

Air Force

Air Force Life Cycle Management Center

In 2012, the Air Force combined cost estimating activities from three product centers under the Air Force Life Cycle Management Center (AFLCMC): the Aeronautical Systems Center, the Electronic Systems Center, and the Air Armament Center. AFLCMC leads estimates for program milestone decisions, manages the annual cost estimate process, supports pre-award activities and source selections, and participates in policy discussions resulting in high-quality cost estimates and analysis across the Center.

Air Force Space Command, Space and Missile Center

The SMC Cost Estimating Division supports cost estimates and cost analyses associated with Air Force Space Command and the SMC’s mission of satellite acquisition, launch, and control.

Air Force Sustainment Center

The Air Force Sustainment Center (AFSC) Cost Estimating Division supports cost estimates and cost analyses associated with the AFSC’s mission to provide depot maintenance, supply chain management and installation support to Air Force weapon systems.

Air Force Nuclear Weapons Center

The Air Force Nuclear Weapons Center (AFNWC) Cost Estimating Division supports cost estimates and cost analyses for all nuclear weapon systems activities. The responsibilities of the AFNWC include acquisition, modernization, and sustainment of nuclear system programs for both DoD and the Department of Energy.

Other

National Reconnaissance Office Cost Analysis Improvement Group

The National Reconnaissance Office (NRO) Cost Analysis Improvement Group provides independent cost estimating support to the NRO. This support covers milestone decisions, budget

submissions, EVM, *ad hoc* program support, data collection, methods development, and model/tool development.

Defense Information Systems Agency

The Defense Information Systems Agency (DISA) Analysis and Internal Controls Division guides, directs, and strengthens cost analyses within DISA; and prepares cost estimates for the development, procurement, and sustainment of automated information systems and IT capabilities. The Division provides independent support for DISA program/project costing efforts, and publishes DISA policies, practices and templates for cost estimation, cost/benefit analysis, and economic analysis.

Missile Defense Agency

The Missile Defense Agency (MDA) Director of Cost Estimating and Analysis (DOC) is responsible for ensuring the quality of cost estimates, providing direction on cost estimating processes, and working with the service cost organizations, CAPE, and the Government Accountability Office on all cost-related matters. In recent years MDA/DOC has worked closely with CAPE on preparing cost estimates for MDA programs and responding to congressional and Missile Defense Executive Board inquiries and tasks.

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Appendix B.

Major Defense Acquisition Program Unit Cost Reporting

Since 1982, the Congress has required DoD to track and report on the unit cost for most MDAPs. The requirement for unit cost reporting may be waived if the program has not entered Engineering and Manufacturing Development (EMD), a reasonable cost estimate has not been established for the program, and the system configuration is not well defined. The provisions of the law concerning unit cost reporting, commonly referred to as the Nunn-McCurdy provisions, are found in section 2433 of title 10, United States Code. A complete description of the Department’s implementation of these provisions is provided in the *Defense Acquisition Guidebook* (see section 10.9 (“Acquisition Program Baseline”) and section 10.10.1.5 (“Unit Cost Reports”)).

There are two unit cost metrics subject to reporting, Program Acquisition Unit Cost (PAUC) and Average Procurement Unit Cost (APUC). PAUC is defined as the total program acquisition cost (sum of research, development, test, and evaluation; procurement; military construction; and acquisition-related Operations and Maintenance (O&M) appropriations) divided by the total program quantity of fully configured end items from both the EMD and Production and Deployment Phases. APUC is defined as the program procurement cost divided by the procurement quantity. Both unit cost metrics are tracked in constant dollars of a base year established for each program.

The most current cost estimate for each unit cost metric is tracked relative to two baseline cost estimates. The current baseline estimate refers to the most recent baseline approved by the Milestone Decision Authority (MDA). The original baseline estimate refers to the baseline approved at program initiation (usually Milestone B). A program is declared to have a unit cost breach when the most current unit cost estimate exceeds either baseline unit cost estimate by more than certain specified percentages. Specifically, as shown in Table B-1, a unit cost breach takes place when any of the following criteria are met, for either version of program unit cost (APUC or PAUC):

Table B-1. Unit Cost Breach Thresholds

	“Significant” Breach	“Critical” Breach
Current Baseline Estimate	+15%	+25%
Original Baseline Estimate	+30%	+50%

Note that there are two degrees associated with the severity of the unit cost breach. For significant unit cost breaches, the Department notifies the Congress of the breach within 45 days of the unit cost report and subsequently submits a program Selected Acquisition Report (SAR) with additional, breach-related information. For critical unit cost breaches, in addition to notifying the Congress and submitting the SAR, the Department is required to conduct a complete assessment of the program, led by USD(AT&L), and determine if it should be terminated or continued. The Department is required to terminate the program unless a letter signed by USD(AT&L), providing the certification that the program currently meets certain criteria established in law (section 2433a of title 10, United States Code), is submitted to the Congress within 60 days of the SAR submission. Among other things, USD(AT&L) must certify that the Director,

CAPE has determined the new unit cost estimates are reasonable. A complete description of the critical unit cost breach certification process can be found in the *Defense Acquisition Guidebook*, section 10.10.1.5.2.2 (“Critical Cost Breach Certification Requirements”).

Appendix C.

Major Automated Information System Reporting

Public law (section 2445c of title 10, United States Code) requires annual and quarterly reports from MAIS programs, pre-MAIS (now referred to as unbaselined MAIS) programs, and any other investment in automated information system or IT products or services that is expected to exceed the MAIS thresholds. Details about the MAIS reporting requirements may be found in the *Defense Acquisition Guidebook*, section 10.11 (“Major Automated Information System Statutory Reporting”). Briefly, a MAIS Quarterly Report is used internally within the Department, and a MAIS Annual Report is provided to the congressional defense committees 45 days after submission of the President’s Budget. The formats of the quarterly report and annual report are similar. The reports provide a program description, a summary of the program status, and the latest estimates regarding schedule, performance characteristics, acquisition cost, and life-cycle cost.

The reports compare the latest estimates of schedule, performance, and costs relative to the program baseline approved at the previous acquisition milestone. This comparison is used to determine if the program has a deviation known as either a significant change or a critical change. A significant change occurs when a program has a schedule delay of more than six months, but less than one year; there is a significant, adverse change in the expected performance of the system; or the estimated acquisition cost or life-cycle cost has increased by at least 15 percent but less than 25 percent. For a program with a significant change, the Department is required to notify the congressional defense committees of the change within 45 days after receiving the report that identified the deviation.

A critical change occurs when a program has a schedule delay of one year or more; there is a change in expected performance that will undermine the ability of the system to perform its intended functions; or the estimated acquisition cost or life-cycle cost has increased by 25 percent or more. For a program with a critical change, the Department must conduct an evaluation of the program, and then submit a report and a formal certification to the congressional defense committees within 60 days after receiving the report that identified the deviation; otherwise, appropriated funds may not be obligated for any major contract under the program until the certification is submitted. The certification must affirm the following:

- (1) the program is essential to the national security or to the efficient management of DoD;
- (2) there is no alternative to the program which will provide equal or greater capability at less cost;
- (3) the new estimates of the costs, schedule, and performance parameters with respect to the program have been determined, with the concurrence of the Director, CAPE, to be reasonable; and
- (4) the management structure for the program is adequate to manage and control program costs.

For all major information technology (IT) investments, the Department until recently had provided the Office of Management and Budget (OMB) with a budget document known as the Major IT Business Case (also known as Exhibit 300a and Exhibit 300b). Starting with the FY 2017 President’s Budget submission, the Department will no longer submit the Major IT Business Case for any IT investment that meets the criteria for a MAIS program. Instead, for a MAIS program, DoD will provide OMB with cost,

performance, and schedule reporting by submitting the MAIS Annual Report that is provided to the Congress.

Appendix D.

CADE and Cost Data Collection Systems

Role of Cost Assessment Data Enterprise

As explained in Chapter IV, the Cost Assessment Data Enterprise (CADE) provides the users in the cost community with single-point access to the complete range of cost and related data. The portal presented to the users is shown in Figure D-1.

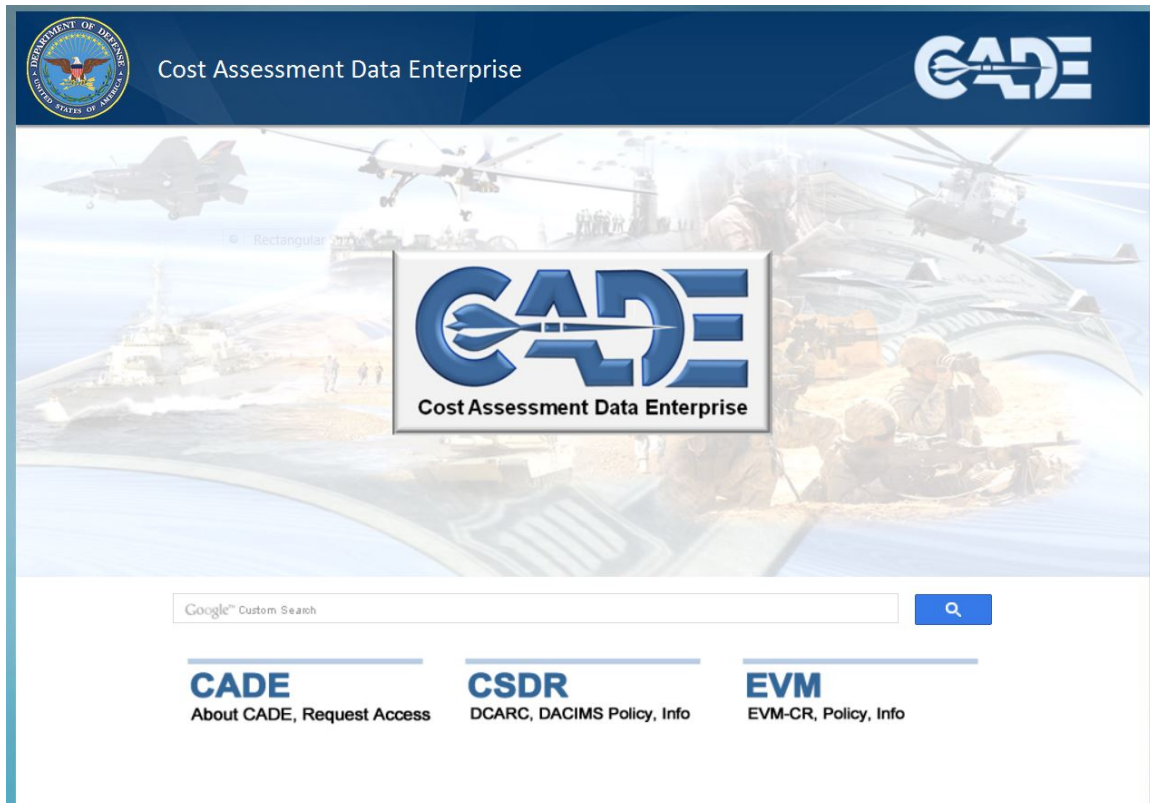


Figure D-1. CADE Portal

Note that the portal not only provides access to the data, but also provides information about policy and procedures relevant to data reporting and collection. The specific data systems that are warehoused in CADE are described later in this appendix.

Access to CADE is made available to government analysts throughout the cost and acquisition communities. A display of active users throughout the Department is shown in Figure D-2. Note the size of each circle reflects the relative number of users. Also note that 75 percent of the CADE users reside in the military departments.

Overview of Cost Data Reporting and Collection

Three primary data collection systems are used by DoD as the major sources of cost data for major acquisition programs:

- Cost and Software Data Reporting (CSDR) system
- Earned Value Management (EVM) Central Repository
- Visibility and Management of Operating and Support (VAMOS) systems

Both the CSDR and EVM reporting use a common, product-oriented taxonomy known as a Work Breakdown Structure (WBS) that follows the guidelines of the DoD Standard Practice, *Work Breakdown Structures for Defense Materiel Items* (MIL-STD-881C). The WBS is a hierarchy of product-oriented elements (hardware, deliverable software, data, and services) that collectively constitute the system to be developed or produced. Further information about the use of the WBS in cost reporting and cost estimating can be found in the *Defense Acquisition Guidebook*, section 3.7.1.1 (“Work Breakdown Structure”).

Cost and Software Data Reporting System

System Description

The CSDR system is the primary means that DoD uses to collect actual cost and related data on major defense contracts and subcontracts. Defense contractors provide information to support the CSDR system, under contractual agreements, by reporting data on development, production, and sustainment costs incurred in executing contracts. The two principal components of the CSDR are the contractor cost data reporting (CCDR) and software resources data reporting (SRDR) systems. These systems are hosted on a secure, web-based, information repository known as the Defense Automated Cost Information Management System within CADE.

CCDR is the primary means within DoD to systematically collect data on the development, production, and sustainment costs incurred by contractors. DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, establishes the CCDR requirements for major contracts and subcontracts (regardless of contract type) associated with MDAPs and MAIS programs.

The SRDR system collects software cost metrics data to supplement the CCDR cost data, to provide a better understanding and improved estimating of software-intensive programs. DoD Instruction 5000.02 establishes SRDR requirements for major contracts and subcontracts (regardless of contract type) associated with MDAPs and MAIS programs. Data collected from applicable contracts include type and size of the software application(s), schedule, and labor resources needed for the software development. Efforts to improve SRDR reporting are described in Chapter IV.

The CSDR data that is currently collected is illustrated in Figure D-3. Access to CSDR data is provided within CADE to authorized and approved users. Detailed procedures and other implementation guidance for both CSDR systems are found in DoD 5000.04-M-1, *Cost and Software Data Reporting (CSDR) Manual*. This Manual is now being updated.

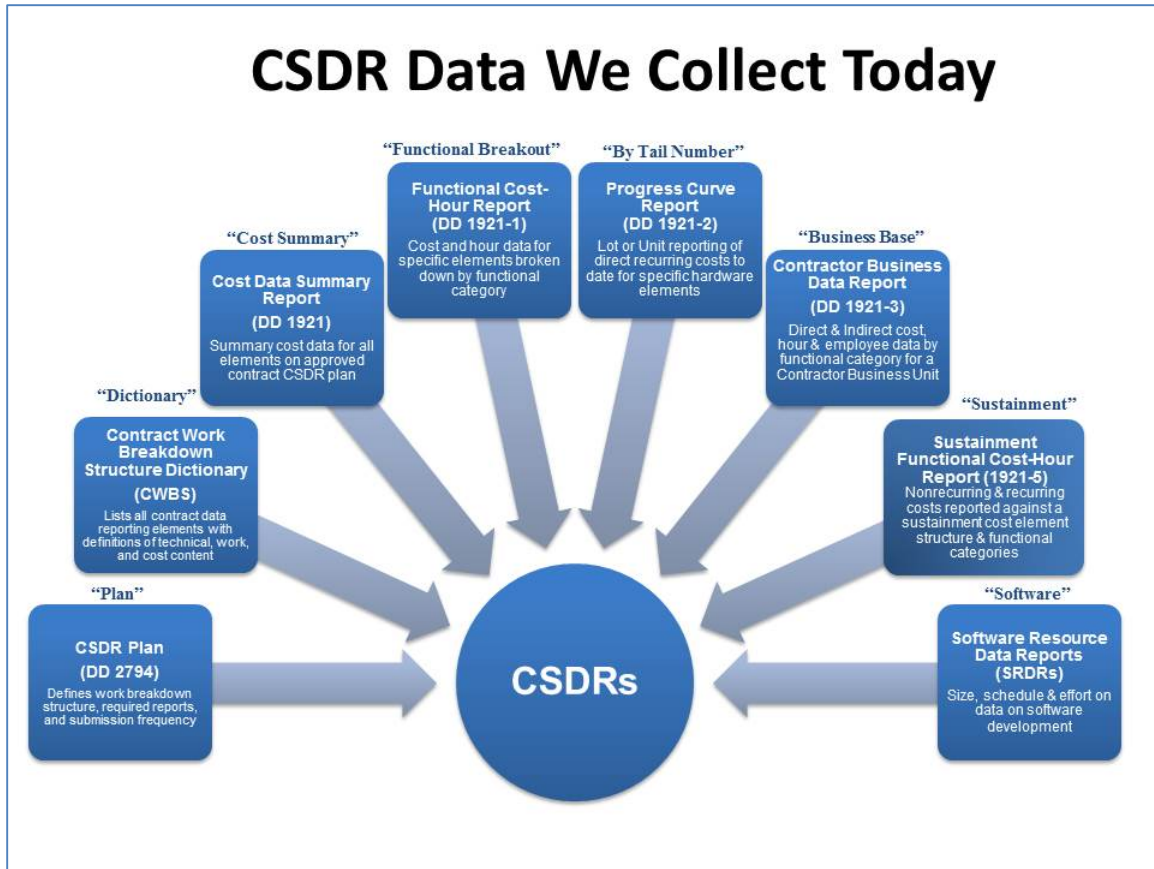


Figure D-3. CSDR Data Reports and Plans

The CSDRs provide essential cost information based on actual cost experience not found in other data sources. The reports provide labor hours, material dollars, and overhead dollars by WBS element and cost estimating functional category. The data may also be used to investigate fixed-variable direct and indirect cost behavior, and to segregate nonrecurring and recurring costs. The data from these reports can be used to construct learning curve projections for labor hours and other recurring costs at various levels of the WBS. The timing of the periodic data reporting is structured to provide key support to the preparation of cost estimates at milestone and other acquisition reviews.

The Defense Cost and Resource Center (DCARC) provides extensive support to the CSDR users and data providers. The DCARC hosts semiannual CSDR Focus Group meetings that provide a forum for DoD and industry stakeholders to discuss evolving CSDR policies and processes, and raise any issues or concerns. The Center provides on-site training to users and data providers at various locations several times each year. This training addresses CSDR policies, CSDR plan construction and subsequent reporting requirements, and DCARC IT systems and applications.

Cost and Software Data Reporting Compliance

The DCARC continually monitors each MDAP for compliance with CSDR requirements where applicable. CSDR reporting is not required when (1) the program is in pre-Milestone A status, with no prototypes, or (2) the CSDR requirements have been waived by CAPE. Waivers for

CSDR requirements may be granted when (1) the relevant item being procured is truly a commercial item, or (2) an item is purchased under competitively awarded, firm fixed-price contracts, as long as competitive conditions continue to exist.

The CSDR compliance rating criteria for programs, which were revised in late 2014, are provided in Figure D-4 below.

CSDR Compliance Rating Criteria

Rating	Criteria
Green	No open CSDR compliance issues
Green Advisory	All outstanding CSDR deliverables are less than three months overdue
Yellow	Any outstanding CSDR deliverable greater than three months, but less than six months overdue
Red	Any outstanding CSDR deliverable greater than six months overdue
Red Critical	<ol style="list-style-type: none"> 1. RFP release without an approved CSDR plan 2. Prime contract awarded without an approved CSDR plan 3. Subcontract awarded without an approved CSDR plan
Not Rated	The program has no CSDR activity (e.g., reporting waiver)

RFP is Request for Proposal

Figure D-4. CSDR Compliance Rating Criteria

Table D-5 provides a breakdown of CSDR compliance using the revised compliance ratings for all MDAPs since FY 2012.

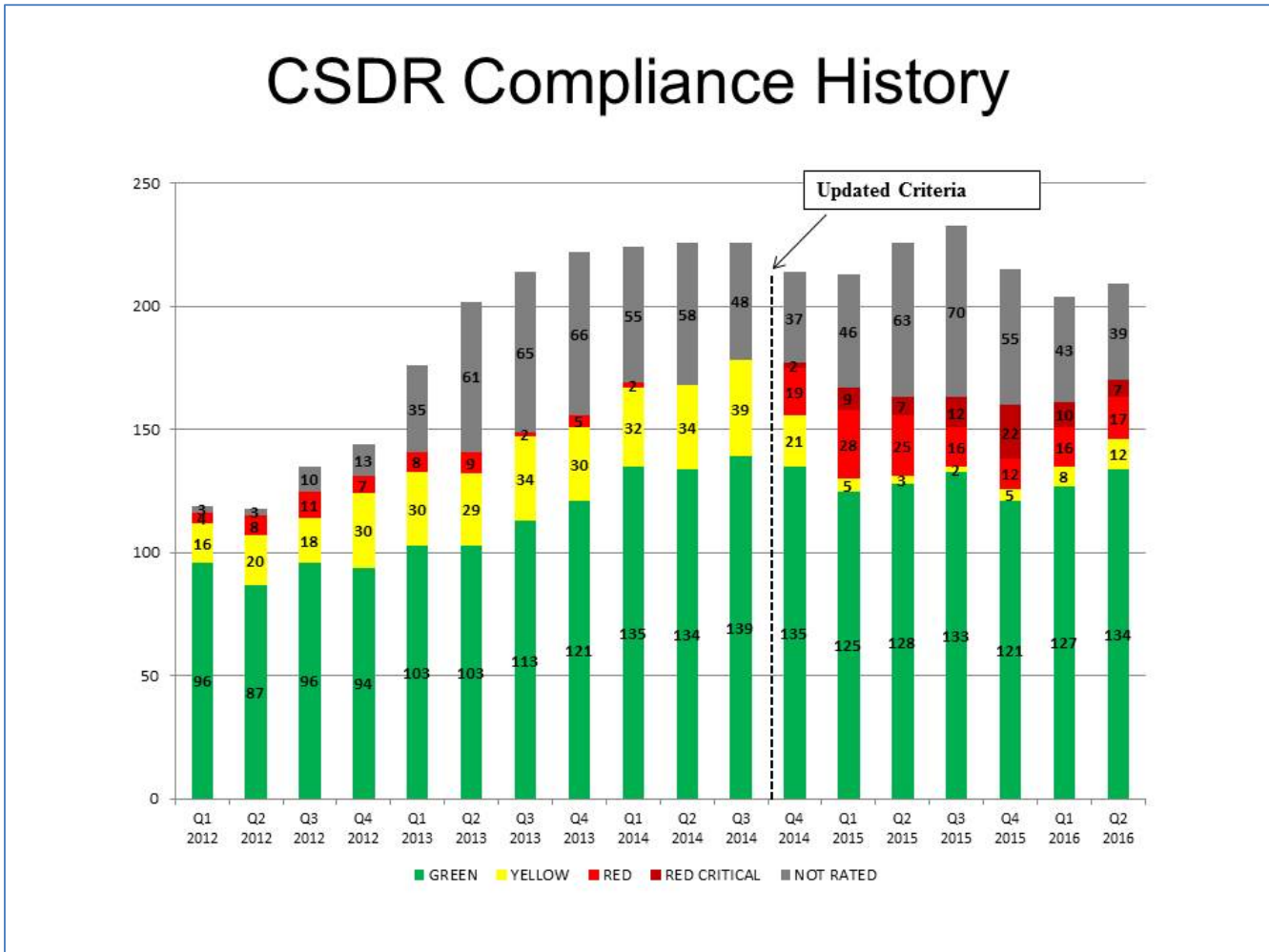


Figure D-5. CSDR Compliance History

At the end of the second quarter of FY 2016, 79 percent of the programs receiving a rating were rated as green or green advisory, 7 percent were rated as yellow, 10 percent were rated as red, and 4 percent were rated as red critical. CAPE and the DCARC continue to emphasize CSDR reporting compliance in order to achieve more accurate and timely cost data to support program cost estimates. Specifically, in cases in which required cost data are not being reported in a timely fashion (i.e., are more than six months late), CAPE now insists that the data be provided before it can complete its ICE.

Earned Value Management Central Repository

In support of the USD(AT&L) staff, the DCARC hosts the EVM Central Repository within CADE. The central repository supports the centralized reporting, collection, archiving, and distribution of key EVM data reports (such as Integrated Program Management Reports) for MDAPs and MAIS programs. General information about EVM reporting is available in the *Defense Acquisition Guidebook*, section 11.3.1 (“Earned Value Management”), and on the DoD EVM website at <http://www.acq.osd.mil/evm>.

The central repository supports complete, timely, and secure transfer of electronic data from the contractor to the repository; secure and controlled warehousing of the data; and controlled, timely, and secure access to the data by authorized users. The main purpose of these data is to provide a consistent and timely situational awareness of acquisition execution.

Visibility and Management of Operating and Support Costs Data System

DoD requires that each military department maintain a system that collects historical data on the O&S costs for major fielded weapon systems. The CAPE Deputy Director for Cost Assessment provides policy guidance on this requirement, known as the VAMOSC program; specifies the common format in which the data are to be reported; and monitors its implementation by each of the military departments. The National Defense Authorization Act for FY 2012, Public Law 112-81, contains a provision (“Assessment, Management and Control of O&S Costs”) that resulted in strengthened CAPE oversight of the VAMOSC program.

Each department has its own unique VAMOSC data system that tracks actual O&S cost experience for major weapon systems. The data can be displayed by timeframe, at various levels of detail, and by functional elements of cost (such as depot maintenance, fuel, consumable items, and so forth). Each VAMOSC system provides not only cost data, but related non-cost data (such as system quantities and operating tempo) as well. VAMOSC data can be used to analyze trends in O&S cost experience for each major system, as well as to identify and assess major cost drivers. VAMOSC data systems are managed by each military department as follows:

- The Navy’s VAMOSC management information systems (known as Navy VAMOSC and Marine Corps VAMOSC) collect and report US Navy and US Marine Corps historical weapon system O&S costs. Both systems are managed by NCCA. The current status of efforts to improve the Navy and Marine Corps systems are described in Chapter IV.

- The Army's VAMOSOC system, called the Operating and Support Management Information System (OSMIS), tracks O&S cost data and other information for over 1,400 major Army weapon/materiel systems and is maintained by DASA-CE. OSMIS-tracked systems include combat vehicles, tactical vehicles, artillery systems, aircraft, electronic systems, and miscellaneous engineering systems. OSMIS will be significantly improved in the future when it is fed data from the emerging Army Enterprise Resource Planning programs, including the General Fund Enterprise Business System.
- The Air Force's VAMOSOC system, AFTOC, is managed by the Deputy Assistant Secretary of the Air Force for Cost and Economics. It provides O&S cost data and related information on all Air Force aircraft, space systems, and missiles.

Abbreviations

ACAT	Acquisition Category
AFIT	Air Force Institute of Technology
AFLCMC	Air Force Life Cycle Management Center
AFNWC	Air Force Nuclear Weapons Center
AFSC	Air Force Sustainment Center
AFTOC	Air Force Total Ownership Cost
AMCOM	Aviation and Missile Command
AMPV	Armored Multi-Purpose Vehicle
AoA	Analysis of Alternatives
APUC	Average Procurement Unit Cost
ASDS	Advanced Seal Delivery System
C&AB	Cost and Analysis Branch
CAC	Common Access Card
CADE	Cost Assessment Data Enterprise
CANES	Consolidated Afloat Network Enterprise Services
CAPE	Cost Assessment and Program Evaluation
CARD	Cost Analysis Requirements Description
CCDR	Contractor Cost Data Reporting
CECOM	Communication-Electronics Command
CIRCM	Common Infrared Countermeasure
CLIN	Contract Line Item Number
CSDR	Cost and Software Data Reporting
DAB	Defense Acquisition Board
DASA-CE	Deputy Assistant Secretary of the Army for Cost and Economics
DAU	Defense Acquisition University
DCAPE	Director, CAPE
DCARC	Defense Cost and Resource Center
DCS	Dry Combat Submersible
DISA	Defense Information Systems Agency
DOC	Director of Cost Estimating and Analysis
DoD	Department of Defense

DoDCAS	Department of Defense Cost Analysis Symposium
DTIC	Defense Technical Information Center
EMD	Engineering and Manufacturing Development
EPAA	European Phased Adaptive Approach
EPAWSS	Eagle Passive Active Warning Survivability System
EVM	Earned Value Management
FCoM	Full Cost of Manpower
FMS	Foreign Military Sales
FOC	Full Operational Capability
FRP	Full-Rate Production
FY	Fiscal Year
FYDP	Future Years Defense Program
GMLRS-AW	Guided Multiple Launch Rocket System – Alternative Warhead
ICE	Independent Cost Estimate
IPPS-A	Integrated Personnel and Pay System – Army
IT	Information Technology
JAGM	Joint Air-to-Ground Missile
JLTV	Joint Light Tactical Vehicle
JMMS	Joint Multi-Mission Submersible
LCMC	Life Cycle Management Command
LRIP	Low-Rate Initial Production
MAIS	Major Automated Information System
MCA	Master’s Degree Program in Cost Analysis
MCEA	Master’s Degree Program in Cost Estimating and Analysis
MCSC	Marine Corps Systems Command
MDA	Milestone Decision Authority
MDA	Missile Defense Agency
MDAP	Major Defense Acquisition Program
MYP	Multi-Year Procurement
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NCCA	Naval Center for Cost Analysis
NNSA	National Nuclear Security Administration
NRO	National Reconnaissance Office

O&M	Operations and Maintenance
O&S	Operating and Support
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OSMIS	Operating and Support Management Information System
PAUC	Program Acquisition Unit Cost
PEO	Program Executive Officer
PMO	Program Management Office
POM	Program Objective Memorandum
RFP	Request for Proposal
RMD	Resource Management Decision
SAR	Selected Acquisition Report
SCP	Service Cost Position
SDB	Small Diameter Bomb
SMC	Space and Missile Center
SOCOM	Special Operations Command
SPAWAR	Space and Naval Warfare Systems Command
SRDR	Software Resources Data Reporting
USD(AT&L)	Under Secretary of Defense (Acquisition, Technology and Logistics)
USD(P&R)	Under Secretary of Defense (Personnel and Readiness)
VAMOSC	Visibility and Management of Operating and Support Costs
WBS	Work Breakdown Structure
WIN-T	Warfighter Information Network – Tactical
WSARA	Weapon Systems Acquisition Reform Act of 2009

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