



FY 2018 Annual Report on Cost Assessment Activities



February 2019

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**Director, Cost Assessment and
Program Evaluation**

February 2019

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FOREWORD

Effective and efficient acquisition is vital to the renewal of our military capabilities—a major line of effort within the National Defense Strategy. Legislation enacted in the past few years provides sweeping guidance, tools, and direction to implement profound changes to defense acquisition management to achieve the objectives of technical superiority and innovation, weapon system affordability, and the more rapid development and fielding of new capabilities. The Department of Defense (DoD) has embraced this opportunity and is actively pursuing reforms that will provide a more streamlined, decentralized, and agile acquisition process in support of these objectives.

Effective and efficient acquisition must also be supported by accurate cost estimates. Such estimates support sound resource planning and program management, and permit the necessary long-term commitments to affordable programs and systems that will ultimately equip the military force structure. In support of these objectives, the Weapon Systems Acquisition Reform Act (WSARA) of 2009 was enacted 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).

This Annual Report of Cost Assessment Activities describes the cost estimating and analysis activities of CAPE, which have been conducted in partnership with the military department cost agencies and other organizations throughout DoD. These activities strengthen cost estimating and thereby increase certainty in acquisition programs. This partnership has provided formal strategic direction for the entire cost community, as stated in written policy and procedures. Specifically, we have invested in the Cost Assessment Data Enterprise (CADE) project that is providing the entire DoD cost community with a centralized and authoritative database. This investment has greatly improved cost data collection and analysis, while increasing analyst productivity. Moreover, we have made great strides in enhancing the underlying data that support this project. We have restored rigorous and systematic cost data collection, which is essential to supporting accurate cost estimates of current and future programs. We have also worked with the Defense Acquisition University (DAU) and other educational institutions to strengthen the education and training of the cost analysis work force.

Although the DoD cost community has made significant progress, many challenges remain, and there is more work to be done. The guiding vision for this work is the need for independent, rigorous, and objective cost and schedule estimates, paired with thorough assessments of risk, based on solid analytic methods, tools, and data. This Annual Report provides a summary of our accomplishments to date, and our plans for the future, in achieving this vision.



Bob Daigle
Director
Cost Assessment and Program Evaluation

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CHAPTER I. INTRODUCTION

The Director, CAPE is the principal official for independent cost estimation and cost analysis, ensuring that the cost estimation and cost analysis processes of DoD provide accurate information and realistic estimates of cost for the acquisition programs of the Department.

In fulfilling this responsibility, the Director, CAPE conducts independent cost estimates (ICEs) 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 acquisition 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 related information for acquisition programs, provides leadership in the education and training of the DoD and other United States (US) government cost analysis communities, and issues guidance relating to the full consideration of life-cycle management and sustainability costs in major acquisition 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. Some of the key points in this chapter are:
 - **DoD Cost Organizations.** Cost organizations are embedded throughout the Department: at OSD, at the headquarters of the military departments and defense agencies, and at field-level acquisition organizations. These organizations conduct a wide range of cost estimation and analysis activities. Each cost organization serves a unique role, but also contributes to the collective efforts of the cost community as a whole.
 - **Procedures for Cost Assessments.** CAPE has completed six major documents that provide guidance to DoD organizations concerning cost assessment policy and procedures. These documents are:
 - DoD Directive 5105.84, *Director of Cost Assessment and Program Evaluation (DCAPE)*
 - DoD Instruction (DoDI) 5000.73, *Cost Analysis Guidance and Procedures*
 - DoD 5000.04-M-1, *Cost and Software Data Reporting (CSDR) Manual*
 - *Operating and Support Cost-Estimating Guide*
 - DoDI 7041.04, *Estimating the Full Costs of Civilian and Active Duty Manpower and Contract Support*
 - DoDI 7041.03, *Economic Analysis for Decision-making*

The first four of these documents are the primary vehicles for implementing the cost assessment provisions associated with defense acquisition programs. The CAPE efforts to publish procedures for all cost assessment activities are now for the most part complete, and all six of these documents are now in compliance with the OSD standard to be reviewed annually or updated within a 10-year period. However, as discussed later in this report, some of these documents will need to be updated due to recent legislation. In particular, work to update DoDI 5000.73 will begin in April 2019.

- **Cost Indices.** The cost community now considers the use of both inflation and price escalation indices in cost estimates to be a best practice. To institutionalize this practice throughout DoD, CAPE published *Inflation and Escalation Best Practices for Cost Analysis* in April 2016. A second publication, *Inflation and Escalation Best Practices for Cost Analysis: Analyst Handbook*, was published in January 2017. These publications are available on the CAPE website.
- Chapter III reviews the Department’s Fiscal Year (FY) 2018 cost estimation and cost analysis activities associated with Major Defense Acquisition Programs (MDAPs) and other programs. These activities include ICEs as well as reviews of military department and defense agency cost estimates. These activities 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 2018 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 Cost Assessment Activities.**
 - CAPE provided four cost analyses—one ICE and three others—that supported milestone or other reviews when the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) was the Milestone Decision Authority (MDA).
 - CAPE provided 10 cost analyses that supported milestone or other reviews when the Service Acquisition Executive (SAE) was the MDA. Three of these were CAPE ICEs; the other seven were reviews and assessments of the Components ICEs, the Component Cost Positions (CCPs), and the funding decisions made by the MDAs.
 - CAPE made independent estimates of cost savings for seven cases of multi-year procurement.
 - CAPE also prepared one acquisition cost estimate for one program that experienced a critical unit cost (Nunn-McCurdy) breach prior to the Department’s certification of the program to the Congress.
 - **Assessment of Compliance, Quality, and Differences in Methodology.** The cost assessment activities in FY 2018 complied with 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. The quality of the cost estimates by both CAPE and the military departments has also continued to improve due to better data. An updated CAPE analysis made a comparison between the CAPE ICEs and the CCPs, and found that the difference between the two estimates since the enactment of WSARA in 2009 has narrowed

significantly relative to the previous period between 1999 and the enactment of WSARA. This is a direct result of improvements to the systematic collection of actual cost information over time and improved availability of this information to all parties in the cost community as discussed later in this report.

- **Other Cost Assessment Activities.**
 - CAPE provided an ICE requested by the Office of Management and Budget (OMB) for the National Nuclear Security Administration (NNSA) Spent Fuel Handling Recapitalization Project supporting naval nuclear propulsion.
 - CAPE provided an analysis that supported a USD(A&S) certification to the Congress concerning NNSA options for plutonium pit production.
 - CAPE provided a congressionally-directed business case analysis regarding the industrial base for ammonium perchlorate.
 - CAPE provided an ICE for a Missile Defense Agency program (SM-3 Block IB).
 - CAPE sponsored the 49th DoD Cost Analysis Symposium (DoDCAS) in September 2018. The theme was Section 804 and Rapid Acquisition. Section 804 refers to a provision in the National Defense Authorization Act for FY 2016 that provided the Department with new authorities for the rapid prototyping of demonstrations and prototypes with innovative technologies, and the rapid fielding of new or upgraded systems with limited development.
- Chapter IV describes the status of several ongoing initiatives that will ensure the cost assessment and cost estimating functions for the Department will be improved and modernized as required to meet the Department's evolving needs. These initiatives address a wide range of issues and concerns, including leadership for the cost community as a whole, 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:
 - **Policies and Procedures.** Efforts are ongoing to make further additions and improvements to the overall cost estimating guidance. It will be necessary to update the guidance to account for recent legislative changes and other fact-of-life changes, as well as to make desired improvements. In the interim, CAPE issued four policy memos in 2018 and early 2019 concerning cost data collection.
 - **Cost Assessment Data Enterprise.** CAPE initiated the development of CADE as the Department's unified initiative to collect, organize, and use data more efficiently. CAPE has partnered with the military department cost agencies and the USD(A&S) staff to establish CADE as the government cost analyst's centralized database and virtual library, housing seamless integrated authoritative data sources that are easily searchable and retrievable. The analysts are provided with cost and related data, access to acquisition reports and information, and a library of historical cost estimates and related decision support products.
 - **Enhanced Cost Data Collection.** Feedback from government users has identified desired improvements for cost data being collected, as well as noted gaps in coverage where important cost data are not being collected. CAPE and the military department cost agencies have established several initiatives to address these concerns and to increase efficiency

through better business processes and use of advancements in information systems technology. These initiatives include the following:

- Cost data reporting requirements for the Section 804 rapid prototyping and rapid fielding programs noted earlier were issued in a policy memo in October 2018.
- Guidance for cost data reporting for programs below the MDAP dollar threshold were issued in a policy memo in January 2019. This guidance responds to Congressional direction.
- Cost data reporting has been modernized by enabling the cost-effective submission of low-level cost data directly from the contractors' accounting systems.
- System technical data that will be useful to cost analysts will soon be collected.
- Cost data reporting on major weapon system sustainment contracts has been improved and expanded.
- Cost data collection and reporting has been extended to certain contract types, in which quantities of supplies or levels of service are not specified up front, that have been used to support high dollar value modernization and sustainment of important weapon system platforms.
- Cost data collection and reporting has also been extended to government-performed efforts as modern financial systems are implemented throughout the government.
- **Cost Analysis Education and Training.** CAPE and the military department cost agencies formed an Education and Training Working Group that developed a framework of desired core competencies—for apprentice, mid-level, and senior cost analysts—that is being used to guide course content. CAPE has continued to work with DAU to review and revise the curriculum and course content and will do so in the future as well. Education and training supported by an advanced training system specific to CADE and its supporting cost data have been developed for incorporation into the curricula at DAU and other educational institutions. In addition, CAPE has established a dedicated CADE training team that provided 38 training and outreach activities to government organizations and contractors throughout the country. CADE users also have access to modern on-line training.

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 recent legislative changes to acquisition and cost assessment policy and statutory requirements. Appendix D provides additional information on CADE and associated DoD 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 evolving needs of the Department and new legislative requirements.

This report assumes a modest familiarity with the defense acquisition process on the part of the reader. Those in need of an introduction to the defense acquisition process are encouraged to refer to the *Defense Acquisition Guidebook* (<https://www.dau.mil/tools/dag>).

Overview of Cost Analysis Organizations in DoD

Cost organizations are distributed throughout DoD: at OSD, at the headquarters of the Components (i.e., military departments and defense agencies), and across DoD field organizations. Each cost group serves unique purposes and functions but also complements the family of cost organizations supporting the defense acquisition process and the broad and diverse operations of the Department. This helps foster best practices and teamwork within the cost community. Appendix A provides more details on the various DoD cost analysis organizations.

At the OSD level, CAPE is the principal office 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. CAPE provides ICEs for MDAPs when the USD(A&S) is the MDA, under the specific circumstances explained later in this chapter. CAPE also provides policy for and oversight of preparation and review of DoD Component cost estimates for MDAPs under other circumstances. CAPE may also choose to provide an ICE for an MDAP where acquisition authority has been delegated to a Component.

Each military department headquarters has its own cost agency. These cost estimating agencies often provide ICEs when acquisition oversight is delegated to the Component and the Component Head or Component Acquisition Executive is the MDA. 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 function independently from their acquisition organizations, since they reside in the financial management organizations of their military departments, and are outside their military department's acquisition chain of command.

There are also many field-level cost organizations. These organizations provide resources to support higher headquarters cost estimates and analyses, and they also provide assistance to support day-to-day operations of program offices and similar entities. Examples of such activities include evaluation of contractor proposals and should-cost reviews; 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.

Procedures for Cost Assessments at Milestone Reviews and Other Events

This section provides a description of DoD cost assessment procedures for MDAPs.

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, 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 cost assessment activities is provided in Enclosure 10 (“Cost Estimating and Reporting”) of DoDI 5000.02, *Operation of the Defense Acquisition System*. DoDI 5000.02 was most recently issued by USD(A&S) in August 2017.

More specific guidance on prescribed policy and procedures is provided in DoDI 5000.73, *Cost Analysis Guidance and Procedures*. This instruction was most recently issued by the Director, CAPE in October 2017. The Instruction 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 Executive Services Directorate website at <https://www.esd.whs.mil/DD/>.

Cost Assessment Procedures for Major Defense Acquisition Programs

As required by section 2334 (Independent Cost Estimation and Cost Analysis) of Title 10, United States Code (hereafter cited in this report as 10 U.S.C. 2334), CAPE prepares ICEs and conducts cost analyses for MDAPs for which the USD(A&S) is the MDA:

- In advance of any Milestone A certification or Milestone B certification under 10 U.S.C. 2366a/b (Determination Required Before Milestone A Approval/Certification Required Before Milestone B Approval).
- In advance of any decision to enter low-rate initial production (LRIP) or full-rate production (FRP).
- For any certification for critical unit cost (Nunn-McCurdy) breaches under 10 U.S.C. 2433a (Critical Cost Growth in Major Defense Acquisition Programs). 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 Director, CAPE or upon the request of USD(A&S) 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 (or defense agency equivalent), reviews the CCP, reviews the funding position selected by the MDA, and provides a written summary of

its review and findings to the MDA; (2) prepares the ICE when considered appropriate by the Director, CAPE or upon the request of USD(A&S) or the MDA; or (3) works with the military department cost agency in a collaborative development of the ICE.

The National Defense Authorization Act for FY 2016 contained certain provisions intended to move acquisition oversight of MDAPs, for the most part, away from OSD and to the military department headquarters. In particular, Section 825 (Designation of Milestone Decision Authority) specified that the MDA for an MDAP reaching Milestone A after October 1, 2016, shall be the SAE of the military department managing the program, unless under certain specific circumstances the Secretary of Defense may designate another official as the MDA. Although Section 825 was not retroactive to programs that had reached Milestone A before October 1, 2016, the Department has recently elected to move oversight for many of these programs to the military departments. As of January 2019, for the 107 pre-MDAPs¹ and MDAPS, USD(A&S) is the MDA for 15 programs and the SAEs are the MDAs for the remaining 92.

Role of the Independent Cost Estimate

MDAPs 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 between cost, capabilities, and schedule;
- Alternative acquisition and contracting 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.

The role of the ICE in support of program decision-making has been further strengthened by the National Defense Authorization Act for FY 2017. This expanded role for the ICE is discussed in Chapter IV.

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

¹ A pre-MDAP is an acquisition program that has yet to reach Milestone B, but is judged likely to reach MDAP status at that time.

the program in the FYDP consistent with the Component's cost position. The Component establishes a documented CCP for all MDAPs prior to the Milestone A, B, and C reviews and the FRP decision. The CCP is signed by an appropriate military department cost agency senior official (or defense agency equivalent). For the Department of the Navy, a CCP may instead be signed by the Program Executive Officer. Each Component has its own process to arrive at the CCP. 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.

For an MDAP for which the USD(A&S), at each milestone or other review, the Component must fully fund the program to the CCP 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 CCP. This Certification Memorandum must be submitted prior to the Defense Acquisition Board (DAB) review.

For an MDAP for which the MDA is delegated to the Component, the MDA reviews the CCP and the CAPE or Component ICE, and issues a funding decision in the Acquisition Decision Memorandum (ADM). CAPE prepares a review and assessment of this funding decision that is provided in a written summary to the MDA in support of the program milestone or other review.

Multi-Year Procurement

10 U.S.C. 2306b (Multiyear Contracts ... Defense Acquisitions of Weapon Systems) 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 substantial 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 an 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, for a specific authorization by law to carry out the MYP strategy. Following congressional approval (in the National Defense Authorization Act and the Department of Defense Appropriations 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 four 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.

Cost Indices

10 U.S.C. 2334 (Independent Cost Estimation and Analysis) 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 inflation guidance derived from 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. To institutionalize this practice throughout the Department, CAPE published *Inflation and Escalation Best Practices for Cost Analysts* in April 2016. CAPE then continued to work with the military department cost organizations to implement these best practices. A second publication, *Inflation and Escalation Best Practices for Cost Analysis: Analyst Handbook*, was published in January 2017. This document is a more in-depth handbook explaining 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. This information is not only important to cost estimates of weapon systems, but is also applicable to general programming and budgeting. These publications are available on the CAPE website (<https://www.cape.osd.mil>) at “Public Reports.”

CAPE has also worked with DAU to incorporate the standard terminology and best practices into current cost analysis training and education. Additional information on cost analysis training and education is provided in Chapter IV.

Cost Estimates for Contract Negotiations

10 U.S.C. 2334f (Estimates for Program Baselines and Analyses and Targets for Contract Negotiation Purposes) requires that for MDAPs, 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 2334f 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.

In the defense acquisition process, the MDA formally approves a cost estimate that serves as the program baseline and the basis for program funding. However, program managers are expected to strive for a lower cost where possible. The intention is that neither the ICE nor the CCP should be allowed to become a self-fulfilling prophecy, and that program managers should take initiatives to identify and achieve savings below budgeted most-likely costs. In particular, should-cost reviews can be used during proposal evaluations and contract negotiations (particularly for sole source procurements) throughout program execution, including sustainment, to evaluate the economy and efficiency of a contractor’s operations and processes.

In addition, electronic data warehouses of contractor cost data 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) that supports preparation of the CCP, the ICE, and other cost estimates as required. The CARD succinctly describes the key technical, programmatic, operational, and sustainment 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. By using the same CARD, different organizations preparing cost estimates for a program can develop their estimates based on the same understanding of program requirements and content.

The most recent guidance for the CARD was provided in the CAPE memorandum, *DoD Cost Analysis Data Improvement*, issued on January 9, 2017. Recent changes to further improve and streamline the CARD are described in Chapter IV.

Operating and Support Cost Estimates

10 U.S.C. 2334 (Independent Cost Estimation and Analysis) requires that the Director, CAPE issue guidance relating to full consideration of life-cycle management and sustainability costs in MDAPs. To meet this requirement, CAPE issued the *Operating and Support Cost-Estimating Guide* in March 2014. This guide 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 available on the CAPE website at https://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.

Cost Comparisons of Military, Civilian, and Contractor Manpower

CAPE issued DoDI 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 Executive Services Directorate website at <https://www.esd.whs.mil/DD/>.

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 CADE public website (<https://cade.osd.mil>) at “Tools/Other Cost Tools” and is usable by all personnel who possess a valid Common Access Card. The personnel cost factors for active-duty military and civilian personnel have been updated to FY 2018 rates. A classified version of the tool is available on the DoD Secure Internet Protocol Router Network (SIPRNet). 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.

Economic Analysis for Decision-making

CAPE issued DoDI 7041.3, *Economic Analysis for Decision-making*, in September 2015. This instruction is the DoD implementation of 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 Executive Services Directorate website at www.esd.whs.mil/DD/.

CADE and DoD Cost Data Collection Systems

CADE is the DoD government cost analyst’s centralized database and virtual library. CADE provides the users in the cost community with a wide range of authoritative cost data and related information. CADE is further described in Chapter IV.

As noted earlier, CAPE is responsible for prescribing policy and procedures for the reporting and collection of actual cost data that are 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. The Cost and Software Data Reporting (CSDR) system serves as the primary source of cost data for major contracts and subcontracts associated with MDAPs. 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 major fielded weapon systems.

Appendix D provides additional details concerning all of the cost data collection systems. Chapter IV discusses current CAPE efforts to improve the CSDR reports, and also describes a major enterprise-wide upgrade to the VAMOSOC systems known as E-VAMOSOC.

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 strengthen its cost assessment institutions and processes. 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 2018

This chapter provides a summary of the DoD cost estimates and cost analyses that were made in FY 2018 in support of MDAP milestone and other acquisition reviews, multi-year procurements, MDAP critical unit cost breaches, and other cost analyses. There are also some observations regarding compliance with policy and procedures, quality of the cost estimates over time, and differences between the CAPE and Component cost estimates.

MDAP Milestone or Other Review Cost Assessment Activities

Table 1 provides a summary of the four cost assessment activities in FY 2018 that supported milestone or other reviews when the USD(A&S) was the MDA. 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.

Table 1. Cost Assessment Activities in FY 2018 for MDAP Milestone or Other Reviews Subject to USD(A&S) Decision

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
F-35 Lightning II Joint Strike Fighter (JSF) Program	F-35	Joint	CAPE Cost Analysis of Economic Order Quantity Contracts	28-Feb-18	USD(A&S) Certification to Congress	7-May-18
Evolved Expendable Launch Vehicle	EELV	Air Force	CAPE Analysis of Delivery on Orbit Cost Impact on EELV Phase 2	12-Jun-18	Approval of EELV Phase 2 Acquisition Strategy	5-Oct-18
B-2 Defensive Management System - Modernization	B-2 DMS-M	Air Force	CAPE Review and Assessment	14-Jun-18	USD(A&S) Direction	11-May-17
			Revised Air Force Cost Position	4-Jun-18		
Next Generation Operational Control System	OCX	Air Force	CAPE Independent Cost Estimate	14-Jun-18	Milestone B Recertification	28-Sep-18
			Air Force Cost Position	25-Mar-17		
			Air Force Cost Position Validation	12-Jun-18		

Remarks about Specific Programs

- The F-35 program intends to execute a contracting strategy known as Block Buy that procures material and equipment through Economic Order Quantity (EOQ) contracts. The National Defense Authorization Act for FY 2018 required the USD(A&S) to make several findings and certifications to the Congress prior to the use of EOQ procurement contracts for the F-35. In particular, the Congress required a determination that the estimates of both the cost of the contracts and the anticipated cost avoidance through the use of EOQ contracts are realistic. This determination was required to be made after the completion of a cost analysis performed by the Director, CAPE.
- The EELV program plans to award contracts to two vendors for launch services during the five-year period FY 2020-2024 known as EELV Phase 2. However, the National Reconnaissance Office (NRO) is planning to procure launch services for a classified space system through the system vendor. This acquisition strategy is known as Delivery On Orbit (DOO). This strategy would reduce the number of launch services procured through the EELV program, and potentially could result in cost increases for the remaining EELV Phase 2 launches. To address this issue, OMB requested that OSD CAPE lead a study on the impacts of DOO for the classified program on the costs of EELV Phase 2 launches, mission assurance, and other related issues so as to inform a decision as to whether NRO should proceed with its proposed approach.
- The B-2 DMS-M updated its Acquisition Strategy in May 2017 to account for changes to the program technical architecture and contract type. The ADM that approved the Acquisition Strategy directed the Air Force to update its CCP to reflect these program changes. The Air Force published an updated CCP memorandum in June 2018.
- The OCX program experienced a critical unit cost (Nunn-McCurdy) breach in June 2016, and was certified to continue in October 2016. However, the program lost its Milestone B certification as a result of the unit cost breach. The Air Force prepared a new CCP for the restructured program in May 2017, and revalidated the CCP in June 2018. The program Milestone B was recertified in September 2018 following completion of the CAPE acquisition cost estimate in June 2018.

Table 2 provides a summary of the ten cost assessment activities in FY 2018 that supported milestone or other reviews when the SAE was the MDA. For each MDAP with a milestone review or other event, Table 2 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.

Table 2. Cost Assessment Activities in FY 2018 for MDAP Milestone or Other Reviews Subject to SAE Decision (1 of 3)

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Intercontinental Ballistic Missile Fuze Modernization	ICBM Fuze Mod	Air Force	CAPE Review and Assessment	5-Oct-17	10 U.S.C. 2366b certification	TBD
			Updated Air Force Independent Cost Estimate	15-Aug-17		
			Air Force Cost Position	25-Jul-14		
			Air Force Independent Cost Estimate	16-May-14		
Patriot Advanced Capability-3 Missile Segment Enhancement	PAC-3 MSE	Army	CAPE Review and Assessment	1-May-18	Full-Rate Production Decision	13-Jun-18
			Army Cost Position	6-Apr-18		
			Army Independent Cost Estimate	4-Apr-18		
Joint Air-to-Ground Missile	JAGM	Army-Navy	CAPE Review and Assessment	22-Jun-18	Milestone C	15-Jun-18
			Joint Cost Position	15-May-18		
			Joint Independent Cost Estimate	17-May-18		

Table 2. Cost Assessment Activities in FY 2018 for MDAP Milestone and Other Reviews Subject to SAE Decision (2 of 3)

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Amphibious Combat Vehicle Phase 1 Increment 1	ACV 1.1	Navy	CAPE Review and Assessment	22-Jun-18	Milestone C	19-Jun-18
			Navy Cost Position	6-Jun-18		
			Navy Independent Cost Estimate	1-Jun-18		
F-22 Increment 3.2B Modernization	F-22 Inc 3.2B Mod	Air Force	CAPE Review and Assessment	27-Jul-18	Full-Rate Production Decision	25-Sep-18
			Air Force Cost Position	12-Jul-18		
			Air Force Independent Cost Estimate	20-Jul-18		
Global Positioning System III Follow-On Production	GPS IIIF	Air Force	CAPE Independent Cost Estimate	1-Aug-18	Milestone B	12-Sep-18
			Air Force Cost Position	13-Jul-18		
MQ-25 Stingray	MQ-25	Navy	CAPE Independent Cost Estimate	23-Aug-18	Milestone B	24-Aug-18
			Navy Cost Position	6-Aug-18		

Table 2. Cost Assessment Activities in FY 2018 for MDAP Milestone and Other Reviews Subject to SAE Decision (3 of 3)

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Utility Helicopter Replacement Program	UH-1N Replacement	Air Force	CAPE Review and Assessment	12-Sep-18	Pre-Milestone C	11-Sep-18
			Air Force Cost Position	4-Sep-18		
			Air Force Independent Cost Estimate	30-Aug-18		
Common Infrared Countermeasures	CIRCM	Army	CAPE Review and Assessment	21-Sep-18	Milestone C	14-Sep-18
			Army Cost Position	23-Aug-18		
			Army Independent Cost Estimate	30-Aug-18		
Advanced Pilot Training Program	APT	Air Force	CAPE Independent Cost Estimate	21-Sep-18	Milestone B	25-Sep-18
			Air Force Cost Position	10-Sep-18		

Remarks about Specific Programs

- The ICBM Fuze Modernization program is being managed under the joint DoD and Department of Energy (DOE) acquisition process for nuclear weapons. The program entered DOE Phase 6.3 Development Engineering, which is roughly equivalent to Milestone B, in August 2013. However, the Assistant Secretary of the Air Force for Acquisition issued guidance in September 2015 that the program would also meet the statutory requirements for an MDAP. In particular, the program is currently seeking the statutory (10 U.S.C. 2366b) certification requirements for Milestone B. In support of this certification, the Air Force prepared an ICE that was subject to CAPE review and concurrence.
- The UH-1N Replacement program held a Pre-Milestone C event prior to the contract award of four air vehicles and associated training devices and support equipment.

CAPE Cost Analysis for Multi-Year Procurement

As noted in Chapter II, CAPE prepares a preliminary independent estimate of savings for a proposed MYP strategy and contract structure to support the Department's certification to the Congress of significant savings and other criteria, and updates the estimate of savings (after MYP approval from the Congress) prior to the award of a multi-year contract. Table 3 provides a summary of the seven CAPE independent estimates of savings for MYP contract awards. Table 3 identifies the program name and acronym, the responsible Component, the CAPE supporting cost estimate of MYP savings, and the event being supported.

Table 3. Cost Analyses in FY 2018 for Multi-Year Procurement Contract Awards

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
C-130J Hercules Transport Aircraft/KC-130J Transport Aircraft	C-130J/ KC-130J	Air Force/ Navy	CAPE Preliminary Estimate of Savings for MYP Contract	12-Mar-18	DoD Request for MYP Authority	20-Apr-18
Standard Missile-3 Block IB	SM-3 Block IB	Missile Defense Agency	CAPE Preliminary Estimate of Savings for MYP Contract	30-Mar-18	DoD Request for MYP Authority	20-Apr-18
V-22 Osprey Advanced Vertical Lift Aircraft	V-22	Navy	CAPE Updated Estimate of Savings for MYP Contract	7-May-18	MYP Contract Award	25-Jul-18
Standard Missile-6 Block I /Block IA	SM-6 Block I /Block IA	Navy	CAPE Preliminary Estimate of Savings for MYP Contract	11-Jul-18	DoD Request for MYP Authority	3-Aug-18
F/A-18 E/F Naval Strike Fighter	F/A-18E/F	Navy	CAPE Preliminary Estimate of Savings for MYP Contract	12-Jul-18	DoD Request for MYP Authority	3-Aug-18
E-2D Advanced Hawkeye Aircraft	E-2D AHE	Navy	CAPE Preliminary Estimate of Savings for MYP Contract	13-Jul-18	DoD Request for MYP Authority	3-Aug-18
DDG 51 Arleigh Burke Class Guided Missile Destroyer	DDG 51	Navy	CAPE Updated Estimate of Savings for MYP Contract	9-Aug-18	MYP Contract Award	28-Sep-18

In FY 2018, CAPE completed seven analyses supporting MYP. In five cases (C-130J/KC-130J, SM-3, SM-6, F/A-18 E/F, and E-2D AHE), CAPE completed preliminary estimates of savings to support the DoD MYP proposal contained in the FY 2019 President's Budget request. Approval for these five cases was provided by the Congress in the National Defense Authorization Act and the Department of Defense Appropriations Act for FY 2019. In the two other cases (V-22 and DDG 51), CAPE completed an updated estimate of MYP savings prior to the award of the final contract.

CAPE estimates that the use of MYP for these seven programs will provide significant savings to DoD. For the four aircraft programs, the preliminary CAPE forecast is that the estimated percentage savings will range from 6 percent to 12 percent. For the two missile programs, the estimated percentage savings will be 10 percent. For the one ship program, the estimated percentage savings will be 7 percent. For the seven programs combined, the estimated total dollar savings is roughly \$2.8 billion in then-year dollars.

Critical Unit Cost (Nunn-McCurdy) Breaches

There was one certification decision associated with a critical unit cost (Nunn-McCurdy) breach in FY 2018. Table 4 identifies the program name and acronym, the responsible Component, the supporting cost estimate(s) or analyses presented to the USD(A&S), and the date of the critical breach certification.

Descriptions of unit cost (Nunn-McCurdy) reporting and the certification process associated with unit cost breaches are provided in Appendix B.

Table 4. Nunn-McCurdy Critical Unit Cost Breach Certifications in FY 2018

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Integrated Defensive Electronic Countermeasures	IDECM	Navy	CAPE Acquisition Cost Estimate	1-May-18	Critical Unit-Cost Breach Certification	28-May-18
			December 2017 Selected Acquisition Report (SAR)	15-Feb-18		

Remarks about Specific Programs

- The breach for IDECM is due to a technicality in its unit cost reporting. One variant (IDECM Block 3) consists of the ALE-55 Fiber Optic Towed Decoy, which is an expendable. However, the FY 2019 President’s Budget proposed to replace the ALE-55 with a new Dual Band Decoy, which is not part of the IDECM program, beginning in FY 2022. This led to a 69 percent decrease in quantity for the ALE-55 expendable decoys, resulting in a unit cost breach for IDECM due to the reduction in planned procurement quantities. The CAPE analysis supporting the program certification found that if the IDECM unit cost reporting had only included those expendables required to support Initial Operational Capability (IOC), as is the norm for other Navy programs with countermeasure expendables, there would have been no unit cost breach for the IDECM program.

Note that the CAPE cost estimate supporting a unit cost breach certification is limited in scope to program acquisition (development and procurement) costs, and excludes O&S and disposal costs.

Assessment of Compliance, Quality, and Differences in Methodology

Compliance with Policy and Procedures

All of the events noted in Table 1 through Table 4 were supported by the appropriate cost estimates or analyses that complied with the requirements of statute and the established cost assessment procedures described in Chapter II. In particular, each MDAP milestone or other acquisition review decision (noted in Tables 1 and 2) was supported by (1) a CCP and (2) the appropriate CAPE or military department cost agency ICE. In addition, CAPE provided an independent estimate of cost savings associated with each proposed MYP strategy or MYP contract award. Information about the compliance of CSDR data reporting is provided in Appendix D.

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. As noted in Chapter II, DoD has instituted a policy—in place since 2009 for all MDAPs—requiring that a signed, dated Component Cost Estimate and a CCP be delivered to CAPE prior to delivery of an ICE, to support each milestone or other DAB review. Also, the military department’s financial and acquisition leadership must provide a statement affirming their commitment to fully fund the program to the CCP during the preparation of the next Program Objective Memorandum (POM) and President’s Budget FYDP.

The quality of the cost estimates for MDAPs provided by the military departments, as well as CAPE, has also continued to improve due to better data. An increased management emphasis throughout the Department concerning the importance of cost data reporting has resulted in significant increases in the quantity and frequency of cost data reports compared to the acquisition reform era of the 1990s. Figure 1 shows the annual volume of CSDR data reports for each of the major system commodities.

CSDR Data Collection Over Time

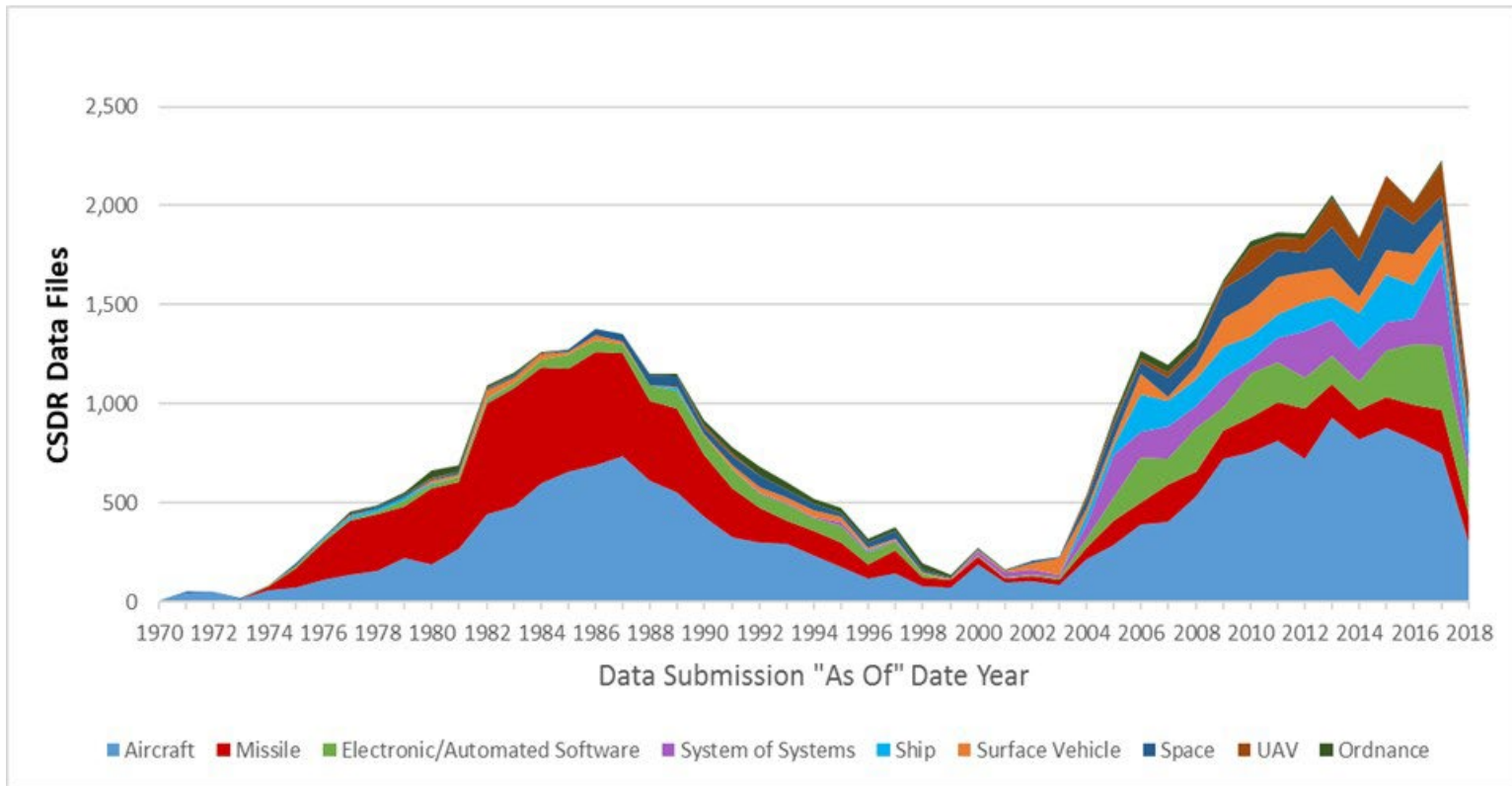


Figure 1. CSDR Data Collection over Time

Note that Figure 1 shows the CSDR reporting based on the “as of” the data, not the submission date. For example, a report with an as of date of December 2018 will typically be submitted in February 2019. As a result, the last year of the Figure has an apparent drop-off in reporting, since not all of the 2018 reports have been submitted by the time of the publication date of this Annual Report.

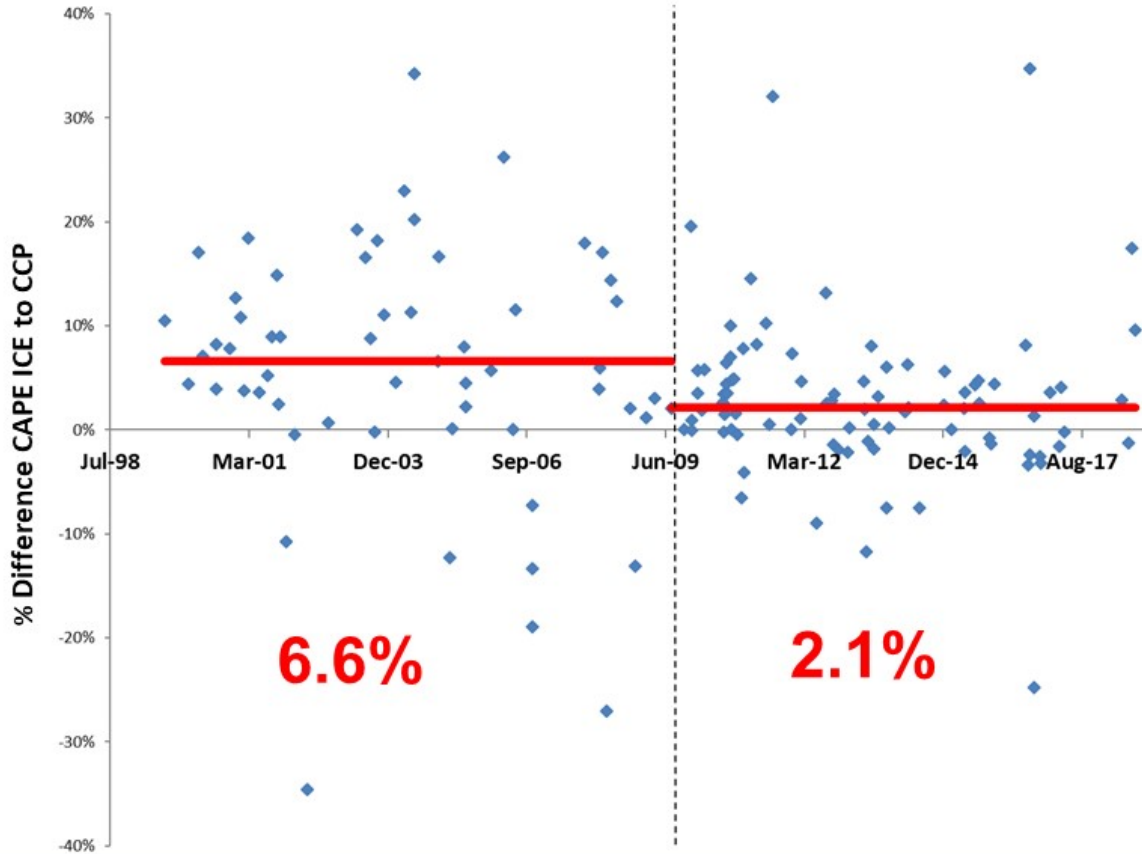
The emphasis on better data is not limited to the volume of reports. Additional ongoing efforts to improve the content and quality of the specific data reports are described in Chapter IV.

Differences in Methodology

Since enactment of WSARA, differences in methodology or approach between the cost estimates prepared by the military departments and by CAPE have decreased over time. Generally, the approaches employed by the military departments and CAPE now follow similar best practices in cost estimation: 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 DoD organizations, which has resulted in smaller differences between the cost and schedule forecasts of the military departments and CAPE.

A CAPE analysis compared the CAPE ICEs and the CCPs, and found that the difference between the two estimates since the enactment of WSARA in 2009 has narrowed significantly relative to the previous period between 1999 and the enactment of WSARA. The most recent results of this comparison are shown in Figure 2.

Difference Between CAPE ICE and CCP



Median difference between estimates has decreased since WSARA of 2009

Observations include Army, Air Force, Navy, Marine Corps and Joint programs

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

The median difference since enactment of WSARA is 2.1 percent, compared to a median difference of 6.6 percent for the previous period. In addition, the statistical variances have also significantly narrowed, meaning that the post-WSARA estimates are more tightly clustered, thus reflecting that the CCPs and CAPE ICEs are now more closely aligned. Despite this narrowing of differences, there have been a few outliers where there was a significant discrepancy (greater than 10 percent) between the CCP and the CAPE ICE. 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 in the future as the program goes forward.

Acquisition Program Cost Performance

Regarding actual cost growth, one simplistic measure of acquisition program cost performance is the annual rate of Nunn-McCurdy unit cost breaches that have occurred over time. The number of significant and critical breaches by Selected Acquisition Report (SAR) reporting year from 1997 to 2018 is displayed in Figure 3.

Nunn-McCurdy Breaches (1997-2018)

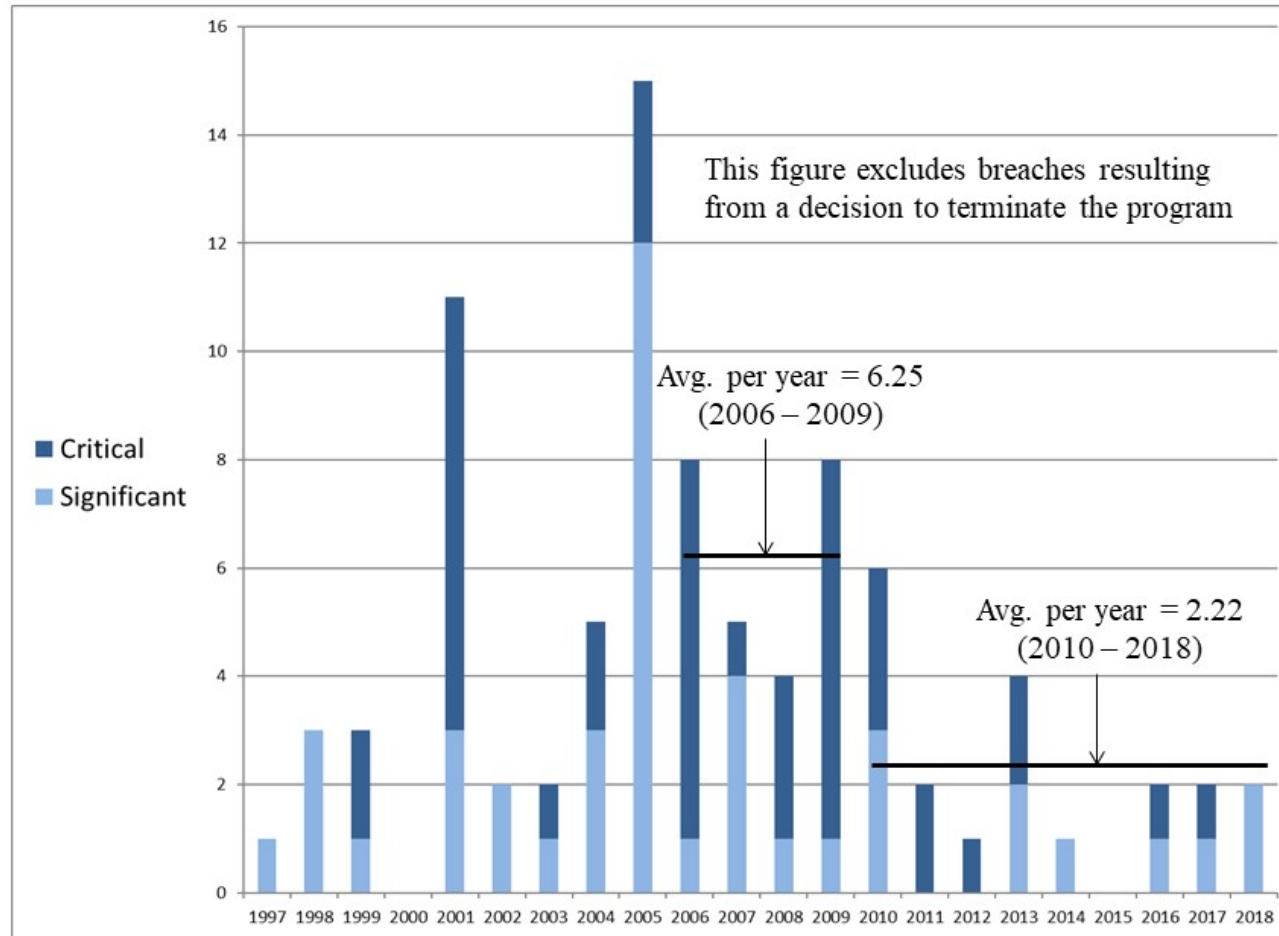


Figure 3. Number of Nunn-McCurdy Breaches by SAR Reporting Year

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.

Note that Figure 3 includes the count of critical unit-cost breaches that have occurred in each SAR reporting year (normally ending in December). These counts are not the same as the number of critical unit-cost certifications provided in Table 4 of this Annual Report each fiscal year. Due to process lag for the certification process, the breaches in each year are typically certified in the next year. For example, the IDECM breach was declared in December 2017, but was certified in May 2018.

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 previous 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 US MYP contracts, and forecasting the effects on contractor business bases and rates. For example, a significant portion of the MYP savings for aircraft programs resulted from higher FMS after a US MYP contract award. Nevertheless, assessing the implications of FMS provides a better understanding of the complete costs for the United States. CAPE is now evaluating how to improve the cost community tools, methods, and policies for cases involving FMS.

This year, actual or potential FMS was a consideration in cost estimates for the F-35 Block Buy, and the E-2D AHE, JAGM, V-22, and C-130J programs.

Other Cost Assessment Activities

Other Cost Estimates and Analyses

CAPE conducted an important cost analysis associated with naval nuclear propulsion. The Naval Nuclear Propulsion Program (NNPP) is managed by the NNSA within the DOE. The NNPP has total responsibility for all aspects of the Navy's nuclear propulsion, including research, design, construction, testing, operations, maintenance, and disposition of naval nuclear fuel. In particular, the NNPP is responsible for the handling and disposition of the naval spent nuclear fuel removed from naval ships and other platforms. The NNPP is currently managing a major construction project, known as the Spent Fuel Handling Recapitalization Project (SFHP), that will modernize the infrastructure that processes aircraft carrier spent nuclear fuel modules for shipment to a long-term storage facility. In late 2014, OMB requested that CAPE provide an ICE of the SFHP before the program baseline is set. In September 2018, CAPE provided the Director of the NNPP with an ICE, as well as a review and assessment of the NNPP cost estimate, for the SFHP. This analysis was provided in support of decisions to approve the program baseline and start construction of the project.

CAPE supported a USD(A&S) certification to the Congress concerning NNSA options for plutonium pit production. A plutonium pit is the core of each weapon in the nuclear stockpile. Section 3141 (Plutonium Capabilities) of the National Defense Authorization Act for FY 2018 required the NNSA Administrator for Nuclear Security to submit to the congressional defense committees a report on the recommended alternative endorsed by the Administrator for recapitalization of plutonium science and production capabilities. Section 3141 also required the USD(A&S), as Chair of the Nuclear Weapons Council, to certify, among other things, that the alternative selected by the Administrator can be acceptably reconciled with any differences in alternatives assessed by a previous CAPE study (a business case analysis of plutonium pit production capability issued in 2013). The Nuclear Weapons Council is a joint DoD-DOE board that provides policy guidance and oversight of the nuclear weapons stockpile management process. CAPE completed the reconciliation in support of the USD(A&S) certification letter provided to Congress in May 2018.

CAPE also conducted a business case analysis regarding the industrial base for ammonium perchlorate. Ammonium perchlorate is used in the making of solid fuel rocket propellants with important military and space launch applications. For more than 50 years, there has been a single domestic supplier for this commodity. However, since the 1990's, the demand for ammonium perchlorate from DoD and NASA has decreased significantly. As a result, the price per pound for ammonium perchlorate has increased significantly, raising concerns about the industrial base. The House Armed Services Committee report that accompanied the National Defense Authorization Act for FY 2017 mandated that the Director, CAPE develop a business case analysis to assess the costs and benefits of government options to ensure a robust domestic industrial base for ammonium perchlorate. In response, CAPE conducted an analysis of short-term options that addressed issues with the current supplier, and long-term options that included the establishment of a second source, or the purchase of the current supplier to establish a government-owned, contractor-operated business operation. CAPE, in partnership with OSD Manufacturing and Industrial Policy, provided briefings on its analysis to House Armed Services Committee staff in March 2018 and to Senate Armed Services Committee staff in June 2018.

CAPE prepared an ICE in January 2018 for the Standard Missile-3 (SM-3) Block 1B. The SM-3 is a part of the Aegis Ballistic Missile Defense. The Block 1B upgrade provides improved capability to defend against medium-range missiles and some intermediate-range ballistic missiles. The SM-3 Block 1B is a Missile Defense Agency program not subject to the oversight process for MDAPs. The CAPE ICE was provided to an oversight body known as the Missile Defense Executive Board chaired by USD(A&S) in support of a full-rate production decision.

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.

CAPE held the 49th DoDCAS on September 26-27 2018 at DAU in Fort Belvoir, Virginia. The theme was Section 804 and Rapid Acquisition. Section 804 refers to a provision in the National Defense Authorization Act for FY 2016 that is intended to enable more rapid fielding of systems with innovative technologies based on new authorities for advanced demonstrations and prototypes. Section 804 also provides new authorities for the rapid fielding of new or upgraded systems with minimal development. The main speakers were USD(A&S) and senior acquisition officials from the military departments who provided their perspectives on the acquisition changes underway and planned for the future. In addition, speakers from CAPE described a new initiative to establish cost data reporting for these rapid prototyping and rapid fielding programs. This initiative is described in Chapter IV. DAU was able to broadcast the events of this DoDCAS to seven locations throughout the continental United States, including key product development and support centers in the military departments.

CAPE is now making plans for the next DoDCAS event, which will be its 50th one, to be held in 2019 or early 2020.

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CHAPTER IV. THE LOOK FORWARD

CAPE has worked with the military department cost agencies and other organizations to strengthen the institutions of the DoD cost community. However, work continues in meeting new legislative requirements and the evolving needs of the Department. This chapter discusses the status and future plans for several key initiatives that comprise this reform effort.

Cost Leadership Forum

The CAPE Deputy Director for Cost Assessment has established periodic meetings (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 of these meetings 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 agreed-to strategic objectives, improving cost analysis, and improving business processes to deal with the challenges of the current constrained resource environment facing the cost community.

The Cost Leadership Forum will continue to meet periodically and provide executive oversight for the initiatives discussed in this chapter. In particular, the leaders of the military department cost agencies serve as the Board of Directors for the CADE project and associated cost data systems. The CADE Board of Directors meets at least monthly.

Policies and Procedures

The various guidance documents that were completed and issued concerning cost assessment policy and procedures were described in Chapter II. More recently, there have been further efforts to make additions and improvements to the DoD guidance for cost estimating and cost data collection. CAPE issued a policy memo on the subject of “DoD Cost Analysis Data Improvement” to the military departments in January 2017. This policy memo provided several updates to current DoD policies regarding improvements to cost data collection in DoD. The details for each update are discussed later in this chapter. Another policy memo issued in February 2018 concerning the CSDR Business Data Report is also discussed later in this chapter.

Policies and procedures are also being updated to respond to recent legislative changes. The National Defense Authorization Acts for FY 2016, FY 2017, FY 2018, and FY 2019 made significant changes to acquisition policy and statutory requirements. The specific provisions affecting cost analysis and cost data collection are discussed in Appendix C. These legislative changes have been assessed by USD(A&S) and CAPE to determine the appropriate revisions that will need to be incorporated into DoDI 5000.02, *Operation of the Defense Acquisition System*, and DoDI 5000.73, *Cost Analysis Guidance and Procedures*. In most cases, the Department has provided interim guidance for these provisions pending updates to the two Instructions. In particular, CAPE issued a policy memo in August 2018 concerning cost data reporting for rapid prototyping and rapid fielding programs executed under the Middle Tier acquisition authorities granted by the Congress in 2016. CAPE also issued a policy memo in January 2019 concerning cost data collection for acquisition programs below the dollar threshold for an MDAP.

Both of these policy memos, which are implementing specific legislative provisions, are discussed later in this chapter. Work on the next update to DoDI 5000.73 will begin in April 2019.

Cost Assessment Data Enterprise

CAPE has partnered with the military department cost agencies and USD(A&S) staff to implement 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. CADE provides immediate analyst access to the complete range of available cost and related data, including CSDR and EVM reports. CAPE has also worked with USD(A&S) 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 also includes a document repository to house ICEs, CCPs, DAB and Overarching Integrated Product Team briefings, and Full Funding Certification memoranda. These documents are stored in the portion of the CADE library accessible only to government personnel.

CADE not only stores authoritative cost, acquisition, and technical data; it also provides the analyst with a modern data warehouse environment where the data are easily searched and displayed in an integrated web-based application. CADE increases the productivity of analysts and supports a more proactive role for cost analysis in supporting acquisition program decisions. 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.

There are currently over 3,000 CADE account holders. Roughly one fourth of these account holders are data reporting contractors in industry, and roughly three fourths of the account holders are government and support contractor personnel.

Current efforts to incorporate training and education concerning CADE and its functionality into the curriculum at DAU and other educational institutions are discussed later in this chapter.

Cost Analysis Requirements Description Update

As described in Chapter II, the CARD establishes the formal program definition that is used as the basis for cost estimates. Until recently, the CARD was a lengthy narrative document and its preparation was a significant burden on program management offices. To remedy this, a new CARD format was developed that now uses a shorter narrative document augmented by a data template for the collection of most technical data (such as programmatic information and design and performance parameters). In the revised CARD, the remaining narrative, excluding tables and figures, should be approximately 20 pages in length, a significant reduction from its earlier format. The technical data are now provided through standardized spreadsheet templates (known as CARD tables) specific to each weapon system commodity type (such as aircraft, ships, and missiles). In addition, CARDS are now required to be updated annually in support of program and budget reviews, not just at acquisition milestone reviews. In this way, as a program changes, the definition of program content in the CARD is kept current. The burden of annual CARD preparation is minimized by allowing program management offices to provide annual updates through revision of only the program parameters that have changed from the previous submission. CARDS for milestone reviews began using the new format in September 2017, and annual CARDS began using the new format

in October 2017. CARDS are now stored electronically by CAPE on the CADE website and are available to CADE users.

Additional information about the CARD is available on the CADE public website <https://cade.osd.mil/policy/card>. The website also provides links to the current “Guidelines for the Preparation and Maintenance of the Cost Analysis Requirements Description (Narrative)” and “Guidelines for the Preparation and Maintenance of CARD Tables.”

Enhanced Cost Data Collection

Over the past few years, as noted in Chapter III, CAPE has made considerable progress in restoring systematic cost data collection that had been diminished in the 1990s. However, 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 have established several related working groups supporting various initiatives to improve the quality of data collection and reporting and increase efficiency through better business processes. The specific initiatives to improve cost data collection are described in the remainder of this section.

Current efforts to incorporate training and education concerning cost data collection into the curriculum at DAU and other educational institutions are discussed later in this chapter.

Cost Data Reporting for Middle Tier Acquisition Programs

Section 804 of the National Defense Authorization Act for FY 2016 provided the Department with new authority to establish a “middle tier” of acquisition programs that are intended to be completed within five years. To implement this provision, USD(A&S) issued a memo providing interim authority and guidance for middle tier acquisition in April 2018, and issued a second memo providing interim governance for middle tier acquisition in October 2018.

Middle tier programs fall between “rapid acquisitions” that are generally completed within six months to two years, and “traditional” acquisition programs that last much longer than five years. The middle tier acquisition process provides two possible acquisition pathways: (1) rapid prototyping (prototypes with innovative technologies), and (2) rapid fielding (new or upgraded systems with minimal development). Programs in this middle tier are to follow streamlined procedures, and are to be exempt from the traditional requirements and acquisition processes. Section 804 also requires that the USD(A&S) guidance for middle tier acquisition establish a process for transitioning successful prototypes to programs for production and fielding under the rapid fielding pathway or the traditional acquisition process.

CAPE established cost data reporting requirements for these middle tier acquisition programs in a policy memo issued in August 2018. Cost data reporting is required for all middle tier acquisition programs with total estimated acquisition expenditures greater than \$100 million. The CAPE Deputy Director of Cost Assessment is responsible for approval of cost data collection plans for covered programs that are projected to require an eventual expenditure greater than or equal to the dollar thresholds for an MDAP².

² An MDAP is a program with expenditures expected to exceed \$480 million (FY 2014 constant dollars) for research, development, test and evaluation, or \$2.79 billion (FY 2014 constant dollars) for procurement.

The cognizant military department cost agency director is responsible for approval of cost data collection plans for covered programs expected to require expenditures below these thresholds. The cost data reporting for middle tier acquisition programs shall use the current CSDR plans and report formats, subject to tailoring on a case-by-case basis. Middle tier acquisition programs may also apply for a waiver from cost data reporting for circumstances where the burdens of cost reporting outweigh the benefits of cost data that would be useful in the preparation of cost estimates. A waiver request is subject to the approval of the CAPE Deputy Director of Cost Assessment. The August 2018 CAPE policy memo is available on the CADE public website at <https://cade.osd.mil/policy/nonacat1>.

Five cost data reporting plans for middle tier programs have been approved by CAPE as of October 2018. Plans for another 15 programs are in development and expected to be approved in FY 2019.

Cost Data Reporting for Programs Below MDAP Dollar Thresholds

Section 842 of the National Defense Authorization Act for FY 2017 required the Director, CAPE to develop policies, procedures, guidance, and a collection method to ensure that quality acquisition cost data is collected for each acquisition program with expenditures greater than \$100 million. This legislation has the effect to expand cost data reporting to acquisition programs below the dollar thresholds for an MDAP. These programs are known as Acquisition Category (ACAT) II, III, or IV.

CAPE issued a policy memo in February 2018 to address the requirement for cost data collection and reporting in Section 842. CAPE established a working group with members from the military departments and defense agencies to create a reporting mechanism for these programs. To better inform the development of sound policies and procedures, the military departments proposed 26 pilot programs for experimentation with cost data collection from contractors for a cross-section of ACAT II/III/IV programs. The reporting in calendar 2018 was limited to the pilot programs, and reporting for other ACAT II/III/IV programs was waived during this time. Based on the experience of these pilot programs, the working group developed recommendations for data collection and reporting procedures that could be implemented for all ACAT II/III/IV programs in the future.

Based on the working group recommendations, CAPE issued a second policy memo in January 2019 to address the implementation of the Section 842 legislative requirements. CSDR reporting was extended to most ACAT II programs, and approval of the cost data reporting plan for ACAT II programs was delegated to the cognizant military department cost agency director. This extension of CSDR was not retroactive to ACAT II programs with a planned final Request for Proposal (RFP) release prior to March 2019. In addition, CSDR requirements for certain specific ACAT II programs were waived based on military department requests. For ACAT III and IV programs not identified as pilots in the February 2018 CAPE policy memo, the waiver for cost data reporting has been extended indefinitely. The experience from these pilot programs will be used to reassess this waiver, and, if appropriate, be used to inform a DoD legislative proposal to adjust the statutory criteria for cost data reporting.

Both the February 2018 and the January 2019 policy memos are available on the CADE public website at <https://cade.osd.mil/policy/nonacta1>.

FlexFiles Initiative

Today cost data are collected in the many forms of the legacy CSDR report formats, similar to those first created in the 1960s. Some 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 submissions by working with industry to enable the submission of low-level cost data from contractors' accounting systems. This transformation, which is the next generation of cost data collection, should improve data quality, reporting compliance and timeliness, and in many cases reduce the reporting burden on contractors. It also provides the analysts with more flexibility in using the data in cost estimates. This initiative is known in the cost community as FlexFiles.

The FlexFiles concept has been developed and refined through a series of 22 pilot programs with industry from 2014 to 2017. The gradual phase-in of FlexFiles cost reporting has now begun on new contracts. The CADE team will be offering training on FlexFiles to the reporting contractors.

Additional information on the FlexFile initiative and the new Quantity data report is available on the CADE public website at <https://cade.osd.mil/policy/flexfile>.

Improved CSDR Planning

A CSDR plan is submitted for approval prior to the release date of an RFP for each contract meeting the CSDR reporting requirements. Each plan specifies the required reports and submission frequency for the major contracts and subcontracts. The Air Force has led a collaborative effort to develop formal standards for CSDR plans that provide a template of the reporting structure for each weapon system commodity type (such as aircraft, electronic system, or missile). To date, the Air Force led effort has developed 18 standard plans. In addition, the Army developed a standard plan for ground vehicle systems. Plans for sea systems and unmanned maritime systems are now being developed by the Navy. These standards provide consistency in data reporting across programs within a commodity type, and provide better communication of government expectations to industry. The use of the standard plans also reduces the burden on program offices and cost analysis organizations, since they no longer have to construct a plan from scratch for each new program. These plans are now being incorporated into CSDR reporting for all of DoD. The standard plans are subject to tailoring approved by the Cost Working-group Integrated Product Team (CWIPT), a team consisting of appropriate stakeholders for the program. In 2018, the Air Force led an initiative to update the original 2016 standard plans based on the update to MIL-STD-881D, *Work Breakdown Structures for Defense Materiel Items*, which was published in April 2018, and collected lessons learned and best practices. The standard plans are available on the CADE public website at <https://cade.osd.mil/policy/csdr-plan>.

Technical Data

Cost analysts often need technical data (e.g., design and performance parameters) for legacy and new systems to make adjustments for complexity or to develop cost estimating relationships used in estimates. To address this need, another working group (the Technical Data Working Group) was formed with representatives from CAPE, the military department cost agencies, and the systems engineering and sustainment organizations in OSD. This collaboration ensures that the parameters, definitions, and

collection methodologies proposed for technical data reporting are consistent with DoD and industry norms.

The working group has developed standardized data template formats that specify the universe of technical parameters that can be collected for each weapon system commodity type (such as aircraft, ships, and missiles) and defines each parameter consistent with systems engineering practices, military standards, and industry guidelines. An initial version of the candidate technical parameters was developed in 2016. These parameters have been used in a series of pilot programs (including the Weather System Follow-On Microwave, the Ground Based Strategic Deterrent, and the Global Position System III Follow-On Production). This experience was used to refine the list of technical parameters in 2018.

The resulting data templates serve as the basis of a new report called the Technical Data Report that will be added to CSDR reporting on some contracts in the near future. The specific design of the Technical Data Report will be determined by the CWIPT as part of the CSDR planning process. Not all of the candidate technical parameters will be incorporated into the Technical Data Report; if some of the desired technical parameters are provided by the contractor in other data deliverable items, the CWIPT will work with the reporting contractor to determine those parameters that will be incorporated into the Technical Data Report and those that can be obtained from other sources that will be referenced in the Technical Data Report.

Consistent vocabulary associated with technical parameters (i.e., parameter names, definitions, and units of measure) is used in both the Technical Data Report (which is submitted by the reporting contractor) and the CARD (which is submitted by the program office) described earlier. As a result, the program office can elect to populate the technical parameters in its annual CARD submission with data from the contractor Technical Data Report, or from other sources as appropriate.

Additional information on Technical Data Reporting can be found on the CADE public website at <https://cade.osd.mil/policy/techdata>.

Cost Data Reporting for Sustainment Contracts

Section 832 (Assessment, Management and Control of Operating and Support Costs for Major Weapon Systems) of the National Defense Authorization Act for FY 2012 directed that the Director, CAPE will establish standard requirements for the collection and reporting of data on O&S costs in an appropriate format for major weapon systems by contractors performing weapon system sustainment functions, and develop contract clauses to ensure that contractors comply with such requirements. As noted earlier, this provision was recently codified into statute (10 U.S.C. 2337a).

CAPE extended CSDR data collection to apply to major weapon system sustainment contracts and subcontracts above specified dollar thresholds in 2012. Since then, CAPE has continued to improve the collection and reporting of contractor actual costs for major sustainment, logistics, and maintenance contracts.

This reporting is important because the military department VAMOSOC systems (described in Appendix D) provide limited visibility into actual costs when a weapon system is sustained through a Contractor Logistics Support (CLS) contract or a similar arrangement. The VAMOSOC systems may in some cases collect and display CLS costs in aggregate, but without providing any details by cost element,

such as depot maintenance or sustaining engineering. With the reporting of actual sustainment costs, these data will support analyses of alternative sustainment strategies. These data will also be used in the development of cost estimating relationships for O&S cost elements.

The first cost data report for sustainment was approved in May 2012 and became effective at that time. This summary report collects and displays contractor costs by CAPE O&S cost element. A second, and more detailed cost data report (known as the Functional Cost-Hour Report) was approved in September 2015. This report, for selected high-cost elements, provides visibility into labor and material for a specific cost element by functional category (such as touch maintenance labor hours or purchased parts dollars). These reports are now required on major sustainment contracts and subcontracts worth more than \$50 million.

Additional information on CSDR sustainment data can be found on the CADE public website at <https://cade.osd.mil/policy/sustainment>.

An additional data report known as the Maintenance and Repair Parts Data Report has been developed to collect detailed cost and technical data for maintenance events and repair parts, similar to the data already collected by maintenance data collection systems for major weapon systems supported under organic maintenance. This report will collect for each maintenance event (1) maintenance data, such as reason for failure, maintenance type, and labor hours; and (2) repair data, such as the name and repair or replacement cost of the repair part. A draft of this report was prepared in February 2017 and circulated to government organizations and industry for comment. The latest version was completed in November 2017 and is now available to be placed on certain sustainment contracts in the future. A Maintenance and Repair Parts Data Report will be requested when a significant portion of the cost of a sustainment contract is due largely to parts-related maintenance activities such as supply chain management, heavy maintenance, recurring spares, or repairs.

Additional information on the maintenance and repair reports can be found on the CADE public website at <https://cade.osd.mil/policy/maintandrepair>.

Data Collection on Indefinite Delivery/Indefinite Quantity Contracts

One of the most problematic data gaps facing the DoD cost community has been the lack of systematic cost data collection for modernization upgrade and sustainment efforts on major platforms using certain contracting strategies. Specifically, such efforts may use a certain type of contract arrangement known as an Indefinite Delivery/Indefinite Quantity (IDIQ) or other similar arrangement such as a Basic Ordering Agreement. These arrangements are used to expedite contracting for supplies and services when specific quantities and prices are not known at the time of the award of the arrangement. As the requirements are established, the government places delivery orders (for supplies) and task orders (for services) against the basic arrangement for each discrete requirement. Before 2017, cost data reporting had not been consistently imposed on these arrangements, even though individual delivery orders or task orders, or the aggregate of several delivery orders and task orders, may exceed CSDR reporting thresholds.

To remedy this, for contractors with modern financial systems capable of producing CSDRs, CAPE now requires the collection of cost and software data on delivery/task orders on IDIQ contracts that directly support an MDAP or ACAT II program where individually, or in the aggregate, the value of the delivery/task order(s) related to the system being supported is likely to exceed existing CSDR threshold

figures over the life of the IDIQ arrangement. These data will be collected in accordance with established CSDR policies, procedures, and report formats.

Additional information on the maintenance and repair reports can be found on the CADE public website at <https://cade.osd.mil/policy/idiq>.

Data Collection on Government-Performed Efforts

In the past few years, CAPE and the military department cost agencies have struggled with the government-executed elements of acquisition and sustainment programs, as the lack of data on these government-performed efforts impedes accurate compilation of total program costs. One of the roadblocks preventing the collection of government cost and software data has been the lack of modern financial systems employed by the government. With the advent of new government financial systems, the only remaining impediment is a lack of specific policy. Therefore, as the government implements modern financial systems in its organizations (such as laboratories, public shipyards, government-owned plants, and depots), CAPE now requires government-performed efforts that meet CSDR thresholds to collect and submit cost and software data following the processes outlined in established CSDR policies, procedures, and report formats. It is expected that the CSDR provisions will be incorporated into a memorandum of agreement or similar document between government organizations in lieu of a contract.

CAPE is currently receiving CSDR reports from the Anniston Army Depot for their subcontract work on the M109A7 Family of Vehicles Program (formerly the Paladin Integrated Management program). CSDR planning is now being finalized for three activities at the Army Picatinny, Rock Island, and Watervliet Arsenal, which are supporting three Army acquisition programs.

Additional information on the data collection on government performed efforts can be found on the CADE public website at <https://cade.osd.mil/policy/goveffort>.

Improved Contractor Business Data Report

In the CSDR system, one of the reports is the Contractor Business Data Report (familarly referred to as the 1921-3 by the cost community). While the other CSDR reports are focused on individual programs and contracts, the Contractor Business Data Report collects more general contractor cost data stratified by direct categories (direct labor, direct material, and other direct expenses) and indirect categories (overhead, General and Administrative (G&A), and other indirect) for a company business unit.

The key point is that this report provides a firm basis for assessing contractor overhead and other indirect costs, based on the occurrence of actual indirect expenses relative to an actual defined business base, rather than as measured as a generic indirect percentage rate relative to an undefined business base.

The design of the Contractor Business Data Report used during the period from 2009 to 2015 was based on government-defined categories for direct and indirect expenses. By 2015, actual experience with the report was that each contractor defines direct/indirect differently. The contractor categories typically do not have a simple cross-walk to the government categories, so the Contractor Business Data Report format was forcing contractors to map their expenses to the government categories where this mapping was artificial, somewhat arbitrary, and obfuscated important business base information. In addition, this mapping was not readily visible to the government users of the report.

To remedy this situation, CAPE developed a new draft Contractor Business Data Report format and instructions to reporting contractors in February 2018. The new draft report can be submitted in the contractor's own format and rate structure. This new report will be more useful to the cost community, and will be more applicable to the contract cost and price communities, since the new format aligns with contractor proposals, Defense Contract Management Agency Forward Pricing Rate Proposals, Forward Pricing Rate Agreements, and Defense Contract Audit Agency audits. At this time, contractors can choose whether to use the previous Contractor Business Data Report with the government-defined categories, or use the new draft Contractor Business Data Report, for their next report submission.

A sample format, draft reporting instructions, and other information on the new Contractor Business Data Report can be found on the CADE public website at <https://cade.osd.mil/policy/1921-3>.

Cost Reporting for Missile Defense Agency Programs

CAPE is also now working with the Missile Defense Agency to establish cost data collection for missile defense programs. Although these programs are exempt from DoDI 5000.02, *Operation of the Defense Acquisition System*, the Agency nevertheless has instituted a policy to collect CSDR data for its high-cost programs. For such programs, the CSDR plans are subject to approval by CAPE.

Contracts Price Database

CADE hosts not only cost data reports, but also contract data as well. Over the past decade, the military department cost agencies have funded the development of a Contracts Price and Schedule Database. Now containing more than \$500 million 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 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, and to work with DoD academic institutions to reach these standards.

Academic Degree Programs in Cost Analysis

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), which began in April 2011. This two-year, distance-learning program is a vital element of the education of the cost estimating community and contributes to the 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 sponsored by a government organization in the cost community. Tuition may be paid through the use of the Defense Acquisition Workforce Development Fund.

The Air Force has established its own master's degree program in Cost Analysis 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 in cost estimating within the financial management field at the base, major command, and higher levels.

Enhanced Training and Education

CAPE, in partnership with USD(A&S), now co-chairs the oversight group responsible for approval of the curriculum associated with DAU and other courses leading to professional certification in Business Cost Estimating, as established by the Defense Acquisition Workforce Improvement Act (DAWIA). Initially, the working group developed a framework of desired core competencies—for apprentice, mid-level, and senior cost analysts—that are now used to guide education and training standards for course content. The working group has also worked with DAU to review the entire curriculum and course content and to ensure that the desired core competencies are being addressed.

In FY 2018, CAPE continued reviewing the DAU curriculum in Cost Estimating and also partnered with the DAU Contract Pricing faculty to review the core Cost and Price Analysis curriculum. For Cost Estimating, CAPE reviewed two core courses and four continuous learning modules (CLMs). For Cost and Price Analysis, CAPE reviewed two core courses and three CLMs. In addition, for Program Management, CAPE reviewed one course and five CLMs in program management tools (cost estimating, EVM, Work Breakdown Structure (WBS), scheduling, and risk management). The review in 2018 provided a total of more than 2,700 comments and suggestions.

In addition, education and training specific to CADE, the utility of its data, and its functionality are now being developed for incorporation into the curricula at DAU, NPS, and AFIT. CAPE stood up and maintains a training system known as the Functional Academic Cost Assessment Data Enterprise, or FACADE (pronounced “fake-CADE”). FACADE has all the same functionality as the CADE portal but is populated with 10 non-proprietary data sets for notional programs representative of actual DoD acquisition programs. Training with the FACADE system supports the teaching of analytic cost assessment techniques using practical, real-world examples, while simultaneously supporting the teaching of navigation and the use of CADE, CSDR data, related acquisition data, and the CADE library. In FY 2018, the number of FACADE registrants increased to over 800 analysts.

CAPE has stood up a dedicated CADE training team. In FY 2018, the team provided 38 training and outreach activities. These activities consisted of regional trainings, outreach events to government and

professional organizations, company-specific engagements with industry, and the CADE Focus Group meeting attended by 171 users and stakeholders from the CADE community. Over the course of these training and outreach events, the team engaged with more than 1,300 cost, program management, and contracting personnel in government and industry. The team has fully incorporated modern analytical survey software into all training activities to assess the effectiveness of the training. The team also uses audience-participation polling software to provide live interaction between the trainers and the audience.

In FY 2018, CAPE stood up an online CADE Bridge Learning Management System (LMS), a software application for the delivery of electronic educational technology (e-learning) courses. The LMS training material includes more than 22 how-to videos and 15 courses. By making the CADE training material available via the LMS, CAPE is able to provide on-demand training to a much broader segment of the workforce. Over 150 cost analysts completed the CADE 101 (Fundamentals of CADE) course and received credit from DAU toward DAWIA certification in Business Cost Estimating.

E-VAMOSC

There has been recent significant legislation pertaining to weapon system O&S costs and associated O&S cost data systems. Section 836 of the National Defense Authorization Act for FY 2018 establishes that the Director, CAPE shall be responsible for developing and maintaining a database on (1) operating and support estimates, (2) supporting documentation, and (3) actual operating and support costs for major weapon systems. Section 832 of the National Defense Authorization Act for FY 2019 requires the Secretary of Defense to commence implementation of each recommendation of an independent assessment conducted by the MITRE Corporation (of the extent to which sustainment matters are considered in decisions related to requirements, acquisition, cost estimating, programming and budgeting, and research and development for MDAPs). This assessment was directed by Section 844 of the National Defense Authorization Act for FY 2017. The MITRE recommendations pertaining to O&S cost data systems are for the Department to:

- Develop a common data repository for all sustainment-related data.
- Create and implement common data definitions, structure, and business rules for sustainment cost data.
- Provide a consistent, predictable funding stream for O&S cost databases, prioritizing department-wide accessibility.
- Develop a common data structure, taxonomy, and data dictionary for all three VAMOSC systems.
- Establish a common logon procedure for the VAMOSC systems and CADE.

As a result, CAPE now has a demanding statutory requirement and mandate to develop a comprehensive enterprise-wide O&S cost data system. The implementing solution will be known as the Enterprise VAMOSC (E-VAMOSC) system. CAPE has now formed a VAMOSC Data Working Group with the military departments. The vision is to collaboratively develop and enforce a common taxonomy and data definitions. E-VAMOSC will be focused on three primary goals for the O&S cost data: completeness, accuracy, and frequency. The intent is to also incorporate modern data processing, and analytical and visualization tools to improve the operational efficiencies of the cost community and drive better decisions for the Department.

Plans for the development of E-VAMOSC are now underway. Three pilot programs (the Stryker Infantry Carrier Vehicle, the Navy DDG 51 destroyer, and the Air Force F-35A fighter) will be used to establish and demonstrate preliminary concepts for the data structures, definitions, and standards. Formal development of the E-VAMOSC system will be initiated in the spring of 2019.

Operational Sustainment Reviews

10 U.S.C. 2441 (Sustainment Reviews) requires the military departments to conduct a sustainment review for an MDAP five years after declaration of IOC and throughout the system's life cycle, using availability and reliability thresholds and cost estimates as the triggers that prompt such a review.

The Army has made significant progress in addressing this legislative requirement. The Army, supported by the Army cost agency, has established a formal process known as Operational Sustainment Reviews (OSRs) for currently operational systems. The purpose of such a review is to assess the effectiveness and efficiency of the system's sustainment (or product support) strategy. This assessment includes a comparison of the system's actual O&S costs to the program baseline or other affordability targets. For those systems that are MDAPs, the Army requires an updated CARD and ICE to support the OSR. The OSR process also addresses the current system readiness relative to its availability goals. The OSR process results in recommended adjustments to program sustainment funding or the system's sustainment strategy moving forward. The Army conducted eight OSRs in FY 2018.

The Air Force has also begun its process for system post-IOC sustainment reviews. The Air Force developed guidelines, identified a process framework, and selected the Airborne Early Warning and Control System (AWACS) Block 40/45 modification as its pilot program. The Air Force cost agency developed a post-IOC sustainment ICE, and the program provided other information to comply with the guidelines and process framework. The Air Force is now preparing to follow the process for a second program in 2019.

The Department of the Navy has several programs that are undergoing post-IOC sustainment ICEs in accordance with 10 U.S.C. 2441. The statutory requirement has been folded into the Department of the Navy policy for Post-Full Rate Production Integrated Logistics Assessments. Additionally, the Navy is working towards establishing a formal process to create sustainment program baselines (SPBs), similar to acquisition program baselines (APBs), as a derivation from a recommendation from the Advisory Panel on Streamlining and Codifying Acquisition Regulations that was established by the Congress. The F/A-18E/F is the Navy's leading program for the post-IOC sustainment ICE. Post-IOC sustainment ICEs are currently underway for the MH-60R and CANES programs are currently underway as well, and the DDG 51 has been identified as the first ship program to commence a post-IOC sustainment ICE later this year. The E-2C/D program is presently in-work and serving as the pilot program for the SPB, with additional programs to be identified in late FY 2019 that will begin SPB analysis in FY 2020.

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(A&S) and the military department cost agencies—reviews each major acquisition program with significant funding changes from the latest baseline or previous 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. As noted earlier, the CARD, which includes the most recent programmatic information, is now being updated annually to support such reviews.

In 2018, in support of the program review, this MDAP cost estimate review process identified approximately \$2 billion in excess program funding that could be used for other high-priority purposes.

Summary

CAPE is continuing to develop and refine initiatives that support 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.

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Appendix A.

Cost Analysis Organizations in DoD

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 of Cost Assessment and Program Evaluation (Director, CAPE). 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) when acquisition oversight has not been delegated to a military department or Defense Agency, and reviews cost estimates and cost analyses prepared by the military departments and Defense Agencies in connection with other MDAPs. CAPE may also choose to provide an ICE for an MDAP whose acquisition authority has been delegated to a Component. The Deputy Director for Cost Assessment also 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 systems. DASA-CE conducts independent reviews and validation of business case analyses, economic analyses, and special cost studies of major weapon 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 – 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, independently reviews MDAP program office estimates, and conducts economic analyses and special studies to support Analyses of Alternatives (AoAs), Defense Business Systems, and relevant defense issues. 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.

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, nuclear, and 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 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 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 review a program office cost estimate upon the request of the Program Executive Officer (PEO)/C⁴I and Space. The Division also provides more general cost analysis support to the PEO as needed.

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, 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 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.

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 system 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 information technology 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 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, DOC has worked closely with CAPE on preparing cost estimates for Missile Defense Agency programs and responding to congressional and Missile Defense Executive Board inquiries and tasks. In addition, the Agency has established a policy to collect CSDR data for its high-cost programs. For such programs, the CSDR plans are subject to approval by CAPE.

Appendix B.

Major Defense Acquisition Program Unit Cost Reporting

Since 1982, the Congress has required the Department of Defense (DoD) to track and report on the unit cost for most Major Defense Acquisition Programs (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 10 U.S.C. 2433 (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 the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)), and determine if it should be terminated or continued. The Department is required to terminate the program unless a letter signed by USD(A&S), providing the certification that the program currently meets certain criteria established in law (10 U.S.C. 2433a), is submitted to the Congress within 60 days of the SAR submission. Among other things, USD(A&S) must certify that the Director of Cost Assessment and Program Evaluation has determined the new unit cost estimates are reasonable.

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Appendix C.

Recent Legislative Changes

The National Defense Authorization Acts for FY 2016, FY 2017, FY 2018, and FY 2019 made significant changes to acquisition and cost assessment policy and statutory requirements. These changes have been assessed by USD(A&S) and CAPE to determine the appropriate revisions that will need to be incorporated into DoD Instruction (DoDI) 5000.02, *Operation of the Defense Acquisition System*, and DoDI 5000.73, *Cost Analysis Guidance and Procedures*. In most cases, the Department has provided interim guidance for these provisions pending updates to the two instructions.

The National Defense Authorization Act for FY 2016 contains the following provisions pertaining to defense acquisition that will affect cost assessment procedures:

- Section 802 (Role of Chiefs of Staff in the Acquisition Process) enhanced the role of the military Chiefs of Staff in the defense acquisition process, and provided specific responsibilities to the Chiefs of Staff and Secretaries of the Military Departments for balancing resources against priorities on acquisition programs and ensuring appropriate trade-offs are made between cost, schedule, technical feasibility, and performance throughout the life of each acquisition program.
- Section 804 (Middle Tier of Acquisition for Rapid Prototyping and Rapid Fielding) requires USD(A&S) to issue guidance that establishes a “middle tier” of acquisition programs that are intended to be completed within five years. These programs would fall between “rapid acquisitions” that are generally completed within six months to two years, and “traditional” acquisition programs that last much longer than five years. The guidance for middle tier acquisition will address two acquisition pathways: (1) rapid prototyping (prototypes with innovative technologies), and (2) rapid fielding (new or upgraded systems with minimal development). This provision also establishes a DoD Rapid Prototyping Fund to be managed by a USD(A&S) official, who is authorized to transfer funds to the military departments using a merit-based process for selection of prototypes with innovative technologies. Programs in this middle tier are to follow streamlined procedures, and are to be exempt from the traditional requirements and acquisition processes. The USD(A&S) guidance for middle tier acquisition must establish a process for transitioning successful prototypes to new or existing programs for production and fielding under the rapid fielding pathway or the traditional acquisition process. CAPE plans for establishing cost data reporting for middle tier programs were described in Chapter IV.
- Section 815 (Amendments to Other Transaction Authority) expands DoD’s ability to use Other Transaction Authority (OTA) for certain prototype programs. OTA permits DoD to enter into transactions (other than a contract, grant, or cooperative agreement) with private organizations (that are small businesses or nontraditional defense contractors) for basic, applied, and advanced research projects. OTA transactions are exempt from many of the acquisition and contracting statutes and regulations.
- Section 825 (Designation of Milestone Decision Authority) specified that the MDA for an MDAP reaching Milestone A after October 1, 2016, shall be the SAE of the military department managing the program, unless under certain specific circumstances the Secretary of Defense may designate another official as the MDA.

The National Defense Authorization Act for FY 2017 contains the following provisions pertaining to defense acquisition that will affect cost assessment procedures:

- Section 805 (Modular Open System Approach in Development of Major Weapon Systems) requires that an MDAP that receives Milestone A or Milestone B approval after January 1, 2019 shall be designed and developed, to the maximum extent practicable, with a modular open system approach intended to enable incremental development and enhance competition, innovation, and interoperability. In the modular open system approach, weapon system platforms are developed so that the system design is partitioned into discrete modules that are self-contained functional elements. The key interfaces among the modules are based on commonly accepted industry standards. This approach therefore permits weapon system platforms to be incrementally upgraded with new components and systems with advanced technologies as they emerge with minimal impact to the host platform.
- Section 806 (Development, Prototyping and Deployment of Weapon System Components or Technology) provides the military departments with new authorities to mature and demonstrate higher risk technologies prior to initiating a formal program of record. This section also provides the military departments with new funding and acquisition flexibility to experiment with, prototype, and rapidly deploy weapon system components or other technologies.
- Section 807 (Cost, Schedule, and Performance of Major Defense Acquisition Programs) requires the Secretary of Defense, or the Deputy Secretary of Defense, to establish program cost and fielding targets for an MDAP before Milestone A, B, or C approval. The program cost targets are the procurement unit cost and sustainment cost. The program fielding target is the date for initial operational capability (IOC).
- Section 808 (Transparency in Major Defense Acquisition Programs) requires that the MDA for an MDAP shall provide the congressional defense committees with a brief summary report (or “acquisition scorecard”) no later than 15 days after granting approval at Milestone A, B, or C. The summary report provides certain information about the program pertaining to cost; schedule; and technical, manufacturing, and fielding risks. In particular, the summary report will include (1) the program cost and fielding targets described in Section 807, (2) the estimated cost and schedule of the program established by the military department concerned, and (3) the statutory independent estimate of the cost of the program, and any independent estimate for the program schedule. The summary and description of the ICE will include an assessment of the major contributors to the program acquisition unit cost and total life-cycle cost.
- Section 842 (Amendments Relating to Independent Cost Estimation and Cost Analysis) makes clarifying amendments to the existing statutes pertaining to independent cost estimation. At Milestone A, the ICE shall now include the identification and sensitivity analysis of key cost drivers that may affect life-cycle costs of the program. In addition, the ICE shall include an analysis to support decision-making that identifies and evaluates alternative courses of action that may reduce cost and risk, and result in more affordable programs and less costly systems. Also, CAPE guidance concerning cost assessment procedures for MDAPs shall establish a requirement for all cost estimates to include a discussion of risk, the potential impacts of risks on program costs, and approaches to mitigate risk. This discussion of risk will be documented in program SARs and in decision documents that approve program baselines. Section 842 also requires CAPE, in consultation with USD(A&S), to develop policies, procedures, guidance, and a

collection method to ensure that quality acquisition cost data are collected for each acquisition program with a dollar amount greater than \$100 million (which is considerably less than the dollar threshold for an MDAP), in order to facilitate cost estimation and comparison across acquisition programs. CAPE implementation of this provision was described in Chapter IV.

- Section 844 (Review and Report on Sustainment Planning in the Acquisition Process) required the Secretary of Defense to enter into a contract with an independent entity with appropriate expertise to conduct an assessment of the extent to which sustainment matters are considered in decisions related to requirements, acquisition, cost estimating, programming and budgeting, and research and development for MDAPs.
- Section 849 (Improved Life-Cycle Cost Control) makes several amendments pertaining to life-cycle cost controls of a program. In particular, the military departments are required to conduct a sustainment review for an MDAP five years after declaration of IOC and throughout the system's life cycle, using availability and reliability thresholds and cost estimates as the triggers that prompt such a review. Chapter IV described recent activities in the military departments to conduct operational sustainment reviews for selected programs.
- Section 897 (Rapid Prototyping Funds for the Military Departments) authorizes the military department secretaries to establish service-specific funds for the rapid prototyping and rapid fielding pathways established by Section 804 (Middle Tier of Acquisition for Rapid Prototyping and Rapid Fielding) of the National Defense Authorization Act for FY 2016 described earlier.
- Section 901 (Organization of the Office of the Secretary of Defense) modifies the position of USD(AT&L) by replacing this position with two new positions: the Under Secretary of Defense for Research and Engineering, and the Under Secretary of Defense for Acquisition and Sustainment. This reorganization became effective February 1, 2018.

The National Defense Authorization Act for FY 2018 contains the following provisions pertaining to defense acquisition that will affect cost assessment procedures:

- Section 833 (Role of the Chief of the Armed Force in Materiel Development Decision and Acquisition System Milestones) establishes a role for the Service Chiefs to concur with MDAP milestone approvals made by the MDA. Now, the MDA must determine that the Service Chief and Secretary of the Military Department concur with the trade-offs between cost, schedule, technical feasibility, and performance at each milestone throughout the life of the program.
- Section 836 (Codification of Requirements Pertaining to Assessment, Management, and Control of Operating and Support Costs for Major Weapon Systems) amends Title 10 U.S.C. to codify Section 832 of the National Defense Authorization Act for FY 2012. This provision mandates several ambitious requirements intended for DoD to take specific steps to improve its processes concerning cost estimating and management of major system O&S costs. In particular, the provision requires the Department to periodically update estimates of program O&S costs, and track and assess these estimates relative to previous estimates. The *CAPE Operating and Support Cost-Estimating Guide* describes how the Department has implemented this legislative provision in various DoD instructions and regulations, and provides recommended approaches and analytic methods for dealing with these legislative requirements. In addition, the provision requires that the Director, CAPE shall be responsible for developing and maintaining a database on (1)

operating and support estimates, (2) supporting documentation, and (3) actual operating and support costs for major weapon systems.

- Section 839 (Enhancements to Transparency in Test and Evaluation Processes and Data) requires senior officials in the major DoD test and evaluation organizations to jointly develop policies, procedures, guidance, and a method to collect consistent and high quality data on the full range of estimated and actual costs of development, live fire, and operational testing for MDAPs. These data shall be stored in an electronic database maintained by CAPE and made available for analysis by testing, acquisition and other analysts in DoD.
- Subtitle G (Provisions Relating to Other Transaction Authority and Prototyping) of Title VIII (Acquisition Policy, Acquisition Management, and Related Matters) contains eight sections intended to expand and improve the use of OTA for prototyping projects.
- Section 1652 (Collection, Storage, and Sharing of Data Relating to Nuclear Security Enterprise) requires DoD and the National Nuclear Security Administration (NNSA) to jointly collect and store cost, programmatic, and technical data relating to programs and projects of the nuclear security enterprise and nuclear forces. Responsibility for this collection and storage is assigned to the Director, CAPE and the NNSA Director of Cost Estimating and Program Evaluation.

The National Defense Authorization Act for FY 2019 contains the following provisions pertaining to defense acquisition that will affect cost assessment procedures:

- Section 817 (Preliminary Cost Analysis Requirement for Exercise of Multiyear Contract Authority) contains a clarifying amendment to 10 U.S.C. 2306b (Multiyear Contracts) that a cost analysis supporting a DoD multi-year request is preliminary (as explained in Chapter II).
- Section 831 (Revisions in Authority Relating to Program Cost Targets and Fielding Targets for Major Defense Acquisition Programs) modifies Section 807 of the National Defense Authorization Act for FY 2017. The individual responsible for establishing program cost, fielding, and performance goals is no longer the Secretary of Defense, and is now the milestone decision authority for the program.
- Section 832 (Implementation of Recommendations of the Independent Study on Consideration of Sustainment in Weapon Systems Life Cycle) requires the Secretary of Defense to commence implementation of each recommendation of an independent assessment conducted by the MITRE Corporation (of the extent to which sustainment matters are considered in decisions related to requirements, acquisition, cost estimating, and programming and budgeting for major defense acquisition programs). This assessment was directed by Section 844 of the National Defense Authorization Act for FY 2017. The implementation of each recommendation shall commence no later than 18 months after the enactment of the National Defense Authorization Act for FY 2019. CAPE efforts to address certain improvements concerning O&S cost data collection recommended by the MITRE study were discussed in Chapter IV.

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 a wide range of cost data and related information. The CADE website provides user access to the data. The specific data systems that are warehoused in CADE are described later in this appendix.

In addition, a complementary public website (<https://cade.osd.mil>) provides considerable background information about CADE, such as the role of the major organizations supporting CADE. The public website contains information about policy and procedures relevant to data reporting and collection and the other initiatives described in Chapter IV, as well as information about training opportunities concerning CADE and its supporting data systems.

Access to CADE is made available to government analysts throughout the cost and acquisition communities. CADE is also selectively available to government-sponsored support contractors that sign company-specific nondisclosure agreements. A display of active users throughout the Department is shown in Figure D-1.

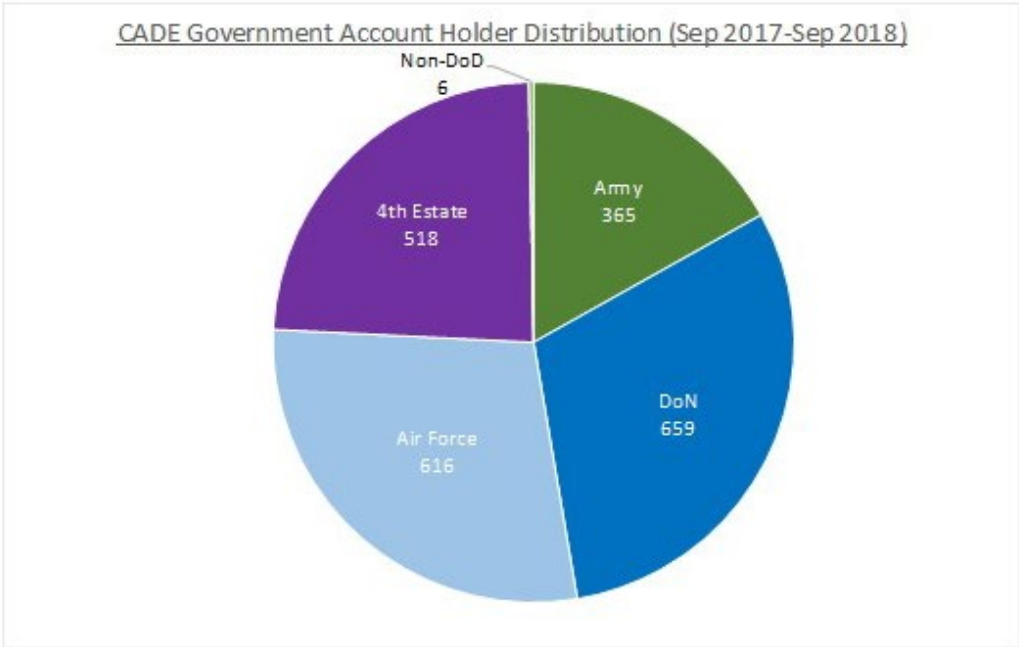
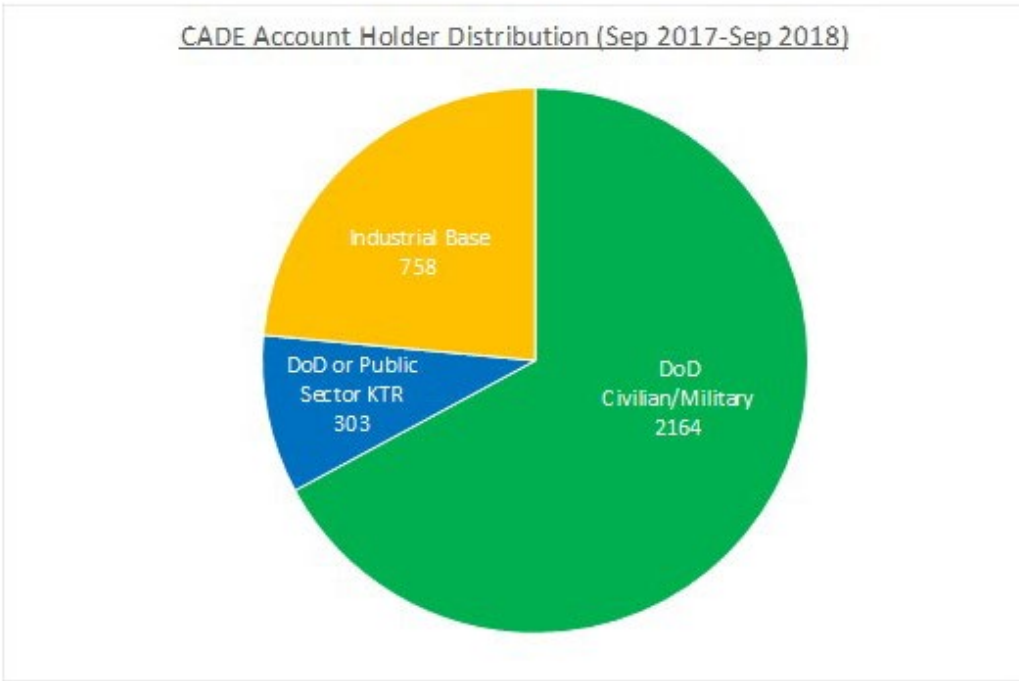


Figure D-1. CADE Users

Note that more than 70 percent of the 2,178 CADE Government users reside in the military departments.

CAPE provides extensive support to the CADE users and data providers. CAPE hosts CADE Focus Group meetings that provide a forum for government and contractor personnel to learn and ask questions about the latest CADE initiatives and the evolving associated policies, processes, and data products, and to raise any issues or concerns. The most recent Focus Group meeting, held in June 2018, was attended by 72 government professionals from more than 20 organizations, 61 partners from industry from more than 12 companies, and 38 support contractors.

In addition, as discussed in Chapter IV, the CADE Training Team hosts regional training sessions open to industry and government throughout the year. Further information on CADE training can be found on the CADE public website at <https://cade.osd.mil/support>.

Overview of Cost Data Reporting and Collection

DoD uses three primary data collection systems 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 Costs (VAMOSOC) systems

Both 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-881D). 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.

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 in a secure, web-based, information repository 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 (DoDI) 5000.02, *Operation of the Defense Acquisition System*, establishes the CCDR requirements for major contracts and subcontracts (regardless of contract type) associated with Major Defense Acquisition Programs (MDAPs). These requirements may need to be changed due to new legislation concerning cost data collection made by the National Defense Authorization Act for FY 2017.

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. DoDI 5000.02 establishes SRDR requirements for major contracts and subcontracts (regardless of contract type) associated with MDAPs. 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 later in this appendix.

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*. Access to CSDR data is provided within CADE to authorized users. The CSDR data that are currently collected are illustrated in Figure D-2.



Figure D-2. 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 FlexFiles reporting discussed in Chapter IV will, over time, replace the legacy 1921, 1921-1, 1921-2, and 1921-5 reports.

Cost and Software Data Reporting Compliance

The Defense Cost and Resource Center (DCARC)¹ 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 most recent CSDR compliance rating criteria for programs are provided in Figure D-3.

¹ The DCARC is the CAPE field office responsible for administering the CSDR system.

CSDR Compliance Rating Criteria

Implementation in January 2017 (Changes Shown in Red)

RATING	CRITERIA
Green	No open CSDR compliance issues.
Green Advisory	Outstanding CSDR deliverable less than or equal to three months overdue.
Yellow	Outstanding CSDR deliverable greater than three months, but less than or equal to six months overdue.
Red	<ol style="list-style-type: none"> 1. Outstanding CSDR deliverable greater than six months overdue. 2. Formally rejected CSDR deliverable outstanding greater than 30 days overdue.
Red-Critical	<ol style="list-style-type: none"> 1. Program Office released Request for Proposal (RFP) without approved CSDR plan. 2. Program Office awarded prime contract without approved CSDR plan or failed to mod contract to place an approved CSDR plan on contract. 3. Program Office or Prime contractor failed to enforce flow down of CSDR requirements to direct reporting subcontractor or the prime contractor failed to mod subcontract to place an approved CSDR plan on contract. 4. Three or more consecutive formal rejections for the same CSDR deliverable event will remain red-critical until the deliverable is accepted. 5. Outstanding CSDR deliverable greater than 12 months overdue.
Not Rated	The program has no CSDR activity (e.g., approved waiver, Pre-MDAP, cancelled, has no CSDR activity, or not currently tracked)

Figure D-3. CSDR Compliance Rating Criteria

Figure D-4 provides a breakdown of CSDR compliance by fiscal quarter using the compliance ratings in effect at the time for all MDAPs since FY 2012.

CSDR Compliance History

Over Time by Fiscal Quarter

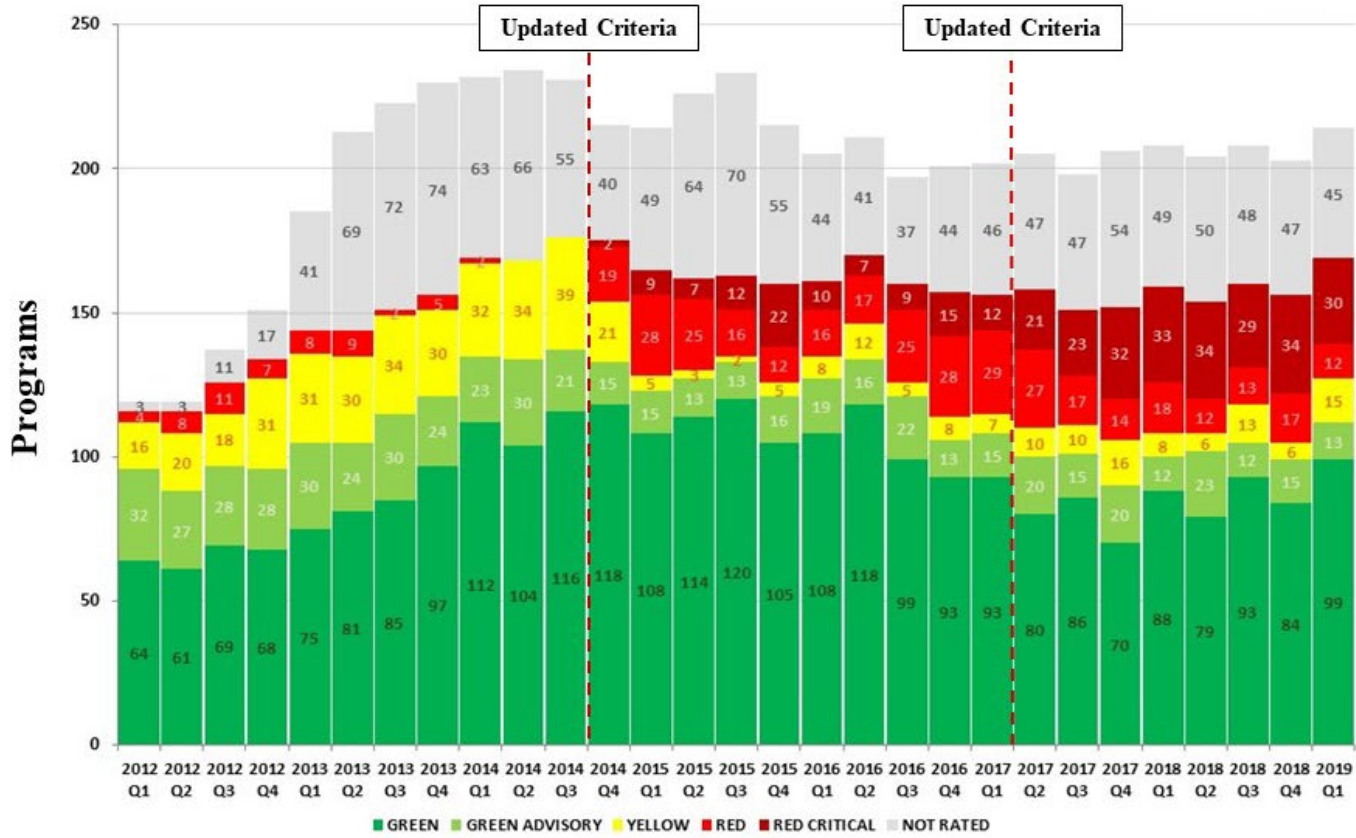


Figure D-4. Quarterly CSDR Compliance History by Fiscal Year

Note that the compliance ratings were revised in late FY 2014, and were revised again in the second quarter of FY 2017. At each time, the compliance rating criteria were made more strict, leading to an increase in red and/or red-critical ratings.

At the end of the first quarter of FY 2019, 66 percent of the programs receiving a rating were rated as green or green advisory, 9 percent were rated as yellow, 7 percent were rated as red, and 18 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 or concur with a military department cost estimate.

Software Data Reporting Initiatives

In 2015, a team was formed with representatives from CAPE and the military department cost agencies to address improved software data collection and reporting. The team determined that the software reporting at that time had many shortcomings, including inconsistency of data reporting, lack of standardization in software metrics, and inability to track to cost reports. The team developed new software data formats, definitions, and instructions for reporting contractors to use in collecting software data to be used by cost estimators across DoD. A critical note is that the data formats and reporting instructions were expanded to include major software maintenance activity. Working with industry, the software working group ensured these new data formats and reporting instructions used state-of-the-art terms, definitions, and agile metrics for software development and maintenance including size, effort, technical parameters, and schedule. The new reports and instructions for both software development software maintenance and software maintenance were updated in November 2017, and are now being used on new contracts that meet SRDR dollar thresholds.

An extension of the improved software report format has been developed for an important class of Defense Business Systems/Information Systems known as Enterprise Resource Planning (ERP) systems. This extension was completed in November 2017.

The data report formats and reporting instructions for the three data reports (software development, software maintenance, and reporting for ERP programs), as well as additional technical information on software data reporting, can be found on the CADE public website at <https://cade.osd.mil/policy/srdr>.

The software reporting working group also found that data submissions were not subject to a complete and rigorous quality control process. As a result of this finding, the team designed and institutionalized a formal Verification and Validation (V&V) process. In 2015, a joint team of subject matter experts from CAPE, the military departments, and the Missile Defense Agency was formed and achieved initial operating capability of the new V&V process. These experts are known as the SRDR Unified Review Function (SURF) team. The SURF team follows a formal, institutionalized V&V process that has been published in the SRDR Verification and Validation Guide. This Guide, updated in March 2018, provides general directions, key focus areas, and recommended solutions to reviewers responsible for inspecting SRDR data submissions for completeness, consistency, quality, and usability. The SURF team's review process has made a significant difference, ensuring only quality data reports are accepted into the CADE

system. Additional information on the review of software data can be found on the CADE public website at <https://case.osd.mil/roles/reviewers>.

Earned Value Management Central Repository

In support of the USD(A&S) 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. General information about EVM reporting is available 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 System

DoD requires that each military department maintain a system that collects historical data on the operating and support (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.

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 Air Force VAMOSC system is known as the Air Force Total Ownership Cost (AFTOC) system. AFTOC provides O&S cost data for all manned and unmanned aircraft; aircraft engines; missiles; munitions; command, control and communication systems; space systems; and other miscellaneous systems and programs. It also provides supplementary data such as aircraft quantities and flying hours, fuel consumption, numbers of personnel by skill/function, and other non-cost information. AFTOC is managed by the Deputy Assistant Secretary of the Air Force for Cost and Economics. See <https://aftoc.hill.af.mil> for additional information.
- The Army VAMOSC system is known as the Operating and Support Management and Information System (OSMIS). OSMIS provides O&S cost data for aviation, tracked and wheeled combat vehicles, artillery systems, engineering and construction equipment, communication and electronic systems, and other tactical systems and equipment. It also provides supplementary data such as system quantities; vehicle miles; aircraft flying hours; consumption for repair parts, fuel, and ammunition; and man-hours for intermediate and depot maintenance. OSMIS is managed by the Deputy Assistant Secretary of the Army for Cost and Economics. See <https://www.osmisweb.army.mil> for additional information.

- The Department of the Navy system is known as Naval VAMOSC and includes both Navy and Marine Corps platforms and systems. Naval VAMOSC provides O&S cost data for ships and shipboard systems, Navy and Marine Corps aircraft, weapons (missiles and torpedoes), military and civilian personnel, facilities, and Marine Corps ground systems. Naval VAMOSC also provides key non-cost data such as personnel counts for ship crews and aircraft Type Model Series, system quantities, flying hours/ship steaming days, fuel consumption, and maintenance hours/days. Naval VAMOSC is managed by the Naval Center for Cost Analysis. See <https://www.vamosc.navy.mil> for more information.

The military departments provide training and documentation for their VAMOSC users. The training material consists of on-site presentations and online videos. The documentation consists of extensive user guides and manuals.

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Abbreviations

ACAT	Acquisition Category
ACV	Amphibious Combat Vehicle
ADM	Acquisition Decision Memorandum
AFCAA	Air Force Cost Analysis Agency
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
AHE	Advanced Hawkeye Aircraft
AMCOM	Aviation and Missile Command
AoA	Analysis of Alternatives
APB	Acquisition Program Baseline
APT	Advanced Pilot Training
APUC	Average Procurement Unit Cost
AWACS	Airborne Early Warning and Control System
C&AB	Cost and Analysis Branch
CADE	Cost Assessment Data Enterprise
CAPE	Cost Assessment and Program Evaluation
CARD	Cost Analysis Requirements Description
CCDR	Contractor Cost Data Reporting
CCP	Component Cost Position
CECOM	Communication-Electronics Command
CIRCM	Common Infrared Countermeasures
CLIN	Contract Line Item Number
CLM	Continuous Learning Module
CLS	Contractor Logistics Support
CSDR	Cost and Software Data Reporting
CWIPT	Cost Working-group Integrated Product Team
DAB	Defense Acquisition Board
DASA-CE	Deputy Assistant Secretary of the Army for Cost and Economics
DAU	Defense Acquisition University

DAWIA	Defense Acquisition Workforce Improvement Act
DCAPE	Director of Cost Assessment and Program Evaluation
DCARC	Defense Cost and Resource Center
DISA	Defense Information Systems Agency
DMS-M	Defensive Management System - Modernization
DOC	Director of Cost Estimating and Analysis
DoD	Department of Defense
DOE	Department of Energy
DoDCAS	Department of Defense Cost Analysis Symposium
DoDI	Department of Defense Instruction
DOO	Delivery On Orbit
EELV	Evolved Expendable Launch Vehicle
EMD	Engineering and Manufacturing Development
EOQ	Economic Order Quantity
ERP	Enterprise Resource Planning
E-VAMOSC	Enterprise VAMOSC
EVM	Earned Value Management
FACADE	Functional Academic Cost Assessment Data Enterprise
FCoM	Full Cost of Manpower
FMS	Foreign Military Sales
FRP	Full-Rate Production
FY	Fiscal Year
FYDP	Future Years Defense Program
G&A	General and Administrative
GPS IIIF	Global Positioning System III Follow-On Production
ICBM	Intercontinental Ballistic Missile
ICE	Independent Cost Estimate
IDECM	Integrated Defensive Electronic Countermeasures
IDIQ	Indefinite Delivery/Indefinite Quantity
IOC	Initial Operational Capability
JAGM	Joint Air-to-Ground Missile
JSF	Joint Strike Fighter
LCMC	Life Cycle Management Command
LMS	Learning Management System

LRIP	Low-Rate Initial Production
MCEA	Master's Degree Program in Cost Estimating and Analysis
MCSC	Marine Corps Systems Command
MDA	Milestone Decision Authority
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
NNPP	Naval Nuclear Propulsion Program
NNSA	National Nuclear Security Administration
NPS	Naval Postgraduate School
NRO	National Reconnaissance Office
O&M	Operations and Maintenance
O&S	Operating and Support
OCX	Next Generation Operational Control System
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OSMIS	Operating and Support Management Information System
OTA	Other Transaction Authority
PAC-3 MSE	Patriot Advanced Capability-3 Missile Segment Enhancement
PAUC	Program Acquisition Unit Cost
PEO	Program Executive Officer
PMO	Program Management Office
POM	Program Objective Memorandum
PPBE	Planning, Programming, Budgeting, and Execution
RFP	Request for Proposal
SAE	Service Acquisition Executive
SAR	Selected Acquisition Report
SFHP	Spent Fuel Handling Recapitalization Project
SIPRNet	Secure Internet Protocol Router Network
SM-3	Standard Missile-3
SM-6	Standard Missile-6
SMC	Space and Missile Center

SPAWAR	Space and Naval Warfare Systems Command
SPB	Sustainment Program Baseline
SRDR	Software Resources Data Reporting
SURF	SRDR Unified Review Function
US	United States
U.S.C.	United States Code
USD(A&S)	Under Secretary of Defense (Acquisition and Sustainment)
VAMOSOC	Visibility and Management of Operating and Support Costs
V&V	Verification and Validation
WBS	Work Breakdown Structure
WSARA	Weapon Systems Acquisition Reform Act of 2009