



FY 2019 Annual Report on Cost Assessment Activities



March 2020

This page intentionally left blank.

FY 2019 Annual Report on Cost Assessment Activities



**Director, Cost Assessment and
Program Evaluation**

March 2020

This page intentionally left blank.

Table of Contents

Foreword.....	1
Chapter I – Introduction.....	3
Chapter II – Overview of Cost Analysis in DoD.....	9
Cost Analysis Organizations in DoD	9
Procedures for Cost Assessments for Major Defense Acquisition Programs.....	10
Cost Assessment Procedures for Milestone Reviews and Other Events.....	10
Role of the Independent Cost Estimate.....	11
Component Cost Position and Full Funding Commitment.....	12
Multiyear Procurement Contracts	12
Cost Indices.....	12
Cost Estimates for Contract Negotiations.....	13
Cost Analysis Requirements Description	14
Operating and Support Cost Estimates	14
DoD Cost Estimating Guide	14
Foreign Military Sales.....	14
Guidance and Procedures for Other Cost Assessment Activities.....	15
Cost Comparisons of Military, Civilian, and Contractor Manpower.....	15
Economic Analysis for Decision-making	15
CADE and DoD Cost Data Collection Systems.....	16
Chapter III – DoD Cost Assessment Activities in FY 2019	17
MDAP Milestone or Other Review Cost Assessment Activities	17
CAPE Cost Analysis for Multiyear Procurement Contracts	22
Assessment of Compliance, Quality, and Differences in Methodology.....	24
Compliance with Policy and Procedures	24
Quality of the Cost Estimates	24
Differences in Methodology	26
Acquisition Program Cost Performance	28
Other Cost Assessment Activities	30
Cost Assessment Activities for Missile Defense Agency Programs.....	30
Other Cost Estimates and Analyses	30
Congressional Testimony.....	31
DoD Cost Analysis Symposium	31
Chapter IV – The Look Forward.....	33
Cost Leadership Forum	33
Policies and Procedures.....	33
Cost Assessment Data Enterprise.....	35

Cost Analysis Requirements Description Update	37
Enhanced Cost Data Collection.....	37
Cost Data Reporting for Programs Below MDAP Dollar Thresholds.....	38
FlexFiles Initiative	38
Improved CSDR Planning	39
Technical Data	39
Cost Data Reporting for Sustainment Contracts	40
Improved Contractor Business Data Report	40
Cost and Software Data Reporting Manual Update	41
Cost Reporting for Missile Defense Agency Programs	41
Cost Analysis Education and Training	42
Academic Degree Programs in Cost Analysis	42
Enhanced Training and Education	42
DoD Cost Estimating Guide	44
EVAMOSOC	44
Approved Estimate—Program/Budget Review and Acquisition	46
Appendix A. Cost Analysis Organizations in DoD	A-1
Appendix B. Major Defense Acquisition Program Unit Cost Reporting.....	B-1
Appendix C. Recent Legislative Changes.....	C-1
Appendix D. CADE and Cost Data Collection Systems.....	D-1
Appendix E. CAPE Policy Memos	E-1
Abbreviations.....	F-1

FIGURES

Figure 1. CSDR Data Collection over Time	25
Figure 2. Comparison of CAPE Independent Cost Estimates to Component Cost Positions	27
Figure 3. Number of Nunn-McCurdy Breaches by SAR Reporting Year	29
Figure 4. CADE Data and Analytics Home Page	36
Figure 5. DAU FY 2019 Courses in Cost Estimating.....	43
Figure D-1. CADE Users	D-2
Figure D-2. Legacy CSDR Data Reports and Plans	D-5
Figure D-3. CSDR Compliance Rating Criteria	D-7
Figure D-4. Quarterly CSDR Compliance History by Fiscal Year.....	D-8

TABLES

Table 1. Cost Assessment Activities in FY 2019 for MDAP Milestone or Other Reviews Subject to USD(A&S) Decision..... 18

Table 2. Cost Assessment Activities in FY 2019 for MDAP Milestone or Other Reviews Subject to SAE Decision..... 20

Table 3. Cost Analyses in FY 2019 for Multi-Year Procurement Contract Awards 23

Table B-1. Unit Cost Breach Thresholds B-1

This page intentionally left blank.

FOREWORD

In an environment of growing threats, competing priorities, and fiscal pressures, the Department of Defense (DoD) must spend DoD resources on the right things, in the right amounts, at the right time. The DoD cost analysis community plays a critical role in this by preparing cost estimates that support the planning, programming, budgeting, acquisition, and requirements generation processes. The community consists of ~2,000 government analysts supporting an annual budget of more than \$700 billion, including 160 major weapons systems and information systems, countless smaller acquisition programs, and ongoing generation of requirements for future capabilities.

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 in defense acquisition management to achieve the objectives of technical superiority and innovation, 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 more streamlined, decentralized, and agile acquisition processes in support of these objectives.

Effective and efficient acquisition must also be supported by accurate cost estimates. The ongoing COVID-19 pandemic has demonstrated the collective wisdom and foresight of the entire DoD cost analysis community to efficiently accomplish this mission. For more than a decade, the community has invested in the Cost Assessment Data Enterprise (CADE), a network-enabled, authoritative data system used to collect actual cost information from defense industry in modern data formats; to maintain the quality and curation of this data which is used to prepare cost estimates; and to store this data and make it easily available for use by DoD personnel in all three military departments and the fourth estate on a worldwide, 24/7 basis. Remarkably, CADE has enabled the DoD cost community to continue the preparation of cost estimates during the COVID-19 pandemic without missing a beat—as of mid-March 2020, about 90% of the cost community continued to produce cost estimates in a mobile work environment—through teleworking. This is largely enabled by the secure, high quality, authoritative, network-enabled data sources provided by the CADE system. Also, the cost community now seeks to extend this success through the development of a new network-based, enterprise-level data system for Operations and Support cost information—the EVAMOS system.

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. 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.

A handwritten signature in black ink, consisting of a stylized initial 'B' followed by a long, wavy horizontal line that tapers to the right.

Dr. Yisroel Brumer
Acting Director
Cost Assessment and Program Evaluation

CHAPTER I. INTRODUCTION

The Director of CAPE (DCAPE) 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, 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 major programs to be procured 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.

The organization of this year's Annual Report on Cost Assessment Activities 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.** Since its creation, CAPE has completed seven 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 Manual (DoDM) 5000.04, *Cost and Software Data Reporting (CSDR) Manual*
 - *Operating and Support Cost-Estimating Guide*
 - *DoD Cost Estimating Guide*
 - DoDI 7041.04, *Estimating and Comparing the Full Costs of Civilian and Active Duty Manpower and Contract Support*
 - DoDI 7041.03, *Economic Analysis for Decision-making*

The first five 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 have been for the most part complete, and all seven 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 needed to be updated due to recent legislation and changes in acquisition policy. In particular, a new version of DoDI 5000.73 was issued in March 2020, and work to update DoDM 5000.04 will begin in 2020. In addition, CAPE has prepared a new *DoD Cost Estimating Guide* that will be issued shortly that provides comprehensive information on the DoD cost estimating process and directs the reader to additional references and training in specific topics in cost estimation.

The policy and procedures for cost assessments for Major Defense Acquisition Programs (MDAPs) are provided in DoDI 5000.73. The specific topics that are addressed include processes and timelines for cost assessment activities supporting milestone reviews, formal cost positions and full funding commitments, cost estimates for multiyear procurement contracts for major programs, and cost estimates for contract negotiations.

- **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.
- Chapter III summarizes the Department's Fiscal Year (FY) 2019 cost estimation and cost analysis activities associated with MDAPs and other programs. These activities include ICEs as well as reviews of military department and defense agency cost estimates. These activities inform 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 2019 complied with established procedures, and discusses the overall quality of 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 two ICEs that supported reviews when the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) was the Milestone Decision Authority (MDA).
 - CAPE provided ten cost analyses that supported milestone or other reviews when the Service Acquisition Executive (SAE) was the MDA. Five of these analyses were CAPE ICEs; one of these was a joint CAPE/Navy ICE; and the other four 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 three cases of multiyear procurement contracts for major programs.
 - **Assessment of Compliance, Quality, and Differences in Methodology.** The cost assessment activities in FY 2019 complied with the established procedures described in

Chapter II. The quality of the cost estimates produced by both CAPE and the military departments has continued to improve due to better data. Cost estimates have also improved due to increased rigor and more disciplined processes. An annual CAPE analysis makes a comparison between the CAPE ICEs and the CCPs, and this year's analysis 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 in the systematic collection of actual cost information over time and the improved availability of this information to all parties in the cost community as discussed later in this report. In addition, the annual number of Nunn-McCurdy unit cost breaches after the enactment of WSARA remains low relative to the period before WSARA.

- **Other Cost Assessment Activities.**
 - CAPE provided three ICEs and one independent cost assessment for four Missile Defense Agency programs.
 - CAPE provided an analysis of the savings resulting from use of a two-ship procurement contract for the acquisition of two Ford class aircraft carriers.
 - CAPE updated its estimate of Life-Cycle Operating and Support (O&S) costs for the F-35 fighter aircraft.
 - CAPE conducted an independent cost benefit analysis on the business case for entering into Energy Savings Performance Contracts to support the use of alternative fueled vehicles for the DoD inventory of non-tactical vehicles (such as buses and trucks). This analysis was requested by the Senate Armed Services Committee.
 - CAPE prepared a report on the cost estimating methods being used by the military departments and defense agencies for Agile software development. This report was requested by the House Committee on Appropriations.
 - CAPE prepared an information paper on various metrics for aircraft cost per flying hour that are used throughout DoD for a variety of purposes. This paper was prepared to answer questions from the House Armed Services Committee.
 - CAPE prepared an ICE for two alternatives concerning the aircraft carrier CVN USS Harry S. Truman. One alternative considered was the inactivation (retirement) of the ship, and the other alternative considered was a Refueling and Complex Overhaul for the ship.
- Chapter IV describes the status of several ongoing initiatives that are intended to 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.** CAPE has completed a major revision of DoDI 5000.73 that was issued in March 2020. The major changes to the instruction were the addition of new procedures and timelines for the new acquisition pathways created by changes to statute and

DoD acquisition policies. The revision also provides new procedures and timelines for a recent statutory requirement for ICEs to support sustainment reviews of major weapon systems after initial operational capability (IOC).

- **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 DoD cost analyst's centralized data warehouse and virtual library, housing seamless integrated authoritative data sources that are easily searchable and retrievable on a machine to machine basis. Analysts are provided with cost and related data, access to acquisition reports and information, and to a library of historical cost estimates and related decision support products. The archived information in CADE reaches back to the 1960s.
- **Enhanced Cost Data Collection.** Feedback from government users has identified desired improvements to the cost data being collected, as well as noting 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 the use of advancements in information systems technology. These initiatives include the following:
 - Cost data reporting requirements for Section 804 middle tier of acquisition (MTA) programs were issued in a policy memo in August 2018, and subsequently incorporated into the revised DoDI 5000.73. Section 804 refers to a provision in the National Defense Authorization Act for FY 2016 that provided DoD with new authorities for the rapid prototyping of technology demonstrations and the rapid fielding of new or upgraded systems with limited development activities.
 - Guidance for cost data reporting for programs below the MDAP dollar threshold (i.e., Acquisition Category (ACAT) II, III, and IV programs) were issued in a policy memo in January 2019, and subsequently incorporated into the revised DoDI 5000.73. This guidance is in response to Congressional direction.
 - Cost data reporting has been modernized by enabling the cost-effective submission of low-level cost data termed as FlexFiles directly from the contractors' accounting systems.
 - System technical data that will be useful to cost analysts are now being collected on a limited basis, and are being evaluated prior to further implementation.
 - Cost data reporting from major weapon system sustainment contracts has been improved and expanded.
 - The Cost and Software Data Reporting (CSDR) report of plant-wide cost data of a company business unit has been improved significantly.
- **Cost Analysis Education and Training.** CAPE and the military department cost agencies have continued to review the entire DAU curriculum and the course content supporting professional certification in Cost Estimating. Education and training supported by an advanced training system specific to CADE and its supporting cost data has been developed for incorporation into the curricula at DAU and other educational institutions. In addition,

CAPE has established a dedicated CADE training team that has provided numerous training and outreach activities to government organizations and defense industry contractors throughout the country in 2019. CADE users also have access to modern on-line training and to several user guides.

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 that affect acquisition statutory requirements and related acquisition and cost assessment policy and procedures. Appendix D provides additional information on CADE and associated DoD cost data collection systems. Appendix E provides a listing of recent CAPE policy memos that pertain to cost data reporting.

This page intentionally left blank.

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>).

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 a unique purpose and function but also complements the family of cost organizations supporting the defense acquisition process and the broad and diverse operations of the Department. This diversity 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, and is 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 or other organization. In some cases, these cost estimating agencies may 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 or other organizations may provide policy guidance and specialized cost analyses that are unique to each of the military departments. The military department cost agencies or other organizations 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 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.

Cost Assessment Procedures for Major Defense Acquisition Programs

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 DCAPE as the principal official for independent cost estimation and cost analysis for the acquisition programs of DoD.

More specific guidance on prescribed policy and procedures is provided in DoDI 5000.73, *Cost Analysis Guidance and Procedures*. The Instruction is the primary vehicle for implementing the cost assessment provisions that are in statute 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 that are discussed later in this chapter.

Recent efforts to update DoDI 5000.73 to respond to major changes in DoD acquisition policy and new statutory requirements, including sustainment reviews of major weapon systems, are described in Chapter IV.

The directive and instruction are available on the Executive Services Directorate website at <https://www.esd.whs.mil/DD/>.

Cost Assessment Procedures for Milestone Reviews and Other Events

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 pre-MDAPs¹ and 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.

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.

- At any other time considered appropriate by DCAPE 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; or (2) prepares the ICE when considered appropriate by DCAPE 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. In those cases where CAPE prepares the ICE, the military department cost agency (or defense agency equivalent) conducts its own cost analyses in accordance with DoD Component policy. These cost analyses typically consist of a program office estimate and a Component cost estimate. The Component cost estimate may range from a military department cost agency (or defense agency equivalent) non-advocate estimate, independent assessment of the program office estimate, or some other cost analysis.

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 elected to move oversight for many of these programs to the military departments. As of December 2019, for the 102 pre-MDAPs and MDAPS, USD(A&S) is the MDA for 13 programs and the SAEs are the MDAs for the remaining 89.

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 data and 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 minimum, 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 without the need for significant adjustments to the program's budgets. However, CAPE's experience is that the ICE should also support much broader program decisions. The ICE should include a discussion of risks, the potential impact of risks on program costs and schedule, and approaches to mitigate risks. The ICE can also 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

- Options to effect better program outcomes along the way as circumstances change or unexpected events occur.

Component Cost Position and Full Funding Commitment

CAPE policy for major acquisition programs requires the Component to establish a formal position on the estimated cost of the program and, furthermore, to commit to fully fund the program in the FYDP. 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 derived from the Component cost estimate and the program office estimate in accordance with Component policy. The CCP is signed by the DoD Component Deputy Assistant Secretary for Cost and Economics (or defense agency equivalent) and includes a date of record. For the Department of the Navy, a CCP instead is co-signed by the Deputy Assistant Secretary of the Navy for Management and Budget and the Deputy Assistant Secretary of the Navy for Acquisition Policy and Budget. CAPE continues discussions with the Navy concerning its implementation of CAPE cost assessment procedures.

CAPE policy for major acquisition programs also requires the MDA to certify that the program is fully funded. Following the meeting of the Defense Acquisition Board (or Component equivalent), the MDA will document his or her decision in an Acquisition Decision Memorandum (ADM) that certifies that the Component will fully fund the program to either the CCP or the ICE in the current FYDP or will commit to full funding of the CCP or ICE during the preparation of the next FYDP. A full funding certification statement in the ADM is required at the Milestone A, B, and C reviews and the FRP decision.

Multiyear Procurement Contracts

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 multiyear 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 multiyear procurement (MYP) strategy and contract structure, which includes a comparison of the estimated costs of multiyear 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 multiyear request to Congress 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 multiyear 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 several studies, which were described in earlier editions of this Annual Report, the current practice in the DoD cost community now makes a distinction between inflation and price escalation.

Inflation refers to an increase in the general price level across the *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 the Office of Management and Budget (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 change experienced in a specific industry or commodity group. Escalation may also account for any real price change associated with a specific contractor (such as costs of direct labor or overhead).

The cost community 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 currently being updated to clarify terminology and include more step-by-step instructions. The publications are available on the CAPE website (<https://www.cape.osd.mil>) at "Public Reports."

CAPE has also worked with DAU, the Air Force Institute of Technology (AFIT), and the Naval Postgraduate School (NPS) 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, the CSDR reports described in Appendix D 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 a shared understanding of program requirements and content.

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 DCAPE 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 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.

DoD Cost Estimating Guide

CAPE has prepared a new *DoD Cost Estimating Guide* that will be issued shortly that provides comprehensive information on the DoD cost estimating process and directs the reader to additional references and training for specific topics in cost estimation. This Guide is described in Chapter IV.

Foreign Military Sales

In a few cases, cost estimates are made for 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. In recent years, CAPE has made considerable progress in improving the cost community tools, methods, and policies for cases involving FMS.

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 2019 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 revised DoDI 7041.03, *Economic Analysis for Decision-making*, in October 2017. 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

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 data warehouse 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. 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, CARDS, CAPE briefings to the DAB and other acquisition decision making groups, and other documents and briefings. 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. The data are easily transferred from machine to machine for analysis. In addition, CADE provides the analyst with a collection of downloadable software tools. CADE increases the productivity of analysts and supports a more proactive role for cost analysis in supporting acquisition program decisions. Recent enhancements to CADE are described in Chapter IV.

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

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. The CSDR system serves as the primary source of cost data for major contracts and subcontracts associated with MDAPs, major systems, and MTA programs. The three Visibility and Management of Operating and Support Costs (VAMOSC) 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 VAMOSC systems known as EVAMOSC.

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.

CHAPTER III. DOD COST ASSESSMENT ACTIVITIES IN FY 2019

This chapter provides a summary of the DoD cost estimates and cost analyses that were made in FY 2019 in support of MDAP milestone and other acquisition reviews, large multiyear procurement contracts, and other cost analyses. Note that this year there were no 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 two cost assessment activities in FY 2019 that supported milestone or other reviews of MDAPs when the MDA was USD(A&S). 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 2019 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
Presidential Aircraft Recapitalization VC-25B	VC-25B	Air Force	CAPE Independent Cost Estimate	30-Nov-18	Acquisition Program Baseline Approval	3-Dec-18
			Air Force Cost Position	27-Nov-18		
Ground Based Strategic Deterrent	GBSD	Air Force	CAPE Independent Cost Estimate	24-Jun-19	Release of GBSD Request for Proposal	16-Jul-19
			Air Force Program Office Estimate	31-May-19		

Remarks about Specific Programs

- The Presidential Aircraft Recapitalization program had Milestone B approval in September 2016, but the Acquisition Program baseline (APB) approval was delayed pending a further review of system requirements. The CAPE ICE and Air Force CCP were both updated prior to the approval of the APB by USD(A&S) in December 2018.
- The GBSD program had Milestone A approval in August 2016, but there was considerable risk in the program cost estimates at that time due to large uncertainties in the definitions of program technical content and the limited historical data available for use in preparing cost estimates. The Milestone A ADM requested that CAPE provide an updated ICE once work was completed to better define the final GBSD products and program content. Based on completion of the two prime contractors' cost/capability trade analyses, and extensive discussions with the two GBSD prime contractors, the Air Force submitted an updated CARD—reflective of an updated government reference architecture—that captured the possible range of the anticipated contractor materiel solutions. In addition, CAPE and the Air Force worked together to locate relevant historical data from the prior Intercontinental Ballistic Missile (ICBM) programs (Minuteman III and Peacekeeper), as well as contractor cost data from the GBSD technology maturation and risk reduction phase. The revised CARD and the improved data were used in updates to the GBSD program office cost estimate and the CAPE ICE. These updated estimates were provided to USD(A&S) prior to the release of the Request for Proposal (RFP) for GBSD engineering and manufacturing development.

Table 2 provides a summary of the nine cost assessment activities in FY 2019 that supported milestone or other reviews when the MDA was the SAE. 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 2019 for MDAP Milestone or Other Reviews Subject to SAE Decision

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
B61 Mod 12 Life Extension Program Tailkit Assembly	B61 Mod 12 LEP TKA	Air Force	CAPE Independent Cost Estimate	31-Oct-18	Milestone C	26-Oct-18
			Air Force Cost Position	24-Oct-18		
Infrared Search and Track	IRST	Navy	CAPE Independent Cost Estimate	4-Dec-18	Milestone C	4-Dec-18
			Navy Cost Position	15-Nov-18		
Armored Multi-Purpose Vehicle	AMPV	Army	CAPE Independent Cost Estimate	15-Jan-19	Milestone C	25-Jan-19
			Army Cost Position	19-Dec-18		
Improved Turbine Engine Program	ITEP	Army	CAPE Review and Assessment	23-Jan-19	Milestone B	1-Feb-19
			Army Cost Position	18-Jan-19		
			Army Independent Cost Estimate	16-Jan-19		
Advanced Anti-Radiation Guided Missile-Extended Range	AARGM-ER	Navy	Joint Navy/CAPE Independent Cost Estimate	4-Mar-19	Milestone B	4-Mar-19
			Navy Cost Position	9-Jan-19		

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

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Joint Precision Approach and Landing System	JPALS	Navy	CAPE Review and Assessment	4-Apr-19	Milestone C	8-Apr-19
			Navy Cost Position	5-Mar-19		
			Navy Independent Cost Estimate	1-Mar-19		
Ground/Air Task Oriented Radar	G/ATOR	Navy	CAPE Review and Assessment	30-May-19	Full-Rate Production Decision	23-May-19
			Navy Cost Position	8-May-19		
			Navy Independent Cost Estimate	29-Apr-19		
Presidential Helicopter VH-92A	VH-92A	Navy	CAPE Independent Cost Estimate	30-May-19	Milestone C	7-Jun-19
			Navy Cost Position	18-Apr-19		
MK21A Reentry Vehicle	MK21A RV	Air Force	Air Force Cost Position	8-Aug-19	Milestone A	10-Oct-19
			Air Force Independent Cost Estimate	8-Aug-19		
Weather System Follow-On	WSF	Air Force	CAPE Independent Cost Estimate	10-Sep-19	Milestone B	TBD
			Air Force Cost Position	7-Aug-19		

Of these ten cost assessment activities, CAPE prepared the ICE for five, and also worked with the Navy on a joint ICE. For the other four cases, CAPE provided a review and assessment of the CCP and the Component ICE prepared by the Component cost agency.

Remarks about Specific Programs

- At the time of the publication of this report, the Weather System Follow-On had not received Milestone B approval. Approval is anticipated in March 2020.

CAPE Cost Analysis for Multiyear Procurement Contracts

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. Following approval of MYP authority by Congress, CAPE updates the estimate of savings prior to the award of a multiyear contract.

Table 3 provides a summary of the three CAPE updated independent estimates of savings for MYP contract awards. Table 3 identifies the program name and acronym, the responsible Component, the preliminary estimate of savings made last year, the updated estimate of savings made this year, and the date of the MYP contract award.

Table 3. Cost Analyses in FY 2019 for Multiyear Procurement Contract Awards

Program Name	Acronym	Component	CAPE Preliminary Estimate of Savings/Date	CAPE Updated Estimate of Savings/Date	Contract Award Date
F/A-18E/F Super Hornet	F/A-18E/F	Navy	8.1% / Jul-18	10.3% / Jan-19	20-Mar-19
E-2D Advanced Hawkeye	E-2D AHE	Navy	6% / Jul-18	10.0% / Feb-19	10-Apr-19
Standard Missile-6	SM-6	Navy	10% / Jul-18	10.3% / Aug-19	20-Dec-19

The results shown in Table 3 are consistent with the observed savings for other previous MYP contracts for aircraft programs negotiated by DoD over the last ten years. The estimate of savings for the SM-6 program is the second CAPE assessment for the missile commodity.

Assessment of Compliance, Quality, and Differences in Methodology

Compliance with Policy and Procedures

All of the events noted in Table 1 through Table 3 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 MYP contract award. Information about the compliance of CSDR data reporting is provided in Appendix D.

Quality of the Cost Estimates

The quality of the cost estimates for MDAPs provided by the military departments, as well as CAPE, has 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

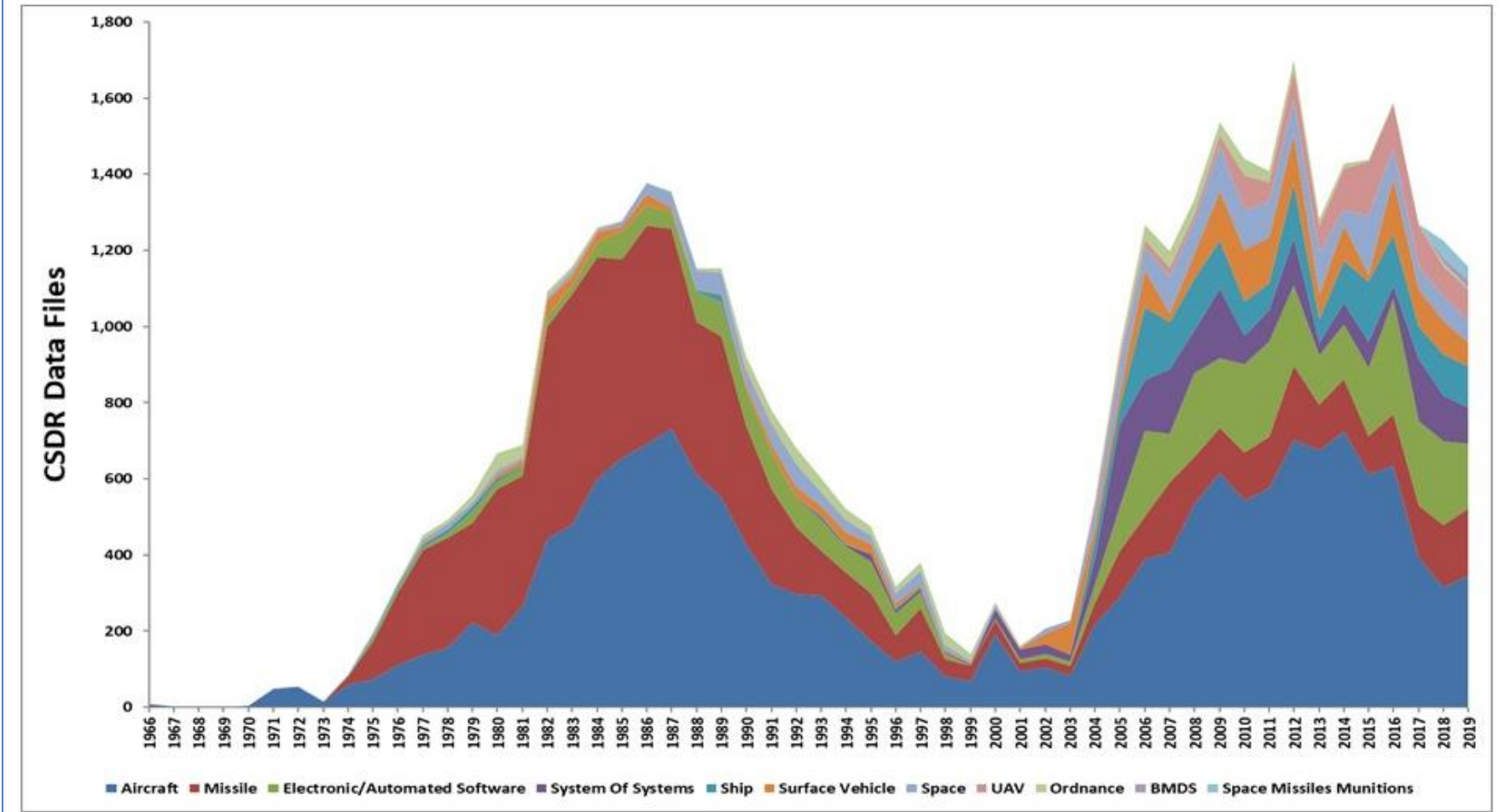


Figure 1. CSDR Data Collection over Time

Note that Figure 1 shows the CSDR reporting based on the “as of” date, not the submission date. For example, a report with an as of date of December 2019 will typically be submitted in February 2020. As a result, the last year of the figure has an apparent drop-off in reporting, since not all of the 2019 reports had been submitted by the time of the publication date of this Annual Report.

The continuing management emphasis on better data is not limited to the volume of reports. Additional ongoing efforts to improve the content and quality of the data reports are described in Chapter IV. These efforts include the FlexFiles initiative, standard templates for CSDR planning, and an improved contractor business base report. There are also major efforts that address the quality of data for system O&S costs. These efforts are the extension of CSDR reporting to major sustainment contracts and the EVAMOS initiative.

The cost community also has better access to the data as a result of the CADE initiative. This access is now more automated and less labor intensive. The CADE warehouse environment also supports more systematic data validation and curation.

Cost estimates have also improved due to better and more rigorous program definition. The new format for the CARD and the organized collection of program technical data provide better visibility into the key framing assumptions that can drive cost and schedule for a program.

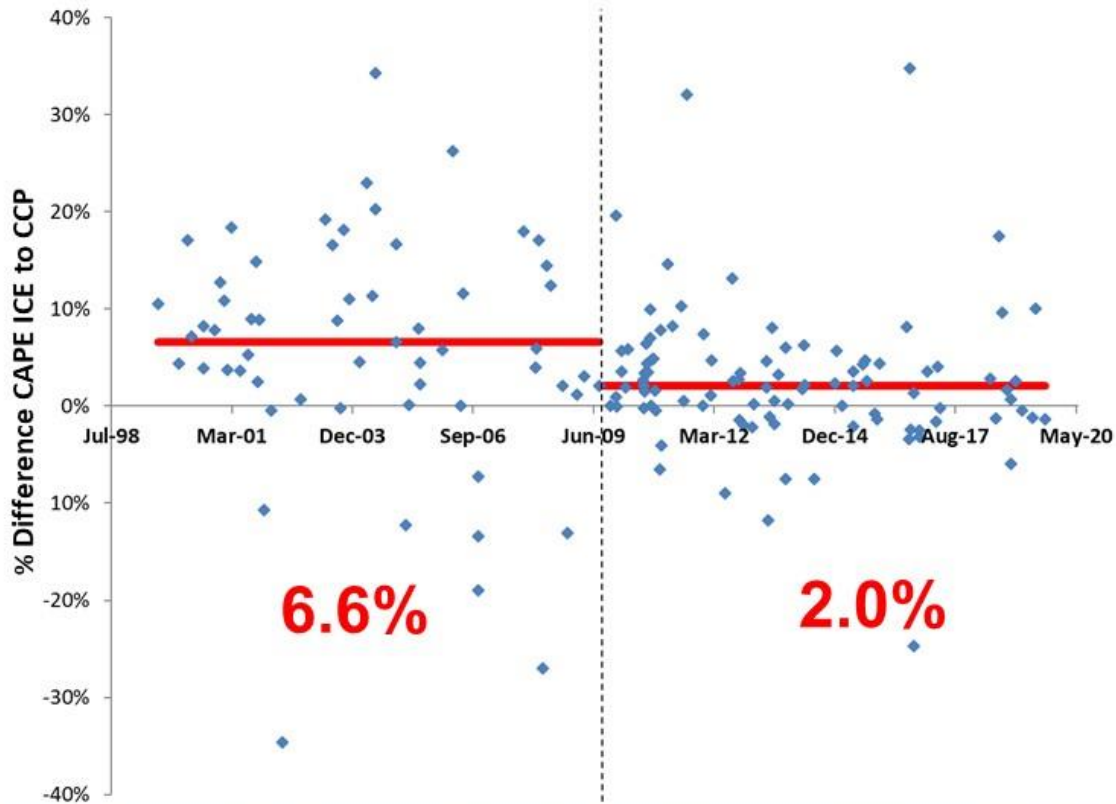
Finally, cost estimates have improved due to increased rigor and more disciplined processes. As noted in Chapter II, there is a policy that institutionalizes a formal CCP and ensures management commitment to full funding at milestone reviews. In addition, CAPE now also works with the military department cost agencies to assess program full funding during the program review.

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 estimates of the military departments and CAPE.

An annual CAPE analysis makes a comparison between the CAPE ICEs and the CCPs. This year’s analysis 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 2.0 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 and managed in the future as the program goes forward.

For the estimates in FY 2019 listed in Tables 1 and 2 where CAPE prepared the ICE, there were no significant outliers; the differences between the CAPE ICE and the CCP for these eight programs were all less than or equal to 10 percent.

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 2019 is displayed in Figure 3.

Nunn-McCurdy Breaches (1997-2019)

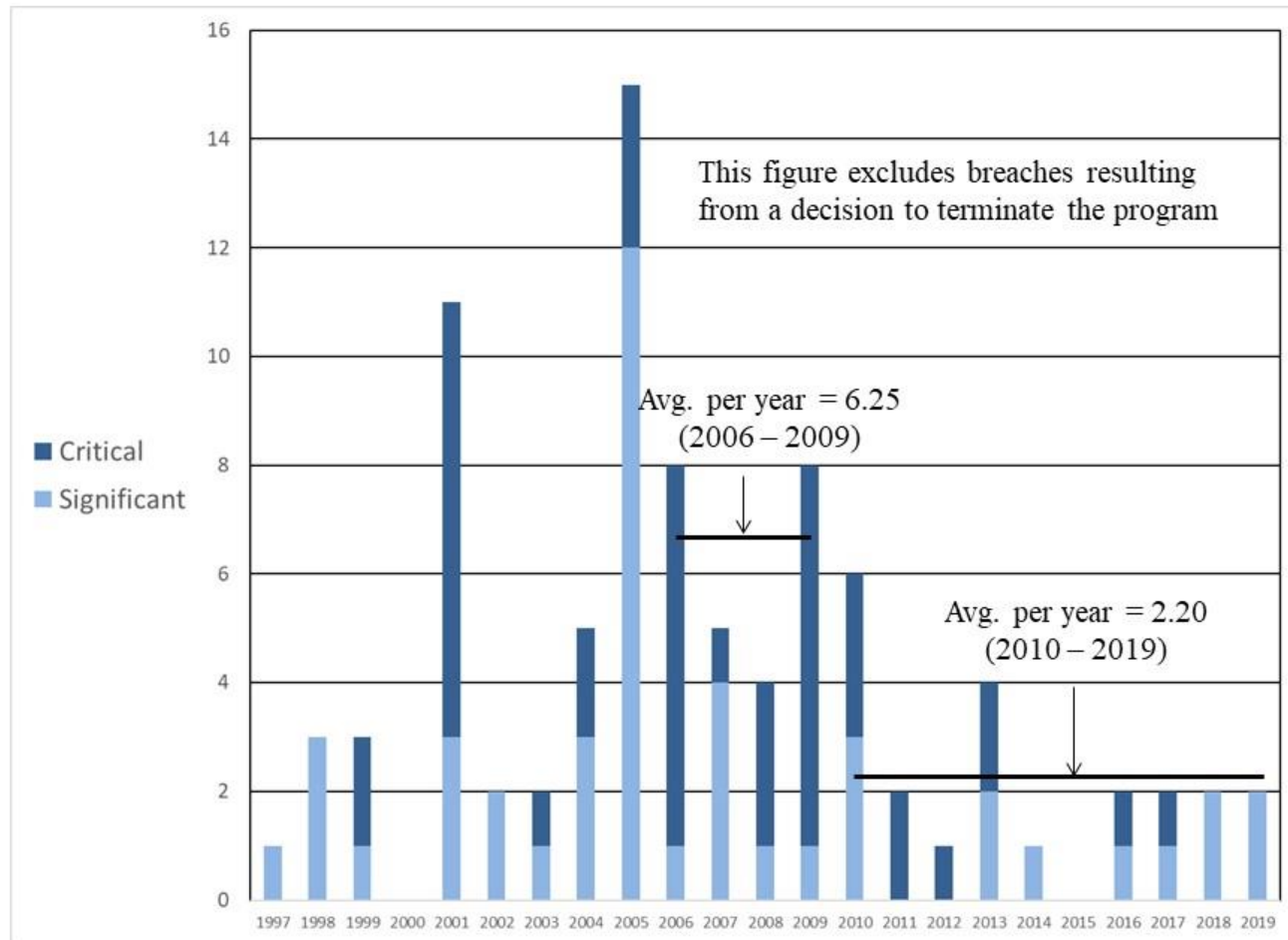


Figure 3. Number of Nunn-McCurdy Breaches by SAR Reporting Year

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 beginning in 2010, the average annual number of breaches has declined after the enactment of WSARA in 2009.

Note that Figure 3 provides 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 sometimes provided in Chapter III 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. Last year, there were no critical unit-cost breaches, and so there were no unit-cost certifications in this year's report.

Other Cost Assessment Activities

Cost Assessment Activities for Missile Defense Agency Programs

CAPE prepared ICEs for two Missile Defense Agency programs in response to a request from the Senate Committee on Appropriations. The two programs are the Aegis Ashore Poland Site and the Neutral Particle Beam Phase 1 program. The CAPE ICE reports provided to the Congress in March 2019 also included a comparison between each CAPE ICE and the corresponding Missile Defense Agency cost estimate.

CAPE prepared an independent cost assessment of the Homeland Defense Radar-Hawaii (HDR-H) at the request of the Director, Missile Defense Agency. This assessment included reviews of the Missile Defense Agency cost estimate and the cost model developed by the Agency used for that estimate. It also included CAPE cost estimates for certain elements of HDR-H. The assessment was provided to the Director in June 2019.

CAPE prepared an ICE for the Standard Missile-3 (SM-3) Block II-A program. The SM-3 II-A will be a part of the Aegis Ballistic Missile Defense. The Block II-A upgrade provides improved capability to defend against intermediate-range missiles and intercontinental ballistic missiles. The SM-3 Block II-A is a Missile Defense Agency program not subject to the oversight process for MDAPs. The CAPE ICE was provided in September 2019 to an oversight body known as the Missile Defense Executive Board, chaired by USD(A&S) in support of an initial production decision. The CAPE ICE report also includes a comparison of the CAPE ICE to the Missile Defense Agency cost position.

Other Cost Estimates and Analyses

CAPE provided an analysis of the savings resulting from use of a two-ship procurement contract for the acquisition of two Ford class aircraft carriers. This analysis was completed in December 2018 in support of the DoD response to Section 121 (Procurement Authority for Ford Class Aircraft Carrier) of the National Defense Authorization Act for FY 2019, which required certification of significant savings for the two-ship buy.

CAPE updated its estimate of life-cycle O&S costs for the F-35 fighter aircraft in December 2018 to support the preparation of the F-35 December 2018 SAR, submitted to the Congress in April 2019. The CAPE O&S cost estimate includes all three US F-35 aircraft variants; is based on a 30-year service-life forecast; and reflects planned flying hour rates for each of the applicable military services. The estimate incorporates updated information regarding the major elements of O&S costs. This includes updated fuel consumption rates for all aircraft variants; an increase in the assumed fuel price per gallon; updated military service bed down plans and unit-level manpower headcounts; revised price escalation rates of government (military and civilian) and contractor personnel; and updated maintenance costs for consumable and depot-level repairable items, based on component reliability projections as of July 2018 obtained from approximately 95,000 hours of flight testing and field operations.

CAPE conducted an independent cost benefit analysis on the business case for entering into Energy Savings Performance Contract (ESPC) agreements to support the use of Alternative Fueled Vehicles (AFVs) or the fueling and charging infrastructure necessary for AFVs. This analysis was requested by the Senate Armed Services Committee. The committee noted that DoD maintains an inventory of roughly 177,000 owned and leased non-tactical vehicles (such as vans and buses, trucks, and other vehicles), and that increased use of AFVs (with a wide range of fuel sources such as natural gas, ethanol, electricity, and electric/gas hybrids) would reduce petroleum consumption and costs. An ESPC would be a mechanism by which a private firm identifies projects to improve energy efficiency, and arranges financing (i.e., a debt instrument) to pay for the projects. In return, a government agency receives recurring energy cost savings from the projects, and the agency pays the private firm based on a partial share of these savings each year. A briefing on the CAPE analysis was made available to congressional staff in March 2019.

CAPE prepared a report on the cost estimating methods being used by the military departments and defense agencies for Agile software development. The term Agile refers to an approach for software development where requirements and solutions evolve through the collaborative efforts of cross-functional teams and the end users. This report was requested by the House Committee on Appropriations. A briefing on the CAPE study was made available to congressional staff in April 2019.

CAPE prepared an information paper on various metrics for aircraft cost per flying hour that are used throughout DoD for a variety of different purposes. This paper was prepared in May 2019 to answer questions from House Armed Services Committee staff members.

CAPE prepared an ICE for two alternatives concerning the aircraft carrier CVN 75 USS Harry S. Truman. One alternative considered was the inactivation (retirement) of the ship, and the other alternative considered was a Refueling and Complex Overhaul (RCOH) for the ship. An RCOH is a mid-life depot availability to accomplish refueling of the ship's reactors, warfighting modernization, and repair of ship systems and infrastructure so that the aircraft carrier may adapt to future mission requirements and meet a 50-year service life requirement. The ICE was formally documented in September 2019 in support of DoD deliberations concerning the FY 2021 President's Budget request.

Congressional Testimony

In May 2019, the Director of CAPE testified before the House Armed Services Committee, Subcommittee on Tactical Air and Land Forces. The subject of the hearing was Air Force acquisition and modernization programs in the FY 2020 President's budget request. The Director's testimony described CAPE analysis

that addressed the need for a mix of fifth-generation F-35 and fourth-generation F-15EX fighter aircraft. The testimony included comparisons of acquisition cost and O&S cost between the two aircraft.

DoD Cost Analysis Symposium

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

In recent years, the symposium event for the most part has been cancelled or curtailed due to guidance from OMB and the Department to reduce expenditures for all conferences and travel, as well as the stress of repeated continuing resolutions. A major concern has been that the potential DoD and other government agency attendees would not have travel funding available to attend the event. CAPE is now examining options to hold a symposium in 2021 at a low-cost facility to allow for the maximum number of attendees.

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.

One significant meeting of the Cost Leadership Forum was held in 2019 at an off-site location. The purpose of this event was to provide background information on recent statutory changes that would affect cost assessment procedures. This information was then used to allow the participants to collaboratively discuss and develop the main themes that would need to be incorporated into the guidance documents issued by the cost community organizations. The update to the guidance document issued by CAPE, which benefited from this discussion, is described in the next section.

Policies and Procedures

As noted in Chapter II, DoDI 5000.73, *Cost Analysis Guidance and Procedures*, is the primary guidance document for implementing the cost assessment policies and procedures as established by CAPE throughout DoD. The latest version of the instruction was issued in March 2020. This revision was made largely due to significant changes in DoD acquisition policies and recent legislative changes that are described in Appendix C. The revision also makes considerable changes and additions to cost data reporting. The revision provides new guidance concerning cost data reporting for MTA programs and ACAT II, III, and IV programs that are below MDAP dollar thresholds. The revision also provides for implementation of FlexFiles reporting. The new guidance for cost data reporting is described later in this chapter and in Appendix D.

The procedures and timelines for cost assessment activities associated with MDAPs and MYP contract analyses remain unchanged for the most part. Major revisions to the instruction were the additions of new procedures and timelines for the new acquisition pathways created by changes to statute and DoD acquisition policy. One new acquisition pathway was established by Section 804 (Middle Tier of Acquisition of Rapid Prototyping and Rapid Fielding) of the National Defense Authorization Act for

FY 2016, which provided the Department with new authority to establish a “middle tier” of acquisition programs that are intended to be completed within five years. MTA programs fall between “urgent acquisitions” that are generally completed within six months to two years, and “traditional” acquisition programs that last much longer than five years. The MTA 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 MTA establish a process for transitioning successful prototypes to programs for production and fielding under the rapid fielding pathway or the traditional acquisition process. This guidance was provided in DoD Instruction 5000.80, *Operation of the Middle Tier of Acquisition (MTA)*, issued in December 2019. This instruction states that DCAPE establishes policies and prescribes procedures for the collection of cost data and cost estimates for MTA programs, as appropriate.

As a result, CAPE has established new procedures for cost estimates for MTA programs in the recent revision to DoDI 5000.73. For the rapid prototyping programs, CAPE or the responsible military department cost agency (determined on a case-by-case basis) will prepare an estimate of life-cycle costs for programs likely to exceed MDAP² dollar thresholds. For the rapid prototyping programs below the MDAP dollar thresholds, cost estimates will be prepared in accordance with guidance issued by the responsible military department cost agency. For the rapid fielding programs, CAPE or the military department cost agency will prepare an estimate of life-cycle costs for programs likely to exceed MDAP or major system³ dollar thresholds. For either case, the decision to determine the organization responsible for the life-cycle cost estimate for an MTA program is made by CAPE and the responsible military department cost agency director after the decision is made to pursue a program using the MTA pathway. Specific procedures and timelines for MTA cost estimates are provided in DoDI 5000.73.

CAPE also developed new cost assessment procedures for sustainment reviews. 10 U.S.C. 2441 (Sustainment Reviews), added by the National Defense Authorization Act for FY 2017, requires the military departments to conduct a sustainment review of each major weapon system not later than five years after declaration of IOC of an MDAP and throughout the life cycle of the weapon system to assess the product support strategy, performance, and operation and support costs of the weapon system. The sustainment review is required to include an ICE for the remainder of the life cycle of the program. CAPE has established procedures for ICEs for sustainment reviews in the recent revision to DoDI 5000.73. In this guidance, a sustainment review is supported by an ICE that will be prepared by either CAPE or the military department cost agency, determined on a case-by-case basis. Additional guidance and timelines are provided in DoDI 5000.73. CAPE has also developed a suggested approach for analytic support to sustainment reviews, which will be added to the CAPE *Operating and Support Cost-Estimating Guide*.

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.

³ A major system is a program other than an MDAP with expenditures expected to exceed \$185 million (FY 2014 constant dollars) for research, development, test and evaluation, or \$835 million (FY 2014 constant dollars) for procurement.

Additional policy changes concerning cost data reporting and collection are described later in this chapter.

Cost Assessment Data Enterprise

A new design for the Data and Analytics home page, displayed in Figure 4, was added in December 2018.



FOR OFFICIAL USE ONLY / PROPRIETARY DATA

Contact Us / Support | Log Out

CADE Portal

Data

Resources

Retrieve Files 1

Welcome to CADE: Data and Analytics

The Authoritative Source for Defense Cost Data

Data by Program Select a program to view its Acquisition, CSDR, and CARD data

Search Programs

GO

[Advanced Program Search](#)
[★ My Favorite Programs](#)

Browse Data Across Programs

CSDR Data

Browse CSDR Submissions

Browse CCDR and SRDR submissions by service, commodity, or program

Business Base Data: 1921-3

Contractor overhead rates, reported annually (1921-3s, FPRs)

Cross-Report CCDR Query

Specialized tool used for searching parsed data within CCDR files

Other Cost Data

Search ACDB Inventory

Search army databases for normalized schedule, cost, and technical data

CADE Library

Library of cost estimate documents: reports, cost estimates, site visits, etc.

Resources

External Links

Links to useful cost estimation websites, such as DAU, DAMIR, and the service cost centers

Downloadable Tools

Collection of software tools such as inflation calculators and the contracts database

User Guide

Step-by-step guide to using Data and Analytics to browse, search, and download cost data

Figure 4. CADE Data and Analytics Home Page

The home page provides better analyst support through two modes of accessing data. The first mode supports analyst queries by individual program. It provides a history of program information (including acquisition cost and quantity, schedule events, and unit procurement cost) as reported in the program SARs over the years. It allows access to the CSDR by contract and report type for each program. It also allows access to CARDS and other library documents and other files for each program. The second mode supports similar queries across multiple programs. Queries can be made by service or weapon system commodity type. For either mode, the data are easily transferred from machine to machine for analysis. In addition, the analyst is provided access to a collection of downloadable software tools. A step-by-step guide for using the home page is provided in a Data and Analytics User Guide.

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 of MDAPs at milestone reviews. In the March 2020 revision to DoDI 5000.73, the CARD is also now required for sustainment reviews. For MTA programs, a CARD is not required; however, the Component must provide a program description with sufficient level of detail upon which to base a cost estimate.

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). Improvements to the CARD tables were made in 2019 based on user feedback from the CARD experiences in 2018, and general interest in reducing the burden on program offices. In addition, the burden of CARD preparation is minimized by allowing program management offices to provide updates through revision of only the program parameters that have changed from the previous submission. CARDS are now stored electronically by CAPE in the CADE library 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.” These documents were updated in March 2019 to incorporate changes to the CARD narrative and tables format made in 2019.

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.

Cost data reporting requirements for MTA programs were established in 2018, and are described in Appendix D. These requirements have been incorporated into the recent revision to DoDI 5000.73.

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 Programs Below MDAP Dollar Thresholds

10 U.S.C. 2334(g) (Guidelines and Collection of Cost Data) requires DCAPE 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 of expanding cost data reporting to acquisition programs below the dollar thresholds for an MDAP. These acquisition programs are known as ACAT II, III, or IV programs.

CAPE issued a policy memo in January 2019 to address the implementation of the legislative requirements. These requirements remain unchanged in the revised DoDI 5000.73. 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 responsible military department cost agency director. Cost data reporting is now required on contracts and government-performed efforts greater than \$50 million for ACAT II programs. This extension of CSDR was not retroactive to ACAT II programs with a planned final RFP release prior to March 2019. In addition, CSDR requirements for certain specific ACAT II programs were waived based on military department requests. CSDR reporting requirements for ACAT III and IV programs are now left to the discretion of the military department cost agencies.

FlexFiles Initiative

Until recently, cost data had been collected in the many forms of the legacy CSDR report formats, similar to those first created in the 1960s. Some contractors had to make manual allocations from their financial and other accounting systems into these formats. CAPE, partnering with the military department cost agencies, 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 directly from contractors' accounting systems, while retaining visibility into the standard government cost elements and categories. This transformation, which is the next generation of cost data collection, will improve data quality and 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 report format and instructions to reporting contractors were completed in November 2017, and the gradual phase-in of FlexFiles cost reporting on new contracts began at that time. Based on this experience, CAPE issued a policy memo in March 2019 to mandate the use of FlexFiles on all new contracts beginning in May 2019. As of February 2020, there were 144 approved CSDR plans and over 1,000 submitted or anticipated reports specified in these plans that will follow the FlexFiles format.

Training on Flexfiles for both government and industry personnel is now underway and is described later in this chapter.

Additional information on the FlexFile initiative and a 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 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). The Air Force-led effort developed 18 standard plans for various commodity types. In addition, the Army developed a standard plan for ground vehicle systems, and the Navy developed standard plans for sea systems and unmanned maritime systems. 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. The use of the standard plan template for each program CSDR plan is subject to tailoring that is approved by the Cost Working-group Integrated Product Team (CWIPT), a team consisting of appropriate stakeholders for the program.

In 2018, the standard plans were updated to reflect the update to MIL-STD-881D, *Work Breakdown Structures for Defense Materiel Items*, which was published in April 2018. The standard plans were revised again in August and September 2019 to incorporate FlexFiles reporting.

The standard plans are available on the CADE public website at <https://cade.osd.mil/policy/csdr-plan>.

Technical Data

Cost analysts 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, a 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. During its work, the working group sought feedback from industry. This collaboration ensured that the parameters, definitions, and collection methodologies proposed for technical data reporting are consistent with DoD and industry norms, and that any requirements for contractor reporting on technical data were not excessively burdensome or redundant with contractor reporting already in place.

The institutionalization of formal and reliable technical data reporting is important, and avoids subsequent ad hoc data calls by cost analysts to the contractor or program office. The working group 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 define each parameter consistent with systems engineering practices, military standards, and industry guidelines.

The latest version of this report was completed in November 2017 and is now being applied on a case-by-case basis. Experience from more examples is required prior to full implementation in the CSDR system, and implementation is ongoing.

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 DCAPE 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. The first cost data report for sustainment was approved in May 2012 and became effective at that time. A second, and more detailed, cost data report (known as the Functional Cost-Hour Report) was approved in September 2015. These reports are described in Appendix D and in the CAPE *Operating and Support Cost-Estimating Guide*.

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 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.

The latest version of this report was completed in November 2017 and is now being applied on a case-by-case basis. Experience from more examples is required prior to full implementation in the CSDR system, and implementation is on-going.

Additional information on the Maintenance and Repair Parts Data Report can be found on the CADE public website at <https://cade.osd.mil/policy/maintandrepair>.

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 expenses) 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 associated 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, since it eliminates the mapping issue, 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. The new report will also be less burdensome for contractors to prepare. During 2018 and 2019, contractors had the option of 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 report submissions. Beginning in 2020, this report is transitioning to the contractor-defined format.

A sample format, 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 and Software Data Reporting Manual Update

Procedures and implementation guidance for the CSDR system is provided in DoDM 5000.04, *Cost and Software Data Reporting (CSDR) Manual*. The next update to the Manual will incorporate the various policy memos concerning cost data collection described in this chapter and Appendix D. This will include new instructions for FlexFiles, Software Resources Data, Technical, and Maintenance and Repair Parts reporting that will be incorporated into the new CSDR Plan template. The update will also provide the latest guidance concerning cost data reporting for MTA and ACAT II programs. It will also provide the latest guidance for the new Contractor Business Data Report. Finally, the update will reaffirm the importance of CWIPT responsibilities and compliance for contractor and government reporting.

Cost Reporting for Missile Defense Agency Programs

CAPE has worked with the Missile Defense Agency to establish cost data collection for missile defense programs. Although these programs are exempt from traditional DoD acquisition processes and requirements, 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.

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 review education and training provided to the cost community, and to work with DoD academic institutions to make improvements where needed.

Academic Degree Programs in Cost Analysis

CAPE has supported the Navy and 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 cost estimating, probability and statistics, operations research, systems engineering, acquisition of defense systems, and financial management and budgeting. The program blends web-based, online instruction with video-televised classroom 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. As of July 2019, 7 cohorts (157 students) have graduated.

The Air Force has its own master's degree program in Cost Analysis at AFIT. This full-time in-residence graduate program is open to military and civilian personnel. 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 statistics, business and economics, risk and uncertainty analysis, systems engineering, maintenance and production management, and decision analysis.

Enhanced Training and Education

CAPE, in partnership with the military department cost agencies, continually reviews the DAU curriculum leading to professional certification in Cost Estimating, as established by the Defense Acquisition Workforce Improvement Act (DAWIA). This process ensures that desired core competencies for apprentice, mid-level, and senior cost analysts are being addressed.

The DAU courses in Cost Estimating (CE) offered in FY 2019 are shown in Figure 5.



FY19 Training - Cost Estimating

Level I Certification

Knowledge Based

ACQ 101
Fundamentals of Systems Acquisition Management

30 hours, online

EVM 101
Fundamentals of Earned Value Management

19 hours, online

BCF 110
Fundamentals of Business Financial Management

23 hours, online

BCF 130
Fundamentals of Cost Analysis

22 hours, online

BCF 131
Applied Cost Analysis

10 days classroom

CLB 035
Statistical Analysis

3 hours, online

CLB 042
Cost Risk and Uncertainty Analysis

8 hours, online

CLM 013
Work-Breakdown Structure

6 hours, online

Level II Certification

Case/Scenario Based

ACQ 202
Intermediate Systems Acquisition, Part A

34 hours, online

ACQ 203
Intermediate Systems Acquisition, Part B

5 days classroom

BCF 230
Intermediate Cost Analysis

9.5 days classroom

BCF 206
Cost Risk Analysis

3.5 days classroom

BCF 216
Applied Operating and Support Cost Analysis

4.5 days classroom

BCF 221
Intermediate Financial Management Concepts

30 hours, online

BCF 225
Acquisition Business Management Application

5 days classroom

BCF 250
Applied Software Cost Estimating

4.5 days classroom

CLB 026
Forecasting Techniques

2 hours, online

CLE 076
Introduction to Agile Software Acquisition

5 hours, online

Level III Certification

Case/Scenario Based

BCF 330
Advanced Concepts in Cost Analysis

5 days classroom

2 Years of Acquisition Experience in CE

4 Years of Acquisition Experience in CE

6 Years of Acquisition Experience 5 in CE

Figure 5. DAU FY 2019 Courses in Cost Estimating

DAU also offers roughly 20 continuous learning modules related to Cost Estimating. These modules allow the workforce members to earn continuous learning points in order to remain certified.

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 non-proprietary data sets for notional programs representative of actual DoD acquisition programs. Access to the FACADE system only requires a user id and password, and is available to a wider range of users than CADE itself, which has limited and controlled access. 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.

CAPE has stood up a dedicated CADE training team. In 2019, the team provided 19 regional training events and 6 outreach activities to various conferences and symposia. Over the course of these training and outreach events, the team engaged with cost, program management, and contracting personnel in government and industry. In addition, there were company-specific engagements with 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 2019, training was provided to 1,105 students in person, and 1,047 students online.

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. As of July 2019, the LMS training material includes 11 how-to videos, 33 courses, and 6 user guides. An additional 10 courses are being developed for 2020. By making the CADE training material available via the LMS, CAPE can provide on-demand training to a much broader segment of the workforce. Much of this CADE-related training can be used by analysts to earn continuous learning points.

DoD Cost Estimating Guide

CAPE completed a new publication, the *DoD Cost Estimating Guide*, that will be issued shortly. The Guide is intended to be useful to all cost analysts, from novices to seasoned veterans. The Guide provides important background, including a review of relevant policy established in statutes and instructions, and an explanation of standard cost terms and definitions. The Guide takes the reader through each critical step in the cost estimating process: (1) program definition, (2) cost estimate planning, (3) identification, collection, and validation of data, (4) selection of estimating methods and models, and (5) documentation and presentation of results. The Guide also provides an extensive list of references and relevant courses at DAU and other institutions.

EVAMOS

There has been recent significant legislation pertaining to weapon system O&S costs and associated O&S cost data systems. Section 836 (Codification of Requirements Pertaining to Assessment, Management, and Control of Operating and Support Costs for Major Weapon Systems) of the National Defense Authorization Act for FY 2018 establishes that DCAPE 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 (Implementation of Recommendations of the Independent Study on Consideration of Sustainment in Weapon Systems Life Cycle) 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 (Review and Report on Sustainment Planning in the Acquisition Process) 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 is known as the Enterprise VAMOSC (EVAMOSC) system. This requirement presents an opportunity to address gaps in coverage from the current VAMOSC systems and serve a wider user community. CAPE has now formed a VAMOSC Data Working Group with the military departments. The vision is to collaboratively develop and implement a common taxonomy, data definitions, and business rules as collaboratively defined by the DoD cost community and codified in policy. To date, pilot programs have been used to establish and demonstrate preliminary concepts for the data structures and definitions that will establish data standardization across DoD. In the future, CAPE will award a contract for database design, implementation, and data platform services. This platform will incorporate modern data fusion and analytics technologies for ingesting, aggregating, standardizing, visualizing, reporting, and securing a large amount of data from an array of systems, including the current military department VAMOSC systems, leveraging service-specific data systems and expertise where possible. Development of the EVAMOSC platform will occur incrementally from 2020 to 2025.

As an interim measure, CAPE is developing a Consolidated VAMOSC Tool (CVT) that allows each service's VAMOSC data to be retrieved and analyzed in a common framework using a common tool. The first version of this tool was made available in August 2019, and is applicable to Navy ships and aircraft, Air Force aircraft, and all Army weapon systems. The tool can convert service VAMOSC cost and programmatic data into the standard OSD CAPE structure. It also can be used to calculate commonly used cost metrics (such as aircraft dollars per flying hour) and display the data graphically.

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.

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.

Appendix A.

Cost Analysis Organizations in DoD

Independent Cost Assessment Organizations

There are three 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 (CAPE). Within the Army and Air Force, the offices all report to their Assistant Secretary for Financial Management and Comptroller. The Navy has a different structure that is described below.

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.

Department of the Army

Deputy Assistant Secretary of the Army for Cost and Economics

The Office of the Deputy Assistant Secretary of the Army for Cost and Economics (DASA-CE) is responsible for providing Army decision-makers with cost, performance, and economic analysis in the form of expertise, models, data, estimates and analyses at all levels. DASA-CE develops ICEs and Component cost analyses for Army systems, and chairs and oversees the Army Cost Review Board, which develops and approves the Army Cost Position for major acquisition programs. It conducts 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 develops cost factors for installation base operations, civilian personnel, and training operating tempo, in support of programming and budgeting. It also manages the Army Cost Research Plan.

Department of the Navy

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. In March 2019, the Navy reorganized its cost analysis community, and moved many resources and responsibilities away from NCCA and to the cost organizations of the major system commands. CAPE is now in discussions with the Navy to determine how CAPE cost assessment procedures will be implemented by the Navy in this new structure.

Department of the Air Force

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

The Deputy Assistant Secretary of the Air Force for Cost and Economics is composed of headquarters staff elements and the Air Force Cost Analysis Agency. The Deputy Assistant Secretary of the Air Force for Cost and Economics is dual hatted as both the Deputy Assistant Secretary of the Air Force for Cost and Economics and the Executive Director for the Air Force Cost Analysis Agency. The Deputy Assistant Secretary of the Air Force for Cost and Economics approves the Air Force Service Cost Position for all major acquisition programs. The Air Force Cost Analysis Agency develops ICEs, non-advocate cost assessments, and recommended Air Force Service Cost Positions of Air Force aircraft, space, weapons, command and control, nuclear, and information systems to support acquisition, programming, and budgeting decisions. It develops annual aircraft cost per flying hour estimates to support programming and budgeting decisions and the Agency conducts and coordinates cost research, methods, and tools. It also is responsible for collecting, processing, and publishing the Air Force Total Ownership Cost (AFTOC) data warehouse. The headquarters staff elements conduct non-advocate business case analyses, economic analyses, financial analyses and special cost studies supporting multiple Air Force and DoD stakeholders; oversee financial performance of Air Force non-appropriated fund activities and the Air Force non-appropriated fund employee pension fund; monitor budget risk for major programs, and advocate for and manage the Air Force cost analysis workforce, ranging from base to headquarters levels.

Additional Field-Level Cost Organizations and Activities

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

Department of the Army

TACOM Life Cycle Management Command

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

Department of the 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 acquisition 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.

Naval Information Warfare Systems Command

The Naval Information Warfare Systems Command (NAVWAR) 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 PEO Space Systems. The Division also provides more general cost analysis support to the PEOs 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.

Department of the 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.

Space Force Space and Missile Systems Center

The Space and Missile Systems Center (SMC) Cost Estimating Division supports cost estimates and cost analyses associated with the United States Space Force 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) Cost Analysis Branch prepares cost estimates for the development, procurement, and sustainment of automated information systems and information technology capabilities. The Division provides independent support for DISA business case analyses.

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.

This page intentionally left blank.

APPENDIX C.

Recent Legislative Changes

The National Defense Authorization Acts for FY 2016 through FY 2020 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 were incorporated into DoD Instruction (DoDI) 5000.02, *Operation of the Defense Acquisition System*, its supplementary acquisition regulations, and DoDI 5000.73, *Cost Analysis Guidance and Procedures*.

The National Defense Authorization Act for FY 2016 contains the following provisions pertaining to defense acquisition policy and 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 guidance for establishing cost data reporting for middle tier programs is described in Appendix D, and recent CAPE guidance concerning cost estimates for middle tier programs is described in Chapter IV.
- Section 809 (Advisory Panel on Streamlining and Codifying Acquisition Regulations) called for the Secretary of Defense to establish an independent advisory panel on streamlining acquisition regulations. There is a Defense Technical Information Center web site (discover.dtic.mil/section-809-panel/) that provides the various reports and recommendations made by the panel from August 2016 to its conclusion in July 2019.
- 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 policy and 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 is 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. The sustainment review is to address the program product support strategy, performance, and operations and support costs of the system. Recent CAPE guidance concerning cost estimates for sustainment reviews is described in Chapter IV.
- 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 policy and 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 (DCAPE) 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 DCAPE 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 policy and 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 are discussed in Chapter IV.

The National Defense Authorization Act for FY 2020 contains the following provisions pertaining to defense acquisition policy and cost assessment procedures:

- Section 830 (Modification of Requirements for Reporting to Congress on Certain Acquisition Programs) requires that Selected Acquisition Reports continue in their present form through FY 2021. This provision also requires the Secretary of Defense to propose an alternative for reporting the status for MDAPs as well as acquisition programs that use alternative acquisition pathways or tailored acquisition procedures. SARs have been valuable to the cost community as important sources of information and data regarding program cost and schedule performance over time. CAPE and the military department cost agencies are now working USD(A&S) to develop a reporting format for the replacement report or system.
- Section 831 (Pilot Program to Streamline Decision-Making Processes for Weapon Systems) requires each Service Acquisition Executive to recommend to the Secretary of Defense at least one MDAP as a pilot program to include tailored measures to streamline the entire milestone decision process, with the results evaluated and reported for potential wider use.
- Section 836 (Report on Realignment of the Defense Acquisition System to Implement Acquisition Reforms) requires the Secretary of Defense to include with the budget request for FY 2021 a report on the progress of implementing acquisition reform initiatives that have been enacted into law through DoD regulations, directives, instructions, or other guidance.
- Section 837 (Report on the “Middle Tier” of Acquisition Programs) requires USD(A&S) to submit a report that includes the guidance required by Section 804 (Middle Tier of Acquisition for Rapid Prototyping and Rapid Fielding) of the National Defense Authorization Act for FY 2016. This guidance shall include the business case elements required by an acquisition program and the metrics required to assess the performance of such a program.

This page intentionally left blank.

APPENDIX D.

CADE and Cost Data Collection Systems

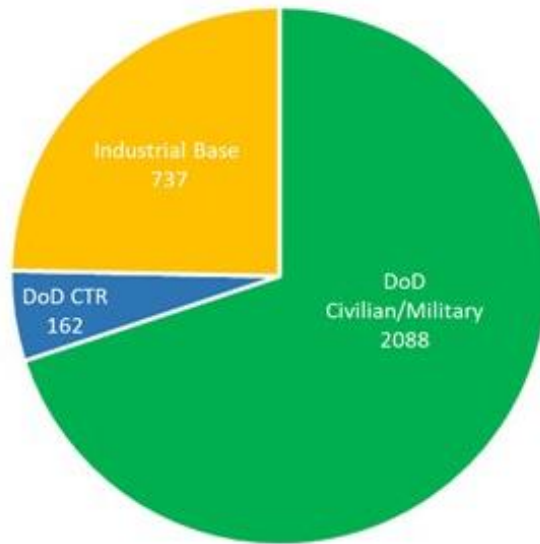
Role of Cost Assessment Data Enterprise

As explained in Chapter II, 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.

CADE Account Holder Distribution (Sep 2018-Jan 2020)



CADE Government Account Holder Distribution (Sep 2018-Jan 2020)

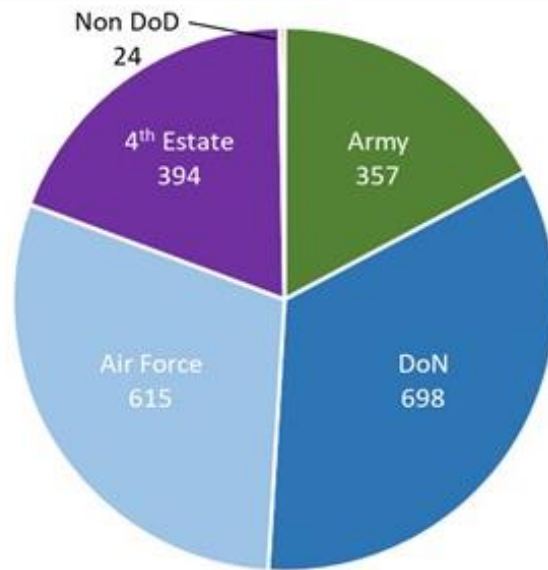


Figure D-1. CADE Users

Note that more than 80 percent of the 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 industry 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, concerns, and feedback. The most recent Focus Group meeting was held in July 2019. 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. Section 4 (“Data Collection”) of DoD Instruction (DoDI) 5000.73, *Cost Analysis Guidance and Procedures*, establishes the CCDR requirements for major contracts and subcontracts (regardless of contract type) associated with Major Defense Acquisition Programs (MDAPs), major systems, and middle tier of acquisition (MTA) programs.

The SRDR system collects software cost metrics data to supplement the CCDR cost data, to provide a better understanding and improved estimating of software-intensive programs. Section 4 of DoDI 5000.73 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 DoDM 5000.04, *Cost and Software Data Reporting (CSDR) Manual*. Plans to update this Manual are described in Chapter IV.

Access to CSDR data is provided within CADE to authorized users. The earlier versions of CSDR data that have been collected are illustrated in Figure D-2.



Figure D-2. Legacy 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.

CSDR data collection was extended to sustainment contracts in 2012. Since then, CAPE has continued to improve the collection and reporting of contractor actual costs for major sustainment, logistics, and maintenance contracts. 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 Sustainment 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.

The legacy 1921, 1921-1, 1921-2, and 1921-5 reports have been recently replaced with the Cost and Hour Report (FlexFile), as described in Chapter IV. The new FlexFile report format has been designed so that the FlexFile data submissions can be used to generate the equivalent of each of the legacy 1921 reports.

Going forward, cost data collection will consist of FlexFile data submissions and Quantity, Technical, and Maintenance and Repair Parts data 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.

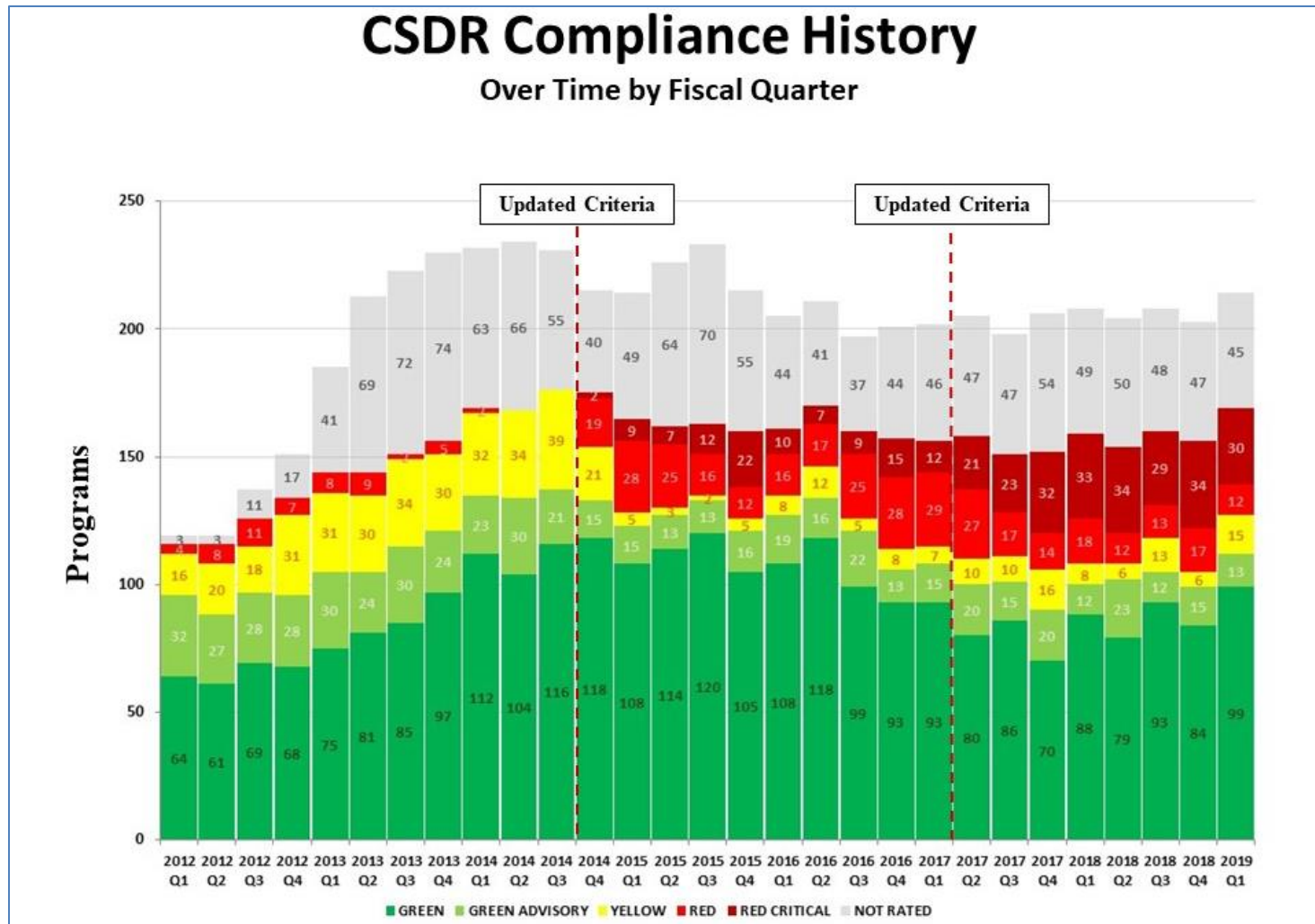


Figure D-4. Quarterly CSDR Compliance History by Fiscal Year

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.

Cost Data Reporting for Middle Tier Acquisition Programs

CAPE established cost data reporting requirements for these MTA programs in a policy memo issued in August 2018. These requirements remain unchanged in the recent revision to DoDI 5000.73. Cost data reporting is required on contracts and government-performed efforts greater than \$20 million for all MTA programs with total estimated acquisition expenditures anticipated to exceed \$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 MDAP. The responsible 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. MTA programs may also apply for a waiver from cost data reporting for circumstances in which 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>.

Data Collection on Indefinite Delivery/Indefinite Quantity Contracts

One of the most problematic data gaps facing the DoD cost community had 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 for which 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 are now being 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 had 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.

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>.

Software Data Reporting Initiatives

In 2015, a team known as the software working group 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 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>.

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. A new tool for analysis of the contracts database was made available to CADE users in October 2019.

Selected Acquisition Report Database

CADE now hosts a database of SARs that includes the older acquisition programs. The current USD(A&S) system that is used for modern electronic reporting of SAR data, known as Defense Acquisition Management Information Retrieval (DAMIR), has reports beginning in 1997 to the present day. Prior to that, SAR data was provided in hard copy. The military departments have databases for the older SAR data that have been keystroked from the official paper SARs. These databases have been merged with the DAMIR data to provide CADE users with a relational and authoritative database of SAR data, useful to cost analysts, which includes program information including mission and description, schedule, performance, cost and funding, major contracts, and deliveries and expenditures.

Earned Value Management Central Repository

The USD(A&S) staff is responsible for the EVM Central Repository. 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 VAMOSOC users. The training material consists of on-site presentations and online videos. The documentation consists of extensive user guides and manuals.

A major enterprise-wide upgrade to the VAMOSOC systems, known as EVAMOSOC, is described in Chapter IV.

This page intentionally left blank.

APPENDIX E.

CAPE Policy Memos

This appendix provides a listing of recent CAPE policy memos that pertain to cost data reporting. The contents of these memos are discussed in Chapter IV. All of these memos are available on the CADE public web site at <https://cade.osd.mil/policy>.

Deputy Director of Cost Assessment Policy Memorandum, “Change to Requirement for Submission of Contractor Business Data Report (DD Form 1921-3),” February 6, 2018

Director of Cost Assessment and Program Evaluation Policy Memorandum, “Implementation of Data Reporting Requirements for Acquisition Programs in Accordance with the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2017,” February 16, 2018

Director of Cost Assessment and Program Evaluation Policy Memorandum, “Implementation of Cost Data Reporting Requirements for Middle Tier Acquisition Programs,” August 30, 2018

Director of Cost Assessment and Program Evaluation Policy Memorandum, “Updated Implementation of Cost Data Reporting Requirements in Accordance with Section 2334(g),” January 4, 2019

Deputy Director of Cost Assessment Policy Memorandum, “Implementation of Cost and Hour Report (FlexFile) and Quantity Data Report Within the Cost and Software Data Reporting (CSDR) System,” March 22, 2019

This page intentionally left blank.

Abbreviations

AARGM-ER	Advanced Anti-Radiation Guided Missile – Extended Range
ACAT	Acquisition Category
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
AFV	Alternate Fuel Vehicles
AHE	Advanced Hawkeye Aircraft
AMCOM	Aviation and Missile Command
AMPV	Armored Multi-Purpose Vehicle
AoA	Analysis of Alternatives
APB	Acquisition Program Baseline
APUC	Average Procurement Unit Cost
B61 Mod 12 LEP TKA	B61 Mod 12 Life Extension Program Tailkit Assembly
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
CLIN	Contract Line Item Number
CSDR	Cost and Software Data Reporting
CVT	Consolidated VAMOSOC Tool
CWIPT	Cost Working-group Integrated Product Team
DAB	Defense Acquisition Board
DAMIR	Defense Acquisition Management Information Retrieval
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
DOC	Director of Cost Estimating and Analysis
DoD	Department of Defense
DoDCAS	Department of Defense Cost Analysis Symposium
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
EMD	Engineering and Manufacturing Development
ERP	Enterprise Resource Planning
ESPC	Energy Savings Performance Contract
EVAMOSOC	Enterprise VAMOSOC
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
G/ATOR	Ground/Air Task Oriented Radar
GBSD	Ground Based Strategic Deterrent
HDR-H	Homeland Defense Radar - Hawaii
ICBM	Intercontinental Ballistic Missile
ICE	Independent Cost Estimate
IDIQ	Indefinite Delivery/Indefinite Quantity
IOC	Initial Operational Capability
IRST	Infrared Search and Track
ITEP	Improved Turbine Engine Program
JPALS	Joint Precision Approach and Landing System
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
MTA	Middle Tier Acquisition
MYP	Multiyear Procurement
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NAVWAR	Naval Information Warfare 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
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OSMIS	Operating and Support Management Information System
OTA	Other Transaction Authority
PAUC	Program Acquisition Unit Cost
PEO	Program Executive Officer
PMO	Program Management Office
POM	Program Objective Memorandum
PPBE	Planning, Programming, Budgeting, and Execution
RCOH	Refueling and Complex Overhaul
RFP	Request for Proposal
RV	Reentry Vehicle
SAE	Service Acquisition Executive
SAR	Selected Acquisition Report
SIPRNet	Secure Internet Protocol Router Network
SM-3	Standard Missile-3
SM-6	Standard Missile-6

SMC	Space and Missile Center
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)
VAMOSC	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
WSF	Weather System Follow-On