



FY 2020 Annual Report on Cost Assessment Activities



May 2021

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FY 2020 Annual Report on Cost Assessment Activities



**Director, Cost Assessment and
Program Evaluation**

May 2021

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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 environment 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 the ongoing generation of requirements for future capabilities.

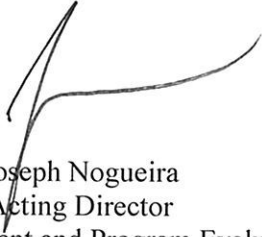
Effective and efficient acquisition is vital to the renewal of our military capabilities. Legislation enacted in the past few years provides sweeping guidance, tools, and direction to implement profound changes in defense acquisition management to achieve the objectives of technical superiority and innovation, system affordability, and the more rapid development and fielding of new capabilities. DoD has embraced this opportunity and actively pursues reforms that will provide more streamlined, decentralized, and agile acquisition processes to support 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 the 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. The DoD cost community continues to prepare cost estimates during the COVID-19 pandemic without missing a beat through teleworking. This effort 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 Operating and Support cost information—the Enterprise Visibility and Management of Operating and Support Cost (EVAMOSC) system.

This annual report describes the cost-estimating and analysis activities of the office of Cost Assessment and Program Evaluation (CAPE) that 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 support 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 workforce. In addition, CAPE has established a dedicated training team that has provided numerous virtual training and outreach activities to government organizations and defense industry contractors throughout the country.

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 activities through September 2020, and our plans for the future, in achieving this vision.

A handwritten signature in black ink, appearing to read 'Joseph Nogueira', written over the printed name.

Joseph Nogueira
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 prescribes policies and procedures for the conduct of cost estimation and other cost analyses in DoD; conducts independent cost estimates (ICEs) and other independent cost analyses; 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 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. This chapter 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 the Office of the Secretary of Defense (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 (DoDD) 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 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 mainly complete, with the exception of DoDM 5000.04. Efforts to update this manual are now underway. All seven documents are now in compliance with the OSD standard to be reviewed annually or updated within a 10-year period.

The policy and procedures for cost assessments for Major Defense Acquisition Programs (MDAPs) and other acquisition pathways are provided in DoDI 5000.73. Specific topics 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. These publications are currently being updated.
- Chapter III summarizes the Department’s fiscal year (FY) 2020 cost estimation and cost analysis activities associated with MDAPs and other programs. These activities inform acquisition 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 2020 complied with established procedures. In addition, this chapter 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 three 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 five ICEs that supported milestone or other reviews when the Service Acquisition Executive (SAE) was the MDA.
 - CAPE independently estimated the 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 2020 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 largely due to better data and training for the cost community. Cost estimates have also improved due to increased rigor and more disciplined processes. An annual CAPE analysis compares the CAPE ICEs and the Component Cost Positions (CCPs). This year’s analysis found that the difference between the two estimates since the enactment of the Weapon Systems Acquisition Reform Act (WSARA) in 2009 has narrowed significantly relative to the previous period between 1999 and the enactment of

WSARA. This narrowing 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 prepared an ICE for the Chemical Demilitarization – Assembled Chemical Weapons Alternatives (Chem Demil – ACWA) program. This program performs a portion of the effort to safely destroy remaining weapons stockpiles. This ICE was conducted in response to a recommendation made by the DoD Office of Inspector General (OIG).
- CAPE prepared an ICE for the F-35 Joint Strike Fighter program. The ICE was directed by the National Defense Authorization Act (NDAA) for FY 2020.
- CAPE prepared a preliminary ICE for the Conventional Prompt Strike program. The ICE was directed by the Senate Appropriations Committee.
- CAPE prepared an assessment of the realism of anticipated cost avoidance associated with the use of Economic Order Quantity contracts for the F-35 program. The assessment was directed by the Senate Appropriations Committee.

- Chapter IV describes the status of several ongoing initiatives that will ensure the cost assessment and cost-estimating functions for the Department will be improved and modernized as required to meet the Department’s evolving needs. These initiatives address a wide range of issues and concerns, including leadership for the cost community as a whole, cost-estimating policies and procedures, cost tools and data systems, and education and training opportunities for the DoD cost community. Some of the notable highlights in this chapter are:

- **Policies and Procedures.** 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 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. As such, CADE houses 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 access to a library of historical cost estimates and related decision support products. The archived information in CADE dates to the 1960s.

- **Enhanced Cost Data Collection.** Feedback from government users has identified desired improvements to the cost data being collected and has noted gaps in coverage where important cost data are not being collected. CAPE and the military department cost agencies have established several initiatives to address these concerns and to increase efficiency through better business processes and the use of advancements in information systems technology. These initiatives include the following:
 - CAPE has issued initial guidance concerning cost data collection and reporting from DoD acquisition programs that will allow DoD to assess the effects of the COVID-19 pandemic on contractor cost, performance, and schedule. CAPE will issue more specific cost data collection guidance in the future based on further dialog between government and industry.
 - Cost data reporting has been modernized by enabling the cost-effective submission of low-level cost data, called FlexFiles, directly from the contractors' accounting systems. The transition from the legacy cost reports to FlexFiles is now underway.
 - CAPE has extended the requirement for cost data reporting to government-performed efforts that support acquisition programs. The first reports are now coming in from Army depots and the Defense Logistics Agency (DLA).
 - The Cost and Software Data Reporting (CSDR) report of plant-wide cost data of a company business unit has been improved significantly. The new format was made mandatory for new contracts beginning in 2020.
- **EVAMOSOC.** Due to recent statutory requirements, CAPE now has a requirement to develop a comprehensive enterprise-wide operating and support (O&S) cost data system, which is known as EVAMOSOC. The plan is to develop and implement a common taxonomy, data definitions, and business rules as defined collaboratively by the DoD cost community and codified in policy. This requirement also presents an opportunity to address gaps in coverage from the current O&S cost data systems and serve a wider user community. CAPE has formed an EVAMOSOC Data Working Group with the military departments. To date, pilot programs have established and demonstrated preliminary concepts for the data structures and definitions that will create data standardization across DoD. CAPE awarded a contract in September 2020 for database design and 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. These systems include the current military department O&S cost data systems as well as other service-specific data systems where possible. Development of the EVAMOSOC platform will continue through 2025.
- **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. This work has been refocused to respond to new guidance—"Back-to-Basics for the Defense Acquisition Workforce"—issued by USD(A&S) in September 2020. Education and training supported by an advanced training system specific to CAPE 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 virtual training and outreach activities to government organizations and defense industry contractors throughout the country in 2020. CADE users, most of whom currently work from home, also have access to modern on-line training and to several user guides.

The report also includes the following 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 enumerates recent CAPE policy memos that pertain to cost data reporting.

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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 ongoing efforts to strengthen these institutions to meet the evolving needs of the Department and new legislative requirements.

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 roles and missions of the various DoD cost analysis organizations.

At the OSD level, CAPE is the principal office for independent cost estimation and cost analysis. In addition, CAPE 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 policy for and oversight of DoD cost assessment activities. CAPE may also provide ICEs for acquisition programs under certain circumstances explained later in this chapter, or it may review a Component ICE under other circumstances.

The headquarters for each military department has its own cost agency or other organization. These organizations provide senior decision-makers with a wide variety of cost and economic analyses to support acquisition, programming, and budget decisions. These analyses may address individual weapon systems, or in some cases, may address broader issues such as force structure or installations. The military department cost agencies or other organizations may provide policy guidance that is unique to each of the Components. In some circumstances, these cost-estimating agencies may provide ICEs for acquisition programs managed by their Component. The military department cost agencies or other organizations function independently from their acquisition organizations because they reside in the financial management organizations of their military departments and are outside their military department's acquisition chain of command.¹

There are also many field-level cost organizations. These organizations provide resources to support higher headquarters' cost estimates and analyses, and they 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 to support 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

¹ The Department of the Navy (DoN) has restructured its cost-estimating organizational structure. These changes are described in Chapter IV.

community workforce often possess important specialized cost and technical experience unique to specific systems or commodity groups, such as satellites, submarines, or tactical missiles.

Cost Assessment Procedures

DoDD 5105.84, *Director of Cost Assessment and Program Evaluation (DCAPE)*, was most recently approved on August 14, 2020 and serves as the CAPE charter. The directive defines overall CAPE roles, responsibilities, and authorities in the Planning, Programming, Budgeting and Execution, acquisition, and requirements processes. Regarding cost assessment, this directive establishes DCAPE as the principal official for independent cost estimation and cost analysis for DoD acquisition programs.

Specific guidance on prescribed policy and procedures is provided in DoDI 5000.73, *Cost Analysis Guidance and Procedures*, which was most recently approved on March 13, 2020. The instruction is the primary vehicle for implementing the cost assessment provisions that are in statute throughout DoD. In particular, this instruction provides guidance to the military departments and defense agencies concerning the preparation, presentation, and documentation of life-cycle cost estimates for acquisition programs. This instruction also assigns roles and responsibilities and describes the process and timelines for various cost assessment activities.

Recent efforts to update DoDI 5000.73 to respond to major changes in DoD acquisition policy and new statutory requirements 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 MDAP Milestone Reviews and Other Events

This section describes DoD cost assessment procedures for MDAPs.

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-MDAPs² and MDAPs for which the USD(A&S) is the MDA:

- Before 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).
- Before any decision to enter low-rate initial production 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 describes the procedures for MDAP unit cost reporting and the criteria for a critical unit cost breach.
- At any other time considered appropriate by DCAPE or upon the request of USD(A&S) or other senior leaders of the Department.

When the MDA is delegated to the Component for milestone and other acquisition reviews, CAPE either (1) reviews the ICE prepared by the military department cost agency (or defense agency equivalent),

² 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.

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 to collaboratively develop 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 consist of 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 NDAA 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, will 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 elected to move oversight for many of these programs to the military departments. As of January 2021, USD(A&S) is the MDA for 13 of the 92 programs, and the SAEs are the MDAs for the remaining 79.

DoD has adopted the Adaptive Acquisition Framework that provides several new acquisition pathways in addition to MDAPs. The DoD policy for the Framework is provided in DoDI 5000.02, *Operation of the Adaptive Acquisition Framework*, that was issued in January 2020. Chapter IV explains the new cost assessment procedures for these additional acquisition pathways.

Component Cost Position and Full Funding Commitment

CAPE policy for MDAPs requires the Component to establish a formal position on the estimated cost of the program and to commit to fully fund the program in the Future Years Defense Program (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, which does not have a Deputy Assistant Secretary for Cost and Economics position, 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 (DAB) or Component equivalent, the MDA will document this 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.

Role of the Independent Cost Estimate

Acquisition programs are supported by ICEs at milestone reviews and other program decision points. In practice, an ICE for a program 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 FYDP to execute the program without 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
- Options to achieve better program outcomes as circumstances change or unexpected events occur

Multiyear Procurement Contracts

Title 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 supports 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 NDAA and the Department of Defense Appropriations Act) for the use of the MYP strategy, the Component and the contractor negotiate and finalize 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

Title 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 report, the current practice in the DoD cost community now distinguishes 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 both inflation and appropriate escalation indices in cost estimates to be a best practice. This approach provides 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 analysts can use to prepare and document 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 public 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

Title 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 the obligation of funds. Section 2334f also states that cost analyses and targets developed for the purpose of contract negotiations and the obligation of funds will 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 lower costs, 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 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 provides 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, various organizations preparing cost estimates for a program can develop their estimates based on a shared understanding of program requirements and content.

The CARD format uses a narrative document augmented by a data template for the collection of most technical data (such as programmatic information and design and performance parameters). The narrative, excluding tables and figures, should be approximately 20 pages long. The technical data are provided through standardized spreadsheet templates (known as CARD tables) specific to each weapon system commodity type (such as aircraft, ships, missiles, and so on). 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>.

DoD Cost Estimating Guide

CAPE has prepared a new *DoD Cost Estimating Guide* 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 U.S. 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 U.S. 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 cost community tools, methods, and policies for cases involving FMS.

Guidance and Procedures for Other Cost Assessment Activities

This section describes certain DoD cost assessment procedures other than cost estimates for acquisition programs.

Cost Comparisons of Military, Civilian, and Contractor Manpower

CAPE revised DoDI 7041.04, *Estimating and Comparing the Full Costs of Civilian and Active Duty Military Manpower and Contract Support*, on July 1, 2020. 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 to perform 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 2020 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*, on October 2, 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, which houses 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. Additionally, CADE includes a document repository to house ICEs; CCPs; CARs; 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 also 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 2,800 current CADE account holders. Roughly one-fourth of these are contractors in industry that report data, and roughly three-fourths 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 and certain other acquisition programs. The three Visibility and Management of Operating and Support Costs (VAMOSOC) systems (one system for each military department) collect historical O&S costs for major fielded weapon systems.

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

CHAPTER III. DOD COST ASSESSMENT ACTIVITIES IN FY 2020

This chapter summarizes DoD cost estimates and cost analyses that were made in FY 2020 to support MDAP milestone and other acquisition reviews, multiyear procurements, and other cost analyses. This chapter also provides 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 summarizes the three cost assessment activities in FY 2020 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 2020 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
Terminal High Altitude Area Defense	THAAD	Missile Defense Agency	CAPE Independent Cost Estimate	12-Jun-20	Full-Rate Production Decision	28-Oct-20
			Missile Defense Agency Cost Position	29-May-20		
Ground Based Strategic Deterrent	GBSD	Air Force	CAPE Independent Cost Estimate	22-Aug-20	Milestone B	8-Sep-20
			Air Force Cost Position	6-Aug-20		
Columbia Class Submarine	SSBN 826	Navy	Cape Cost Estimate for Lead Ship	26-Aug-20	In-Process Review	28-Aug-20
			Navy Program Office Estimate	26-Jun-20		

Remarks about Specific Programs

THAAD is a Missile Defense Agency program, and so is exempt from the traditional DoD acquisition process. For this program, the CAPE ICE was provided to an oversight body known as the Missile Defense Executive Board.

In August 2018, the Assistant Secretary of Defense for Acquisition (ASD(A)) requested that CAPE provide an assessment of the lead ship cost estimate prior to the authorization of lead ship construction. In response, CAPE prepared a cost estimate for the lead ship that includes the Shipbuilding and Conversion, Navy (SCN) costs. It excludes development, MILCON, SCN for later ships, O&S, and disposal costs.

Table 2 summarizes the cost assessment activities in FY 2020 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 2020 for MDAP Milestone or Other Reviews Subject to SAE Decision

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
M109A7 Family of Vehicles	M109A7 FOV	Army	CAPE Independent Cost Estimate (Update)	24-Mar-20	Full-Rate Production Decision	5-Feb-20
			Army Cost Position	5-Feb-20		
HH-60W Combat Rescue Helicopter	HH-60W CRH	Air Force	CAPE Independent Cost Estimate (Update)	1-Apr-20	Milestone C/Low-Rate Initial Production Decision	24-Sep-19
			Air Force Non-Advocate Cost Assessment (update)	27-Feb-20		
Joint Light Tactical Vehicle	JLTV	Army	CAPE Independent Cost Estimate (Update)	20-Apr-20	Full-Rate Production Decision	20-Jun-19
			Joint Program Office Estimate (Update)	15-Jan-20		
			Joint Cost Position	31-May-19		
Guided Missile Frigate	FFG(X)	Navy	CAPE Independent Cost Estimate	28-Apr-20	Milestone B	30-Apr-20
			Navy Cost Position	7-Apr-20		
Global Positioning System Follow-On Production	GPS-IIIIF	Air Force	CAPE Independent Cost Estimate	26-Jun-20	Milestone C/Low-Rate Initial Production Decision	13-Jul-20
			Air Force Cost Position	15-Jun-20		

Remarks about Specific Programs

The M109A7 Family of Vehicles had an FRP decision in February 2020, and a CAPE ICE was prepared to support that event. However, the CAPE ICE was updated and provided to the Army Acquisition Executive in March 2020. The ICE was updated to reflect the actual manufacturing labor and material costs from the most recent procurement contract that was completed in July 2019. This ICE update supported the determination of the proper level of procurement funding in the FY 2022 President's Budget request.

The HH-60W Combat Rescue Helicopter had a Milestone C review in September 2019, and a CAPE ICE and an Air Force cost assessment were prepared to support that event. However, this program experienced a major change to the annual procurement quantity profile in the FY 2021 President's Budget request that was submitted on February 10, 2020. Both the CAPE ICE and the Air Force cost assessment were updated to reflect the programmatic changes to the HH-60W to support the FY 2022 President's Budget request.

The Joint Light Tactical Vehicle had an FRP decision in June 2019, and a CAPE ICE and a Joint Cost Position were prepared to support that event. However, this program experienced three major changes as a result of the FY 2021 President's Budget request. First, the Army added 18,224 trailers to the program of record. These trailers attach to the vehicles for the transport of ammunition, weapons, and supplies. Both the CAPE ICE and a Joint Program Office Estimate were updated to reflect this change. Second, the Army and Marine Corp significantly reduced the JLTV annual funding that extended the JLTV procurement by 4 years. Third, additional vehicles were added to the program for the Air Force and the Navy. The update to the CAPE ICE also reflected these changes to JLTV to support the FY 2022 President's Budget request.

CAPE Cost Analysis for Multiyear Procurement

As noted in Chapter II, CAPE prepares a preliminary independent estimate of savings for a proposed MYP strategy and contract structure to support the Department's certification to the Congress of significant savings and other criteria, and updates the estimate of savings (after MYP approval from the Congress) prior to the award of a multiyear contract. Table 3 summarizes the three updated CAPE independent estimates of savings for MYP contract awards in FY 2020. Table 3 identifies the program name and acronym, the responsible Component, the CAPE supporting cost estimate of MYP savings, and the event being supported.

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

Program Name	Acronym	Component	Cost Assessment Activity	Activity Date	Supported Event	Event Date
C-130J Transport Aircraft	C-130J	Air Force	CAPE Updated Estimate of Savings for MYP Contract	11-Oct-19	MYP Contract Award	27-Dec-19
Virginia Class Submarine	SSN 774	Navy	CAPE Updated Estimate of Savings for MYP Contract	16-Oct-19	MYP Contract Award	2-Dec-19
Standard Missile 3 Block IB	SM-3 IB	Missile Defense Agency	CAPE Updated Estimate of Savings for MYP Contract	10-Feb-20	MYP Contract Award	27-Mar-20

CAPE estimates that using an MYP for these three programs will provide significant savings to DoD. For the three programs combined, the estimated total dollar savings is roughly \$2.5 billion in then-year dollars.

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 Table 1 and Table 2) was supported by (1) a CCP, and (2) an ICE prepared by the appropriate CAPE or military department cost agency. In addition, for each MYP contract award (noted in Table 3), CAPE provided an independent estimate of MYP cost savings. Information about the compliance of CSDR data reporting is provided in Appendix D.

Quality of the Cost Estimates

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

The quality of the cost estimates for MDAPs provided by the military departments, as well as CAPE, has also continued to improve due to better data. An increased, Department-wide emphasis by management on 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

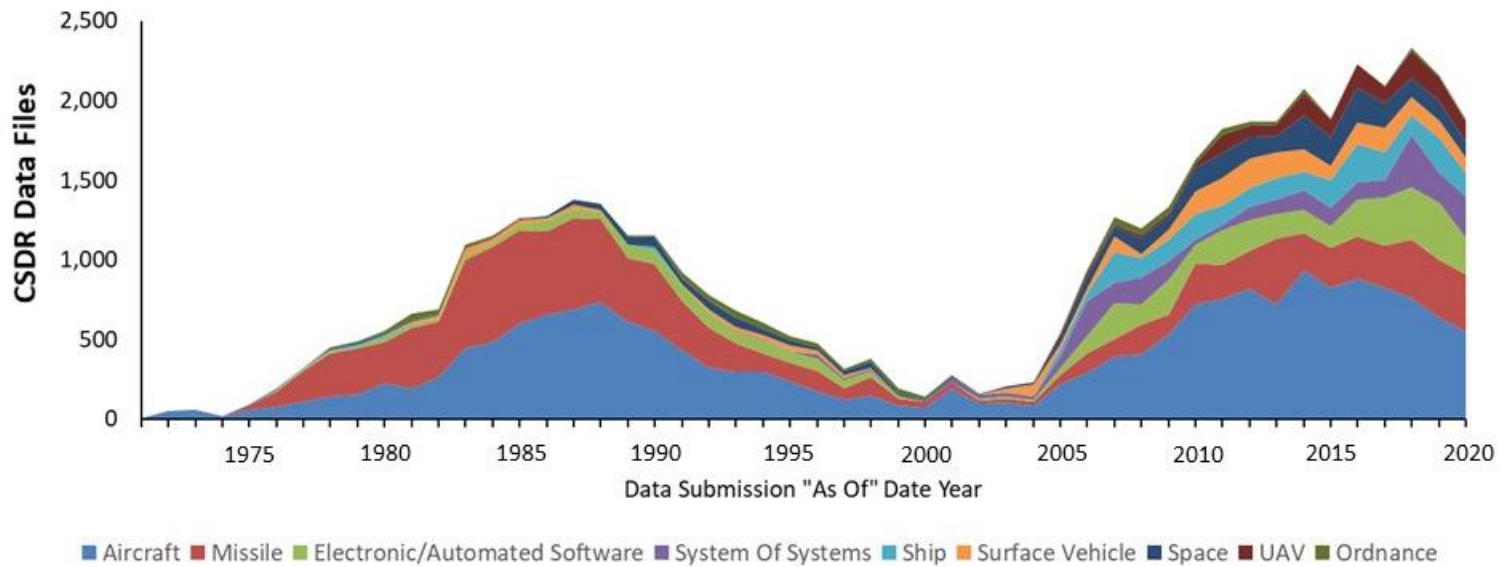


Figure 1. CSDR Data Collection over Time

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 2020 will typically be submitted in February 2021. As a result, the last year of the figure has an apparent drop-off in reporting, because not all of the 2020 reports had been submitted by the publication date of this report.

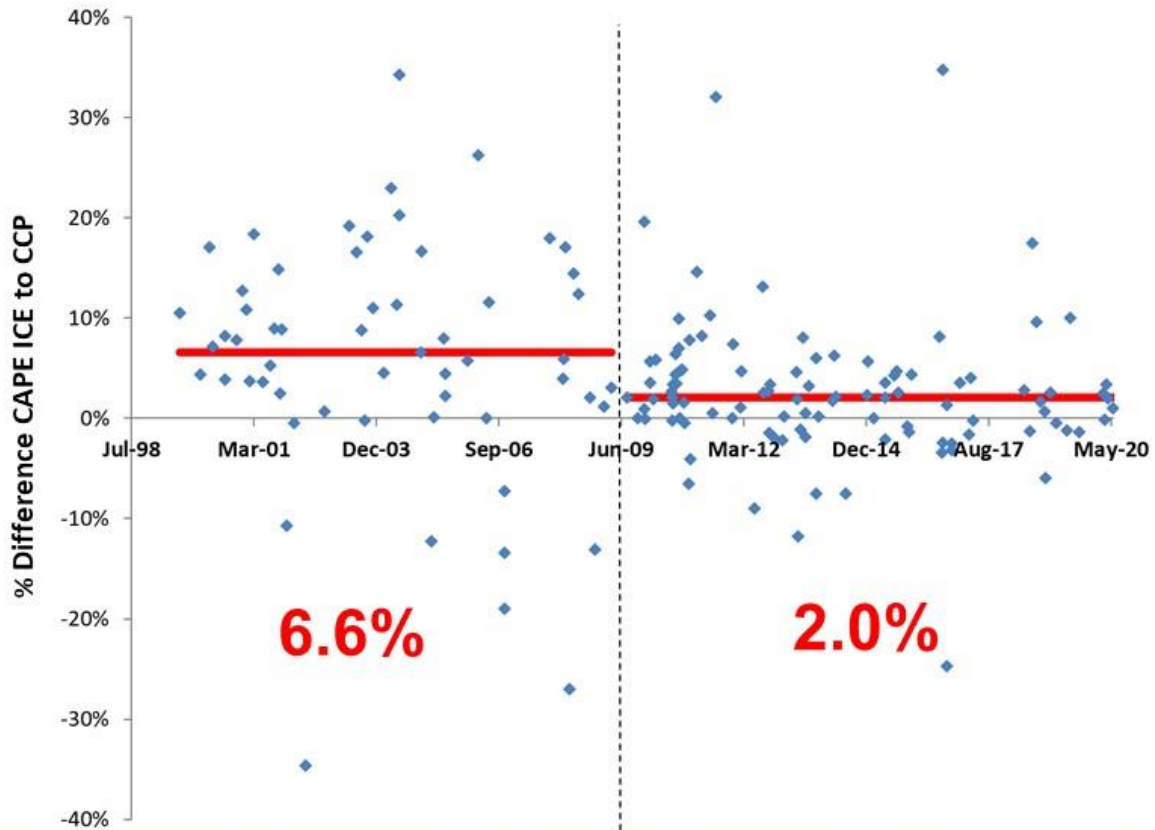
The emphasis on better data is not limited to the volume of reports. Additional ongoing efforts to improve the content and quality of the specific data reports are described in Chapter IV.

Differences in Methodologies

Since the enactment of WSARA, differences in methodologies or approaches between the cost estimates prepared by the military departments and by CAPE have decreased over time. Generally, the approaches used 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 Department’s goal has been to improve the systematic collection of actual cost information over time and ensure the data are available to all DoD organizations. This approach has resulted in smaller differences between the cost and schedule forecasts of the military departments and CAPE.

An annual CAPE analysis compared the CAPE ICEs and the CCPs. This analysis found that since the enactment of WSARA, the difference between the two estimates had 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.

Differences 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 ICEs to Component Cost Positions

Since the enactment of WSARA, the median difference is 2.0 percent, compared to a median difference of 6.6 percent for the previous period. In addition, the statistical variances have 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, a few outliers have indicated significant discrepancies (greater than 10 percent) between the CCP and the CAPE ICE. In these situations, CAPE and the military department cost agency meet to assess the reasons for the discrepancy and determine whether there are better data available to reconcile the difference. Failing that, CAPE and the military department work together to assess how costs can be controlled as the program moves forward.

For the FY 2020 estimates in Table 1 and Table 2, where CAPE prepared the ICE, there were no significant outliers. Rather, the differences between the CAPE ICE and the CCP for these eight programs were all less than or equal to 4 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)

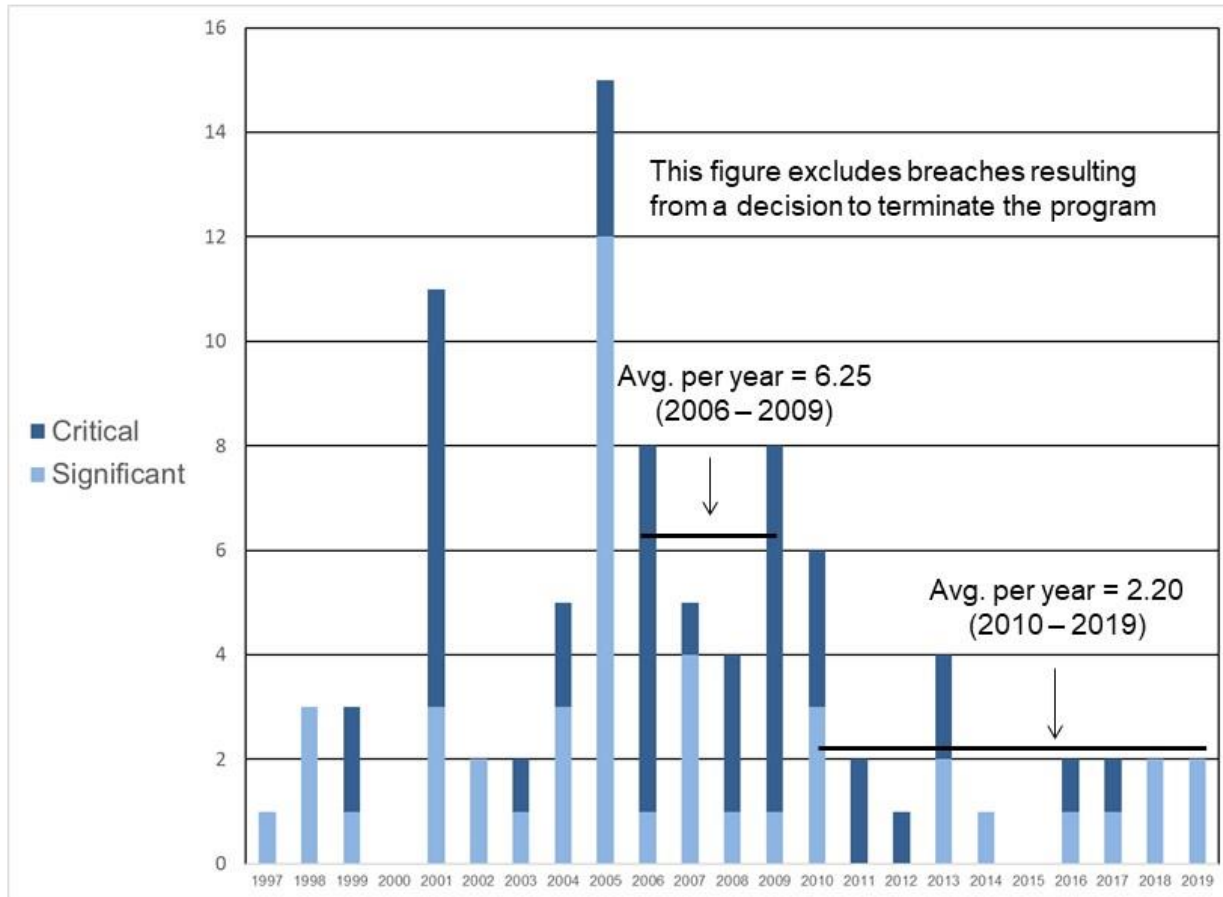


Figure 3. Number of Nunn-McCurdy Breaches by SAR Reporting Year

It is important to note that the NDAA for FY 2006 changed 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 requirement caused a large spike in 2005, when 11 programs had to report preexisting significant breaches. Thus, for historical comparisons, the period before 2006 is not comparable to the period after that. For the more recent period, the average annual number of breaches has declined since the enactment of WSARA in 2009.

Other Cost Assessment Activities

Other Cost Estimates and Analyses

CAPE prepared an ICE for the Chem Demil – ACWA program. ACWA performs a portion of the chemical demilitarization program mission to safely destroy remaining chemical weapons stockpiles. The United States uses this program to comply with the Chemical Weapons Convention established in 1997. The ICE was initiated in response to a recommendation by the DoD OIG. The Senate Report that accompanied the FY 2020 DoD Appropriations Act required that CAPE provide the ICE to the congressional defense committees no later than 15 days after its completion. The ICE was provided to the DoD OIG on January 29, 2020, and was forwarded to the congressional defense committees on February 10, 2020.

CAPE prepared an ICE for the F-35 Joint Strike Fighter program. The ICE was directed by the NDAA for FY 2020. The ICE was provided to the congressional defense committees on June 17, 2020.

CAPE prepared a preliminary ICE for the Conventional Prompt Strike (CPS) program. CPS is managed as a middle tier of acquisition (MTA) rapid prototyping program. The ICE was directed by the Senate Report that accompanied the FY 2020 DoD Appropriations Act. The ICE was briefed to congressional staff on May 29, 2020, and provided to the Assistant Secretary of the Navy for Research, Development and Acquisition (ASN (RD&A)) on June 19, 2020.

The F-35 program uses a contracting strategy that procures material and equipment through Economic Order Quantity (EOQ) contracts. CAPE assessed the realism of anticipated cost avoidance through the use of these EOQ contracts. This assessment was directed by the Senate Report that accompanied the FY 2020 DoD Appropriations Act. The assessment was provided to the congressional defense committees on July 10, 2020.

DoD Cost Analysis Symposium

For several decades, CAPE and its predecessor organization have 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 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.

Obviously, the ongoing COVID-19 pandemic has prevented DoD from holding a traditional symposium event. In the long term, the hope is to resume the symposium when it is safe to do so. In the interim, CAPE held two community-wide virtual meetings. In October 2020, CAPE held its inaugural Virtual Cost and Technical Focus Group, which included several presentations concerning CAPE policy updates and major ongoing initiatives. This event was attended by over 200 personnel from government and industry. In February 2021, CAPE held a Cost Integrated Product Team General Session that included presentations concerning COVID-19 cost reporting, the FlexFiles initiative, CAPE policy updates, and a review of new relevant statutory requirements contained in the NDAA for FY 2021. There was also a presentation concerning a recent CAPE study on cost trends for radar systems, an event that was attended by over 330 personnel from government and industry.

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 toward meeting the evolving needs of the Department and new legislative requirements. This chapter discusses the ongoing status of future plans for several key initiatives that make up this reform effort.

Cost Leadership Forum

The CAPE Deputy Director for Cost Assessment has held periodic meetings (known as the Cost Leadership Forum) 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. In addition, these meetings will help develop a collective vision of the cost community's path forward for the next 5 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.

In addition, the Cost Leadership Forum discusses issues and challenges with personnel and staffing levels in the organizations in the DoD cost community. A significant increase in workload for the cost community is anticipated due to recent additional legislative and regulatory guidance. This new guidance concerns new acquisition pathways and sustainment reviews as discussed in the next section of this chapter. In addition, Section 151 (Budgeting for Life-Cycle Costs of Aircraft for the Army, Navy, and Air Force) of the NDAA for FY 2021 requires DoD to submit an annual plan for the procurement of the aircraft in the military departments. This plan includes cost estimates for (1) the annual investment funding necessary to carry out each aircraft program, and (2) the annual funding necessary to operate, maintain, sustain, and support each aircraft program throughout the life cycle of the program. Additional discussion about Section 151 is provided in Appendix C.

Policies and Procedures

Cost Assessment Procedures for New Acquisition Pathways

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 described in Appendix C. The revision also considerably changes and adds to cost data 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. These pathways were introduced in DoDI 5000.02, *Operation of the Adaptive Acquisition Framework*, that was issued in January 2020. These pathways provide options for program managers and senior acquisition officials to develop acquisition strategies that match the characteristics of the capability being acquired. The adaptive acquisition pathways are shown in Figure 4.

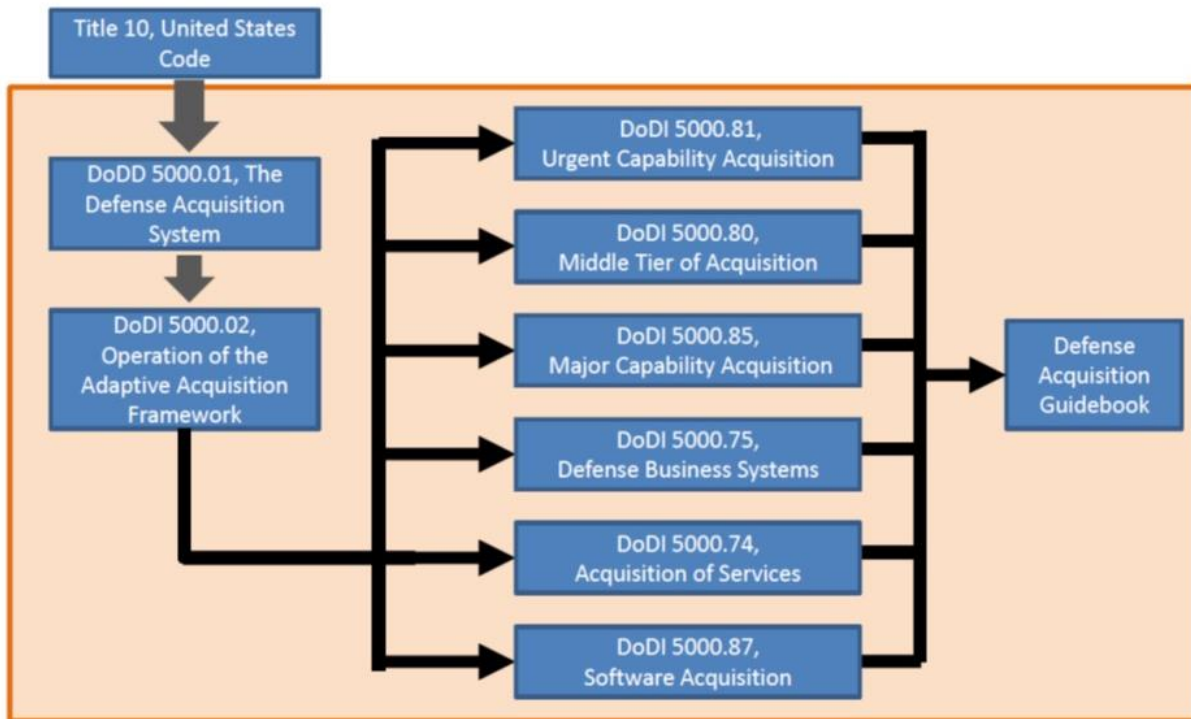


Figure 4. Adaptive Acquisition Framework Pathways

The term “Major Capability Acquisition” refers to MDAPs; major systems (i.e., Acquisition Category (ACAT) II programs); and other capabilities developed by the major capability acquisition pathway. The acquisition and cost assessment procedures for these programs, which are described in Chapter II, are largely unchanged.

However, recent legislation requires that each military department conduct a sustainment review of each major weapon system (i.e., a weapon system acquired as an MDAP) every 5 years after declaration of IOC. Each sustainment review must include an ICE for the remainder of the life cycle of the program. In the March 2020 revision to DoDI 5000.73, there are three options for the preparation of the ICE: CAPE may choose to (1) prepare the ICE, or (2) review and approve a military department or defense agency equivalent ICE, or (3) delegate responsibility for the ICE to the Component. In any case, the ICE will be briefed at the sustainment review, and a copy of the ICE report will be provided to CAPE within 7 days of the sustainment review. Additional legislative provisions concerning sustainment reviews are discussed in Appendix C.

One new acquisition pathway was established by Section 804 (Middle Tier of Acquisition of Rapid Prototyping and Rapid Fielding) of the NDAA for FY 2016. This pathway provided the Department with new authority to establish a “middle tier” of acquisition programs intended to be completed within 5 years from the start of the MTA program. The MTA process provides two possible acquisition paths: (1) rapid prototyping (prototypes with innovative technologies), and (2) rapid fielding (new or upgraded systems with minimal development). For the rapid prototyping path, the objective is to field a prototype that meets defined requirements that can be demonstrated in an operational environment and provide a residual operational capability within 5 years from the program start date. For the rapid fielding path, the objective

is to complete fielding of the program within 5 years from the program start date. MTA programs fall between “urgent acquisitions” that are generally completed within 6 months to 2 years, and “traditional” acquisition programs that last much longer than 5 years.

Programs in this middle tier follow streamlined procedures and are 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 production and fielding under the rapid fielding pathway or the traditional acquisition process. This guidance was provided in DoDI 5000.80, *Operation of the Middle Tier of Acquisition (MTA)*, issued in December 2019. This instruction directs that DoD Components will develop processes for (1) the merit-based selection of approved requirements to meet needs communicated by the Joint Chiefs of Staff and the Combatant Commanders, (2) the development of an acquisition strategy that addresses security, schedule and production risks, (3) a full funding strategy that is based on a cost estimate, and (4) the development of a test strategy for demonstrating and evaluating the performance of the proposed products and technologies. This instruction also states that DCAPE establishes policies and prescribes procedures for cost estimates and collecting cost data 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 MDAP dollar thresholds.³ 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 system dollar thresholds.⁴ For either case, CAPE and the director of the responsible military department cost agency will determine the organization responsible for the life-cycle cost estimate for an MTA program 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.

For Defense Business Systems, CAPE may conduct a cost estimate at DCAPE’s discretion. For all other cases, the military department cost agency or defense agency equivalent will conduct cost analyses or delegate this responsibility to another designated organization. Cost analyses will be conducted for each phase of the business capability acquisition cycle in order to support authority to proceed decision points.

For contracted services, CAPE may conduct a cost estimate at DCAPE’s discretion. All other cost estimates for contracted services will be conducted in accordance with the policies and procedures issued by the relevant military department cost agency or defense agency equivalent.

³ 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.

⁴ 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.

For software acquisition, CAPE will conduct an ICE for programs likely to exceed MDAP or major system thresholds before the program enters the execution phase. CAPE may, at its discretion, delegate the authority for the cost estimate to the military department cost agency or defense agency equivalent. Estimates for software programs that do not exceed the major system threshold will be conducted according to the policies and procedures issued by the relevant military department cost agency or defense agency equivalent.

Cost assessment procedures for Defense Business Systems, contracted services, and software acquisitions are new and have not been validated or refined based on lessons learned from actual experience.

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

Cost Assessment Procedures for Missile Defense System Programs

The programs of the Missile Defense Agency are exempt from the traditional DoD acquisition processes and procedures. Instead, in March 2020, the Deputy Secretary of Defense issued Directive-type Memorandum 20-002, *Missile Defense System Policies and Governance*. This memorandum establishes policy, assigns responsibilities, and prescribes procedures for missile defense system programs. In this memorandum, for each missile defense system program, DCAPE (1) develops an ICE before the product development decision or the production decision, and (2) identifies, and recommends to the Deputy Secretary of Defense, sources of funding at a funding level consistent with the CAPE ICE. The Director of the Missile Defense Agency develops a life-cycle cost estimate and an affordability analysis that are provided to DCAPE before the product development decision for each missile defense system program.

Department of Navy Cost Organization Changes

In March 2019, the Navy reorganized its cost analysis community and moved many responsibilities and resources away from the Navy cost agency (Naval Center for Cost Analysis, or NCCA) and to the cost organizations of the Navy major system commands. In particular, the Navy removed responsibility for MDAP cost estimates from NCCA.

Prior to February 2020, CAPE was in the process of negotiating a memorandum of agreement (MOA) with the Navy to have cost personnel from Navy organizations detailed to CAPE temporarily to work on CAPE-led teams preparing ICEs, specifically for Navy and Marine Corps programs. The draft agreement, which was never completed and signed, included provisions for Navy personnel to travel and work in CAPE spaces in the Pentagon for the duration of each detail. Unfortunately, with the U.S. onset of COVID-19 in early 2020, and the immediate implementation of DoD risk management measures, certain provisions in the original draft agreement are not currently feasible.

CAPE is still very interested in working with Navy to augment CAPE teams responsible for developing the ICEs for Navy and Marine Corps programs, and in improving the breadth and depth of experience levels of Navy personnel responsible for developing cost estimates in the Navy. As a result, CAPE and Navy agreed to implement a first pilot demonstration by having personnel from the NAVAIR cost team in Patuxent River, Maryland participate on the CAPE team developing the Milestone B ICE for the Next Generation Jammer (NGJ) – Low Band (LB) program. This ICE was completed on November 30, 2020, and forwarded to the Navy on December 11, 2020.

This pilot program was executed in accordance with the spirit of the prior draft agreement but with specific implementation differences. For example, Navy personnel were not resident in CAPE spaces as part of their details as originally envisioned. Instead, nearly all of the interactions and meetings of the NGJ-LB CAPE ICE team occurred in virtual environments—including classified meetings. Also, both CAPE and Navy personnel shared access to the same data sources for developing cost estimates through CADE. CAPE plans to update the draft MOA to incorporate all of the lessons learned from this experience.

Cost Assessment Data Enterprise

A new design for the Data and Analytics home page, displayed in Figure 5, was added in October 2020.

Welcome to CADE: Data and Analytics

The Authoritative Source for Defense Cost Data

Search for CSDR Data

CSDR Browse

Browse authoritative CSDR submissions with enhanced searching on metadata and the WBS. Download 1921, SRDR, FlexFile, and CWBS Dictionary files and export flat data.

Data by Program

View all available data for a given program, including SAR data, CARDS, associated documents, and planned and scheduled CSDR submissions by contract.

Search Programs

GO

[Advanced Program Search](#)

[★ My Favorite Programs](#)

1921-3 Data

Cross-Report
CCDR Query

CARDS

ACDB Inventory

D&A User Guide

Cost Libraries

Other Libraries

Endorsed Datasets, Tools and Models Hub

Endorsing Organization

Keyword search

Service

Commodity



FCoM: Full Cost Of Manpower Tool

The FCoM tool generates cost estimates associated with DoD military, civilian, and contractor personnel.



NAVAIR SRDR DB: Navair Software Data Compilation

Joint agency SRDR database compiled by NAVAIR as of July 2020.



AFTOC System: Air Force Total Ownership Cost

Provides routine, timely visibility into all AF costs including all major AF systems, all appropriations and Major commands



OSMIS: Army Operating And Support Management Information System

OSMIS tracks O&S information for more than 1,600 major Army weapon/materiel systems for DASA-CE.



VAMOSOC - Navy: Navy Visibility And Management Of Operating & Support Costs

The Navy VAMOSOC management information system collects and reports US Navy and Marine historical operating and support costs.



VAMOSOC Air Force - Aircraft: Consolidated Vamosoc Tool Air Force - Aircraft

The CVT allows each Service's VAMOSOC data to be retrieved and analyzed in a common framework using a common tool.

Figure 5. CADE Data and Analytics Home Page

The home page supports analysts better by offering two modes to access data. The first mode supports queries for CSDR and other data in the CADE data warehouse or library 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. A step-by-step guide for using the home page is provided in a Data and Analytics User Guide. The second mode supports analyst queries by individual program. This mode 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. This mode also allows access to the CSDR by contract and report type for each program and also allows access to CARDS and other library documents and other files for each program.

Another CADE feature that was added in 2020 is the Endorsed Datasets, Tools and Models Hub (DTMHub), which allows endorsing organizations to share datasets, tools, and models with the cost community. Users can search for items of interest by organization, keyword, branch of service, or commodity (such as aircraft or ship). Alternatively, users can access a specific application and download items and user guides.

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 working groups. These groups support various initiatives to improve the quality of data collection and reporting and increase efficiency through better business processes. The ongoing initiatives to improve cost data collection are described in the remainder of this section.

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

Cost Data Collection in a COVID-19 Environment

The global pandemic has had an undeniable impact on society as a whole and the defense industrial base in particular, with disruptions to the workforce, production activities, and supply chains. These disruptions, in turn, affect program cost, schedule, and performance. CAPE has coordinated with ASD(A) and the Army, Navy, and Air Force SAEs to begin developing data collection guidance to understand the effects of COVID-19 on contractor performance and capture the effects to support future analysis and decision support.

On May 27, 2020, initial guidance was issued in the memorandum, “COVID-19 Cost and Performance Data Collection Guidance.” This memo instructed the military departments and buying commands to engage with their respective suppliers to develop an approach for capturing the effects of COVID-19 in future CSDR deliverables. Contractors required to submit CSDR deliverables before the specific reporting guidance is issued were instructed to include relevant information on COVID-19 effects (e.g., overhead rates, material costs from suppliers, or specific Work Breakdown Structure (WBS) elements) in the remarks sections of reports. In addition, program offices should work with their contractors, suppliers, and other government activities to document the methodologies used to collect and isolate the cost and schedule impacts associated with COVID-19.

Beginning in August 2020, the reporting instructions in new and revised CSDR plans require the reporting entity to provide COVID-19 related impacts, if applicable. Specifically, the reporting entity should describe the type and timing of all impacts—to program schedule, incurred actual costs to date, forecasted at completion costs, in process quantities, and delivered quantities—that are directly attributable to the COVID-19 pandemic.

At present, there is continuous dialog between government and industry that will iterate and collect lessons learned to provide industry clearer and improved guidance on reporting COVID-19 impacts. CAPE, in coordination with USD(A), expects to issue specific CSDR guidance in the future when all parties better understand the quantifiable effects across DoD's major programs.

FlexFiles Initiative

Until recently, cost data was collected in legacy CSDR report formats, similar to those first created in the 1960s. Some contractors had to manually allocate from their financial and other accounting systems into these formats. CAPE partnered with the military department cost agencies to commission a government team to work with industry. The goal was to improve data quality and enable the submission of monthly 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. This change also provides analysts with more flexibility in using the data in cost estimates. This initiative is known in the cost community as FlexFiles.

CAPE issued a policy memo in March 2019 to mandate the use of FlexFiles on all new contracts beginning in May 2019. As of August 2020, there were 254 approved FlexFile CSDR plans and over 1,400 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 is available on the CADE public website at <https://cade.osd.mil/policy/flexfile>.

The transition from the legacy CSDR submissions (known as the DD 1921 series) to Flexfile reporting is shown in Figure 6.

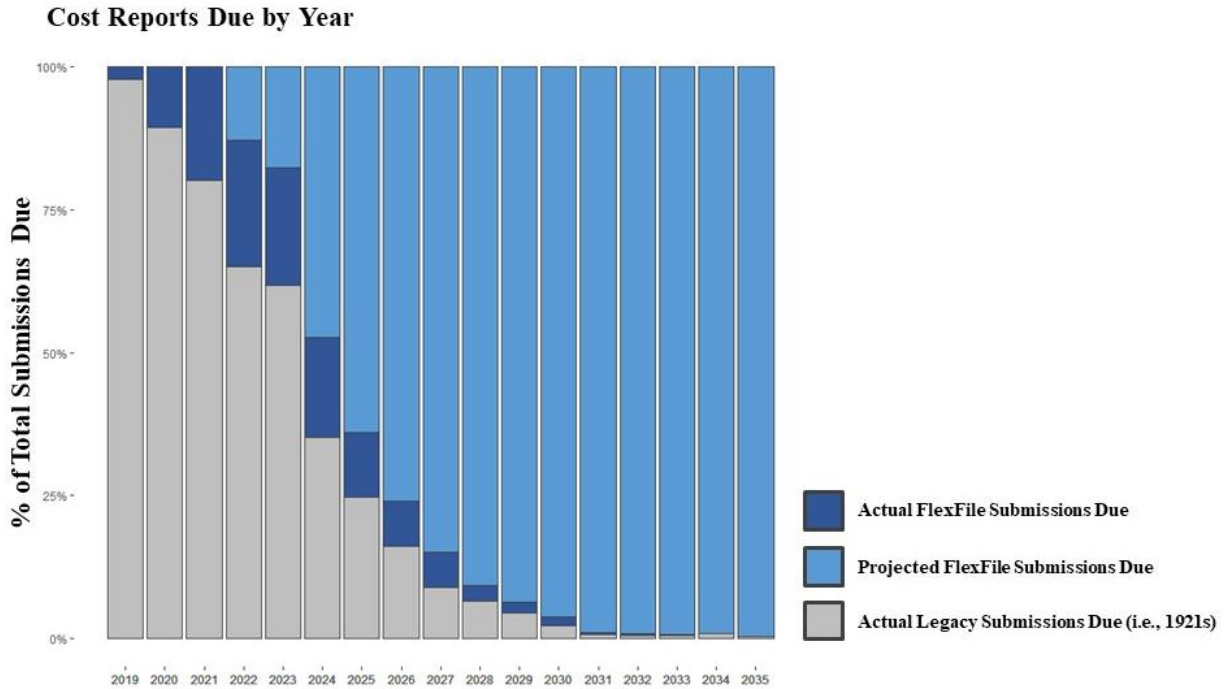


Figure 6. FlexFile vs. Legacy CSDR Submissions

Organic Industrial Base Cost Reporting

In January 2017, DCAPE signed a memorandum directing the collection of CSDR data from government-performed efforts. Although the requirement was publicized and communicated with affected organic industrial base organizations, initial attempts at collecting this data via legacy cost reporting practices were largely unsuccessful due to time and resource constraints at depots and arsenals.

In 2020, CAPE experienced a breakthrough in government reporting from the Army's industrial base facilities. Working with analysts from the Office of the Deputy Assistant Secretary of the Army for Cost and Economics (ODASA-CE), Army Materiel Command and multiple Army program offices, CAPE personnel ultimately identified a solution that maps cost data directly from the Army's depot maintenance Enterprise Resource Planning (ERP) system into CAPE's FlexFile cost data model for ingestion into CADE. This approach reduces workload on depot personnel and offers a solution for Army-wide implementation, as CAPE analysts can extract and process the data directly from a standard ERP user account. Although the technical solution is tailored to the Army ERP, CAPE intends to use the underlying approach as a blueprint for cost data collection in the organic industrial base across DoD. Of note, CADE accepted the first successful submission from this process in the summer of 2020 to include unit-level (vehicle-level) reporting on direct labor and material.

DLA Cost Reporting

From February 2020 through February 2021, CAPE and the Chief Management Officer conducted a comprehensive review of DLA to support the Department's ongoing Defense-Wide reform efforts. One issue from the review was that DLA failed to regularly follow CSDR requirements identified in DoDI 5000.73 and statutorily required by 10 U.S.C. § 3227. CAPE and DLA met to review and clarify

CSDR policy and to tailor CSDR data collection processes and requirements to DLA's method for developing and executing contracts. These meetings culminated in (1) a new DLA-specific CSDR training course, (2) updates to clarify CSDR requirements in the Defense Logistics Acquisition Directive, and (3) the initiation of regular reviews of upcoming DLA solicitations to develop and include CSDR plans in accordance with DoDI 5000.73 requirements. Since September 2020, 125 DLA employees have received CSDR training and 15 CSDR plans have been prepared or are in process for DLA actions. The resulting CSDR data collected on these contracts will assist CAPE analysts prepare cost estimates. This data also will assist DLA analysts prepare budget requests, forecast item quantity demand, and assess price reasonableness of the hardware and services procured on those contracts. This is the first time DoD has received DLA cost reporting since the department began collecting contractor cost data.

Improved Contractor Business Data Report

One of the reports in the CSDR system is the Contractor Business Data Report (referred to as the 1921-3 by the cost community). Although other CSDR reports focus on individual programs and contracts, the Contractor Business Data Report collects general contractor cost data stratified by direct categories (direct labor, direct material, and other direct expenses) and indirect categories (overhead, General and Administrative, 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. These assessments are 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 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 and indirect costs 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. This approach caused the mapping to be artificial and somewhat arbitrary, obfuscating important business base information. In addition, this mapping was not readily visible to government users of the report.

To remedy this situation, CAPE developed a new draft Contractor Business Data Report format with associated instructions and distributed it to reporting contractors in February 2018. The new report can be submitted in the contractor's 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 could choose whether to use the previous report with the government-defined categories, or use the new draft Contractor Business Data Report. Beginning in 2020, this report is transitioning to the contractor-defined format. The final version of the report format and reporting instructions are pending approval.

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 provide implementation details concerning the cost data collection policies and requirements that were issued in the March 2020 revision to DoDI 5000.73.

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 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. Between January and December 2020, there were 217 CSDR submissions from 15 Missile Defense Agency programs.

EVAMOSOC

There has been recent, significant legislation pertaining to weapon system O&S costs and associated cost data systems. Section 836 of the NDAA for FY 2018 (Codification of Requirements Pertaining to Assessment, Management, and Control of Operating and Support Costs for Major Weapon Systems) establishes that DCAPE is responsible for developing and maintaining a database on (1) operating and support estimates, (2) supporting documentation, and (3) actual operating and support costs for major weapon systems. Section 832 of the NDAA for FY 2019 (Implementation of Recommendations of the Independent Study on Consideration of Sustainment in Weapon Systems Life Cycle) requires the Secretary of Defense to implement each recommendation of an independent assessment by the MITRE Corporation (of the extent to which sustainment matters are considered in decisions related to requirements, acquisition, cost estimating, programming and budgeting, and research and development for MDAPs). This assessment was directed by Section 844 of the NDAA for FY 2017 (Review and Report on Sustainment Planning in the Acquisition Process). The MITRE Corporation 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 VAMOSOC systems
- Establish a common logon procedure for the VAMOSOC 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 VAMOSOC (EVAMOSOC) system. The vision is to collaboratively develop and implement a common taxonomy, data definitions, and business rules as defined by the DoD cost community and codified in policy. This requirement also presents an opportunity to address gaps in coverage from the current VAMOSOC systems and serve a wider user community.

CAPE has now formed a EVAMOSC Data Working Group with the military departments. To date, pilot programs have established and demonstrated preliminary concepts for the data structures and definitions that will standardize data across DoD. CAPE awarded a contract in September 2020 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 as well as other service-specific data systems where possible. Development of the EVAMOSC platform will continue through 2025.

As an interim measure, CAPE developed the Consolidated VAMOSC Tool 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 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 calculate commonly used cost metrics (such as aircraft dollars per flying hour) and display the data graphically.

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

In April 2011, CAPE supported the Navy and NPS in establishing an accredited Master's Degree Program in Cost Estimating and Analysis. This 2-year distance-learning program is a vital element of the education of the cost-estimating community and helps improve 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 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 do 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 Defense Acquisition Workforce Development Fund. The ninth cohort commenced in April 2019 and will graduate in March 2021. The tenth cohort commenced in March 2020 and will graduate in March 2022.

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 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 USD(A&S), co-chairs the oversight group known as the Curriculum Review Board (CRB) that is represented by all three military departments and the Fourth Estate (i.e., defense agencies and other organizations outside the military departments). The CRB is responsible for approving the curriculum associated with DAU and other courses leading to professional certification and credentials in cost estimating, as established by the Defense Acquisition Workforce Improvement Act (DAWIA). Initially, the working group developed a framework of desired core competencies—for apprentice, mid-level, and senior cost analysts—that currently guide education and training standards for course content. The working group has also collaborated with DAU to review the entire curriculum and course content to ensure that the core competencies are being addressed.

The DAU courses in cost estimating (CE) offered in 2020 are shown in Figure 7.

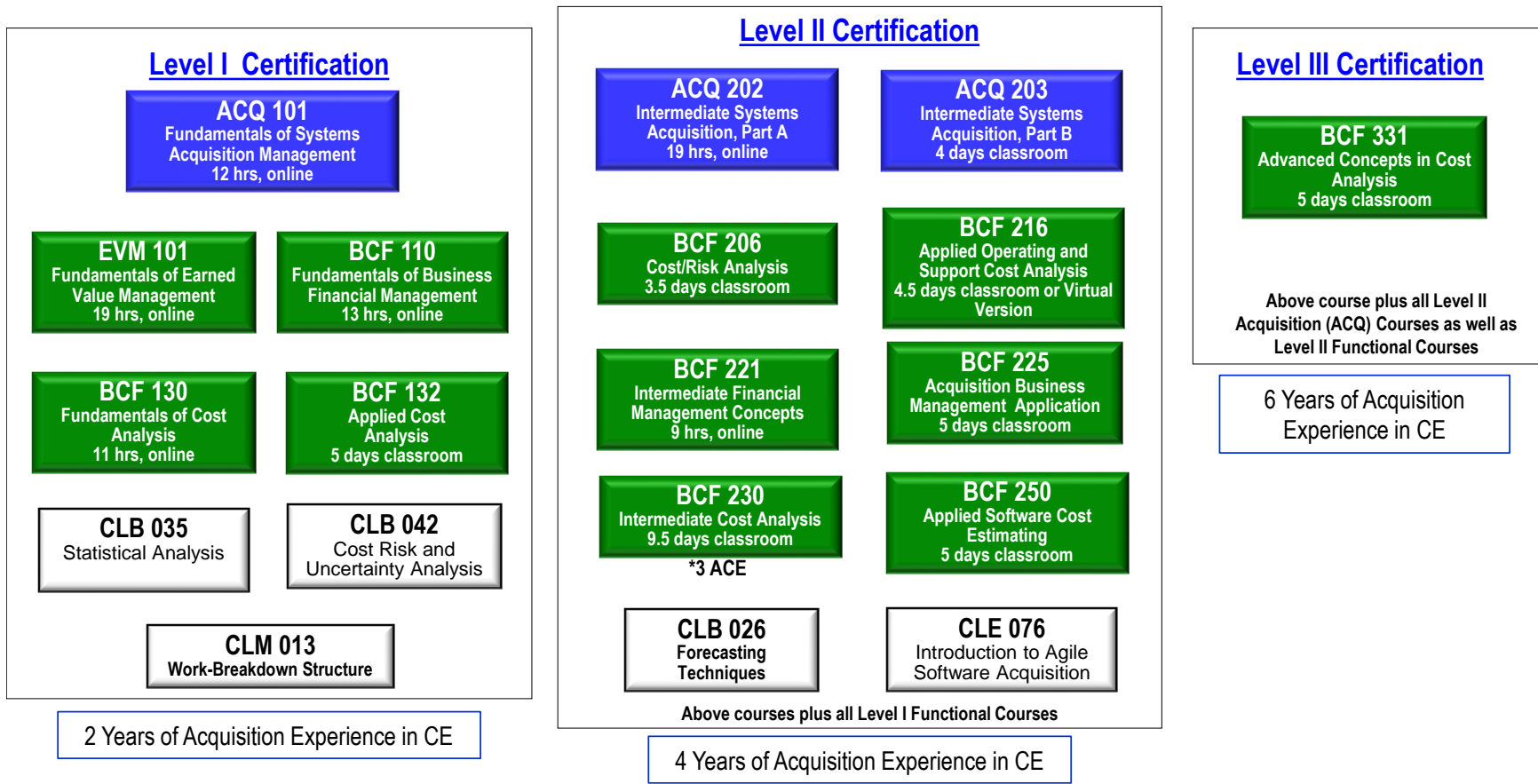


Figure 7. DAU 2020 Courses in Cost Estimating

CAPE has worked with DAU to review and participate in student pilot offerings for all core cost analysis courses, including Business, Cost Estimating, and Financial Management (BCF) 132 Applied Cost Analysis; BCF 230 Intermediate Cost Analysis; BCF 331 Advanced Concepts in Cost Analysis; BCF 216 Applied Operating and Support Cost Analysis; and BCF 250 Applied Software Cost Estimating. DAU also offers roughly 20 continuous learning modules (CLMs) related to cost estimating. These modules allow the workforce to earn continuous learning points (CLPs) in order to remain certified. During FY 2020, the focus was on implementing recommended changes to several core CLMs. CAPE also provided material and updates directly related to CADE, CSDRs, and the emerging policy and practice of FlexFiles.

CAPE has provided over 1500 substantive actionable comments in a thoroughly documented comment resolution matrix format for the core cost-estimating courses, and hundreds more for cost-related content across the program management, contracting, earned value management (EVM), and engineering curricula. CAPE continued to use DAU's course Development and Revision Tool to directly enter over 600 change requests for CLMs to enable the thorough and timely update of these online materials.

The review of the DAU curriculum has recently been subject to new policy guidance. On September 2, 2020, USD(A&S) issued a policy memorandum "Back-to-Basics for the Defense Acquisition Workforce." The purpose of the memorandum is to get "Back-to-Basics" (BtB) by streamlining the functional area framework for acquisition talent management and prioritize the limited training resources for the Defense Acquisition Workforce (AWF). The memorandum provides for the phased implementation of the BtB 21st Century AWF talent management framework, beginning October 1, 2020 with full deployment by October 1, 2021. The talent management framework was consolidated into six AWF Functional Areas. The BtB outcome for each functional area will streamline and restructure certification requirements, identify prioritized credentials, and provide for responsive continuous learning. One of these functional areas is Business/Financial Management/Cost Estimating; the functional leader for this area is ASD(A).

In July 2020, CAPE established the cost-estimating Tiger Team in anticipation of the BtB Memo. In coordination with ASD (A) and DAU, the Tiger Team developed an overarching framework for certifications and credentials that supports both Business/Financial Management and Cost Estimating. The Tiger Team gathered and identified competencies from different sources to create a comprehensive Competency Model for cost estimating that comprises the knowledge, skills, and abilities to be captured within the Acquisition Common Core, Business Functional Core (with Business/Financial Management), and Cost Estimating levels. The Tiger Team is currently working to determine the specific competencies within each level and has undertaken Strategic Sourcing (aka Make/Buy) analysis to determine which competencies may be best met via other sources.

CAPE also supervised the reinvention of the CRB in light of the BtB guidance. As a first step, CAPE conducted a detailed review of BCF 250, Applied Software Cost Estimating, and provided crucial feedback to enable ongoing improvement of the course materials. Through a MOA, these materials will be used in building out the International Cost Estimating and Analysis Association Software Cost Estimating Body of Knowledge, an effort that will strengthen the department's ties with professional standards per the BtB memo.

In addition, education and training specific to CADE, the utility of its data, and its functionality have been incorporated into the curricula at DAU, NPS, and AFIT. To support classroom training at these institutions, where contractor proprietary data is not permitted, 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. CAPE sustains 10 FACADE programs, demonstrating CSDR Plan Task and Submission Events; Contractor Cost Data Reporting (CCDR) files (i.e., 1921 series); Software Resources Data Reporting (SRDR) files; and CADE library data. FACADE leverages three FlexFile fake data sets (Ground Vehicle, Aircraft, Space) to enable students to view and use all four different FlexFile export options (1921 Formatted Report, 1921 Flat File, FlexFile Template, and FlexFile Flat File). 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 the CADE Data & Analytics application, CSDR data, related acquisition data, and the CADE library.

CAPE maintains a dedicated CADE training team that executed more than 20 virtual targeted CADE Regional Training courses and events in 2020. The team engaged with over 1,245 personnel in government and industry in the fields of cost, program management, and contracting. In addition, CAPE planned and executed its inaugural Virtual Cost and Technical Focus Group, promulgating CADE policy updates and major initiatives and increasing the awareness of over 200 leading government professionals and industry partners. Furthermore, CAPE launched an eight-part CADE Webinar series to provide an engaging platform that highlights how to use the CADE Portal and associated CSDR Planning and Execution Tool, informed by common User Support/Help Desk interaction. The team has fully incorporated modern analytical survey software into all training activities to assess the effectiveness of the training. The team also uses audience-participation polling software to provide live interaction between the trainers and the audience.

In FY 2018, CAPE stood up CADE Learn, an online Bridge Learning Management System (LMS), a software application for the delivery of electronic educational technology (e-learning) courses. As of October 2020, the Bridge LMS instructional platform included over 31 informative videos and 65 courses and multiple interactive elements tailored to 3,000 active CADE users and other members of the acquisition community. By making the CADE training material available via the LMS, CAPE can provide on-demand training to a much broader segment of the workforce. Since the beginning of FY 2020, the number of active users of CADE Bridge LMS grew to over 1,853 lifetime users. These users recorded over 5,992 completed modules, a 69.8 percent growth rate. Furthermore, during FY 2020, the team certified 290 analysts in CADE 101, 83 analysts in CSDR for Submitters, and 248 analysts in FlexFile 101 via Bridge LMS. This CADE-related training can be used by analysts to earn CLPs toward both DAWIA and Comptroller FM certification.

DoD Cost Estimating Guide

In December 2020, CAPE completed a new publication, the *DoD Cost Estimating Guide*, which is intended to be useful to all cost analysts, from novices to seasoned veterans. The guide provides important background information, including a review of relevant policy established in statutes and instructions, and explains standard cost terms and definitions. The guide also 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. In addition, the guide provides an extensive list of references and relevant courses at DAU and other institutions.

This guide is available on the CADE public web site at <https://cade.osd.mil/policy/costestimating>.

Operating and Support Cost Estimating Guide

Title 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. CAPE meets this requirement through the *Operating and Support Cost-Estimating Guide*, which provides terms and definitions for the standard structure or taxonomy for O&S cost elements. The guide also summarizes the O&S cost data and related data systems available to the DoD cost community, including contractor cost data reporting for major sustainment contracts. In addition, the guide provides a tutorial on best practices for planning, conducting, presenting, and documenting O&S cost estimates.

The guide was revised and reissued in September 2020. The revision added a discussion about a wide range of O&S metrics that are used by various DoD organizations for a variety of analytic purposes. The revision recommends an analytic approach that can be used to support sustainment reviews of major weapon systems after IOC. The guide also provides an example of an O&S cost estimate at the component or black box level of detail. In addition, the revision discusses the critical importance of product support during acquisition and provides a roadmap of the transition from the acquisition product support cost elements to the O&S cost elements.

This guide is available on the CADE public web site at <https://cade.osd.mil/policy/os>.

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 key milestones 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. This review determines the source of the cost estimate supporting the revised program and ensures that the program remains fully funded.

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Appendix A.

Cost Analysis Organizations in DoD

Independent Cost Assessment Organizations

Three key offices in DoD prepare ICEs for defense acquisition programs, one in OSD and two within the military departments. The office within OSD responsible for ICEs reports to DCAPE. Within the Army and Air Force, the offices report to their Assistant Secretary for Financial Management and Comptroller. The Navy uses a different structure that is described later.

Office of the Secretary of Defense

Deputy Director for Cost Assessment

The CAPE Deputy Director for Cost Assessment prepares ICEs for MDAPs and other acquisition programs when acquisition oversight has not been delegated to a Component. CAPE may also choose to provide an ICE for an MDAP or other acquisition program when acquisition authority has been delegated to a Component. In other cases, CAPE reviews the cost estimates and cost analyses prepared by the Component for MDAPs and other acquisition programs. The Deputy Director for Cost Assessment also provides leadership to the entire 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. DASA-CE also reviews and validates business case analyses, economic analyses, and special cost studies of major weapon systems, force structure, and O&S costs. In addition, DASA-CE develops cost factors for installation base operations, civilian personnel, and training operating tempo to support programming and budgeting. DASA-CE 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 transferred many resources and responsibilities from NCCA to the cost organizations of the major system commands. This reorganization is described in Chapter IV.

Department of the Air Force

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

The office of the Deputy Assistant Secretary of the Air Force for Cost and Economics (SAF/FMC) consists of headquarters staff elements and the Air Force Cost Analysis Agency (AFCAA). SAF/FMC also serves as the Executive Director of AFCAA. SAF/FMC approves the Air Force Service Cost Position for all major acquisition programs. AFCAA 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. This agency also develops annual estimates of aircraft cost per flying hour to support programming and budgeting decisions. In addition, AFCAA 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 summarizes these important organizations.

Department of the Army

Tank-automotive and Armaments Command

The Tank-automotive and Armaments Command (TACOM) Cost and Systems Analysis organization is responsible for preparing program office estimates, life-cycle cost estimates, economic analyses, and combat effectiveness modeling that support the development of combat and tactical vehicles. This organization manages the tools and databases to support cost and systems analysis processes for TACOM. The major cost analysis activities are life-cycle cost estimating, cost reporting and EVM, O&S cost baselines, support to 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. This division 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 to support weapon system cost analyses. The division also performs cost risk analyses and cost risk assessments to

support weapon system program decisions. Additionally, this division provides validation/review for cost estimates, economic analyses, and business case analyses.

Note that beginning in FY 2021, the Army is moving TACOM and AMCOM cost support personnel to the Program Executive Officers (PEOs) and Program Management Offices (PMOs).

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. This division 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 conducting life-cycle cost estimates, the Cost Department supports source selection cost evaluations, 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. This division also provides cost estimates to support the acquisition review process, including AoA studies. In addition, this division participates in contract proposal evaluations and the source selection process for builders and suppliers of ships and weapon systems. This division also 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 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 at the request of the PEO/C⁴I or PEO Space Systems. The division also provides more general cost analysis support to the PEOs as needed.

Marine Corps Systems Command

The Cost Estimating and Analysis (CE&A) Community is the Marine Corps Systems Command (MCSC) authority in the field of cost analysis. The CE&A Community conducts and oversees the development of cost estimates and analyses for MCSC and related PEO weapon, information technology, and non-standard training systems programs. The community advises the Commander, MCSC, and related PEOs on the historic, current, and emerging trends in elements of cost estimating and analysis. The community works for the MCSC Commander as an agent that provides independent cost and analytical products to MCSC Portfolio Management Offices, PMOs and related PEOs. The community has four functional

areas: Cost Estimating (CE), Contract Services Management (CSM), Integrated Program Management (IPM), and Studies and Analysis (S&A). CE includes analytical teams in direct cost support of the Portfolio Managers, Direct Reporting Program Manager, Training Systems, and related PEOs. CSM manages the Command's Services Requirements Review Board process and Program Management Tool submissions. IPM conducts Earned Value (EV) Management determination, EV and scheduling analysis, and scheduling. S&A is 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 also 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.

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Appendix B.

Major Defense Acquisition Program Unit Cost Reporting

Since 1982, the Congress has required DoD to track and report on the unit cost for most MDAPs. The requirement for unit cost reporting may be waived if the program has not entered Engineering and Manufacturing Development (EMD), a reasonable cost estimate has not been established for the program, and the system configuration is not well defined. The provisions of the law concerning unit cost reporting, commonly referred to as the Nunn-McCurdy provisions, are found in 10 U.S.C. § 2433 (Unit Cost Reports).

Two unit cost metrics are 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 specified percentages. Specifically, a unit cost breach takes place when any of the following criteria in Table B-1 are met, for either version of program unit cost (APUC or PAUC).

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

Note that two degrees are 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 SAR with additional, breach-related information. For critical unit cost breaches, in addition to notifying the Congress and submitting the SAR, the department is required to conduct a complete assessment of the program, led by USD(A&S), and determine whether the program should be terminated or continued. The department is required to terminate the program unless a letter signed by USD(A&S), certifying that the program meets specific 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 DCAPE has determined that the new unit cost estimates are reasonable.

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Appendix C.

Recent Legislative Changes

The NDAAAs for FY 2016 through FY 2021 significantly changed 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 NDAA 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. This section also provided specific responsibilities to the Chiefs of Staff and Secretaries of the Military Departments for balancing resources against priorities on acquisition programs, ensuring that 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 5 years. These programs would fall between “rapid acquisitions” that are generally completed within 6 months to 2 years, and “traditional” acquisition programs that last much longer than 5 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 selecting prototypes with innovative technologies. Programs in this middle tier must 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. A Defense Technical Information Center web site (discover.dtic.mil/section-809-panel/) provides various reports and recommendations made by the panel from August 2016 through 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 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, will be the SAE of the military department managing the program, unless under specific circumstances the Secretary of Defense may designate another official as the MDA.

The NDAA 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 will 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 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 IOC.
- Section 808 (Transparency in Major Defense Acquisition Programs) requires that the MDA for an MDAP will 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, (3) the statutory independent estimate of the cost of the program, and (4) 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) provides clarifying amendments to existing statutes for independent cost estimation. At Milestone A, the ICE will now include the identification and sensitivity analysis of key cost drivers that may

affect life-cycle costs of the program. In addition, the ICE will 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 will 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). These data will 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 assess 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 5 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 addresses the program product support strategy, performance, and operations and support costs of the system. Each sustainment review will also include a life-cycle cost estimate for the remainder of the program. 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 NDAA 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 Under Secretary of Defense for Acquisition and Sustainment. This reorganization became effective February 1, 2018.

The NDAA for FY 2018 contains the following provisions pertaining to defense acquisition policy and cost assessment procedures:

- Section 802 (Management of Intellectual Property Matters Within the Department of Defense) requires DoD to develop policy on the acquisition or licensing of intellectual property. The purpose of this policy is to enable coordination and consistency across the military departments and DoD in strategies for acquiring or licensing intellectual property; to ensure that program managers fully consider and use all available techniques and best practices for acquiring or licensing intellectual property early in the acquisition process; and to encourage customized intellectual property strategies for each system based on, at a minimum, the unique

characteristics of the system and its components, the product support strategy for the system, the organic industrial base strategy of the military department concerned, and the commercial market. This provision also requires DoD to establish a cadre of personnel who are experts in intellectual property matters. These experts will be assigned to a program office or an acquisition command within a military department to advise, assist, and provide resources to a program manager or program executive officer on intellectual property matters at various stages of system's life cycle.

- 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. As a result, the MDA must determine that the Service Chief and Secretary of the Military Department concur with the trade-offs among 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 NDAA for FY 2012. This provision mandates several ambitious requirements intended for DoD to take specific steps to improve its processes for estimating and managing O&S costs of major system. 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. This guide also recommends approaches and analytic methods for dealing with these legislative requirements. In addition, the provision requires that DCAPE will 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 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 will 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 NDAA 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 NDAA 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 begin implementing 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 NDAA for FY 2017. The implementation of each recommendation will commence no later than 18 months after the enactment of the NDAA for FY 2019. CAPE efforts to address certain improvements concerning the collection of O&S cost data recommended by the MITRE study are discussed in Chapter IV.

The NDAA 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 SARs 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 and 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 with 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 SAE to recommend to the Secretary of Defense at least one MDAP as a pilot program, including 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 NDAA for FY 2016. This guidance will include the business case elements required by an acquisition program and the metrics required to assess the performance of such a program.

The NDAA for FY 2021 contains the following provisions pertaining to defense acquisition policy and cost assessment procedures:

- Section 151 (Budgeting for Life-Cycle Costs of Aircraft for the Army, Navy, and Air Force) requires the Secretary of Defense to submit an annual plan for the procurement of the aircraft in the military departments in order to meet the requirements of the National Defense Strategy. This plan includes the estimated levels of annual investment funding necessary to carry out each aircraft program, and the estimated annual funding necessary to operate, maintain, sustain, and support each aircraft program throughout the life cycle of the program. For each of these two cost estimates, the plan will document whether the cost estimate is derived from a military department cost position or from a CAPE estimate. If the military department cost position and the CAPE estimate differ by more than 5 percent for any aircraft program, the plan will document the percentage difference and provide sufficient rationale to explain the difference.
- Section 802 (Improving Planning, Execution, and Oversight of Life Cycle Sustainment Activities) modifies 10 U.S.C. to improve DoD's planning, execution, and oversight of life cycle sustainment activities for covered systems. This section modified the earlier provisions of Section 849 (Improved Life-Cycle Cost Control) of the NDAA for FY 2017. In particular, the Secretary of each military department is directed to conduct a sustainment review for an MDAP 5 years after declaration of IOC and every 5 years thereafter throughout the life cycle of the program. The Secretary of each military department will annually submit to the congressional defense committees the sustainment reviews required for each fiscal year. The Comptroller General of the Government Accountability Office will annually select 10 covered systems for which a sustainment review has been submitted, and submit to the congressional defense committees an assessment of the steps taken by the Secretaries concerned to quantify and address any critical operating and support cost growth for each selected system.

Appendix D.

CADE and Cost Data Collection Systems

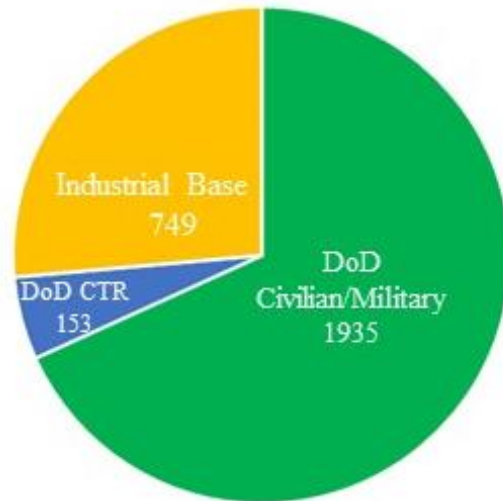
Role of the Cost Assessment Data Enterprise

As explained in Chapter II, the Cost Assessment Data Enterprise (CADE) provides 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 that support it. 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 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 (as of Nov 2020)



CADE Government Account Holder Distribution (as of Nov 2020)

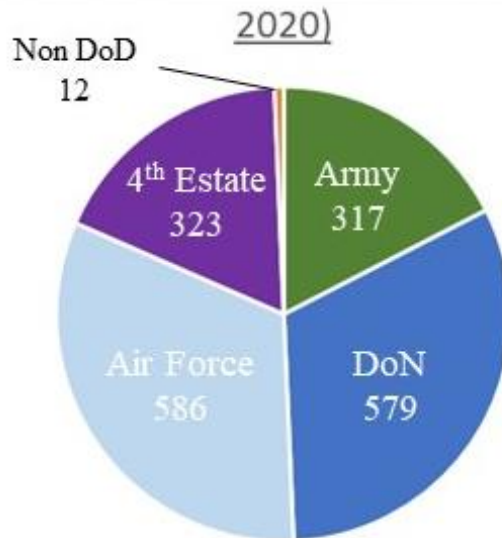


Figure D-1. CADE Users

Note that more than 80 percent of the CADE Government users reside in the military departments.

CAPE provides extensive support to 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. In addition, these meetings allow users to raise issues and concerns and provide feedback. The most recent Focus Group meeting was held in October 2020.

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 two primary data collection systems as the major sources of cost data for acquisition programs:

- Cost and Software Data Reporting (CSDR) system
- Visibility and Management of Operating and Support Costs (VAMOSOC) systems

CSDR reporting uses 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-881E). 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

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.

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.

Additional information on CSDR reporting policies can be found on the CADE public website at <https://cade.osd.mil/policy/csdr-timeline>.

Beginning in 2017, CAPE extended the requirements for CSDR reporting to government-performed efforts. In March 2020, this policy was formalized in the update to Section 4 (“Data Collection”) of DoD Instruction (DoDI) 5000.73, *Cost Analysis Guidance and Procedures*. As noted in Chapter IV, CAPE now receives cost reports from Army depots and arsenals for work supporting manufacturing on some Army acquisition programs. In addition, CAPE now receives cost reports from DLA.

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

Contractor Cost Data Reporting

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 CCDR reporting requirements. For MDAPs and major systems, CCDR reporting is required for contracts, subcontracts, and government-performed efforts valued at more than \$50 million (then-year dollars). For MTA programs anticipated to

exceed \$100 million (then-year dollars), CCDR reporting is required for contracts, subcontracts, and government-performed efforts valued at more than \$20 million (then-year dollars). CSDR reporting requirements for programs below the major system threshold are left to the discretion of the military department cost agencies.

The CCDRs 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 also 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.

CCDR 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). For current and former MDAPs and major systems, these reports are now required on major sustainment contracts and subcontracts worth more than \$50 million (then-year dollars).

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

An additional data report known as the Maintenance and Repair Parts Data Report has been developed to collect detailed cost and technical data for maintenance events and repair parts, similar to the data already collected by maintenance data collection systems for major weapon systems supported under organic maintenance. For each maintenance event, this report collects (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. For MDAPs and major systems, a Maintenance and Repair Parts Data Report is required for sustainment contracts that exceed \$100 million (then-year dollars) when a significant portion of the cost of the contract is due largely to parts-related maintenance activities (such as supply chain management, heavy maintenance, recurring spares, or repairs), and equivalent information cannot be provided by the program manager.

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>.

The legacy CCDR reports are being replaced with the Cost and Hour Report (FlexFile), as described in Chapter IV. The new FlexFile report format has been designed so that data submissions can be used to generate the equivalent of each legacy report.

Software Resources Data Reporting

The SRDR system collects software cost metrics data to supplement the CCDR cost data and to provide a better understanding and improved estimating of software-intensive programs. Data collected from applicable contracts include type and size of the software application(s), schedule, and labor resources needed for software development. The SRDR data formats and reporting instructions use state-of-the-art terms, definitions, and agile metrics for software development. SRDR reporting was expanded in 2016 to include major software maintenance activity. SRDR reporting was expanded again in 2017 for an important class of Defense Business Systems/Information Systems known as Enterprise Resource Planning (ERP) systems.

Section 4 of DoDI 5000.73 establishes SRDR reporting requirements. For software development and ERP reports, SRDR is required on all contracts, subcontracts, and government-performed efforts for MDAPs, major systems, and MTA programs anticipated to exceed \$100 million (then-year dollars). For the software maintenance report, SRDR is required on all contracts, subcontracts, and government-performed efforts for MDAPs and major systems.

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>.

CSDR Planning

A CSDR plan is submitted for approval prior to the release date of a Request for Proposal for each contract meeting the CSDR reporting requirements. Each plan specifies the required reports and submission frequency for the major contracts and subcontracts. CAPE provides formal standards for CSDR plans that include a template of the reporting structure for each weapon system commodity type (such as aircraft, electronic system, or missile). 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 standard template for each program CSDR plan is subject to tailoring approved by the Cost Working-group Integrated Product Team (CWIPT) which consists of appropriate stakeholders for the program.

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

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.

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

The most recent CSDR compliance rating criteria for programs are provided in Figure D-2.

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-2. CSDR Compliance Rating Criteria

Figure D-3 provides a breakdown of CSDR compliance by fiscal quarter using the compliance ratings in effect at the time for all MDAPs since FY 2012.

CSDR Compliance History

Over Time by Fiscal Quarter

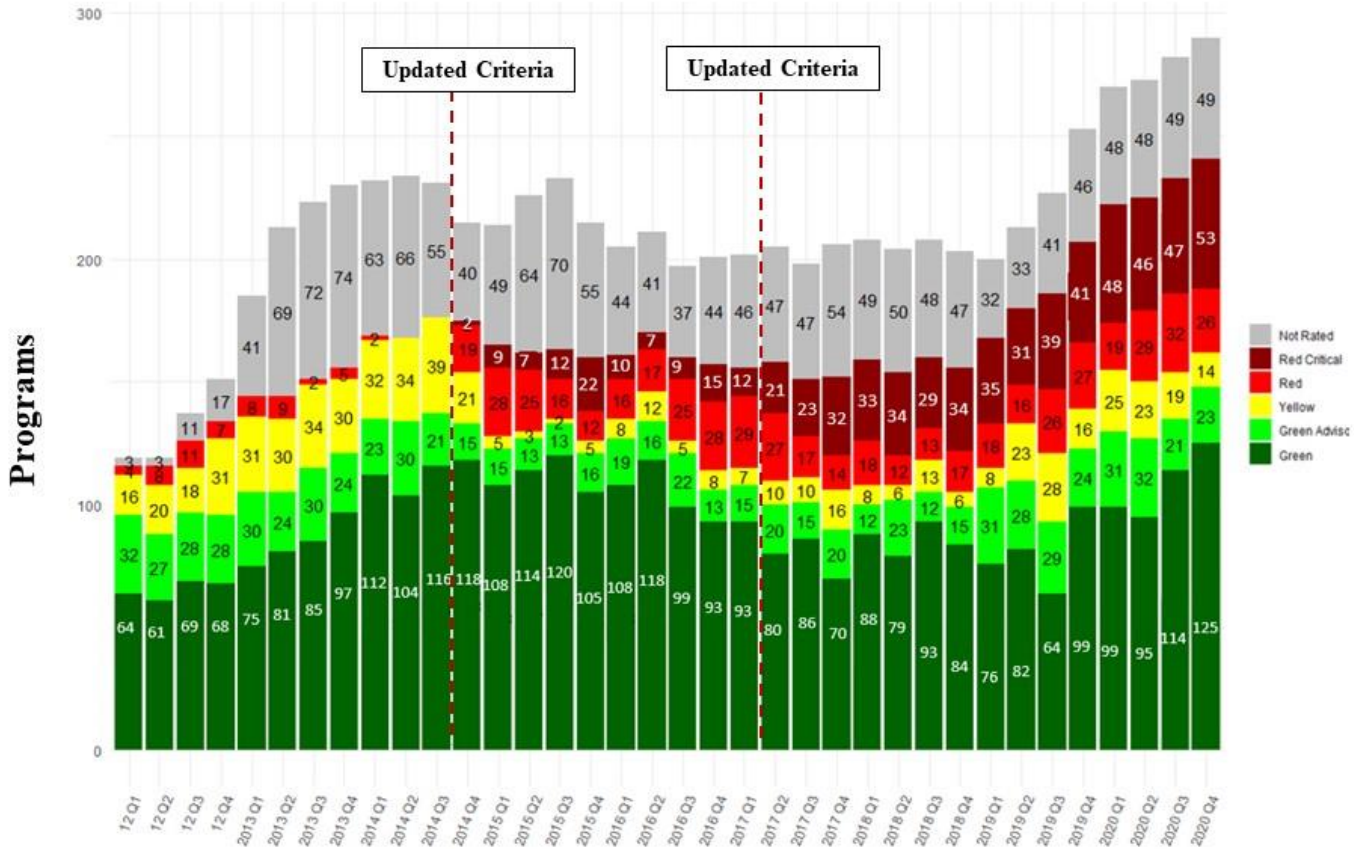


Figure D-3. Quarterly CSDR Compliance History by Fiscal Quarter

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

At the end of the fourth quarter of FY 2020, 61 percent of the programs receiving a rating were rated as green or green advisory, 6 percent were rated as yellow, 11 percent were rated as red, and 22 percent were rated as red-critical. The number of programs with a red or red-critical rating, as a percentage of all reporting programs, has been stable over the last three years. Between the period of the end of the fourth quarter of FY2017, and the end of the fourth quarter of FY 2020, the average percentage number of red programs was 11 percent, and the average percentage number of red-critical programs was 21 percent.

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. In November 2014, CAPE revised language in the Defense Federal Acquisition Regulation Supplement that ensure that CSDR reporting requirements are made known to contracting officers. CAPE is now considering strengthening this language by tying contractor payments to timely submissions. CAPE will also work with the incoming USD(A&S) to reemphasize the need for timely CSDR submissions. In addition, in cases where required cost data are not reported in a timely fashion (i.e., are more than 6 months late), CAPE insists that the data be provided before CAPE can complete its ICE or concur with a military department cost estimate.

Technical Data Report

Cost analysts need technical data (e.g., design and performance parameters) for legacy and new systems to adjust for complexity or to develop cost-estimating relationships used in estimates. Section 4 of DoDI 5000.73 requires a Technical Data Report on all contracts and government-performed efforts valued at more than \$50 million (then-year dollars) for MDAPs and major systems when equivalent information cannot be provided by the program manager.

CAPE provides standardized data template formats for technical data reporting 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. These formats were developed so that the parameters, definitions, and collection methodologies 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.

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

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 level of the Contract Line Item Number (CLIN). In cases where CSDR reporting requirements were not in place, these CLIN-level data may be the only cost data available to the cost community. Where CSDR 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 over contract execution. A new tool to analyze 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 from 1997 to the present. 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, which is useful to cost analysts, and includes program information such as mission and description, schedule, performance, cost and funding, major contracts, and deliveries and expenditures.

Visibility and Management of Operating and Support Costs System

DoD requires that each military department maintain a system that collects historical data on the O&S costs for major fielded weapon systems. The CAPE Deputy Director for Cost Assessment provides policy guidance on this requirement, known as the VAMOSC program; specifies the common format in which the data are to be reported; and monitors its implementation by each of the military departments.

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 cost elements (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). VAMOSC data can be used to analyze trends in O&S cost experience for each major system and 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. AFTOC also provides supplementary data such as aircraft quantities and flying hours, fuel consumption, numbers of personnel by skill/function, and other non-cost information. AFTOC is managed by the Deputy Assistant Secretary of the Air Force for Cost and Economics. See <https://aftoc.hill.af.mil> for additional information.
- The Army VAMOSC system is known as the Operating and Support Management and Information System (OSMIS). OSMIS provides O&S cost data for aviation, tracked and wheeled combat vehicles, artillery systems, engineering and construction equipment, communication and electronic systems, and other tactical systems and equipment. It also provides supplementary data such as system quantities; vehicle miles; aircraft flying hours; consumption for repair parts, fuel, and ammunition; and man-hours for intermediate and depot maintenance. OSMIS is managed by the Deputy Assistant Secretary of the Army for Cost and Economics. See <https://www.osmisweb.army.mil> for additional information.

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

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

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

Appendix E.

CAPE Policy Memos

This appendix lists recent CAPE policy memos that pertain to cost data reporting. The contents of these memos are discussed in Chapter IV. 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

Director of Cost Assessment and Program Evaluation Policy Memorandum, “COVID-19 Cost and Performance Data Collection Guidance,” May 27, 2020

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Abbreviations

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
AMCOM	Aviation and Missile Command
AoA	Analysis of Alternatives
APUC	Average Procurement Unit Cost
ASD(A)	Assistant Secretary of Defense (Acquisition)
ASN(RD&A)	Assistant Secretary of the Navy (Research, Development, and Acquisition)
AWF	Acquisition Workforce
BCF	Business, Cost Estimating, and Financial Management
BtB	Back to Basics
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
CE	Cost Estimating
CE&A	Cost Estimating and Analysis
CECOM	Communication-Electronics Command
Chem Demil - ACWA	Chemical Demilitarization – Assembled Chemical Weapons Alternatives
CLIN	Contract Line Item Number
CLM	Continuous Learning Module
CLP	Continuous Learning Point
CPS	Conventional Prompt Strike
CRB	Curriculum Review Board

CRH	Combat Rescue Helicopter
CSDR	Cost and Software Data Reporting
CSM	Contract Services Management
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
DLA	Defense Logistics Agency
DOC	Director of Cost Estimating and Analysis
DoD	Department of Defense
DoDCAS	Department of Defense Cost Analysis Symposium
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DTMHub	Datasets, Tools and Models Hub
EMD	Engineering and Manufacturing Development
EOQ	Economic Order Quantity
ERP	Enterprise Resource Planning
EV	Earned Value
EVAMOSOC	Enterprise VAMOSOC
EVM	Earned Value Management
FACADE	Functional Academic Cost Assessment Data Enterprise
FCoM	Full Cost of Manpower
FMS	Foreign Military Sales
FOV	Family of Vehicles
FRP	Full-Rate Production
FY	Fiscal Year
FYDP	Future Years Defense Program
GBSD	Ground Based Strategic Deterrent

GPS	Global Positioning System
ICE	Independent Cost Estimate
IOC	Initial Operational Capability
IPM	Integrated Program Management
JLTV	Joint Light Tactical Vehicle
LMS	Learning Management System
MCSC	Marine Corps Systems Command
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
MOA	Memorandum of Agreement
MTA	Middle Tier of 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
NGJ - LB	Next Generation Jammer – Low Band
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
OIG	Office of the Inspector General
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
S&A	Studies and Analysis
SAE	Service Acquisition Executive
SAR	Selected Acquisition Report

SCN	Shipbuilding and Conversion, Navy
SIPRNet	Secure Internet Protocol Router Network
SM-3	Standard Missile-3
SMC	Space and Missile Center
SRDR	Software Resources Data Reporting
SSBN	Submersible Ship Ballistic Missile Nuclear
SSN	Submersible Ship Nuclear
TACOM	Tank-automotive and Armaments Command
THAAD	Terminal High Altitude Area Defense
U.S.	United States
U.S.C.	United States Code
USD(A&S)	Under Secretary of Defense (Acquisition and Sustainment)
VAMOSOC	Visibility and Management of Operating and Support Costs
WBS	Work Breakdown Structure
WSARA	Weapon Systems Acquisition Reform Act of 2009