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OFFICE OF THE SECRETARY OF DEFENSE
COST ASSESSMENT AND PROGRAM EVALUATION

Enterprise Visibility and Management of Operating and Support Cost (EVAMOSC)

CLEARED
For Open Publication

Nov 16, 2021 5

Department of Defense
OFFICE OF PREPUBLICATION AND SECURITY REVIEW

CAPE Cost & Technical Focus Group

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The overall classification of this briefing is:
UNCLASSIFIED

What is EVAMOSC?

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- **A data platform to collect and report actual operating and support (O&S) data for all major weapon systems**
- **Incorporates technologies for:**
  - Ingesting, aggregating, standardizing, visualizing, reporting, and securing a large amount of data (anticipating over 75 sources and TBs of data)
  - Serving multiple functional communities: financial management, logistics, maintenance, human resources, property, and acquisition
  - An architecture that is scalable to include weapon systems across the DoD
- **EVAMOSC will not only address capability gaps in current data collection systems for the cost community, but will also be useful for:**
  - Program Reviews, Readiness Planning, and others in the Acquisition Community
- **EVAMOSC is early in its development and OSD CAPE recognizes the importance of collaborating early and often with the Services to ensure EVAMOSC data is accurate, consistent between the Services, clearly documented, and informative**
  - Data transformation decisions will be reviewed in accordance with the EVAMOSC Data Governance Board Policy

What is O&S Data?

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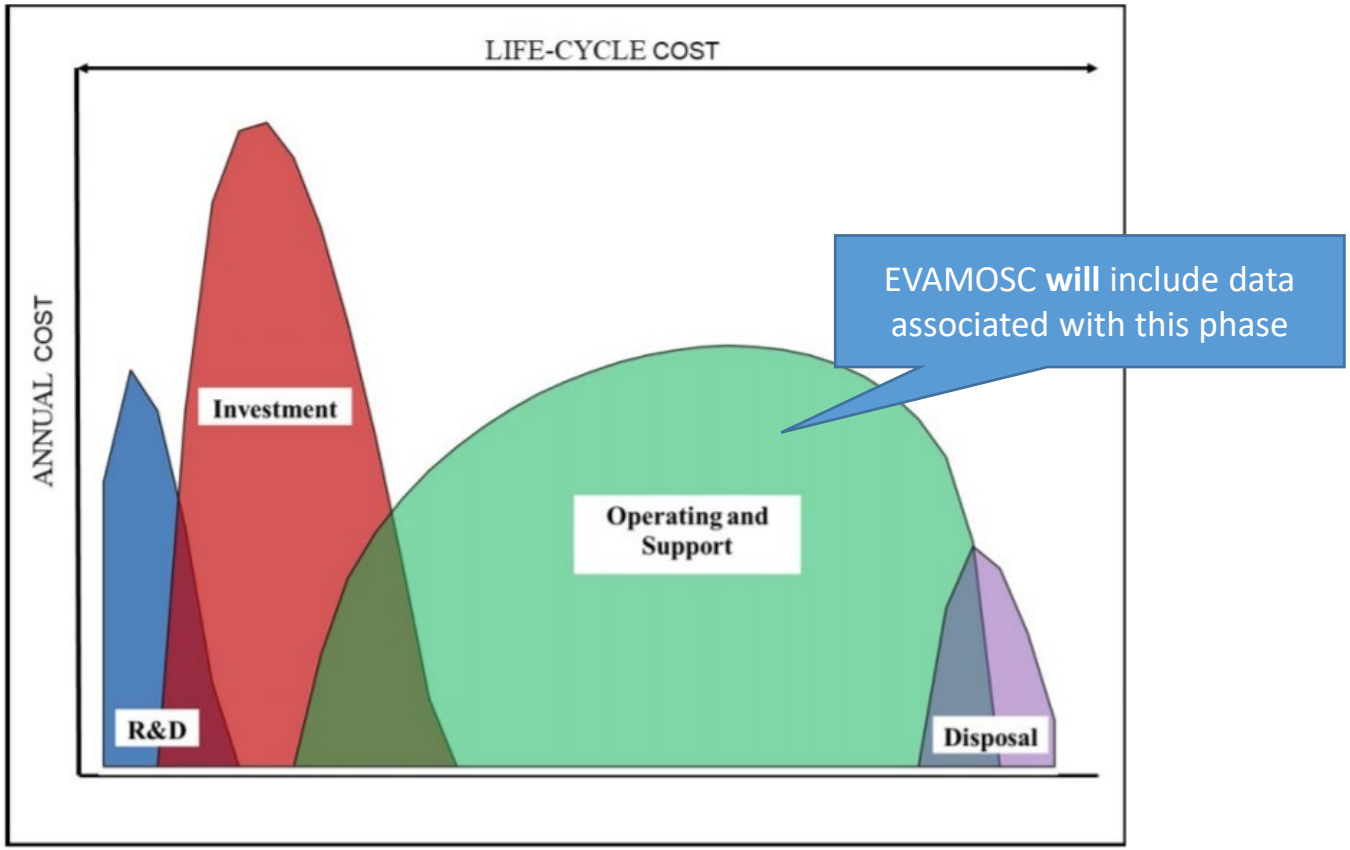
- O&S consists of all effort related to sustainment which occurs from the initial system deployment/fielding through the end of system operations
- Specifically, this consists of the costs of personnel, equipment, supplies, fuel, software, and services associated with operating, modifying, maintaining, supplying, and otherwise supporting a system in the DoD inventory.



EVAMOSC Classification of O&S Cost Data

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Title 10 U.S.C. § 2334 (Independent Cost Estimation and Analysis) requires that DCAPE issue guidance relating to sustainability costs in Major Defense Acquisition Programs.

The Operating and Support Cost Estimating Guide provides terms and definitions for the standard structure or taxonomy for O&S cost elements.

1.0 UNIT-LEVEL MANPOWER

Cost of operators, maintainers, and other support manpower assigned to operating units. Includes military, government civilian, and/or contractor manpower.

2.0 UNIT OPERATIONS

Cost of unit operating material (e.g., direct fuel and training material) and unit support services. Excludes all maintenance and repair material.

3.0 MAINTENANCE

Cost of all system maintenance other than maintenance manpower assigned to operating units. Consists of organic and contractor maintenance.

4.0 SUSTAINING SUPPORT

Cost of system support activities other than maintenance that can be attributed to a system and are provided by organizations other than the system's operating units.

5.0 CONTINUING SYSTEM IMPROVEMENTS

Cost of hardware modifications and software maintenance to keep the system operating and operationally current.

EVAMOSC Technical Architecture

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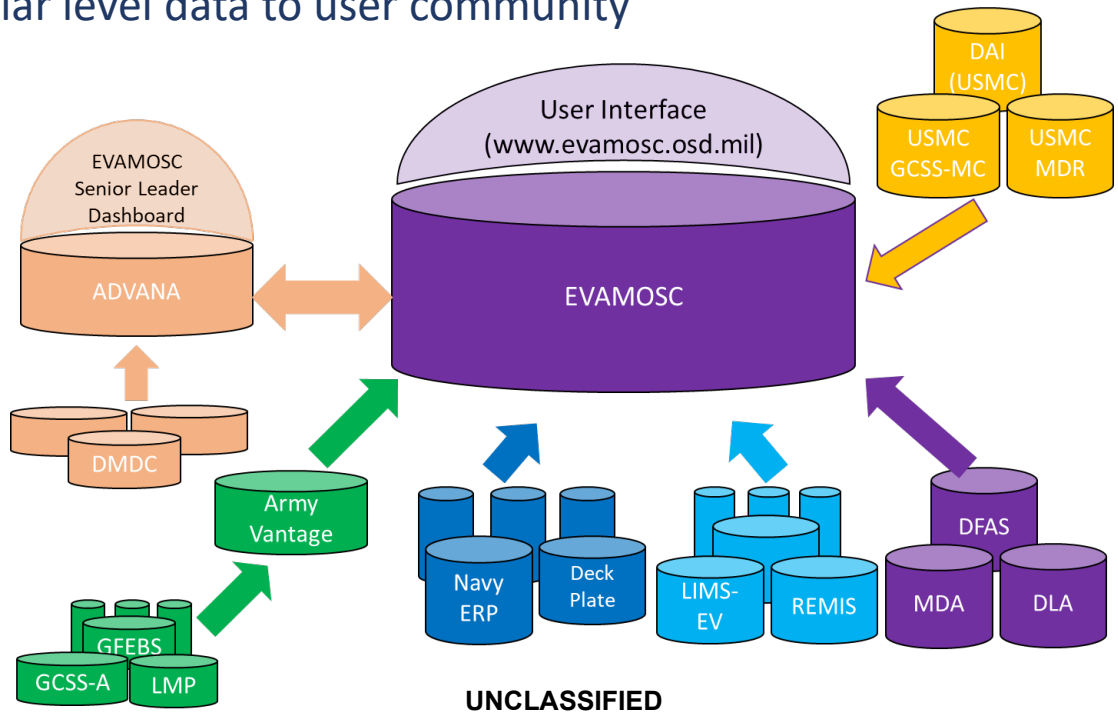
OSD CAPE has a statutory requirement for EVAMOSC that include:

- Develop and maintain a data repository for all Service sustainment related data
- Common login procedures to gain access to all Service O&S cost data
- Standardize data definitions, structure, and business rules for O&S cost data for all major weapons systems across the DoD

EVAMOSC will automate data feeds from source data system

- Automate data ingestion
- Collaborate with Data Governance Board to develop and automate business rules
- Provide granular level data to user community



Current Service VAMOSC View
Summary, Data Acquisition and Source Definition

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- Current focus addressing the O&S cost data gaps in the Army and USMC
- Note: "X" doesn't necessarily mean the data is complete or of good quality

CAPE 2020 O&S CES	Air Force	Army	Naval VAMOSC					
	AFTOC	OSMIS	Aircraft	Ships	MSC	Shipboard Systems	Weapons	USMC GE
1. Unit Level Manpower	X	X	X	X	X			
2. Unit Operations	X		X	X	X	X	X	
2.1. Energy	X	X	X	X	X	X		
2.2. Training Munitions and Expendable Stores	X	X	X	X	X		X	X
2.3. Support Services	X			X	X			
2.4. Temporary Duty (TDY) Travel	X		X	X	X			
2.5. Second Destination Transportation	X		X		X		X	
3. Maintenance	X	X	X	X	X	X	X	
3.1. Consumables	X	X	X	X	X	X	X	
3.2. Depot Level Reparables	X	X	X	X	X	X	X	in 3.4
3.3 Intemediate Maintenance (External to Unit Level)		N/A	X	X	X	X		
3.4 Depot Level Maintenance	X	X	X	X	X	X	X	X
4. Sustaining Support	X		X	X	X	X	X	
4.1 System Specific Training	X	X	X	X	X	X		
4.2. Support Equipment Replacement and Repair	X		X		X		X	
4.3. Sustaining/Systems Engineering	X		X	X	X	X	X	
4.4. Program Management	X		X		in 4.3		X	
4.5. Data and Technical Publications	X		X	X				
4.6. Simulator Operations and Repair	X		X					
4.7. Other Sustaining Support	X		X	X	X		X	
5. Continuing System Improvements	X		X	X	X	X	X	
5.1. Hardware Modifications	X	X	X	X	X	X	X	
5.2. Software Maintenance	X		X	X	X	X	X	

X USA Ground Vehicle data captured (GCSS-A, LMP)

USA Aviation data source defined (CAMMS)

USA data sources defined (DMDC (1.0), TAMIS (2.2), AWRDS (3.0), GFEBS (4.0))

USMC data sources defined (DMDC, GCSS-MC, TCPT, TDM, MSST, DAI, SABRS)

EVAMOSC Data Acquisition Status (U.S. Army)

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- **Partnering with Army Chief Data Officer, other Army components, Vantage, and OSD Advana through data sharing agreements**

Data System	OSD-CAPE CES	Description	Status
Defense Manpower Data Center (DMDC)	1.0	Salary and allowance data for unit-level military personnel	✓ Data sharing agreement in place with Advana • Setting up automated data feeds
Training Ammunition Management Information System (TAMIS)	2.2	Ammunition and missile costs; quantities consumed in training	• Working with SMEs to set up data sharing agreement
Army War Reserve Deployment System (AWRDS)	3.0	Storage and maintenance costs of Army Prepositioned Stocks (APS)	✓ Data sharing agreement in place with Army Vantage • Working on details of data transfer
Global Combat Support System – Army (GCSS-A)	3.1 3.2	Retail supply transactions, unit-level maintenance, labor hours, and property book data	✓ Data sharing agreement in place with Army Vantage ✓ Receiving automated data feed
Consolidated Aviation Maintenance Management System (CAMMS)	3.1 3.2 3.4	Aviation maintenance data	• Working with SMEs to set up data sharing agreement
Logistics Modernization Program (LMP)	3.4	Depot-Level maintenance material, labor, and other direct cost data	✓ Data sharing agreement in place with Army Vantage ✓ Receiving automated data feed
General Fund Enterprise Business System (GFEBS)	4.0	General Ledger Financial Data	✓ Data sharing agreement in place with Army Vantage • Working on details of data transfer

Consolidated VAMOSC Tool (CVT)

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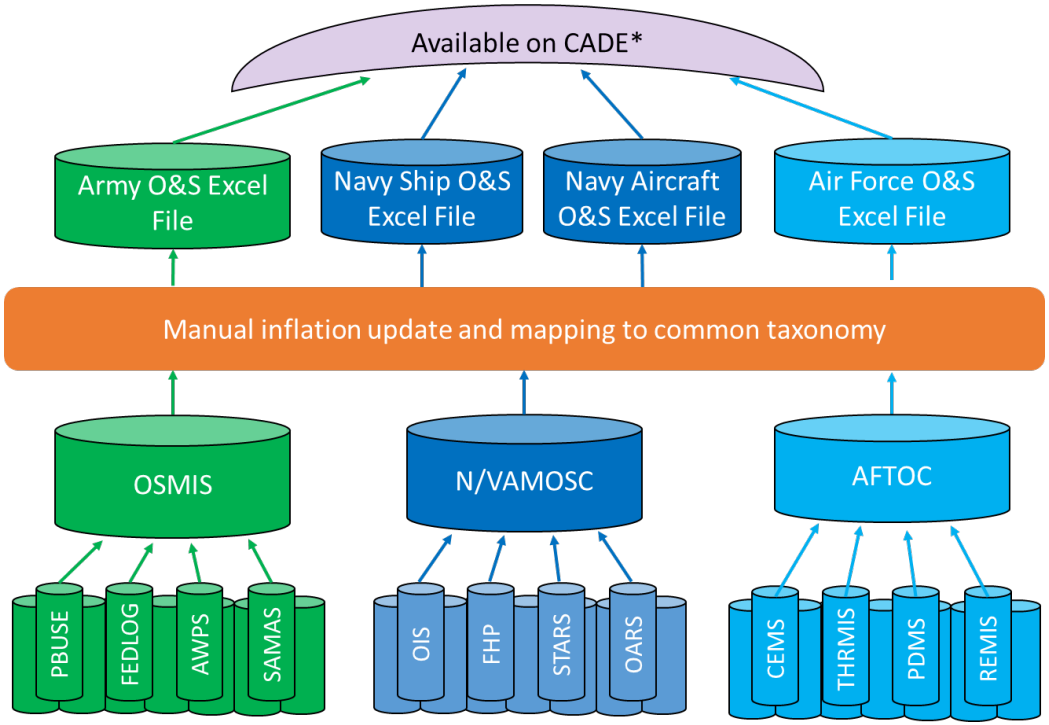
The CVT was developed to meet the initial EVAMOSC requirement

The CVT collects data in Navy VAMOSC, Air Force Total Ownership Cost (AFTOC), and the Army's Operation and Support Management Information System (OSMIS)

CVT Features:

- Then-year cost data for major weapon systems
- Commonly used, non-cost metrics
- The ability to adjust inflation assumptions from then-year to constant year
- A common CES for all services
- Pre-built visuals for unit cost analysis
- A fuel cost normalization tool
- Standard metrics
- Quick reference of operating and support costs by weapon system
- Tool to compare historic costs between systems, operated by different services
- Consistent inflation methodology



*See backup slides for downloading instructions

CVT Features (CVT Data Tab)

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- Select Weapon System
- Inflation Assumptions

CVT Navy Aircraft (Cost in $M)

Data Source: Navy VAMOSC ATMSR FY20 as of May 2021

Aircraft TMS	AH-1W
TY or CY	CY
Table BY	2021
FY	2020

Consolidated VAMOSC Tool (CVT), Navy Aircraft Data in $M

Element	Cost Element Description	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1.0	Unit-Level Manpower																								
1.1	Operations																								
1.2	Unit-Level Maintenance																								
1.3	Other Unit-Level																								
2.0	Unit Operations																								
2.1	Energy (Direct Fuel, Electricity, etc.)																								
2.2	Training Munitions and Expendable Stores																								
2.3	Support Services																								
2.4	Temporary Duty (TDY) Travel																								
2.5	Second Destination Transportation																								
3.0	Maintenance																								
3.1	Consumables																								
3.2	Depot Level Reparables																								
3.3	Intermediate Maintenance (Ext to Unit-Level)																								
3.3.1	I-Level Consumable Materials & Repair Parts																								
3.3.2	I-Level Government Labor																								
3.3.3	I-Level Contractor Maintenance																								
3.3.4	Other I-Level Maintenance																								
3.4	Depot Maintenance																								
3.5	Other Maintenance																								
3.5.1	Other Government Maintenance																								
3.5.2	Other Contractor Maintenance																								
4.0	Sustaining Support																								
4.1	System Specific Training																								
4.1.1	System Specific Operator Training																								
4.1.2	System Specific Maintenance Training																								
4.1.3	System Specific Other Support Training																								
4.2	Support Equipment Replacement and Repair																								
4.3	Sustaining/Systems Engineering																								
4.4	Program Management																								
4.5	Data and Technical Publications																								
4.6	Simulator Operations and Repair																								

Read Me | CVT Data | CVT Visuals 1 | CVT Visuals 2 | Data for Visuals | Fuel-OPTEMPO Adjustment Tool | CES Notes | VAMOSC Navy Aircraft Database

Ready

Common CES Element for Contract Maintenance

CVT Features (CVT Visuals)

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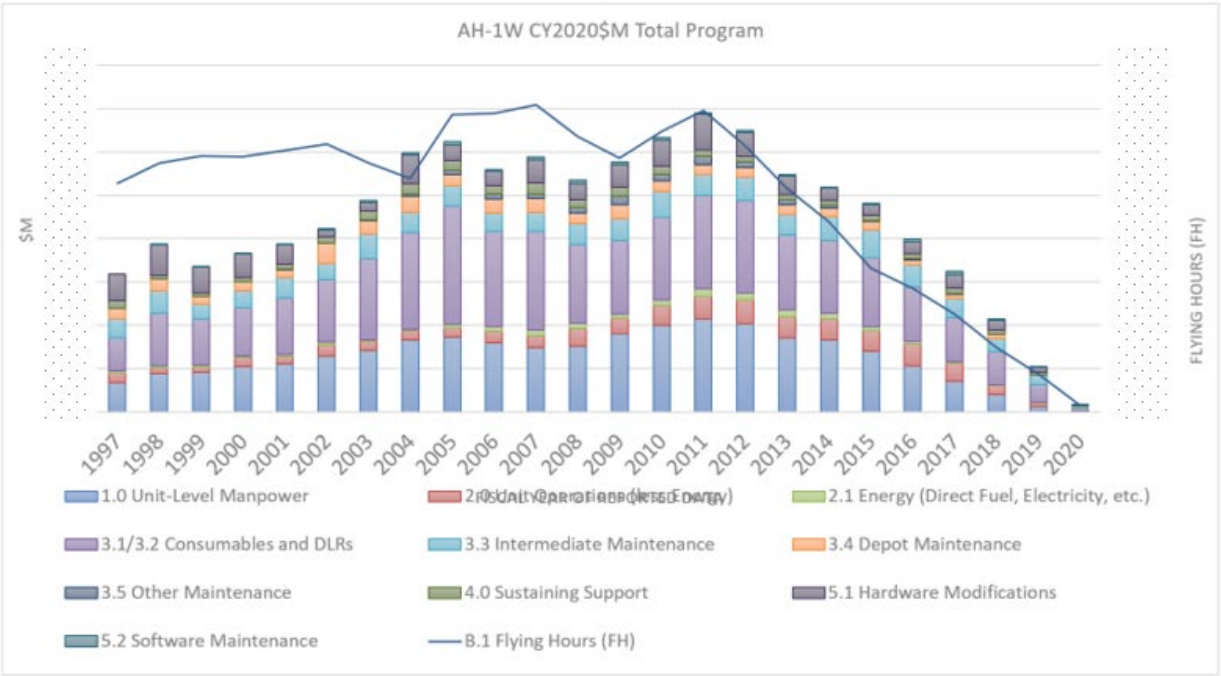
CVT Visuals 1 - Navy Aircraft

Aircraft TMS	AH-1W
Cost	CY2020

System Selected in "CVT Data" tab

AH-1W CY2020$M Total Program

Y2 | Flying Hours (FH)



Read Me | CVT Data | CVT Visuals 1 | CVT Visuals 2 | Data for Visuals | Fuel-OPTEMPO Adjustment Tool | CES Notes | VAMOSC Navy Aircraft Database

Public Website: EVAMOSC.OSD.MIL

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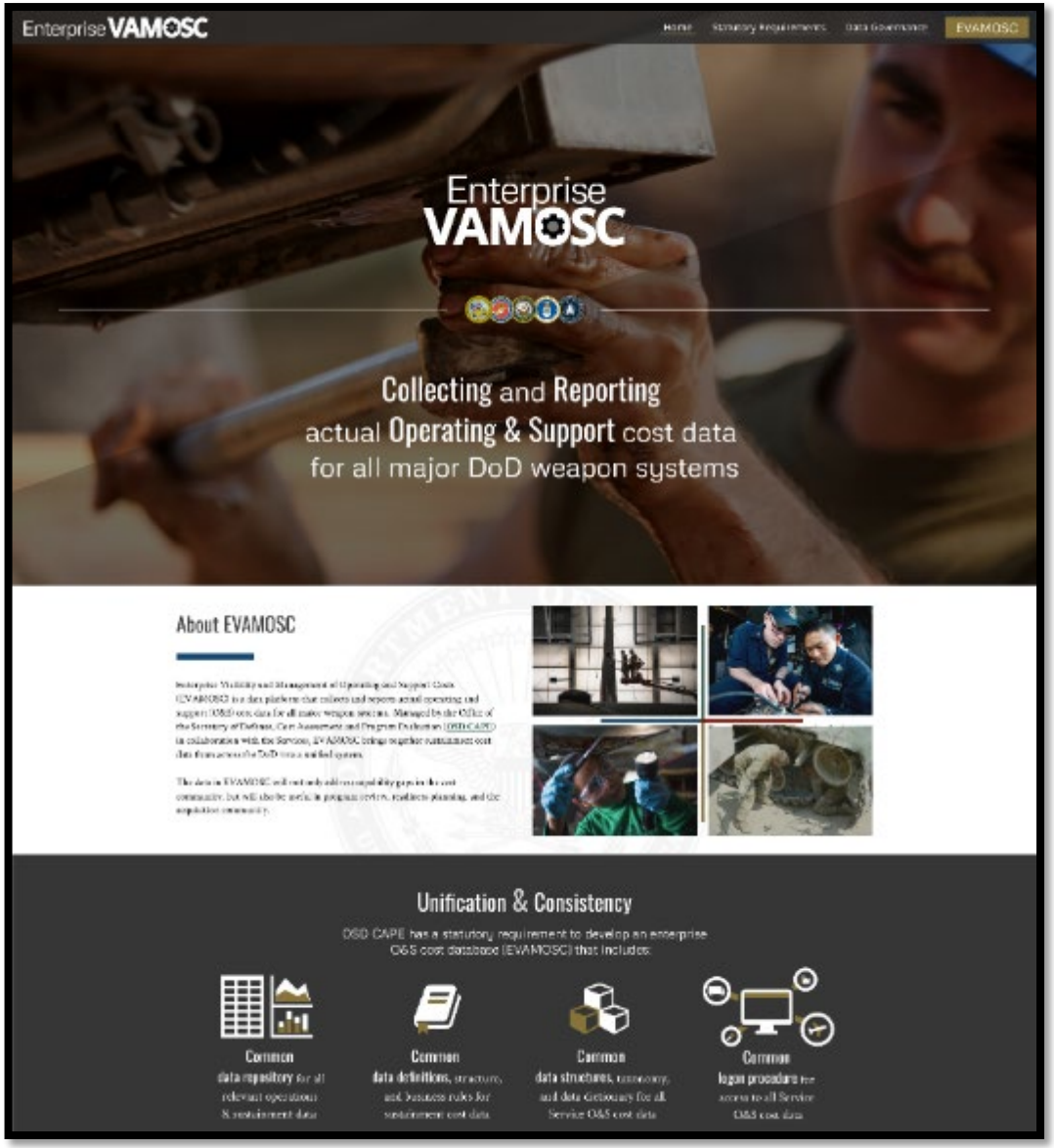

- **Website launch coming soon**
- **EVAMOSC Goals and Objectives**
  - Common Data Repository, Data and Definitions, Data Dictionary, Log-on Procedure
- **EVAMOSC Statutory Mandates**
- **Data and Governance Policy**
  - Data Definitions and Structure
  - Data Governance Board

EVAMOSC Architecture

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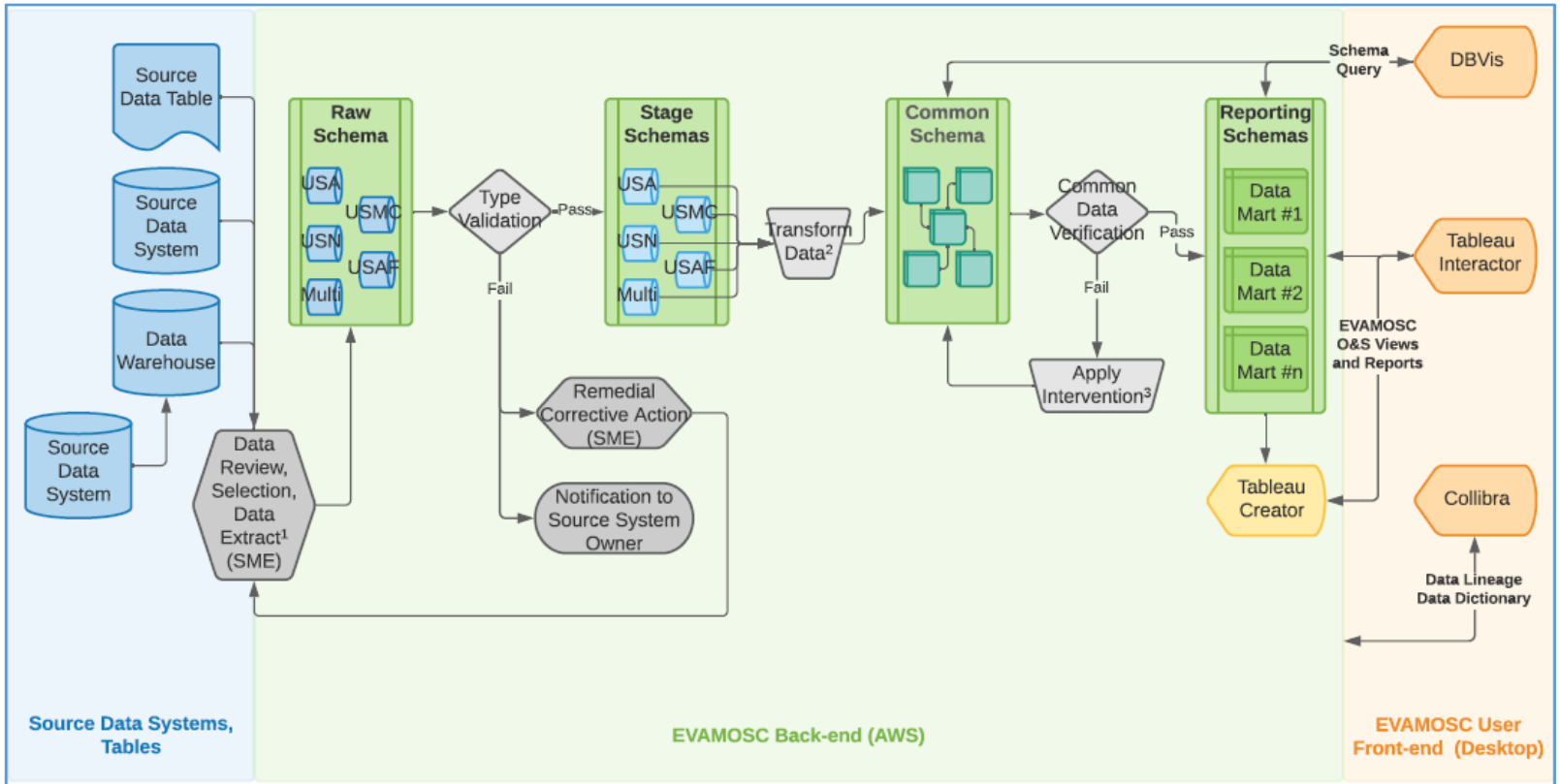

Notes:

[1]Data filtering to support EVAMOSC analyses; capture O&S related data elements. Includes cost, non-cost, and EVAMOSC reference tables

[2]Data flitering/grouping to support EVAMOSC analyses; e.g., >2018, OH grouping, allocation

[3]Data flagging/filtering to support EVAMOSC analyses; e.g., data anomaly flagging/EVAMOSC revision. Any EVAMOSC revision will require DGB review. All source raw data will be retained, any EVAMOSC revision will simply populate an additional field to capture this "revised" value

Source Data System, Table | SME Defined Business Rule | EVAMOSC Artifact | Data Verification, Validation Test | Desktop Tool

Automated Business Rule | Set of Data Tables | Data Table | Cloud Application

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EVAMOSC Documentation Construct

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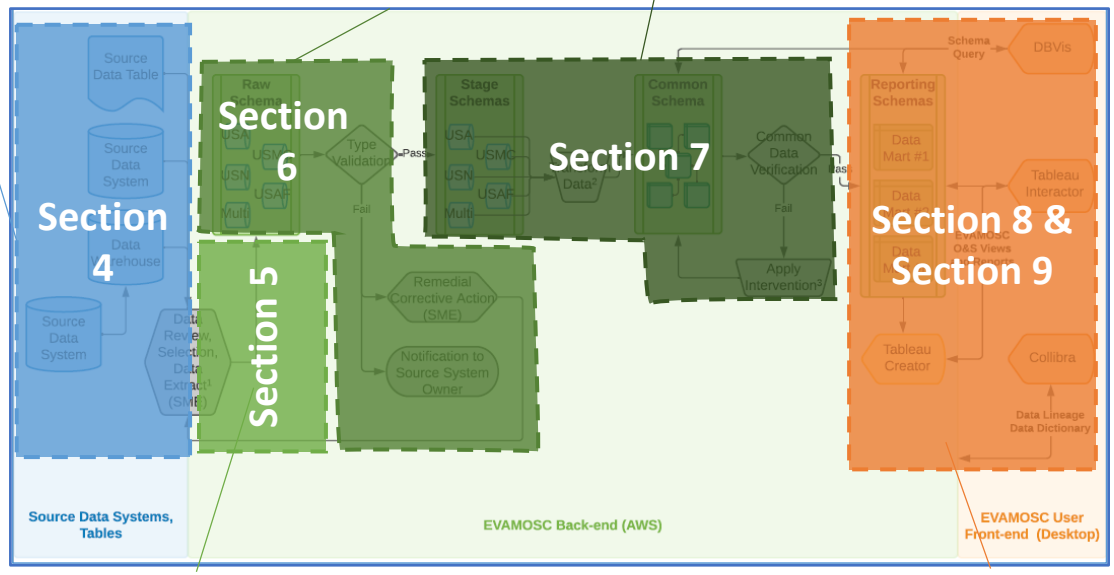
- **The EVAMOSC documentation follows the flow of data through EVAMOSC**

Section 4 - Source Data
What source data did you use and where did you get it?

Section 6 - Raw to Stage Schemas (Type Validation)
How was the data type validated and who to talk to if that goes wrong?

Section 7 - Stage to Common Schemas (Transformation)
How was source data transformed to create common schema? What errors were found and how were they corrected?



Section 5 - Data Ingestion, Cleaning, and Loading
How did you get the source data into EVAMOSC?

Section 8 - Common to Reporting Schemas (Verification) & Section 9 - Data Output
How was common schema used to create the reporting schema tables? What is the final result pushed to the front-end?

Non-schema based sections include:

Section 1 - Executive Summary

Section 2 - Problem Statement
Why is this source data needed?

Section 3 - Introductory Material
Important Terms/Acronyms, etc.

Section 10 - Completed Results, Calls to Action
What work does EVAMOSC still need to complete? What work should the services do to help?

November 2021 MVP

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November 2021 Minimum Viable Product (MVP) will contain:

- **All Army maintenance data for ground vehicles (~45M records from LMP and GCSS-A): 3.1 Consumables, 3.2 Depot Level Reparables, and 3.4 Depot Maintenance**
  - Fiscal Year (2015 – 2021)
  - Major Capability, supports MDS/NIIN relationship search
  - Equipment Family, commodity-like with additional 60 USA "families"
  - Mission-Design-Series (MDS) associated with weapon system
  - National Item Identification Number (NIIN)
  - Unit Identification Code (UIC)
  - Replacement Part NIIN
  - Replacement Part NIIN Description
- **EVAMOSC Front End (Tableau) allowing CAPE users to explore granular level data**
- **Detailed documentation of data lineage and transformations**
- **Basic user training**

EVAMOSC User Interface and Data Analytics (MVP)

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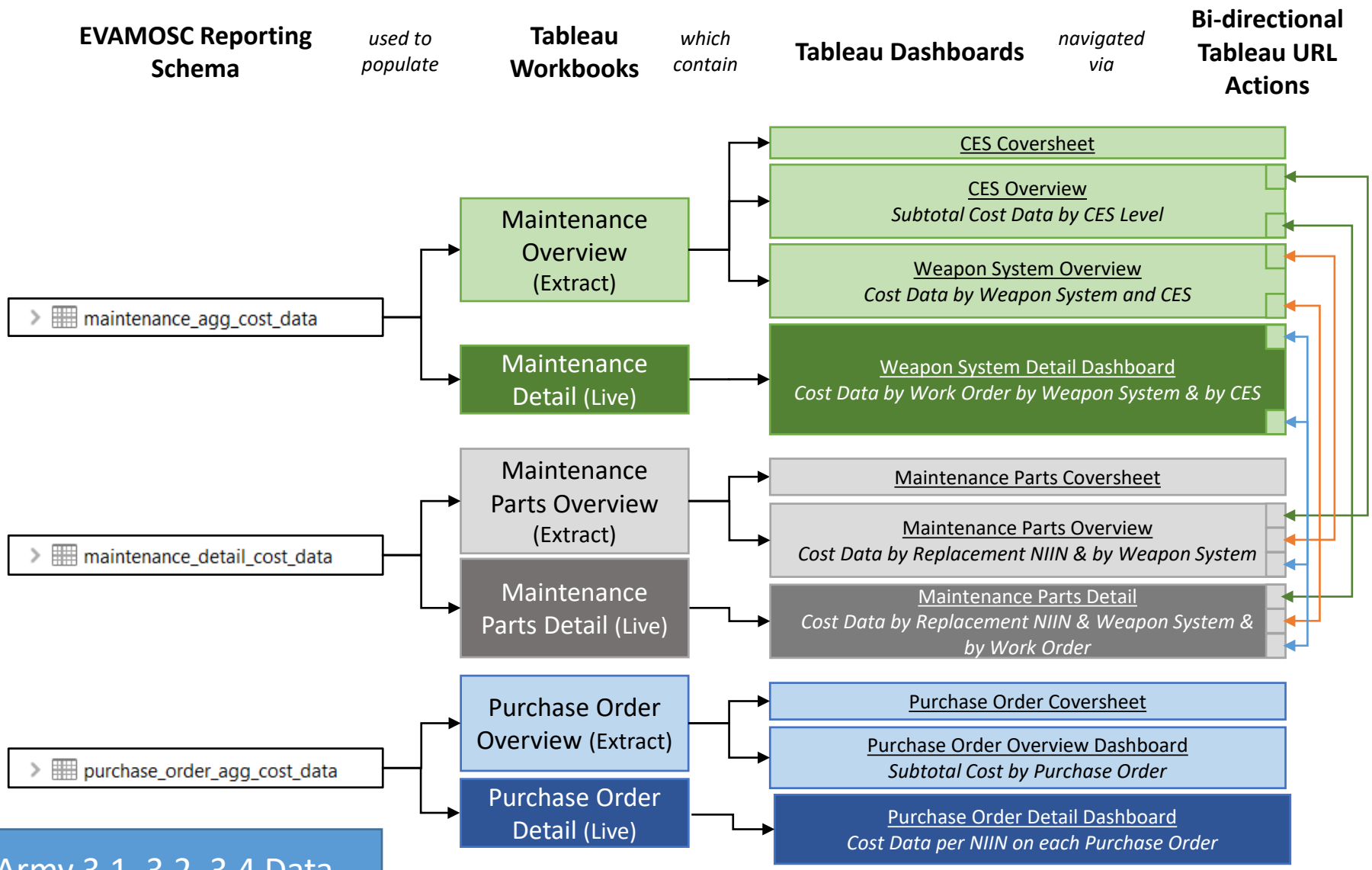

Army 3.1, 3.2, 3.4 Data

Feedback Needed From Cost Community

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The EVAMOSC team requires regular collaboration with the Services and the cost community to be fully successful

EVAMOSC will utilize the Data Governance Board to ensure all data transformations are accurate, repeatable, and useful

Feedback from the cost community is requested to help build a database that can be utilized to answer some of the most pressing questions from the DoD, including:

- **O&S Budget Preparation**
- **Affordability Analysis**
- **Readiness Inquiries**
- **Cost Estimating Needs**

Backups

Relevant EVAMOSC Statutory Requirements (1 of 6)

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EVAMOSC Statutory Mandate:

10 U.S. Code §2337a Assessment, Management, and Control of Operating and Support Costs: Section 2337a states that "The Director of Cost Assessment and Program Evaluation shall be responsible for developing and maintaining a database on operating and support estimates, supporting documentation, and actual operating and support costs for major weapon systems." Further, this section states that "The Secretary of Defense shall ensure that the Director, in carrying out such responsibility—(A) promptly receives the results of all cost estimates and cost analyses conducted by the military departments with regard to operating and support costs of major weapon systems; (B) has timely access to any records and data of the military departments (including classified and proprietary information) that the Director considers necessary to carry out such responsibility; and (C) with the concurrence of the Under Secretary of Defense for Acquisition and Sustainment, may direct the military departments to collect and retain information necessary to support the database."

**New statute numbering goes into effect Jan 2022

Relevant EVAMOSC Statutory Requirements (2 of 6)

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EVAMOSC Statutory Mandate (con't):

Section 832 FY19 NDAA Implementation of Recommendations of the Independent Study on Consideration of Sustainment in Weapon Systems Life Cycle: Requires the Secretary of Defense to:

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

Relevant EVAMOSC Statutory Requirements (3 of 6)

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Other Relevant EVAMOSC Statutes:

10 U.S. Code §2337a Assessment, Management, and Control of Operating and Support Costs Section B: The Director of Cost Assessment and Program Evaluation shall

- **(4)** establish policies and procedures for the collection, organization, maintenance, and availability of standardized data on operating and support costs for major weapon systems in accordance with section 2222 of this title;
- **(5)** establish standard requirements for the collection and reporting of data on operating and support costs for major weapon systems by contractors performing weapon system sustainment functions in an appropriate format, and develop contract clauses to ensure that contractors comply with such requirements;

Relevant EVAMOSC Statutory Requirements (4 of 6)

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Other Relevant EVAMOSC Statutes:

10 U.S. Code §2441 Sustainment Reviews: Section 2441 requires the Secretary of Defense to conduct a sustainment review of each major weapon system not later than five years after declaration of initial operational capability of a major defense acquisition program and throughout the life cycle of the weapon system to assess the product support strategy, performance, and operation and support costs of the weapon system. The section focuses on requiring reporting of actual O&S costs. Specifically, this section requires review to include:

- An independent cost estimate for the remainder of the life cycle of the program.
- A comparison of actual costs to the amount of funds budgeted and appropriated in the previous five years, and if funding shortfalls exist, an explanation of the implications on equipment availability.
- A comparison between the assumed and achieved system reliabilities.
- An analysis of the most cost-effective source of repairs and maintenance.
- An evaluation of the cost of consumables and depot-level repairables.
- An evaluation of the costs of information technology, networks, computer hardware, and software maintenance and upgrades.
- As applicable, an assessment of the actual fuel efficiencies compared to the projected fuel efficiencies as demonstrated in tests or operations.
- As applicable, a comparison of actual manpower requirements to previous estimates.
- An analysis of whether accurate and complete data are being reported in the cost systems of the military department concerned, and if deficiencies exist, a plan to update the data and ensure accurate and complete data are submitted in the future.

Relevant EVAMOSC Statutory Requirements (5 of 6)

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Other Relevant EVAMOSC Statutes (con't):

10 U.S. Code §2334 Independent Cost Estimation and Analysis: Establishes numerous responsibilities and authorities for the Director of Cost Assessment and Program Evaluation pertaining to cost estimation and cost analysis for the acquisition programs of DoD. In particular, these sections require the Director to issue guidance relating to full consideration of life-cycle management and sustainability costs in Major Defense Acquisition Programs and major subprograms. In addition, these sections also provide responsibilities and authorities concerning cost data collection.

10 U.S. Code §2366a Major Defense Acquisition Programs: Determination Required Before Milestone A Approval: States that an MDAP may not receive Milestone A approval until the Milestone Decision Authority (MDA) determines in writing that the program meets several criteria, including planning for sustainment.

10 U.S. Code §2366b Major Defense Acquisition Programs: Determination Required Before Milestone B Approval: Section 2366b states that an MDAP may not receive Milestone B approval until the MDA determines in writing that the program meets several specific criteria, including planning for life-cycle sustainment planning.

10 U.S. Code §2366c Major Defense Acquisition Programs: Determination Required Before Milestone C Approval: Section 2366c requires that the MDA provide the congressional defense committees a brief summary report not later than 15 days after granting Milestone C approval for an MDAP, including total life-cycle costs.

Relevant EVAMOSC Statutory Requirements (6 of 6)

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Other Relevant EVAMOSC Statutes (con't):

10 U.S. Code §2443 Sustainment Factors in Weapon System Design: Section 2443 states that DoD shall ensure that the defense acquisition system gives ample emphasis to sustainment factors, particularly those factors that are affected principally by the design of a weapon system, in the development of a weapon system.

Section 151 FY20 NDAA Budgeting for Life-Cycle Costs of Aircraft for the Army, Navy, and Air Force: This section requires the Secretary of Defense to submit an annual plan for the 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.

Section 879 FY19 NDAA Briefing on Funding of Product Support Strategies: Section 879 requires the Secretary of Defense to provide an annotated briefing to the congressional defense committees regarding the funding for product support strategies for major weapon systems for each of the fiscal years 2020, 2021, and 2022.

Download the CVT From CADE

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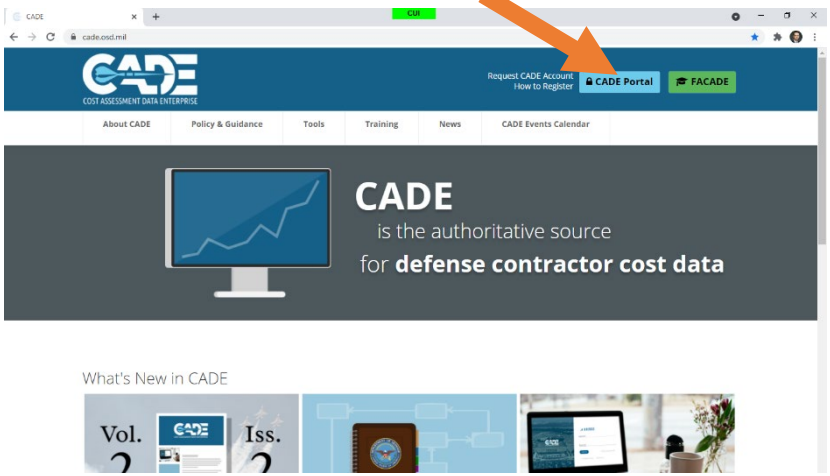
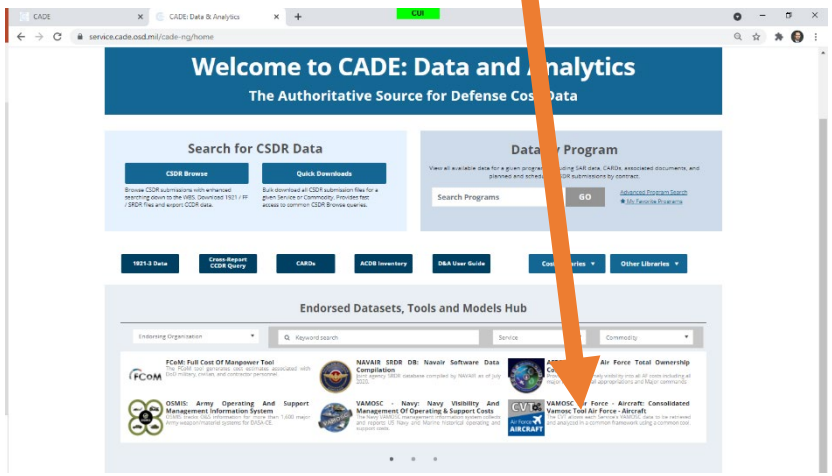
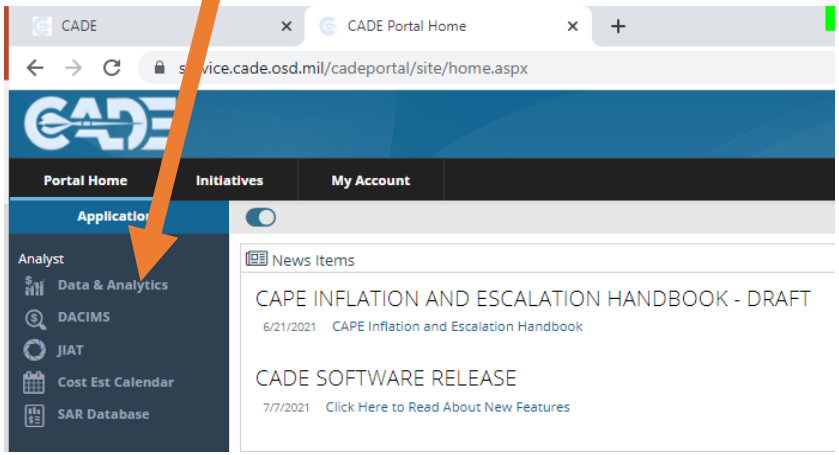
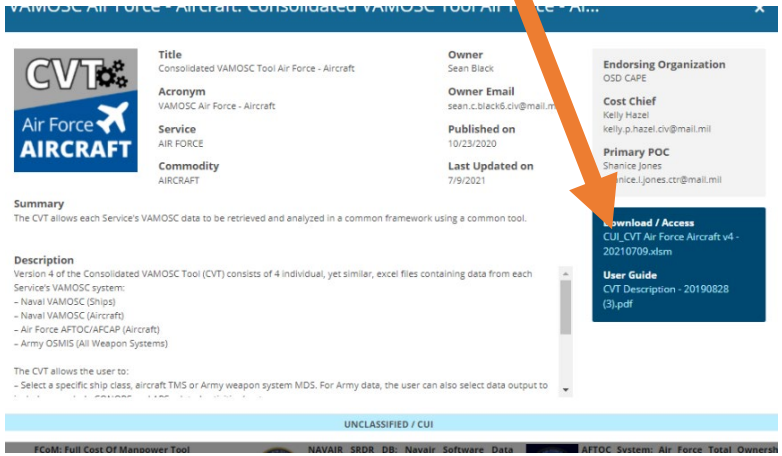
Step 1: Log in to the CADE Portal



Step 3: Chose a CVT from the tiles below



Step 2: Click on "Data & Analytics"



Step 4: Click here to download