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OFFICE OF THE SECRETARY OF DEFENSE
COST ASSESSMENT AND PROGRAM EVALUATION

Empowering Sustainment Through the Use of a Multi-schema Database Structure

SLIDES ONLY
NO SCRIPT PROVIDED

2022 Joint IT & Software Cost Forum

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The overall classification of this briefing is:
UNCLASSIFIED

Purpose / Agenda

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Purpose:

1. Highlight EVAMOSC's solution to comingling multiple source data systems together
2. Raise awareness of O&S data and EVAMOSC.

Agenda:

- What is O&S data?
- What is EVAMOSC?
- Typical database schema structures.
- EVAMOSC's schema structure and how its benefits EVAMOSC users.
- Applicability and limitations.
- Future of EVAMOSC.

What are Operating & Support (O&S) Costs?

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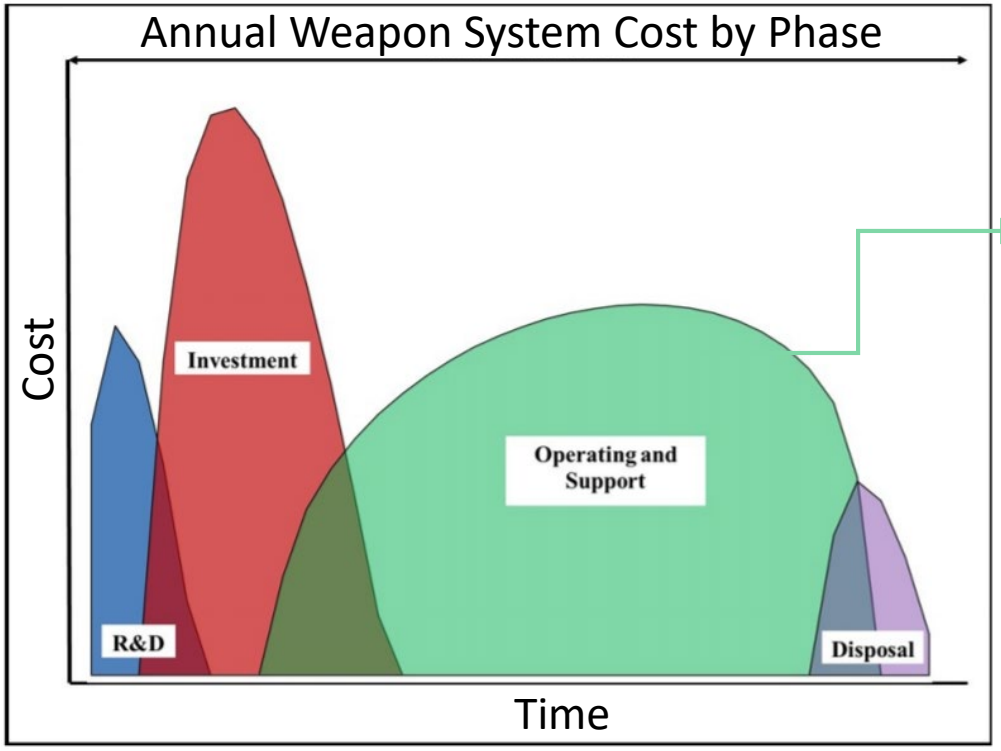
- Operating & Support (O&S) consists of all effort related to sustainment; from initial system deployment/fielding through the end of system operations.
- For most weapon system commodities, the O&S phase is the longest & most costly phase.
- O&S costs are categorized utilizing OSD CAPE's O&S Cost Estimating Guide's Cost Element Structure.



2020 O&S Cost Estimating Guide's Cost Element Structure (CES)

CES Number & Title	CES Description
1.0 UNIT-LEVEL MANPOWER	Operators, maintainers, and other support manpower assigned to operating units. Includes military, government civilian, and/or contractor manpower
2.0 UNIT OPERATIONS	Unit operating material (e.g., direct fuel and training material) and unit support services. Excludes all maintenance and repair material
3.0 MAINTENANCE	System maintenance other than maintenance manpower assigned to operating units. Consists of organic and contractor maintenance
4.0 SUSTAINING SUPPORT	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	Hardware modifications and software maintenance to keep the system operating and operationally current

What is EVAMOSC?

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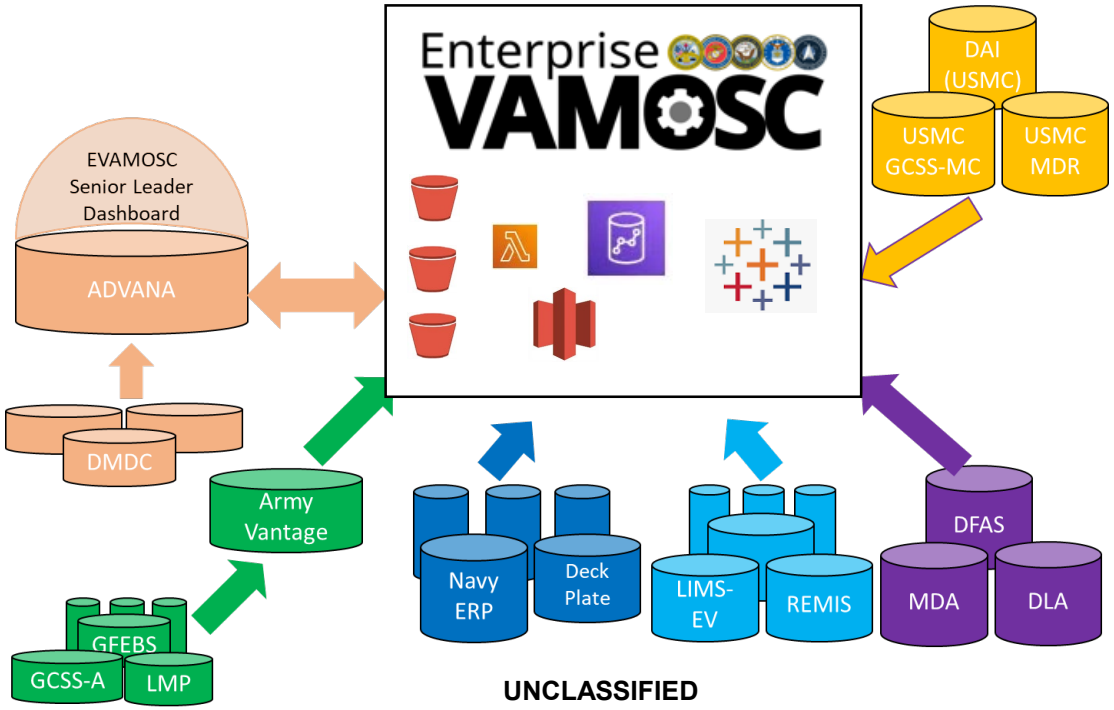
- **An OSD CAPE developed and managed cloud (i.e., AWS) data platform to consolidate, normalize, and make O&S data from major weapon systems across all of DoD accessible to DoD analysts.**

- **Incorporates technologies for:**
  - Ingesting, aggregating, standardizing, visualizing, reporting, while securely storing large (~100 TB) of data from ~75 source data systems.
  - Serving multiple functional communities: financial management, logistics, maintenance, human resources, property, and acquisition.



Data Schemas Introduction

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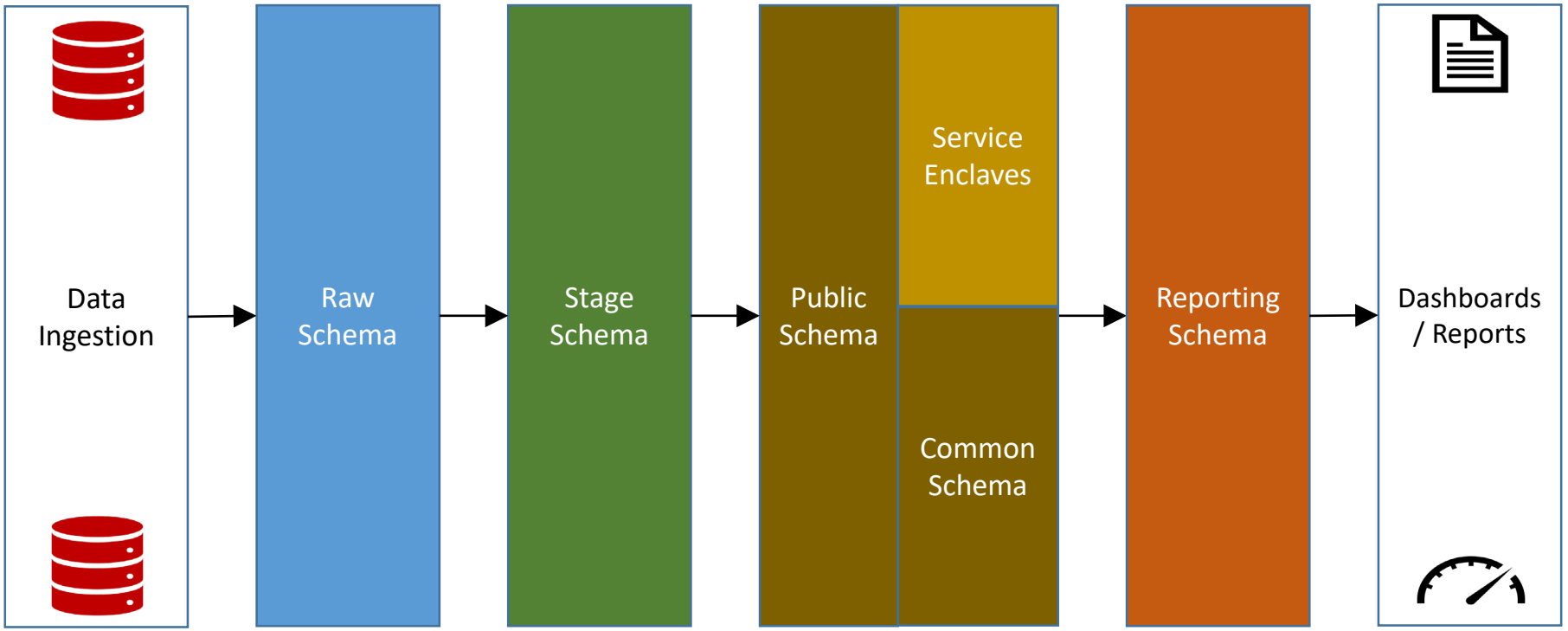
- **EVAMOSC utilizes a multi-schema structure to ingest, clean, and normalize data.**
- **Each schema is critical to the efficient execution of EVAMOSC, each as a specific use case, and value add to EVAMOSC's user categories:**
  - EVAMOSC Developers (IT Experts)
  - EVAMOSC Subject Matter Experts (Ret. CWOs, Source Data System SMEs)
  - EVAMOSC Users



Data Ingestion

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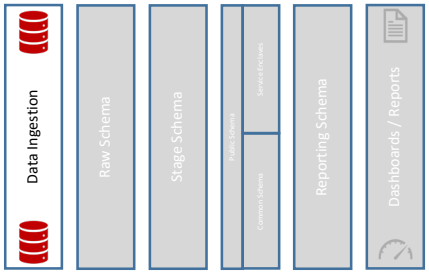
Data ingestion includes

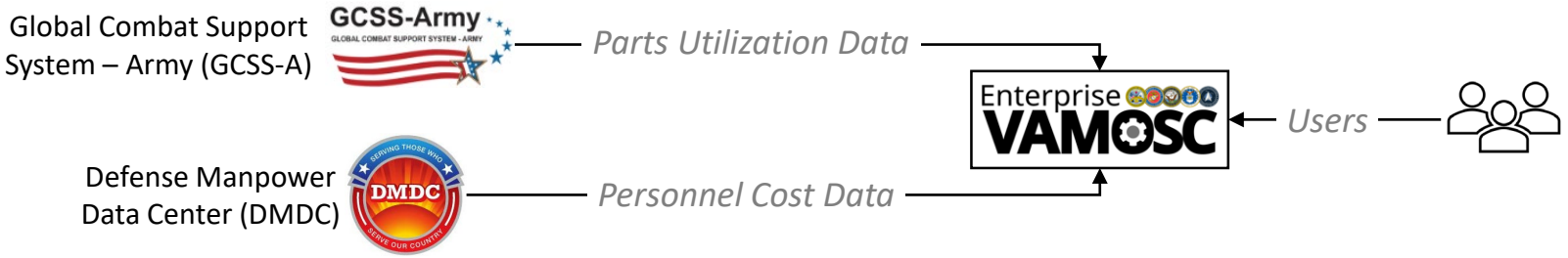


- Negotiating and establishing Memorandums of Agreements between source data system owners & EVAMOSC's developers.
- Connecting to/query source data system APIs (when available).
- Exporting and ingesting csv, json, xml, from source data systems (when APIs are not available).

Value Added:

1. EVAMOSC's solution reduces or removes the need for typical EVAMOSC users to connect to multiple data sources/acts as a single centrally accessible repository.
2. EVAMOSC users need not understand specific APIs, manage large files, or learn to deal with the variety of potential file formats and structures observed in the wild.

Example



Raw Schema

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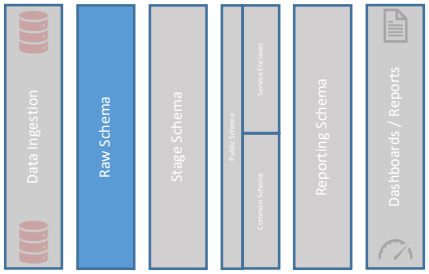
The Raw Schema:



- Used by EVAMOSC's Development Team.
- Landing spot for data from source systems.
- A transitive schema where no data is stored.
- Ingested source data is checked for erroneous characters and is type-converted for efficient storage in AWS S3 buckets/Redshift.

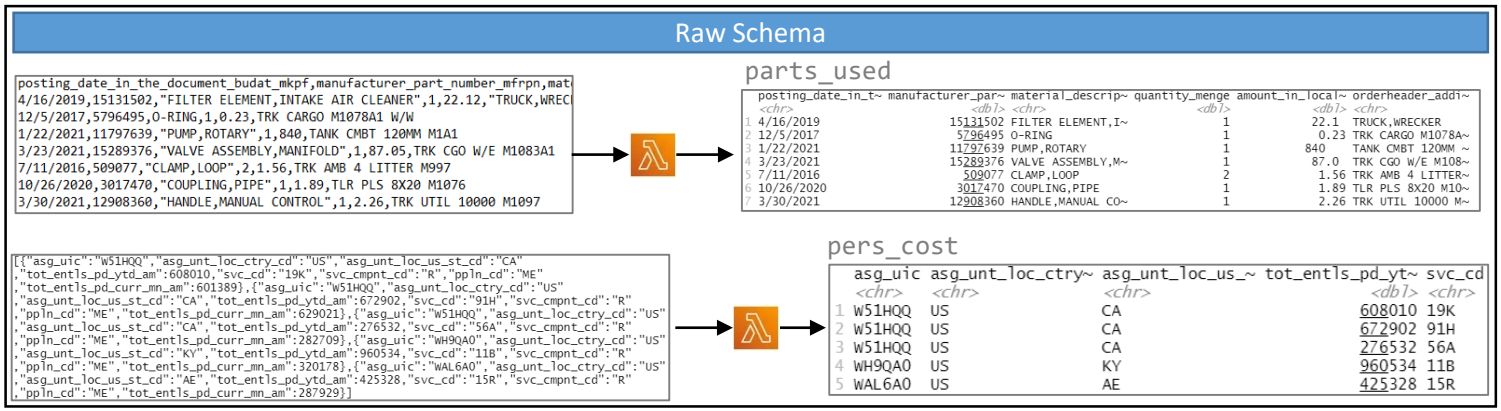
Value Added:

1. Useful to EVAMOSC's developers to ensure data being ingested are properly formatted.
2. Checks for issues on ingest and before user facing schemas are impacted.
3. Breaks up overall ingest workflow and keeps data processing minimal/below AWS' 15-minute lambda time threshold.

Example (notional data)

GCSS-Army — *data.csv* →

DMDC — *API* →



Stage Schema

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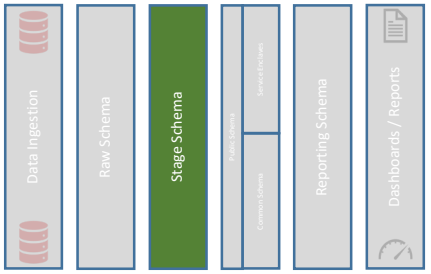
The Stage Schema:



- Used by EVAMOSC's Development and SME teams.
- Source data is kept unmodified, in the same structure, and with the same field names as was found in source data system.
- Includes both transactional fact tables, dimension, and reference tables.

Value Added:

1. Having a set of data unmodified, in its original format, ensures traceability/transparency between source data systems and latter schemas within EVAMOSC.
2. Stage schema enables the development of tables and workflows which can be safely developed and reviewed before being exposed to EVAMOSC users.

Stage Schema

parts_used

	posting_date_in_t~	manufacturer_par~	material_descrip~	quantity_menge	amount_in_local~	orderheader_addi~
	<chr>	<dbl>	<chr>	<dbl>	<dbl>	<chr>
1	4/16/2019	15131502	FILTER ELEMENT,I~	1	22.1	TRUCK,WRECKER
2	12/5/2017	5796495	O-RING	1	0.23	TRK CARGO M1078A~
3	1/22/2021	11797639	PUMP,ROTARY	1	840	TANK CMBT 120MM ~
4	3/23/2021	15289376	VALVE ASSEMBLY,M~	1	87.0	TRK CGO W/E M108~
5	7/11/2016	509077	CLAMP,LOOP	2	1.56	TRK AMB 4 LITTER~
6	10/26/2020	3017470	COUPLING,PIPE	1	1.89	TLR PLS 8X20 M10~
7	3/30/2021	12908360	HANDLE,MANUAL CO~	1	2.26	TRK UTIL 10000 M~

part_numb_to_ces

	part_number	part_nomenclature	ces_map
	<int>	<chr>	<dbl>
1	509077	CLAMP,LOOP	3.1
2	3017470	COUPLING,PIPE	3.1
3	5796495	O-RING	3.1
4	11797639	PUMP,ROTARY	3.2

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pers_cost

	asg_uic	asg_unt_loc_ctry~	asg_unt_loc_us_~	tot_entls_pd_yt~	svc_cd
	<chr>	<chr>	<chr>	<dbl>	<chr>
1	W51HQQ	US	CA	608010	19K
2	W51HQQ	US	CA	672902	91H
3	W51HQQ	US	CA	276532	56A
4	WH9QA0	US	KY	960534	11B
5	WAL6A0	US	AE	425328	15R

sys_per_uic

	uic	quantity	weapon_system
	<chr>	<int>	<chr>
1	W51HAA	14	TANK CMBT 120MM M1A1
2	W51HAA	22	CARRIER PERS M113A3
3	W51HAA	36	TRK UTIL 10000 M1097

mos_to_sys

	mos	mos_nomenclature	weapon_system
	<chr>	<chr>	<chr>
1	19K	M1 Armor Crewman	TANK CMBT 120MM M1A1
2	91H	Track Vehicle Repairer	multiple
3	56A	Chaplain	multiple

JOIN

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Example (notional data)

Public Schema

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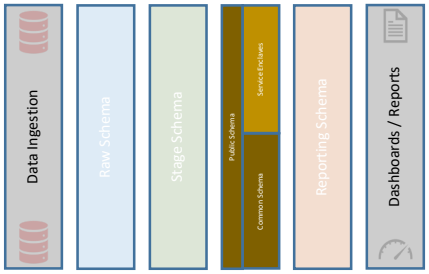
The Public Schema:



- Contains data for use by EVAMOSC's users.
- Split into "enclaves":
  - ***Public enclave*** contains data commingled from all services, normalized using EVAMOSC derived business rules, using common field names, mapped into the CES, and structured/formatted for analysts.
  - ***Service enclaves*** contain service specific data and additional fields/info only applicable to the given service (e.g., LIN for Army, TAMCN for USMC)

Value Added:

1. Public enclaves ensures users can compare normalized weapon system data across services, using consistent terminology, and without having to develop their own business rules and data transformations.
2. Service enclaves enable users to extract additional data and fields using terminology applicable to their source service/system.

Example (notional data)

Stage Schema

parts_used
pers_cost
part_numb_to_ces
sys_per_uic
mos_to_sys

stage_to_public.sql

```
SELECT
  orderheader_additional_series_groupings AS niin_weapon_system,
  niin_weapon_system_nomenclature
  ces,
  uic, uic_nomenclature,
  SUM(amount_in_local_currency_dmbtr) AS amount
  -- apply additional business rules
GROUP BY
  niin_weapon_system,
  ces,
  uic;
```

Public Schema

ces_mapping_aggragate

	niin_weapon_system	niin_weapon_system_nomenclature	ces	source_data_system	uic	amount
	<int>	<chr>	<dbl>	<chr>	<chr>	<chr>
1	13285964	TANK CMBT 120MM M1A1	1.1	DMDC	W51HAA	$126,439
2	13285964	TANK CMBT 120MM M1A1	1.2	DMDC	W51HAA	$458,683
3	13285964	TANK CMBT 120MM M1A1	3.1	GCSS-A	W51HAA	$1,235,8~
4	13285964	TANK CMBT 120MM M1A1	3.2	GCSS-A	W51HAA	$4,214,2~

Reporting Schema

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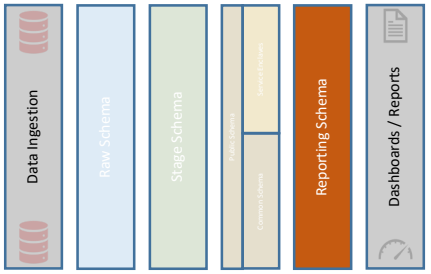
The Reporting Schema:



- Is not accessed directly by users but is used to populate EVAMOSC's front-end.
- Contains data from the public schema but transformed for fast, technically efficient use by EVAMOSC's front-end.
- Includes tables at various levels of aggregation so dashboards and reports can quickly query the appropriate level of detail.

Value Added:

1. Enables a fast user experience, even with large tables.
2. Data is pre-joined with helpful reference tables/fields, ready to be displayed in dashboards or provided in an acceptably sized and downloadable report.
3. Reduces compute costs by removing the need for live computation.

Dashboard / Reports

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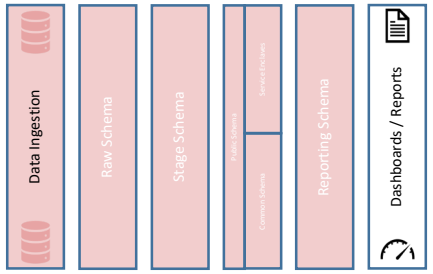
Dashboards and reports support known use cases with connections between dashboards allowing users to seamlessly explore different data elements at different levels of aggregation to include the downloading of project/item level reports.



Value Added:

- Dashboards, through the use hover-overs provides cost analysts and decision makers on demand information and education into operations and sustainment costs.
- Dashboards and reports support known use cases setting the standard for O&S cost reporting.

Public Website: https://evamosc.osd.mil

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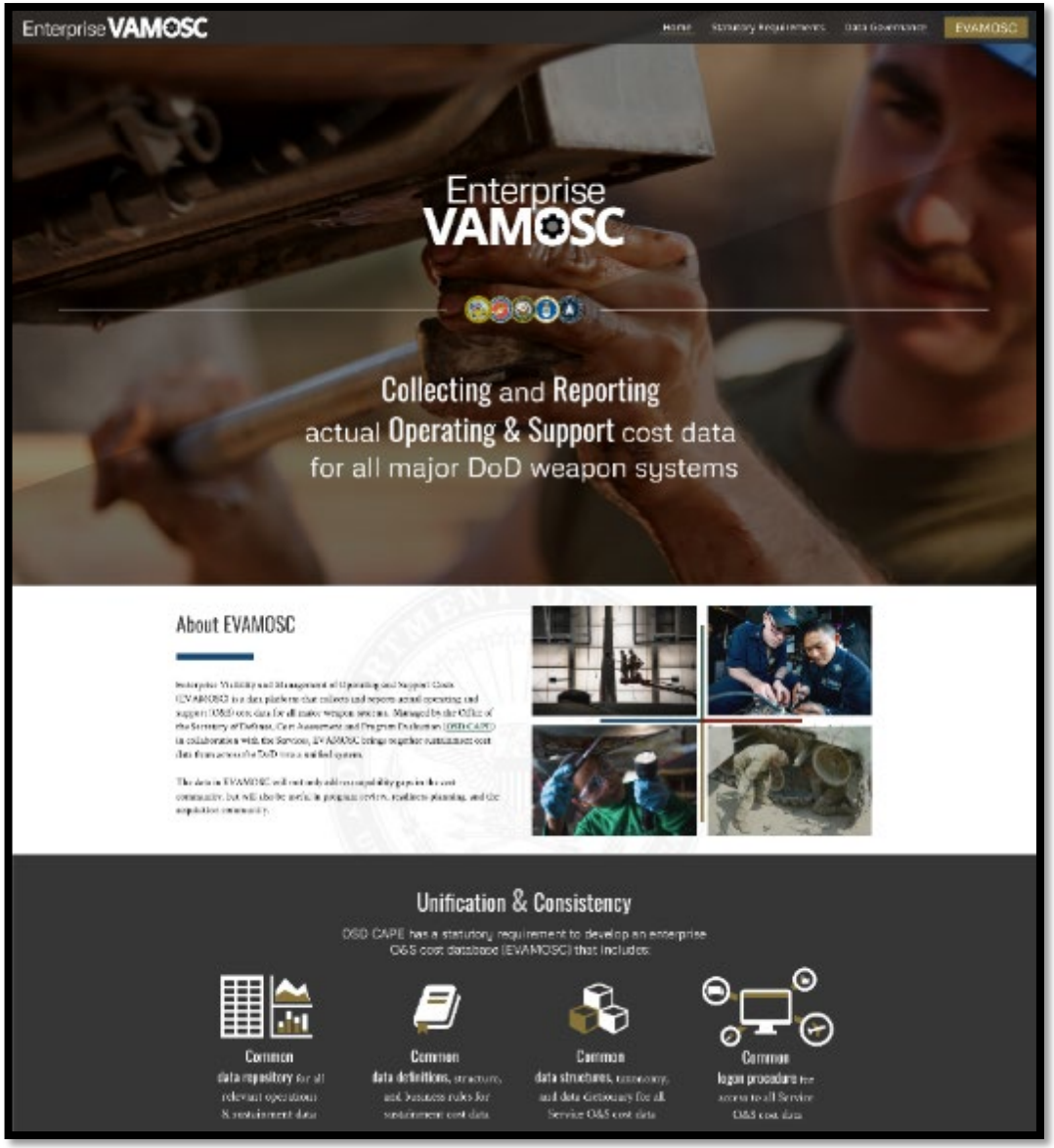

- **Supporting EVAMOSC Goals and Objectives**
  - Common Data Repository
  - Common Data, Definitions, and Structure
  - Common Log-on Procedure
  - EVAMOSC Statutory Mandates
  - Data Governance Board (Governance Policy)

EVAMOSC Dashboard Access and Feedback

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- **Access for CAPE analysts to Tableau**
  - http://214.18.17.13/#/projects/7
  - User will need to fill out a JSP Software Form 7 and submit to the EVAMOSC HelpDesk email, follow-up email to be sent for next steps.
- **EVAMOSC Help Desk e-mail**
  - osd.mc-alex.cape.mbx.evamosc-helpdesk@mail.mil
- **Feedback for EVAMOSC**
  - As we continue to grow and evolve with EVAMOSC, any user feedback is greatly appreciated. Please feel free to send an email to the EVAMOSC HelpDesk
- **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

EVAMOSC Path Ahead and Source System Data

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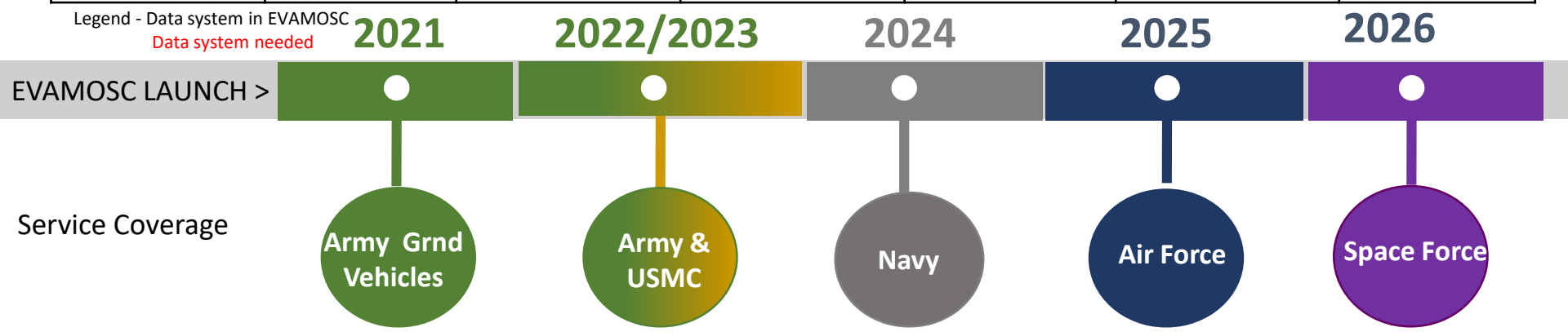
CAPE 2020 O&S CES	2021	2022	2023	2024	2025	2026
1.0 Unit-Level Manpower		DMDC →			THRMIS	
2.0 Unit Operations		DLA, TAMMS	DLA, TAMMS	STARS, MSC, OIS	FAS	TBD
3.0 Maintenance	LMP, GCSS-A, GFEBS	CAMMS, GCSS-MC, SABRS/DAI, TFSMS	CAMMS, GCSS-MC, SABRS/DAI, TFSMS	STARS, MSC, DMDC, OARS, USN Commands	DO35K, CEMS, REMIS, LIMS - EV	TBD
4.0 Sustaining Support		Service Financial Ledger System →			THRMIS	
5.0 Continuing System Improvements		LMP, GCSS-A, GFEBS, SABRS	LMP, GCSS-A, GFEBS, SABRS	USN Commands	IDEC	TBD

Legend - Data system in EVAMOSC
Data system needed



Backup, Supporting Content

Why Build EVAMOSC?

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Standardized, Historical O&S Cost Data

10 U.S. Code §4325

Assessment, Management, and Control of Operating and Support Costs

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.

FY19 NDAA, Section 832

Implementation of Recommendations of the Independent Study on Consideration of Sustainment in Weapon Systems Life Cycle

Section 832 of the FY19 NDAA 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 (CADE) data system

Other Relevant Statutes

- 10 U.S. Code §4251
- 10 U.S. Code §4252
- 10 U.S. Code §4253
- 10 U.S. Code §4228
- FY20 NDAA, Section 151
- FY 19 NDAA. Section 879

EVAMOSC will serve as the DoD's authoritative source of O&S cost data for major weapon systems

EVAMOSC Impacts on DoD Budget and Decisions

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- **Improving Readiness**
  - EVAMOSC data can identify cost drivers using detailed O&S cost data for all weapons systems across all Services
  - Budget or program analysts can utilize EVAMOSC data to identify readiness cost drivers
  - EVAMOSC data will enable DoD to improve readiness by making targeted investments in O&S expenditures

- **Validating Programming and Budgeting Estimates**
  - EVAMOSC data will allow OSD to examine prior years' expenditures with detailed data to guide future budget allocations and decisions

- **O&S Cost Estimates**
  - The data in EVAMOSC will provide more accurate information and it will enable DoD to properly invest in the sustainment of extant and new weapon systems

- **Sustainment Support**
  - EVAMOSC will meet 6 of the 10 Sustainment Review elements as required by the statute enacted in 2017 (i.e., in 10 USC §2441)
  - EVAMOSC will be the source data for the DEPSECDEF Sustainment Dashboard Data Call

EVAMOSC Major Accomplishments

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2021

- Completed back end development using Amazon Web Services GovCloud - first cloud-based database in CAPE
- Developed front end with visualization dashboards and granular maintenance data
- Established public website (https://evamosc.osd.mil) includes a brief description of requirements, Data Governance Board and Policy, statutory requirements
- Established data connections to 7 source data systems across OSD, Army, and USMC
- EVAMOSC obtained access to 70-80% of Army ground vehicle O&S cost

2022

- Maintenance cost drivers of Army ground vehicles can now be analyzed
- Established connection to GCSS-MC
- Ingested 1.4B records into EVAMOSC from Army GFEBS (general financial ledger data)
- Ingested ~600M records from DMDC (manpower data) into EVAMOSC
- Ingested ~500M records from SABRS/DAI (USMC financial ledger data) into EVAMOSC

The EVAMOSC team has been highly successful in 100% remote work environment

EVAMOSC User Interface

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Multiple Tableau workbooks implemented to:

- Visualize O&S Cost data according to the cost element structure (CES) described in the O&S Cost Guide
- Data definitions and other O&S educational material available within user interface
- Provide granular level data to users

Data Overview/Visualizations		Granular Cost Data	
Workbook Name	**Description**	**Dashboard Name**	**Description**
O&S Cost Overview	Total O&S cost by CES and FY		
Weapon System Overview	Weapon system O&S Cost, by CES and FY	**Maintenance Work Order Export**	Weapon System and work order cost by CES and FY
Maintenance Parts Overview	Weapon system, replacement part cost by CES and FY	**Maintenance Parts Export**	Weapon system, work order, quantity, and replacement part cost by CES and FY
Purchase Order Overview	Purchase order cost by CES and FY	**Purchase Order Export**	Purchase order cost by CES, weapon system and FY

EVAMOSC Release Data Definitions

- **Maintenance transactions are categorized into three categories using the 2020 CAPE O&S Cost Guide:**

  - **(3.1) Consumables**
    Costs for consumables used to operate and maintain the primary system at the unit level. Typically, consumables are considered "throw-away items" and are replaced by new items. Examples include temperature sensors, fans, oil filters, valves, switches, probes, coolants, deicing fluids, lubricants, gaskets, capacitors, and batteries

  - **(3.2) Depot Level Reparables (DLR)**
    Costs for a reparable item/component that is repaired at the depot level of maintenance. Typically, when a DLR item requires maintenance, the item is removed from the system and replaced with another item from inventory

  - **(3.4) Depot Level Maintenance**
    Depot maintenance is the cost of labor, material, and overhead incurred in performing major overhauls or other similar depot-level maintenance on a system or any of its major end items (e.g., aircraft engines) at centralized repair depots, contractor repair facilities, or onsite by depot teams

Continuing Improvements

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Data Governance Board/Stakeholder Engagement throughout the DoD to include Army Deputy Assistant Secretary of the Army (Cost & Economics), Army CDO, USMC Sustainment Cost SMEs, Service VAMOSC database teams

Gain access and ingest additional Service source data systems:

- Unit Level Manpower Data: Salary and allowance data for military personnel
- General Ledger Financial Data: financial data for support services and software/hardware cost data
- Army Aviation Maintenance Data: Maintenance transaction cost data
- USMC Ground Vehicle Maintenance Data: Maintenance transaction cost data

Technical Architecture

- Expand availability of EVAMOSC data to DoD community via obtaining a Cloud Access Point (Cloud One, NAVAIR, DC2HS)

Improving user experience to include tools, training, and help desk

EVAMOSC will continue to evolve with customer feedback

EVAMOSC User Interface Dashboards

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- **Multiple Tableau workbooks implemented to:**
  1. Visualize O&S Cost data according to the cost element structure (CES) described in the OSD-CAPE O&S Cost Guide
  2. Provide granular level data to users

Data Visualization

O&S Cost Overview	Total O&S cost by CES and FY
Weapon System Overview	Weapon System O&S cost by CES and FY
Maintenance Parts Overview	Weapon System and Replacement Part cost by CES and FY
Purchase Order Overview	Purchase Order cost by CES and FY

Data Export

Maintenance Header Level Export	Weapon System cost by Work Order by CES and FY
Maintenance Parts Export	Weapon System/Replacement Parts cost and quantity by Work Order by CES and FY
Purchase Order Export	Purchase Order related cost by CES, Weapon System and FY

Dashboard Types

Visualization Dashboards	Include both graphical and tabular data displays and data download options
Data Export Dashboards	Designed with tabular data displays and allow users to download detailed data
Purchase Order Dashboards	Provide additional cost output based on Purchase Order vice Work Order information

EVAMOSC Statutory Requirements

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.

Common VAMOSC Tool (CVT)

What is the Common VAMOSC Tool (CVT)?

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- **The CVT stores service VAMSOC data in a set of four excel files (Army, Navy Aircraft, Navy Ships, and Air Force). The CVT provides the following:**
  - 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 (see next slide)
  - Pre-built visuals for unit cost analysis
  - A fuel cost normalization tool
  - Standard metrics
- **The CVT was designed to cost assist analysts**
  - Quick reference of operating and support costs by weapon system
  - Comparing historic costs between systems, operated by different services
  - Consistent inflation methodology

Consolidated VAMOSC Tool (CVT)

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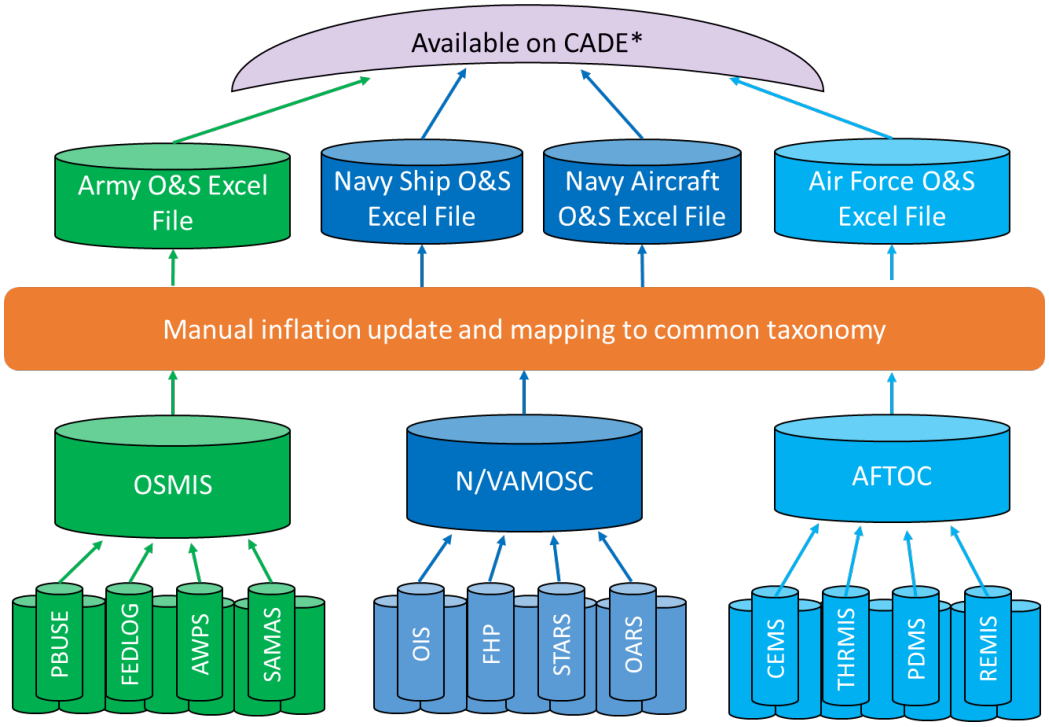
- **The CVT was developed to meet the initial EVAMOSC requirement**
- **The CVT collects data in Navy VAMOSC, Air Force Total Ownership Cost (AFTOC), and the Army's Operation and Support Management Information System (OSMIS)**

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 Common WBS

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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
4.7	Other Sustaining Support
5.0	Continuing System Improvement
5.1	Hardware Modifications
5.2	Software Maintenance

Element	**Non-Cost Element Description**
A.1	Number of Aircraft
A.1.1	Number of Aircraft - Navy
A.1.2	Number of Aircraft - USMC
B.1	Flying Hours (FH)
B.1.1	Flying Hours (FH) - Navy
B.1.2	Flying Hours (FH) - USMC
B.2	Steaming Hours (SH)
B.3	Steaming Hours Underway (SHU)
B.4	Steaming Hours Not Underway (SHNU)
B.5	Miles Driven
C.1	Fuel Consumed (Gallons M)
C.2	Fuel Consumed Underway (Gallons M)
C.3	Fuel Consumed Not Underway (Gallons M)
C.4	Fuel Consumed Auxiliary (Gallons M)
D.1	Aircraft Age

*Element 3.5 created for commonality across services

Download the CVT From CADE

Enterprise VAMOSC

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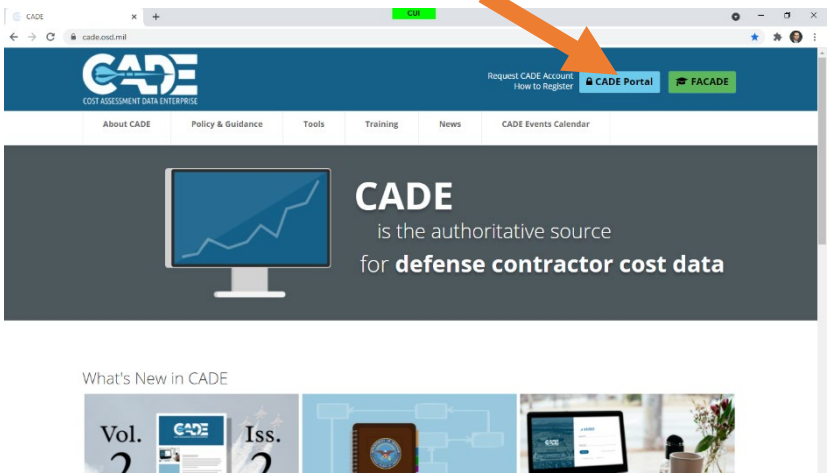
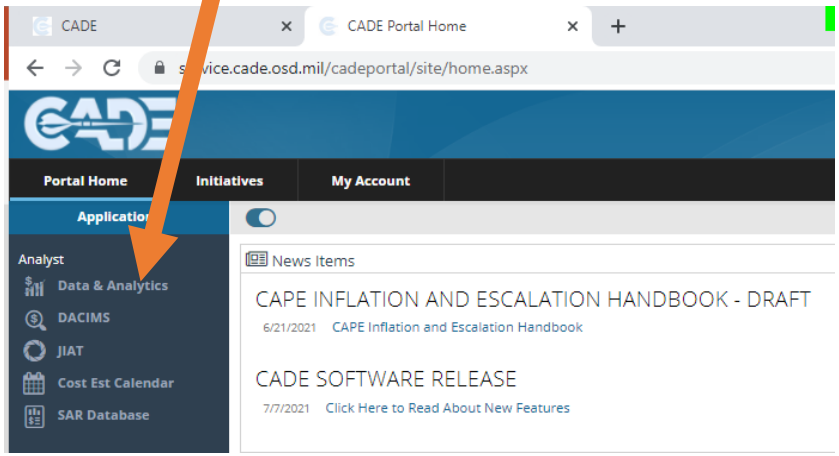
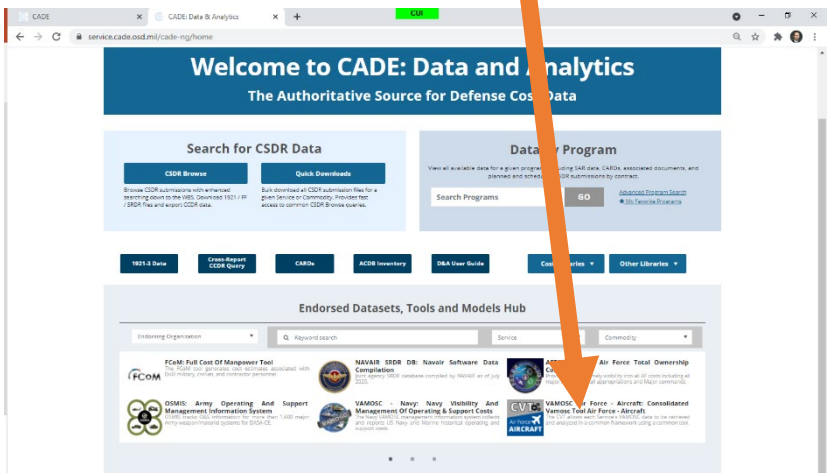
Step 1: Log in to the CADE Portal



Step 2: Click on “Data & Analytics”



Step 3: Chose a CVT from the tiles below



Step 4: Click here to download