Overarching Plan to Enable Adoption of Modern Engineering Tools

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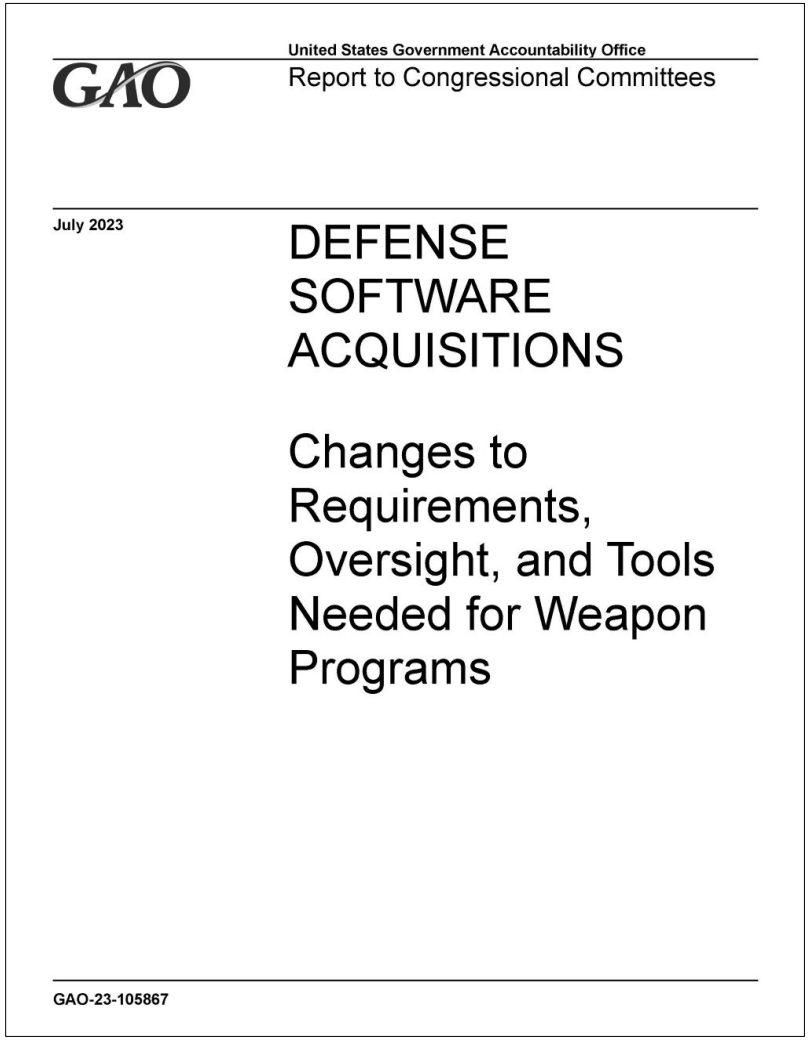
Topics

- Background for creation of an Overarching Plan
- What is the Overarching Plan
- Some current DoD approaches to adoption of modern engineering tools
- OUSD(R&E) role in supporting adoption of modern tools
- Challenges in identifying resources

Background

GAO Report 23-105867, Recommendation #3

"The Secretary of Defense should ensure that the Under Secretary of Defense for Research and Engineering, with the input of the military departments, establishes an overarching plan—which identifies associated resources—to enable the adoption of modern engineering tools, across all programs. This should include (1) mission engineering, (2) systems engineering, and (3) software engineering. (Recommendation 3)."


GAO

United States Government Accountability Office

Report to Congressional Committees

July 2023

DEFENSE SOFTWARE ACQUISITIONS

Changes to Requirements, Oversight, and Tools Needed for Weapon Programs

GAO-23-105867

DoD Response to Draft GAO Report

GAO DRAFT REPORT DATED JULY 1, 2023
GAO-23-105867 (GAO CODE 105867)

"DEFENSE SOFTWARE ACQUISITIONS: CHANGES TO REQUIREMENTS, OVERSIGHT, AND TOOLS NEEDED FOR WEAPON PROGRAMS"

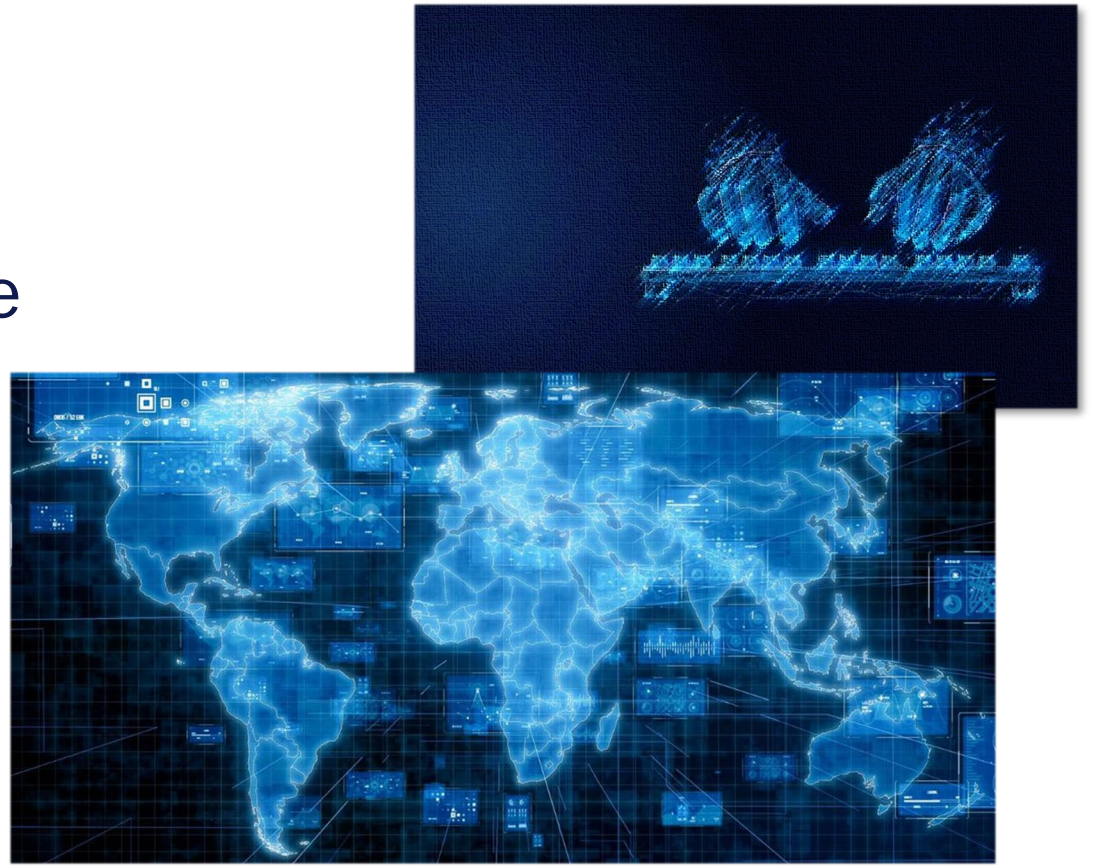
DoD RESPONSES TO THE GAO RECOMMENDATIONS

RECOMMENDATION 3: The Secretary of Defense should ensure that the Undersecretary of Defense for Research and Engineering, with the input of the military departments, establishes and overarching plan – which identifies associated resources – to enable the adoption of modern engineering tools, across all programs. This should include (1) mission engineering, (2) systems engineering, and (3) software engineering.

DoD RESPONSE: PARTIALLY CONCUR. The Department agrees that there is need of modern engineering tools across all programs including mission engineering, systems engineering and software engineering. However, the Department does not agree a single overarching plan will address the issue nor can it provide a single source of resources needed to implement. The realization of engineering tool modernization is in the scope of each Service. The overarching plan will be developed in conjunction with the Services and R&E will actively support implementation efforts through working groups and relevant guidance and policy development.

Overarching Plan

- The Approach: A federated overarching plan to enable the adoption of modern engineering tools across all programs, including Military Services and Defense Agencies
- A two-phase plan
  - Initial Phase
  - Incremental Phase
- Plan considers current approaches of Military Services / DoD Agencies



Overarching Plan - Initial Phase

Engagement across multiple communities is facilitated by numerous existing meetings, forums, and collaboration opportunities

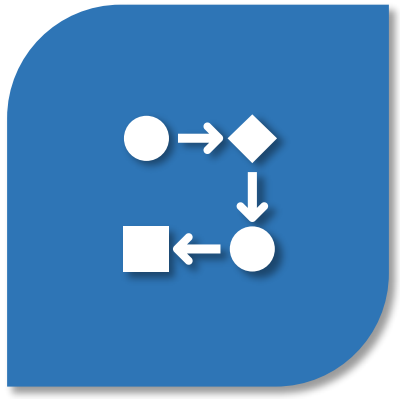
Aggregate information to:

- View current state of digital tool modernization plans across Department
- Share inputs and insights gained with programs across Department
- See how OUSD(R&E) can support implementation efforts through working groups, guidance, and policies
- Help identify resources that support goals of their respective organizations

Ensure coordination across OSD where appropriate, while keeping the plan at a high level, with summits addressing further details

Overarching Plan - Incremental Phase

See how services and defense agencies are working their plans within and across their respective organizations and the support being received



Re-evaluate the initial phase and release an updated plan every two years

View and discuss objectives defined by each military service or defense agency

Overarching Plan – The importance of summits

- Intended to align and synchronize activities
- Different from the other forums and meetings – DoD participants discuss adoption of modern engineering tools
- Looks at current Service modernization efforts, resources leveraged, and resources still needed
- Takes note of accomplishments, looks at objective measures, and determines steps forward

Timing of Summits

- Scheduled to allow coordination in time for the budgeting cycle
- Continue until no longer necessary or assimilated into other activities

	Annual Cycle Each Fiscal Year			
	1QFY	2QFY	3QFY	4QFY
Military Services and Defense Agencies	Finalize Budget for Tools (FY+1)			Military Services and Defense Agencies Draft Budget for Tools (FY+2)
DoD		Semi-Annual Summit	Semi-Annual Summit	

DoD Approaches

- What are some current approaches to adoption of modern engineering tools among the Military Services and Defense Agencies?

Photo by Air Force Tech. Sgt. Ned T. Johnston.

Army's Approach To Adoption of Modern Engineering Tools

- Promotes adoption of digital engineering processes via:
  - Upskilling on digital tools and techniques
  - Fostering development and reuse of collaborative digital engineering environments
  - Encouraging use of interoperable tools and data
- Leverages software factories by exposing Soldiers and civilians to technology industry best practices, cloud technologies, Agile methods, and DevSecOps
- Army Capability-based Architecture Development and Integration Environment (ArCADIE) is Army's example of exploring enterprise licensing and using cloud environments for tool use and sharing data

U.S. Army photo by Spc. Ashley Xie.

Navy's Approach to Adoption of Modern Engineering Tools

- Created the Digital Systems Engineering Transformation (DSET) Strategy
- DSET objectives:
  - Develop, integrate, and use models
  - Provide an authoritative source of knowledge
  - Incorporate innovations for engineering practice
  - Establish supporting infrastructure and environments
  - Transform the culture and workforce to adopt digital engineering
- Navy's Information Superiority Vision (ISV) - includes information management, digital modernization, and technology tools
- Integrated Modeling Environment (IME) is the Enterprise IT service for systems modeling

Photo by Petty Officer 2nd Class Terrin Hartman.

Air Force's Approaches to Adoption of Modern Engineering Tools

- Implementing the Digital Materiel Management (DMM) Initiative
- DMM institutes a "digital first" culture
  - New programs start digitally
  - Programs in development or sustainment adopt digital practices
- Air Force has developed a cloud-based enterprise tool environment called Launch Pad
- Examining best software tools according to type such as analysis, architecture, MBSE, and visualization
- Looking at Authority to Operate (ATO), Infrastructure-as-a-Service, Data-as-a-Service, and Platform-as-a-Service

Photo by Senior Airman John Linzmeier.

Missile Defense Agency's Approach to Adoption of Modern Engineering Tools

- Created a Transformation Task Force (TTF)
  - Identify and streamline efforts to accelerate delivery of capabilities throughout the life cycle
  - Adapt Agency systems engineering and software engineering processes
  - Adopt mission engineering practices
- The initiative emphasizes:
  - Need for tools to comply with data sharing standards
  - Allowing tools to contribute to and pull from common sources of truth

Photo by Ryan Keith, Missile Defense Agency.

OUSD(R&E) Support via Forums and Working Groups

- R&E participates in and provides forums and working groups for knowledge sharing and collaboration
- Discussions focus on digital engineering tools relevant to mission engineering, systems engineering, software engineering, and test and evaluation
- Groups discuss best practices, success stories, and lessons learned regarding modernization of tool ecosystem
- Examples of meetings and forums:
  - Software factories, communities of practice, working groups, senior steering groups, workshops, tiger teams, task forces, meetings with CDAO and CIO, data summits, NDIA events, digital talent management forums, and various other Military Service-specific meetings

Photo by Staff Sgt Robert W. Mitchell, 715th Public Affairs Detachment.

OUSD(R&E) Support via Policy and Guidance

- OUSD(R&E) maintains policy associated with digital engineering and modern digital tools
- Locations of some of these policies:
  - Systems Engineering and Architecture Library, https://www.cto.mil/sea/pg/
  - DoD Instruction 5000.97 *Digital Engineering*, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500097p.PDF
- Guidance efforts include:
  - Software Science and Technology Strategy and Implementation Plan
  - Software Modernization Strategy and Implementation Plan
  - Systems Engineering Guidebook
  - DoD Software Engineering for Continuous Delivery of Warfighting Capability
  - Evaluation of tools such as Digital Engineering Tool Evaluation Criteria Template (DETECT)

Considerations in Identifying Resources Toward Adoption of Tools

- Allocation of associated resources can be challenging and is a complex balance of competing priorities within limited resources
- Some complexities to consider include:
  - Ensuring tool capabilities meet needs of DoD
  - Tool version control and managing updates
  - Relationships with tool vendors
  - APIs / data interoperability / data portability / data access
  - Getting an approved ATO for a tool(s)
  - Security standards compliance, and operating tools across multilevel security (i.e., unclassified, secret, top secret)
  - License management
  - Workforce training and retention

Summary

- No single, centrally controlled overarching plan to address the issue
- No single source of resources identified to implement
- Federated plan is the preferred approach
- Plan recognizes modernizing engineering tools is within scope of each Military Service and Defense Agency
- OUSD(R&E) supports through working groups, policy, and guidance
- Two-phase federated overarching plan includes summits aimed to align to budgeting cycle

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