




Assessing MOSA – New Method to Develop Quantitative Assessment Criteria

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Agenda



- Background
- Current MOSA Assessment Practices
- Current MOSA Assessment Tools
- Assessing MOSA Tiger Team
- MOSA Pillars
- Identifying MOSA Criteria Categories
- Recommended Process
- Example Assessment
- Process Benefits



Background



- Modular Open Systems Approach (MOSA) requirements are codified in law (e.g., 10 U.S.C. Section 2446 and Section 2448) for Department of Defense (DoD) programs
- **§2446a. Requirement for modular open system approach in major defense acquisition programs; definitions (a) Modular Open System Approach Requirement.**
 - A major defense acquisition program that receives Milestone A or Milestone B approval after January 1, 2019, shall be designed and developed, to the maximum extent practicable, with a modular open system approach to enable incremental development and enhance competition, innovation, and interoperability.
 - Other defense acquisition programs shall also be designed and developed, to the maximum extent practicable, with a modular open system approach to enable incremental development and enhance competition, innovation, and interoperability.
- This presentation addresses a new standardized methodology to develop quantitative assessment criteria



Current MOSA Assessment Practices Are Used in Standardization Efforts



- All Services Have Incorporated MOSA-Like Criteria into Their Programs to Some Extent
- Each Service Has Taken Their Own Approach
- Little to No Standardization Across the Services
- All Services Incorporate Multi-Organizational Consortia (Government, Industry, Academia)

Services Are Attempting to Incorporate MOSA into Their Programs



Current MOSA Assessment Tools



- All Current Tools Contain Subjective/Qualitative Criteria
- Some Provide Scalars to Convert the Qualitative Assessments into Quantitative Outcomes
- Open Architecture Assessment Tool (OAAT) Provides Criteria that Align Well with Those Identified in Policy and Guidance (Navy)
- OAAT Attempts to Quantify a Program's Compliance with MOSA Standards

No Consistent Set of Tools Across Services



Assessing MOSA Tiger Team

MOSA SE Assessment Focus Areas



- During the April 2021 Modular Open Systems Working Group (MOSWG) Steering Group meeting, the Assessing MOSA Tiger Team reported an impasse in developing specific MOSA evaluation criteria that would be representative for all Services and program types. They were only able to identify general criteria categories.
- OUSD(R&E) recommended the Steering Group members vote for one of four options in which to proceed:
 - **Option 1.** Continue Status Quo
 - **Option 2.** Select one current Service methodology/criteria/tool to be the standard for all Service use
 - **Option 3.** Each Service provides OUSD(R&E) with a set of criteria and scoring methodology. OUSD(R&E) will develop a consensus from those inputs
 - **Option 4.** OUSD(R&E) will proceed with their proposed methodology using MOSA Pillars categories. Within each category, OUSD(R&E) will map general (high-level) criteria categories identified in Law, Policy, DoD Directives, and currently in use along with their specific definition. Each Service would then be responsible for developing specific quantitative and/or qualitative criteria within these categories (with scoring scales), tailored to their specific program(s) being evaluated
- The Steering Group preferred Option 4 and recommended the Assessing MOSA Tiger Team focus their efforts on that option.



MOSA Pillars



- To ensure consistency throughout OUSD(R&E), the Assessing MOSA Tiger Team coordinated with the Enabling MOSA Tiger Team to identify and define the 5 MOSA Pillars.
- These 5 Pillars are common across the pain point tiger teams and form a representative set of MOSA Criteria Categories. They include:
 - Establish Enabling Environment
 - Employ Modular Design
 - Designate Key Interfaces
 - Select Open Standards
 - Certify Conformance



MOSA Pillars (continued)



- Establish Enabling Environment
 - Establishes requirements, business practices, development, acquisition, test and evaluation, and strategies that support MOSA
- Employ Modular Design
 - Accurately isolates functionality during the design process to simplify development, maintenance, changes, and upgrades.
- Designate Key Interfaces
 - Decouples the interface and Service implementation so that they can maintain separate life cycles. In order for components to decouple their inner workings from each other but be able to leverage the capability provided by each highly cohesive service, developers expose openly available key interfaces to other components.
- Select Open Standards
 - Open standards allows developers to leverage commercially developed technologies, increasing competition. Additionally, they offer faster upgrades at reduced cost and complexity. Fielded systems are more affordable and maintainable.
- Certify Conformance
 - Developers need to verify and validate their MOSA strategy and requirements, ensuring conformance to selected internal and external open interface standards.



Identifying MOSA Criteria Categories



- A set of example Criteria Categories were identified from:
 - Criteria in Law and Policy
 - Current MOSA Standards
 - Current MOSA Criteria
- These criteria were not exhaustive
- Services were encouraged to develop additional criteria that are appropriate for their individual Service and program(s) but must ensure they are incorporated into the appropriate Pillar



Recommended Process



- OUSD(R&E) recommends the criteria be evaluated on a 0-5 scale to allow a quantitative scoring and life-cycle measurement (where 0 is no/minimal capability and the 5 represents total/maximum capability for that particular criterion).
- Example:

Establishing Enabling Environment: To What Extent are MOSA requirements documented?

0 – No documentation supporting MOSA requirements

1 – Minimal documentation. Approximately 10% of complete MOSA required documents

2 – 25% complete

3 – 50% complete

4 – 75% complete

5 – Complete set of MOSA required documents



Recommended Process (continued)



- OUSD(R&E) recommends using a Multi-Attribute Utility Theory (MAUT) for scoring. MAUT is a structured methodology designed to handle the tradeoffs among multiple objectives. Many MOSA models/tools used by the Services today utilize this process to provide a *quantitative* MOSA evaluation of their program(s). Although there are several COTS tools available to conduct MAUT, a simple Excel spread sheet is often the preferred tool.
- An example spreadsheet using a subset of the criteria categories is shown on the following slide. The example shows the Pillars equally weighted. This is not always the case, and Pillars should be weighted according to Service and program needs.
- The example only shows the Benefit (or performance) of a particular program's MOSA compliance. To completely evaluate a program, a Cost/Benefit analysis should be conducted using the program's calculated performance versus its *life-cycle* cost.

Program X MOSA Evaluation					
Criteria	Pillar Weight	Score (0-5)	Weighted Score	Justification for Score	Comments
Establish Enabling Environment	0.2				
To what extent are MOSA requirements documented?		2	0.40		
Establish and monitor MOSA life-cycle costs and performance goals		4	0.80		
Is MOSA included in sustainment planning?		3	0.60		
Extent to which MOSA is integrated into contracts and data rights strategy		5	1.00		
Weighted Pillar Score			2.80		
Employ Modular Design	0.2				
Are components separated into scalable, reusable modules consisting of self-contained functional elements?		4	0.80		
To what extent does the system's architecture exhibit modular design characteristics?		5	1.00		
Does the architecture provide failure isolation?		3	0.60		
Weighted Pillar Score			2.40		
Designate Key Interfaces	0.2				
Are key interfaces openly available to other components?		5	1.00		
To what extent has the criteria for designating key interfaces been established?		5	1.00		
To what extent has the program designated key interfaces?		5	1.00		
Weighted Pillar Score			3.00		
Select Open Standards	0.2				
Does the system use open licenses without restrictions and without requirements?		2	0.40		
Are Open standards in alignment with IP/data rights strategy?		4	0.80		
Weighted Pillar Score			1.20		
Certify Conformance	0.2				
To what extent are MOSA standards and requirements verified and validated?		4	0.80		
What is the program's level of MOSA Compliance?		5	1.00		
How well are the MOSA goals for the program being reached?		2	0.40		
Weighted Pillar Score			2.20		
Overall Score for Program X (Sum of Weighted Pillar Scores)			11.60		



Process Benefits



- Process is aligned with the recommendation from the MOSA Metrics Sub-Committee of the NDIA SE Architecture Committee
- Allows Services flexibility in developing criteria to meet their specific programs
- Provides standardization using MOSA Pillars as criteria categories
- Creates repeatable, quantifiable results

Seeking Service Partners to Validate Approach with a Current Program



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Abstract

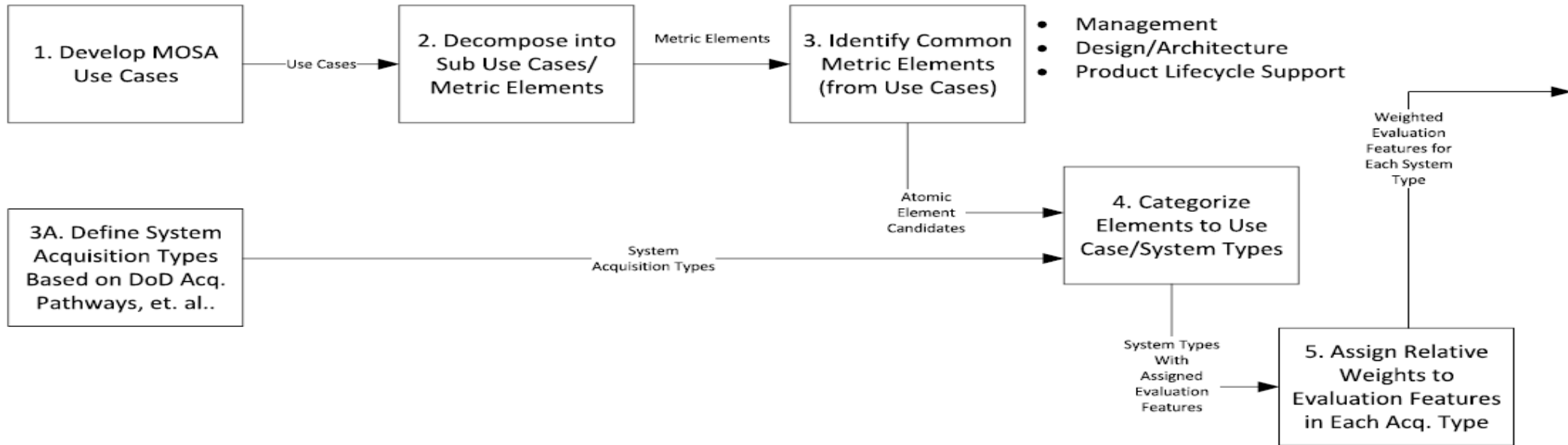


- Modular Open Systems Approach (MOSA) requirements are now codified in law (e.g., 10 U.S.C. Section 2446 and Section 2448) for certain Department of Defense (DoD) programs. Major Defense Acquisition Programs (MDAPs) must comply with the law at designated program acquisition decision points. In addition, even if the laws do not apply to a given program, program managers can benefit from considering the requirements for modularity and open standards.
- DoD program sponsors and their associated Milestone Decision Authority need consistent, quantitative, and repeatable measures to assess their program's compliance with statute. This measurement in turn will better enable them to continuously support DoD missions within a rapidly evolving battlespace.
- This presentation addresses program-related MOSA requirements included in 10 U.S.C. Section 2446 and Section 2448 that require quantitative metrics. It describes the current state of MOSA assessment tools and practices within DoD and offers recommendations for a proposed metric development process. The presentation includes recommendations for new or modified MOSA assessment mandates, tools, and practices.



MOSA Metrics Determination and Resolution Process

NDIA SE Division
Systems Architecture Committee
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