Implementing a Modular Open Systems Approach (MOSA) to Achieve Acquisition Agility in Defense Acquisition Programs

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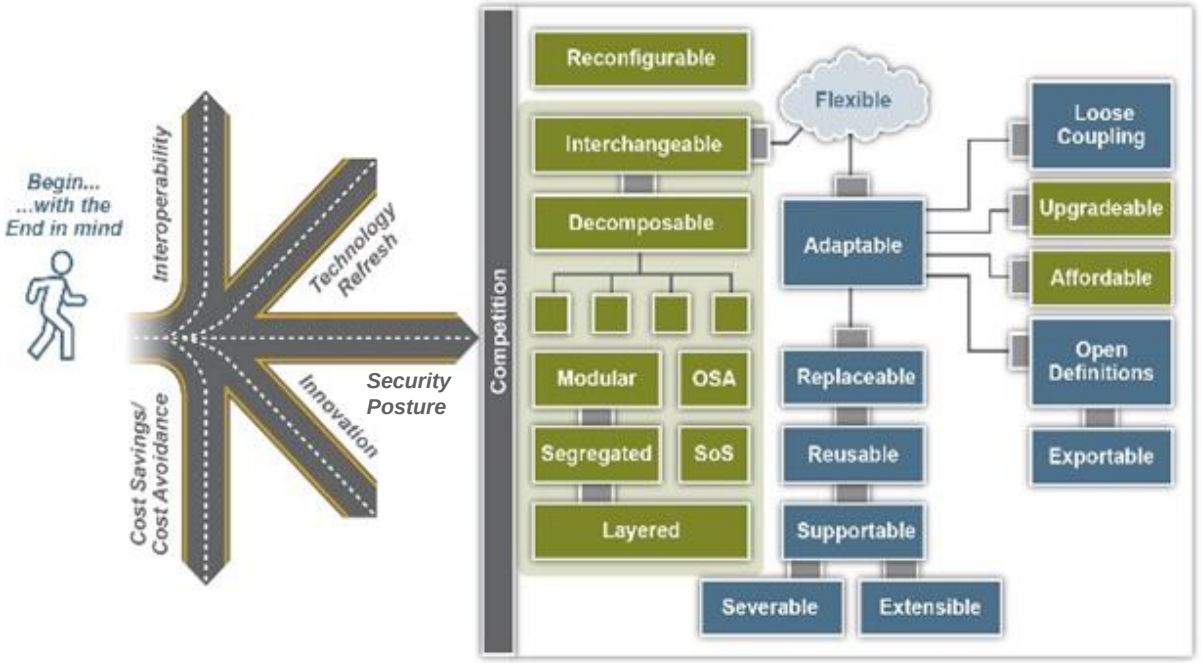
Design Choices

- **Begin with the End in Mind**
  - There is no single, magic bullet for implementing MOSA
    - There are multiple pathways for MOSA
  - Determine expected outcomes up front



Implementing MOSA is about trades

MOSA Stakeholder Communities

- **Open Collaboration**
  - Successful MOSA implementation should foster open collaboration across DoD communities and seek to unify MOSA efforts
    - There are elements from multiple communities that must collaborate for successful MOSA implementation

Multiple communities must align to enable MOSA

Balancing Business and Technical Drivers

- **MOSA is intended to:**
  - Balance business objectives with technical methods
  - Serve as the acquisition program's foundational design and architecture structure to facilitate modernization, threat response, mission integration, competition, resource savings and security enablement
  - Enable system components and platforms to be separated, competed, and independently evolved throughout the lifecycle
    - Support using common, reusable hardware and software components that can be more readily adapted and refreshed allowing the DoD to deploy and support the latest technologies.
    - Provide the ability for competition of replacement elements, when properly supported by appropriate data rights/intellectual property access.

Modular Open Systems Approaches

WHY	HOW	WHAT
Interoperability Tech Refresh Competition Innovation Cost Savings	Modular Design Defined Interface Standards Process Accessible Data Open Interfaces IP Rights	**Modular Technical Design Approaches** ▪ Design severable modules ▪ Define interfaces between modules ▪ Publish consensus-based standards ▪ Define, standardize & describe data models **Open System Business Approaches** ▪ Use standards & specs for interfaces ▪ Recognize the relevant technical community ▪ Acquire necessary data & IP rights

MOSA implementation consists of various methods, processes, and tools which underpin the approach.

NDAA FY17 MOSA Definition Sec. 805, §2446a (b)(1) p.253

- **An integrated business and technical strategy that:**
  - (A) Employs a modular design that uses major system interfaces between a major system platform and a major system component, between major system components, or between major system platforms;
  - (B) Is subjected to verification to ensure major system interfaces comply with, if available and suitable, widely supported and consensus-based standards;
  - (C) Uses a *system architecture that allows severable major system components at the appropriate level to be incrementally added, removed, or replaced throughout the life cycle of a major system platform to afford opportunities for enhanced competition and innovation while yielding*-
    - (i) Significant cost savings or avoidance; (ii) schedule reduction; (iii) opportunities for technical upgrades; (iv) increased interoperability, including system of systems interoperability and mission integration; or (v) other benefits during the sustainment phase of a major system;
  - (D) complies with the technical data rights set forth in Sec 2320, title 10.

Defining MOSA

From Better Buying Power (BBP) 3.0 MOSA Initiative

- **Interpretation of law - recommended DoD definition:**
  - The Department of Defense defines a Modular Open Systems Approach (MOSA) as an integrated business and technical strategy for competitive and affordable acquisition and sustainment of a new or legacy system, or a component within a new or legacy system, over the entire system life cycle.
  - The approach uses a modular open systems architecture that defines key interfaces based on widely supported consensus-based standards for which conformance can be verified

Acquisition Agility

- **The goal of the NDAA FY17 Acquisition Agility Act (Sec 805-809) is to improve our ability to evolve weapon systems**
  - (AAA) DoD Acquisition programs will be required to identify, develop and sustain major system interfaces, which comply with, if available and suitable, widely supported and consensus-based standards
  - (AAA WG) Military Services will establish prototyping investments targeted, in large part, to maturing technologies suited to meet MDAP evolution needs
  - Programs will determine the value proposition of MOSA by linking the design, interface, and standards definitions directly to the benefits they aim to achieve, including evolving operational requirements

Emerging Technology and Evolving Threats

- **Responding to projected threats and changing technology**
  - (Sec 2446(b)) Address emerging threats, evolving technology, as well as component obsolescence when acquiring defense systems
  - (AAA WG) Anticipate evolution of technologies - forecast – for possible tech insertion, and interoperability through the use of technology maturation/prototyping and MOSA

Program Planning and Requirements Development

- **Delivering agile technical solutions to the Warfighter**
  - MDAPs will use MOSA, where practicable, to enable incremental development, enhance competition, increase innovation and interoperability (Sec 2446B)
    - **Milestone B approval** includes use of MOSA at system interfaces, which are consistent with consensus-based standards, and appropriate data rights
    - **Program Acquisition strategies** describe MOSA across the system architecture, evolution of major system components, or addition of new or likely to change components, intellectual property (IP), tech data deliverables associated with the use of MOSA, describe the approach planned for systems integration and systems-level configuration management to ensure mission and information assurance.
    - **Request for Proposal (RFP)** for development and production phases describes MOSA of major system components in the design
    - **Program Capability Document** identifies capabilities likely to evolve because of changing threats, or potential interoperability needs
    - **Analysis of Alternatives (AoA) study plan** addresses applicability of MOSA, prototyping and evolutionary acquisition

Support Acquisition Planning

- **Military Services will provide technical expertise and resources to support a modular open systems approach in requirements development and acquisition program planning (Sec 2446c)**
  - PEOs/PMs employ systems engineering and MOSA practices
  - Programs to address MOSA in product designs where feasible and cost-effective in architecture and engineering design documentation
  - Ensure MOSA training to requirements and acquisition workforce
- **Additional Milestone Reporting Requirements**
  - The DoD Community can structure technology investments, upgrades and innovation opportunities for insertion into programs at regular refresh cycles

Technology Prototypes and System Components
(Sec 806)

- **Component prototyping using MOSA**
  - Prototyping and experimentation of major system components and other technologies will be overseen by the Military Services
    - including the identification and composition of the prototype oversight boards, as well as the services' procedures for selecting prototype projects
- **Integration of new components into acquisition programs**
  - Allowing for appropriate experimentation, risk reduction, and technology transition activities to be conducted
- **Prototype projects using MOSA**
  - Considering MOSA in development, weapon system component, and technology prototype projects

Interfaces, Standards and Conformance Testing
(Sec 2446c)

- **System and component interfaces, along with supporting standards will be identified, developed, and sustained**
  - Allow interfacing components to evolve independently from the internal elements of a system
  - Enable efficient logistics and maintenance strategies. allowing interfacing components to evolve independently from the internal elements of a system
    - Development and sustainment of system interfaces will be coordinated and maintained through rigorous system configuration, configuration management and design disclosure
      - Other major systems interfaces will be maintained across the Services and DoD as necessary
    - Services will identify and select standards pertinent to their unique systems. Where gaps exist, standards will be developed and sustained as necessary
      - Standards conformance testing to be conducted ensure consistent implementation
      - Defense Standardization Program activities will be used and queried for help

Acquisition of Data Rights and Intellectual Property (IP)
(Sec 809)

- **Acquiring Data Rights and IP**
  - Program Acquisition Strategy assists programs to appropriately promote competition
    - Acquisition programs should create and sustain a competitive environment from program inception through sustainment.
    - Strategies should consider:
      - Competitive prototyping, dual sourcing, an open systems architecture that enables competition for upgrades, acquisition of complete technical data packages, and competition at the subsystem level.

- **IP considerations**
  - The Strategy for managing IP across enables competitive and affordable acquisition & sustainment
    - PMs should identify and manage the full spectrum of IP and related issues from program inception and throughout the lifecycle
      - Assess program technical data needs
      - Enable the development of competitive acquisition of deliverables of IP & associated license rights

Strategic Considerations

- **MOSA is not an all or nothing proposition**
  - Must tailor approach to expected MOSA benefits; requires tradeoffs
  - Must be addressed in all aspects of acquisition
- **MOSA is more than just defining architectures and selecting standards**
  - MOSA requires technical community enablers and business relationship enablers
- **Governance and leadership matter**
  - Leadership, and guidance applies across multiple programs
- **Industry must be an able and willing partner**
  - Crossing the government/industry boundary: Intellectual Property/Data Rights (IP/DR) in design, documentation, specifications, tools, etc.

MOSA enables flexibility and longevity in our weapon systems

Systems Engineering: Critical to Defense Acquisition










Defense Innovation Marketplace
http://www.defenseinnovationmarketplace.mil

DASD, Systems Engineering
http://www.acq.osd.mil/se

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