U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND AVIATION & MISSILE CENTER

An Update to the Comprehensive Architecture Strategy (CAS) and its Supporting Architecture Processes and Body of Knowledge (BoK)

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Distribution Statement A: Approved for public release. Distribution is unlimited.

CURRENT DOD SYSTEMS ENVIRONMENT

Only Constant for DoD Systems is CHANGE!

Military systems **must rapidly adapt** to maintain operational relevance

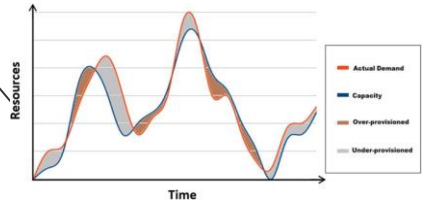
Evolving Threats

Strategic and Tactical Innovation

Rapid Technological Change

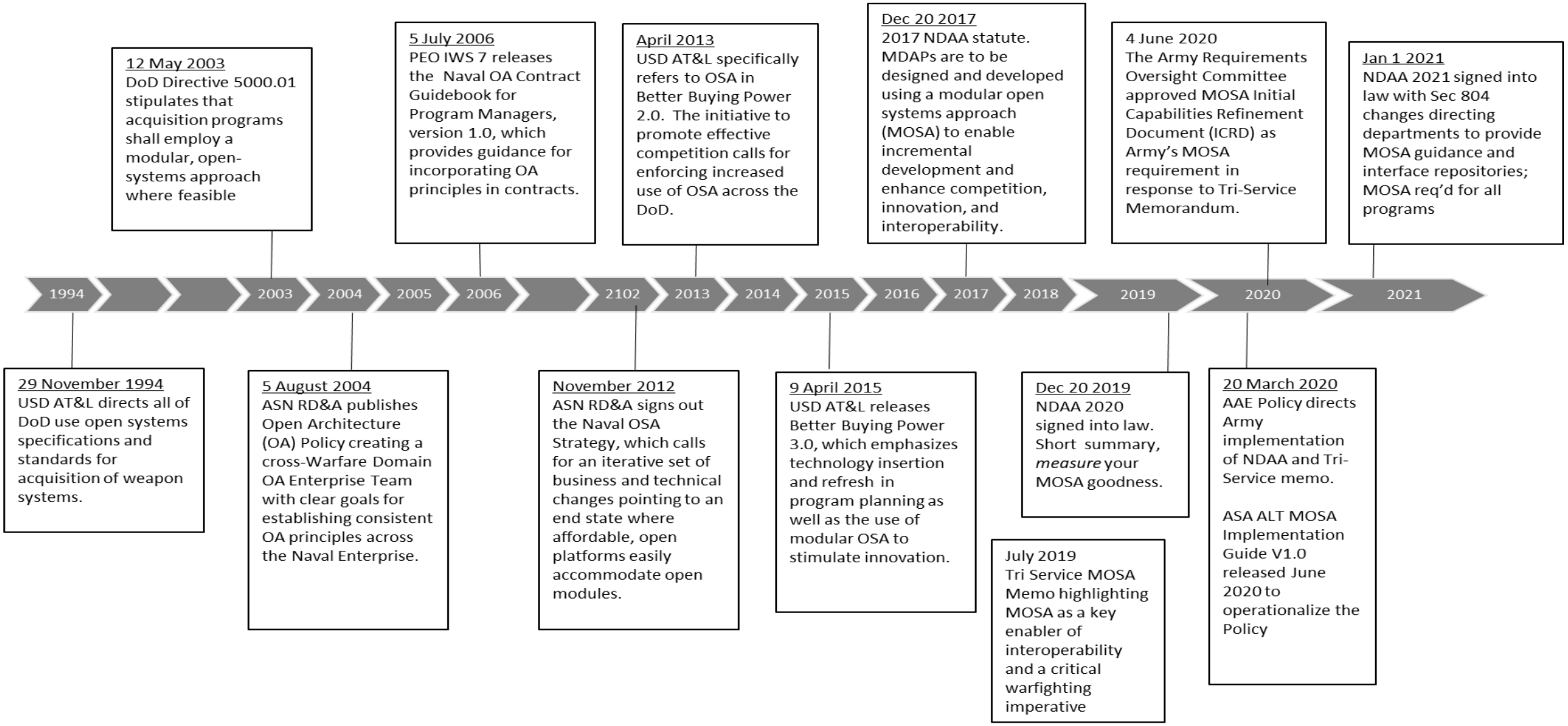
Increased Leverage of COTS

Resource and Demand Uncertainty



Modular Open Systems Approach (MOSA) is Key to Achieving Systems Resilient to Change

WE'VE BEEN TOLD TO DO MOSA FOR A LONG TIME



But we haven't been told how; nor do we have good metrics

IF MOSA IS THE ANSWER; WHAT ARE THE CHALLENGES?

(1) “We must inspect what we expect”, and architecture is key to MOSA

(2) We must inspect architectures to ensure MOSA is realized

(3) We lack process for deep architectural inspection across lifecycle

(4) We lack engineering foundation for architectural inspections

COMPREHENSIVE ARCHITECTURE STRATEGY (CAS)

- CAS is a strategy to address architecting for MOSA objectives
- Business Goals are the baseline to define and empower a MOSA
- An overarching architectural approach to Enterprise and Product Line management to enable rapid capability reuse and deployment across systems resulting in significant cost, schedule, and warfighting advantages
- Used to guide development of architectures that support a MOSA

The AVE architecting processes presented today evolved from the CAS

ARCHITECTURE VERIFICATION ENVIRONMENT (AVE) VISION

Mission

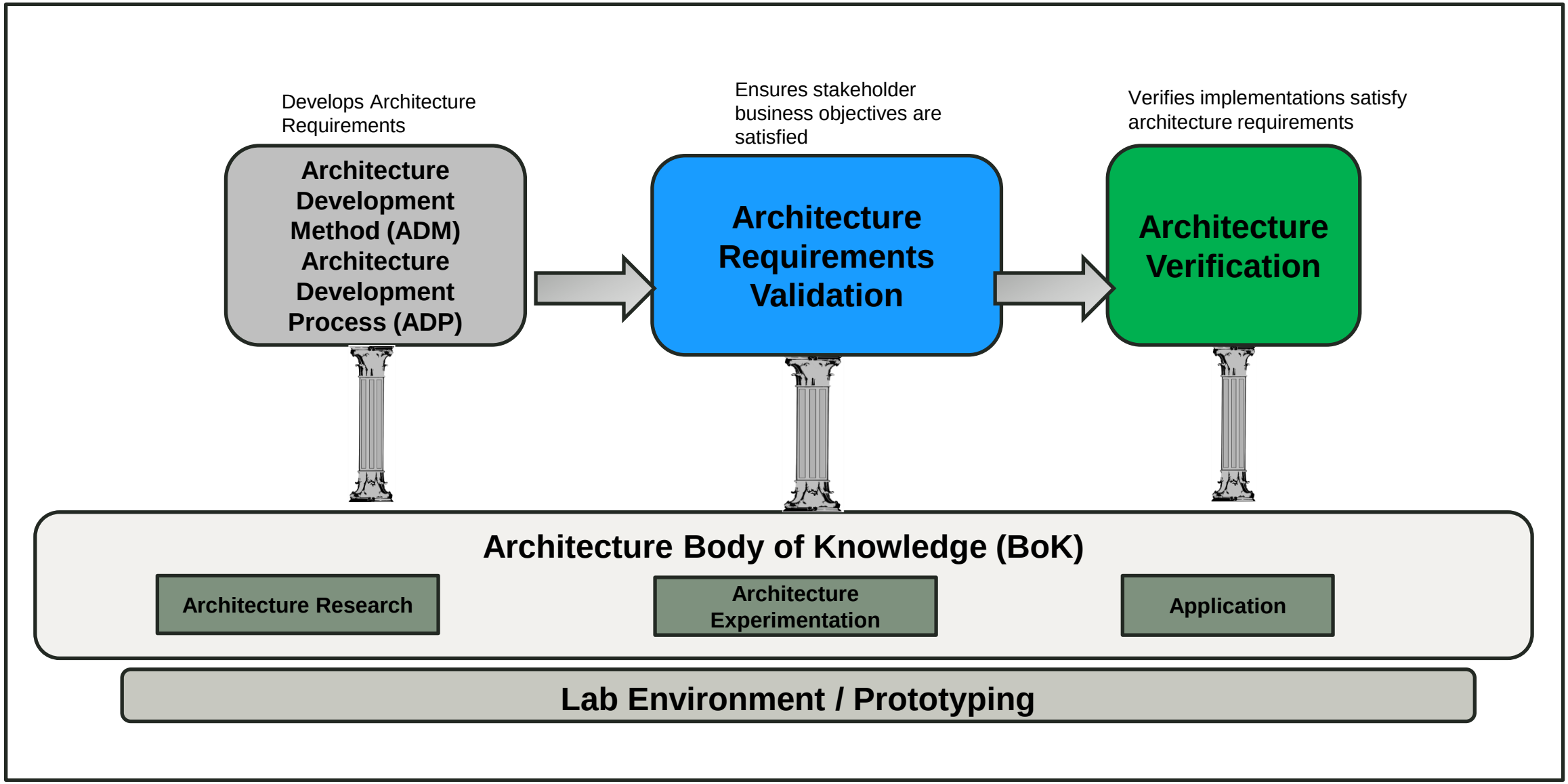
Provide capabilities to **inspect architectures** and their derivations for an **ability to handle future uncertainty** which drives system changes

Early Lifecycle Assessment of how well an architecture will enable a system to handle lifecycle change

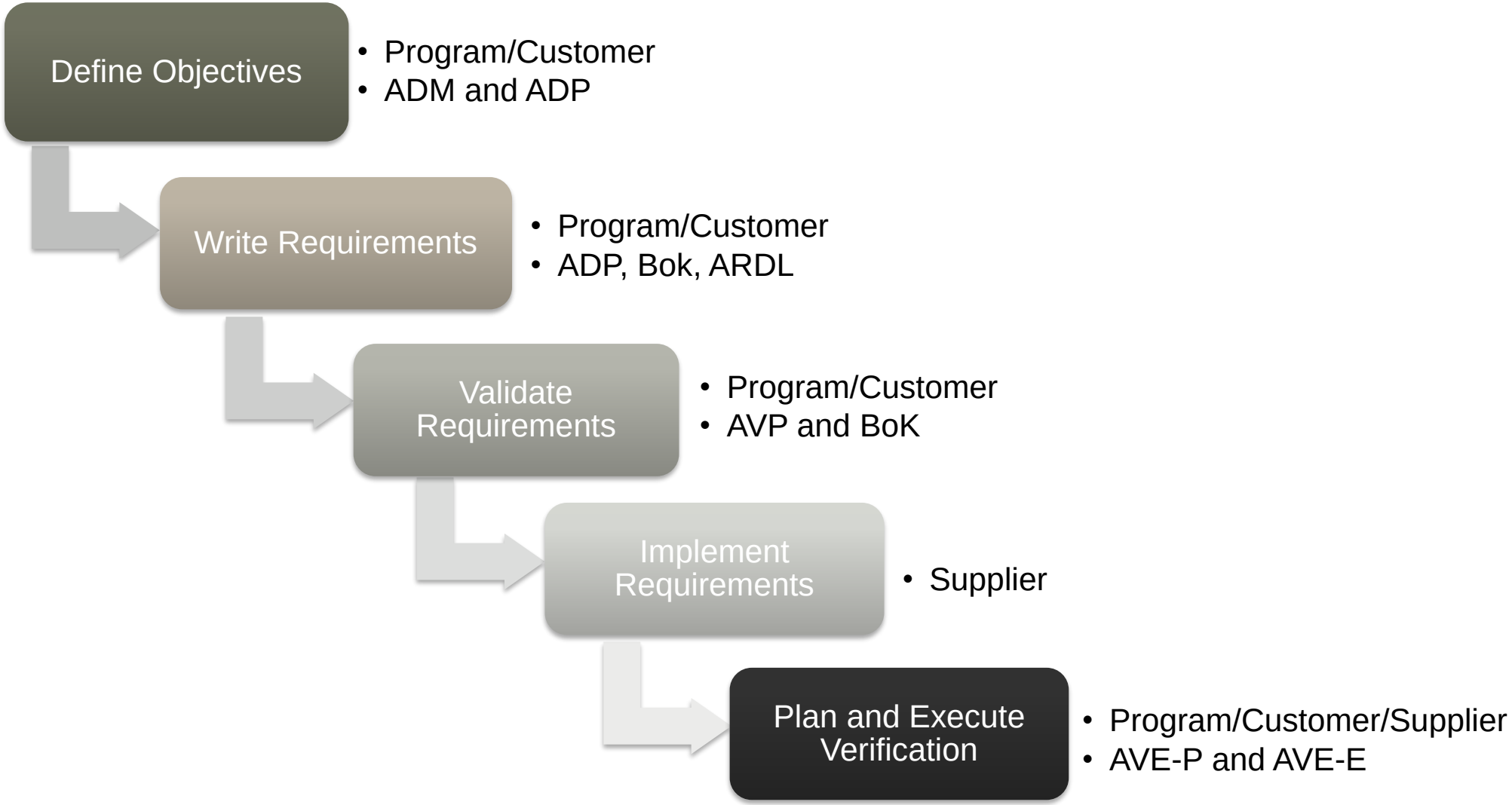
Ensure Derivations Maintain Architecture intent, decisions, and conceptual/logical instantiations

Assess SW/HW Implementations for predicted or specified response to lifecycle changes

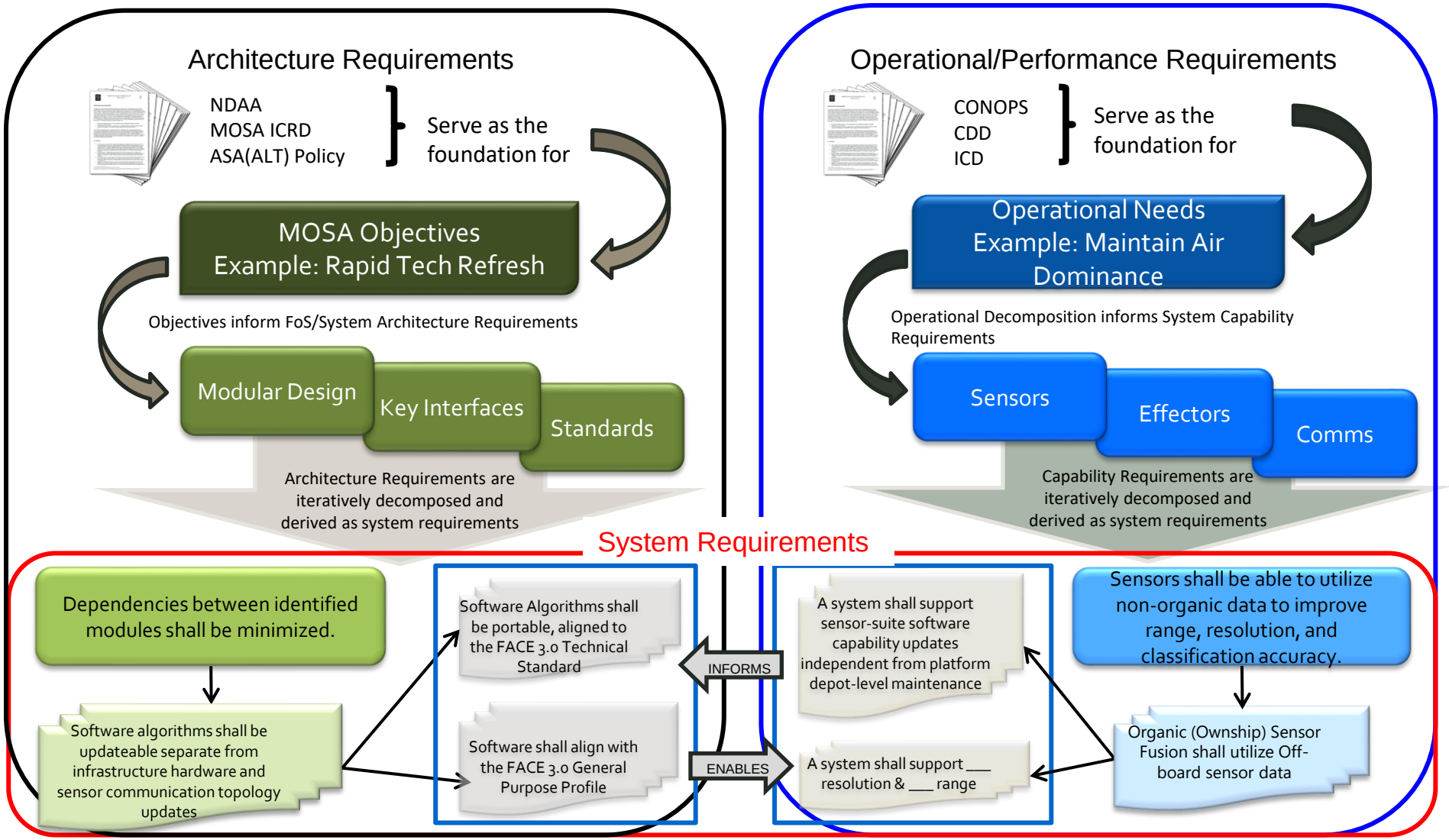
AVE OVERVIEW



ARCHITECTURE LIFECYCLE PROCESSES

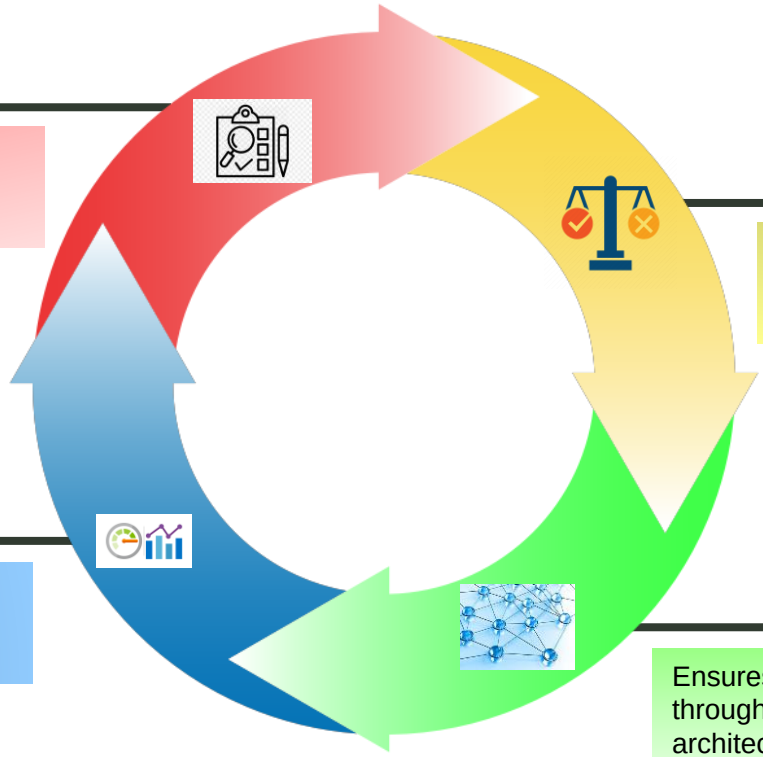


ARCHITECTURE REQUIREMENTS EXAMPLE



ARCHITECTURE REQUIREMENTS VALIDATION

GOAL: Early assessment of architecture and design's ability to enable system evolution w.r.t. MOSA Objectives within required business and technical criteria



Requirements Well-Formedness Checks

Ensures requirements are clear, appropriate, and cohesive to communicate intent as system evolves

Strategic Architecture Decision Analysis

Assesses strategic architecture decisions for their ability to enable program MOSA objectives

Architecture Traceability Analysis

Ensures architecture is maintained through refinement (e.g., requirements, architectures, design) across the lifecycle

Architecture Metrics Assessment

Shows how well architecture instantiations are expected to handle evolution through change

VERIFICATION PLANNING AND EXECUTION

Architecture Verification Planning covers:

- Architecture Scenario development
- Create Architecture Test cases
- Determine Test method (inspect, analyze, demonstrate, test)
- Determine resources needed (humans, software, tools, hardware, lab, etc.)

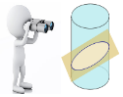
Architecture Verification Execution covers:

- Execute Test method
- Capture results
- Analyze results
- Make assessment

Assess SW/HW Implementations for predicted or specified response to lifecycle changes

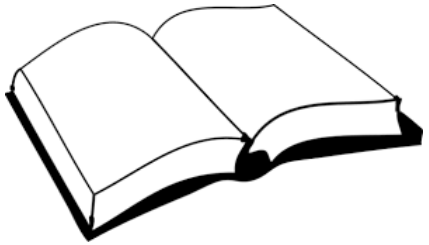
ENGINEERING FOUNDATION OF THE BODY OF KNOWLEDGE

- Standardized Business Drivers 
- Standardized Quality Attributes (QA) 

- Standardized Architecture Mechanisms 
- Policy and Regulatory Statements 
- Business Drivers to QA Relationships 
- QA to Mechanism Relationships (early draft) 
- QA to QA Relationships (early draft) 
- Standard Architecture Viewpoints and Aspects 
- Example Architecture Requirements 

Incorporated Into

Architecture Book of Knowledge (BoK)



Used for

Architecture V&V Processes

- Architecture Requirements Validation
- Architecture Implementation Verification

AVE SUMMARY