RT-185 Approaches to Achieve Benefits of Modularity in Defense Acquisition

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Research Motivation

Current US Department of Defense Challenges

- To affordably address emerging threats
- Component obsolescence
- Loss of critical suppliers and planned technology upgrade for tightly coupled, highly integrated systems

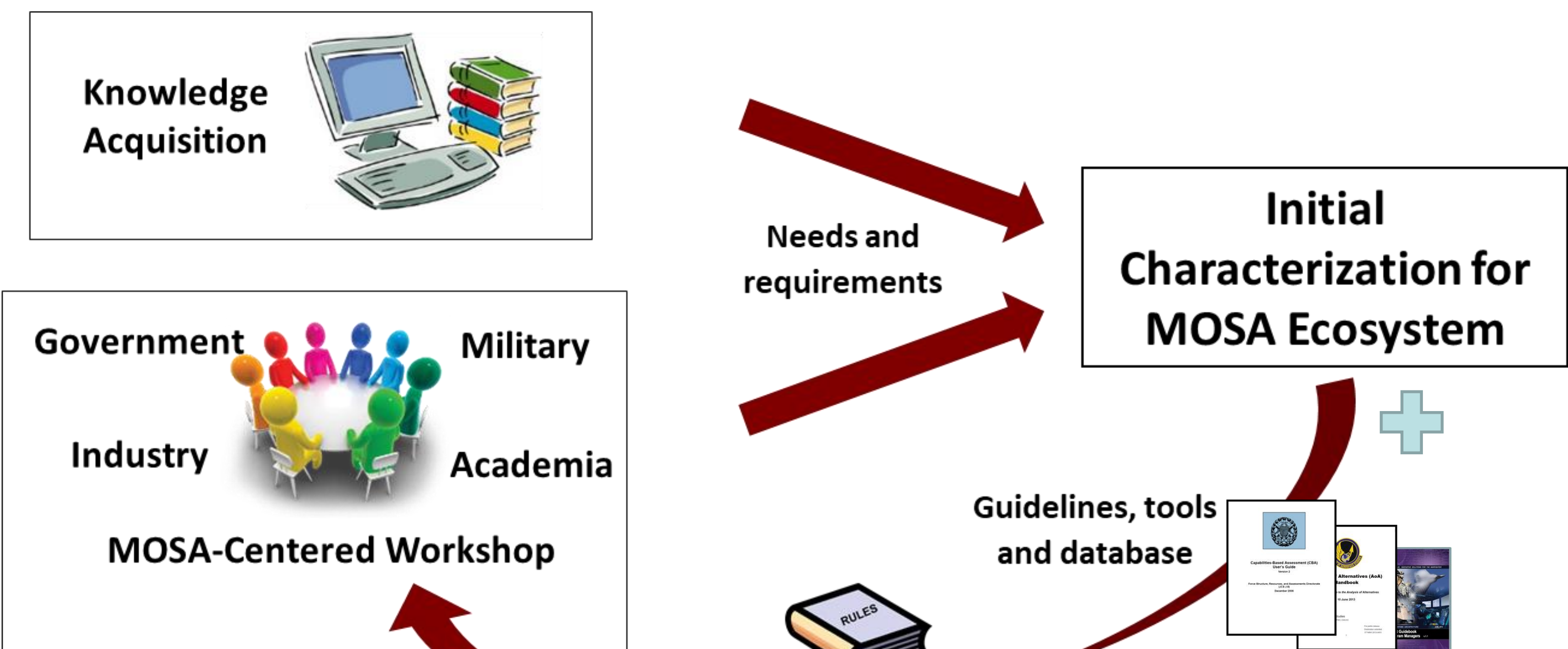### US Department of Defense Acquisition Strategy

- Implement best practices to improve productivity, affordability, capabilities, reduce unproductive states across DoD acquisitions

- Includes **encouraged use of modularization strategies** to achieve desired end benefits, via a **Modular Open Systems Approach (MOSA)**

<u>CHALLENGE</u>: Need strategies and tools to be successful in MOSA ecosystem

Research Goals & Objectives

- **Investigate development of systems to exploit modularity** to enhance defense acquisitions and military capabilities.

- **Explore concept of an ecosystem** that facilitates adoption of modular solutions to achieve benefits (business + technical ends)

- **Investigate how to encourage modularity** to gain its benefits – conducive modular patterns, decompositions, methods, factors, catalysts etc.

- **Map relevant knowledge artifacts** to defense acquisition lifecycle

- **Provide guidance and insights** to:
  - Aid decision-making on modularization and achieving the intended benefits
  - Connect desired program outcomes to a MOSA goal
  - Construct **prototype executable model** that captures salient dynamics and heuristic influence mechanisms for acquisitions
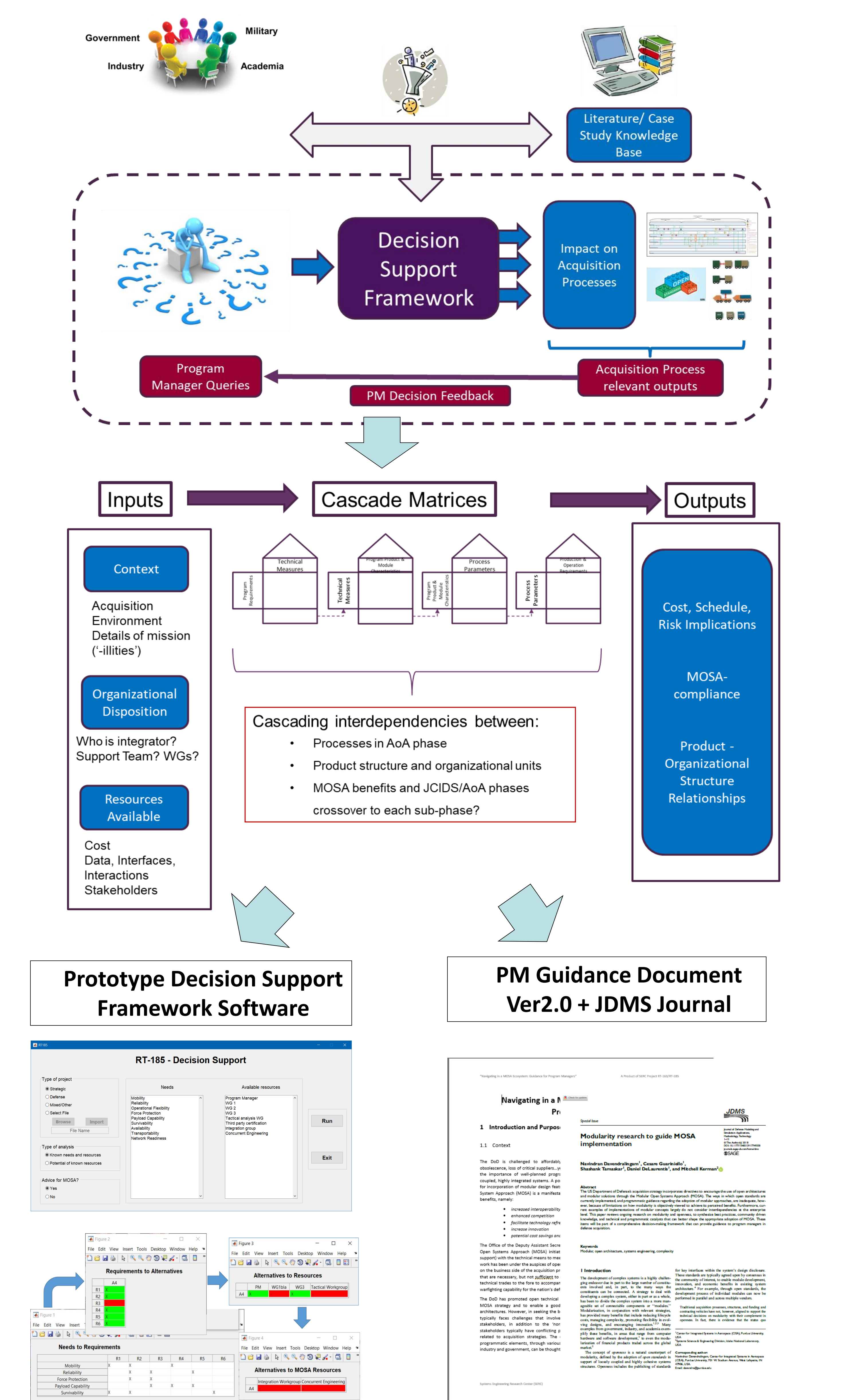
Prior Foundational Work

Knowledge Acquisition

Needs and requirements

Initial Characterization for MOSA Ecosystem

Government · Military · Industry · Academia
MOSA-Centered Workshop

Guidelines, tools and database

Detailed literature reviews and targeted MOSA workshop to:

- Investigate status quo of barriers, enablers, benefits, drawback, on modularity and openness in MOSA

- Characterize MOSA ecosystem and derive *actionable insights* from accumulated knowledge

Current Effort

Government · Military · Industry · Academia

Literature/ Case Study Knowledge Base

Decision Support Framework

Impact on Acquisition Processes

Program Manager Queries

PM Decision Feedback

Acquisition Process relevant outputs

Inputs → Cascade Matrices → Outputs

Context
Acquisition Environment Details of mission ('-illities')

Organizational Disposition
Who is integrator? Support Team? WGs?

Resources Available
Cost Data, Interfaces, Interactions Stakeholders

Cascading interdependencies between:
- Processes in AoA phase
- Product structure and organizational units
- MOSA benefits and JCIDS/AoA phases crossover to each sub-phase?

Cost, Schedule, Risk Implications

MOSA-compliance

Product - Organizational Structure Relationships

Prototype Decision Support Framework Software

PM Guidance Document Ver2.0 + JDMS Journal

Potential Future Research

- Further enrichment of knowledge repository

- Partnered development of prototype toolset and PM document towards specified program outcomes

- Expand context to beyond early stage defense lifecycle considerations

Contacts/References

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