NATIONAL SECURITY INSTITUTE
VIRGINIA TECH

Geoffrey Kerr
Senior Research Associate

October 31, 2024

Integrating ME, DE, and MB Acquisition

NATIONAL SECURITY INSTITUTE
VIRGINIA TECH

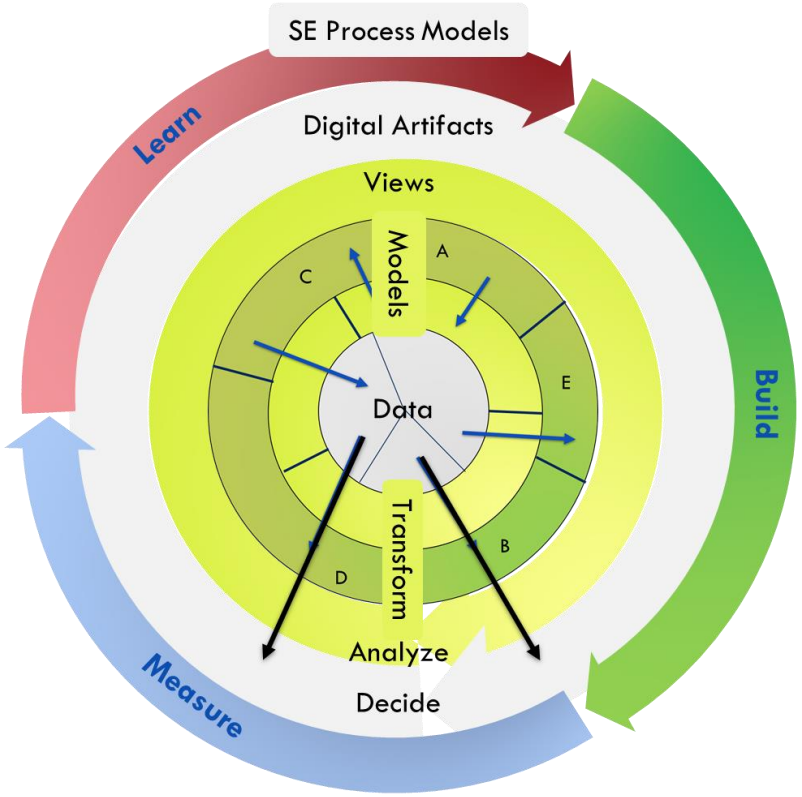
- The Motivation
  - Efficiency in the Development/Acquisition World
  - Leverage Existing Technology
  - Avoid Duplication

- The Contributors
  - Dr. Jim Moreland, Raytheon Technologies (RTX)
  - Dr. Nicole Hutchison, Virginia Tech National Security Institute
  - Mr. Geoffrey Kerr Virginia Tech, National Security Institute

The Technology May Not Be the Hard Part!

Definitions

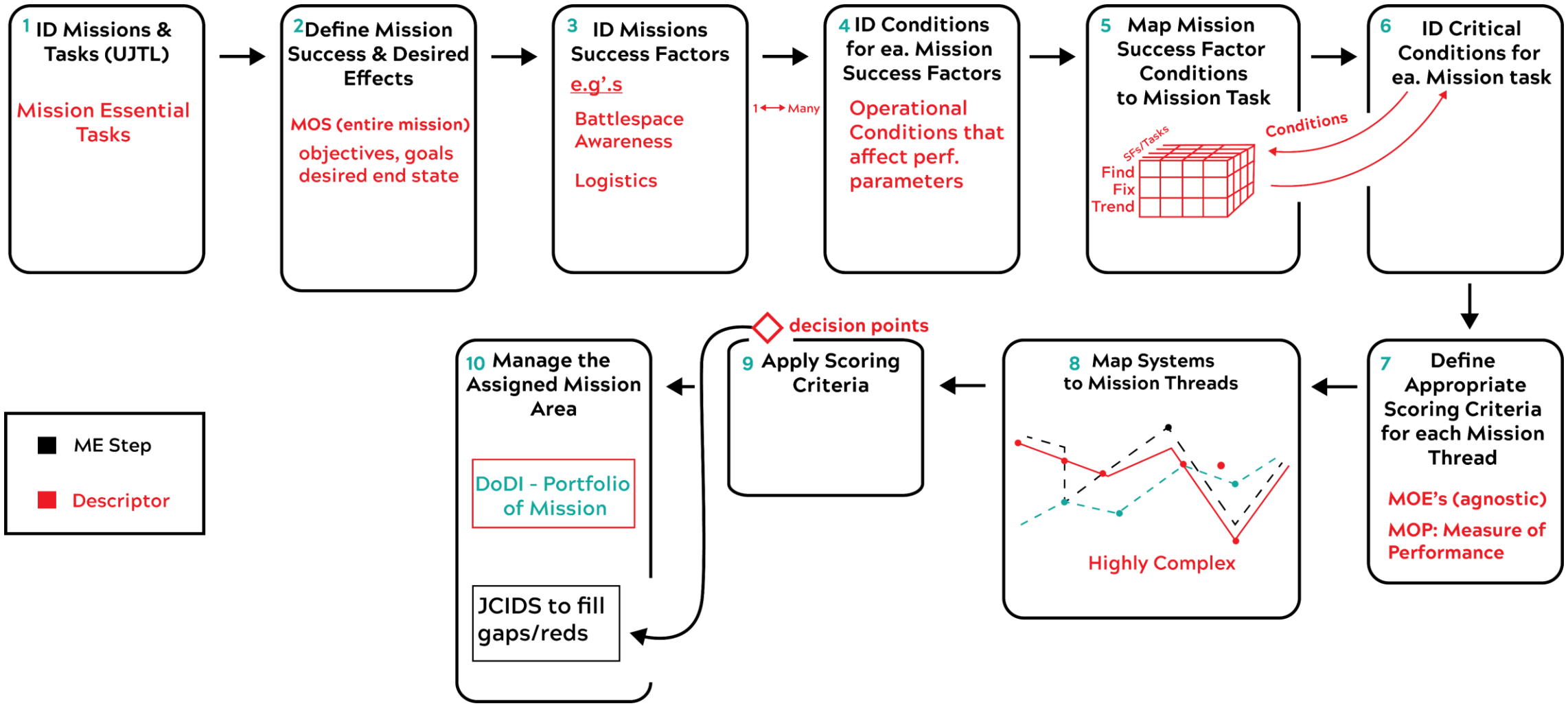
- Mission Engineering
  - Mission Engineering Guide 2.0
  - Understanding the Ultimate Objective – *Mission Outcome*
- Digital Engineering
  - Life Cycle Modeling – Life Cycle Management
    - System Design
    - Hardware Design
    - Software Design
    - Modeling and Simulation
    - Test and Evaluation
    - Production
  - Data
  - Linkage – Fitting It All Together



The Technology May Not Be the Hard Part!

Mission Engineering Process

NATIONAL SECURITY INSTITUTE
VIRGINIA TECH

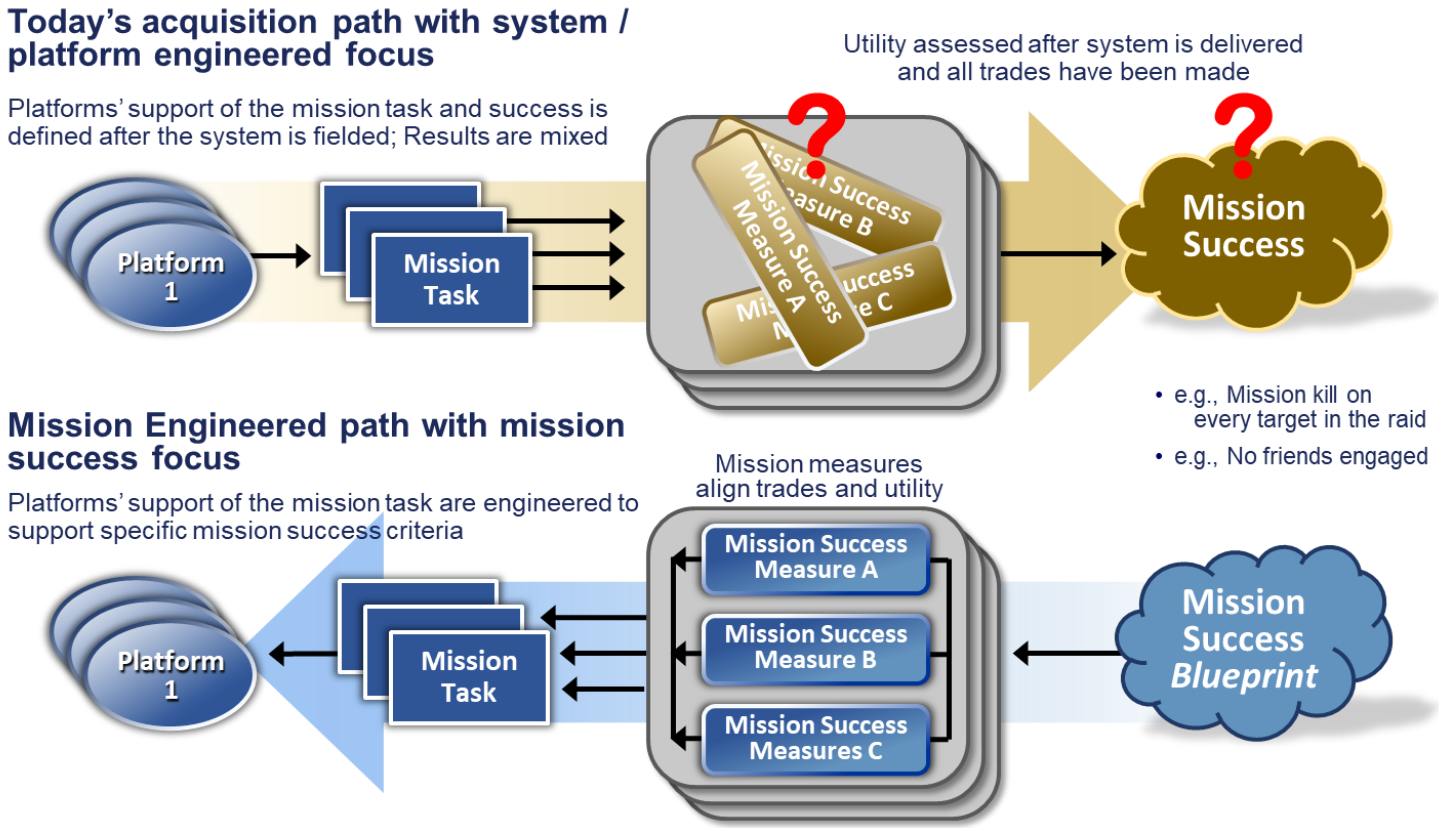


Approved for Public Release

Mission Engineering Aligns Mission Success Measures

NATIONAL SECURITY INSTITUTE
VIRGINIA TECH

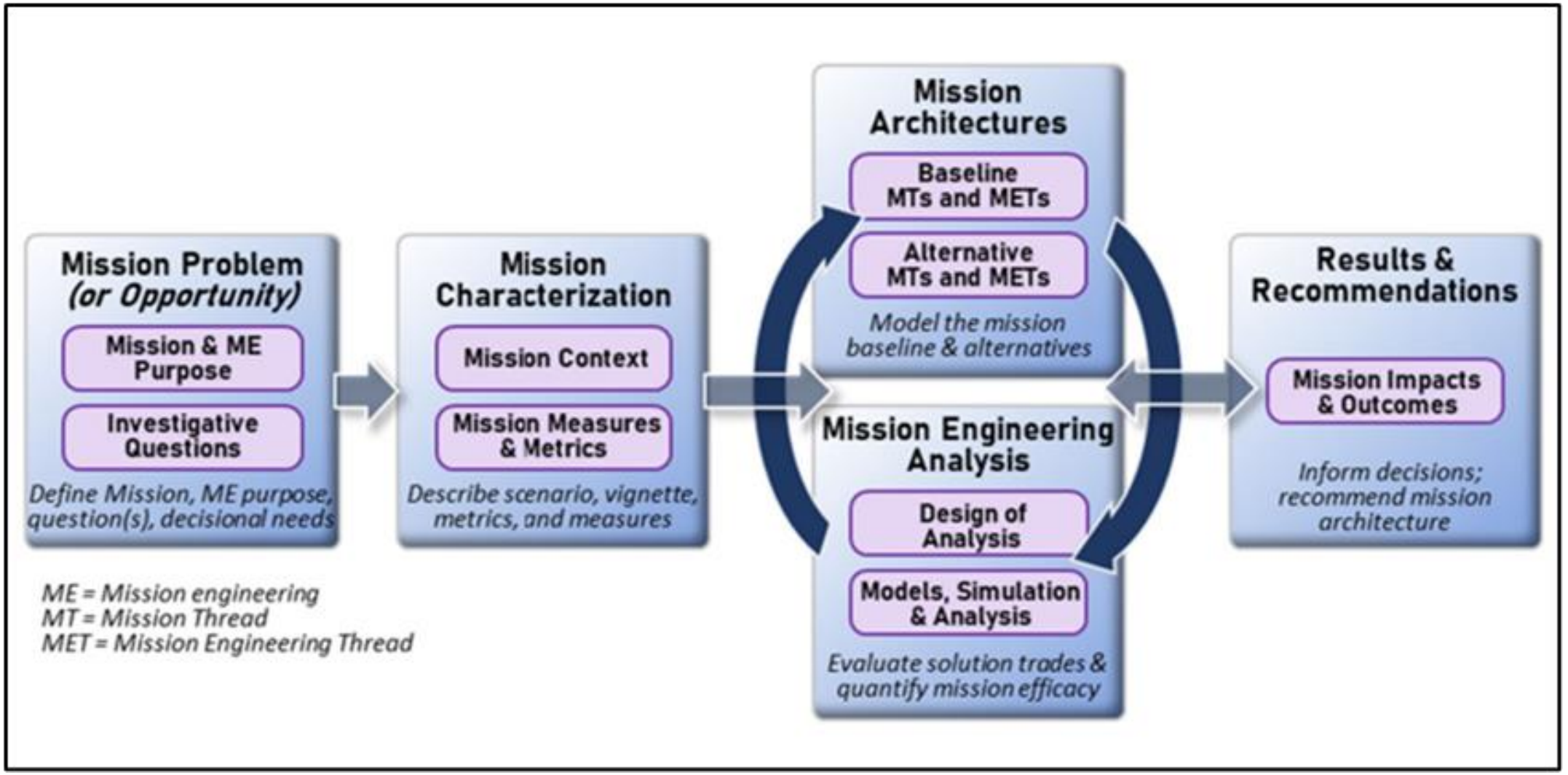
- **Engineering and deploying products with mission success in mind** is the way to avoid integration and interoperability issues across the force by providing a **better understanding.**
- Using a **mission-based system-of-systems approach** needs to be applied when developing requirements and building constituent systems to **reduce rework and cycle times with the goal of moving faster.**
- Mission Engineering is critical to **ensuring that the system being built will integrate** with other systems while **decreasing uncertainty in the fielded capabilities** necessary for **mission success.**



Mission Success Drives Investments

Approved for Public Release

Mission Engineering Guide v2

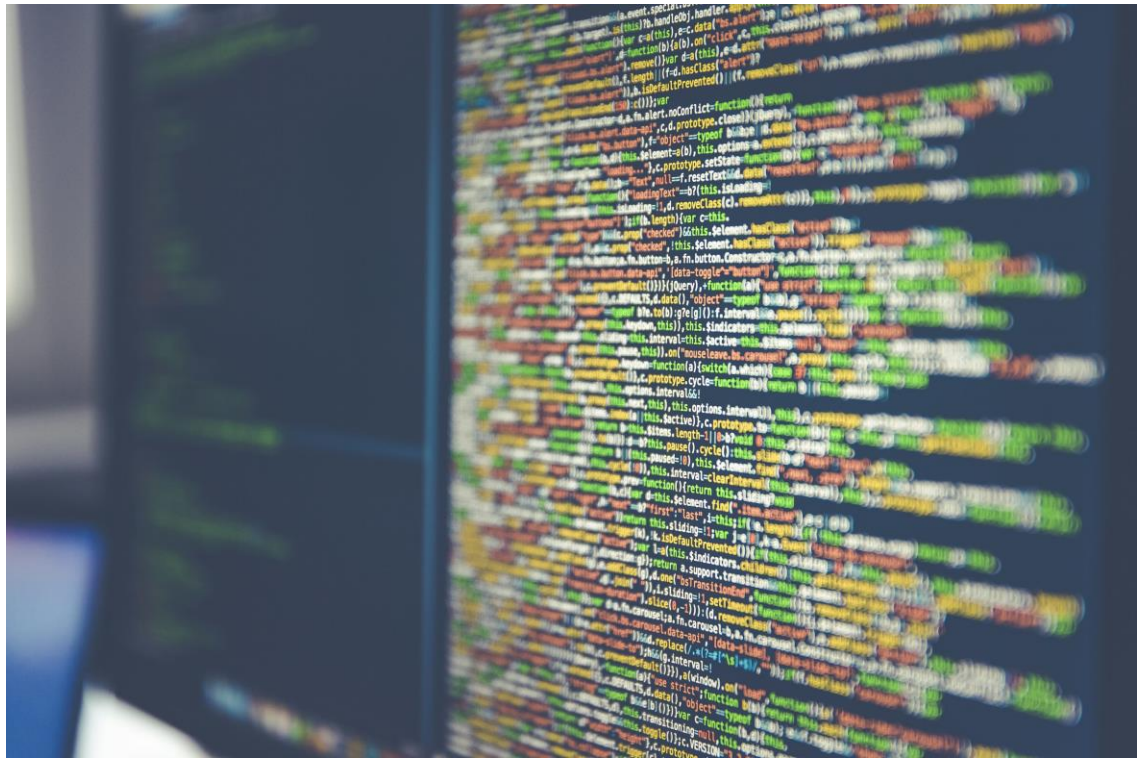


Digital Engineering

- MBSE – System Design in logical, object-oriented model illustrating organization, behavior and subsystem interactions
- CAD – Digital Representation of Physical Systems
- DevSecOps – Integrated Tool Suite for Iterative Software Development and Test
- M&S – Models and Simulations to understand system performance and quantify uncertainty of results without necessitating physical artifacts and test
- T&E – Model Based Test and Evaluation Planning, Execution, and Decisioning
- Production – Enabling Automated High Quality Manufacturing Drawing from Digital System Designs

Product Lifecycle Management

Model Based Acquisition



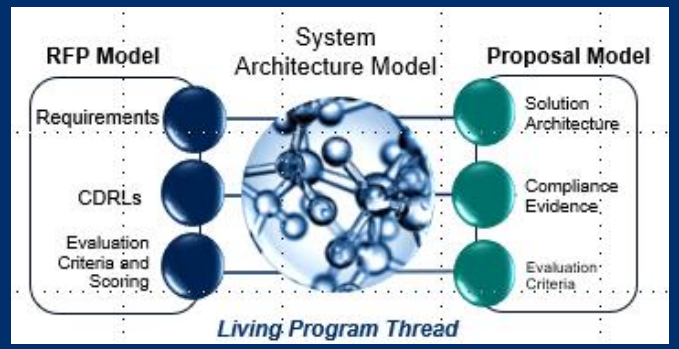
- Meaning/Thoughts
  - ERP
  - Contractor/Subcontractor Integration
  - Production
  - Sustainment
- Vision
  - Integrated Business and Technology
  - Rapid Contracting
  - Transparent Management

Bringing in Program Mgmt and Business

OMG Model-Based Acquisition (MBAcq) Community Introduction

What is MBAcq

Model-based acquisition is the Technical approach to acquisition that uses models and other digital artifacts as the primary means of information exchange, rather than document-based information exchange.



Why MBAcq Matters

- Customers are increasingly specifying MBSE and the use of models during proposals "MBAcq"
- The System Model is growing in importance as an Authoritative Source of Truth and lifecycle management tool
- No standard approach for MBAcq
- Significant variations across USG Services creates uncertainty and risk; including risk on non-compliance

Gov & Industry can shape future MB Acquisitions & Compliance together

OMG MBAcq User Group

Is a broad industry body with participation from OMG, INCOSE, Armed Services, OUSD, DoD CIO, NDIA, DAU, FFRDCs and many industry suppliers such as Boeing, Northrop Grumman, Lockheed Martin, etc. working together to create the standards and guidance to successfully deploy MBAcq to the larger community.

Last updated 6/9/2023

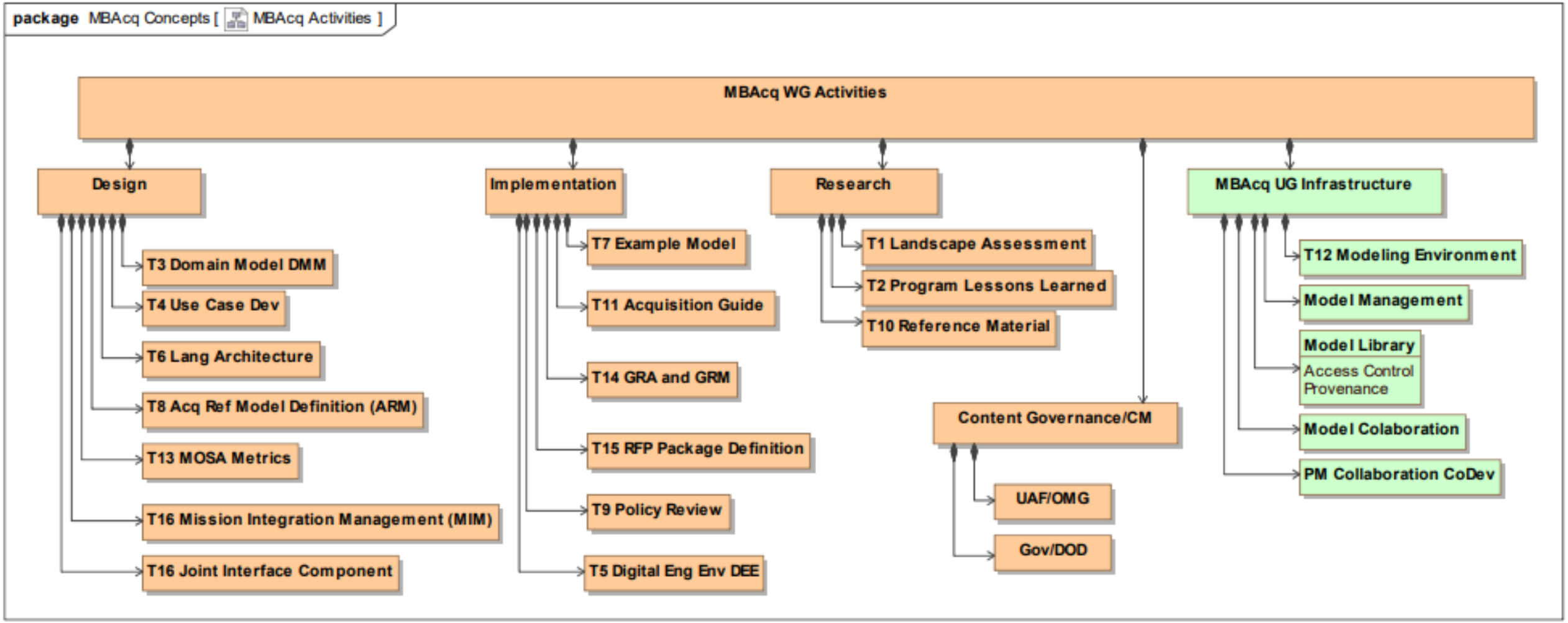
Expected Timeline

2022: Formed Team & Framework
2025: Q1 Govt Ref Arch and Analysis Pattern (DO)
Q1 MBAcq Pilot Exemplar
Q2 Role Based Acquisition Users Guide
Q2/3 DAU Acquisition Training
Ongoing: Curate and Create Reusable Content (Reference Architectures, Domain Overlays)

For more information contact:
laura.e.hart@lmco.com
rahaselden@mitre.org
toni.m.nolder@aero.org

Full lifecycle should be addressed during Acquisition!

MBAcq – User's Group Activities



Digital Materiel Management

NATIONAL SECURITY INSTITUTE
VIRGINIA TECH

Air Force and Army Collaboration with Industry Association Consortium

- Kickoff, November 2023
- Digital Dayton Roundtable, March 2024
- Dayton Digital Coalition, May 2024
- NDIA Conference, October 2024

DoD Captures the Vision – Join the Effort!!

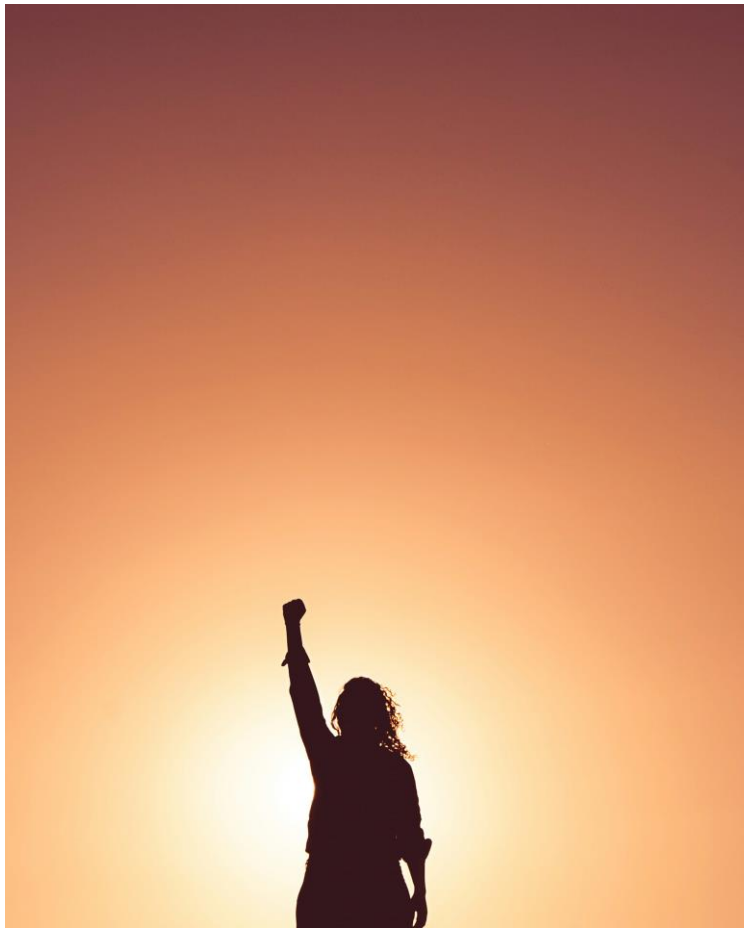
Progress is Being Made

NATIONAL SECURITY INSTITUTE
VIRGINIA TECH

Lockheed Martin

- PrSM Missile
  - Circuit Card Assembly – Schedule Reduction
  - Model Based Engineering, Design for Mfg
    - 25% Part Count Reduction
    - 75% Labor Reduction
- Space Programs – 18% Decrease in Total Ownership Cost (Software Factory)

Other Contractors Experiencing Similar Results



Business Results are Being Realized

Challenges Still Exist

- Proprietary Information / Intellectual Property Protection
- Security
- Tooling
- Culture
- Cost w/o ROI

The Road Ahead

- Standards
  - Data Architectures
  - Reference Architectures
  - APIs for Peace in the Tooling War
- Policy and Practice
  - Contracting Reform
  - Cost Sharing
  - Incentivize Transformation
- Adoption
  - Learn and Build From Success
  - Collaboration without Compromise

One Bite At A Time


NATIONAL SECURITY INSTITUTE
VIRGINIA TECH