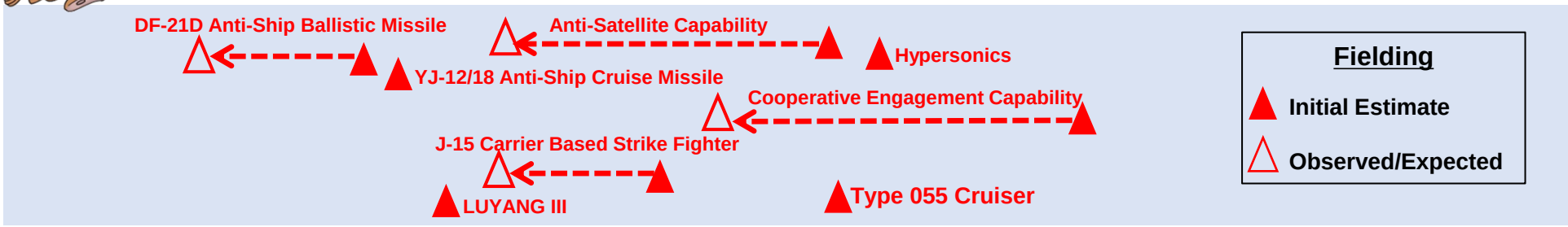
USAF Digital Transformation

Thing Big, Start Small, Scale Fast

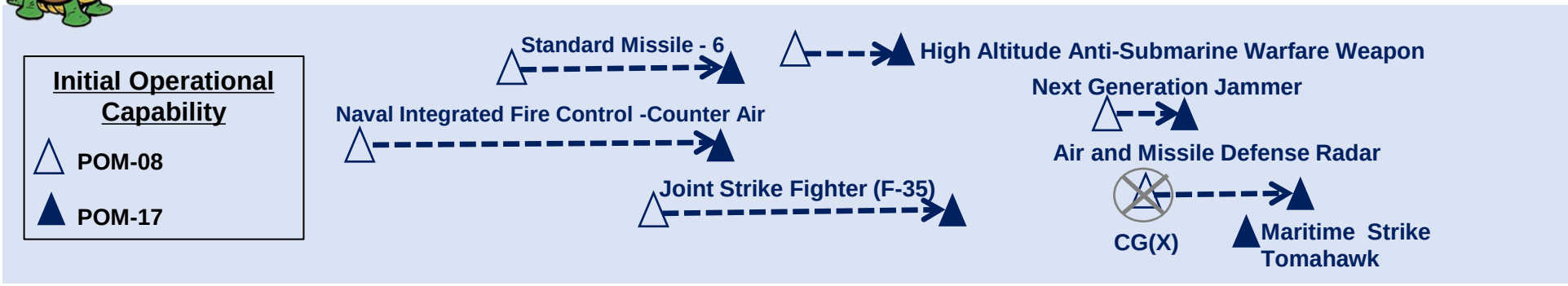
Mr. Chris Garrett
SL for Systems Engineering
AFLCMC/EN

USN vs PLA(N)
Capability Fielding Trends



How? Acquiring Designs – No DOD 5000 – No Bureaucratic Process Requirements

We're Slower!



Open Source Information

USN Warfighting Advantage Against PLA(N) has Steadily Eroded

Strategic Digital Initiatives

AQ Digital Acquisition Priorities

1. Implement Open Systems Standards and Reference Architectures
2. Ensure Programs Are "Born Digital" or Digitally Adapt over the Lifecycle
3. Expand Enterprise Solutions and Embrace Cloud-based Collaborative Environments
4. Institutionalize Processes for Agile Software Development and Software-Intensive Systems

AFMC Digital Materiel Management Initiatives

1. Structure and Secure our Data
2. Facilitate Digital training across AFMC
3. Facilitate access to DMM tools
4. Develop Digital strategies across AFMC organizations
5. Instill a digital-first culture across AFMC
6. Modernize IT Infrastructure

AFMC Strategy Map

MISSION

Powering the world's greatest Air and Space Forces… We develop, deliver, support, and sustain war-winning capabilities.

VISION

One AFMC--integrated, innovative, trusted, and empowered…

Indispensable to our nation, disruptive to our adversaries.

Our Cross-Cutting Attributes

Speed • Strength • Endurance • Balance • Flexibility • Coordination

Our Commitments

Enable DAF Priorities • Support the Warfighter & Respect the Taxpayer • Focus on Enterprise Solutions & Digital Materiel Management • Provide All Airmen the Opportunity to Reach Full Potential • Embrace Innovation

Our Lines of Effort

LOE 1 — Deliver Integrated Capabilities

Integrate research, development, test, sustainment, support, and infrastructure to maximize readiness and lethality for each individual capability and across all capabilities.

- **Sustain the Legacy Force (Internal/External):** Integrate all efforts within and across our centers by working together as One Team to ensure the current force structure is ready anytime and anywhere against any adversary.
- **Deliver the Future Force (Internal/External):** Create future capabilities that deter and disrupt our adversaries using the same integrated intra- and inter-center One Team approaches.
- **Seek DAF Enterprise Solutions (Internal/External):** Through intra- and inter-center integration and coordination, deploy DAF enterprise solutions to the max extent and defer to unique solutions only when necessary.
- **Responsive Support (Internal/External):** Deliver AFMC materiel capability and combat support; integrate to ensure operational surge and sprint capabilities meet warfighter and humanitarian requirements

LOE 2 — Strengthen Our Team

Advance the professional and personal development, retention, and resiliency of our entire workforce so every AFMC Airman can achieve their full potential.

- **Build Full Potential Airmen (Internal):** Provide intentional opportunities for military, civilian team members to achieve their professional and personal goals, ensuring diversity, equity, inclusion, and accessibility.
- **Entrust Decisions to Lower Levels (Internal):** Push responsibilities and decision-making to trained-and-ready lower levels
- [illegible] personally thrive

Digital Materiel Management - DMM

LOE 3 — Revolutionize Our Processes

Implement AFMC Enterprise Solutions and Digital Materiel Management, revolutionizing critical processes in support of mission execution and the warfighter.

- **Build One AFMC Business Enterprise (Internal):** Inculcate internal processes that activate speed, strength, endurance, balance, flexibility, and coordination in AFMC's ability to deliver capabilities on relevant timelines in spite of fluid threat environments.
- **Employ Digital Materiel Management (Internal):** Ensure critical processes employ digital methods across the entire lifecycle--from invention to retirement--for both warfighting capabilities as well as installation and mission support capabilities.

LOE 4 — Amplify Warfighting Culture

Connect every Airman to the mission and focus the materiel enterprise on delivering capabilities and services in support of operational execution and deterrence.

- **Connect to the Mission (Internal):** Ensure every team member and unit understands their role, value, and connection in materiel capability delivery to the operational units we support.
- **Be the Trusted Partner (Internal/External):** Drive toward the speed of trust with one another, the warfighter, industry, and our mission partners

DMM End State

- **Goal**: Accelerate capability delivery through Digital Acquisition and Materiel Management

- **Vision**: DAF digital ecosystem and fully empowered digital workforce, equipped to deliver integrated, innovative, and trusted capability across Digital Materiel Management (DMM) lifecycle with unprecedented industry and government collaboration

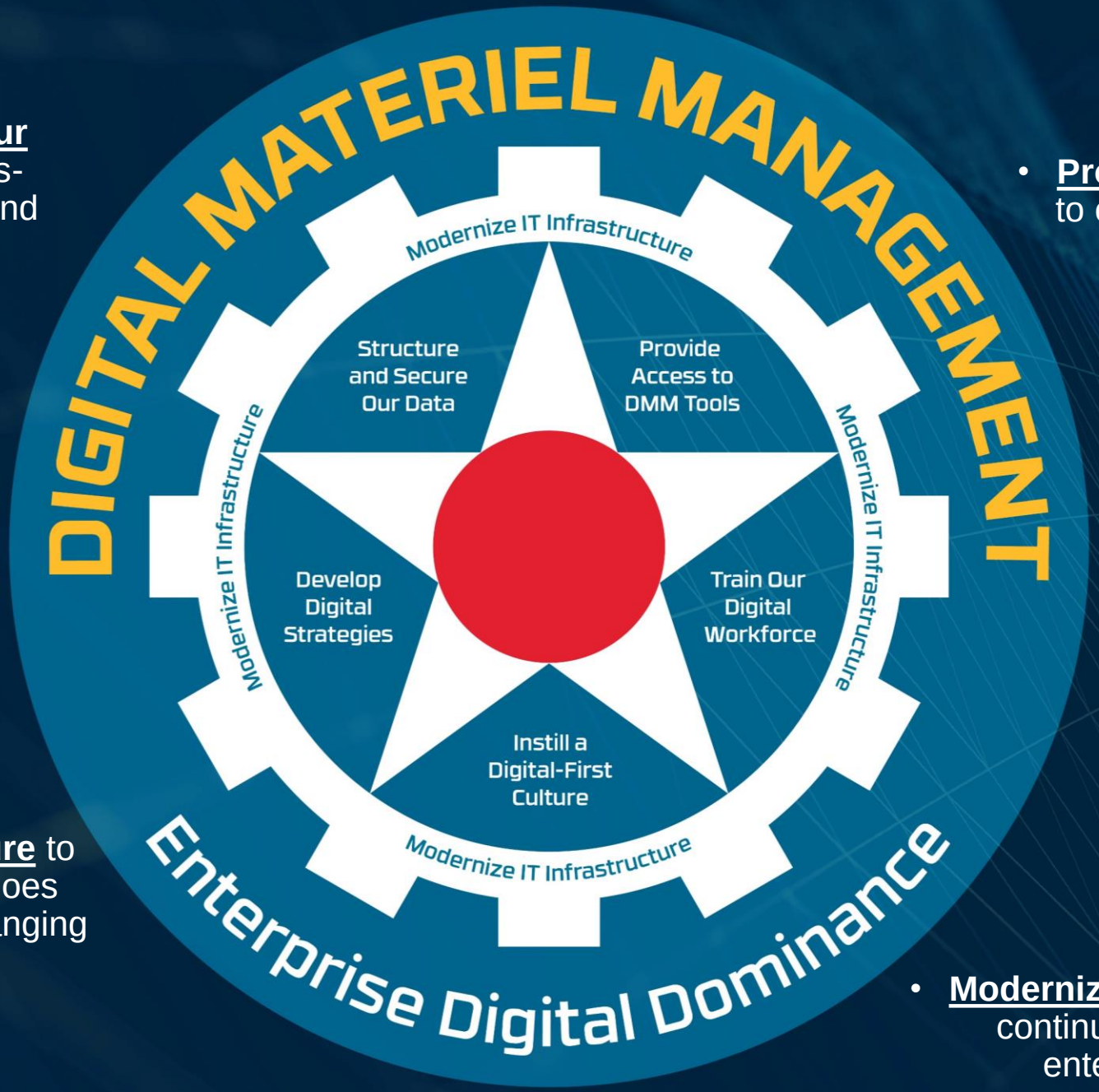
- **Purpose**: Speed, flexibility, and agility in our acquisition enterprise; war winning capability, delivered faster, to win tomorrow’s fight

Revolutionize Our Processes via DMM

- **Structure and Secure Our Data** for low friction, cross-organizational teamwork and decision-making

- **Develop Digital Strategies** to leave behind stale practices and pave the way for agile acquisition & sustainment

- **Instill a Digital-First Culture** to revolutionize how AFMC does business in a constantly changing threat environment



- **Provide Access to DMM Tools** to equip our workforce for digital operations with a dynamic toolbox

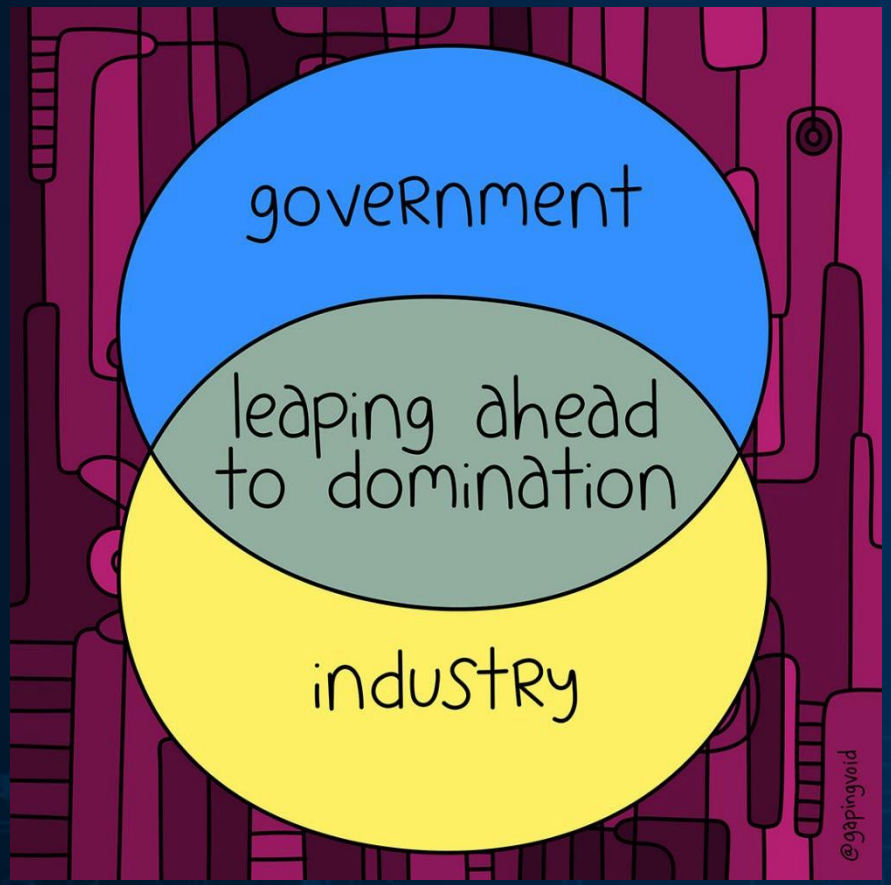
- **Train Our Digital Workforce** so we are prepared to collaborate with partners in a fully digital ecosystem

- **Modernize IT Infrastructure** to continuously enable rapid enterprise solutions

Digital Challenges

- Enterprise **Resourcing** to establish enterprise solutions/approaches
- Workforce education, training, and adoption
- Tool **interoperability** and SW vendor lock
- SW testing, approval, deployment processes
- **Data Standards**, formats, modeling style guides
- USAF v USSF v DAF integration and commonality
- **IT Infrastructure**, tools, *enterprise* digital environments
- **Scaling** enterprise solutions across programs, DAF, and Industry
- Transitioning **legacy** programs, processes
- **Cross-domain solutions** / multi-level security (CDS/MLS) scalability and standardization
- **Data item Descriptions**, Contract Data Requirements Lists, Contract language, IP/data rights considerations, data access vs. data ownership
- Real-time government/contractor **access to data** vice traditional time-phased delivery

Digital Consortium: Areas for Continued Coordination



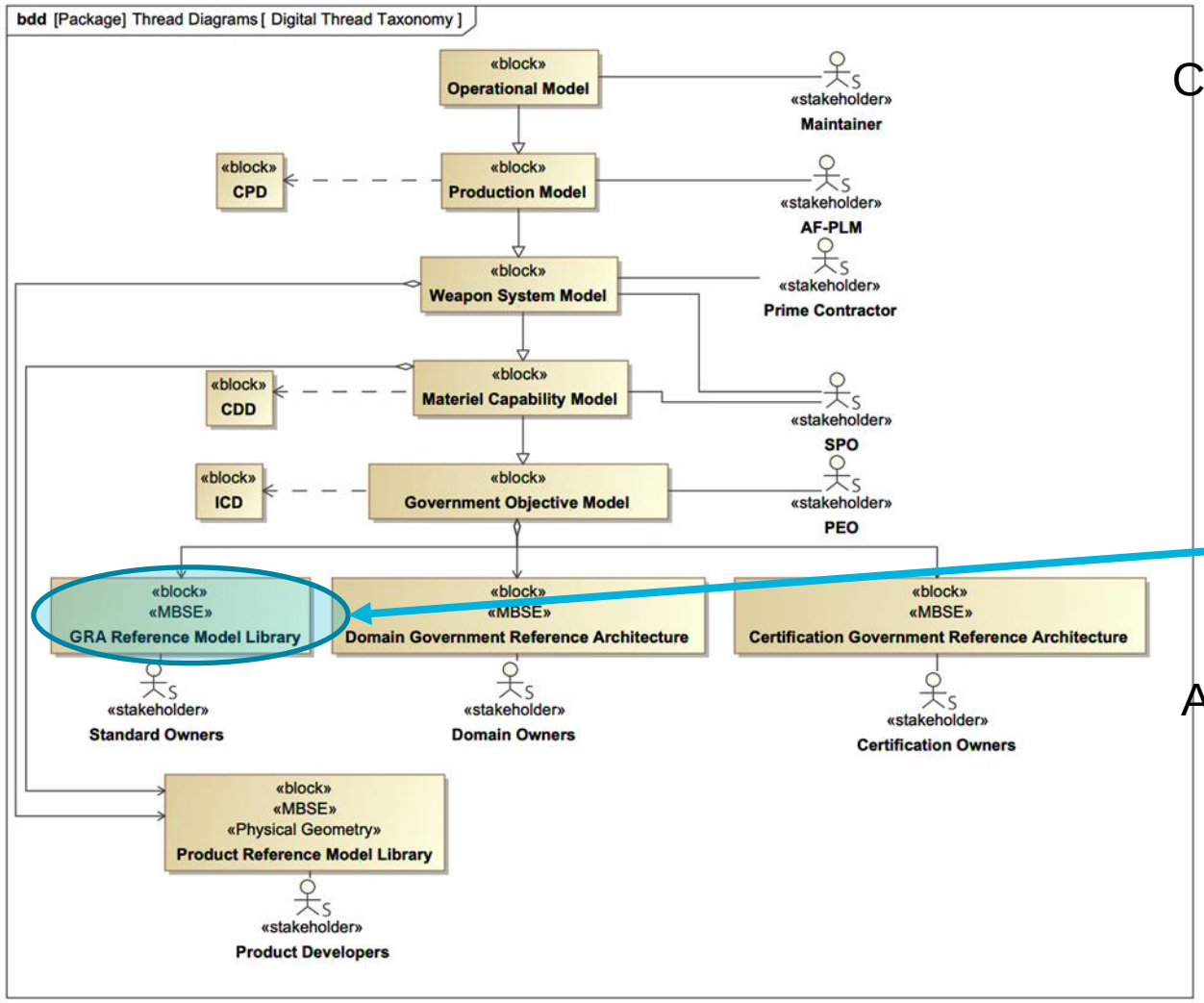
- Data and model curation, verification, validation (over time)
- Scaling enterprise solutions to integrate digital engineering across programs, DoD, & Industry
  - Processes (not just digitizing current processes, but digitalizing new processes - consider cross life cycle, standardization, models)
- Transitioning legacy artifacts, processes, & best practices
- Technical barriers & policy inhibitors

DAC Announcement

DAC Description

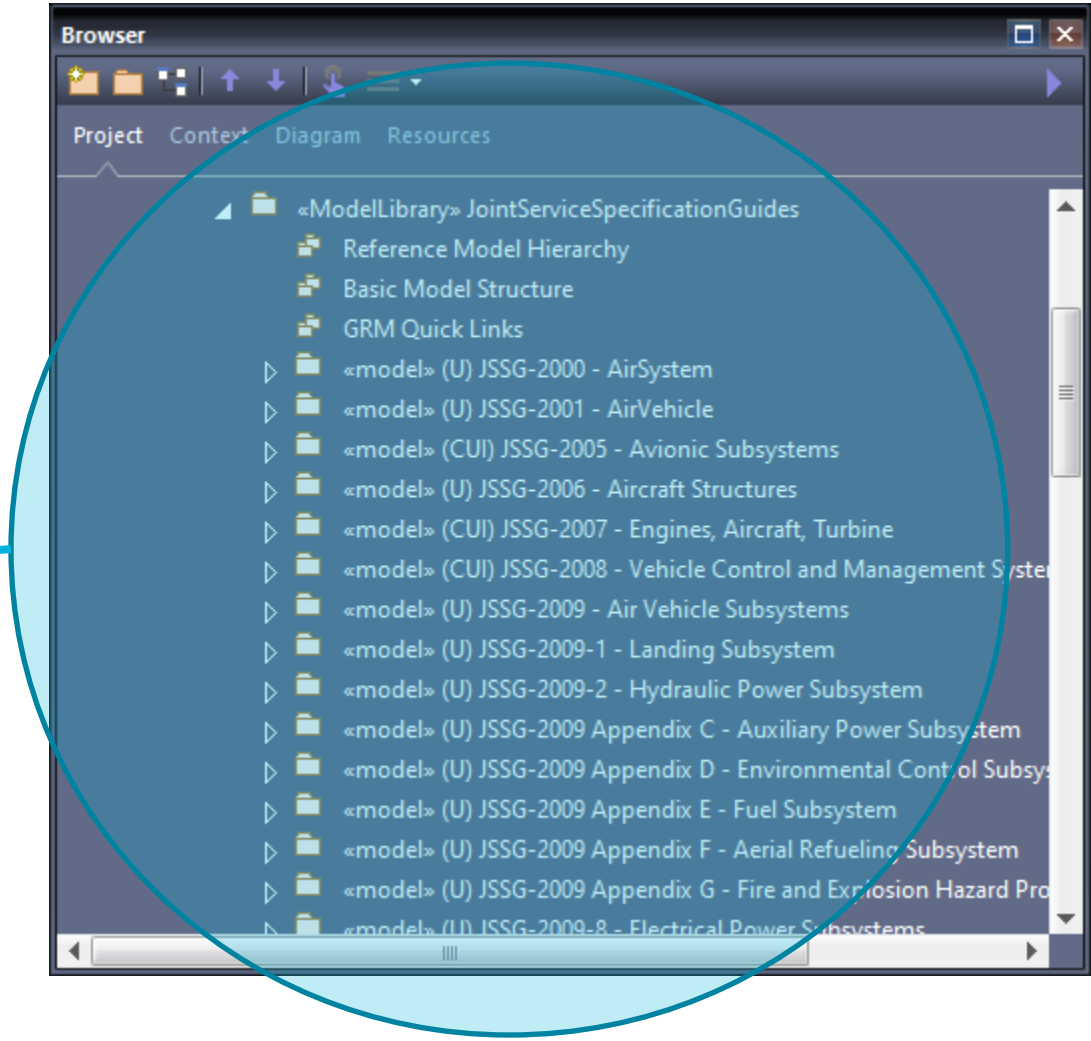
Advanced Notification - Digital Acceleration Consortium (DAC) Prototype

Abstract Models Managed per Level

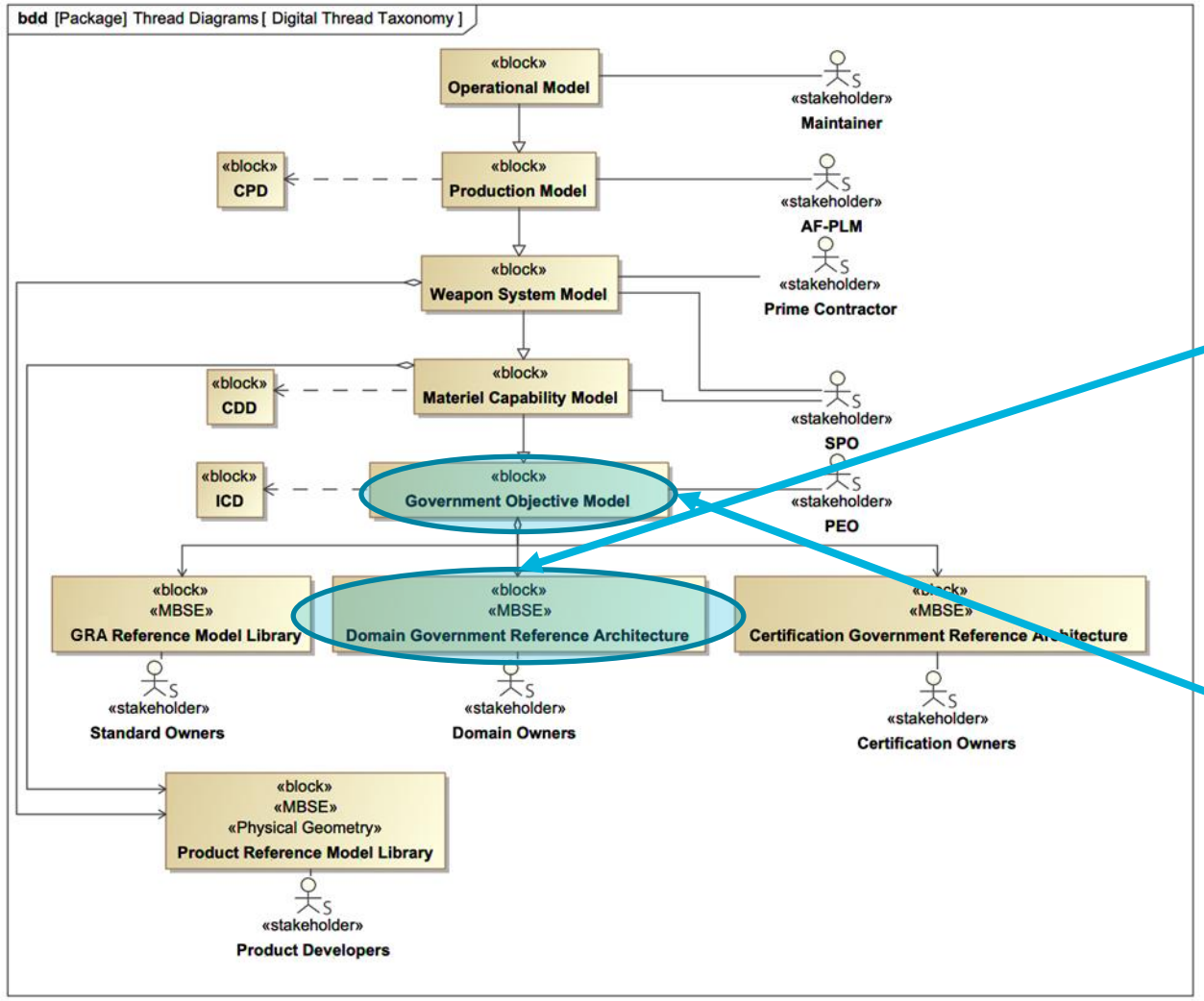


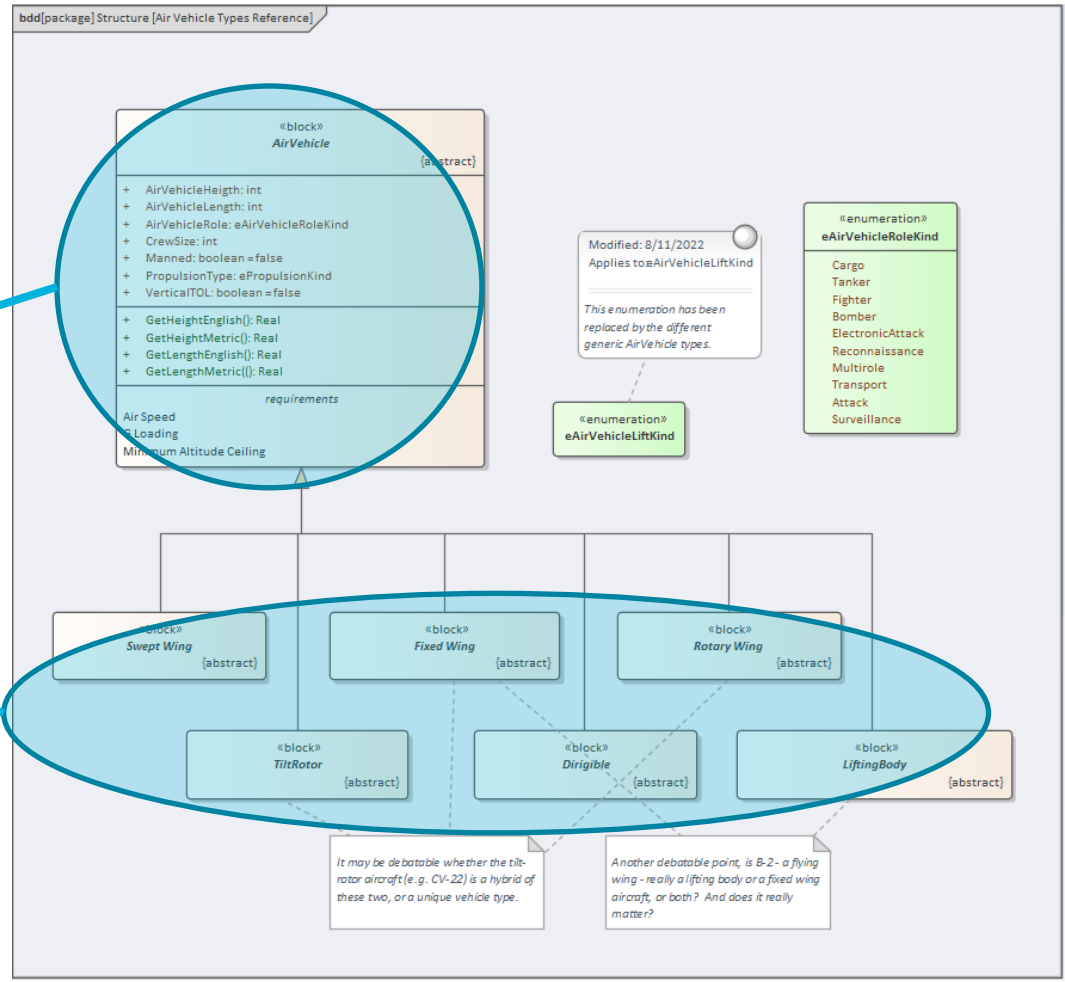
Concrete

Abstract

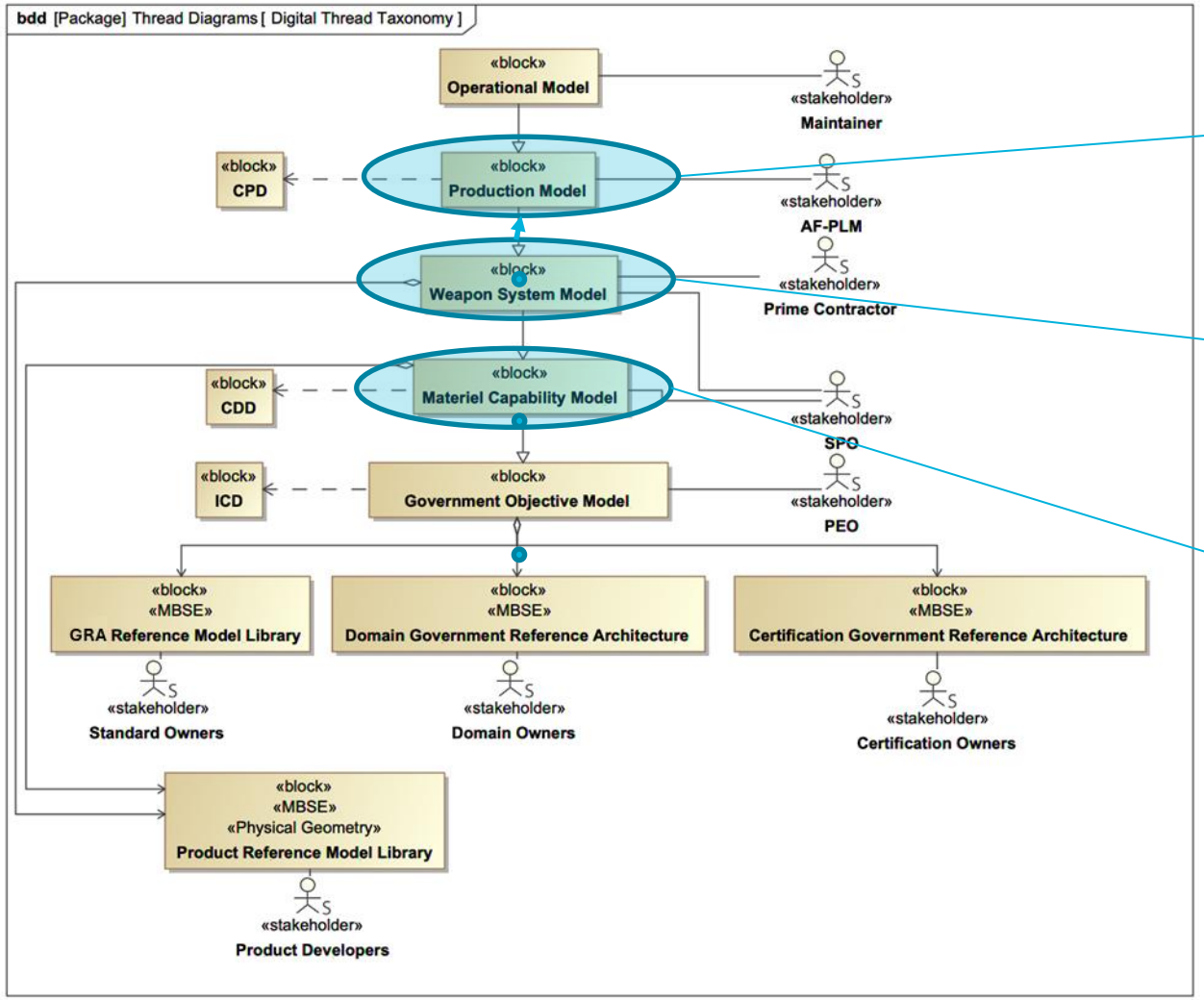


Abstract Models Managed per Level





Abstract Models Managed per Level



Production Configuration Baseline

Allocation Configuration Baseline

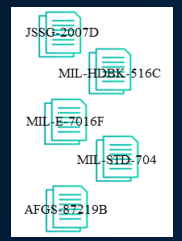
Functional Configuration Baseline

AV GRA Activities

1. Construct document-based reference model library
   - Convert MIL standards, handbooks, etc. from pdf to models
   - Focus on electrical subsystem documents as identified in MIL-HDBK-516 section 12 and JSSG-2009-8 (formerly Appendix H)
   - Maintain original document content but expand model elements
     - Activity diagrams
     - Data blocks
2. Build AV GRA
   - Build out AV GRA creating common structure of Air Vehicle and related content
     - AV structure based upon MIL-STD-881
     - Common content including logical architecture, requirements, verification, etc
   - Integrate and connect across document models
3. Manage using Agile methodology
   - Backlog and Sprints managed in Jira

Model Library and AV GRA Modeling

Source Documents

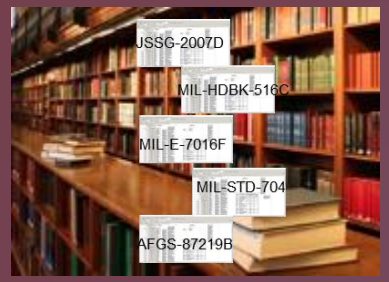


Reference Model Development Practices Guide

Focus on documents referenced in Section 12 (Electrical System) of MIL-HDBK-516 and JSSG-2009-8 (formerly Appendix H)

- Model representations of the documents
  - 79 documents → 36 system models
  - Retain document structure
  - Add content
- Apply common practices
  - Practices evolve
- SME Reviews
- Conversion tool

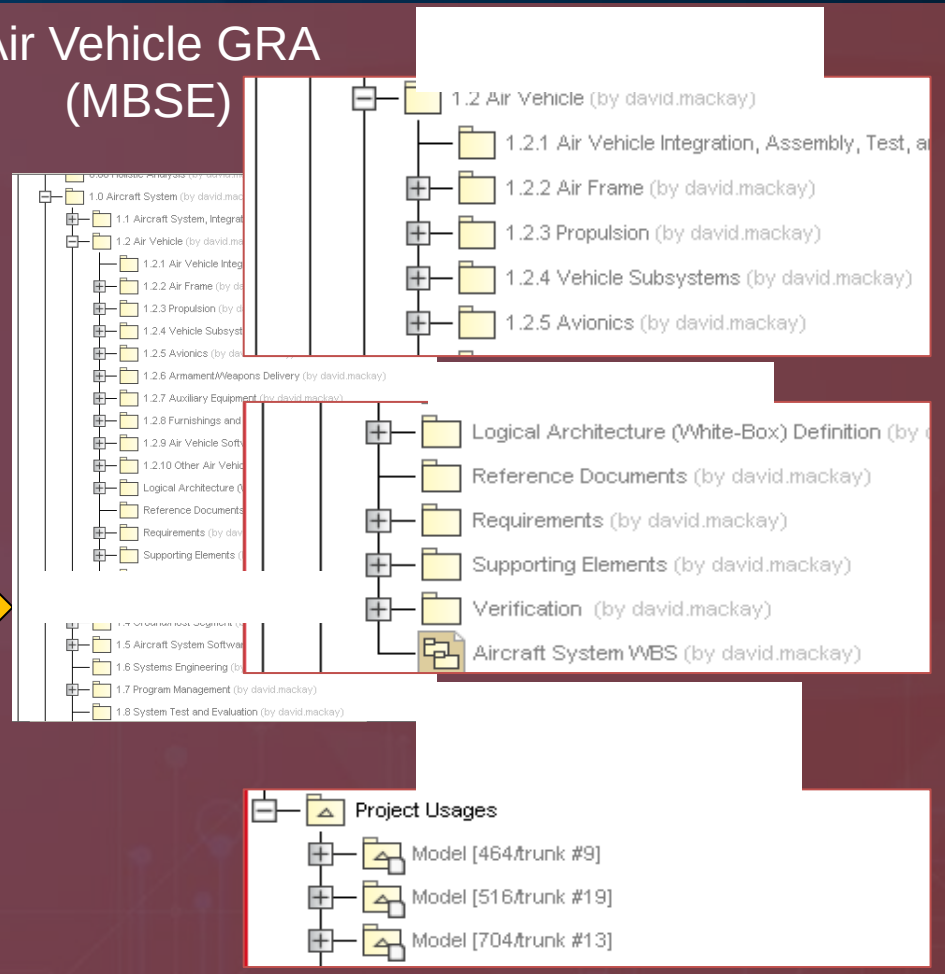
Reference Model Library (MBSE)



Cameo Project Usages

Electrical Power System Components (Generators, Batteries, Relays, Connectors…)

Air Vehicle GRA (MBSE)



LaunchPad En

Style Guide
VV&A Process and Model

The Library

- Electrical Power System
  - JSSG-2009-8
  - ***MIL-E-7016***
  - ***MIL-STD-704 (8 handbooks)***
  - AFGS-87219
- Battery
  - MIL-PRF-29595 (2 spec sheets)
  - ***MIL-PRF-81757*** **(13 spec sheets)**
  - ***MIL-PRF-8565*** **(15 spec sheets)**
- Generator
  - MIL-PRF-21480
  - MIL-DTL-6162
  - MIL-E-85583 (2 spec sheets)
- Converter
  - MIL-PRF-7115 (3 spec sheets)
- Inverter
  - MIL-PRF-7032 (2 spec sheets)
- Electric Power Monitor
  - MIL-PRF-24021
- Connectors/Contactors/Controllers/Relays
  - MIL-PRF-18148 (4 spec sheets)
  - MIL-DTL-2212
  - MIL-PRF-6106

- JSSGs
  - JSSG-2000
  - JSSG-2001
  - JSSG-2007
  - JSSG-2008
  - JSSG-2009
  - JSSG-2009 Appendix C
  - JSSG-2009 Appendix D
  - JSSG-2009 Appendix E
  - JSSG-2009 Appendix F
  - JSSG-2009 Appendix G
  - JSSG-2009 Appendix M
  - JSSG-2009-2
  - JSSG-2009-8 (also under EPS)
  - JSSG-2009-9
- Other
  - MIL-HDBK-516
  - MIL-STD-461
  - MIL-STD-464
  - MIL-STD-810
  - MIL-STD-7080
  - MIL-STD-130
  - CFR Title 14

* Models in **BOLD** and *ITALIC* have been revised based upon review of questions with SME

Gov't Reference Architecture Example

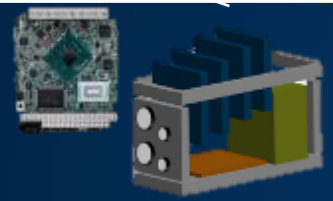
System Architecture
Final Design SWaP-c

. . .

40+ platforms just PNT

Agile
Adaptable
Interoperable

Objective Architecture
Mission specific trades
ID Common Services
S/W Application Services



Reusable, Shared Assets:
Models, Services, Components, S/W Applications

Government Reference Architectures
Functional GRAs

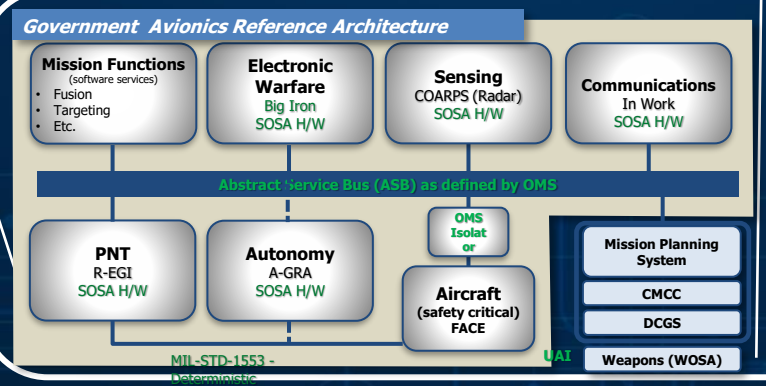
PNT GRA
R-EGI
OMS/UCI
FACE
SOSA H/W

Sensor GRA
COARPS
OMS/UCI
FACE
SOSA H/W

Weapons GRA
WOSA
CFW ICD

. . .

Library of Government Reference Architectures
Unifying Principals, **<u>Industry-consensus frameworks, and open standards</u>**



ABMS GRA ⟷ . . .

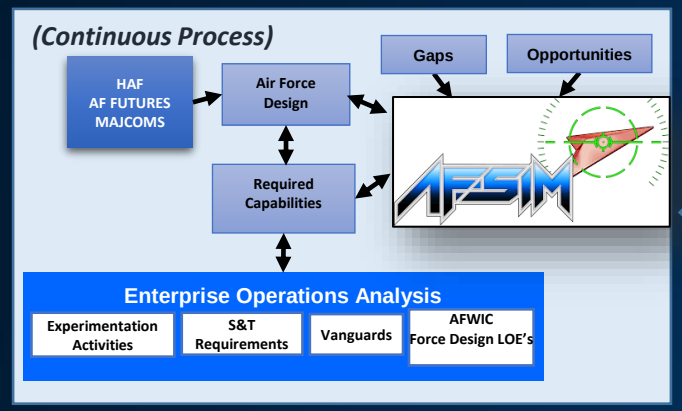
SCARS GRA
Mission Planning GRA
NC3 GRA
Sentinel GRA…etc.

Avoids duplication of effort across systems

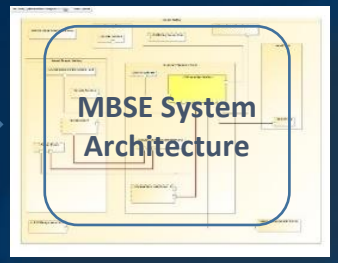
Speeds Delivery

Enables rapid innovation and integration

Digital Ecosystem



Produce Digital CDD Model



Own the reference architecture and model in modern tools

Use Government Tech Stack for Continuous Review

Link Model with LogRA for PLM Integration

Tradespace & Operations Analysis

AF Futures
MAJCOMS
AFLCMC
SDPE
PEOs

Contracting Language

RFP
SOW/PWS
CDRLS/DIDs
SRD/TRD

System Development

Technical Reviews
Agile Development
Finance, Risk, & Log Mgt
Test & Certs

System Lifecycle

Supply
Maintenance
Product Support
Operations
Modifications

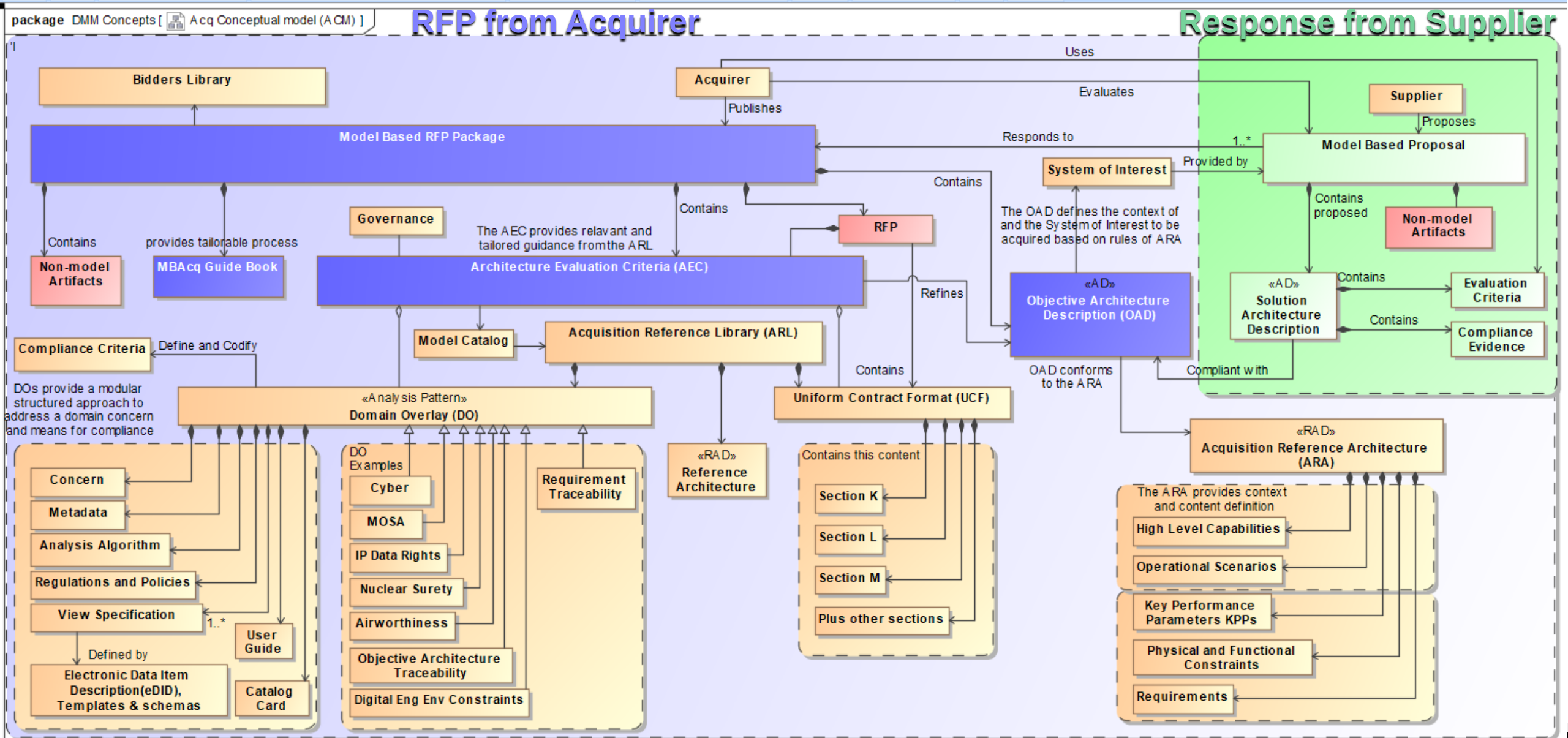
Standards | **Reference Architecture Models** | **Training** | **Tools** | **Data Architecture**

Digital Ecosystem Enabled By

PLM / FENCES / CLOUDONE / PLATFORMONE

MBAcq Future State

Bringing it all together!



Digital Transformation Points of Contact

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Architecture in Action!