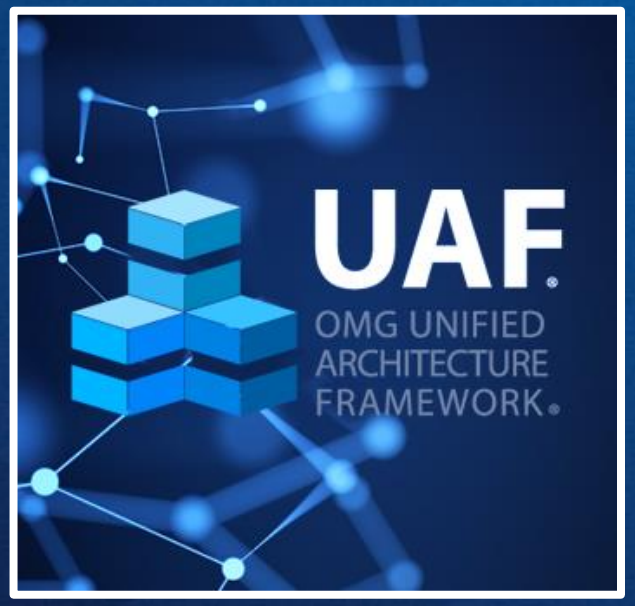


2023 UAF® SUMMIT

MODEL-BASED ACQUISITION (MBACQ) USER GROUP UPDATE

LAURA HART – UAF CO-CHAIR/MBACQ CO-CHAIR

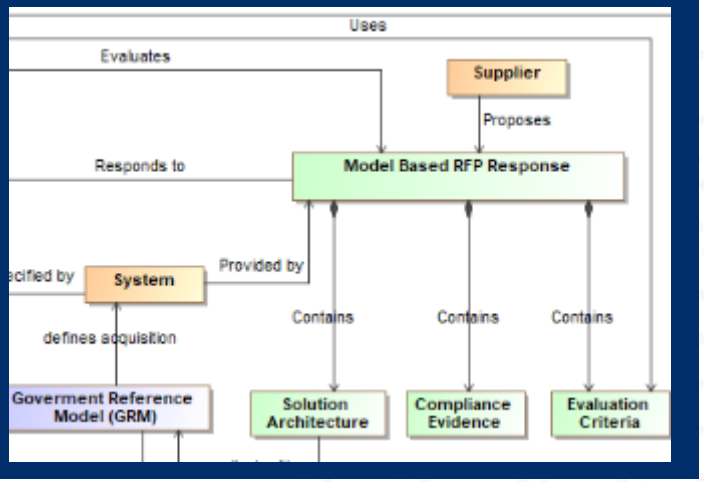
LAURA.E.HART@LMCO.COM

3/28/2023

BLUF: Model-Based Acquisition (MBAcq)

About 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 in RFPs
Customers are increasingly requiring models in proposals
Lack of standardization raises proposal learning curves

MBAcq standardization minimizes acquisition risk while improving communication across industry

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.

Expected Timeline

2022: Formed Team & Framework
2023: Q4 Govt Ref Arch
2024: Q2 Acquisition Users Guide
Q2/3 DAU Acquisition Training
Q4 Acquisition Model Example

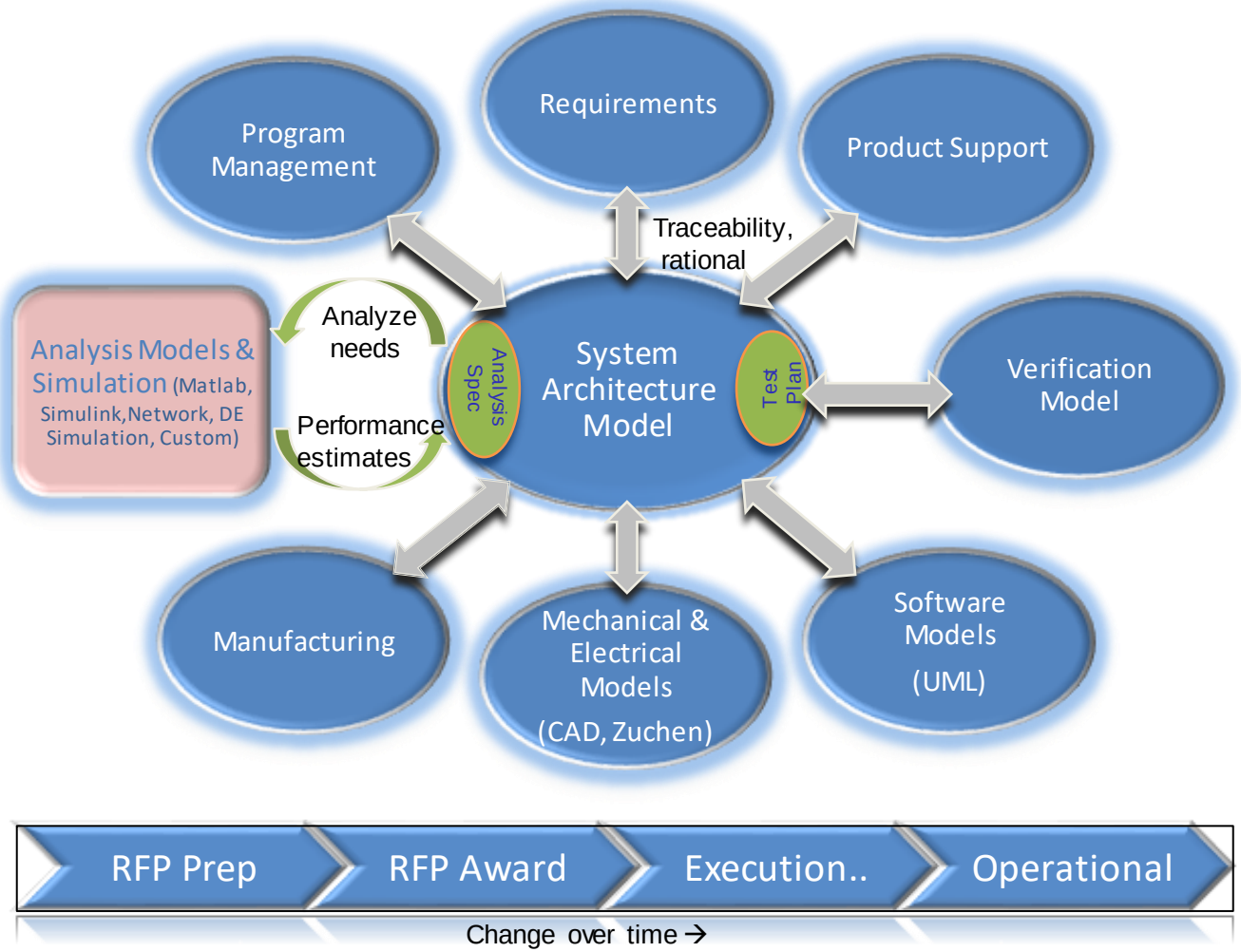
Descriptive vs Analytical Models

System Architecture Model (SAM)

- Descriptive in nature
- Emphasizes how pieces fit together into a *consistent* whole
- Provides context for analysis

Analysis Models and Simulation Models

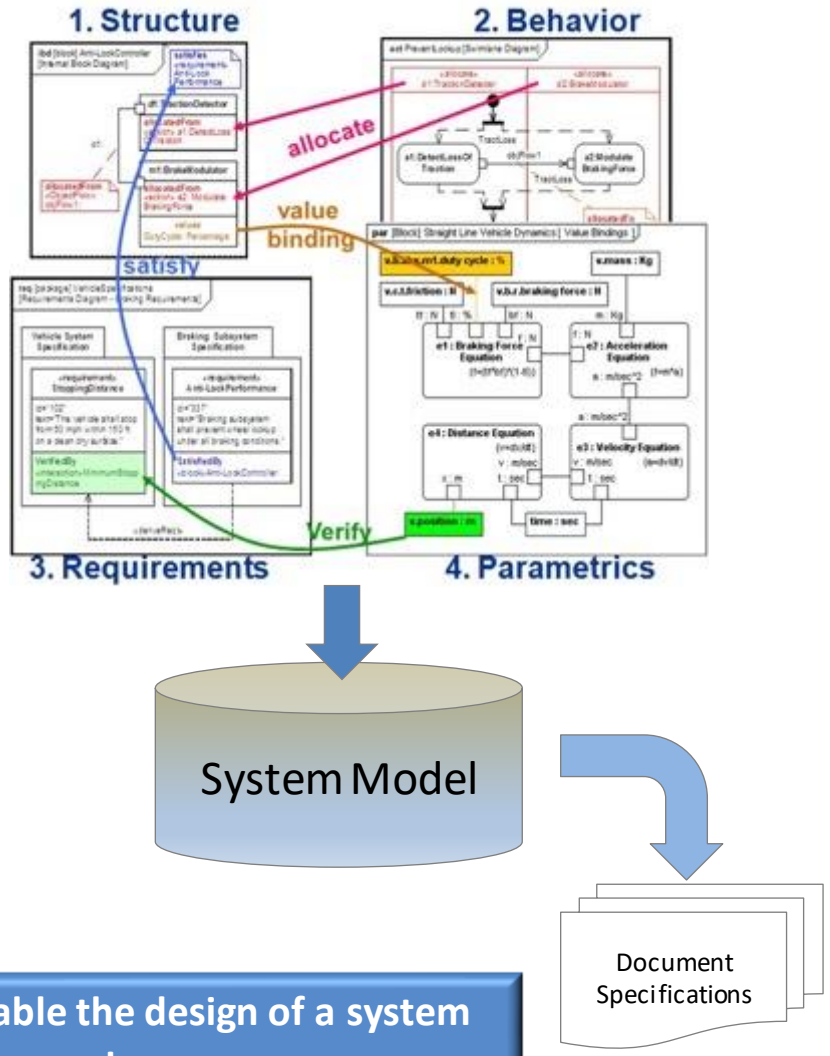
- Emphasize specific aspects of performance, *consistent* with the Architecture Model.
- Mathematically-based computation or simulation
- Reduces risks thru analysis, validation and optimization of:
  - MOE, MOP, KPP, TPM timing, probability of hit/survival reliability/availability, MTBF cost, total cost of ownership
- A vehicle to solve some problem or verify a solution



SAM provides a "hub" for data integration and transformation across the product lifecycle

What's in the System Architecture Model

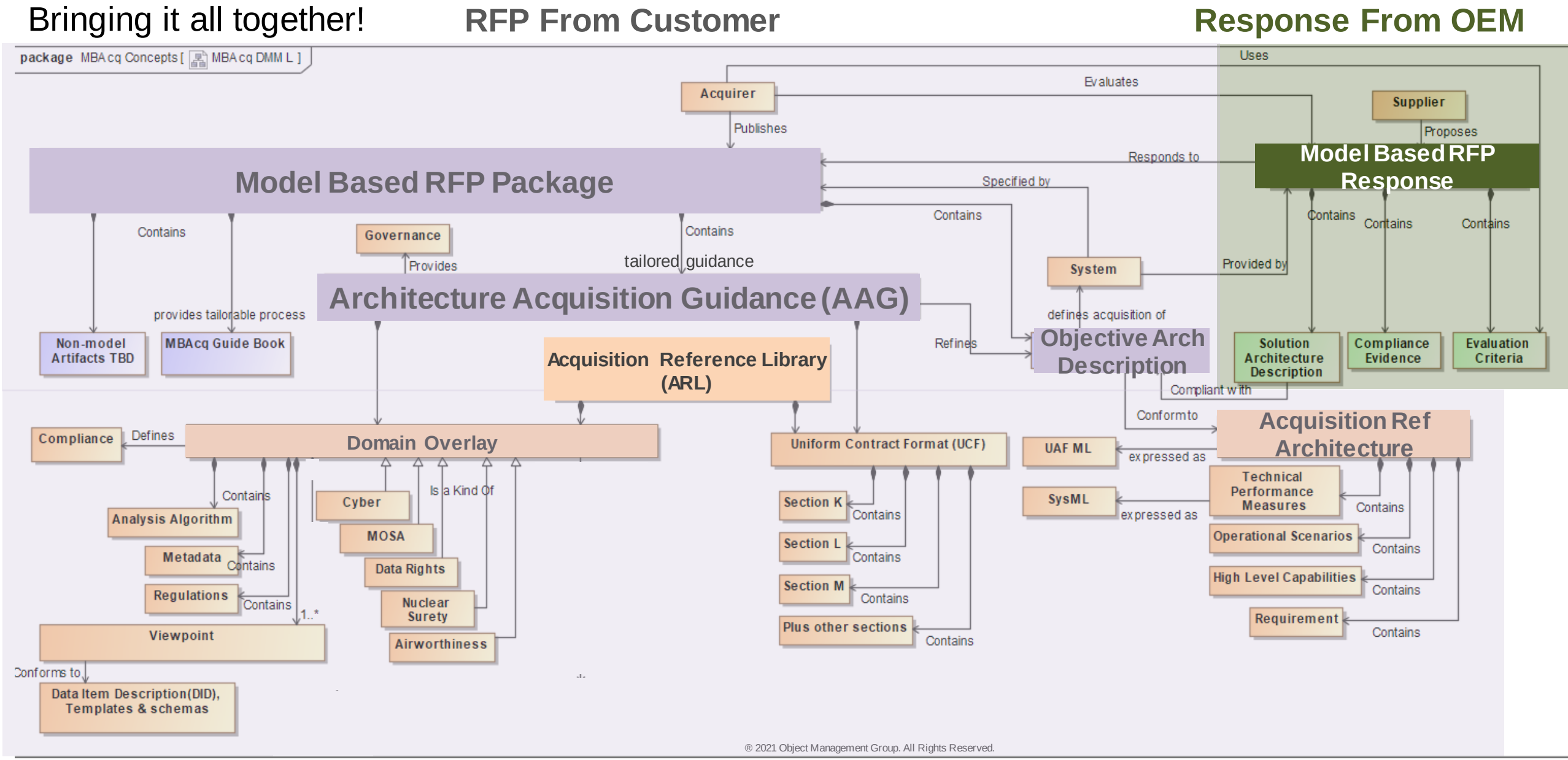
- **A System Architecture Model is an Integrated Structured Representation of the Requirements, Behaviors, Structure, Properties, and Interconnections**
  - Requirements
    - What are the mission operations, stakeholders' goals, purposes, and success conditions for the system?
  - Behavior
    - What the system needs to do to meet requirements
    - Transformation of inputs to outputs
    - Responses to External stimulus
  - Structure
    - The parts of the system that are responsible for the behaviors
    - The component hierarchy, elements and stores
  - Properties
    - The performance, physical characteristics and governing rules that constrain the structure and behaviors
  - Interconnections
    - The ability of the structured elements to exchange information and achieve their required behaviors



Primary use of the system model is to enable the design of a system that satisfies its requirements

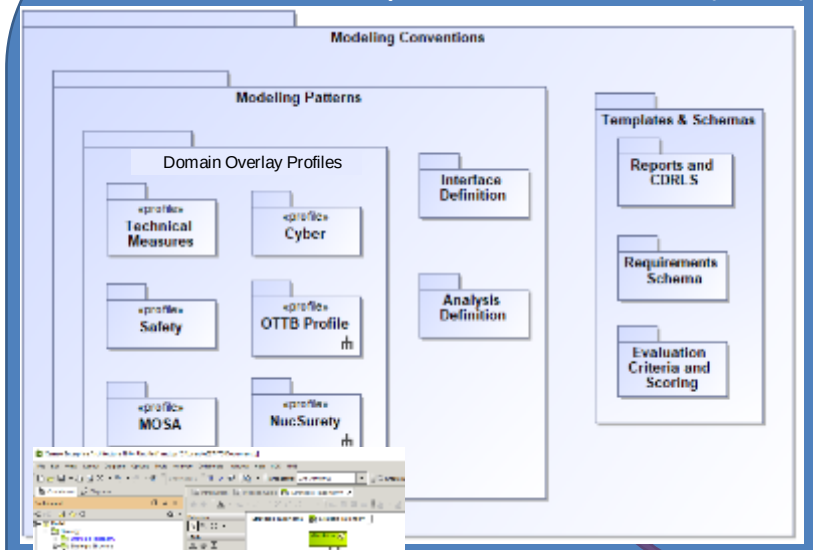
MBAcq Future State

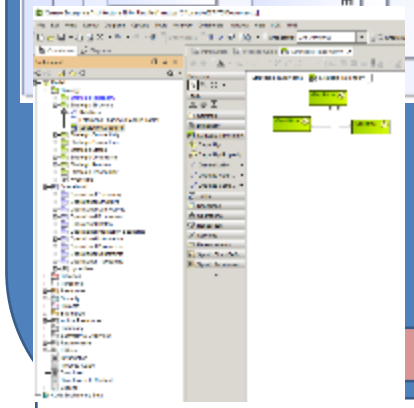
Bringing it all together!



Model-Based Acquisition

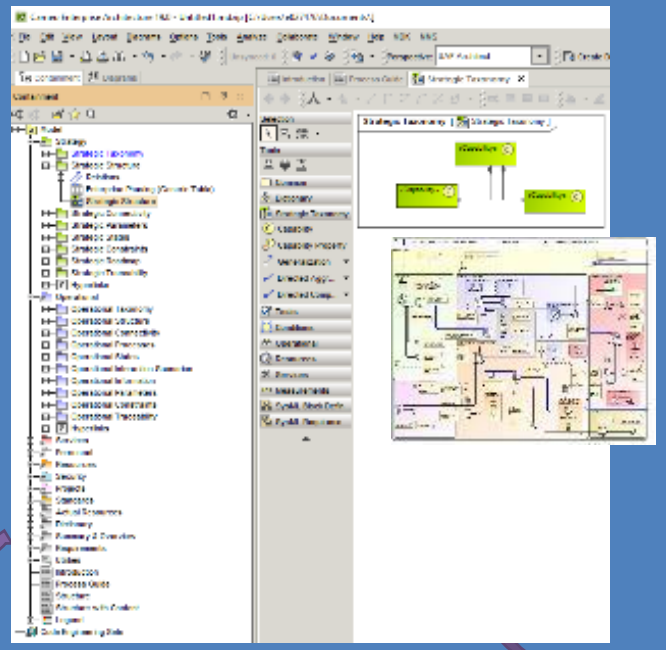
1. Architecture Acquisition Guidance (AAG)





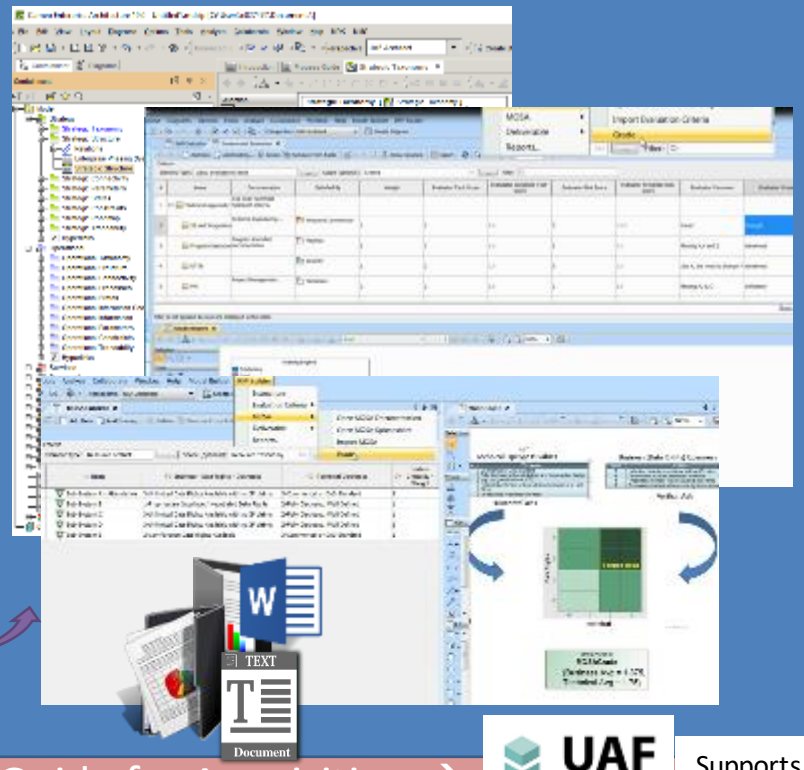
AAG & (OAD)

2. Objective Architecture Description (OAD)



Populated with Program & contract Data

3. Model-based RFP Package



← 4. Unified Architecture Framework (UAF) Process Guide for Acquisition →

UAF OMG UNIFIED ARCHITECTURE FRAMEWORK

Supports DoDAF

1. The AAG provides model structure for RFP content and evaluation tools:
- Modeling Patterns
  - DO Profiles (i.e. MOSA, Data Rights, certs)
  - Interface & Analysis Definitions
- Templates & Schemas
  - Evaluation Criteria & Scoring (Section K, L, M)
  - Reports & CDRLS

2. The OAD is a descriptive model containing the program requirements, constraints and context
- High-level Capabilities, mapped to Operational scenarios, traced to requirements (e.g. CDD, SRD, Conops)
- Technical performance measures (i.e. KPPs, KSAs, MOEs..)
- Any required architectural partitioning including structural and functional

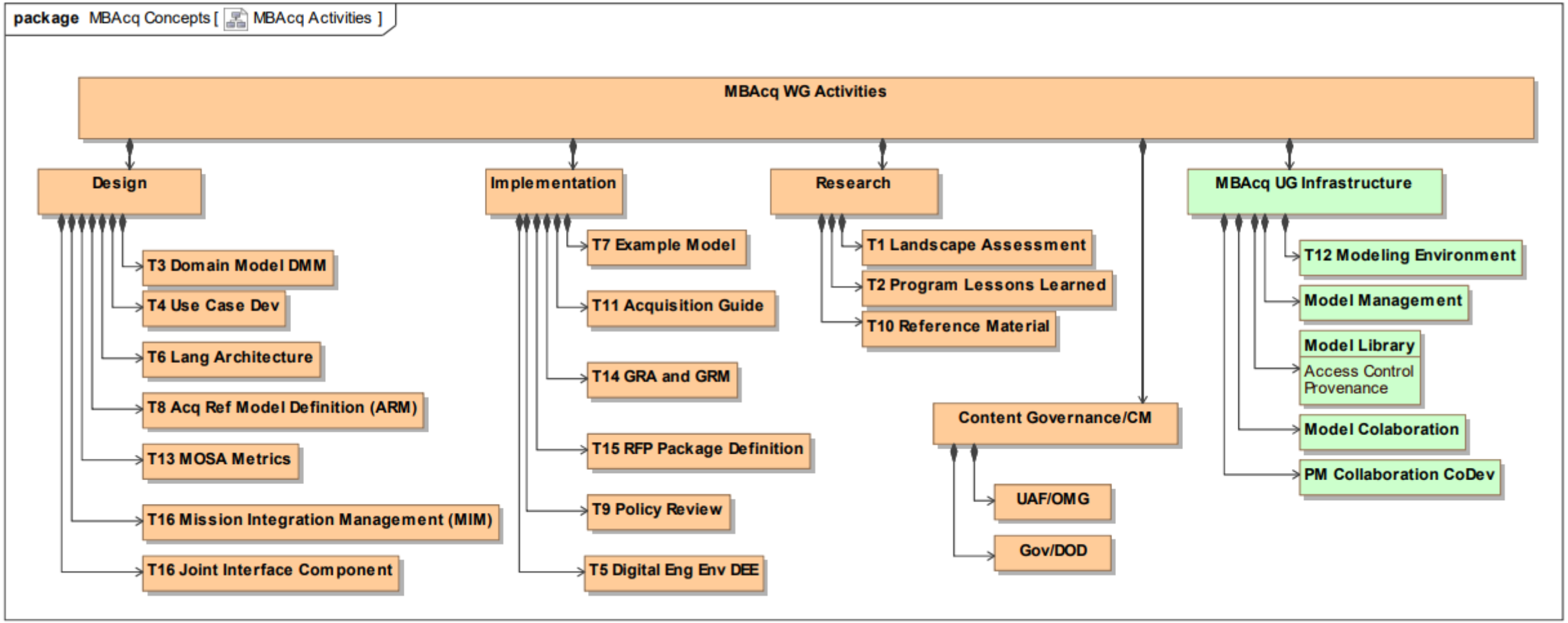
(Based on UAF acquisition process guide and template)

3. The Model-based RFP model contains the populated OAD&AAG providing **RFP evaluation content**, **CDRL definitions** for documentation generation and **scoring tools** for solution validation and evaluation

4. UAF Process Guide provides the Acquisition Guidance for using the OAD and AAG **template to create, respond and evaluate a Model-based RFP**.

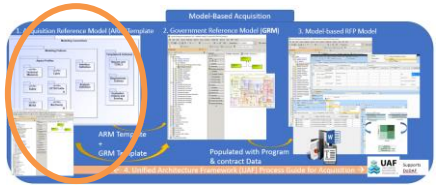
SOURCE: Laura Hart, MITRE 2017

UAF MBAcq UG Activities



OMG Standards Development Organization

What's the Architecture Acquisition Guidance (AAG) (previously ARM)

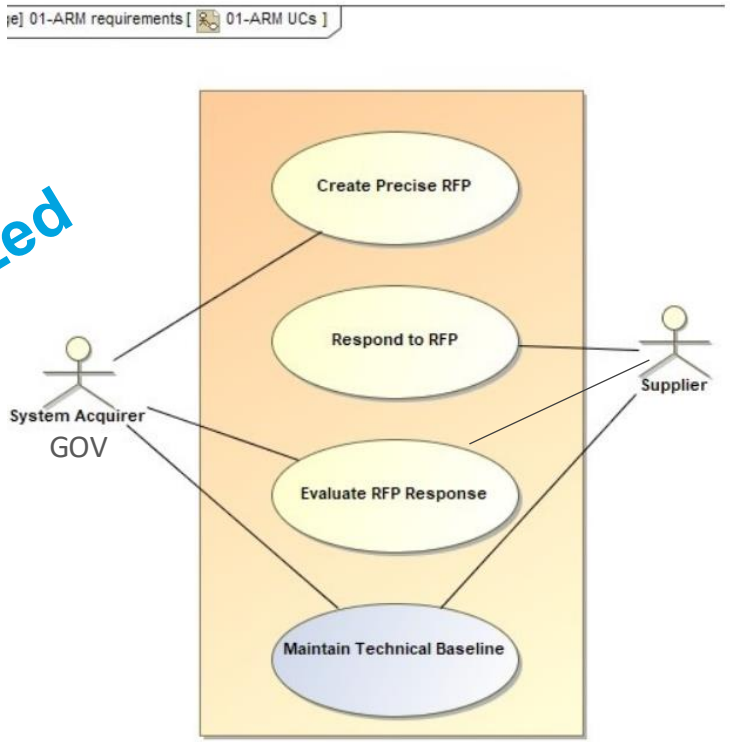


AAG is a set of reusable model templates, and guidance used to augment a model-based RFP based on standards to support data driven decisions beginning with acquisition which can be maintained throughout the complete lifecycle of program.

Use Cases:

- **Create Precise RFP**
- **Respond to RFP**
- **Evaluate RFP Response**
  - Contractor Self Evaluation
  - Government Evaluation
- **Maintain Technical Baseline**
  - Model evolves over time and represents the technical baseline

In a Standardized Format



Focus on Unified Contract Format: Sections K, L, & M

SOURCE: Laura Hart, MITRE 2017

OMG Standards Development Organization.

Collaboration and Transparency in an Open Env

wiki.codev.mitre.org/display/UAF/T3%3A+High-Level+Domain+Model

Welcome to LMPeo... | External Outreach... | Service Central Ho... | CoDev Portal | SAP Budet Reports | Calendar Vacation... | Weekly Team M

Spaces | Forums | People | Questions | Polls | Ideation | Glossaries | Calen

- Websites
- Digital Acquisition WG
  - Membership and Attendance
  - Agenda/Meeting Minutes
  - Activities and Deliverables
    - T1/2: Landscape Assessment
    - T3: High-Level Domain Mo
      - Sustainment
    - T4: Use Case Development
    - T5: Digital Eng Env (DEE) ass
    - T6: Language Architecture
    - T7: Updates to the Example I
    - T8: (ARM) Acq Ref Model: Te
    - T9: Policy Review Group
    - T10: Identify Reference Reso
    - T11: Acquisition Guide Outli
    - T12: Modeling Environment
    - T13: MOSA Metrics
    - T14: Define (ARA & OAD): pr
    - T15: Define Model Based RFI
    - T16: Joint interface compone
- MBAcq Shared Files

Pages / ... / Activities and Deliverables

T3: High-Level Domain Mod

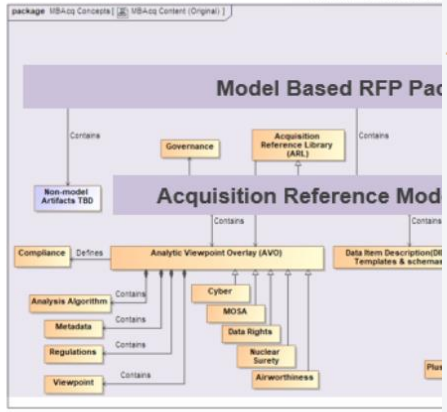
Created by Laura Hart, last modified about 22 hours ago

Special Task Description: Capture the core high-level conc

Task Leader: @Laura Hart @Matthew Hause , Monty

Members: Yvette Rodriguez, Jeff Banks

RFP From C



OMG UAF Task Force

Pages | Calendars

SPACE SHORTCUTS
- Meeting Notes & Action Items
- UAF 1.2 Sample Model Document
- Glossaries

PAGE TREE
- Meeting Notes & Action Items
- UAF 1.2 Sample Model Document
- UAF 1.2 Layers
- Files list
- How-to Articles
- Websites
- Digital Acquisition WG
  - Membership and Attendance
  - Agenda/Meeting Minutes
    - 05/06/2022 Agenda/Minutes
    - 05/20/2022 Agenda/Minutes
    - 06/07/2022 Agenda/Minutes
    - 07/01/2022 Agenda/Minutes
    - 07/29/2022 Agenda/Minutes
    - 08/12/2022 Agenda/Minutes
    - **09/02/2022 Agenda/Minutes**
    - 09/09/2022 Agenda/Minutes
    - 10/14/2022 Agenda/Minutes
    - 10/28/2022 Agenda/Minutes
    - 11/18/2022 Agenda/Minutes
    - 12/6/2022 OMG Agenda/Minutes
    - Orientation Meeting Sept 1, 2023
  - Activities and Deliverables
  - MBAcq Shared Files
  - Files: Reference Documentation
  - MBAcq User Group Charter
  - New CoDev Request
  - Model & Data Catalog
  - Sub Committee Meeting Schedule
  - FAQs -- Frequently Asked Questions
- Glossaries

Pages / ... / Agenda/Meeting Minutes | 22 views

09/02/2022 Agenda/Minutes

Created by Laura Hart, last modified on Sep 02, 2022

All Attendees put your name/org/email in the chat window. That allows us to capture attendance

and if you need access to the MITRE CoDev Collaboration Site (Confluence)

https://wiki.codev.mitre.org

General Request:

- If this was your first meeting, please send me your Chat Introduction
- To request an MBAcq collaboration site account, send email request to Rae Ande
  - Gaining access to the OMG UAF Task Force Confluence site is a THREE STE

1) follow the link and register either using a password or enrolling your Dc
2) You must log in to the MITRE CoDev network to create an account on t
3) Once you do, please email me (rahaselden@mitre.org), and I will invite

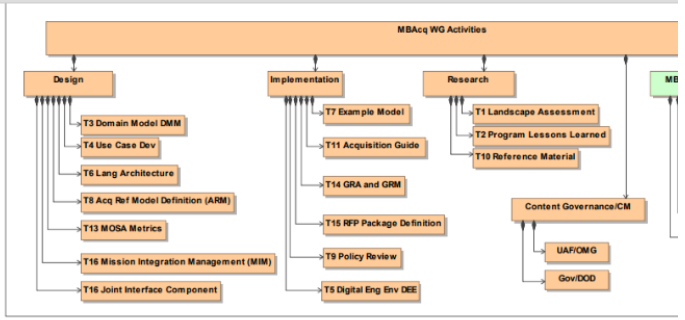
Agenda:

- Topics:
  - Report from the subgroups: What can we get done in the next 30, 60, 90 d
    - [x] Rae Anderson: T1/2: Landscape Assessment and Lessons Learned
      - [ ] Monte will provide rolled up Lessons Learned
    - [x] Hart/Hause: T3: High-Level Domain Model
    - [x] Rae/Tom: T4: Use Case Development
      - [ ] Review UC document and instructions
    - [ ] Hart: T7 Example Model Definition
    - [x] Tom M and Barry P: T9: Policy Review Group - The SERC has comple
    - [x] Yvette Rodriguez: T10: Identify Reference Resource Authoritative So
    - [x] Bob Scheurer/John Quintana: T11: Acquisition Guide Outline
      - [ ] This will be a distributed effort; all please review and provide
    - [x] T5: Digital Eng Env (DEE) associated with primary System
    - [x] Rae Anderson/Dave McDaniel: T14: Define (GRA & GRM): proposed
    - [ ] Daniel Brookshier: T12: Modeling Environment Tool Support
    - [ ] Gene Sherve: T6: Language Architecture
  - General conversation around the room:
    - Nadine: new OSD Architecture group is being formed lead by Lt Col
    - Ed Moshinski (OUSD R&E and NDIA Arch co-chair) stated that a MC these deliverables will be pivotal to the MOSA standardization appr
    - Frank Salvatore Asked, Are you planning to start with what was dor
    - Keith provided new contract for ASDP >"Frood" SCHNEIDER, MICH
    - Monte Porter - PEO MS : I'm interested in the govt reference model
    - Frank Salvatore : I will sign up to be a reviewer of the concept map.
    - Mike Guba to support GRA/GRM development
    - Frank Salvatore : There is a digital engineering measurement frame
    - Keith Siders, AFLCMC/EZSI, working to get AF legal/contract suppor
- Actions:
  - [ ] Frank, can you get us a copy of the Skyzer model?
  - [ ] Ed Moshinsky, provide MOSA Implementation Guide
  - [ ] Ed Moshinsky, provide NDIA Arch MOSA Metrics from Steve Henry
  - [ ] Get SATCOM RM
- Acquire existing Arch models to build upon (NAVAIR, AF MBSE, AFC, SATCOM....) who can get these for us?

Next Week:

Spaces | Forums | People | Questions | Polls | Ideation | Glossaries | Calendars | Blogs | Create

- Meeting Notes & Action Items
- UAF 1.2 Sample Model Document
- UAF 1.2 Layers
- Files list
- How-to Articles
- Websites
- Digital Acquisition WG
  - Membership and Attendance
  - Agenda/Meeting Minutes
  - **Activities and Deliverables**
    - T1/2: Landscape Assessment and L
    - T3: High-Level Domain Model
    - T4: Use Case Development
    - T5: Digital Eng Env (DEE) associatec
    - T6: Language Architecture
    - T7: Updates to the Example Model
    - T8: (ARM) Acq Ref Model: Template
    - T9: Policy Review Group
    - T10: Identify Reference Resource A
    - T11: Acquisition Guide Outline
    - T12: Modeling Environment Tool Su
    - T13: MOSA Metrics
    - T14: Define (ARA & OAD): propose
    - T15: Define Model Based RFP Packa
    - T16: Joint interface component arc
  - MBAcq Shared Files
  - Files: Reference Documentation
  - MBAcq User Group Charter



Topic ID#	WG Name	Leader(s)	Description
T1/2 Landscape Assessment & Lessons Learned	Research	@Rae Anderson	Identify Existing activities and organizations associated with [
T3 Domain Model	Design	Laura Hart Matthew Hause	Capture the core high-level concepts, definitions, relationshi Metamodel
T4 UC Development	Design	@Rae Anderson	Identify and define major MBAcq Use Case set
T5 Digital Eng Env	Implement		Examine the special considerations for addressing the **Digita** support the larger strategic goals expected from Digital Engi address DEE requirements/specificity in a MBAcq context. De the enabling system and a lighter version of requirements. D
T6 Lang Arch	Design	Gene Sherve	Define the implementation of the ACQ DMM for inclusion int

UAF MBAcq Planned Deliverables

- AAG templates and guidance (how to specify model-based DIDs, CDRLs)
- Guidance on building Domain Overlays (DO)
- OAD template and guidance (includes guidance for how NOT to over-specify a system)
- Sample model (as part of UAF sample model)
- UAF Process Guide for Acquisition will:
  - define the CONOPS for how a program office will use all the models they will receive over the lifetime of a system
  - how to make models available for reuse for other/new systems
  - portfolio management for models/programs
  - provide process and guidance that describes how to integrate MBSE approaches into pre-acquisition (before request for proposal release), request for proposal, contract award, and contract execution steps
- Impact to existing policy with recommendations for change
- Descriptions of what Sections K, L, and M could look like for model delivery
- Taxonomies with precise definitions for concepts and terms

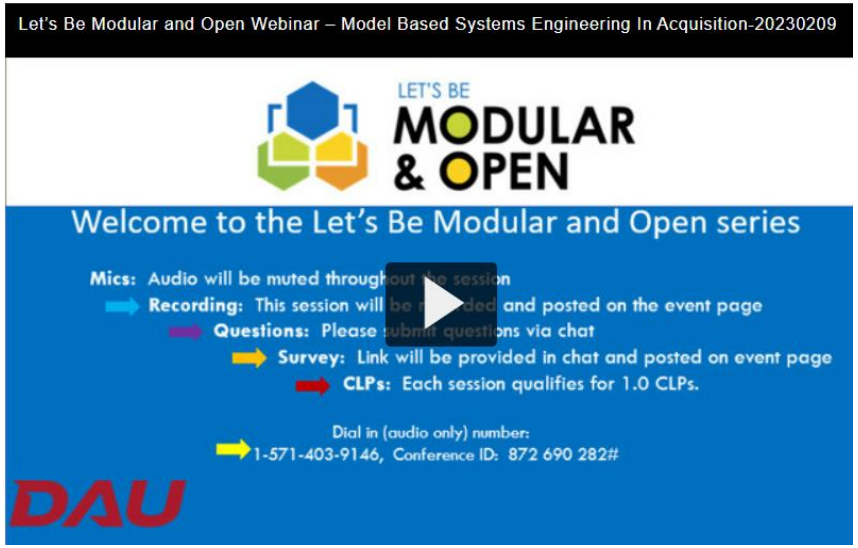
OMG Standards Development Organization.

More on UAF/MBAcq

Intro to UAF

https://youtu.be/AWJk_7KtQ0w

DAU MBAcq Recording



The session Link (~30 min presentation and 30 min Q&A) :
https://www.dau.edu/event/Lets-Be-Modular-and-Open-Webinar-Model-Based-Systems-Engineering-In-Acquisition

Unified Architecture Framework (UAF)
https://www.linkedin.com/groups/8878655/

OBJECT MANAGEMENT GROUP®

Thank You!

Laura Hart, laura.e.hart@lmco.com

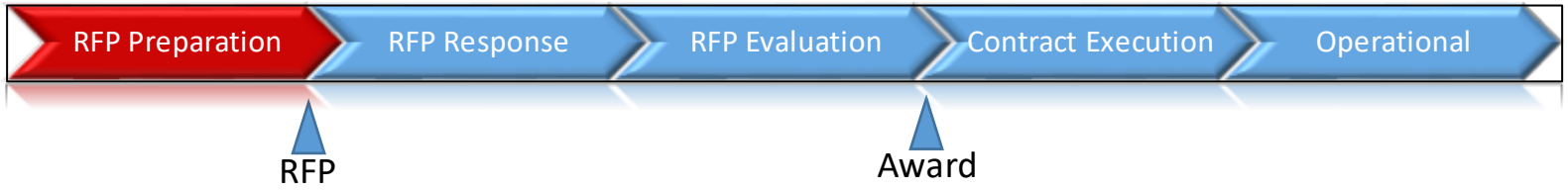
Rae Anderson, rahaselden@mitre.org

Steve MacLaird, maclaird@omg.org

Unified Architecture Framework (UAF)
https://www.linkedin.com/groups/8878655/

Backup

MBAcq: RFP Preparation and Planning

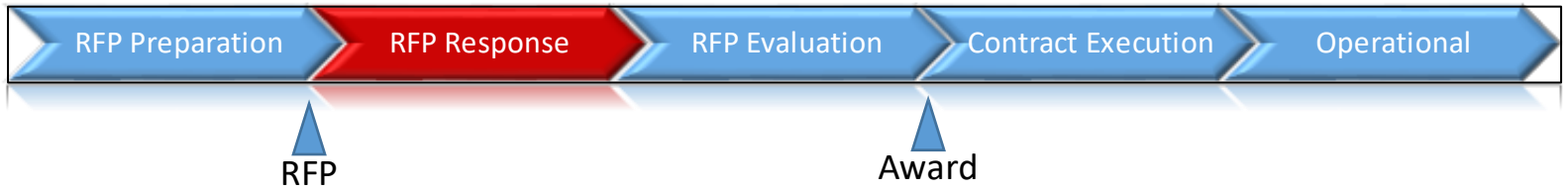


During RFP Preparation and Planning phase, the acquirer (**GOV**) can use **MBAcq** process to:

- Get a clear understanding of the system being acquired through the creation of the Objective Arch Description (OAD) addressing:
  - Operational context, capabilities, requirements, constraints…
- Determine what information will be needed for evaluation & validation of a supplier response such as:
  - MOSA, Certification properties, Data Rights, KPPs
- Determine and codify the supplier instructions expected for a model based response in the Arch Acq Guidance (AAG)
  - Use of gov furnished profiles (Domain Overlays), and supplier guidance
- Determine any implications to contract language (i.e. Tagging a component with certain data rights)
- Communicate the RFP content unambiguously to the supplier with a precise RFP Model (handoff or collaboratively)

Identify what is needed, know where to find it, how to use it and how to evaluate it!

MBAcq: RFP Response by Suppliers

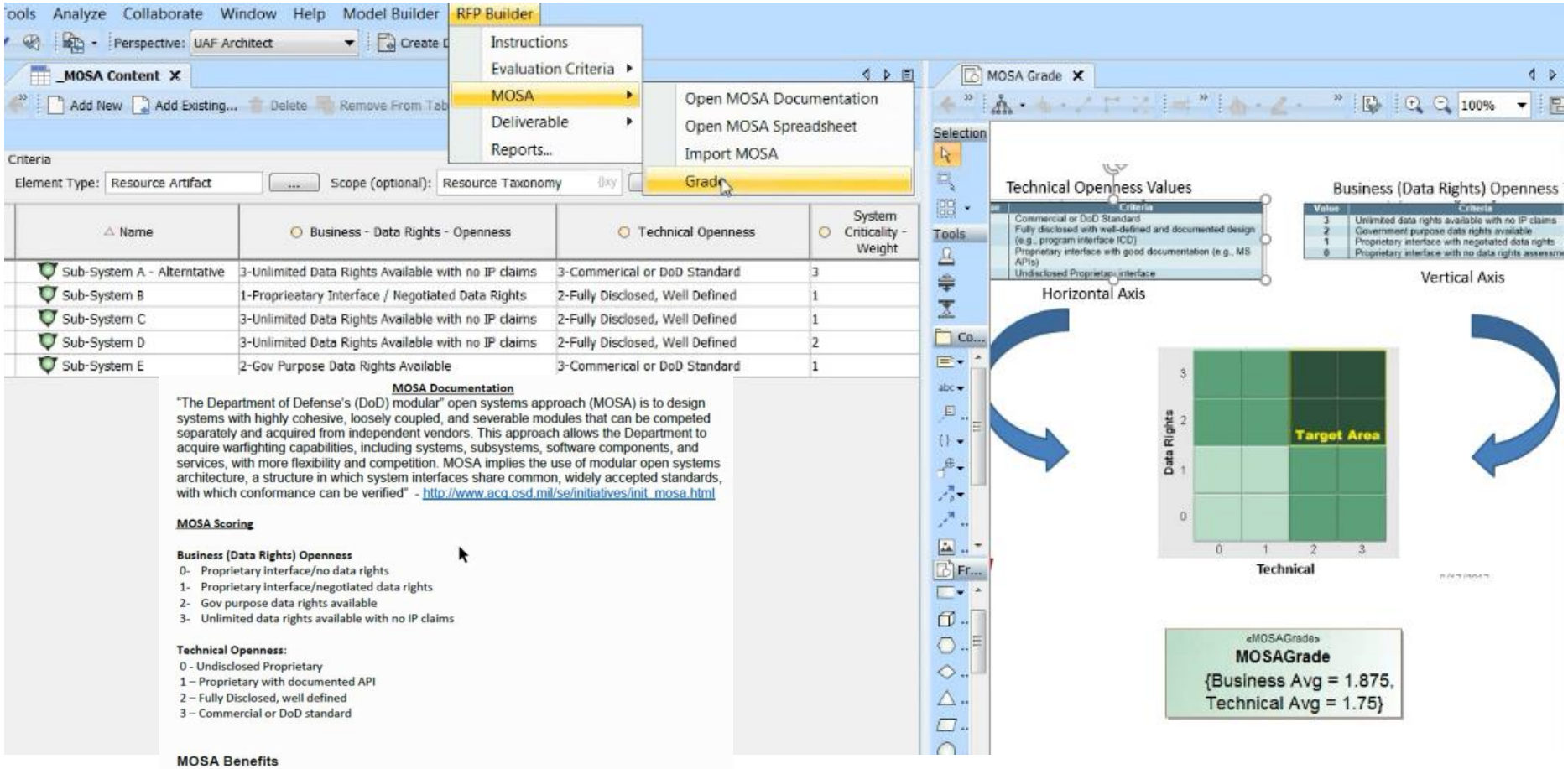


During the RFP Supplier Response phase, the **supplier** will use the **MBAcq** process to:

- Get a clear understanding of the system being acquired within the operational environment context
- Respond to the RFP with supplier value added approach supporting analysis
- Get a clear understanding of expected modeling response using the provided Arch Acq Guidance (AAG)
- Utilize built-in self evaluation methods to support compliance

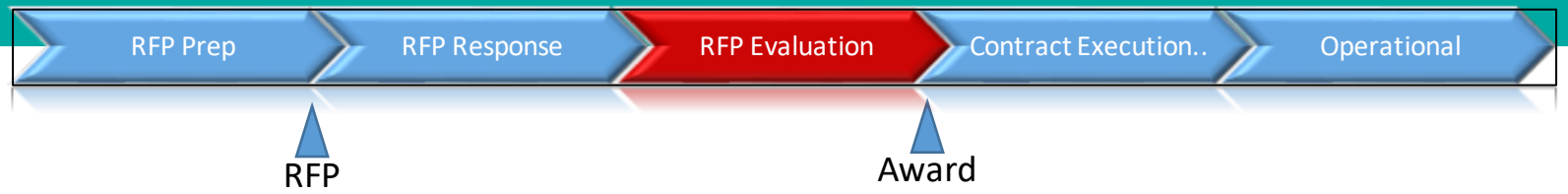
Focus is on Response and less on process mechanics

Modular Open Systems Approach (MOSA) Evaluation



[Modular Open Systems Approach](#)
[NDIA Paper](#) July 1, 2020

MBAcq: Evaluation (Supplier/Gov)

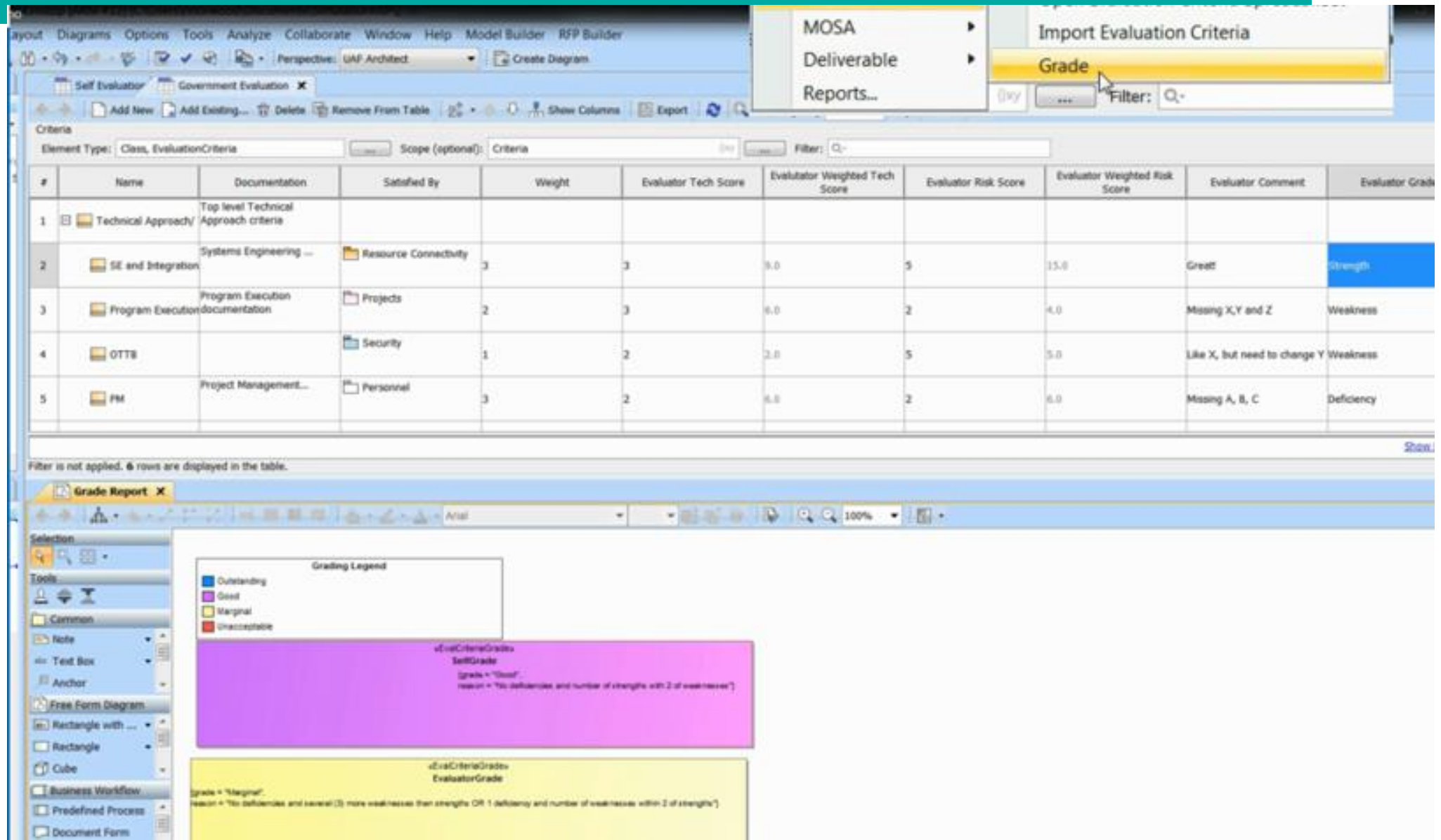


During RFP Evaluation phase, the **Supplier** & **GOV** can use **MBAcq** process to:

- Assist the evaluation process for compliance and scoring using built in evaluation criteria
- Assist in the assessment of key concerns such as MOSA, Security, survivability though the use of Domain Overlays(DOs) provided in the Arch Acq Guided (AAG)
- Capture scoring and rational with standard metrics for future evidence

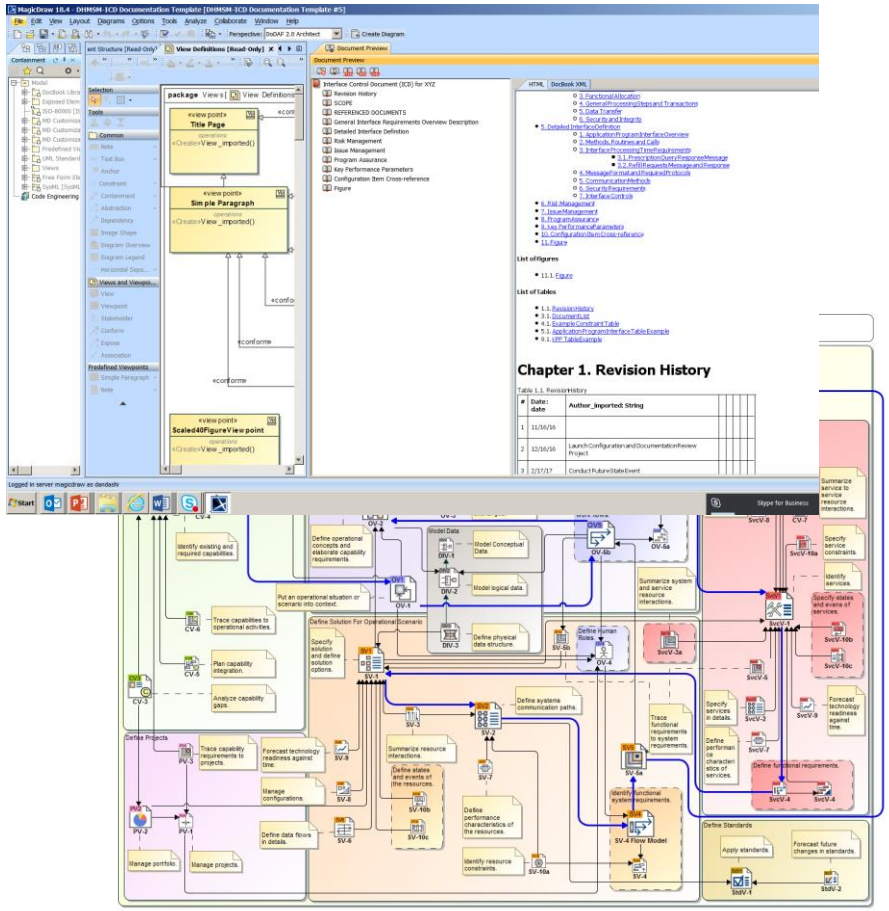
Grading Rubrics and Scoring are captured in the Model

Evaluation Criteria are Represented as Model Elements and Graded



Document Generation from Model

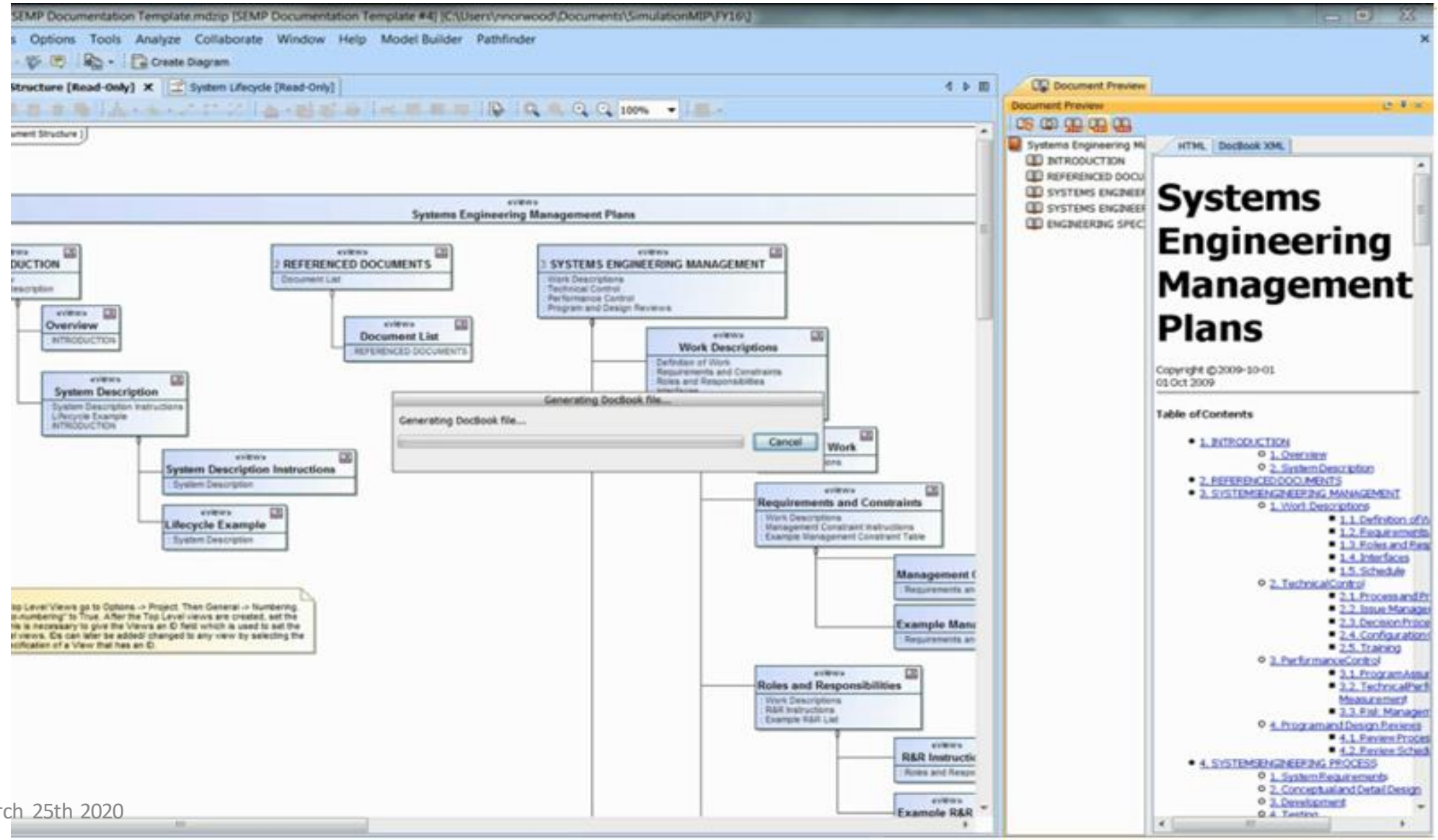
- Define Reusable document templates (CDD, AoA Plan…)



Generate Required Documents and Reports

(Source: Laura Hart, MITRE 2017)

Document Generation



Generated Document Content

Table of Contents

List of Figures

List of Tables

1. INTRODUCTION

1.1. Overview

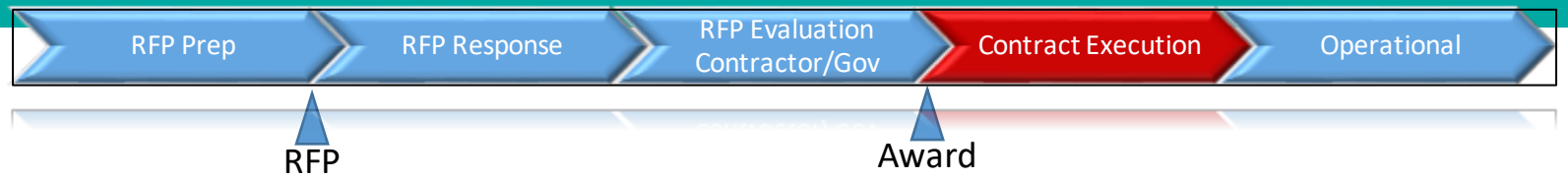
Describe the purpose and scope of the SEMP.

1.2. System Description

At a high level, describe the system to be created, to include the entire system lifecycle from concept to dismantlement/retirement.

Figure 1.1. Lifecycle Example

MBAcq: Contract Execution

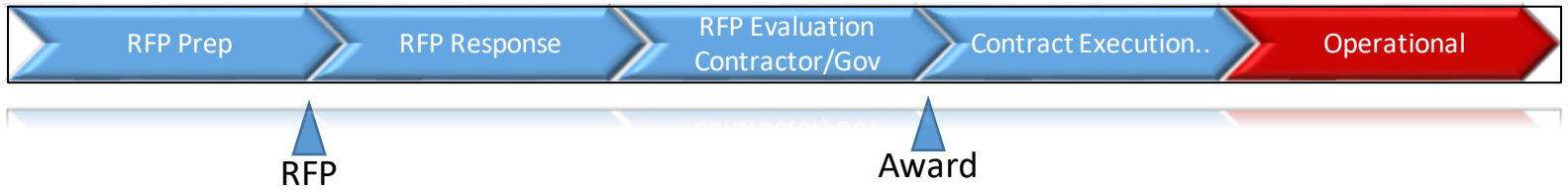


During the RFP Contract Execution phase, the **GOV** will use the **MBAcq** process and evolving model(s) to:

- Collaboration with suppliers
- Monitor progress, maturity
- Assess change impact and manage risks

The evolving model is a source of collaboration

MBAcq: Operational System



During the Operational phase, the **GOV** and **supplier** will use the matured evolving set of models to:

- Support knowledge management and training
- Assess change impact and manage risks
- Provide the foundation for a digital twin

Living Knowledge Repository Supporting Data-driven decisions