ManTech
Securing the Future



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Taking Authority Over Your Modeling Enterprise: ManTech's Elastic Model Governance Approach

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This presentation contains "forward-looking statements," within the definition of the Private Securities Litigation Reform Act of 1995. These statements are subject to numerous assumptions, risks, and uncertainties, many of which are outside of our control, and include the risks and uncertainties that are identified in the Risk Factor section in our Annual Report on Form 10-K (filed with the SEC on February 19, 2021), and in other periodic and current reports we file with the SEC. While the forward-looking statements herein reflect our current expectations, no assurance can be given that the results or events described in such statements will be achieved, and our actual results may differ materially from the results we anticipate.

We undertake no obligation to revise or update any of these forward-looking statements (whether as a result of new information, subsequent events or circumstances, changes in expectations or otherwise) that may arise after the date of this presentation.

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Executive Summary

Model Governance Guide

As Digital Engineering (DE) employs a digital thread with a broad range of interconnected models, it can be difficult to govern linked models across disciplines and contractual boundaries. This approach includes:

GUIDANCE – Model-based guidance with in-model work instructions,

INTEGRATION – Integration of the overall model governance system, DE Ecosystem (DEE) infrastructure, individual models, and composite models,

PURPOSE – Traceability of model purpose and resolution of technical debt,

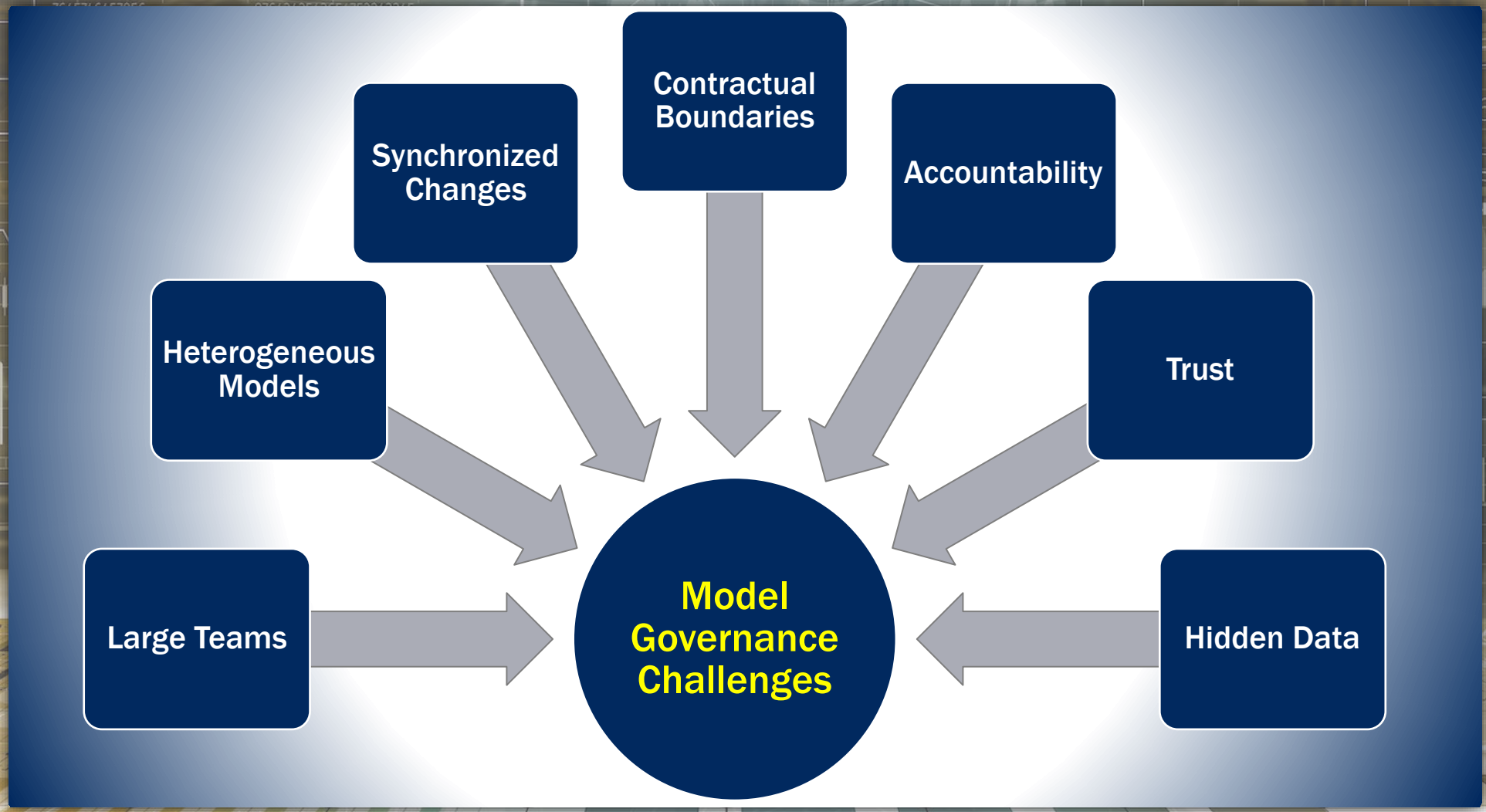
VALIDATION – Automated validation for insight on compliance,

FLEXIBILITY – Customization for flexibility and tailoring (fleX-engineering™).

Agenda

Model Governance Challenges

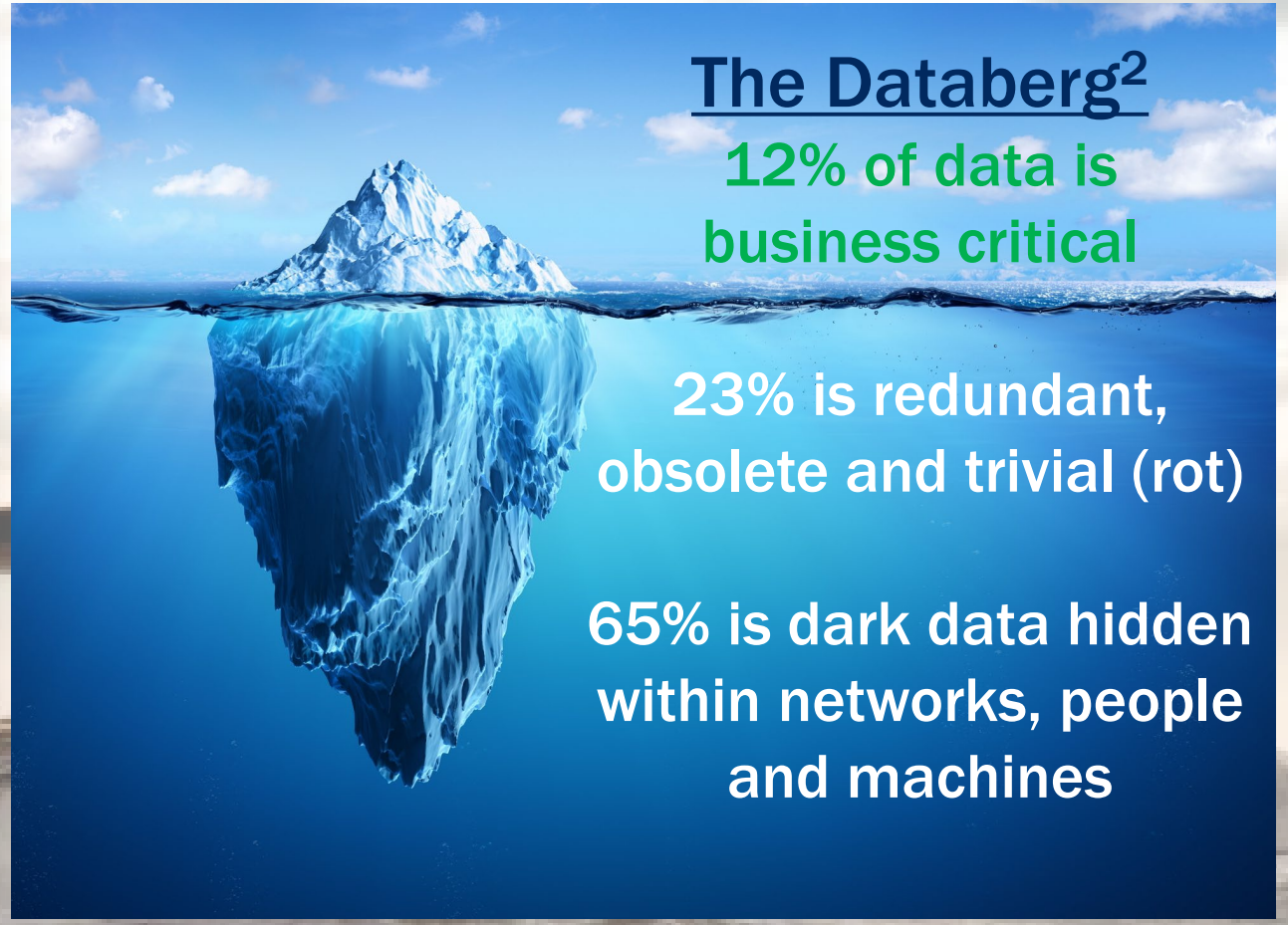
Challenges


Contractual Boundaries
Synchronized Changes
Accountability
Heterogeneous Models
Trust
Large Teams
Model Governance Challenges
Hidden Data

Data on Challenges

Need[1]

- Organizations score low on “Model Management” capabilities when assessed by the INCOSE Model-Based Capabilities matrix
- SERC SE Survey cited “Model Management” as a significant area of improvement
- Acquirers routinely ask for model management work and responding bidders have a range of responses

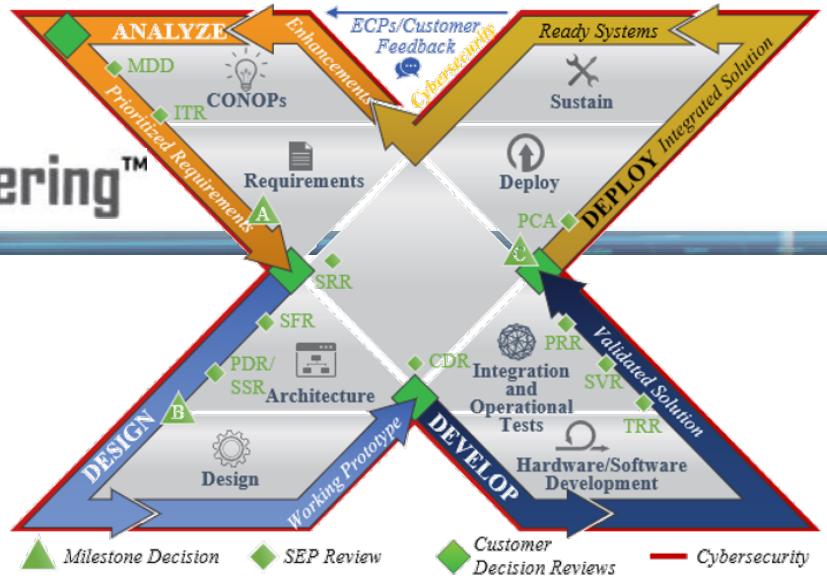


Model Governance is a Recognized Need

ManTech Approach

Approach to Problem

fleX-engineering™



1. **Harvest information**
   - ❑ Review existing literature and practice
2. **Develop process and address desired features**
   - ❑ Use model lifecycle and guidelines from NASA-STD-7009[3,4]
   - ❑ Expand on International Council on Systems Engineering model lifecycle management[5] and configuration management[6], OpenMBEE[7,8], model curation[9,10], digital curation[11], data governance[12], Model Portfolio Management Guide[13], Model-Based Capabilities Matrix[14]
   - ❑ Structure process to be flexible per DoDI 5000.02[15] "Operation of the Adaptive Acquisition Framework" and ManTech's fleX-engineering™
   - ❑ Utilize established SysML model validation practices[16]
   - ❑ Involve ManTech Data Governance expertise to update approach
3. **Obtain feedback and update**
   - ❑ Update using feedback from stakeholders, users, presentations

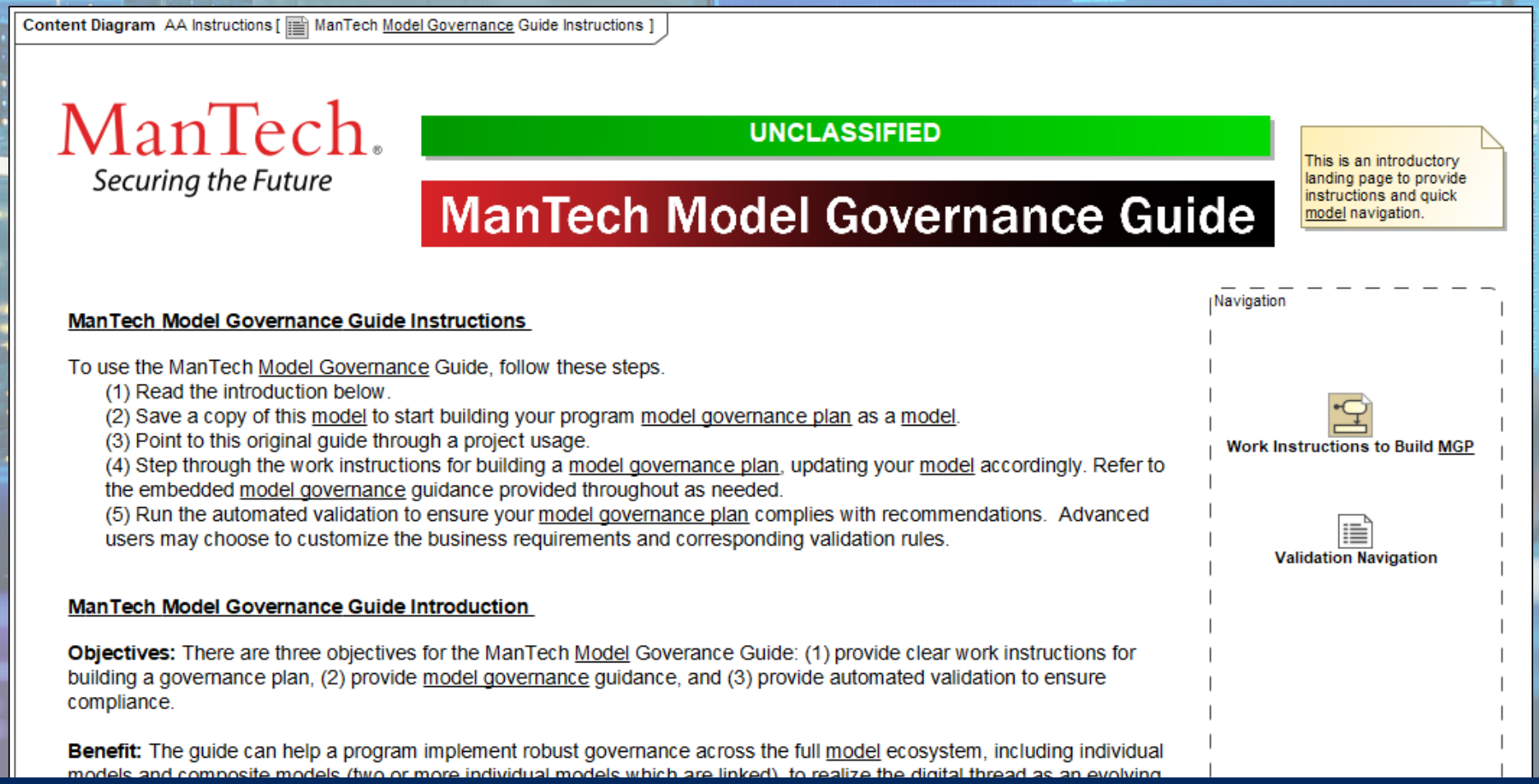
Build from Existing Model Governance Work

Solution Features with Corresponding Value

Features	Value
Provide model-based guidance with in-model work instructions	Enhance usability and demonstrate model-based methods promoted
Establish explicit governance system	Ensure veracity of authoritative source of truth
Include interacting elements – model governance system, DEE infrastructure, individual models, composite models	Improve integration, since elements can be referenced, linked, checked
Trace model purpose through needs addressed, questions answered, technical debt resolved	Establish transparency into system development status
Automate validation for insight on compliance	Enable synchronized data structuring for analytics applications to enhance outcomes
Structure for customization	Provides flexibility and tailoring for context

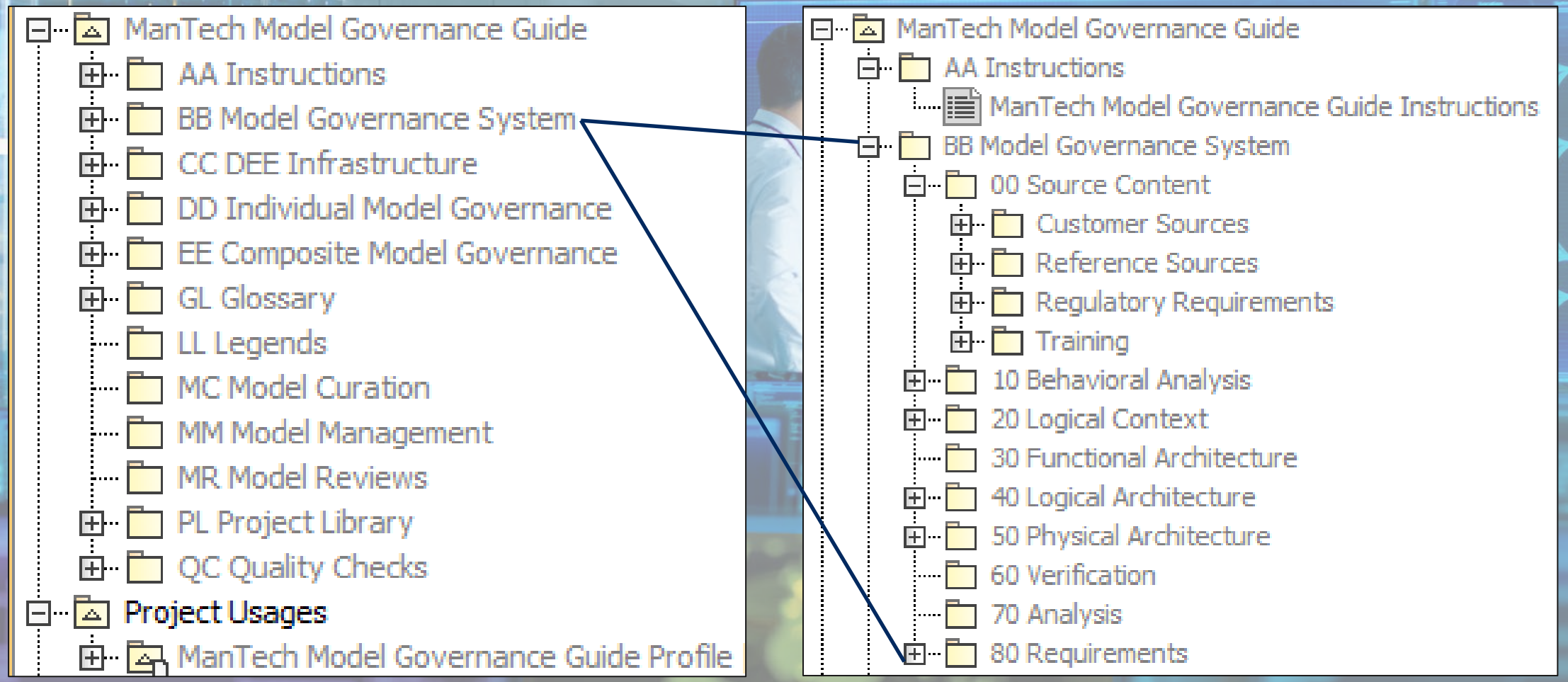
Model Governance Guide Profile and Model

Welcome and Navigation



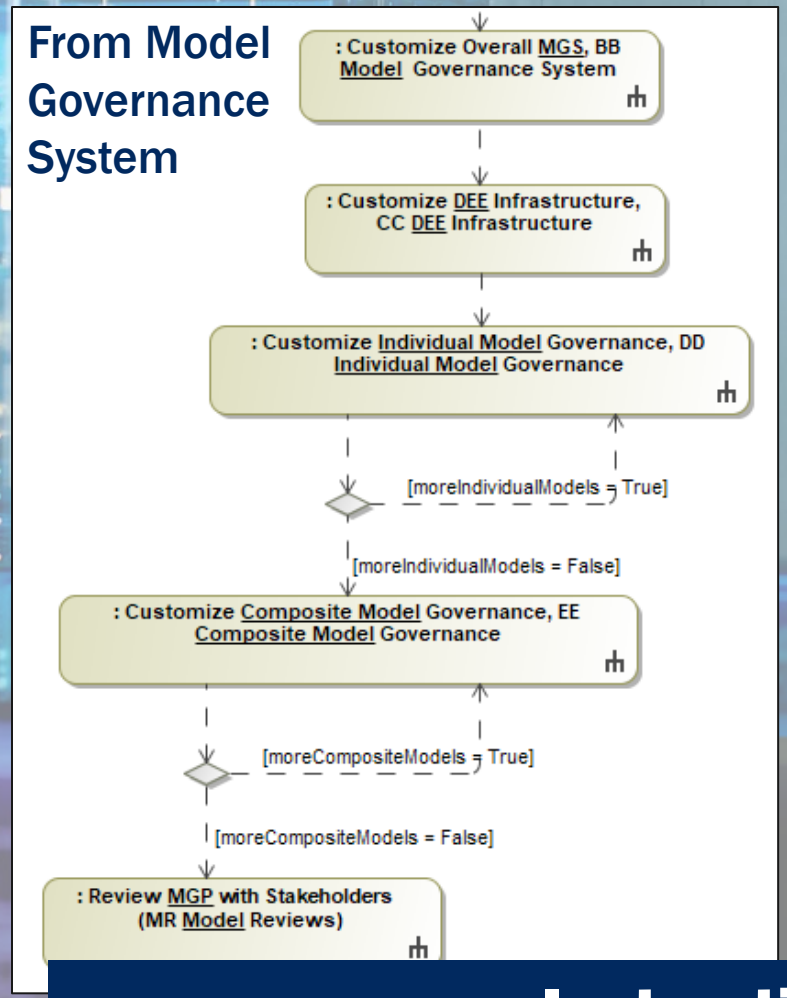
Navigation Aids and Embedded Explanation Provided

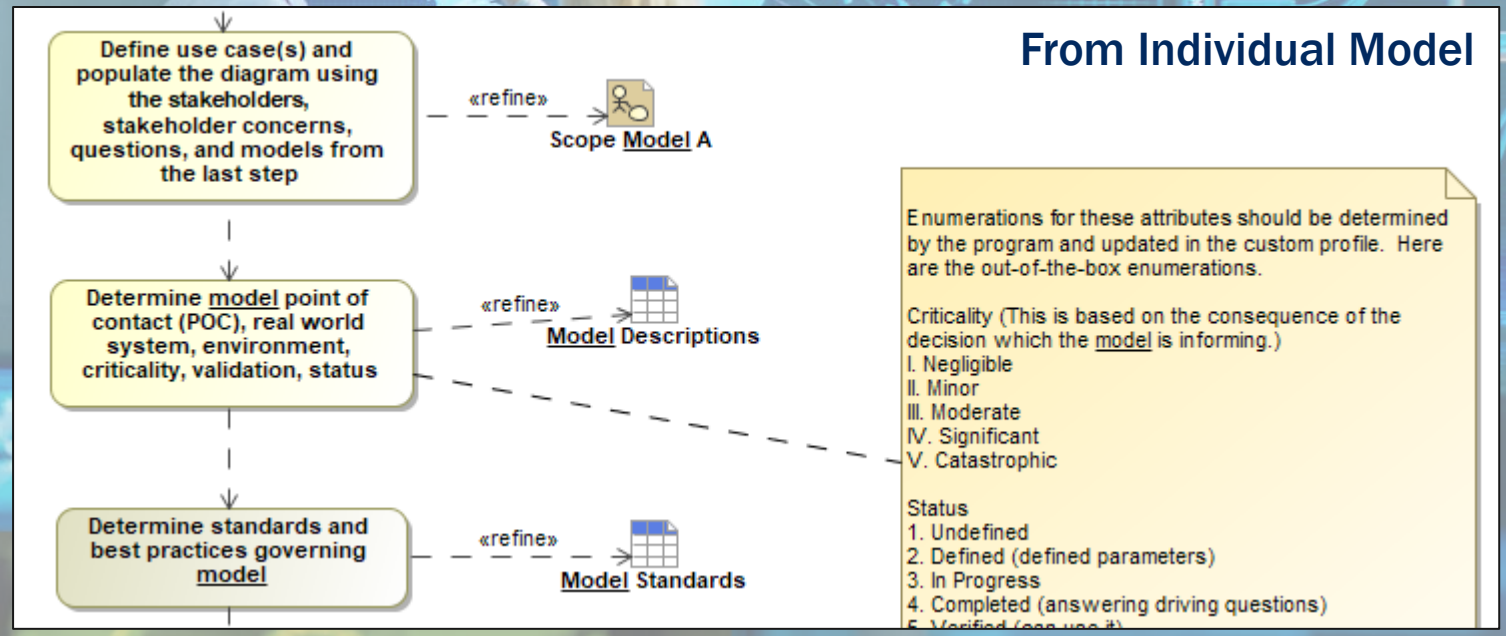
Structure



Repeatable Structure to Easily Find Information

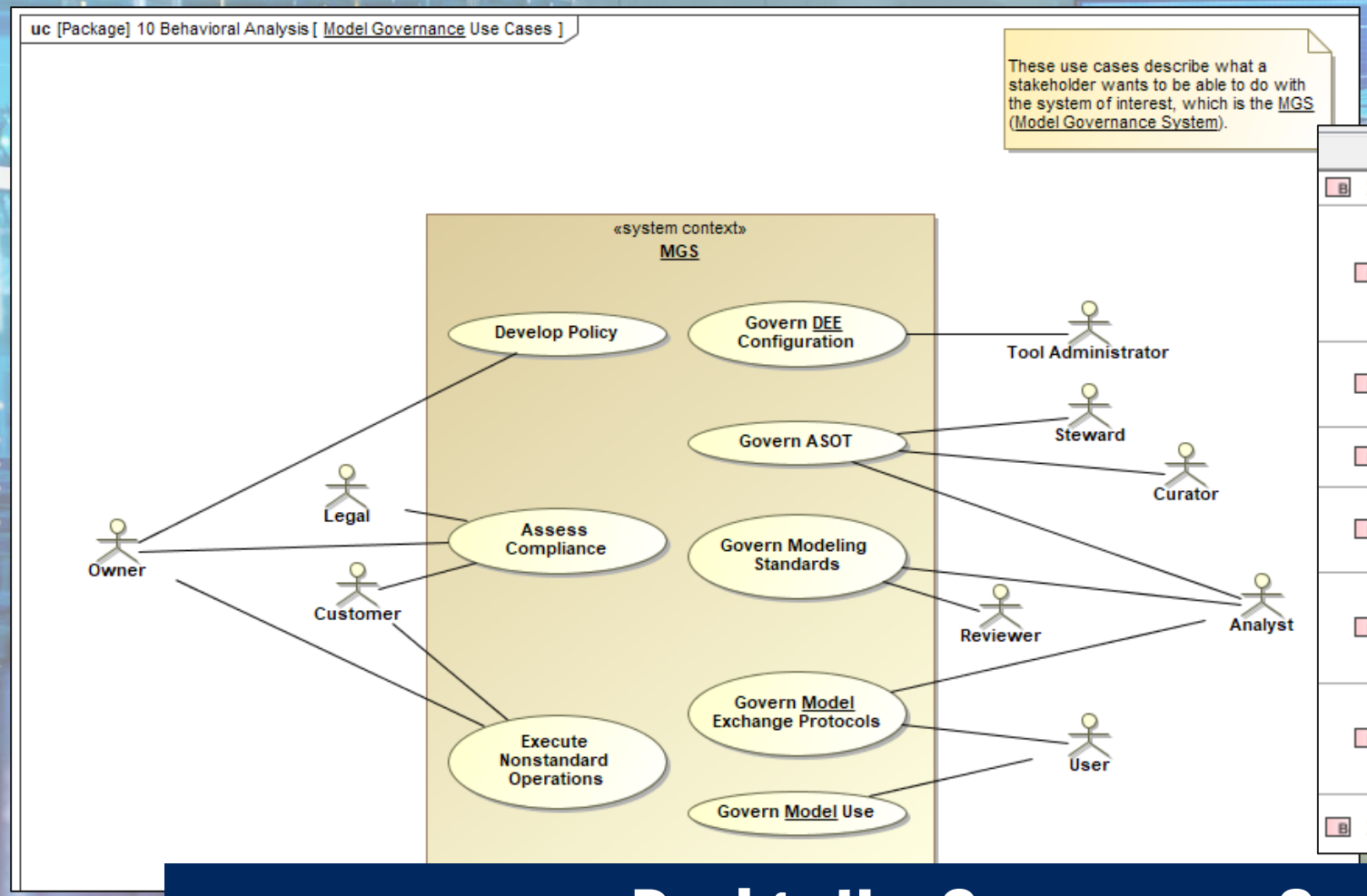
Work Instructions





Instructions Provided at Point of Need

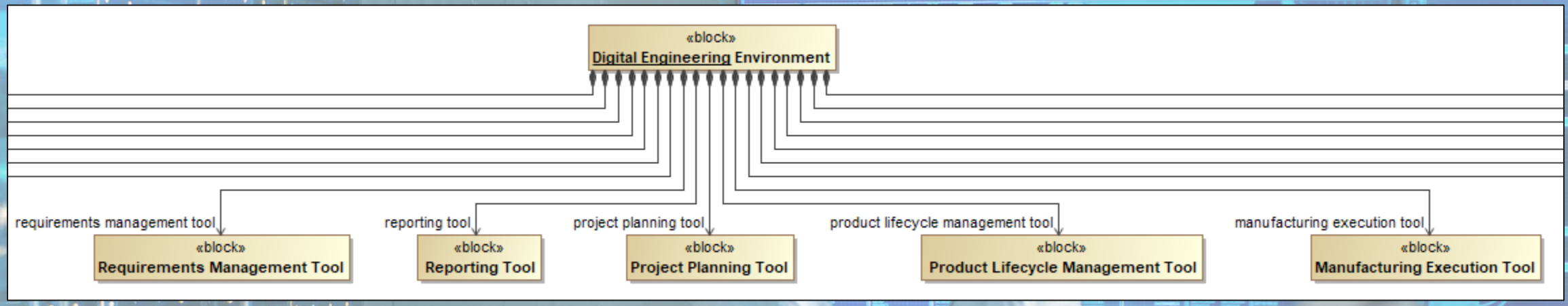
Model Governance System

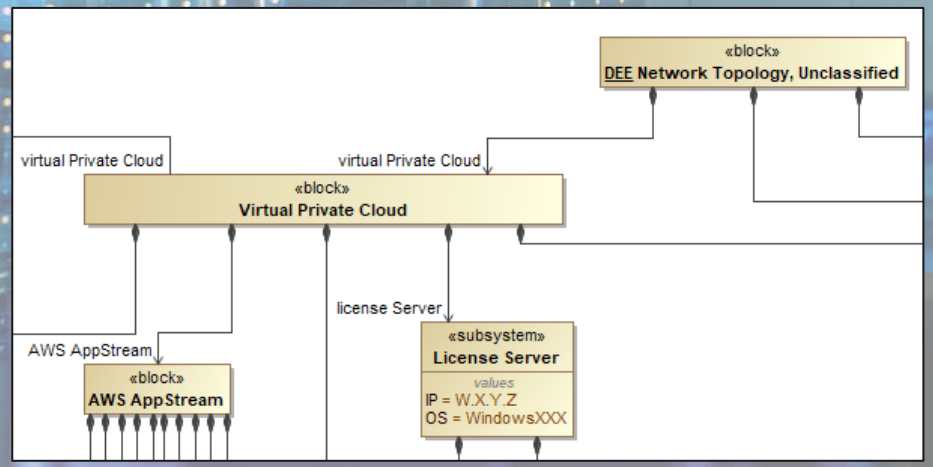


Name	Text	Traced To
26 MGS Services		
26.1 Different Kinds	The MGS services shall include models of different kinds including geometric, analysis, and logical models (refer to model taxonomy in SEBoK Part 2 'Representing Systems with Models').	Fisher, Amit, M. Nol
26.2 Results	The MGS services shall include artifacts that result from the execution of models such as simulation and analysis results.	Fisher, Amit, M. Nol
26.3 Inputs	The MGS services shall include needed inputs to stimulate the models.	Fisher, Amit, M. Nol
26.4 Views	The MGS services shall include artifacts that are generated as views of the models including documents and reports.	Fisher, Amit, M. Nol
26.5 Environments	The MGS services shall include the tools and environments used to create, review, update and delete the models and related artifacts.	Fisher, Amit, M. Nol
26.6 Metadata	The MGS services shall include metadata about the models, the related artifacts, the tools and environments, and the users of the models and related artifacts.	Fisher, Amit, M. Nol
27 Model Content Modification	The MGS shall not modify the model content (excluding its metadata).	Fisher, Amit, M. Nol

Design the Governance System Itself

DEE Infrastructure

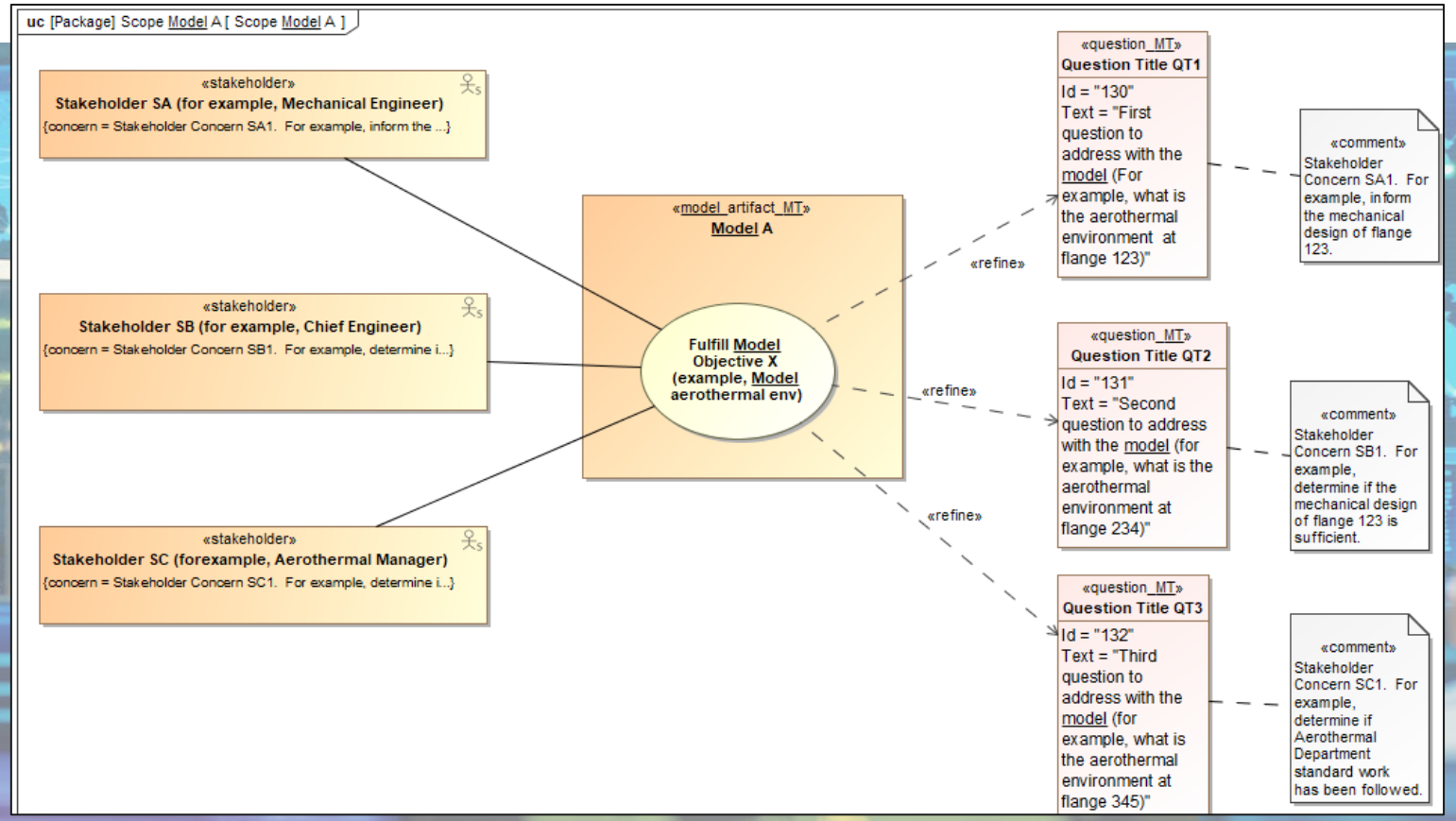




Name	Documentation	Realizes	Associations
Cameo Enterprise Architecture	Dassault Cameo is a model-based systems engineering tool.	Architecture Tool Verification Management T	Teamwork Cloud FlexNet Publisher Cameo Collaborator AWS AppStream
Matlab	Matlab is an analytical tool.	Analytical Tool	Computer A AWS AppStream
ModelCenter	ModelCenter is a tool which enables trades and multi-disciplinary optimization.	Analytical Tool Trades and Optimization T	FlexNet Embedded AWS AppStream

Include DEE Infrastructure Details and Relationship to Models

Individual Models



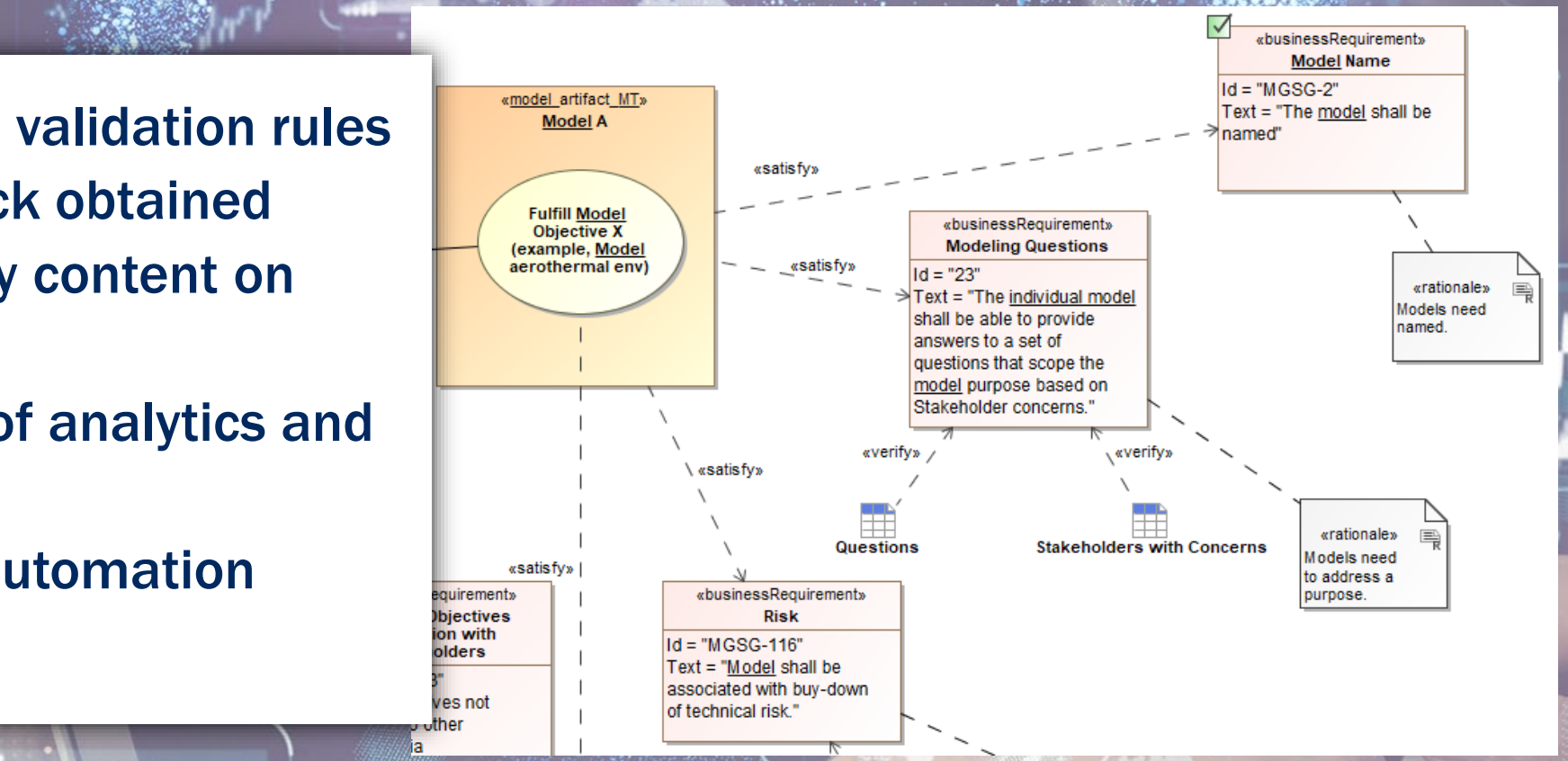
#	Name	Documentation	Associated Assumptions	Associated Risks	Traced to Standards	Use Cases	Questions2	Satisfies	Allocated To	Location
1	Model A	This is the description of Model A...	Assumption B Assumption A	Risk R1	Standard 1 (for example, I Best Practice 3 (for examp Standard 2 (for example, (	Fulfill Model Objective X (e	Question Title QT1 Question Title QT2 Question Title QT3	23 Modeling Questions MGSG-116 Risk MGSG-2 Model Name	ansys : ANSYS	AWS AppStream

Scoping and Traceability for Models to Address Stakeholder Needs

Next Steps

Next Steps

- Add more automated validation rules
- Update using feedback obtained
- Add more explanatory content on customization steps
- Enhance integration of analytics and automation
- Explore governance automation across digital thread



Enhance Automation and Analytics for Digital Thread Integration

Summary

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Thank you

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Dr. Douglas Orellana, Douglas.Orellana@ManTech.com

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