Unleashing the Power of MBSE Model Library Deployments with Cutting-Edge Methods and Strategic Considerations

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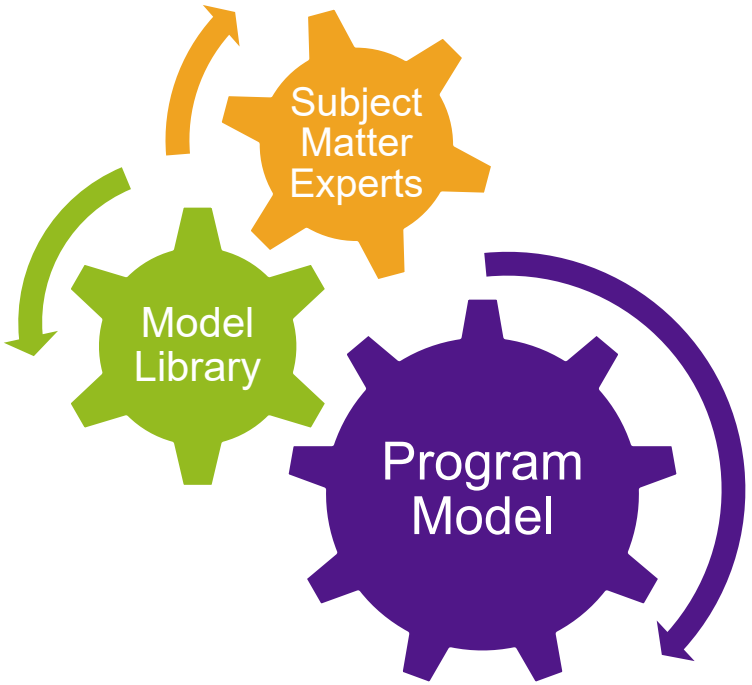
Introduction

- **In our industry's quest for more complex MBSE models, we often duplicate the same work.**
  - Model consistency across platforms remains a challenge.
  - Repeating model development across platforms adds unnecessary costs.
- **Model Libraries offer a solution but require careful planning and distribution.**
  - Similar to modeling, aiming high is crucial.
  - Falling short of our goals wastes effort and offers limited benefits.
- **During this presentation, we will explore "5 Steps for Mastering MBSE Model Library Development" to address these challenges and make the most of MBSE models.**

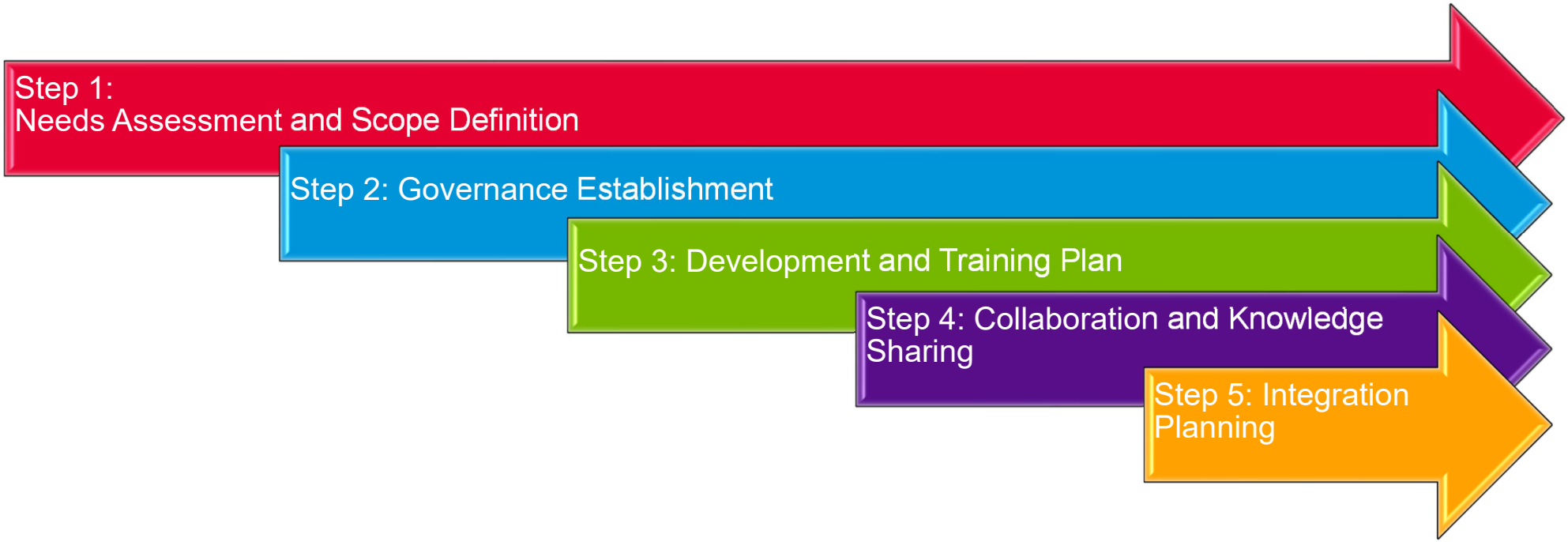


Case Study Regarding Libraries at Boeing

- **An initiative was launched at Boeing to minimize rework through the creation of "Model Libraries."**
  - The libraries aimed to expedite new modeling projects and identified specific subject areas, such as Commercial Platform Aircraft.
- **Initial Style Guides were established to maintain consistency.**
- **Funds were primarily allocated from existing program budgets.**
- **However, as content development progressed, shortcomings emerged:**
  - No formal review process beyond the modeling group.
  - Communication and knowledge sharing were inadequate.
  - Integration plans and deployment were poorly communicated.
  - The concept of post-development library maintenance was overlooked.

This case study highlights the importance of comprehensive planning and continuous support when implementing Model Libraries.

5 Steps for Mastering MBSE Model Library Development



Step 1: Needs Assessment and Scope Definition

- **Start by identifying the specific needs of the engineering team for the MBSE model library.**
  - Use the "Five 5s" framework:
    - **Who:** Identify the team needing the library.
    - **What:** Determine what they want to model.
    - **When:** Establish the timeline for library implementation.
    - **Where:** Identify the domains they need to cover.
    - **Why:** Understand the purpose or questions they aim to address with the model.
- **Evaluate the team's experience level, technical capabilities, and the types of projects they typically handle.**
- **Clearly outline the library's scope by specifying the models and templates to be included.**
  - Define standard work, such as developing Block Definition Diagrams (BDD), Internal Block Diagrams (IBD), and Activity Diagrams (ACT) for each system.
  - Ensure alignment with the Systems Architecture Management Plan (SAMP) and execute accordingly.

Step 2: Governance Establishment

- **Establish governance guidelines, including naming conventions and data entry standards.**
- **Form a governance board consisting of library developers and users.**
  - After creating the model library, it's crucial to schedule ongoing maintenance and review processes.
    - Library Developers can be:
      - Programs with a modeling need that can benefit from reuse opportunities.
      - Members of the governance board responsible for library maintenance.
    - Users are the programs that will adopt the contents of the model library.
- **Board is responsible for:**
  - Defining use cases for Model Libraries.
  - Providing training for library development and usage.
  - Establishing model development guidelines.
  - Facilitating knowledge-sharing efforts, including:
    - Using communication channels to convey library updates.
    - Offering support to programs implementing library content.

Step 3: Development and Training Plan

- **Begin by crafting a training plan tailored to the team's specific experience level.**
  - Adapt what the governance board has developed to meet the team's unique requirements.
- **Explore diverse training methods, including hands-on exercises, webinars, and on-site sessions.**
  - Utilize the training guidelines established by the governance board.
- **Enhance training effectiveness by embedding elements directly into the model, such as navigators, comments, and modeling tools.**
  - The ultimate goal of the training is to empower both new and existing users to seamlessly integrate the model library into their program models.

Step 4: Collaboration and Knowledge Sharing

- **Actively promote collaboration among different teams to unlock the full potential of the model library.**
  - Encourage programs adopting the model libraries to identify areas for improvement, benefiting future projects.
- **Foster knowledge sharing through various communication channels, such as presentations.**
  - Establish efficient feedback mechanisms for programs using the libraries, including options like:
  - email,
  - Mattermost
  - Cameo Collaborator comments
- **Create an environment that facilitates easy sharing and reuse of library components among teams.**
- **In cases involving both commercial and defense projects, ensure a well-defined action plan for model library delivery:**
  - Commercial projects can use Read-Only access on Teamwork Cloud.
  - Defense projects should adhere to DFARS compliant approval processes.

Step 5: Integration Planning

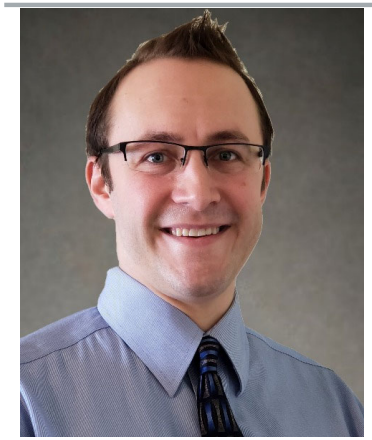
- **Strategically plan how to integrate the MBSE model library into your team's current workflow.**
- **Explore options for custom integrations or adaptations tailored to your team's specific requirements.**
  - In many cases, customization may not be necessary, as the library can be seamlessly integrated.
  - For defense projects, consider providing guidance on migrating models to a secure high-side environment if needed.
- **Ensure that the integration process not only adds value but also offers robust support for the development of complex systems architecture.**
  - Remember that integrating the model library into your program model is a crucial step, but it's essential to connect all the pieces. While model libraries reduce rework and promote first-time quality, engineering expertise is still needed to ensure everything fits together seamlessly within the program's model.

Conclusion

- **Vital role of MBSE Model Libraries in modern engineering.**
- **Explored a case study showcasing the importance of libraries at Boeing.**
- **Unveiled the 5 critical steps for mastering MBSE Model Library Deployment:**
  - Step 1: Needs Assessment and Scope Definition
  - Step 2: Governance Establishment
  - Step 3: Development and Training Plan
  - Step 4: Collaboration and Knowledge Sharing
  - Step 5: Integration Planning
- **As we conclude, remember that harnessing the power of MBSE Model Libraries can elevate efficiency, consistency, and innovation in your engineering endeavors.**

We look forward to your successful deployment of MBSE Model Libraries!

About the Authors



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Andrew is an experienced Boeing engineer with over 11 years in the industry. His expertise lies in merging Software Engineering with Systems Engineering to gain a holistic grasp of the systems he works on. Currently, he leads efforts to consult on Model Based Systems Engineering (MBSE) with experience in over 10 programs. He earned a Master of Engineering Management from the University of Nebraska – Lincoln in 2023 and holds a Bachelor of Science in Computer Science and Engineering Physics from Kansas Wesleyan University, awarded in 2012.

Ariel Mordoch

Ariel joined Boeing and the Enterprise MBSE Capability team in July 2021. Since then, he has supported many MBSE efforts, including requirements management, integrated simulations with external tools, architecture development, integrating AI with Systems Engineering, and integrating specialty engineering disciplines into MBSE models. Ariel has also authored several Cameo/MSOSA plugins and garnered a reputation within Boeing as a Cameo/MSOSA expert. Ariel's background is in Aerospace Engineering, in which he completed his B.S. at the Georgia Institute of Technology in 2020.