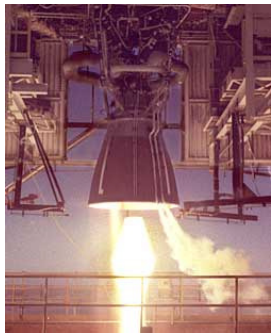
Eaton’s Journey to Excellence: Embracing Model-Based Systems Engineering

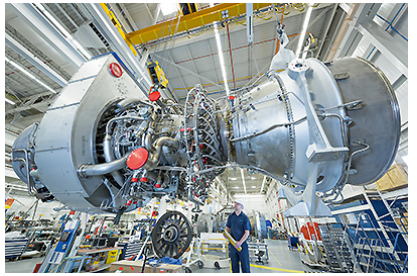
Jason Turk, Eaton

GLOBAL PRODUCT DATA INTEROPERABILITY SUMMIT 2024

Presenters Bio

- **Name**: Jason T. Turk
- **Job Title**: Systems Engineering Manager
- **Company**: Eaton, Aerospace Group
- **Location**: Fort Worth, TX
- **Education**:
  - BS Mechanical Engineering
  - MBA
  - Systems Engineering Professional Certification from INCOSE
- **Background & Experience**:
  - Oil & Gas/Energy and Aerospace sectors
  - Design engineering, systems engineering, functional excellence, and engineering management
  - Leadership in systems engineering processes and training
- **Current Roles**:
  - Manage systems engineers for development of hydraulic power generation systems in aircraft
  - Lead role in scaling MBSE across the organization





Eaton’s Aerospace Group

Irvine, California

Aerospace Group

Fort Worth, Texas

Fuel & Motion Control Systems Division

Fluid & Electrical Distribution Division

Davenport, Iowa

Mission Systems Division

Versailles, France

Interconnect Technologies Division

Agenda

- **Motivations for Adopting MBSE**
- **Initial Planning and Preparation**
- **Scaling MBSE Across the Organization**
- **Lessons Learned**

Motivations for Adopting MBSE

US Department of Defense

- 2018: Digital Engineering Strategy
- 2023: Digital Engineering Instruction 5000.97

Our Customers

- Our customers are using MBSE
- DE & MBSE requirements in RFPs

INCOSE Vision35 Systems Engineering

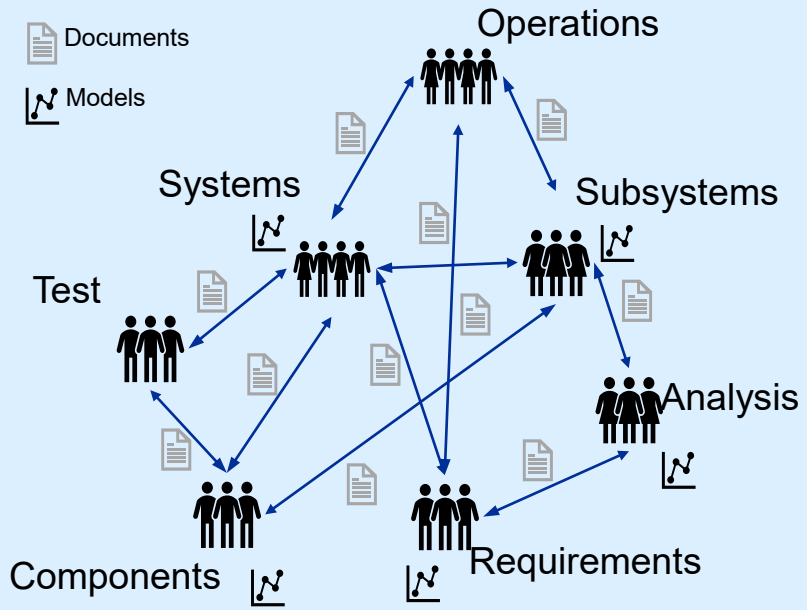
Best Practice

- Manages complexity & risk
- Enables better decision-making

Current State to Future State

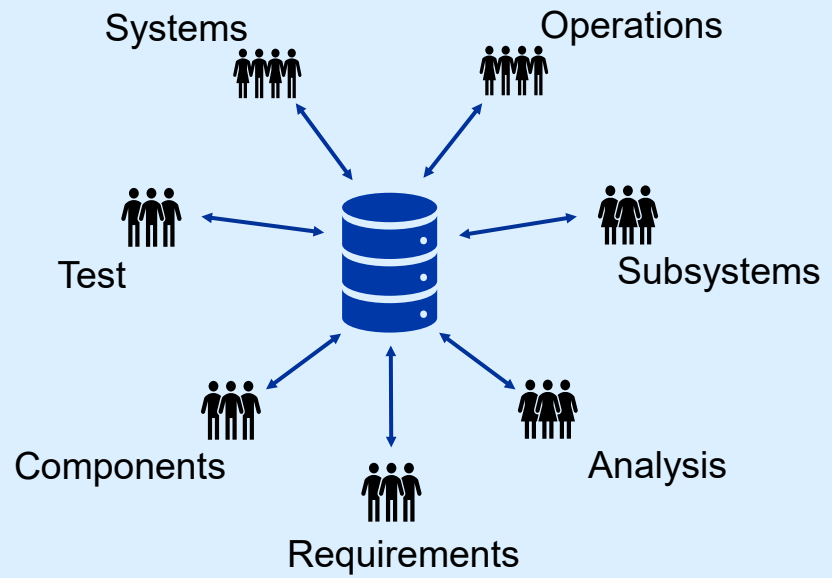
Today

Standalone models related through documents

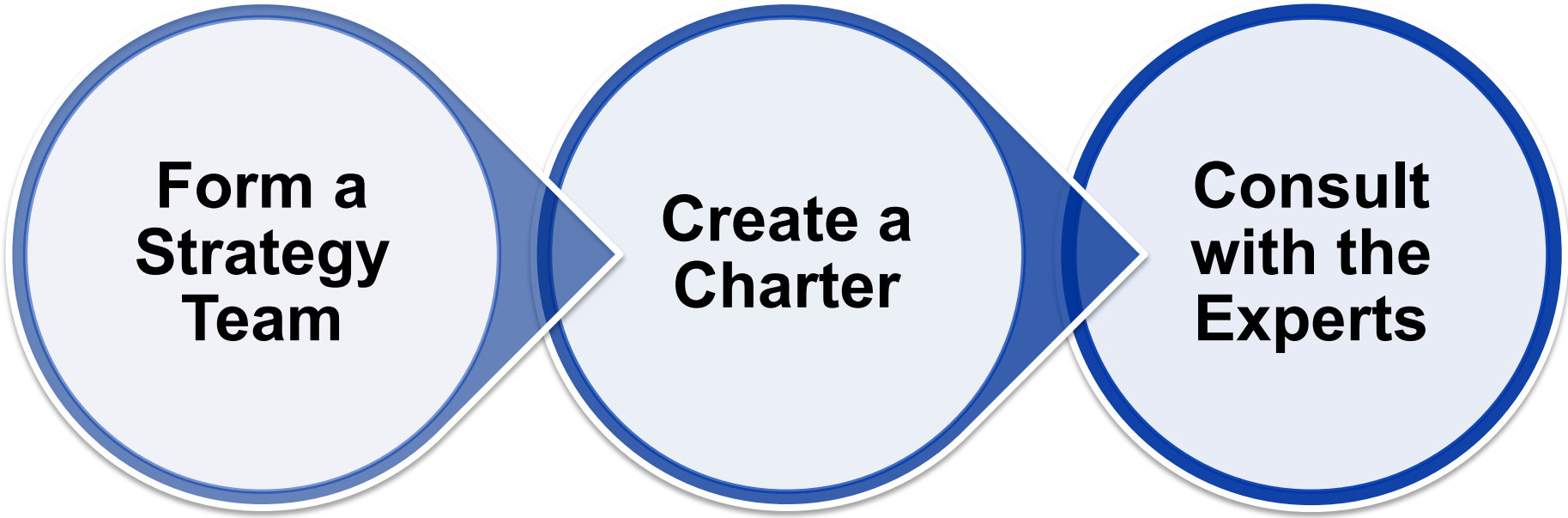


Future

Shared system model connected to discipline models



Initial Planning and Preparation



- Executive Sponsorship
- Product team Managers
- User outreach

- Clear objectives and scope
- Stakeholder alignment

- Leverage expertise
- Apply their lessons learned

MBSE Charter

Purpose

- Formally establish MBSE within the business
- Align related processes and tools across the business
- Develop a trained and qualified workforce to effectively and efficiently engineer complex systems.

Stakeholders / Benefits

- Our customers needs will be met with greater confidence
- We will be positioned for future contracts that require or request MBSE
- Programs will deliver higher-quality solutions with reduced risk through early error detection and better decision-making

Deliverables / End Results

- A digital infrastructure to support authoritative sources of truth (ASoT) from model data
- Policies, standards, & guidance to align the business
- A trained and qualified engineering workforce to effectively and efficiently develop complex systems.

Measures of Success

- Customers report satisfaction with our MBSE abilities
- Our ability to do MBSE secures more business
- The business recognizes the benefits of and supports MBSE on future projects.
- MBSE becomes the standard to handle the complexity of systems programs.

Short-term Objectives

Establish IT Infrastructure

- Model Repository
- Software Procurement
- Manage Access & Licensing

Execute on Pilot Projects

- Create System Models
- Connect with other domain models
- Demonstrate feasibility for larger programs

Develop Standards

- SysML 1.6
- Cameo Systems Modeler
- Teamwork Cloud
- OOSEM
- Templates & Guides

Pilot Projects

Objectives

- Create system models linking use cases, requirements, functions, and architectures.
- Connect the system model to other domain models in an integrated environment.
- Develop processes, guides, & templates.
- Upskill the systems engineers to perform basic modeling tasks on their own.

Logistics

- Three pilot projects were selected. Smaller systems with a variety of components.
- Trained the systems engineers in SysML, tool, and OOSEM.
- Consulted regularly with external experts.
- Budgeted for a nine-month pilot project duration.

Outcome

- Objectives obtained.
- Connected system models to Simulink, DOORS Classic, and DOORS NextGen.
- Team felt confident with the language, tool, and methodology while still acknowledging a learning curve ahead.

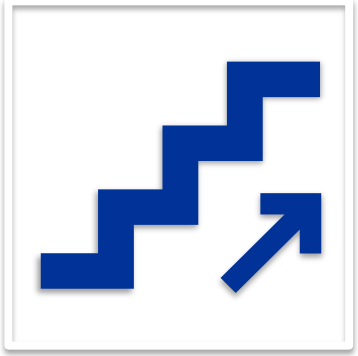
Scaling MBSE Across the Organization

MBSE Foundation

- Infrastructure
- Standards & guides
- Lessons learned

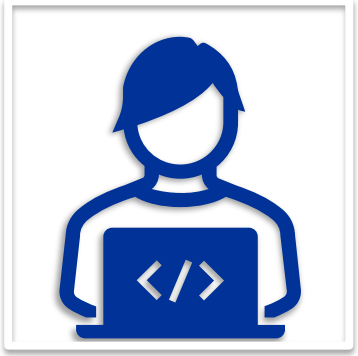
Opportunistic Approach

- More complex systems
- R&D projects, lower TRL
- Customer-driven



Digital Enterprise

- Align to DE goals
- Build the digital thread



Project Execution

- JIT Training
- Leverage expertise
- Cross-Divisional Collaboration

Lessons Learned

- Leadership support is paramount
- Vision & direction
- Resource allocation
- Organizational change management

Leadership Support

- Expertise
- Efficiency
- Lessons learned

Consult the Experts

- JIT Training
- Expert guidance during project execution
- Plan for a significant investment of time

Training

- Continuous Improvement
- User Groups
- OJT Sessions
- Demonstrations

Outreach

Contacts

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