



MBSE Community of Practice

The Path Forward:

Supporting the Emergence of Usability in the
Community of practice



Context

- **MBSE Initiative:**
 - Collaborative effort to facilitate MBSE development
- Usability is a key issue
- **Desired:**
 - Easy to learn
 - Efficient to use
 - Structures & Processes easy to remember
 - Easy to avoid mistakes
 - High satisfaction among users
- **Assumption:**
 - MBSE is *“Fit for intended use”*
 - Assumes wide range of capabilities



Major Results:

Preliminary Use Case Analysis

- Preliminary Use Case Analysis
 - 35 use cases including:
 - Orienting team to a design problem
 - Requirements Tracing
 - Design Review
 - System Integration
 - Use cases span lifecycle
 - Most emphasized: Library based architectural modeling
 - Components
 - Rules
 - Patterns
 - Use cases were preliminary in nature:
 - At most, high level scenarios
 - Many “User stories”



Why We Need Detailed Use Cases

- We need to identify all of the actors / stakeholders
- We need to be able to lay out the sequence in detail to support
 - Tool development companies
 - Process developers
 - People learning new aspects of MBSE usage
 - Language developers
- We need to identify all of the objects /features of objects being manipulated
 - For usability evaluation, including usability testing
 - To identify usability issues with the structure of models
 - For tool development
- We need to share good strong examples with each other, so that we can
 - Discuss them
 - Learn from each other
 - Manifest emergent insights that come through dialog
 - Move forward, together



NASA's MBSE challenges (CSER)

- Vision of the future engineering environment:
 - Model-based artifacts
 - Seamless data flow
 - Distributed teams
- Major Issues:
 - Complexity
 - N^2 Interactions within a system or worse
 - Nonlinear growth of interfaces
 - SoS environment for integration
 - Verification and Validation have become significantly more difficult
 - Long Lifecycle – Models critical for decision support at every phase
 - Greater use of simulation creates transparency issues with
 - Validity & Scope of assumptions
 - Deterministic modeling hides significant uncertainties
 - Transparency

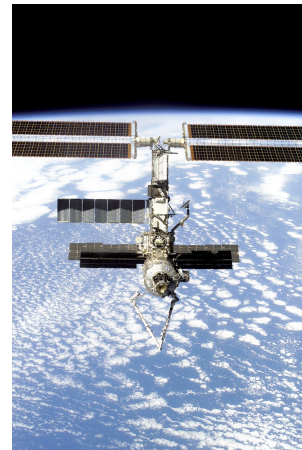


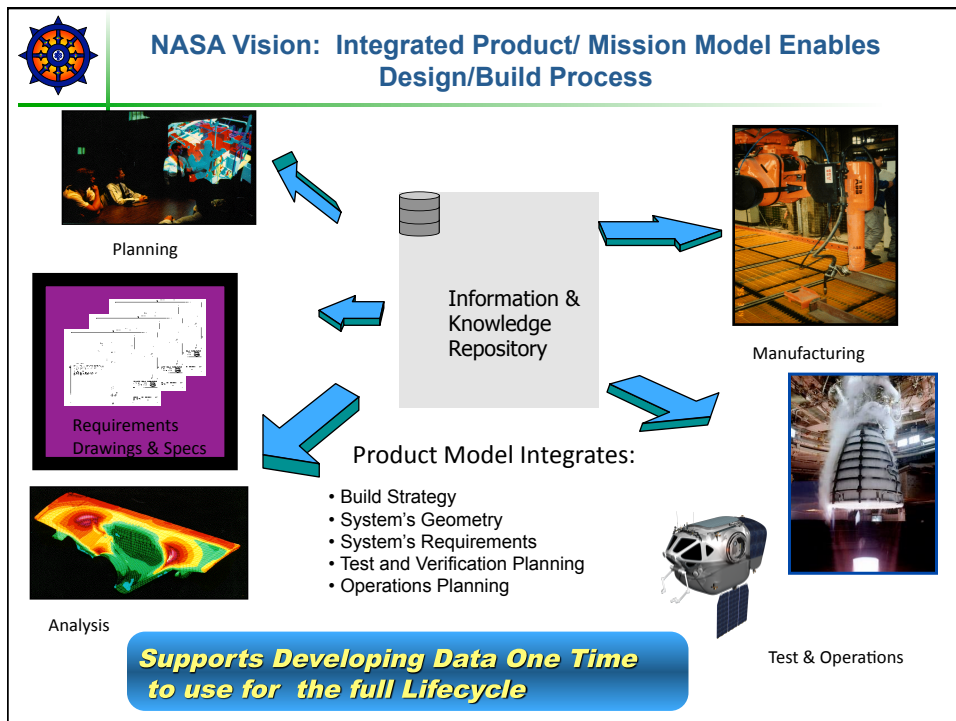
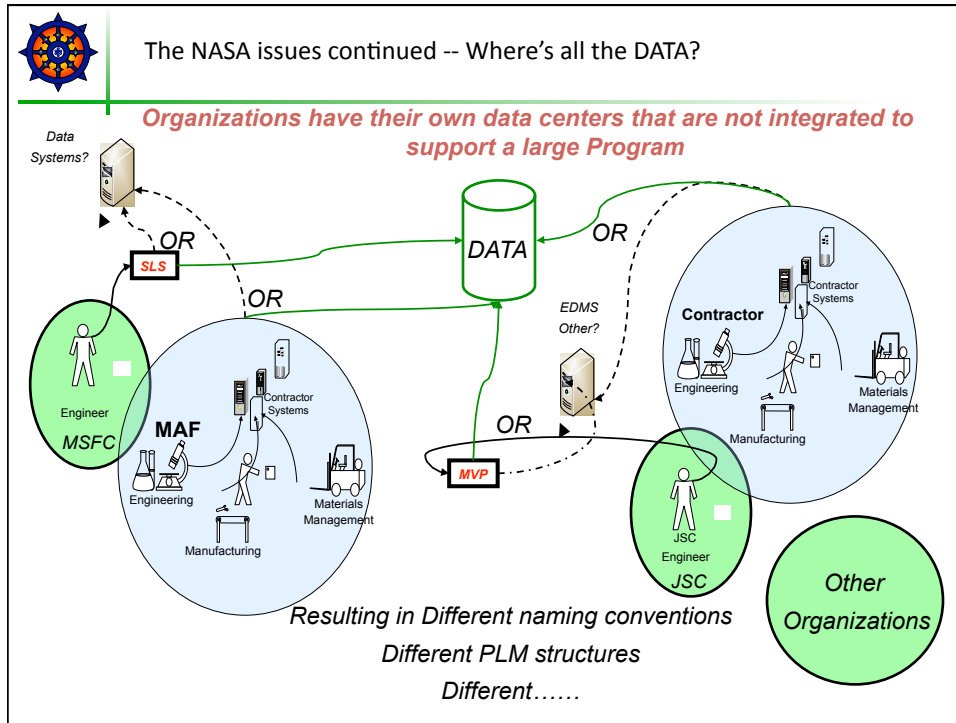
“All models are wrong, some are useful.” George Box



NASA MBSE Challenges (cont.)

- Efficiency, accuracy, cost effectiveness
- Current methods are “wetware” intensive
- Rapid & effective teaming
- Integration of discipline oriented tools
- Capturing design rationale
- Lossless integration across organization and tool boundaries
- Supporting operations with design data
- **All current implementation schemes do not fully meet data & interoperability requirements**
- Better integration with test & evaluation
- **Collaborative SE needed**
 - Libraries of parts
 - Incremental refinement of models through lifecycle
 - Rapid and diverse teaming







The Problem We Face

- Most large organizations face MBSE Challenges similar to NASA
- Taken in the aggregate from Use Cases and NASA:
 - Over half of the Use Cases assume significant integration of the MBSE env.
 - Over half of the Use Cases assume significant collaboration.
- To be usable, an MBSE Environment requires basic functions that make it “fit for use,” frequently including integration and collaboration support.
- SysML tool license trend:
 - Exponential growth
 - Strong evidence of perceived value
- We don’t know where MBSE environments are going
- The Learning Curve is exponential
- ***The integration and collaboration support assumed in the use cases and needed by many organizations do not exist, today.***
- Our Resource limits are very real

There’s a mismatch between the need and the resources



Finessing the Resource Challenge

- We’ve been working essentially as a project
- Insight:

“Usability is an emergent quality.”
– Ron Lyells
- Idea: Organize as a Community of Practice
 - Let expertise and leadership emerge naturally
 - Create a vast Internet-based collaboration
 - Needed: a space where people can practice, share, participate...



Key Thrust of the MBSE CoP

- Trust the MBSE Community of Practice
 - Support them
 - Facilitate them
 - Empower them
- Develop and Manage the Collaboration Environment
- Role of MBSE Usability Team
 - Create exemplars
 - Use Cases
 - Processes
 - Models
 - Measurement of Usability
 - Focus attention on excellence
- Who is the MBSE Community of Practice? We are.
- Who is the MBSE Leadership? You are.



Aspect of the MBSE Collaboration Space

- A Place where people can:
- Talk about what they're doing
 - Share examples
 - Process
 - Tips
 - Techniques
 - Models
 - Tools
 - Meeting place with tool vendors where they can get
 - Feedback
 - Observe work of leading practitioners
 - Self Organizing



Examples of Internet Collaboration

- Wikipedia
 - Encyclopedia of Topics
 - Not a forum
- Google Groups
 - Dialog
- Google Code
- Google Sites
- Can we combine them?
- Weekly Meetings are desirable with discussions led by members of CoP
 - Ex. What is a library
 - Library Example
 - Discussion



What we can do now

- The proposed solution includes previously planned efforts
- Develop a detailed use case exemplar arch w/ libraries:
 - The detailed use case
 - The library needed for the use case
 - The model that the use case manipulates
- Develop other high value use cases as exemplars.
- Additional efforts, including:
 - Further discussion of: A shared vision
 - Presentation & dialog with the whole team
- Develop our own collaboration environment.
 - Core Capabilities that include a critical mass for initial use
 - A path toward full capabilities
 - **Support Dialog about Artifacts**
- Improve the working document



The MBSE CoP Collaboration Environment

- Issue: We need a supportive collaboration Environment for the MBSE CoP
- Exemplar: David's preliminary investigation of GITHUB and Google Code
- Tasks: Identify candidates, examine them, build a consensus, choose, then:
- Implement:
 - Initial Seed
 - Manage Growth
- Set of Requirements:
 - CM Support
 - Capability to Access and Publish Models
 - Capability to Access and Publish Documents
 - Support for Dialog
 - Strong support for Dialog linked to Artifacts (Models, Documents...)
 - Usability (Need definitions for this particular effort)
 - Other... (The set of requirements is definitely within the CoP's purview.)
- Issue Lead / Coordinator: David Lempia



For further thought:

Collaboration Environment Issues

- Getting the collaboration infrastructure to **critical mass**.
(What would constitute critical mass in this case?)
- Attracting participation /building
- Making the entry bar for participation low
- How to design all this in such a way that people naturally add their creativity and it grows in a healthy way to go beyond the initial vision. (Design for emergence)
- Incentives for participation:
 - The joy of participation
 - Social
 - Recognition – "Usability Heroes"
 - Awards
 - Prizes



Summary

- Use Case Analysis → Serious Mismatch between size of need and resources
- Insight: Usability is Emergent
- Solution:
 - From organizing as a project,
 - Move to organizing as a Community of Practice
- Our Role:
 - Build exemplars
 - Focus attention on excellence as it emerges from contributions
- What we can do now:
 - Develop Our MBSE Collaboration Environment
 - Develop Use Case Exemplars
 - Library-based development of Architectural Model
 - Others (There's really no limit.)
 - Meet at International Symposium – Event Lead: Ron Lyells

“Let a thousand flowers bloom.”



Backup Slides



Using an Exemplar to Demonstrate a Practice

- **Exemplar** – An example of best practice in a domain
- **Structure of an Exemplar**
 - Objective of the Practice (Problem to be solved)
 - Task List – A list of the major tasks needed to solve the problem
 - The Example – Step by step description of how an engineer solves a specific problem, using specific references to domain objects.
 - Key Knowledge & Insights needed to accomplish each task
 - Key Skills & Techniques needed to solve each task
 - Tools that are useful in accomplishing the tasks
 - Artifacts – Inputs, Outputs and Intermediate Work Product
 - Tacit – Example Objects ground the exemplar in a “real world” practice
- **Supplementary Structure**
 - Key Competencies – Key abilities demonstrated by the exemplar
 - Connections to Key Issues / Themes in the domain



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Working Paper → Further Development

- Working paper is expected to keep evolving
- Problem section OK, but
 - Tighten it
 - Add nuances
- Integration section is soft - Ron
- Example needed for problem section – David
- People aspect → training processes should be mentioned



Roles

- Monitoring
 - Deduce
 - Summarize
 - Facilitate Next Steps

MBSE Usability Collaboration

David Lempia

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MBSE Collaboration

- A place to share exemplars (ideal example model or pattern)
- discussions tied to each exemplars
- A place to publish exemplars
- A place to view exemplars (web compatible format)
- A place to discuss exemplars (tie discussion to exemplar)
- Support various SysML model types
 - Artisan RTS, Enterprise Architect, Magic Draw, Papyrus, Rhapsody, ...
- Configuration management

Possible solutions

- GitHub (https://github.com/dlacroes/mbse_usability)
- Google Code (<http://code.google.com/p/mbse-usability>)
- Other Ideas?