



Proposal to Establish Model Based Mission Assurance (MBMA) Working Group for Information Sharing

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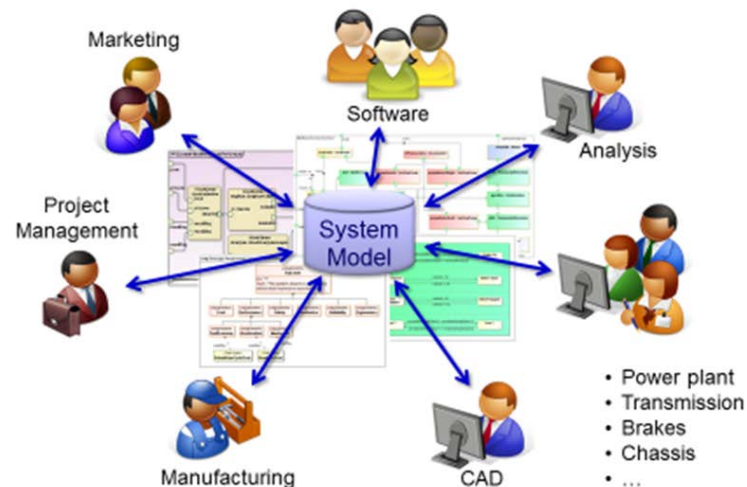
Team

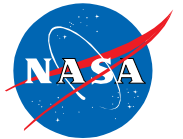
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Model Based *Systems Engineering*

- In Model Based Systems Engineering (MBSE), a virtual model of the system is created. The model is used as a singular reference source—a *single point of truth*—for system concept, requirements and design, and verification and validation and associated data.
- MBSE is being increasingly applied for the planning and design of complex systems, *space missions included*.

Model-Based Systems Engineering
Enabling the Organization to “Understand” the System





Model Based *Mission Assurance*

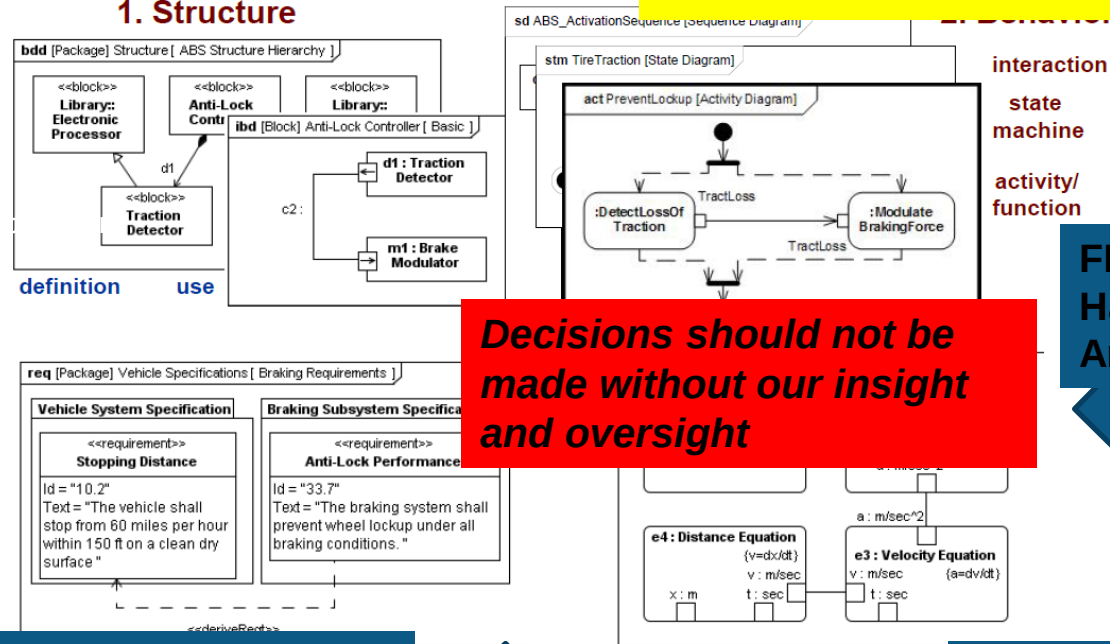
- Mission Assurance can benefit from MBSE since information can be efficiently extracted from the system model:
 - Improvements to current assurance practices – though reduced effort, increased accuracy and more timely (faster) feedback to the mission of the results of those assurance activities
 - Increased and new opportunities for involvement of assurance in the systems engineering lifecycle
- MBSE can benefit from Mission Assurance
 - Assurance of the system model
 - Assurance of the systems engineering process as it evolves in response to increasing use of system models

SysML: Enabling MBSE

4 Pillars of SysML – ABS

Our products may need to be different in a model based environment

1. Structure



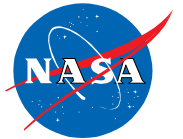
Decisions should not be made without our insight and oversight

FMEA
Hazard
Analysis

Safety Requirements
and Quality Demands

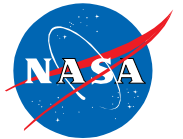
4. Parametrics

Reliability
Models



Model Based Mission Assurance (MBMA) Trilateral Working Group

- Promote information sharing on Model-Based Mission Assurance between all three agencies
- Discuss respective Agencies roadmap and plans in Assurance Applications of Model Based approaches
- Define common objectives for roadmaps and development plans and research projects
- Report on accomplishments and findings among the respective programs and agency efforts

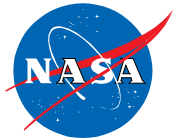


Working Group Output

- Initial output is limited to research papers and presentations
- Future outputs are forecast to be:
 - interface definition between MBSE tools/data bases and MBMA tools
 - practical illustration of use of MBMA tools/data bases; e.g. Model-Based approach to definition of Fault Detection, Isolation and Recovery (FDIR)
 - presentations on MBMA tools to produce RAMS models (e.g. FMEA) and Quality (Product Assurance) Models (e.g. model metrics)



BACK UP MATERIAL



Model Based Mission Assurance (MBMA) Trilateral Working Group

Possible early activity: develop “Guiding Principles”

This example of such is from the NASA MBMA Community of Practice (reproduced here with permission from Scott Darpel and Sean Beckman, NASA GRC):

1. Explore and pursue avenues for the inclusion of SMA [Safety and Mission Assurance] expertise and personnel in the early phases of (model based) systems engineering concept and product development, thereby increasing the validity, effectiveness, and utility of the models
2. Explore and develop the means by which traditional SMA models and analysis products can be incorporated into, linked to, or exchange data with the MBSE and engineering models
3. Understand the assurance needs and practices required for the validation and verification of models developed under MBSE