

# Model-Based Systems Engineering: Documentation and Analysis

## *Key Takeaways*

### WEEK 1: WHAT IS MBSE?

Model-Based Systems Engineering (MBSE)\* is the formalized application of modeling to support system requirements, design, analysis, verification and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases.

#### MBSE Approach

In MBSE all the information from the different disciplines is accumulated into one integrated model or collection of models, designed to provide a *single source of truth*. The model(s) can be used to generate different views for different stakeholders to access the information, notably to answer multiple questions and address multiple stakeholder concerns.

#### Major Tenets of MBSE

- Central Model or Federation of Models
- Model Views
- Model Repository or Library
- Standards and Patterns
- Model Checking: Logically Verifiable Rules or Tests
- Ontology
- MBSE Methodology

#### Scope of MBSE

Choosing a scope for an MBSE effort is an important task that should be clearly identified early in the process. This scope should answer the following questions, including what explicitly specifying what lies outside the boundary of the MBSE effort:

- Which functions of the system will be captured by the MBSE model? Which will not be captured?
- Which form or components will be modeled? Which will not be captured?
- Which organizations will contribute? Which will not be expected to participate?

## Purpose of MBSE

- Enhances Communication
- Improves Productivity
- Improves Quality
- Supports Integration
- Manages Complexity
- Facilitates Reusability

\*INCOSE SE Vision 2020 (INCOSE-TP- 2004-004-02, Sep. 2007)

Promise of MBSE > Introduction to MBSE >

# MODEL BASED ENGINEERING

## MBE Model-Based Engineering

**MBReq**  
Model-Based  
Requirements

**MBSE**  
Model-Based  
Systems  
Engineering

**MDD**  
Model-Driven  
Software  
Development

**MBT**  
Model-Based  
Testing/V&V

**MBxx**  
Model-Based  
Engineering



## Overview of MBSE> Models for Communication >

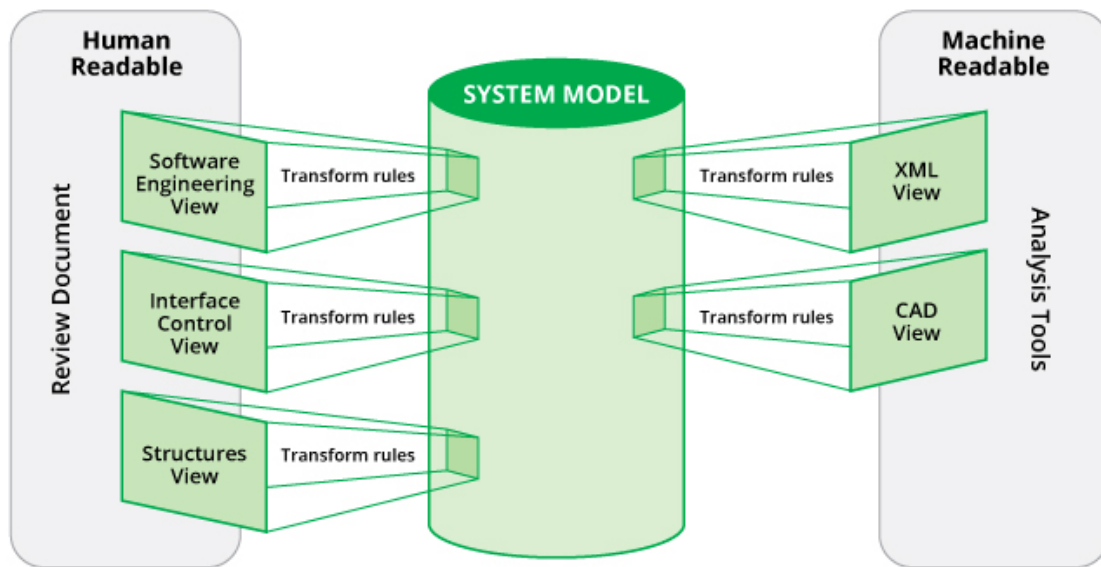
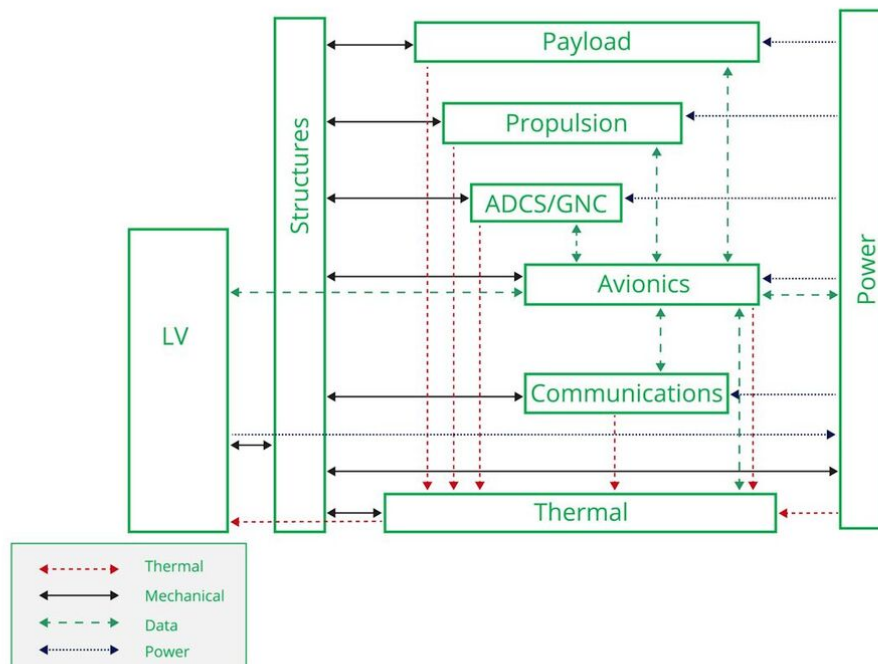


Image Credit: Adapted from figure by NASA/JPL-Caltech

## Promise of MBSE > Case study Satellite Development >

### PRE-LAUNCH INTERFACE DIAGRAM



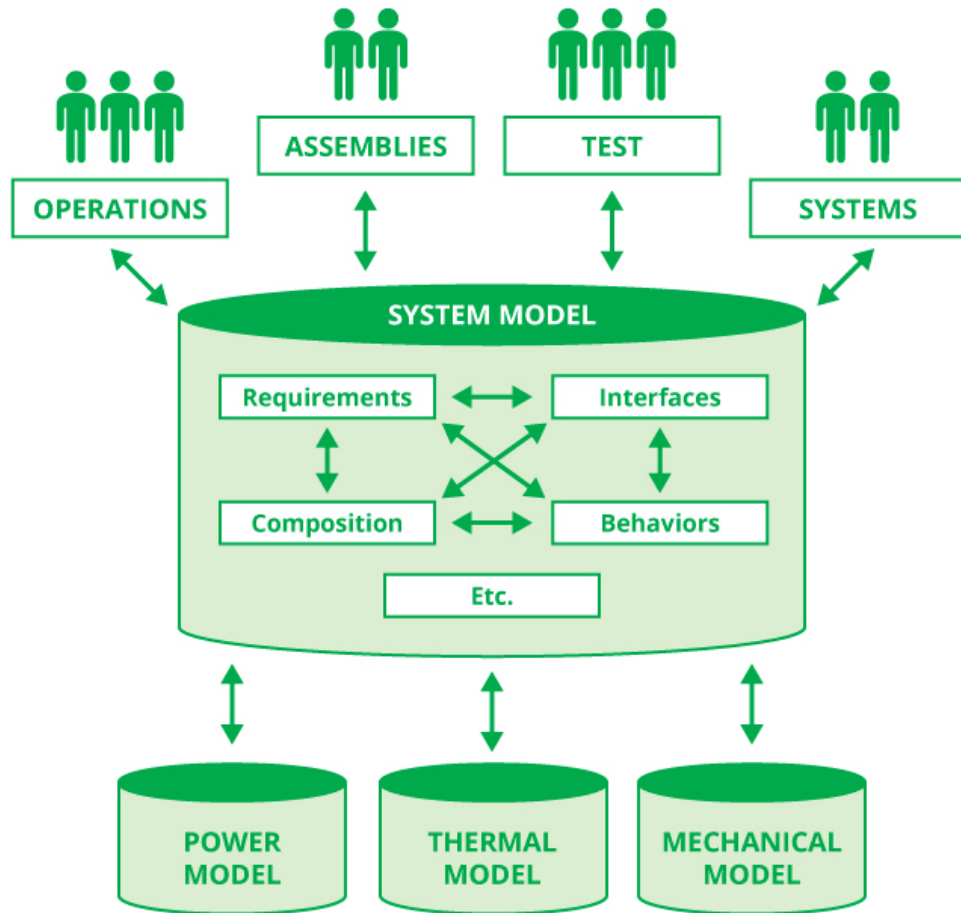


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