



Applied Model-based Systems Engineering

A Hands-On Guide to Building and Using Models That Matter

Course Description

Model-Based Systems Engineering (MBSE) can empower teams to work smarter. However, teams often get lost in tool complexity and lose sight of the objective—capturing and communicating key system information to stakeholders. Diagrams may multiply, but clarity does not automatically follow. Applied MBSE (AMBSE) helps you harness MBSE tools by developing practical skills for building and using models that deliver real project value.

This course treats MBSE as an engineering communication discipline. Rather than focusing on how to operate a specific tool, AMBSE emphasizes abstracting real-world systems into purposeful models that improve clarity, consistency, traceability, and engineering judgment—principles that apply across tools and projects. While tool-agnostic, participants gain hands-on experience using either Innoslate or Cameo, with other tools accommodated by arrangement. Emphasis is placed on applying MBSE across the lifecycle: capturing requirements, communicating architectures, connecting interfaces, and tracing verification.

You will learn by doing. Through progressively more complex exercises, you will demonstrate MBSE's core advantages—capturing, connecting, controlling, communicating, collaborating, and cycling. Starting with a guided model of a simple system, you will build the skills needed to develop models for increasingly complex systems, culminating in creating your own model from scratch.

Who Should Attend

Have an MBSE tool but not sure where to start? Are you expected to build or maintain models that actually support engineering work? AMBSE is designed for systems engineers and technical team members who need hands-on experience using models as active engineering assets.

Course Objectives

By the end of this course participants will be able to...

- ◆ **Define** model-based systems engineering and discuss its value proposition across the project lifecycle.
- ◆ **Recognize and explain** the use of SysML as well as other commonly used systems engineering diagrams and artifacts.
- ◆ **Given existing system details, apply** MBSE tools and techniques to build a basic system model that captures and communicates the design solution as well as key relationships.
- ◆ **Use** a system model to simulate system behavior.
- ◆ **Participate** in a simulated model-based Design Review to explore the application of MBSE to evaluate project technical maturity.
- ◆ **Using MBSE**, examine details about a system's structure and behavior to identify potential issues (i.e. gaps, omissions, overlaps, missing traceability, cause and effect, etc.) and propose fixes or improvements to the model.
- ◆ **Model** specific systems engineering artifacts such as requirements, functional architectures, and interface architectures using diagrams and other techniques across the Design, Manage and Realize lifecycle.
- ◆ **Build** your own integrated model

Courseware

- ◆ *Applied Space Systems Engineering* textbook
- ◆ Innoslate cloud-based tool (free trial license). Internet access required.
- ◆ Cameo Enterprise Architect also available (Customer needs to provide own licenses)

Course Topics

◆ Foundations

- Introduction to Systems Engineering using Models
- Innoslate/Cameo Quick Start Guides
- Ontologies, Languages and Frameworks
- Solar Fan Exercise

◆ MBSE Applications

- Design—Expectations, ConOps, Requirements, Solution Architectures
- Manage—Requirements, Interfaces
- Realize—V&V planning

◆ MBSE Creation

- Introduction to MBSE Simulations
- Design Patterns and Model Re-use
- Software Modeling
- Project and Configuration Management
- Digital Threads and Digital Twins
- Tool Selection Exercise
- Building Your Own Model
- Model Building “Graduation” Exercise

Testimonials

“Before this class I was completely unaware of what MBSE was and why it was important. But now I've learned what MBSE is and how to properly implement it in projects.” - USAF Engineer

“This was one of the best online implementation of a course I have been in. It was the perfect amount of discussion, lecture and hands on activity to gain proper understanding.” - USAF Engineer

“This training has open my mind to the endless possibilities using MBSE. - NOAA Engineer