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On-Demand Executable Modeling with Cameo Simulation Course Syllabus

Course Title: On-Demand Executable Modeling with Cameo Simulation Toolkit Course

Course Description:

This course introduces practitioners of Model-Based Systems Engineering (MBSE) to executable modeling using the Cameo Simulation Toolkit. Building on prior SysML and Cameo modeling experience, participants will learn how to transform descriptive system models into dynamic, testable, and analyzable models. The course emphasizes correct execution context, exchange of data, matter, and energy, static and dynamic roll-up analyses, simulation configuration, and probabilistic analysis techniques. Through guided, hands-on activities, learners will develop skills that enable early verification, validation, and quantitative insight long before physical prototypes exist.

Objectives

- Execute SysML behavioral models using correct execution context
- Model discrete and continuous exchanges of data, matter, and energy
- Configure and control simulations using the Cameo Simulation Toolkit
- Perform static and dynamic roll-up analyses across system hierarchies
- Incorporate uncertainty and conduct Monte Carlo simulations for risk and cost analysis
- Apply executable modeling patterns transferable to real-world engineering projects

Prerequisites

Participants should have a foundational understanding of SysML, prior hands-on experience using Cameo or a compatible Dassault Systèmes MBSE tool, and familiarity with MBSE methodology. Completion of formal SysML training (such as an OCSMP-aligned course) and several months of practical modeling experience are strongly recommended.

Duration

- 13 hours 48 minutes

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Training materials/equipment (provided by Client):

- Computer with high-speed internet connection and the ability to stream video content from Vimeo. (Note: the course is accessed via the Delligatti Associates Learning Center learning management system which uses Vimeo to stream the training videos. Some organizations' IT policies prevent streaming from Vimeo, in which case we recommend learners access the course from outside their organization's IT network, including VPN.)
- We recommend that Cameo Systems Modeler version 2024x R2 Enterprise Edition or later be installed on learners' computers, or that an equivalent tool be installed. The following is a list of products suitable for use in the Executable Modeling with Cameo Simulation Toolkit Course:

  (Legacy) No Magic Products

  - Cameo Systems Modeler Enterprise Edition (2024x R2 or later)
  - Cameo Systems Modeler Architect Edition plus **Simulation Toolkit plugin**
  - Cameo Enterprise Architecture plus **Simulation Toolkit plugin**
  - MagicDraw plus SysML, Requirements Modeler, and **Simulation Toolkit plugins**

  (New) Dassault Systemés CATIA Magic Products

  - Magic Cyber Systems Engineer plus **Magic Model Analyst plugin**
  - Magic System of Systems Architect plus **Magic Model Analyst plugin**

Scope of Coverage

Activity	Segment	Topic	Duration (h:mm)
0	S1	Course Introduction & Rationale for Executable Modeling	0:10
	S2	Course Materials, Tooling & Prerequisites	0:07
1	S1	Behavior Context & Fundamentals of Execution	0:34
	S2 (Pt I)	Activity Partitions, Context, and Discrete Exchanges	0:50
	S2 (Pt II)	Target Pins, Structural Feature Actions & Robust Expressions	0:43
	S3	Executable Interaction Patterns Across System Parts	0:45
2	S1	Continuous Flows, Flow Properties & Executing State Machines	0:48
	S2	Simulation Configurations & Interactive User Interfaces	0:56
	S3	Executing Behavioral Models with Integrated Flows	0:45
3	S1	Static Roll-Up Analysis Concepts & Manual Construction	0:19
	S2	Automated Roll-Up Patterns & Requirement Constraints	0:36
	S3	Instance Snapshots, Tables & Value Inspection	0:34
4	S1	Dynamic Roll-Ups Driven by Executing Behaviors	0:53
	S2	Power Usage Analysis, State-Driven Consumption & Budgets	0:51
	S3	Visualization, Charts & Modeling Uncertainty	0:39
5	S1	Integrating Course Concepts for Probabilistic Analysis	0:28
	S2 (Pt I)	Monte Carlo Simulation Fundamentals & Failure Modeling	1:07
	S2 (Pt II)	Aggregation, Risk Exposure, & Simulation Scaling	0:55
	S3	Warranty Cost Analysis Using Monte Carlo Simulation	1:45
	S4	Farewell, Review & Future Study Pathways	0:06

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Detailed breakdown of concepts covered by Activity:

Activity 0: Introduction to the Course

Coverage: rationale for executable modeling in MBSE, limitations of static descriptive models, early verification and validation through model execution, lifecycle cost impact of late defect discovery, overview of the Cameo Simulation Toolkit, course structure and learning progression, included training materials, required tool versions and plugins, prerequisite knowledge and recommended prior coursework, instructional expectations and pacing.

Activity 1: Execution Context & Discrete Exchanges

Coverage: behavior execution context, context objects and ownership versus allocation of behaviors, execution semantics of activities, activity partitions (swim lanes) and their communicative versus executable meaning, discrete data exchange via signals, send signal and accept event actions, object tokens and runtime values, opaque actions and expression authoring, linking expressions to model elements, target pins and exchange by reference, structural feature actions (read self, read structural feature), execution of behaviors across system parts, modeling tightly coupled interactions.

Activity 2: Continuous Flows, State Machines & Simulation Interaction

Coverage: behavior execution context, context objects and ownership versus allocation of behaviors, execution semantics of activities, activity partitions (swim lanes) and their communicative versus executable meaning, discrete exchange of data via signals, send signal actions and accept event actions, object tokens and runtime values, opaque actions and expression authoring, linking expressions to model elements, target pins and exchange by reference, structural feature actions (read self, read structural feature), execution of behaviors across system parts, modeling tightly coupled interactions.

Activity 3: Static Roll-Up Analysis & Requirements Constraints

Coverage: static roll-up analysis concepts, hierarchical aggregation of values, mass and cost roll-ups, manual construction of roll-up relationships, application of built-in roll-up patterns, requirements linkage to system elements, automatic constraint generation, constraint evaluation and violation detection, creation of instance snapshots, inspection and modification of instance values, use of instance tables for analysis.

Activity 4: Dynamic Roll-Ups, Uncertainty & Visualization

Coverage: dynamic roll-up analysis driven by executing behaviors, propagation of value changes through system hierarchies, state-dependent value variation, power usage modeling and budget analysis, detection of threshold violations during execution, dynamic charts and time-based visualization, modeling uncertainty with value ranges, aggregation of uncertain values, behavior-driven fluctuation analysis, structured expressions and metachain queries, creation of smart packages populated by queries.

Activity 5: Monte Carlo Simulation & Pattern-Based Analysis

Coverage: probabilistic modeling concepts, failure rates and probabilistic distributions, Monte Carlo simulation execution, creation of multiple simulated system instances, aggregation of lifecycle outcomes, warranty cost and risk exposure analysis, interpretation of simulation results, creation of reusable pattern elements, bulk application and removal of analysis structures, separation of analysis-specific constructs from baseline system specification, synthesis of executable modeling techniques.

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Course Completion

Upon completion of all course activities, participants will receive a certificate of completion suitable for professional development and continuing education documentation.

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Appendix A

Executable Modeling with Cameo Simulation Toolkit Course Content Durations

Summary

Total Course Duration: 13 hours, 48 minutes, 50 seconds
Average Activity Duration: 2 hours, 18 minutes, 9 seconds
Longest Activity (Activity 5): 4 hours, 20 minutes, 38 seconds
Longest Segment (Activity 5 Segment 3): 1 hour, 44 minutes, 56 seconds

Content Item	Content Description	Duration (h:mm:ss)
Activity 0	**Course Introduction**	**0:16:43**
Segment 1	Course Introduction & Rationale for Executable Modeling	0:09:51
Segment 2	Course Materials, Tooling & Prerequisites	0:06:52
Activity 1	**Execution Context & Discrete Exchanges**	**2:51:13**
Segment 1	Behavior Context and Fundamentals of Execution	0:33:35
Segment 2 Pt I	Activity Partitions and Context Semantic	0:49:44
Segment 2 Pt II	Target Pins and Structural Feature Actions	0:42:35
Segment 3	Executable Interaction Patterns Across System Parts	0:45:19
Activity 2	**Continuous Flows, State Machines & Simulation Interaction**	**2:27:58**
Segment 1	Continuous Flows, Flow Properties, and Executing State Machines	0:47:43
Segment 2	Simulation Configurations and Interactive User Interfaces	0:55:37
Segment 3	Executing Behavioral Models with Integrated Flows	0:44:38
Activity 3	**Static Roll-Up Analysis & Requirements Constraints**	**1:28:35**
Segment 1	Static Roll-Up Analysis Concepts and Manual Construction	0:18:33
Segment 2	Automated Roll-Up Patterns and Requirements Constraints	0:36:10
Segment 3	Instance Snapshots, Tables, and Value Inspection	0:33:52
Activity 4	**Dynamic Roll-Ups, Uncertainty & Visualization**	**2:22:43**
Segment 1	Dynamic Roll-Ups Driven by Executing Behaviors	0:52:52
Segment 2	Power Usage Analysis, State-Driven Consumption, and Budgets	0:50:59
Segment 3	Visualization, Charts, and Modeling Uncertainty	0:38:52
Activity 5	**Monte Carlo Simulation & Pattern-Based Analysis**	**4:20:38**
Segment 1	Integrating Course Concepts for Probabilistic Analysis	0:27:33
Segment 2 (Pt I)	Monte Carlo Simulation Fundamentals and Failure Modeling	1:06:38
Segment 2 (Pt II)	Aggregation, Risk Exposure, and Simulation Scaling	0:55:23
Segment 3	Warranty Cost Analysis Using Monte Carlo Simulation	1:44:56
Segment 4	Farewell, Review, and Future Study Pathways	0:06:08

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