No Magic Webinar Series

Connecting SysML with PLM/ALM, CAD, Simulation, Requirements and Project Management Tools

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Dirk Zwemer, PhD
About Intercax

- Georgia Tech spin-off 2008
- Location: Tech Square, Atlanta; Pune IT Park, Pune, India
- Focus: Software for MBSE
  - **Syndeia** - PLM/CAD/CAE/ALM Integration with SysML
  - SysML parametric solvers (e.g. ParaMagic, Melody, Solvea, ParaSolver)
- Training, consulting, custom apps
  - 3500+ students since 2008
- Customers
  - Gov: NASA, DoD, DoE
  - Commercial: aero, auto, transportation, consumer goods, energy, mfg., healthcare
Agenda

• MBSE, MBE and Syndeia
• Use Cases
  – Syndeia and PLM/Databases
  – Syndeia and CAD
  – Syndeia and Simulink
  – Syndeia 3.0
• Where Syndeia is Headed
• Discussion
Model-Based Systems Engineering

• The goal of MBSE is to create a single, unified model of the system from which all documents/views can be generated.

• The documents will be self-consistent, generated from a single source of truth. When the model changes, new views can be created easily.
The Engineering Software Universe

• Our customers deal with a diverse, multi-vendor engineering toolset.
• Our customers create and store product/system data in a variety of tools, models and repositories: PLM, ALM, CAD, spreadsheets, databases, SysML models…
The goal of MBE is to create a single, unified model extending over all the tools and data repositories.

This kind of model is called a Graph, where the nodes of the Graph can be structural elements, behaviors, requirements,… and the edges of the Graph can be constraints, dependencies,…
MBE Value Proposition

- Engineers deal with a diverse, multi-vendor toolset.
- Engineers create and store product/system data in a variety of tools, models and repositories: PLM, ALM, CAD, spreadsheets, databases, SysML models…
- MBE means creating and managing a unified system model with a network of persistent connections between model elements in different tools and repositories.
- MBE allows engineers to
  - Search and access system data in remote tools
  - Transform, compare and synch system data between models
  - Trace and visualize connections across the system model
We need a way to create, maintain and visualize the information in the graph
Syndeia Use Cases

When we talk about connecting tools or models, it’s all about the use cases…

What is the connection supposed to do for the user?
Syndeia Use Cases

Step 2: A surrogate SysML block element is generated with the Creo parameters. This block represents the Creo model for the system engineer.

Step 3: The surrogate SysML block element (and corresponding instance) is connected to the Creo model. System engineer can sync parameter values.

Values read from Creo
Syndeia Use Cases

Search & Connect
Access
Transform
Total System Model History

Timeline

T1

T2 (Baseline B1)

T3

T4 (Baseline B2)
Syndeia Use Cases

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Step 3: The surrogate SysML block element (and corresponding instance) is connected to the Creo model. System engineer can sync parameter values.

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Syndeia

- **Syndeia 1.0** (formerly known as SLIM, 2014)
  - Supports MagicDraw, IBM Rational Rhapsody
  - Interfaces to Siemens Teamcenter, PTC Windchill, MySQL, MS Excel
- **Syndeia 2.0** (July, 2015)
  - Added interfaces to Simulink, Siemens NX, PTC Creo
  - Added search and access capabilities
- **Syndeia 3.0** (May, 2016)
  - Adding interfaces to JIRA, Git, DOORS NG
  - Adding a generic REST interface to connect to any RESTful service
  - Improving scalability and visualization capabilities
Syndeia Value Proposition

• Our customers deal with a diverse, multi-vendor engineering toolset.
• Our customers create and store product/system data in a variety of tools, models and repositories: PLM, ALM, CAD, spreadsheets, databases, SysML models…
• Syndeia enables our customers to
  – Create and manage a unified system model with a network of persistent connections to models in different tools and repositories
  – Search and access system data in remote tools
  – Transform, compare and synch system data between models
  – Trace and visualize connections across the system model
• Intercax focuses on implementing specific, high-impact customer use cases, using industry MBE standards.
The Challenge

• An SE needs to develop a system model for a configurable UAV using a diverse set of modeling & simulation software, databases, & repositories and a global supply chain.

The SE wishes to do

- System engineering
- Modeling & simulation
- Model reconciliation
- Model communication
- Document exchange
The Current SE Environment
The New SE Environment

Subsystem provider

Syndeia
System Architecture

Detailed Design & Simulation

Subsystem providers

UAV Integrator

Prime

风chill

Subcon 1

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Use Case 1 - Build a system architecture model from existing product data in PLM and databases

Use Case 2 - Initiate a **new** PLM Bill-of-Materials from a SysML system architecture model

Use Case 3 – Harmonize SysML and PLM models as the system evolves
Use Case 1 – If a SysML element is connected to a CAD model, SEs can visualize the CAD model in SysML
Integrating systems modeling with CAD

Use Case 2 – (A) System-level representation of hardware sub-systems can be derived from CAD assembly models and used in the SE (SysML) model.
Integrating systems modeling with CAD

Use Case 3 – (A) System-level requirements/constraints on a hardware sub-system can be used to seed a CAD model for designers, and (B) System-level representation of hardware sub-systems can be derived from CAD models and used in the SE (SysML) model, such as for roll-ups and requirement verification.
SysML-Simulink Model Transform

Use Case 1 - Generate Simulink models from SysML internal block structure or activities.

Use Case 2 - Generate SysML internal block structure or activity structure from Simulink model.

Use Case 3 - Comparison and bi-directional sync of SysML and Simulink models
Use Case 4. Use a library of SysML blocks representing standard Simulink function blocks to generate a fully executable Simulink model.
Use Case 1 – Link SysML elements to DOORS NG Requirements
SysML-DOORS NG Model Transform

Use Case 2 - Drag-n-Drop requirements to generate requirements on the other side.
Use Case 3 - Compare and Sync Requirements (bi-directionally).
SysML-DOORS NG Model Transform

Use Case 4 - Compare and Sync Requirements (and Other) Structures
or use a multilevel SysML requirements, activity or block structure to generate a multilevel JIRA issue structure – track personnel assigned, time to completion, WBS
Syndeia Today and Tomorrow

• Today, Syndeia is a plug-in for MagicDraw or Rhapsody
  • Stores connections in the SysML model
  • Operates primarily from the SysML tool

• Tomorrow, Syndeia is an enterprise application
  – A set of web services with a backend graph database
  – Advanced query & visualization capabilities
  – Multiple deployment modes: web, plugin, mobile
  – Accessible from anywhere in the tool chain
  – Incorporates parametric execution and analysis
  – Provides API for customer-developed applications
Tracing Intra-model and Inter-model Edges across the Graph

System Architecture

Simulation
Requirements
ALM
Project Mgmt
MCAD
PLM
ECAD
Visualizing the Graph

Simulink

SysML

Teamcenter

MySQL

Windchill
Summary

• Syndeia creates and manages a unified system model with a network of persistent connections to models in different tools and repositories, and enables a SE to
  – Search and access system data in remote tools
  – Transform, compare and synch system data between models
  – Trace and visualize connections across the system model

• InterCAX works with customers to implement specific high-value use cases, using a platform based on MBE standards.

• Syndeia is available for evaluation. Contact us for a license!
Learn and Try Syndeia

• Syndeia site: www.intercax.com/syndeia

• Demo Videos
  – Intro to Syndeia in 3 minutes - https://youtu.be/_RZ4lHDtdN8

• Download and try Syndeia
  – Request 30-day or longer-term evaluations at: http://intercax.com/products/syndeia/download/
Contact us

Dirk Zwemer, Manas Bajaj

Intercax
75 Fifth Street NW, Suite 312
Atlanta, GA 30308

Voice: +1-404-592-6897, Ext 101

Email:
- dirk.zwemer@intercax.com
- manas.bajaj@intercax.com

Web: www.intercax.com