Using MoSSEC to exploit modelling and simulation context data for overall aircraft design

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• Why do I need MoSSEC?
• What is MoSSEC?
• How is MoSSEC used?
• Summary
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Why do I need MoSSEC?

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Lifecycle Model-Based Enterprises: Typical decision making questions

1. Is there a change to this requirement and what does it impact?
2. Why was it decided to use this technology?
3. Show me the detailed analysis behind these figures of merit?
4. What method has been used for this type of analysis in the past?
5. Which partner has the skills to perform this task?
6. Who made this assumption and what evidence was there to support it and where was it used to support a decision?
7. What method should be used to verify this requirement and what level of output quality is needed?
8. What inputs were used for this analysis and where were the results used?
9. This is a surrogate model of this component behaviour and is valid for this input range.
Lifecycle Model-Based Enterprises: Typical decision making questions

If there is a change to this requirement and what does it impact?

Why was it decided to use this technology?

Which partner has the skills to perform this task?

Show me the detailed analysis behind these figures of merit?

What method has been used for this type of analysis in the past?

Who made this assumption and what evidence was there to support it and where was it used to support a decision?

What type of analysis in the past?

This is surrogate model of this component behaviour and is valid for this input range.

What method should be used to verify this requirement and what level of output quality is needed?


“The Kipling Method”
Lifecycle Model-Based Enterprises: Improving decision making across an organisation

- Needs efficient distribution and retrieval
  - Of system-of-systems definition
  - Across multiple organisations, platforms and locations
- To facilitate a joined-up “big-picture” view
Lifecycle Model-Based Enterprises: Improving decision making across an extended enterprise

- Needs efficient distribution and retrieval
  - Of system-of-systems definition
  - Across multiple organisations, platforms and locations
- To facilitate a joined-up “big-picture” view
Combining Modelling and Simulation Data with Collaboration Data

Modelling and Simulation data
- Managed by PLM/SPDM tools
- Exchanged with technical standards

Collaboration data
- Managed by MoSSEC Compliant Tools
- Exchanged with MoSSEC standard

Together this supports a lifecycle model-based enterprise
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MoSSEC: A work-in-progress ISO Standard

- ISO Committee Draft approved June 2018 ([ISO/AWI 22071](https://www.iso.org/standard/60603.html), AP243)
  - Draft International Standard planned end of 2018
  - International Standard planned mid 2019
- Contributing web services specification for the STEP Extended Architecture

- Supported by industrial partners (e.g. Airbus, Rockwell Collins, Boeing, BAE Systems)
- Supported by vendors (e.g. Eurostep, Dassault Systèmes, MSC Software, Siemens)
MoSSEC: Business Object Model coverage

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Objects are:
- Domain neutral
- Business level

- Security & Trust
- Actors & Organisations
- Value Generation
- Models Management
- Study Management
- Requirements & Quality
- Methodology
- Architecture & Interfaces
- Optimisation
- Connections, Components Breakdowns
- Studies, Objectives Concepts
- Templates, Methods, Libraries
- Networks, Models, Key Values
- Expectations, Needs and Goals, Value Creation Strategy
- Requirements and Approvals, Assumptions and Justifications, Quality Gates and Reports

Contracts
Access rights
Security classification
Organisations
Persons

Templates
Libraries
MoSSEC: Building on Related Standards

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- ISO 10303 STEP modular architecture (model based)
  - Mapping to Core, shares subset with AP239 (PLCS), harmonized with AP242 ed2
  - Allows for alternative technology specific implementations – future proofing
  - Model Based definition enables test suite export for implementers and forums
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Implementation Scenario – Intermediate Collaboration Hub communication

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User Interface

Internal Database

API

STUB
Translates MoSSEC calls into API calls

STUB
Translates MoSSEC calls into API calls

Collaboration Hub

STUB

API

API

User Interface

Internal Database

Each tool builds a “Stub” to convert native API to MoSSEC.

Tools then Push/Pull to/from the Collaboration Hub

Implementation Examples:

Windchill (PTC)
SimManager (MSC) → ShareAspace (Eurostep)
Non COTS (various)
Implementation Scenario – Direct Tool communication

Each tool builds a “Stub” to convert native API to MoSSEC.

Tools then communicate directly with each other

Implementation Examples:

- 3DX (Dassault Systemes) ↔ TeamCenter (Siemens)
- 3DX ↔ SimManager (MSC)
- Non COTS (various) ↔ SimManager
Typical application area – Aircraft Design Trades

Single domain
Exploring rapidly loads of concepts

Multi-domain
Trade-Off analysis across a set of concepts involving rapid domain M&T

Multi-domain
Designing one concept in detail

Typical Product Development Cycle

Discipline silos

No means to steer trade process

Incoherent & not traced data

Key information trapped in reports
Fractal Studies and Associative Model Networks - context illustration

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Actors & Organizations

Justifications

Assumptions

Approvals

Requirements

Why

When

Study

What

Who

Where

Associative Model Network

How

Associative Model Network

How

What

Assumptions

Approvals

Requirements

Why

When

Study

What
Fractal Studies and Associative Model Networks - context illustration

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Study
- Associative Model Network

Input

Actors & Organizations

Where

Who

Justifications
- Assumptions
- Approvals

Requirements

Why

When

Study
- Associative Model Network

Study
- Associative Model Network

Study
- Associative Model Network

Study
- Associative Model Network

Input
“Model Instance” context illustration

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MoSSEC in use

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MoSSEC VIDEO
Benefits/Observations

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• Development lifecycle
  • Initial Development
    – Mapping to internal data model
    – Services development
  • Subsequent Development
    – Implementation reuse

• Technology Independent model of Standard
  • E.g. SOAP to REST without changing model

• Standardized semantics and services
  • Improved Collaboration, Traceability, decision making
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Summary
MoSSEC: A Unique Combination of Features

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• Links Modelling and Simulation to the Systems Engineering Context
  • Uses objects at a business level

• Efficiently shares context information
  • Uses web services defined using the business object specification

• Builds on existing standards
  • Uses STEP Extended Architecture mapping to ISO 10303 AP239 PLCS and the Core Technical Capabilities
  • Exploits AP239 usages such as Long Term Archiving and Retrieval (LOTAR)

• Supports Lifecycle Model-Based Enterprises
MoSSEC: Further information

MoSSEC website
- http://www.mossec.org/
- Overview
- Resources
- News
- Links

Members website
- http://private.mossec.org

To be added to the members list contact:
- Adrian.Murton@airbus.com
- Gregory.Pollari@rockwellcollins.com
Join us at the MBSE Workshop on Wednesday!
Any Questions?