CapellaDay
MUNICH 2019

MapleMBSE

An Excel-based MBSE Tool for Knowledge Sharing and Collaboration across the Enterprise

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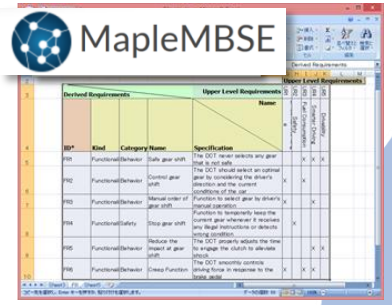
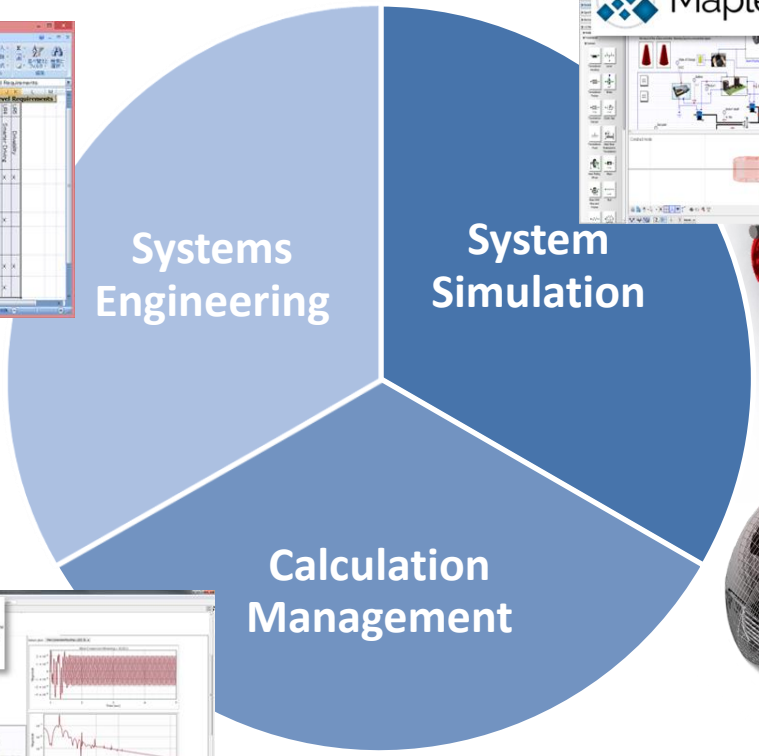
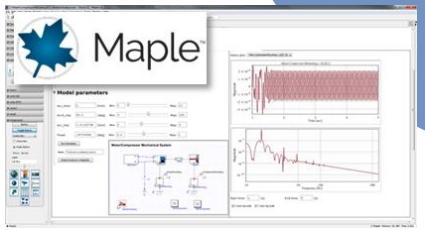
Maplesoft
Mathematics • Modeling • Simulation
A Cybernet Group Company

Maplesoft Engineering Solutions

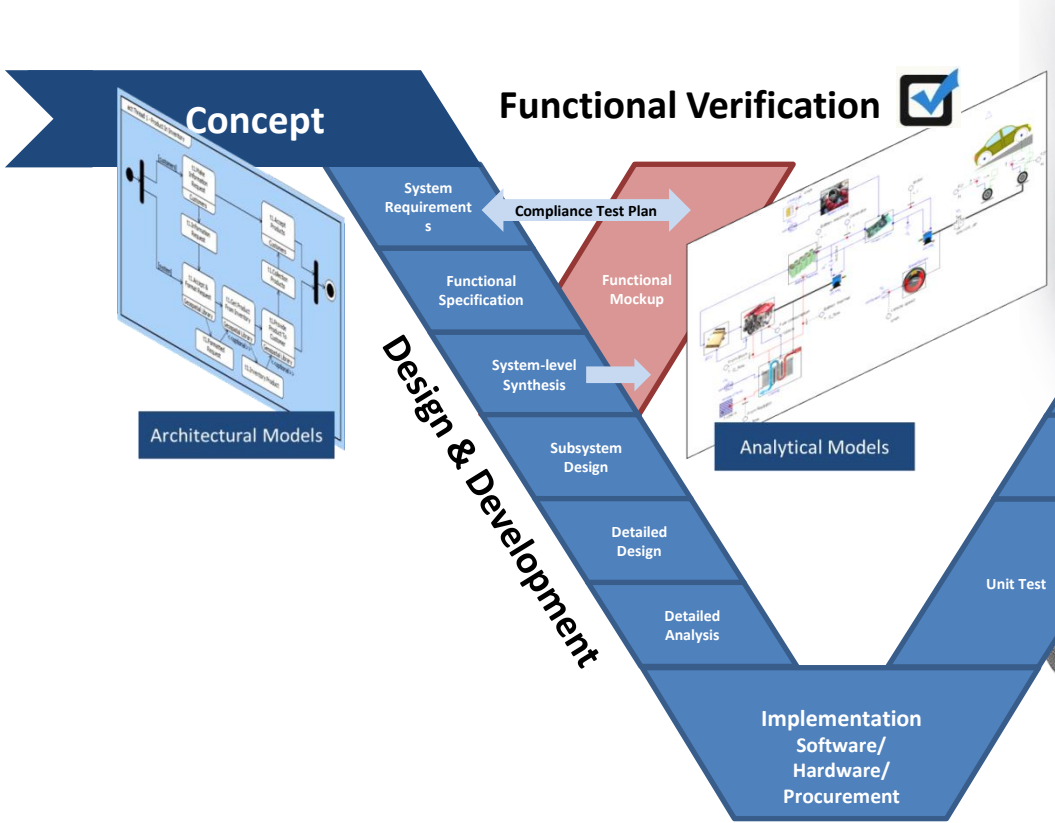
Model-driven Innovation for Engineering Systems Design



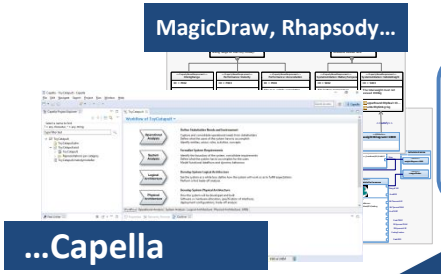




Systems Design & Development Process



How to scale Systems Engineering beyond Systems Engineers?



Systems Engineers

Architecture

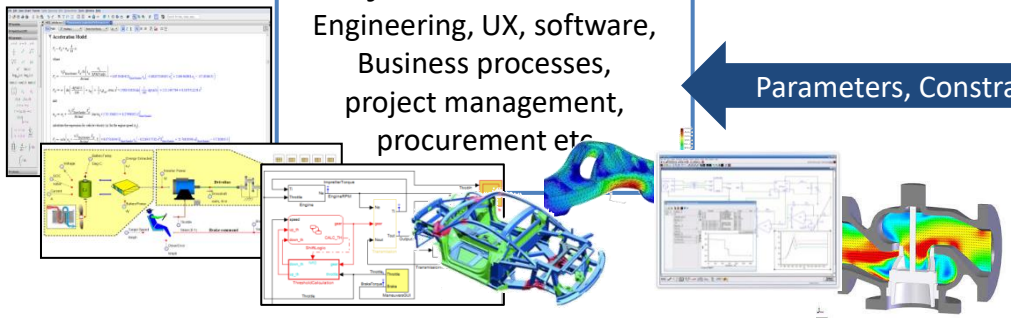
Systems Model
"Single Source of Truth"

Structure
Behavior
Requirements
Parametric Constraints

Parameters, Constraints, etc

Project Stakeholders
Engineering, UX, software,
Business processes,
project management,
procurement etc

Results
Spreadsheets
Documents
Email, etc



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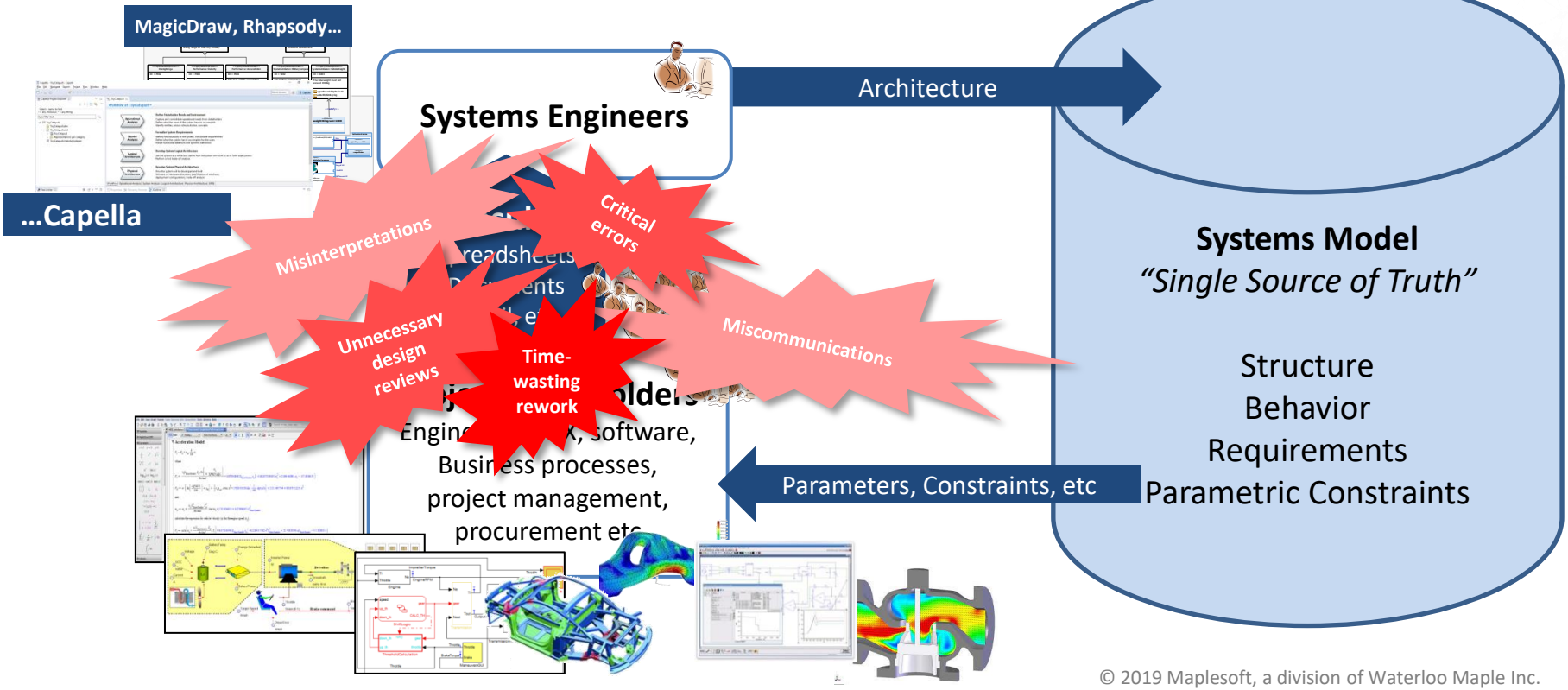

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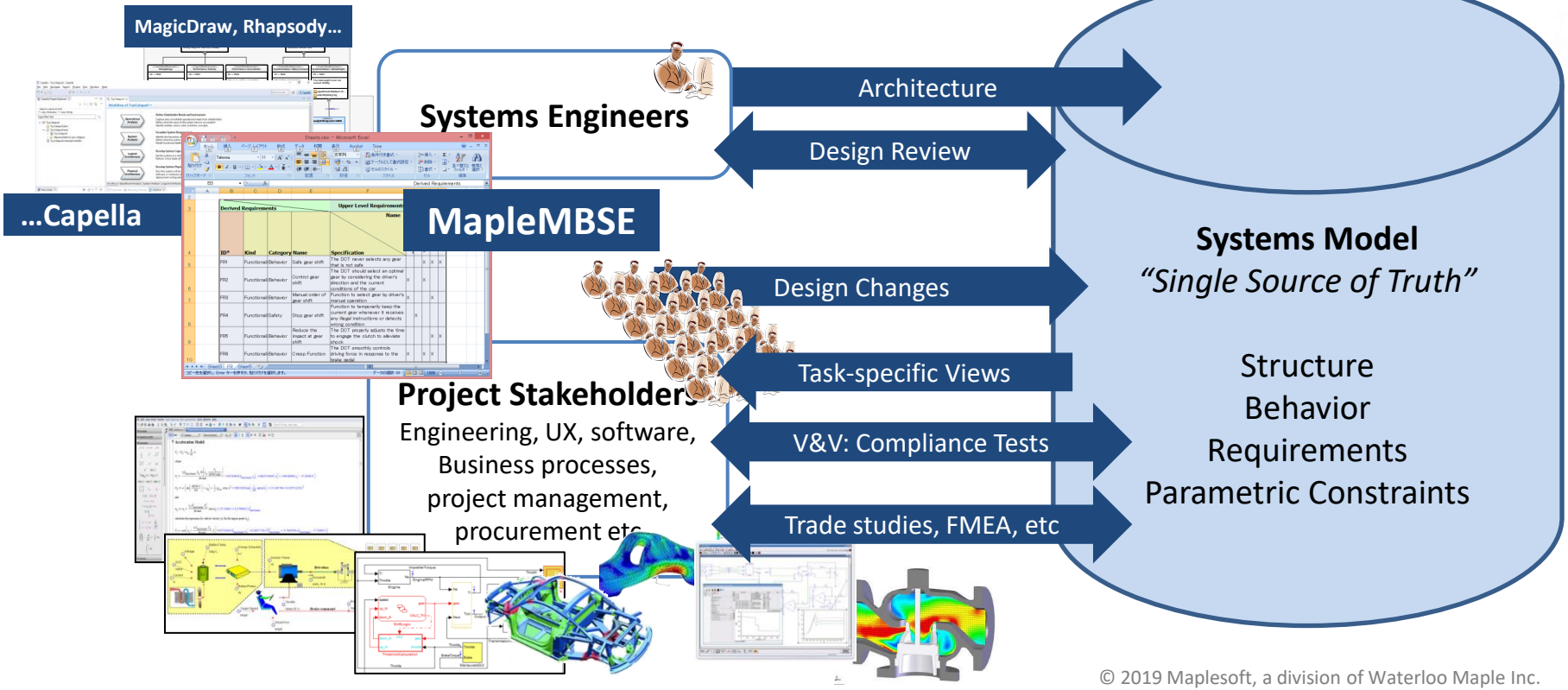

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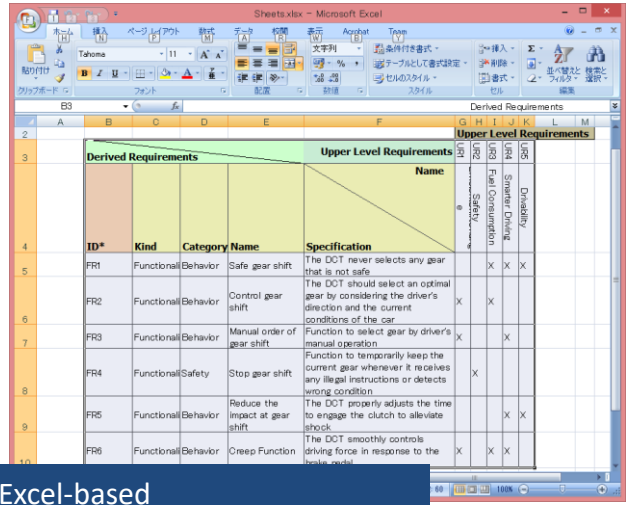
Systems Engineering for All Project Stakeholders



Excel-based development of system designs

- Intuitive, Excel-based UI for viewing, entering, and modifying system design information
- Synchronized updates between Excel and system model
  - Add new structures or modify existing ones
  - Instant impact analysis of design changes, eg conflicting requirements.
  - Perform FMEA, trade-studies, dependency analysis etc
- Customizable UI for task-specific views and analyses
- Integration with standard SE platforms, such as Rhapsody and MagicDraw/Teamwork Cloud (SysML)
- Interfaces and tools for rapid integration with other SE and PLM platforms

www.maplembse.com

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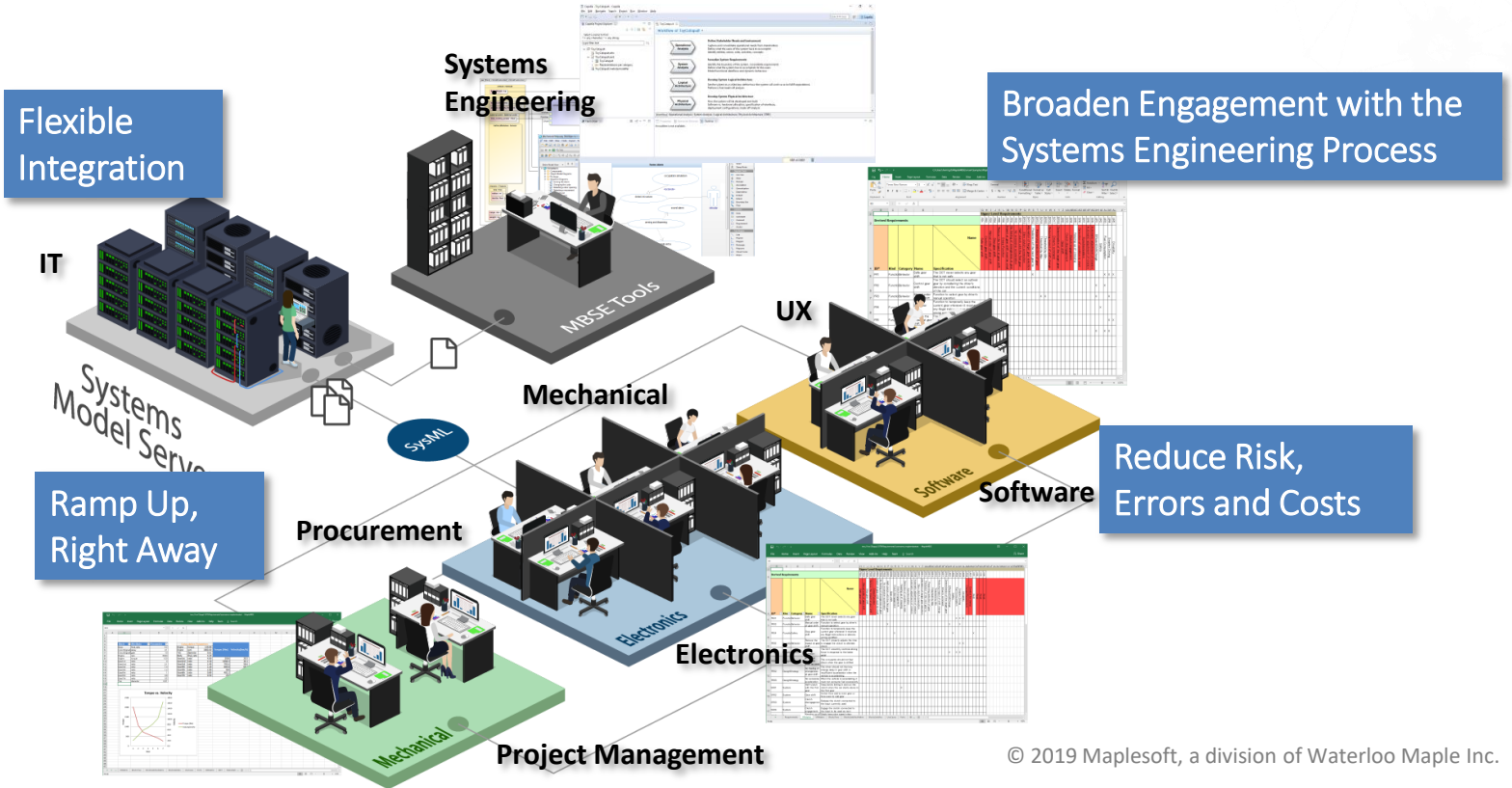
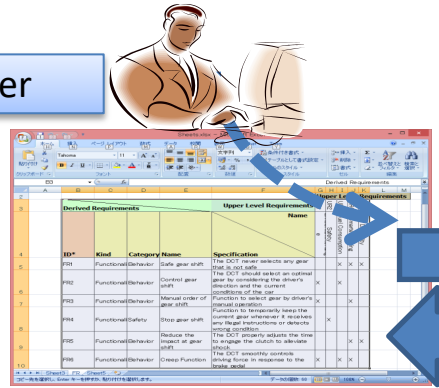
Facilitate Design Collaboration Across the Enterprise



MapleMBSE Architecture Overview

MapleMBSE enables systems-model development Excel. Since it is built on top of EMF, we can integrate many modeling tools by providing Adapters

End-user



Model Spreadsheets in Excel

Change Event

Update

Systems Expert

Configurations, Templates

MapleMBSE

EMF-based Interface

MapleMBSE Adapters

Teamwork Cloud (SysML)

Rhapsody (SysML)

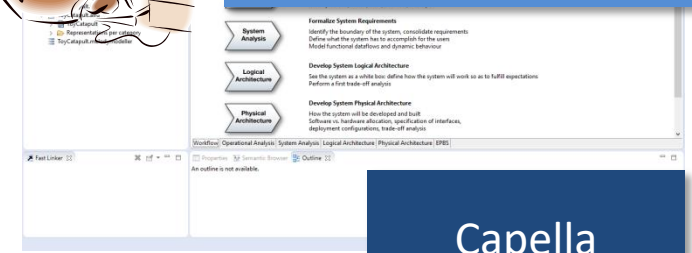
Capella

etc…

Demonstration work-flow: FMEA

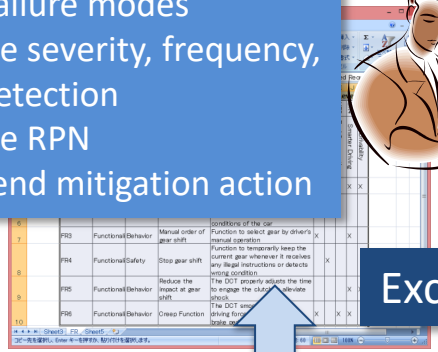
Systems Engineer

- System architecture
- Requirements
- MapleMBSE Templates & Configurations



Safety Engineer

- Identify failure modes
- Determine severity, frequency, ease of detection
- Determine RPN
- Recommend mitigation action



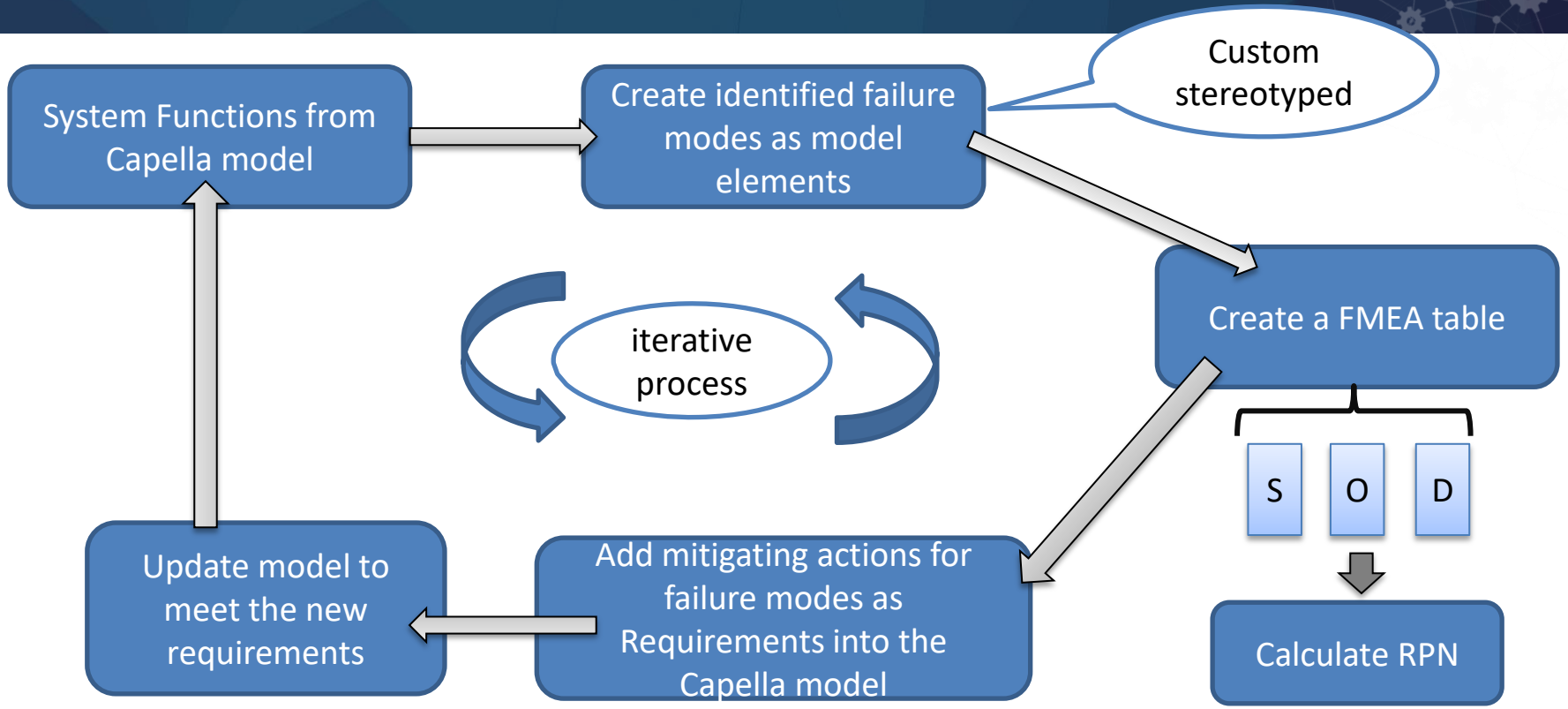
Excel

Capella

MapleMBSE

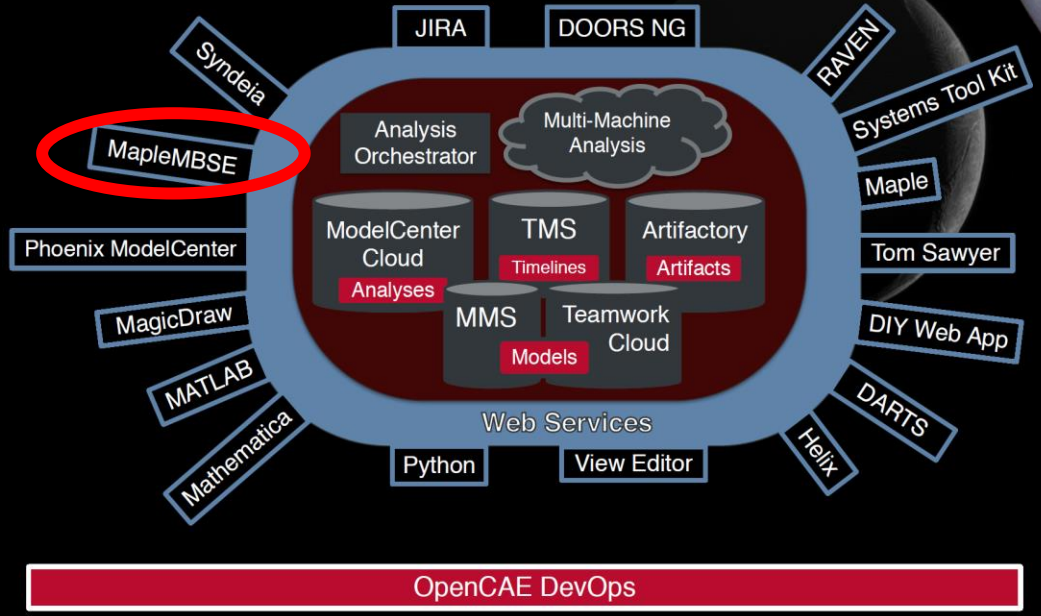
Capella Model

Demonstration work-flow: FMEA



Jet Propulsion Laboratory
California Institute of Technology

CAE Systems Environment: Overview

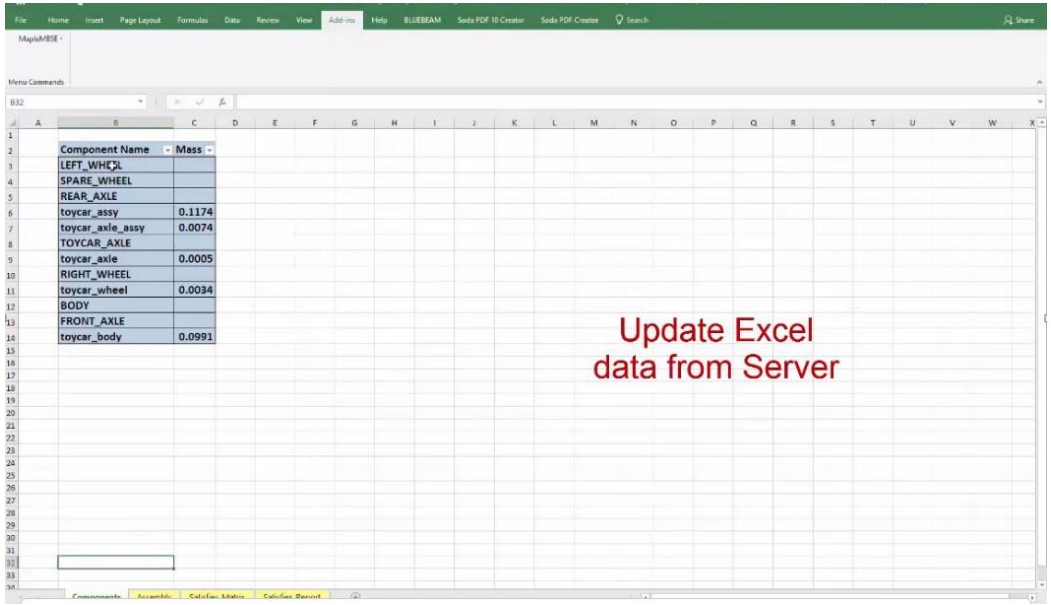


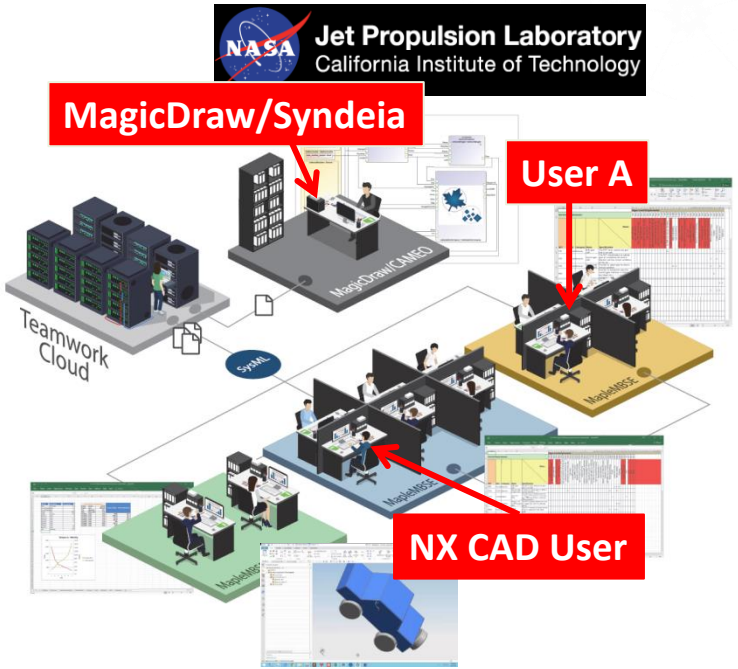
"MapleMBSE is one of the key enablers for effectively viewing and editing systems models"

Model-Based Systems Engineering Products in the OpenCAE Model-Based Engineering Environment with Europa Lander as a Case Study, **Eric W Brower**

Case Study: NASA-JPL

MapleMBSE-Syndeia-Excel-NX-integration





Summary

- MapleMBSE provides easy-to-use Excel-based Systems Engineering modeling environment for system definition throughout the design cycle
- Offers the power to “democratize” the Systems Engineering process by allowing a broader range of stakeholders to engage with the systems model without learning other MBSE tools
- Proven to reduce risk in the system design process by simplifying the systems-model development, thus reducing errors and costs
- Currently supports Rhapsody and MagicDraw/TWC. We are building the business case for Capella

www.maplembse.com

Questions?

www.maplembse.com

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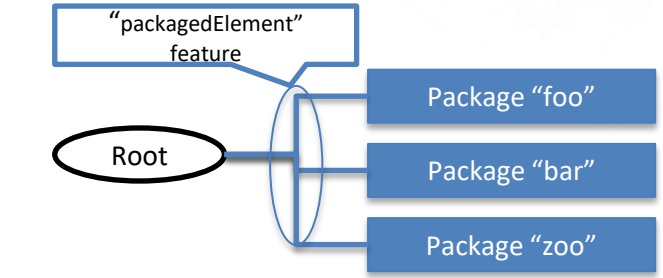
Engineering
Solutions

QPE: Query Path Expression

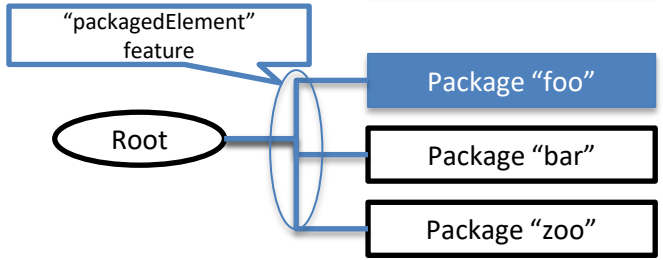
Query Path Expression is a simplified XPath to query model elements

Examples:

- **Root/packagedElement[Package]**
  - Pick up all of “Package” elements under the “packagedElement” feature of “Root”
  - where “packagedElement” is a name of a feature (more specifically, reference)
  -

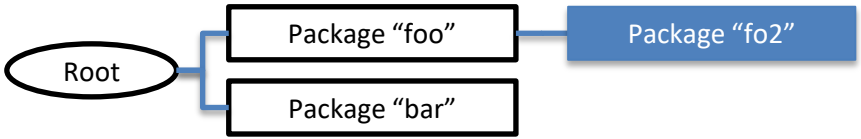


- **Root/packagedElement[Package|name=“foo”]**
  - Pick up a “Package” element of the name of “foo” under the “packagedElement” feature of “Root”,
  - where “name” is also a name of a feature (more specifically, attribute)



- **Root/packagedElement[Package|name=“foo”]/packagedElement[Package|name=“fo2”]**

[…] part is called a qualifier



MapleMBSE Demos on YouTube

Introduction to MapleMBSE

High-level overview of how MapleMBSE allows engagement with the systems engineering process by all project stake-holders across the enterprise

Easy-to-use Excel-based UI for Systems Engineering

MapleMBSE gives you an intuitive, Excel®-based interface for easily entering system definitions without having to be an expert in your company's MBSE tool.

Allows all stakeholders to contribute to the Systems Engineering process

With MapleMBSE, you don't need to be a systems engineering expert to contribute to the process. Task-specific views are excel-based and show each stakeholder only what they need to see.

Simplifies information-entry, reducing risk of errors

MapleMBSE allows you to use natural language and numerical inputs to reduce errors associated with the complex entry mechanisms of MBSE tools.

Offers rapid customization of model views and data integration

Because every systems engineering project is different, MapleMBSE allows you to provide customized model views that best suit the task at hand.

MapleMBSE and No Magic Teamwork Cloud Work-flow

Detailed demonstration of how MapleMBSE users can interact with systems models on Teamwork Cloud for No Magic/Dassault Systemes

MapleMBSE Demos on YouTube

MapleMBSE Demo with Rhapsody and MagicDraw

This shows how MapleMBSE works with Rational Rhapsody and MagicDraw, both well-established diagramming tools used extensively by system engineers. Fundamentally, the spreadsheets are a “views” into the system model that can be edited by adding more detailed structures and requirements then submitted back into the system model.

MapleSim ModelCenter Demo

This shows how the data in a systems model can be integrated with other simulation and analysis tools (in this case, Maple and MapleSim) to perform functional verification of a proposed system design, using ModelCenter from Phoenix Integration. By simulating the system’s dynamic performance over a range of duty cycles, key properties can be tested to ensure compliance with the requirements very early in the design process.

JPL/OpenMBEE Managed Excel

This is a demo that was developed by one of our customers, JPL, that shows the workflow between different stakeholders who perform different tasks, but the results of these tasks have a direct impact on other. Both can work in MapleMBSE without needing to work in MagicDraw at all.

JPL/OpenMBEE MultiBranch Excel

This is a demo that was developed by one of our customers, JPL, that shows how different stakeholders can be working on different branches of the same system model. MapleMBSE automatically builds the view that is scoped by the branch of the model that is selected.

JPL/Syndeia Excel NX Integration

This is a demo that was developed by one of our customers, JPL, that shows the integration of MapleMBSE with Siemens NX through Syndeia from Intercax, and MagicDraw and CAMEO Systems Modeler from No Magic.