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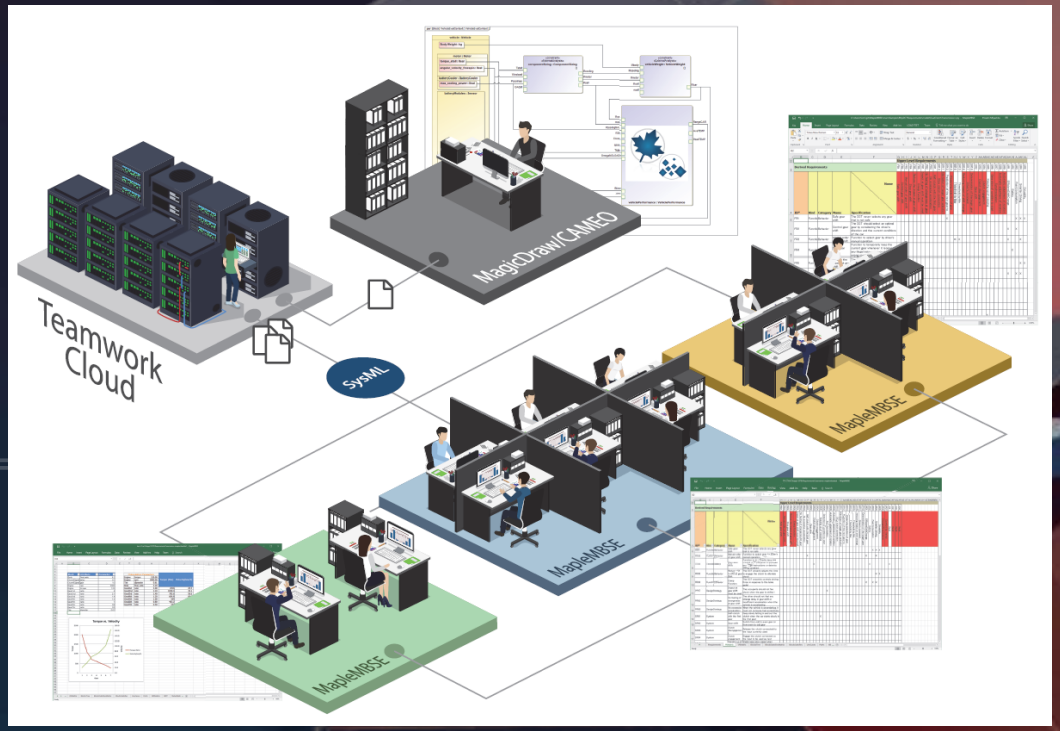

An Excel-based MBSE Tool for Knowledge Sharing and Collaboration across the Enterprise

Paul Goossens, VP MBSE Solutions, Maplesoft
Bharani Mohan, Developer, Maplesoft

pgoossens@maplesoft.com

Maplesoft Mathematics • Modeling • Simulation

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Maplesoft Engineering Solutions

More than 30 years of Engineering Computation

- 1980: Research project at University of Waterloo, Ontario
- Company founded in 1988
- Leading provider of high-performance solutions for engineering, science and mathematics

Global Presence

- Part of the Cybernet Group (since 2009)
- Offices in Canada, US, Germany, UK and Japan
- >30 partners worldwide

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Model-driven Innovation for Engineering Systems Design

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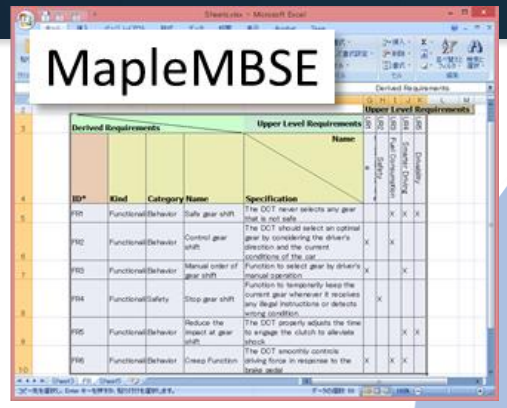

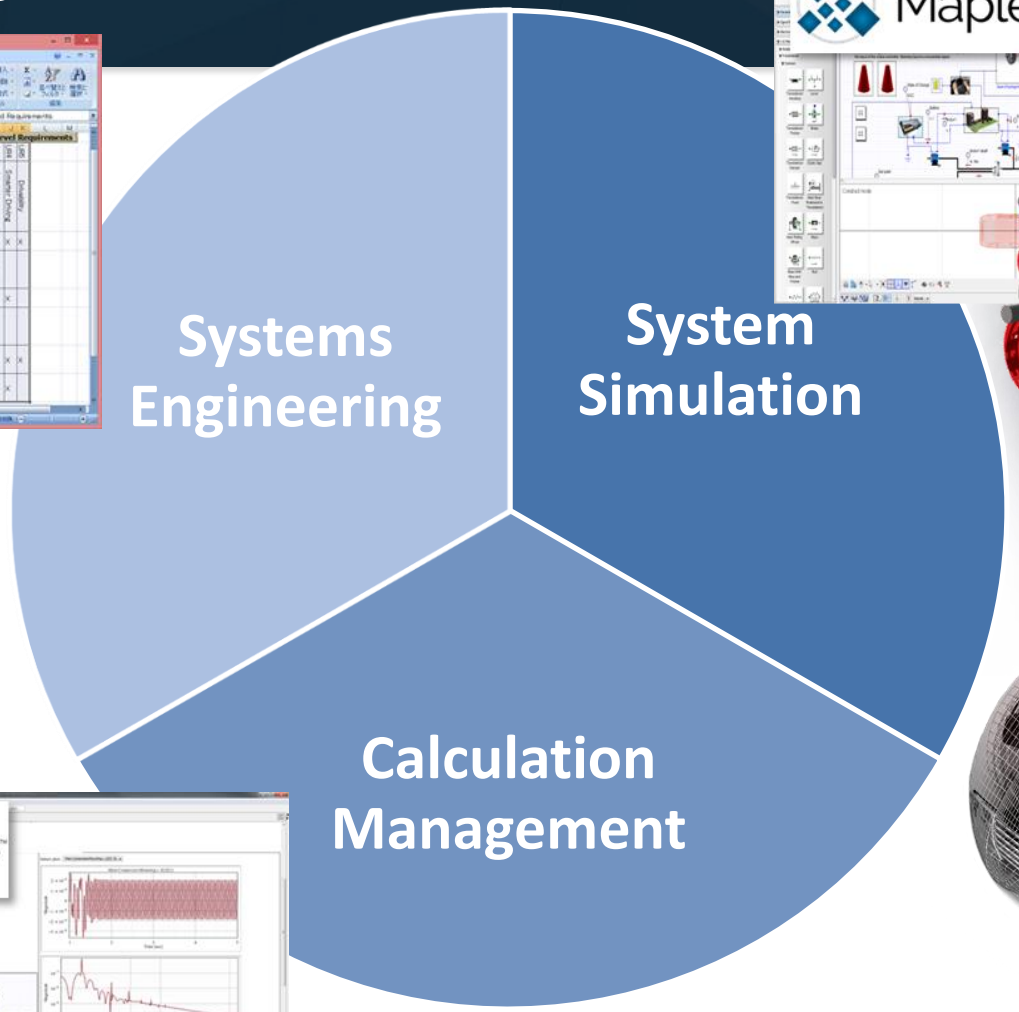

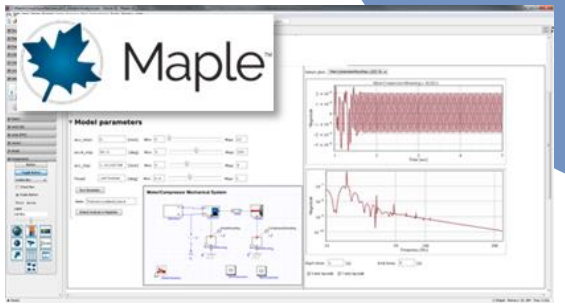

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Systems Design & Development Process

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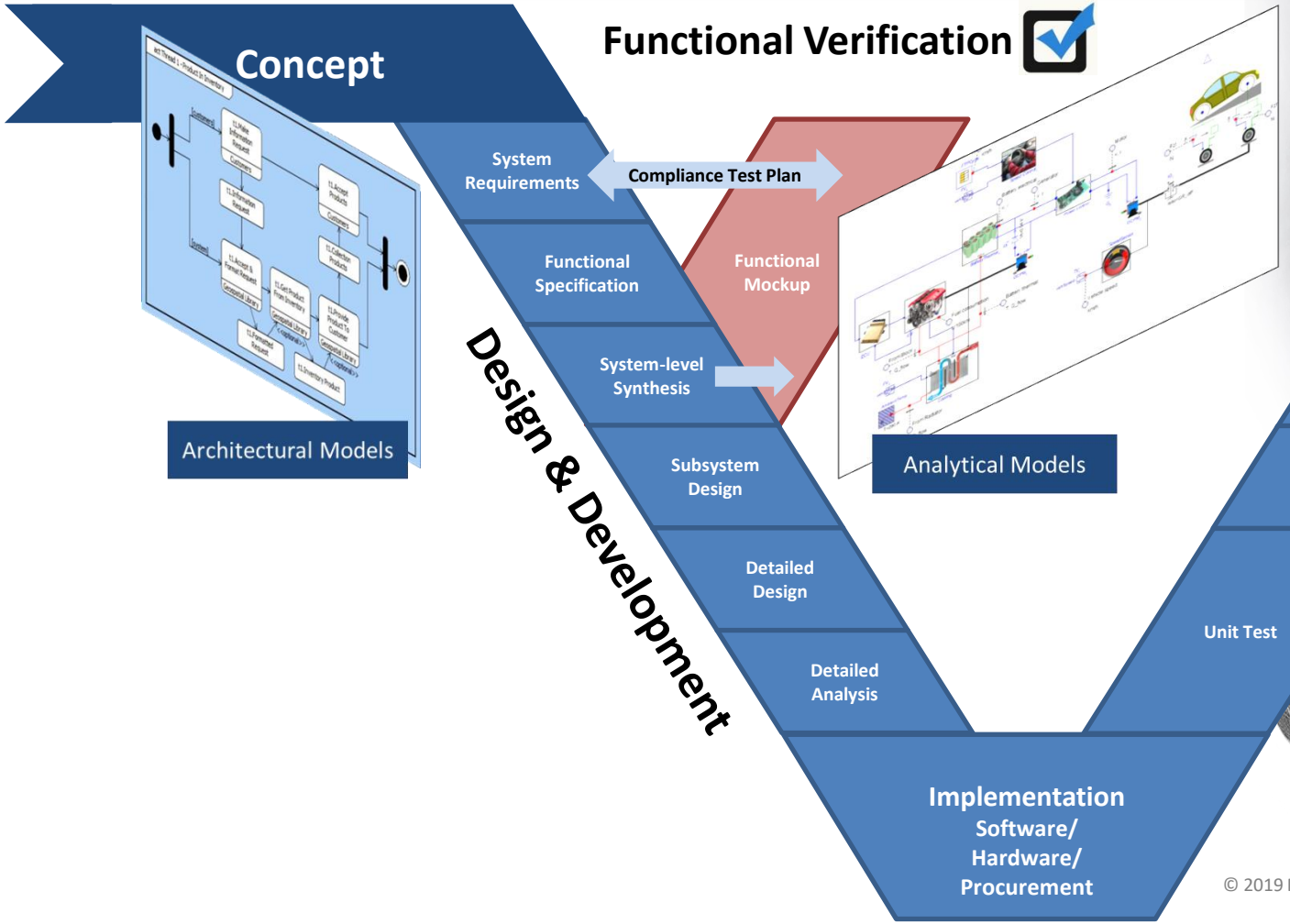

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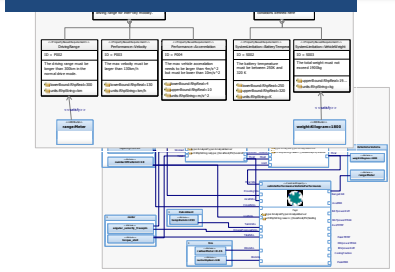
How to scale Systems Engineering beyond Systems Engineers?

Maplesoft Engineering Solutions

MagicDraw, Rhapsody…



Systems Engineers

Architecture

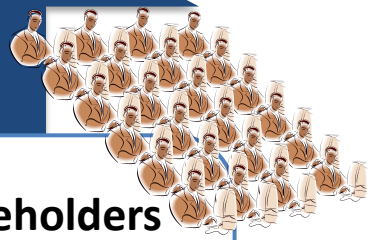
Systems Model

"Authoritative Source of Truth"

Structure
Behavior
Requirements
Parametric Constraints

Results

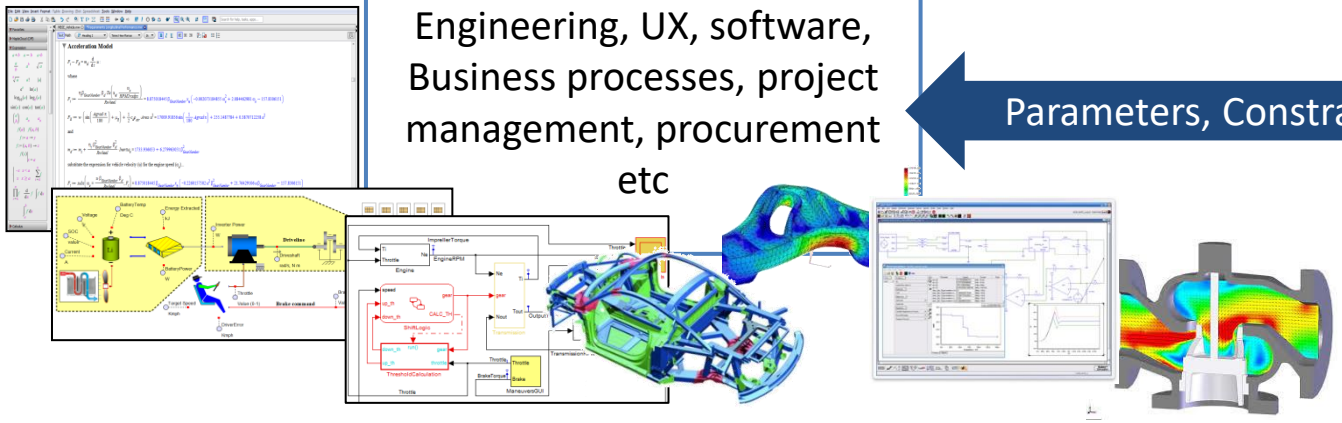
Spreadsheets
Documents
Email, etc



Project Stakeholders

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

Parameters, Constraints, etc



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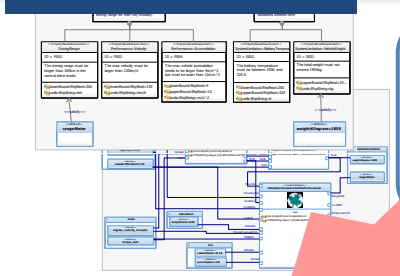


Systems Engineers

Architecture

Misinterpretations

Critical errors

Unnecessary design reviews

Time-wasting rework

Miscommunications

Engineers

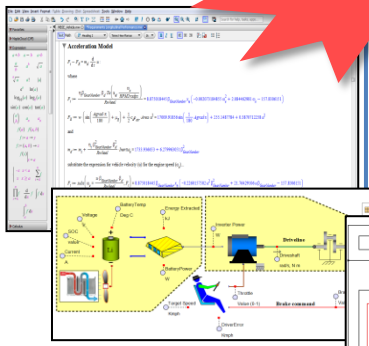
Engineering, Software, Business processes, project management, procurement etc

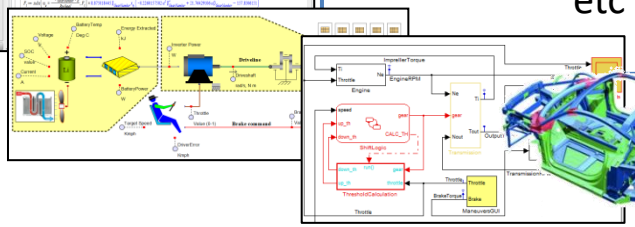
Parameters, Constraints, etc

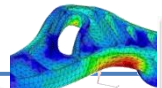
Systems Model

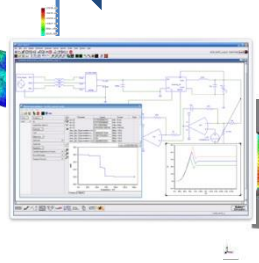
"Authoritative Source of Truth"

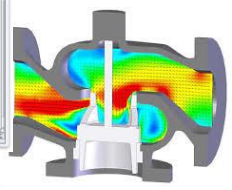
Structure
Behavior
Requirements
Parametric Constraints











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How to scale Systems Engineering beyond Systems Engineers?

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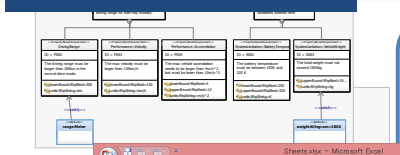
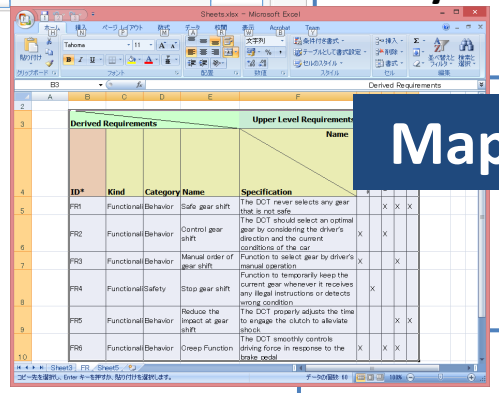
MagicDraw, Rhapsody…



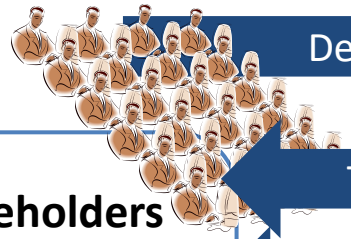
Systems Engineers

Architecture

Design Review



MapleMBSE



Design Changes

Task-specific Views

Project Stakeholders

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

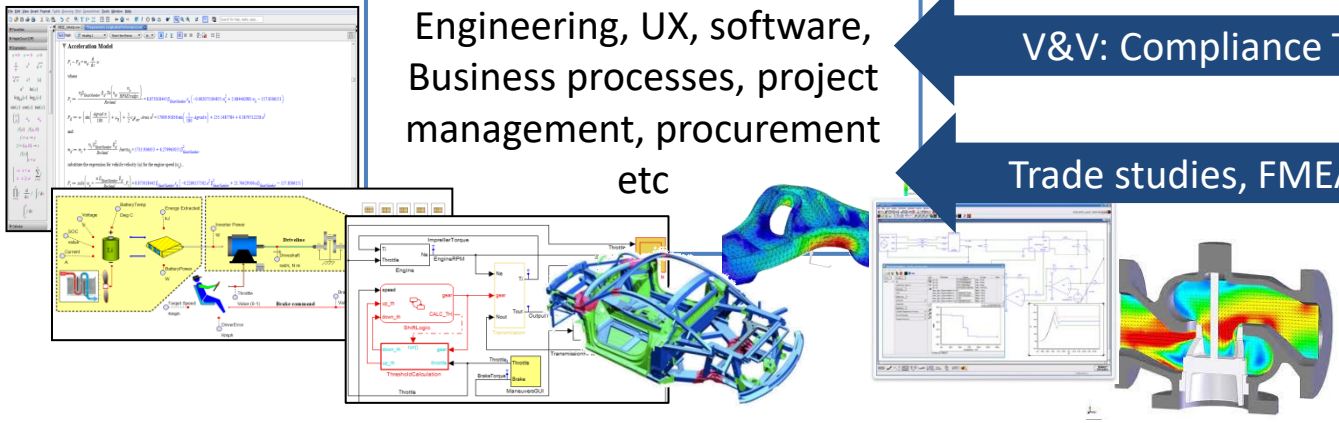
V&V: Compliance Tests

Trade studies, FMEA, etc

Systems Model

"Authoritative Source of Truth"

Structure
Behavior
Requirements
Parametric Constraints



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MapleMBSE

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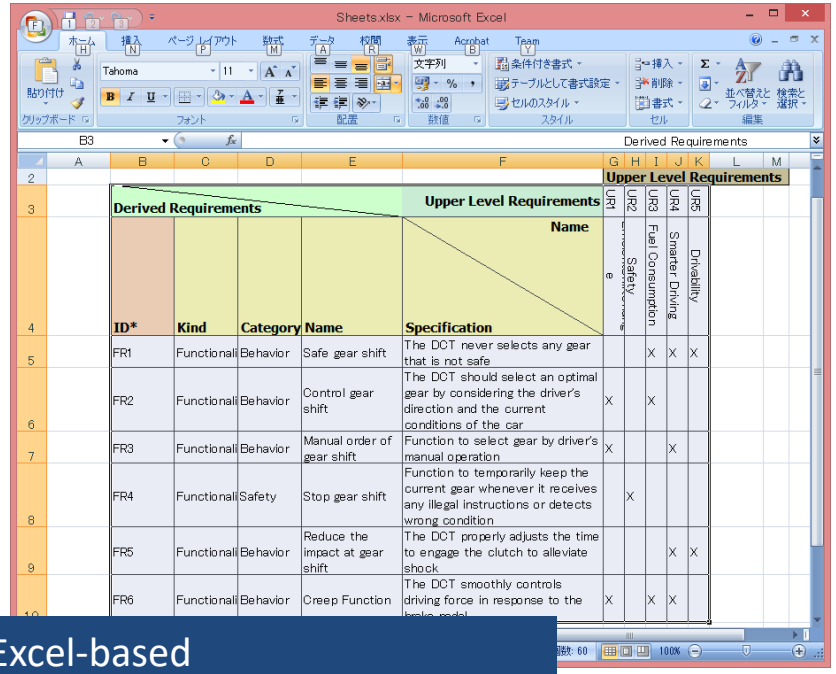

Excel-based development of system designs

- 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

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Demonstration

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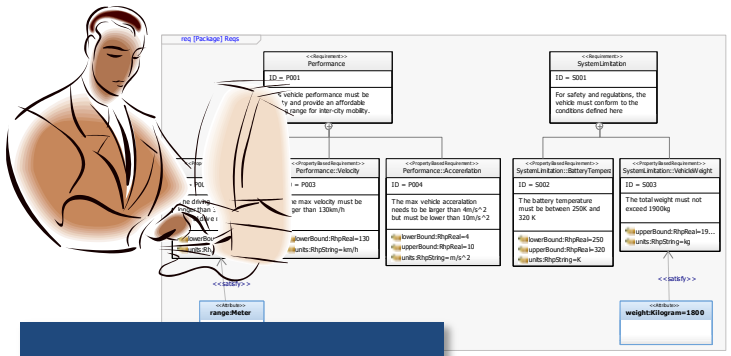
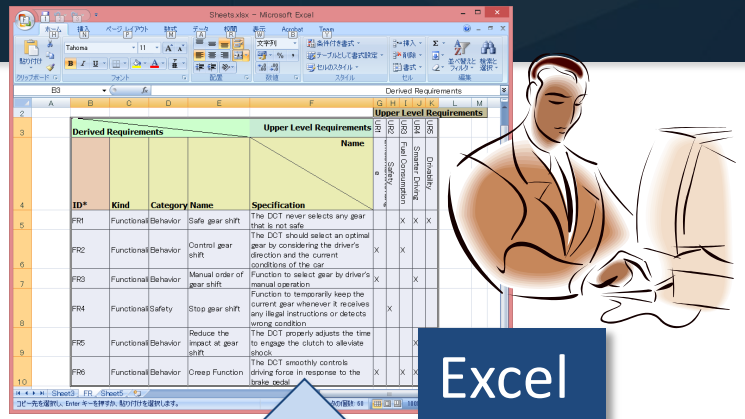


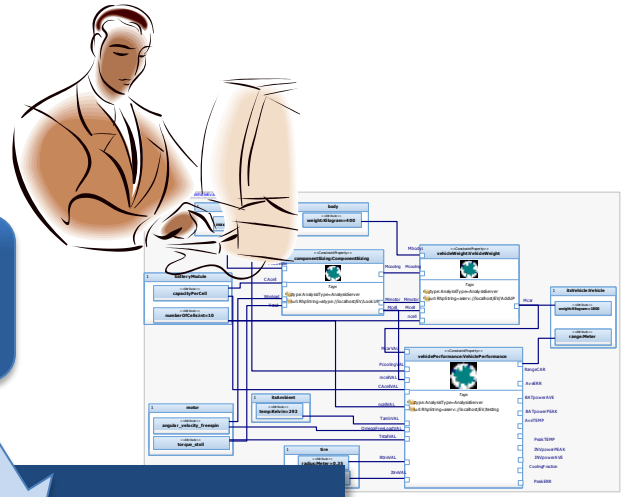
MagicDraw
(No Magic)



Excel

MapleMBSE

Teamwork Cloud
(No Magic)



Rhapsody

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MapleMBSE Demos on YouTube

Maplesoft Engineering Solutions

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

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MapleMBSE Demos on YouTube

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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.

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MapleMBSE

Facilitate Design Collaboration Across the Enterprise

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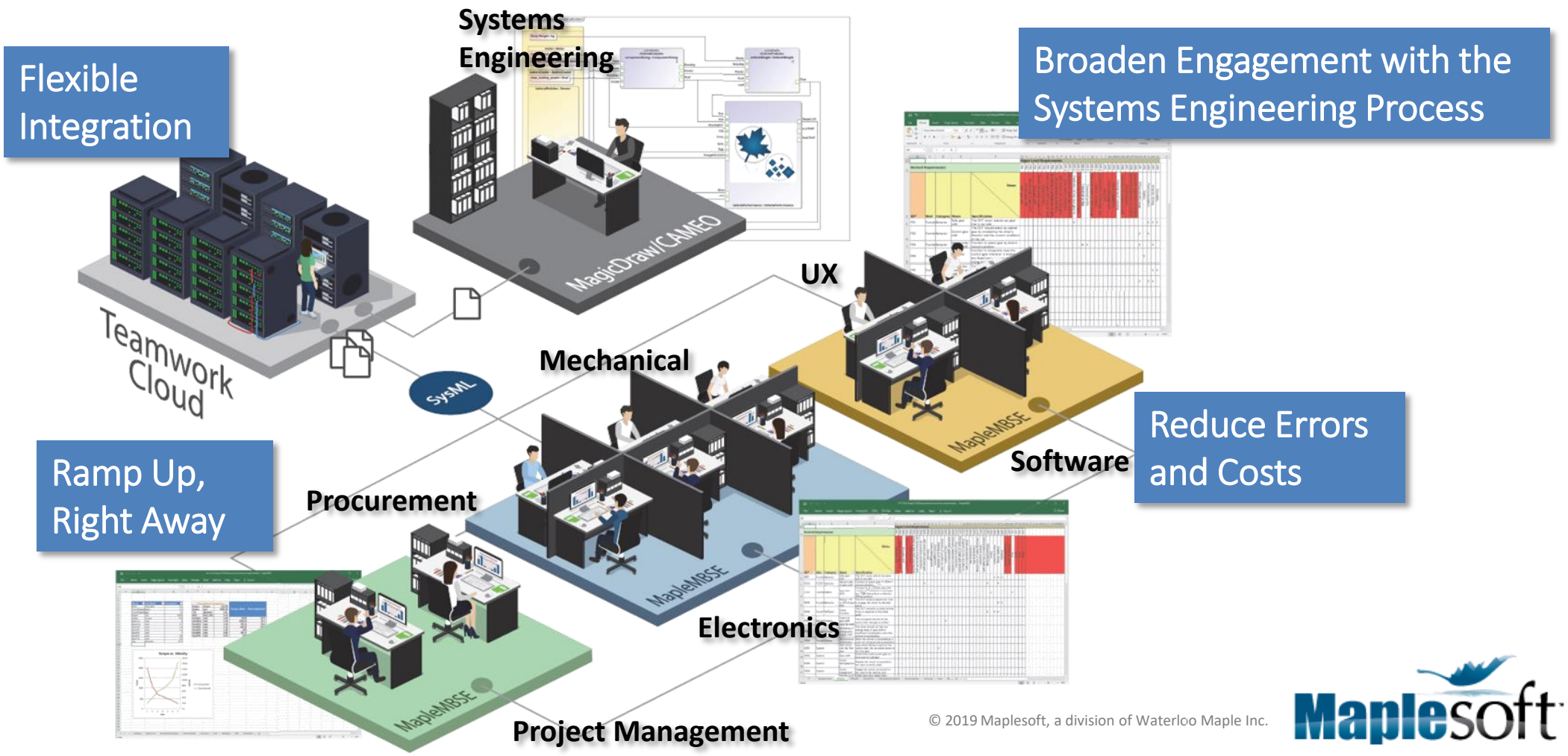

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Summary

www.maplembse.com

Maplesoft Engineering Solutions

- 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 contribute to it without learning graphical MBSE tools
- Proven to accelerate the system-definition process by simplifying the information-entry and reducing the risk of errors

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Questions?

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