Simulink as Your **Enterprise Simulation Platform**

MATLAB EXPO 2017

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Why simulation?

Hyperloop

Hyperloop is a revolutionary concept for a new type of rapid, low-energy transport system using magnetic levitation, which would be capable of transporting people and goods through extremely low-pressure tubes at speeds of up to Mach .98, or 750 mph/1,200 kmh.

Enterprise Simulation Platform

Enterprise: connects complete product development process

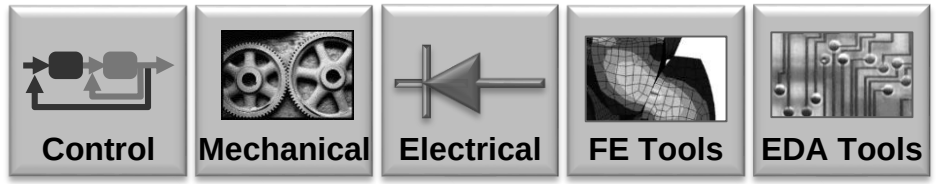
Research

Development

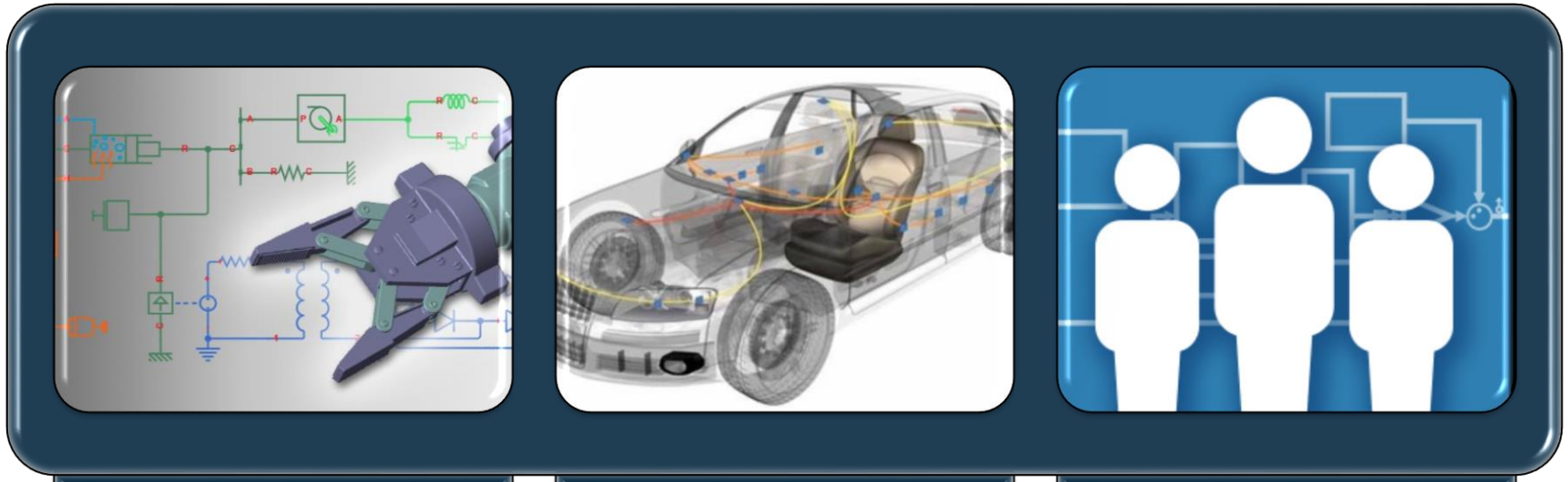
Production

Simulation: evaluating system behavior through computation

Platform: connects all relevant domains for modelling and simulation



Enterprise Simulation Platform Enablers



Multi-Domain Modelling

Integration

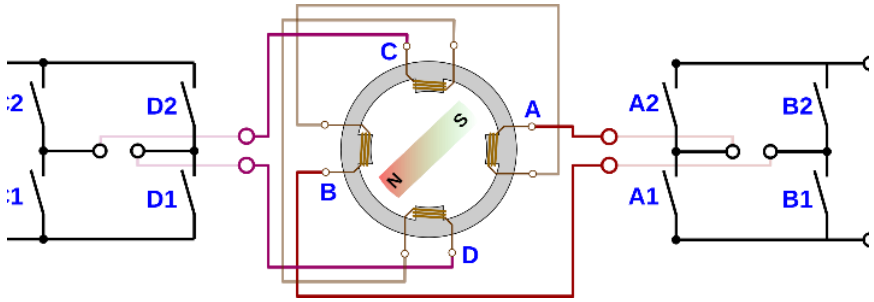
Scalability

Multi-Domain Modelling

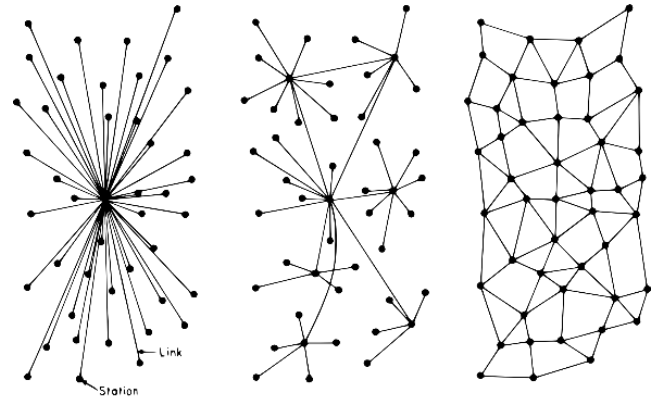
Integration

Scalability

Multi-Domain Modelling in Simulink

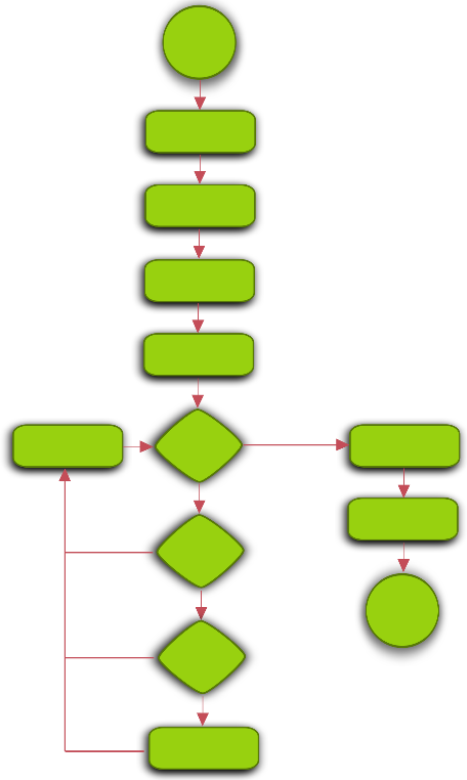


Dynamic Systems



Discrete-Event Systems

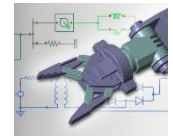
Physical Modelling

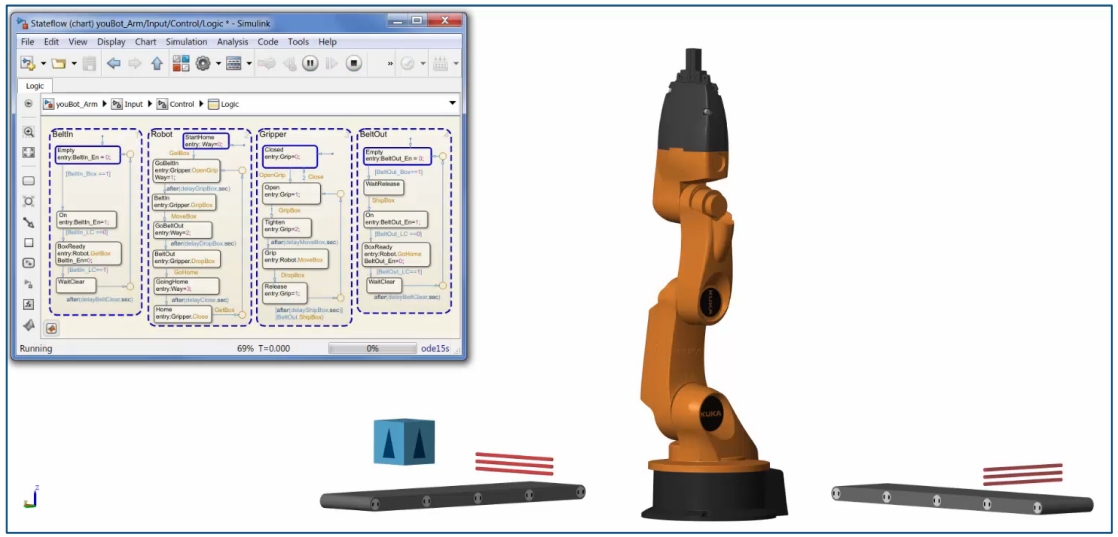


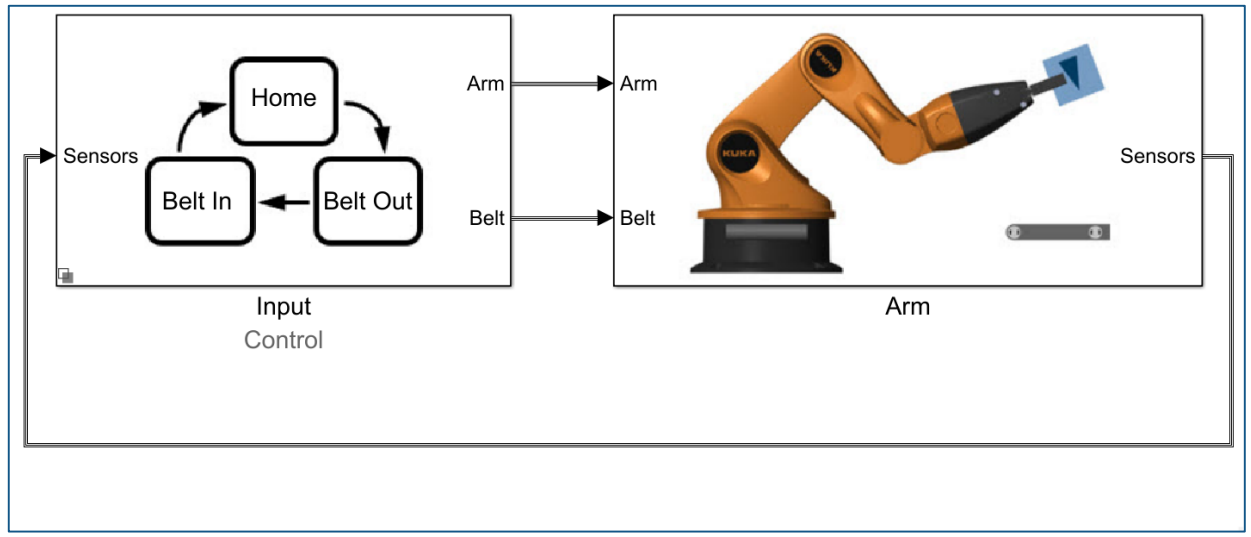
State Machines

Function and Object-Oriented

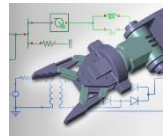
Need for Multi-Domain Simulation

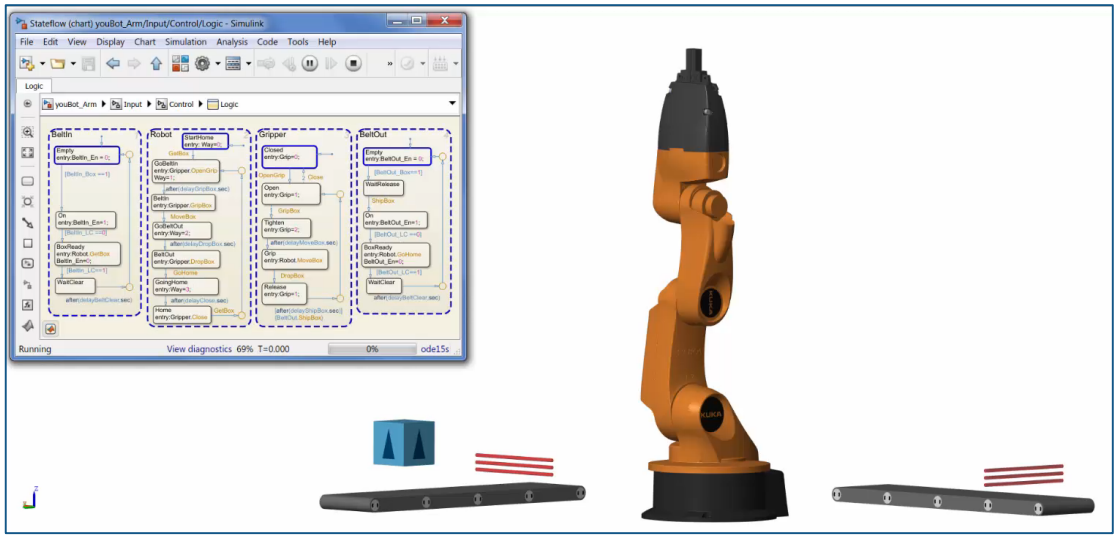


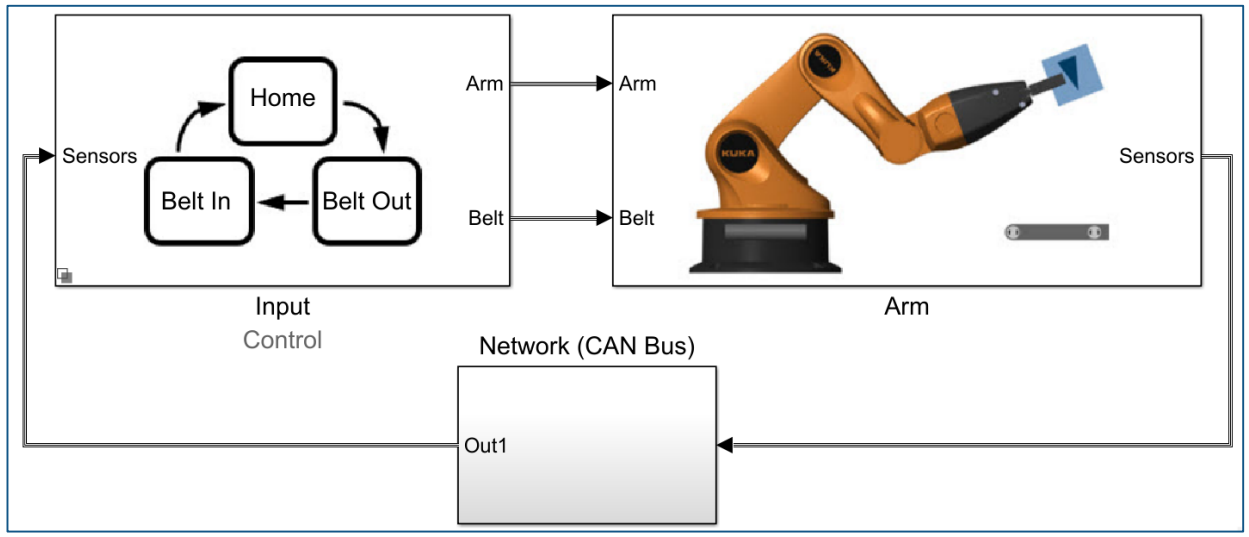




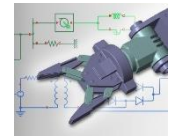
Need for More Multi-Domain Simulation

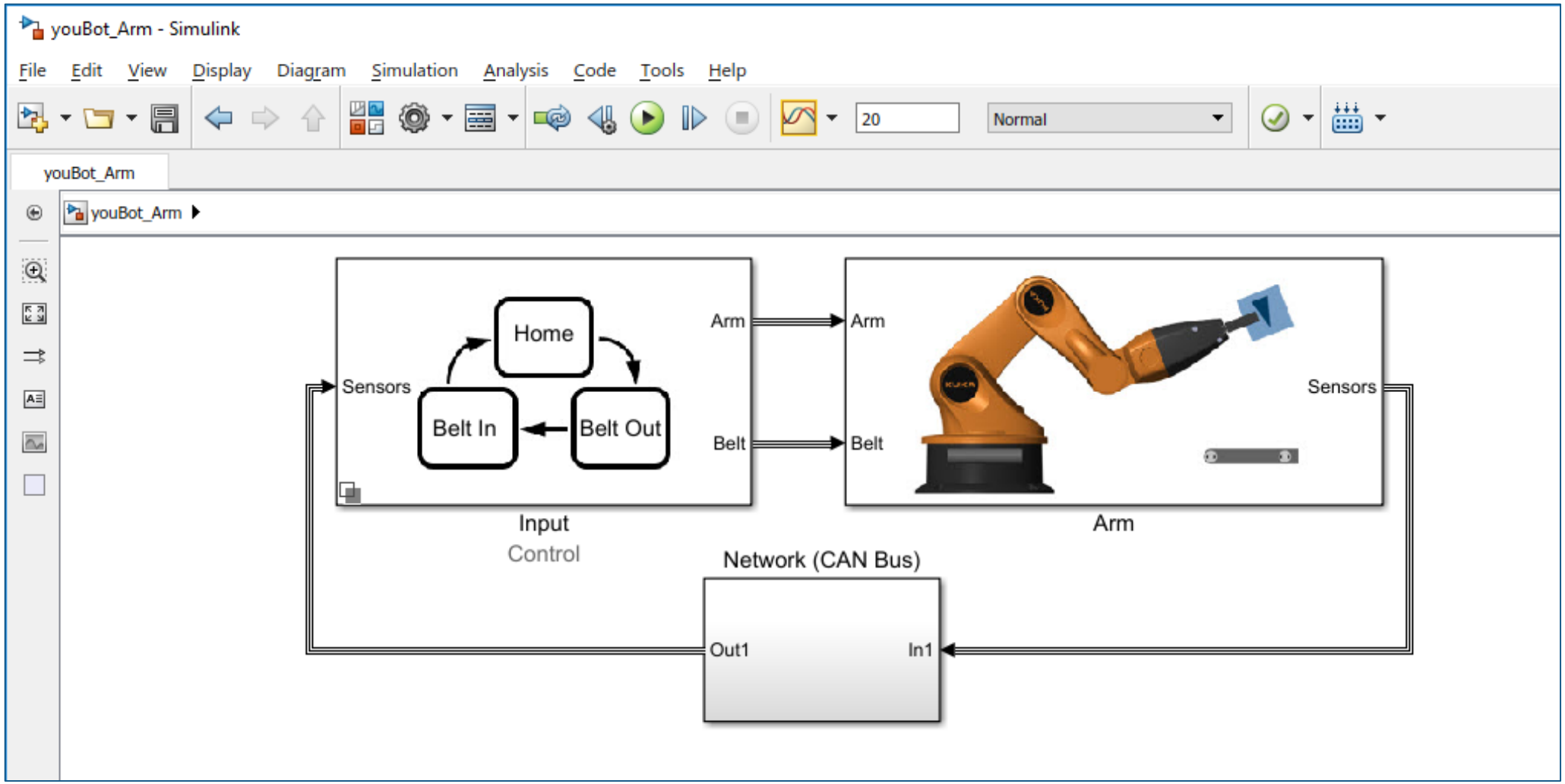




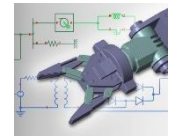


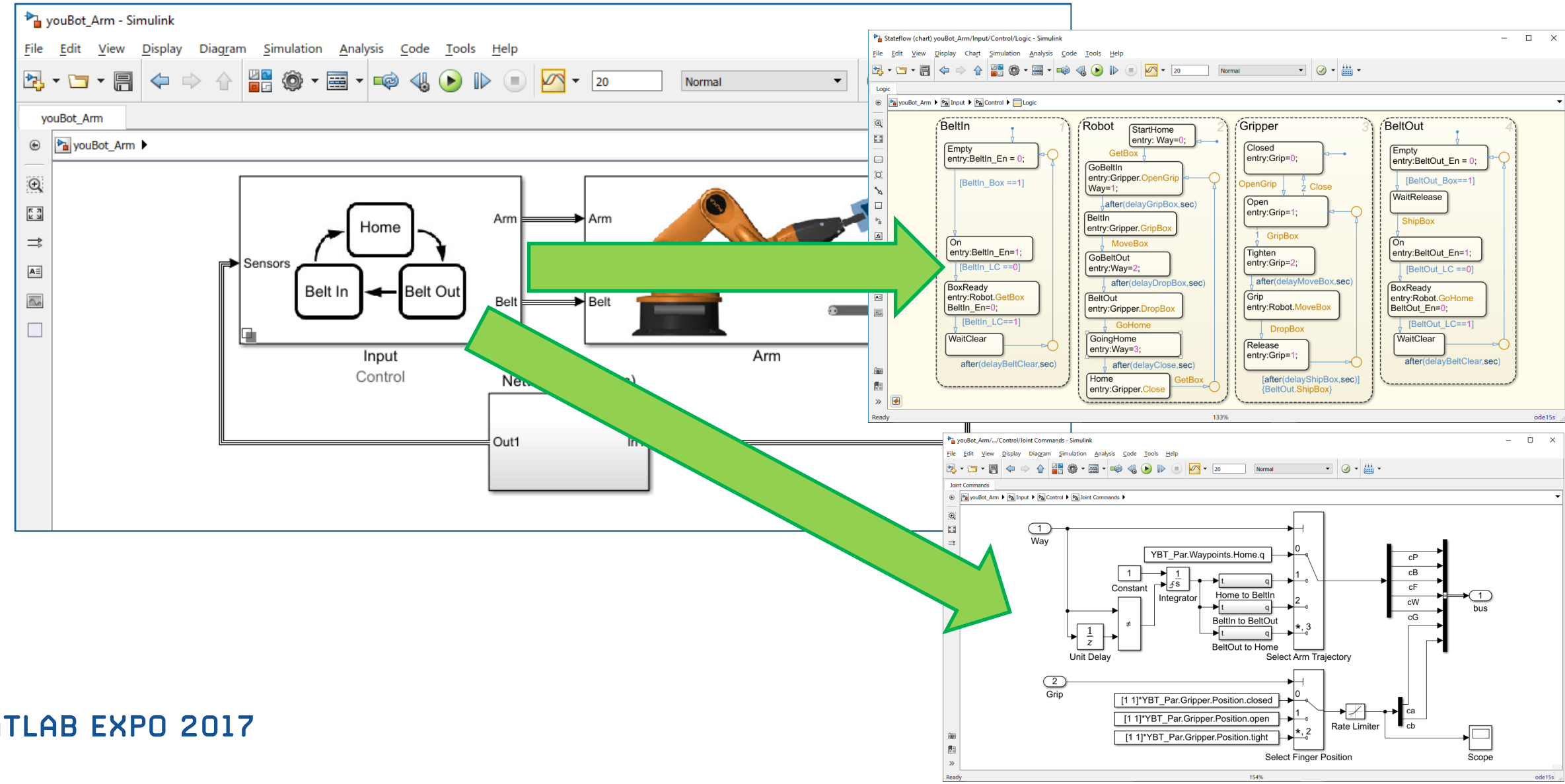
Multi-Domain Model



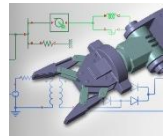


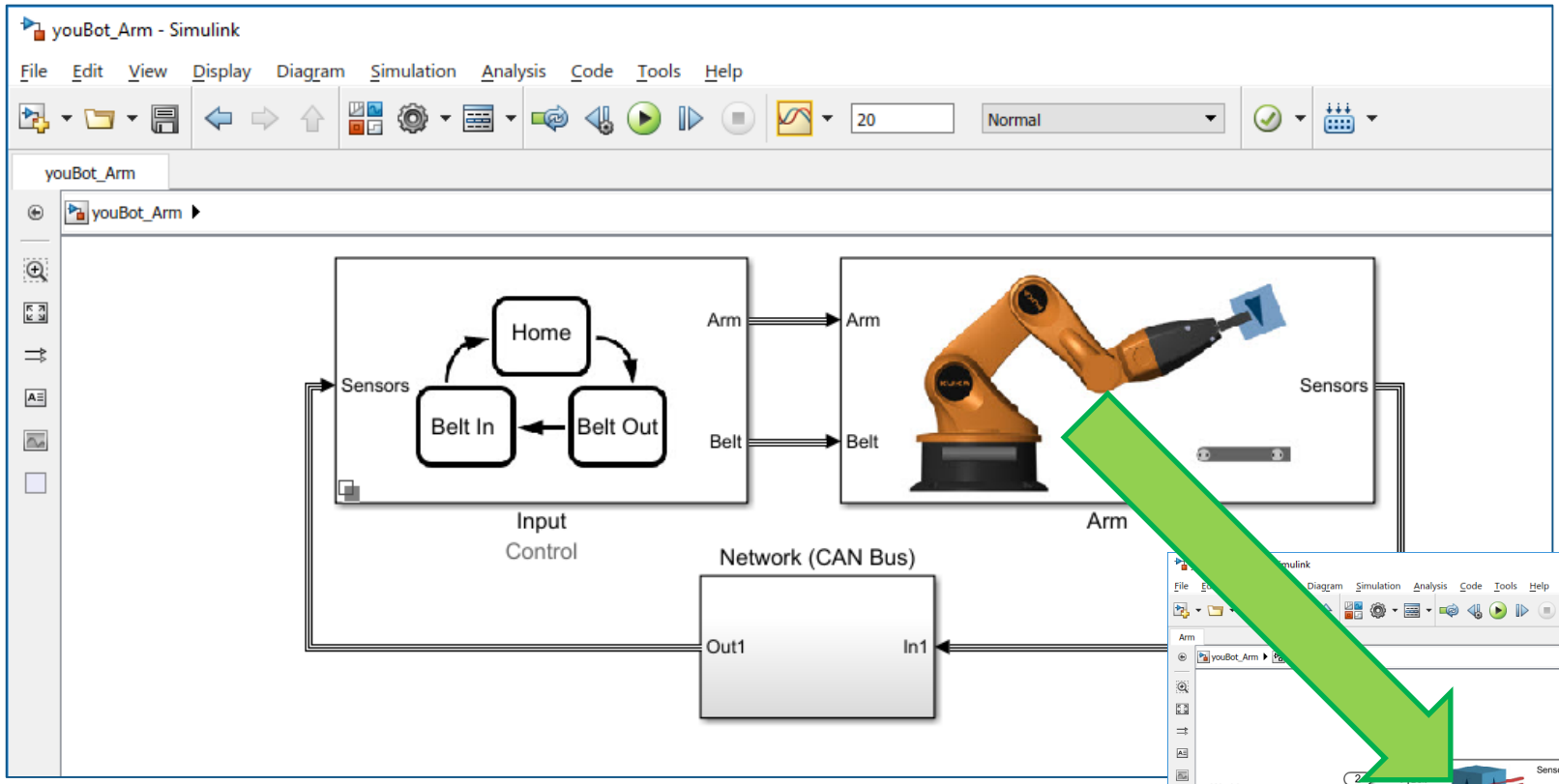
State Charts and System Dynamics

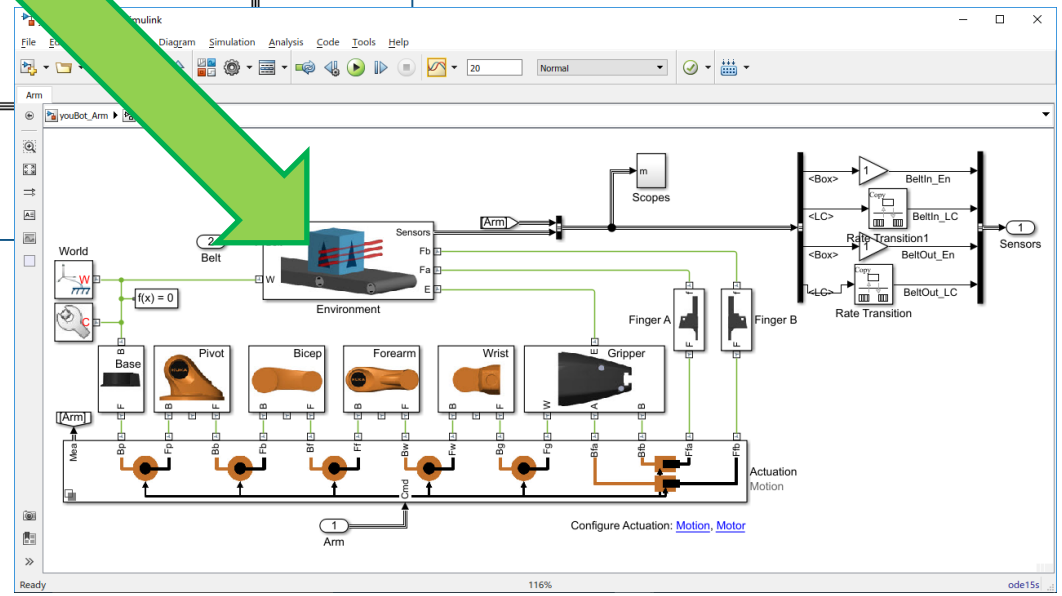




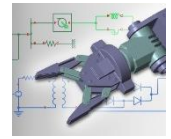
Physical Modeling

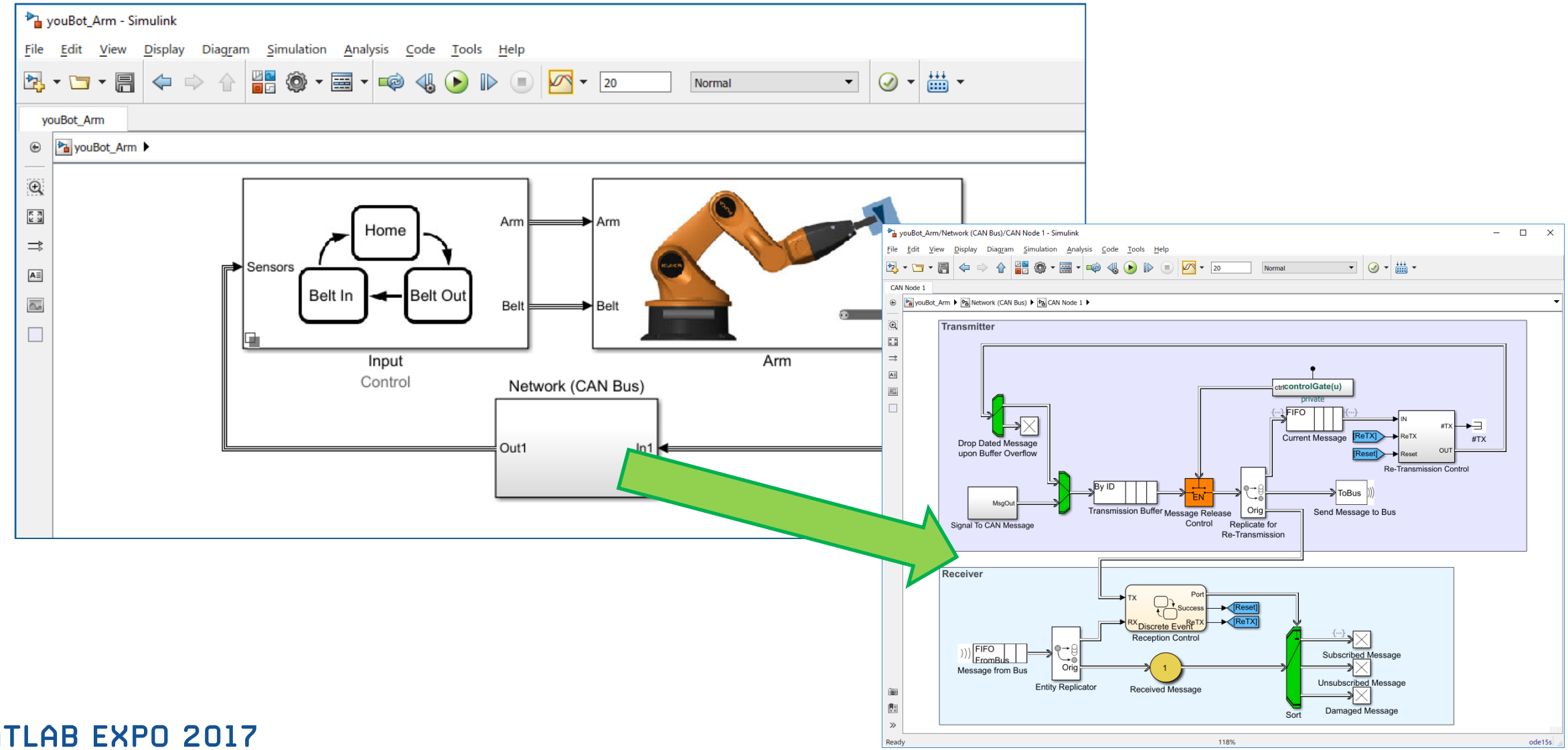




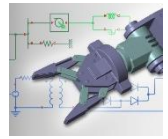


Discrete-Event Modeling

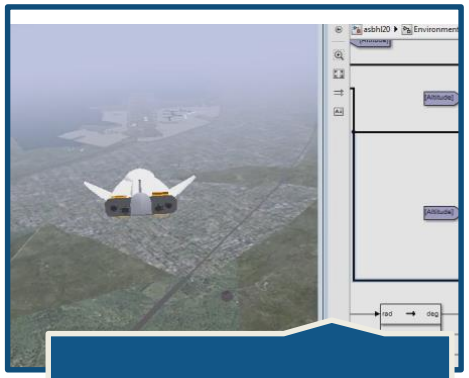




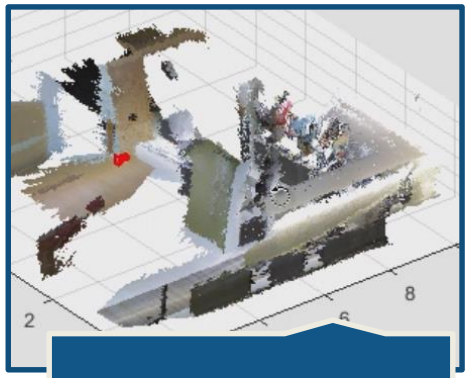
Domain-Specific Extensions



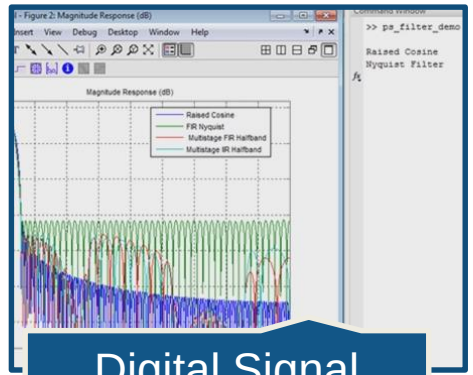
Simulink has numerous domain-specific capabilities, for example:



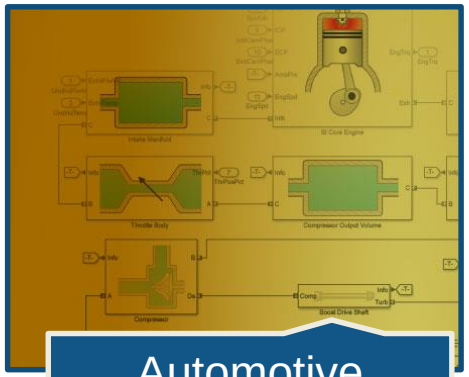
Aerospace



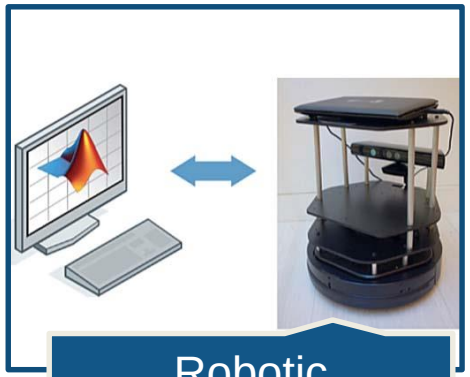
Computer Vision



Digital Signal Processing



Automotive Powertrains



Robotic Applications

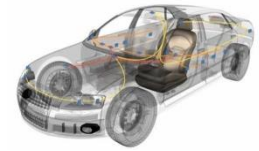
+More

Multi-Domain Modelling

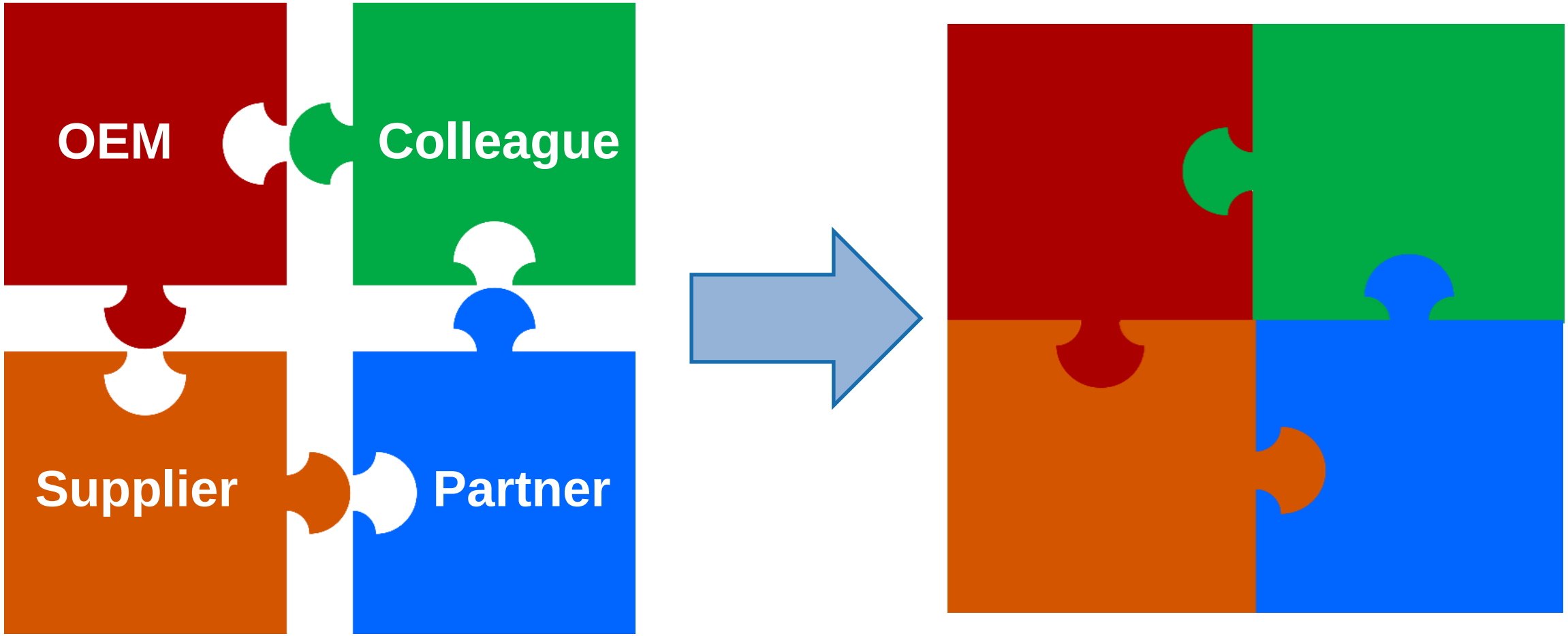
Integration

Scalability

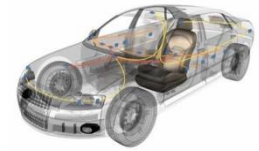
Integration Challenges



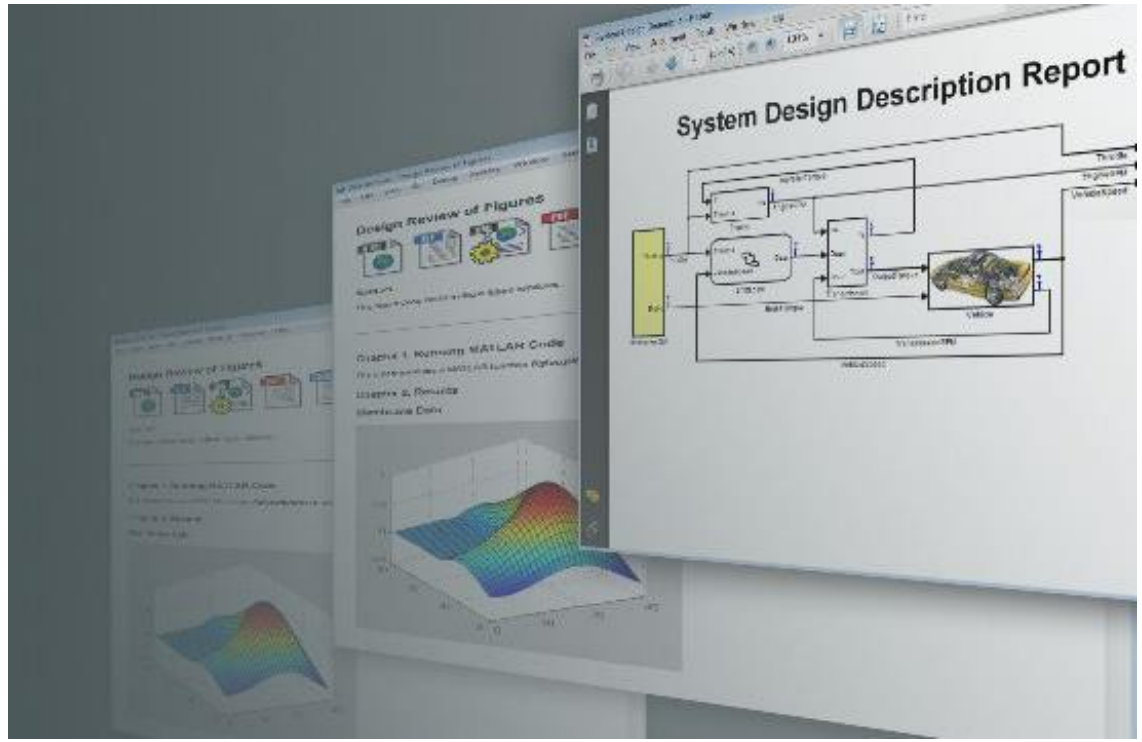
Your IP exists in many forms and in many locations, making integration difficult



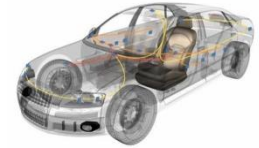
Integrating by Sharing Models



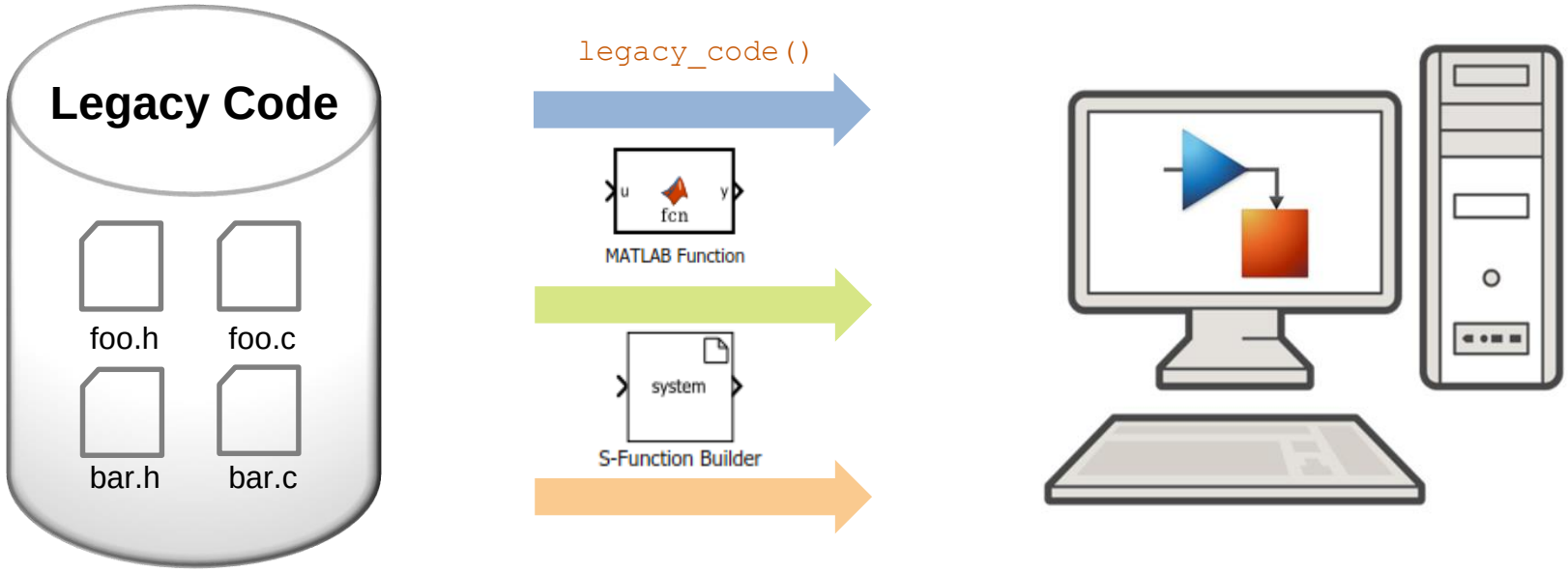
- Quick File Packaging
- Model Protection (IP Management)
- Reporting and Documentation



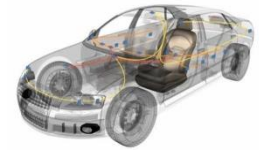
Integrating Your Code



Multiple ways to reuse your legacy code with Simulink



Integrating Third-Party Simulation Tools

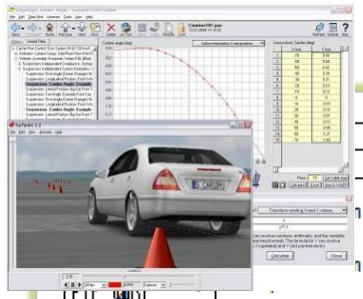


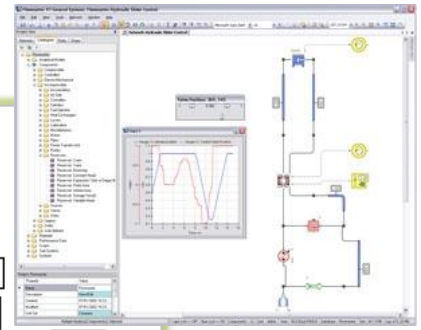
Mature and extensive APIs for third-party tool integration

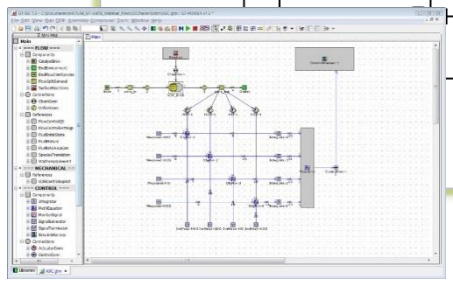
Tire behavior assessment

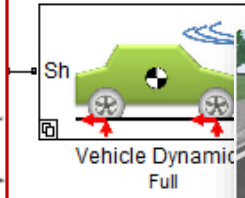
Vehicle dynamics modeling

Thermo-fluid system simulation





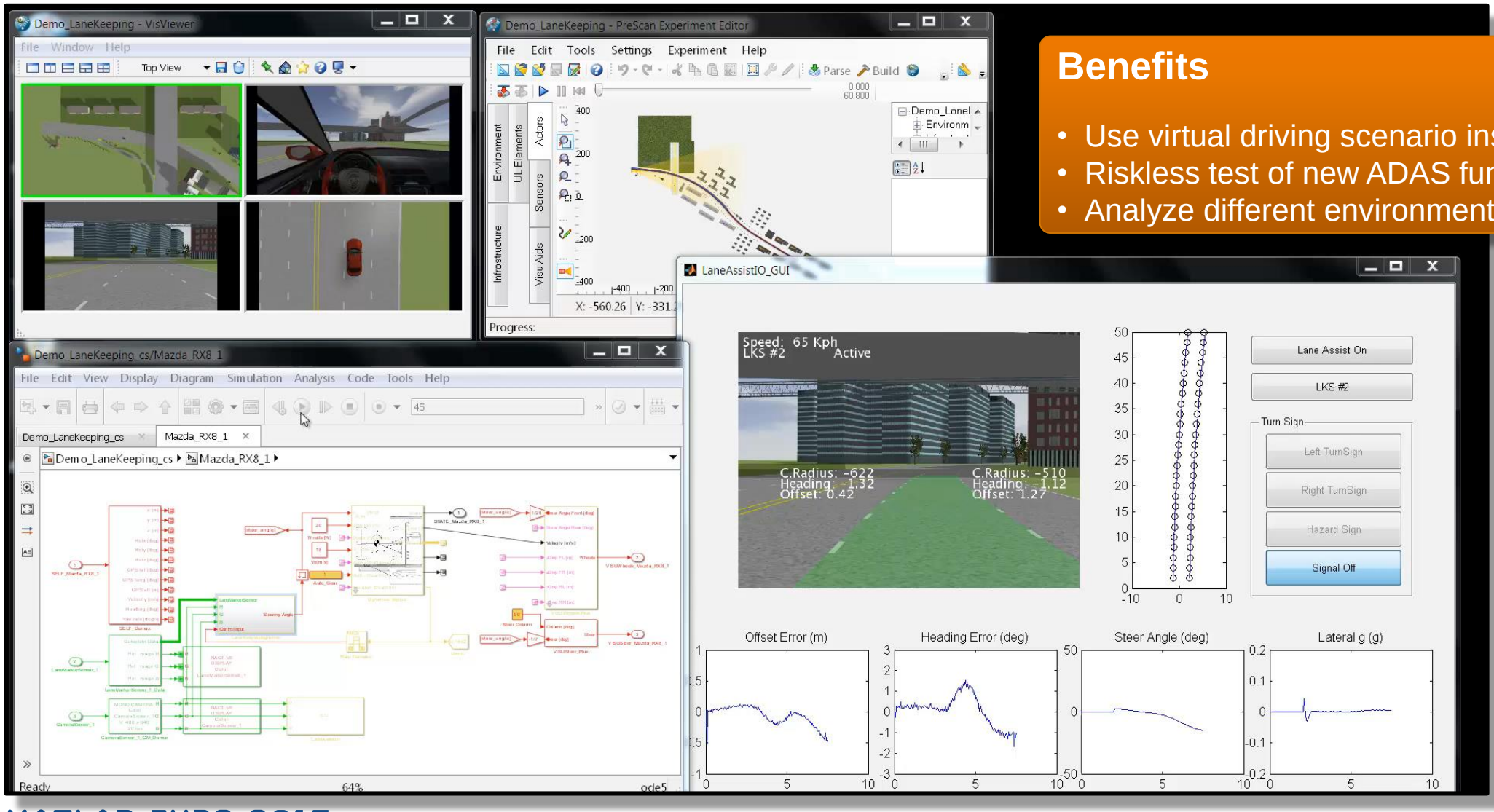




1D / 3D engine /exhaust simulation

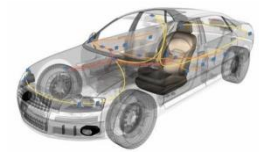
Virtual test driving

ADAS System Level Simulation – Lane Keeping Support at TASS



Benefits

- Use virtual driving scenario instead of real car
- Riskless test of new ADAS functions
- Analyze different environmental conditions

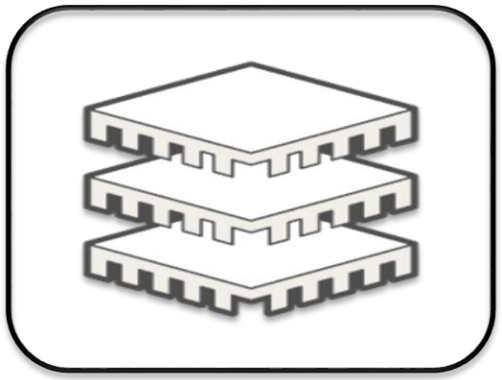


Multi-Domain Modelling

Integration

Scalability

Scalability Challenges

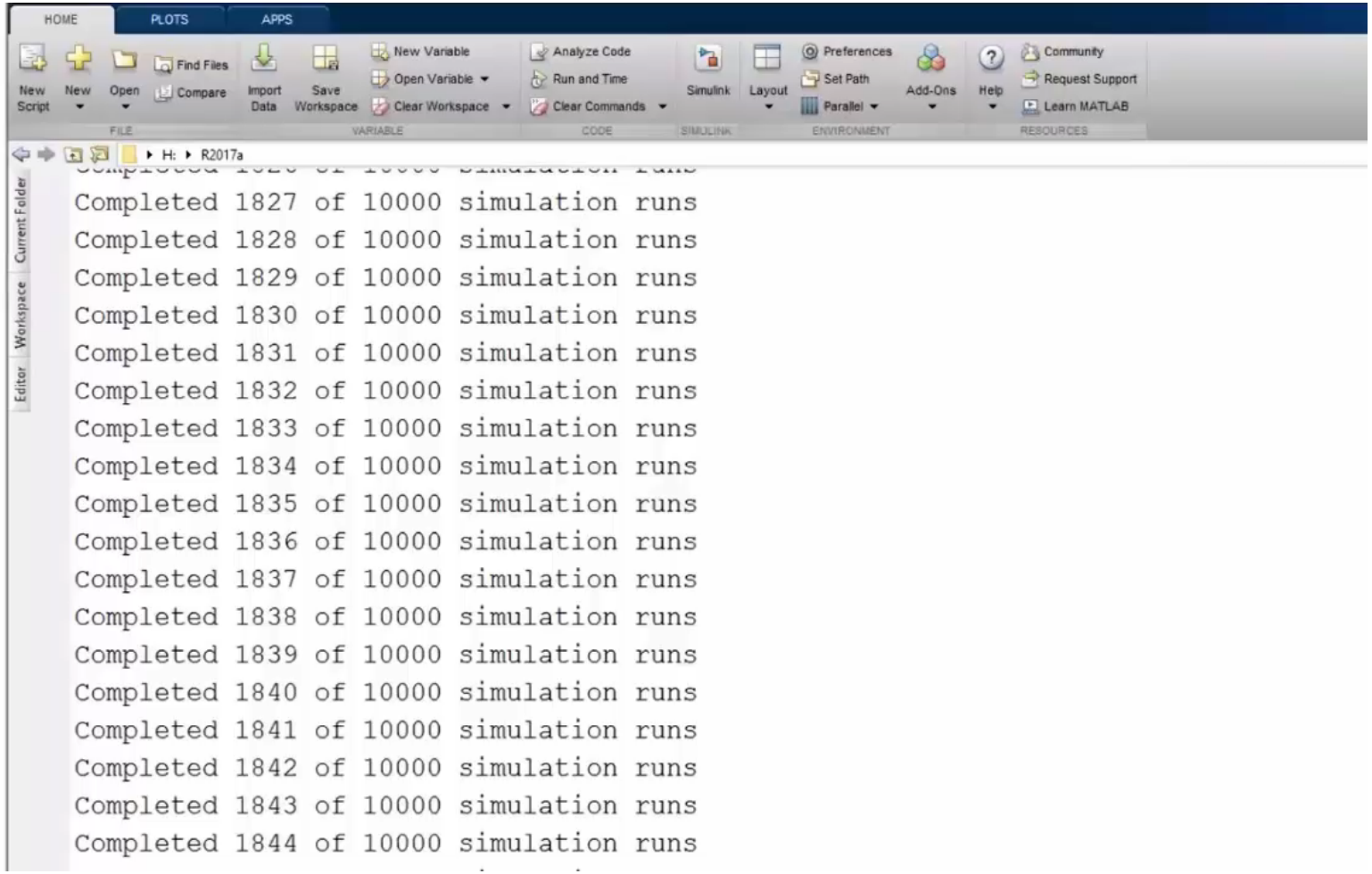


Performance

Team Workflows

Performance Scalability

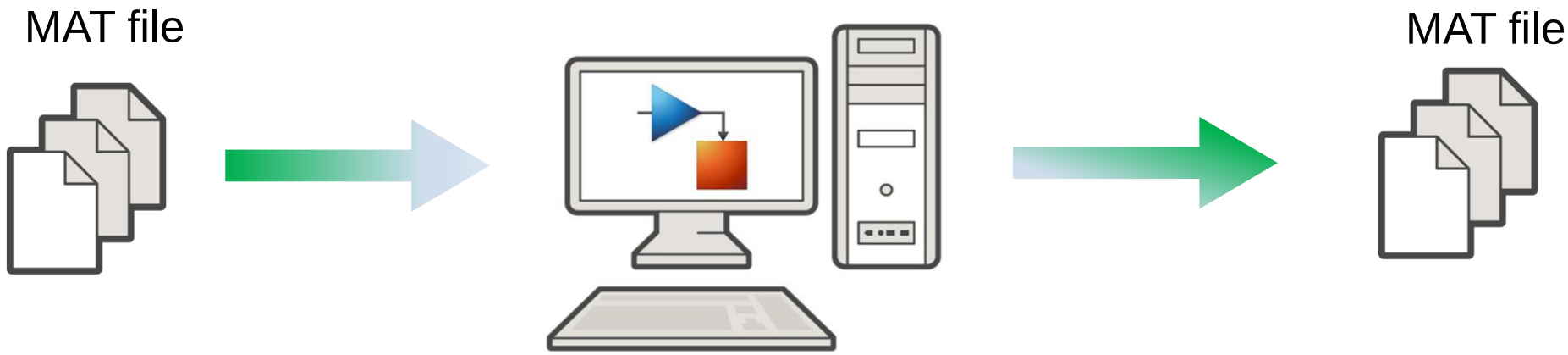
Easy scalability to multicore or cluster/cloud computation environment



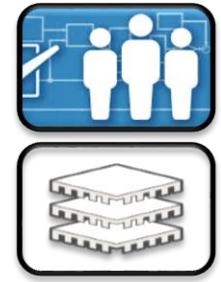
Performance Scalability

Big data workflow

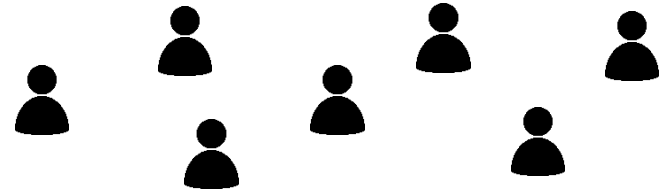
- Processing large amount of simulation inputs / outputs

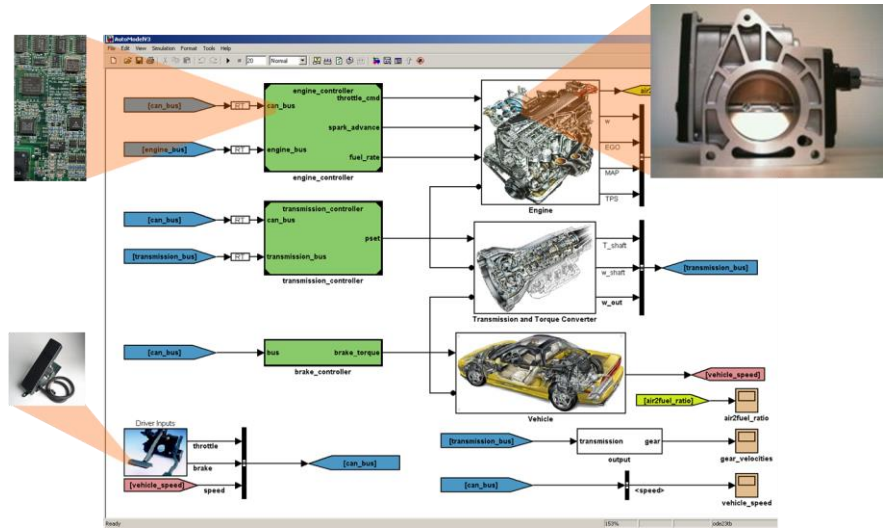


Complex Design Development through Componentization



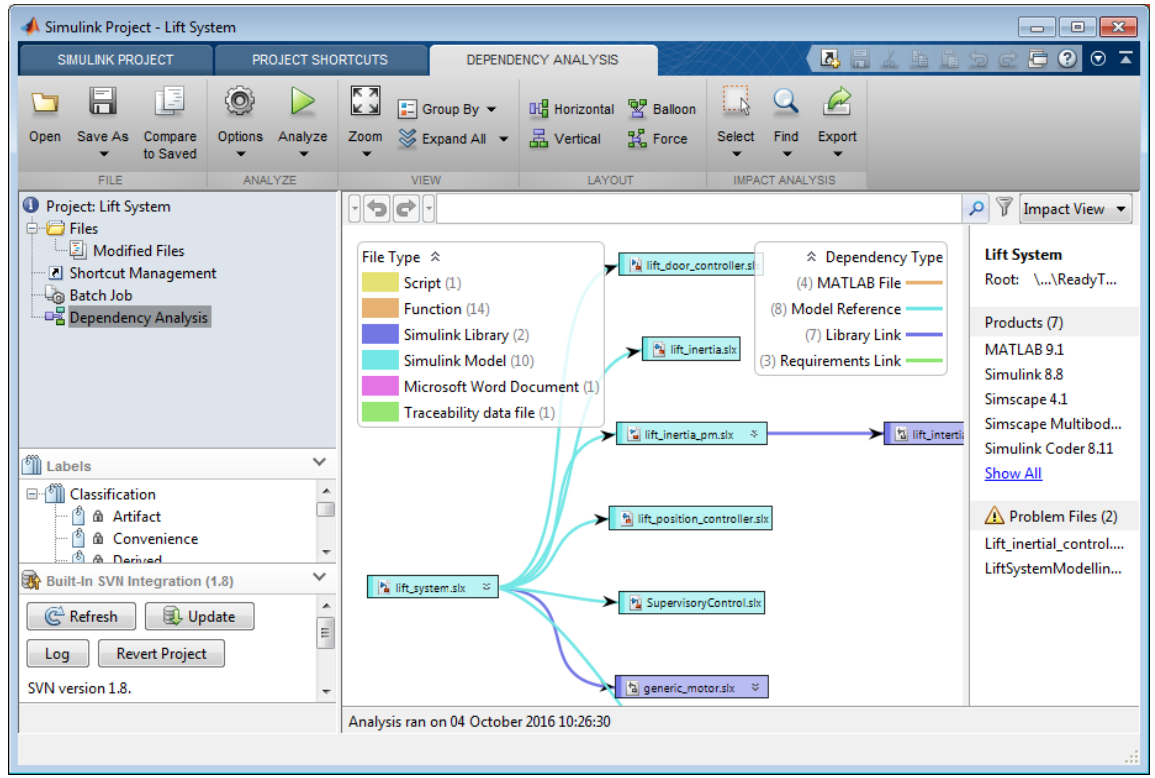
- Improving performance
  - Incremental loading and code generation
  - Simulation speed
  - Memory usage
- Supporting team workflows
  - Faster modular development
  - More effective verification
  - Increased reusability





Capabilities Enabling Team Workflows

- Source control
- Design comparison and merging
- Dependency analysis
- Task automation



Source Control Integrations

Microsoft Team Foundation Server (TFS) integration available now from MathWorks File Exchange

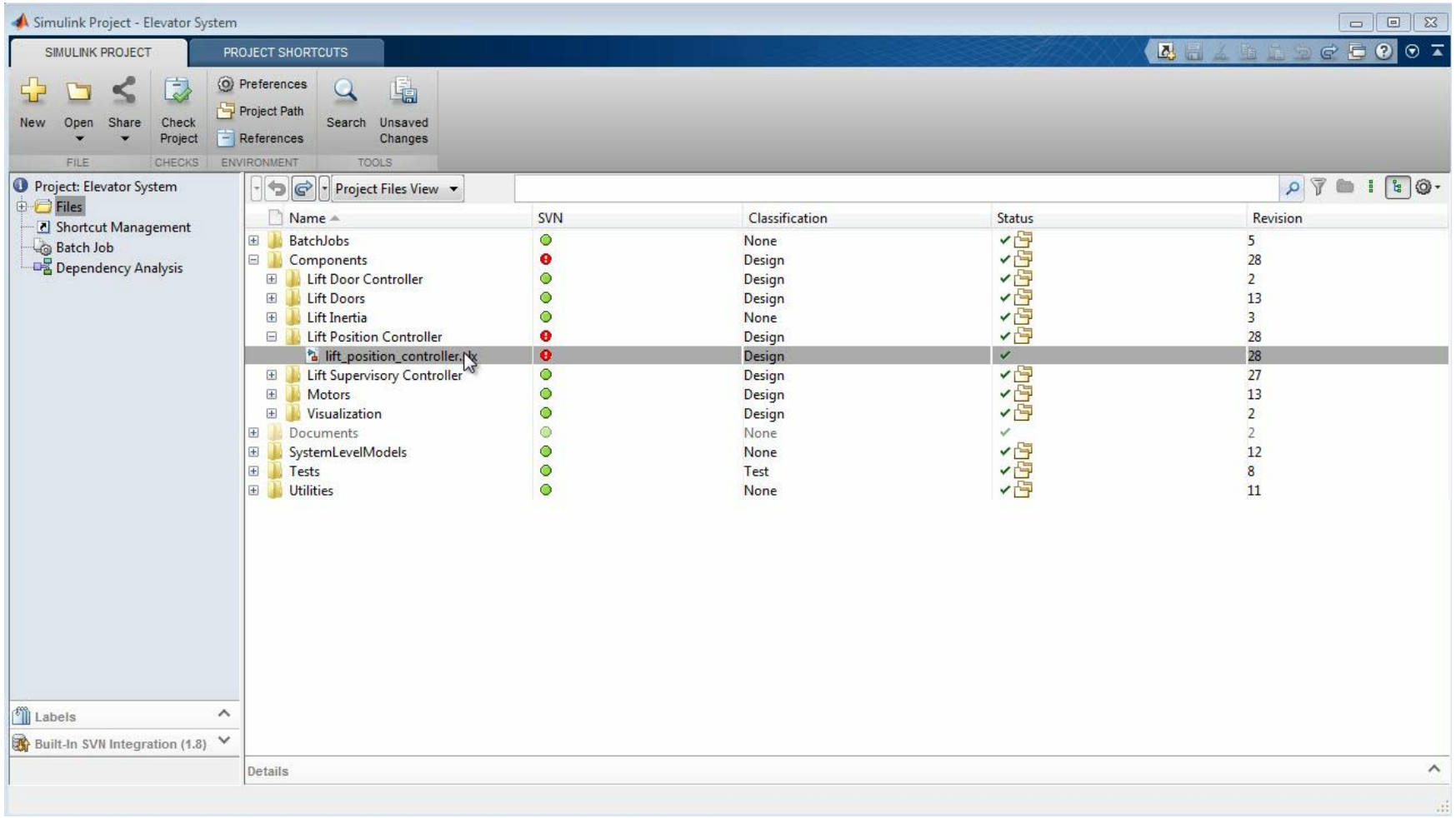
SUBVERSION

PERFORCE
Version everything.

git

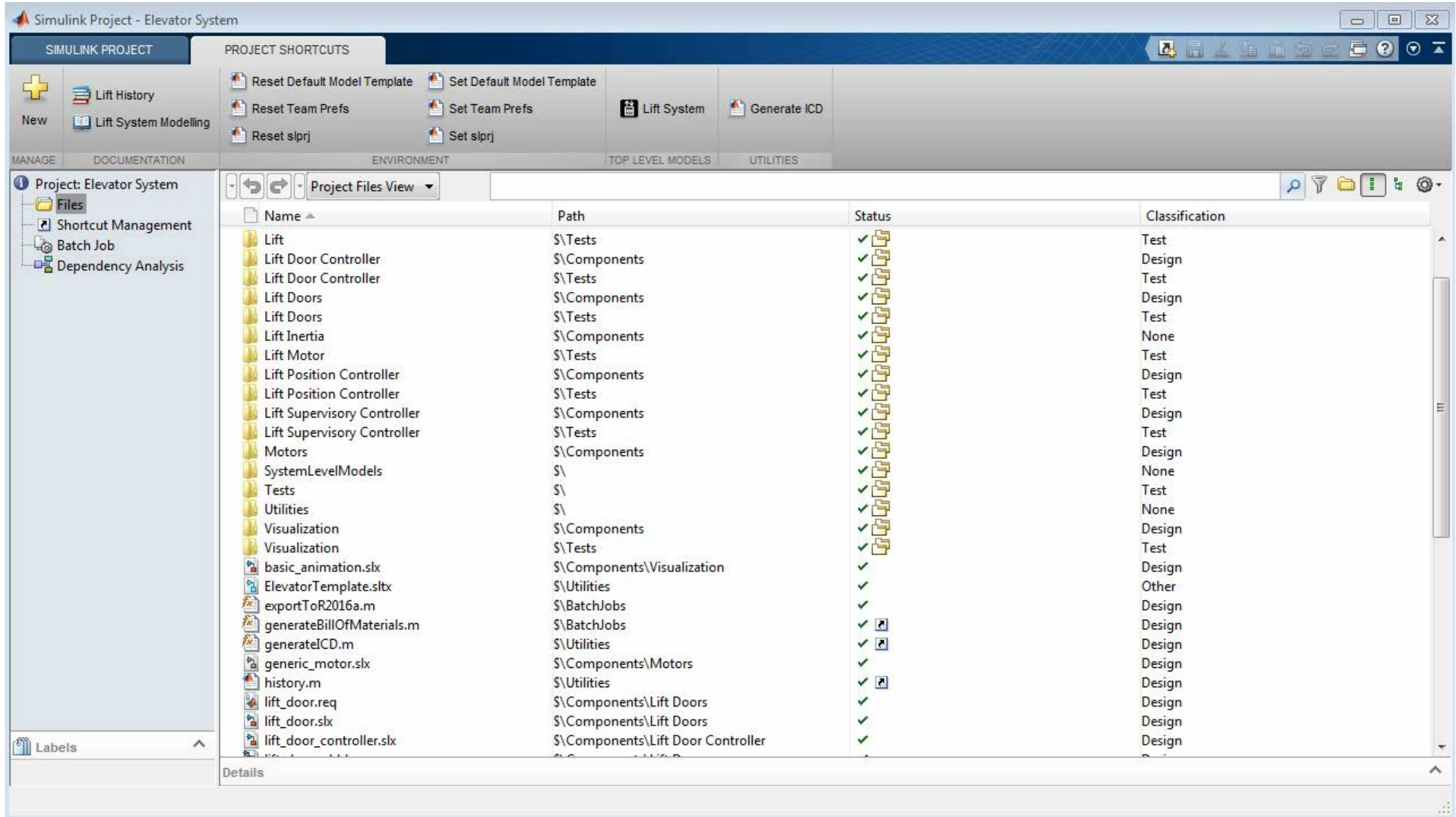
Team Foundation Server 2012
Microsoft

Integrating Work from Different Engineers via Merge

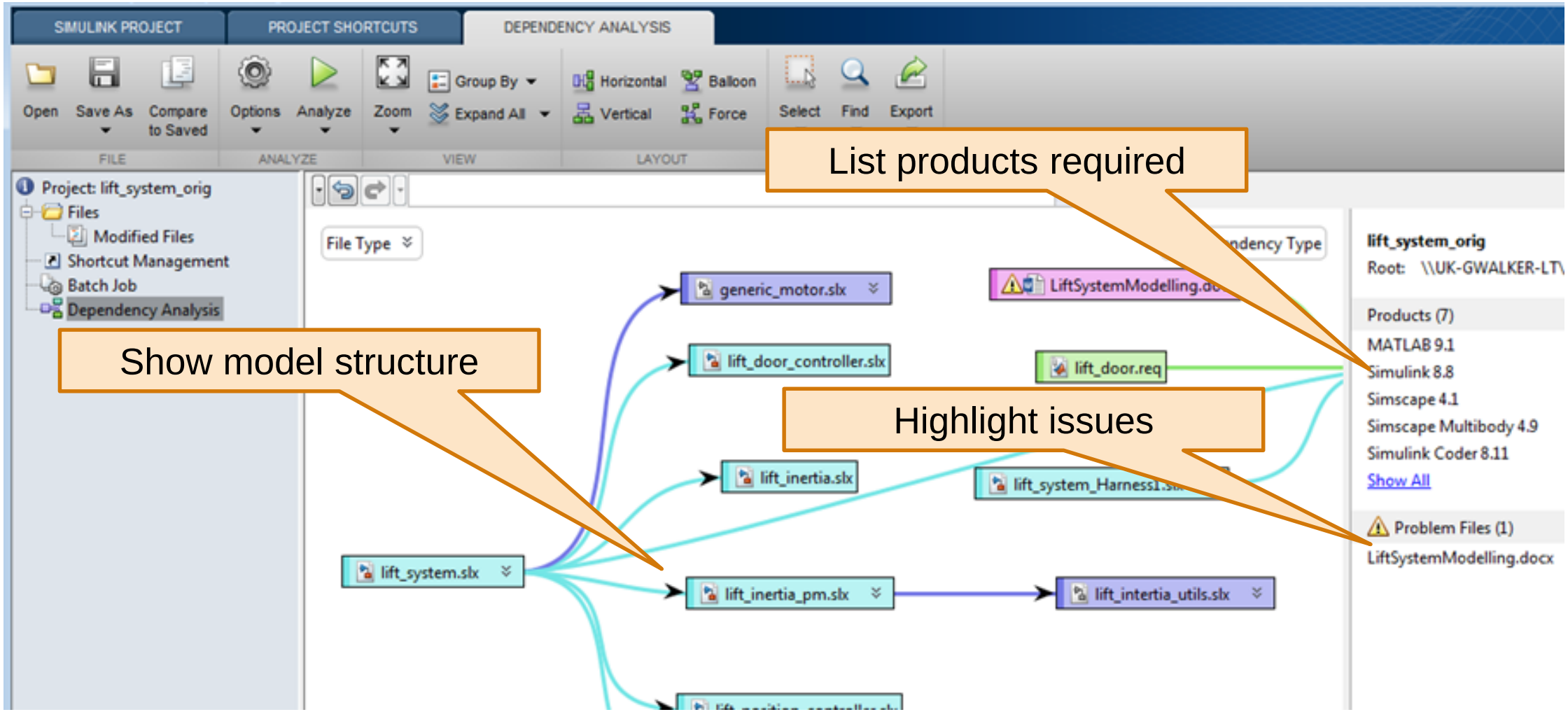


- Supports concurrent engineering
- Lets you concentrate on design

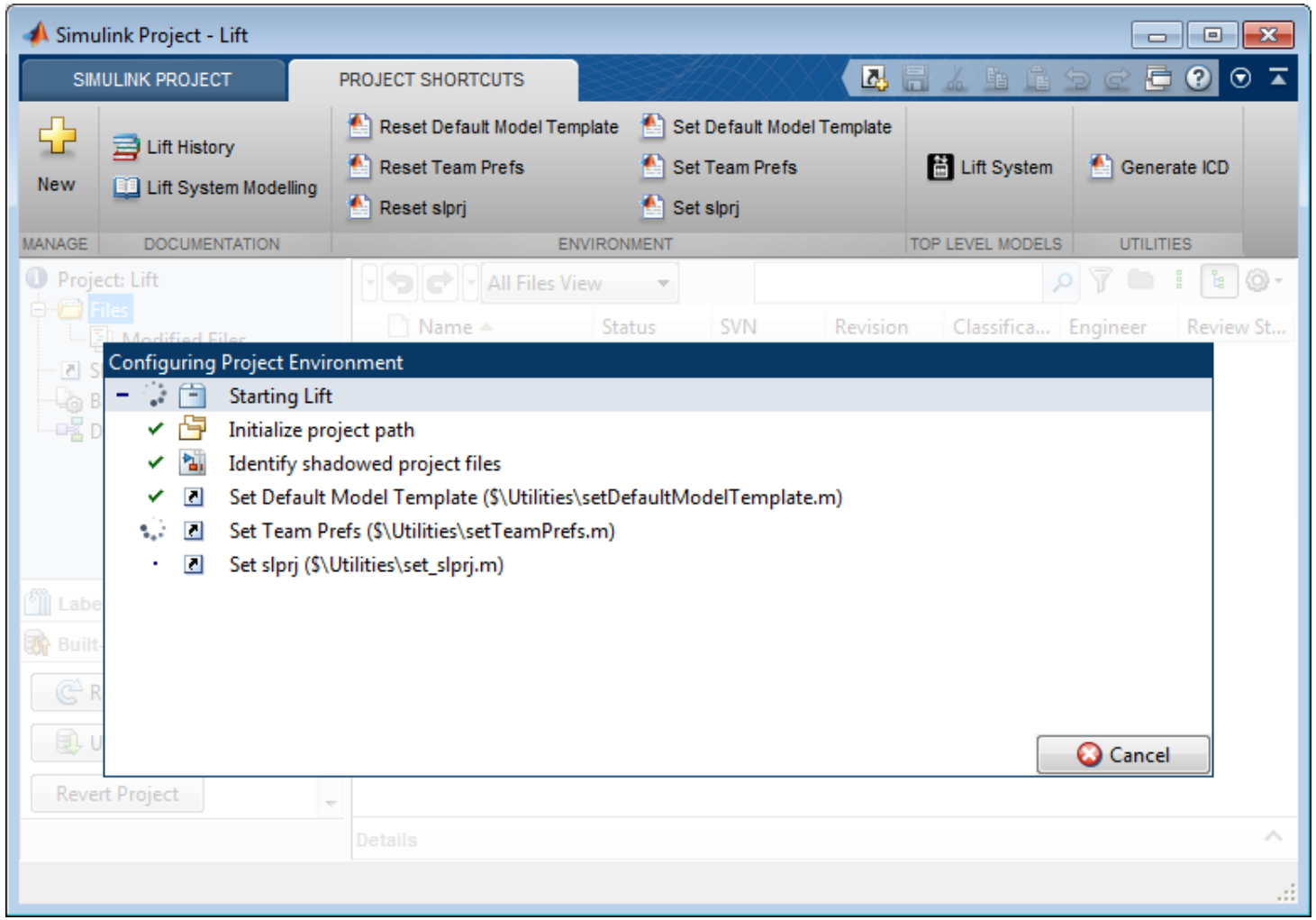
Dependency Analysis – Modular Development



Dependency Analysis – Modular Development

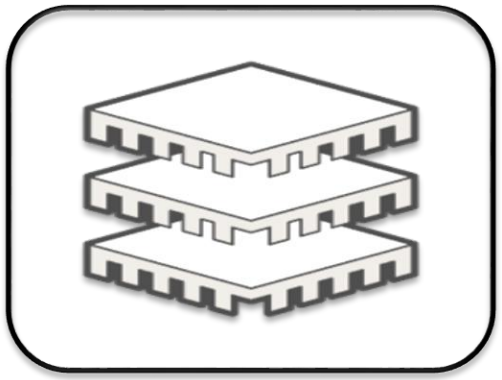


Task Automation – Configuring Project Environment



- Robustly configure the team environment
- For everyone
- Automatically

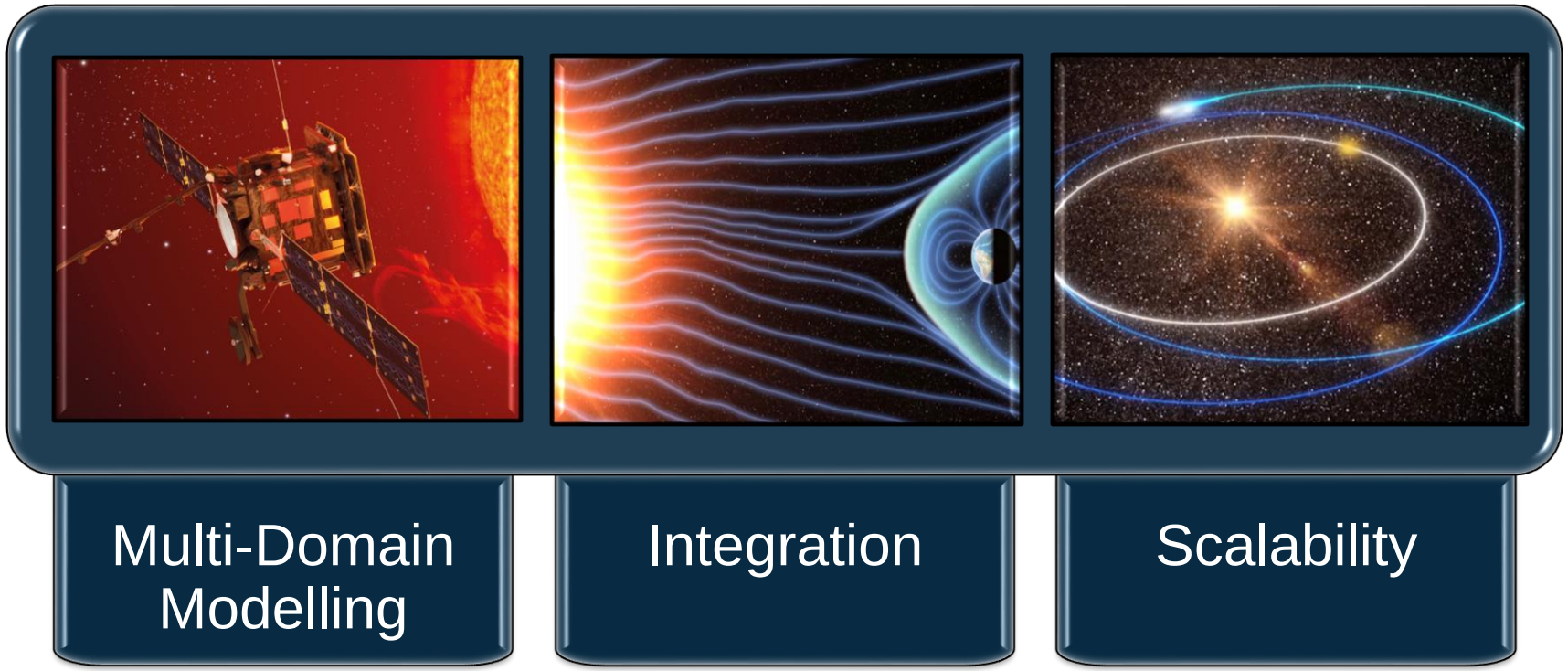
Simulink Addressing Scalability Challenges



Performance

Team Workflows

Enterprise Simulation Platform Enablers



"No other tool gives us the multidomain simulation capability and block diagram environment in a way that is scalable to represent complex systems. That is why we use Simulink."

Andrew Pollard
Tessella

How to get started?

- Model-Based Design
- Stateflow
- Simscape

MATLAB®

Data Analytics
Data Processing and Visualization
Statistics
Machine Learning
Optimization Techniques
Parallel Computing

Application Development
Programming Techniques
Building Interactive Applications
Object-Oriented Programming

Code Generation
MATLAB Coder
Interfacing with C-code

Application-Specific
Control System Design
Signal Processing
Communication Systems
LTE Systems

Computational Finance
Risk Management
Time-Series Modelling

Signal Processing
Using MATLAB
Using Simulink

Image and Video Processing
Image Processing
Computer Vision

SIMULINK®

Model-Based Design
Implementing MBD Workflow
Model Management and Architecture
Verification and Validation

Stateflow®
Event-Based Modeling

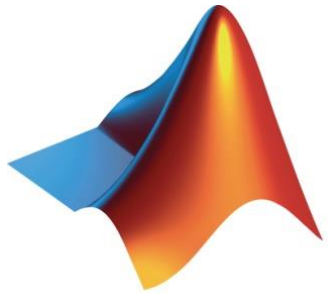
Simscape™
General Simscape™
Simscape Multibody™
Simscape Drivelime™
Simscape Fluids™
Simscape Power Systems™

Code Generation
Rapid Prototyping and HIL-Simulation
Embedded Systems
FPGA Design
Generating HDL Code
Xilinx Zynq SoCs
AUTOSAR

Code Integration
Integrating C and MATLAB

Polyspace©
Polyspace Code Prover™

https://nl.mathworks.com/services/training.html



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