MATLAB EXPO 2019

Systems Engineering

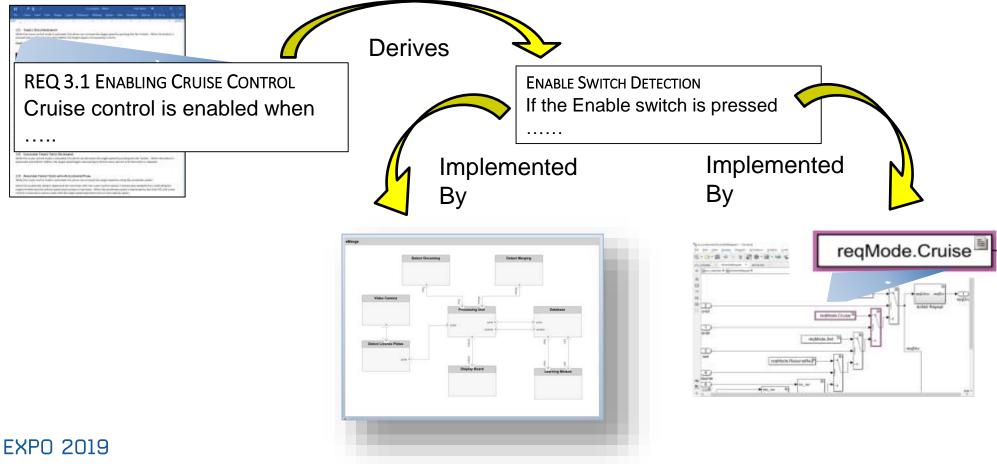
Requirements to Architecture to Simulation





Key Takeaways

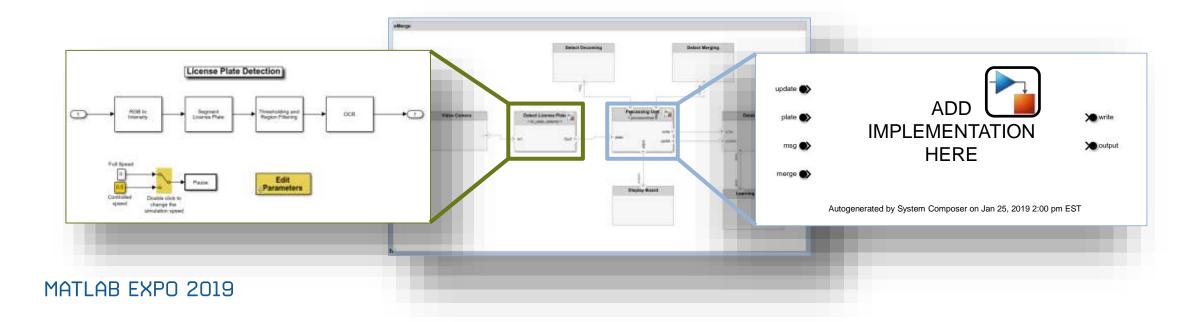
Digital thread providing traceability between requirements, architecture, and design





Key Takeaways

- Digital thread providing traceability between requirements, architecture, and design
- Connected environment for designing and analyzing architectures and designs





Key Takeaways

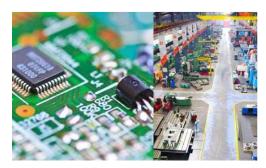
- Digital thread providing traceability between requirements, architecture, and design
- Connected environment for designing and analyzing architectures and designs
- Integrated platform for analyzing all parts of your architecture in one multidomain environment



Dynamic Systems
MATLAB EXPO 2019



State Machines



Discrete-Event

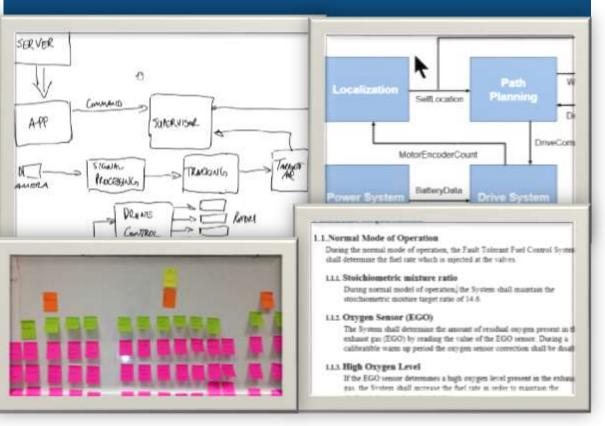


Physical Modeling

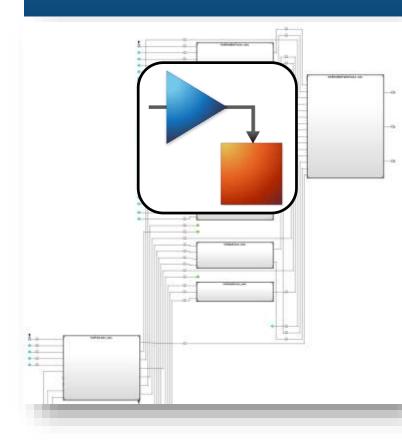


What does that mean?

Early in the Process Concepts/Descriptions



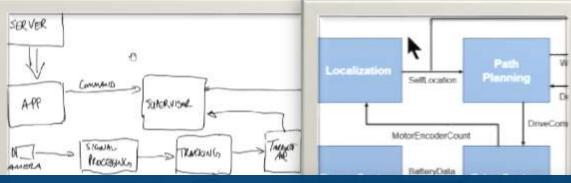
Later in the Process Models





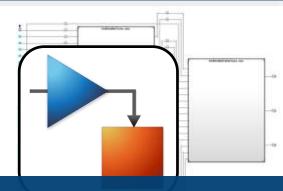
What is the Gap?

Early in the Process Concepts/Descriptions





Later in the Process Models



Digital Thread Connected Environment Analysis & Simulation Platform

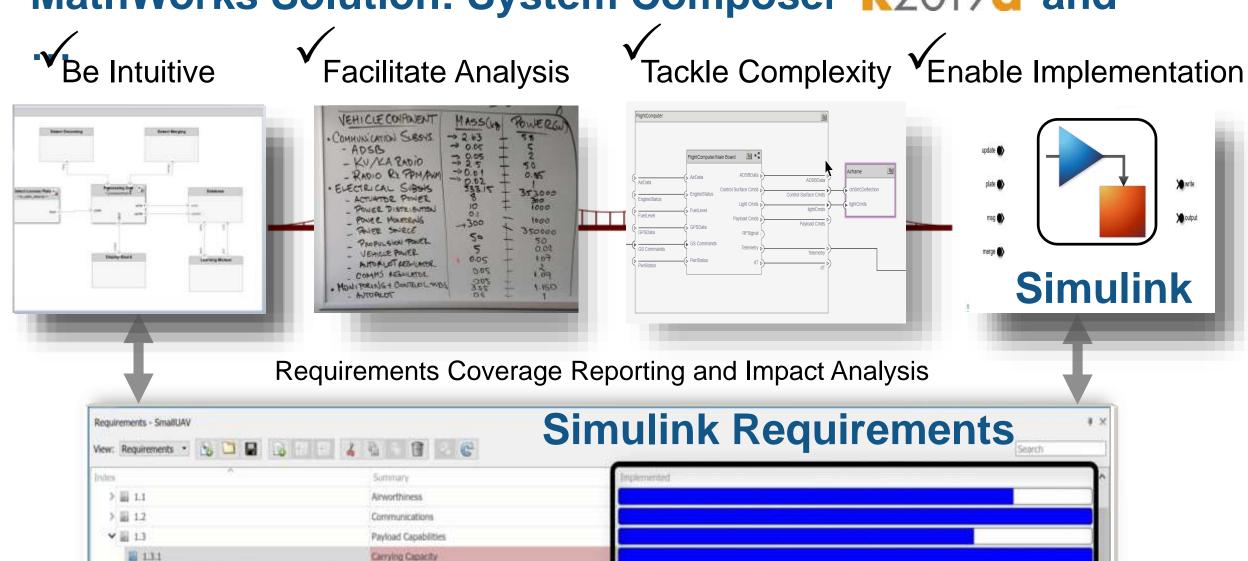


What goes into the bridge?

Be Intuitive Facilitate Analysis Tackle Complexity **Enable Implementation** Electric / Software Electronic SOFTWARE MECHANICAL Sys em SYSTEM OTHER ELECTRICAL DISIPLINES ---1 Other Concepts/Descriptions Models Mechanic Disciplines Digital Thread for Traceability **Functional Requirements** Normal Mode of Operation During the normal mode of operation, the Fault Tolerant Fuel Control System shall determine the fuel rate which is injected at the valves. 1.1.1. Stoichiometric mixture ratio During normal model of operation, the System shall maintain the stoichiometric mixture target ratio of 14.6. 1.1.2. Oxygen Sensor (EGO) MATL



MathWorks Solution: System Composer R2019 and



Payload Bay Capacirty

Default Payload

Pyload Protection

132

圖 1.3.3

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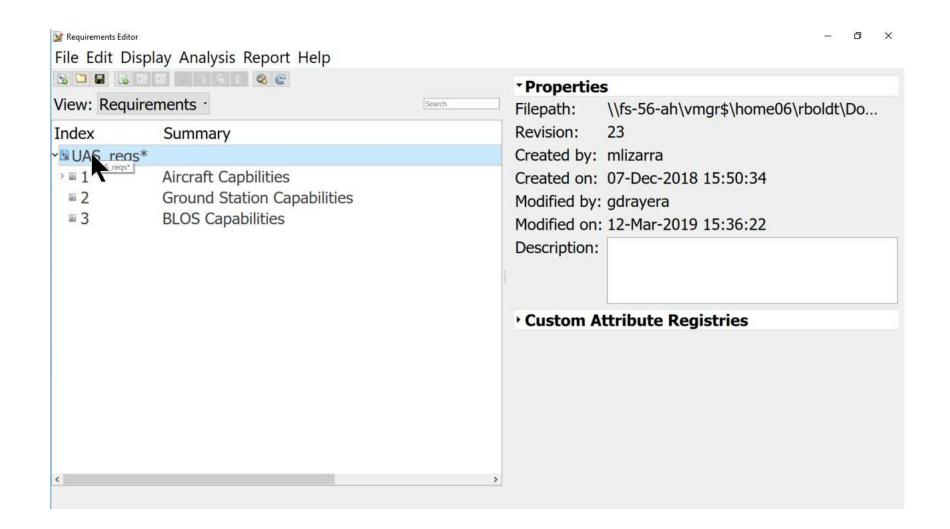


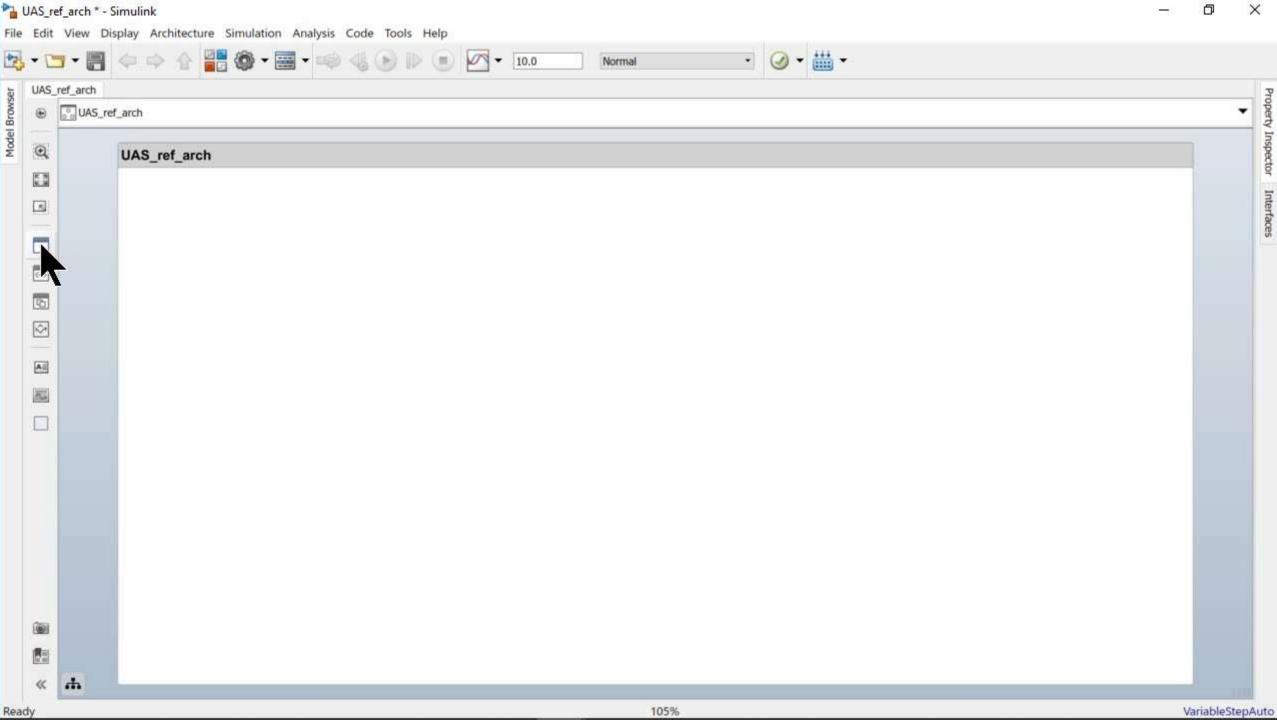
Now let's see it in action

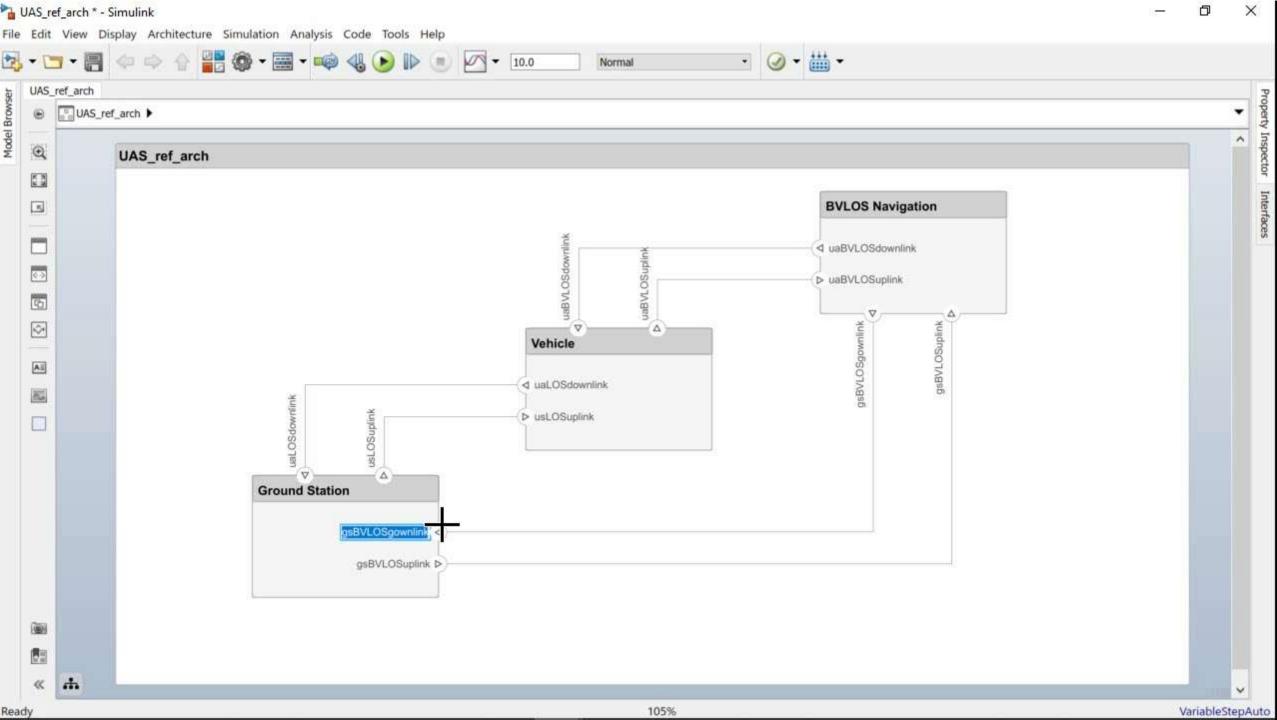


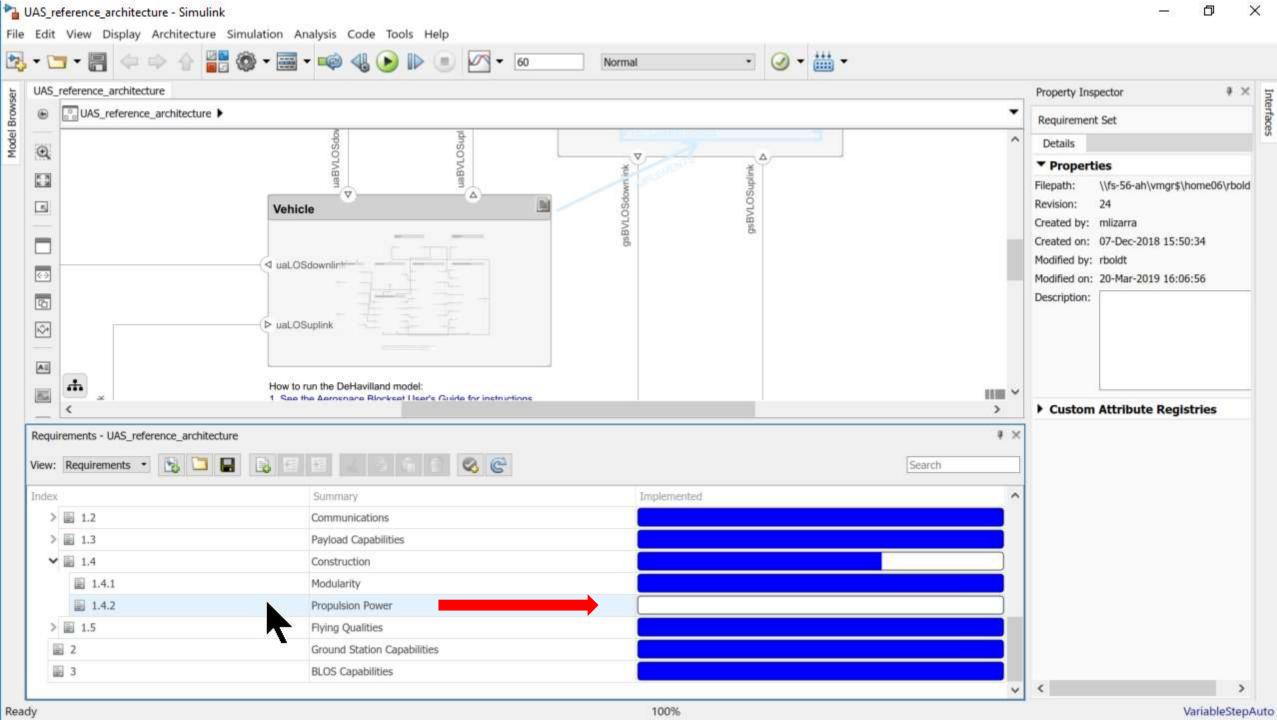


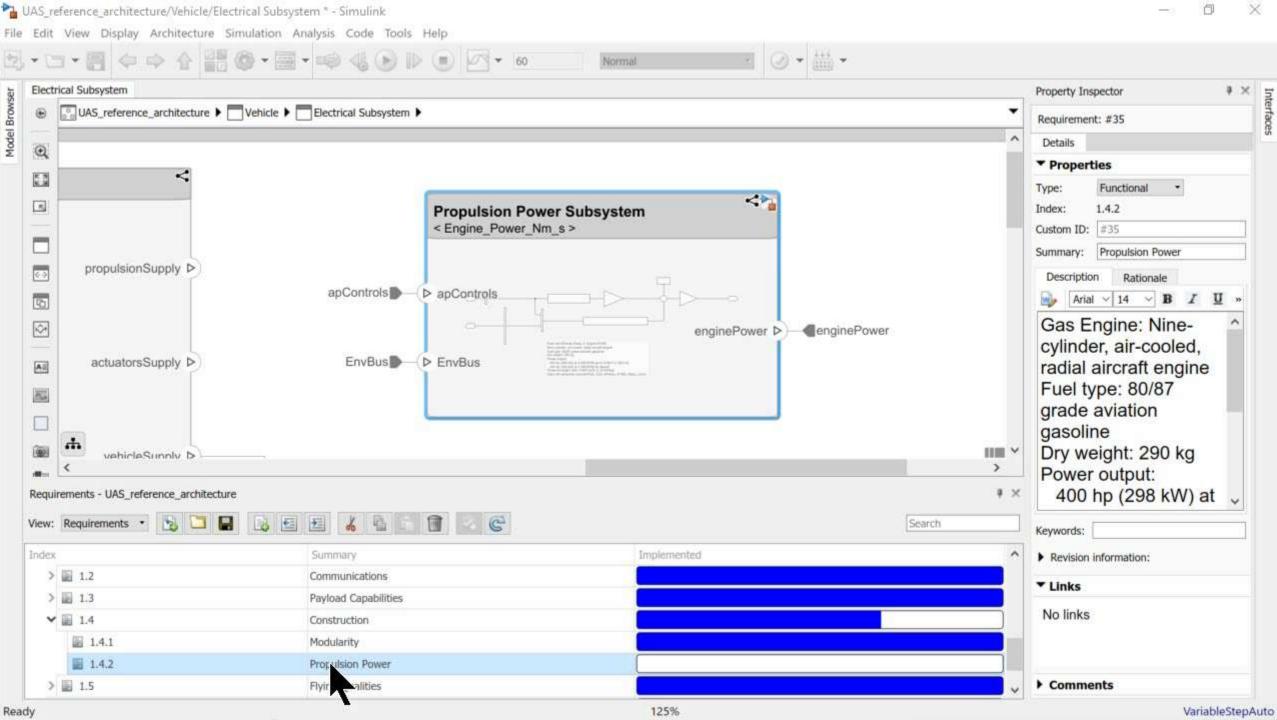


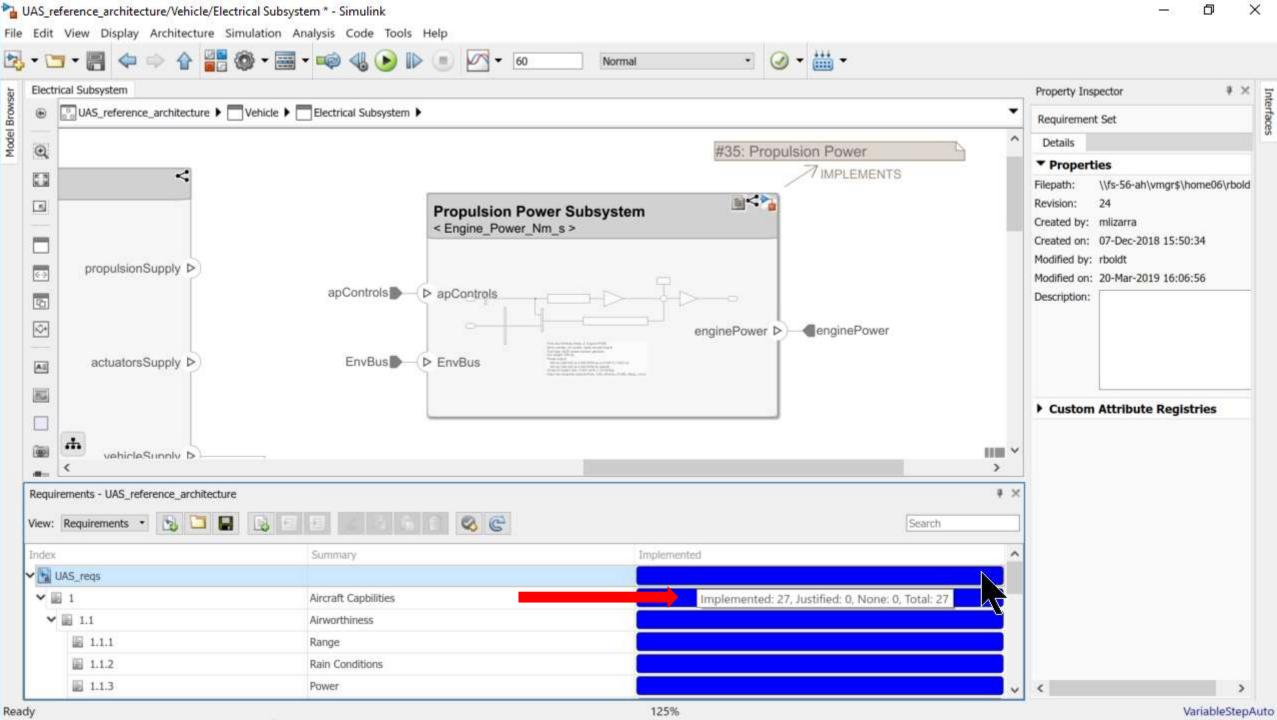


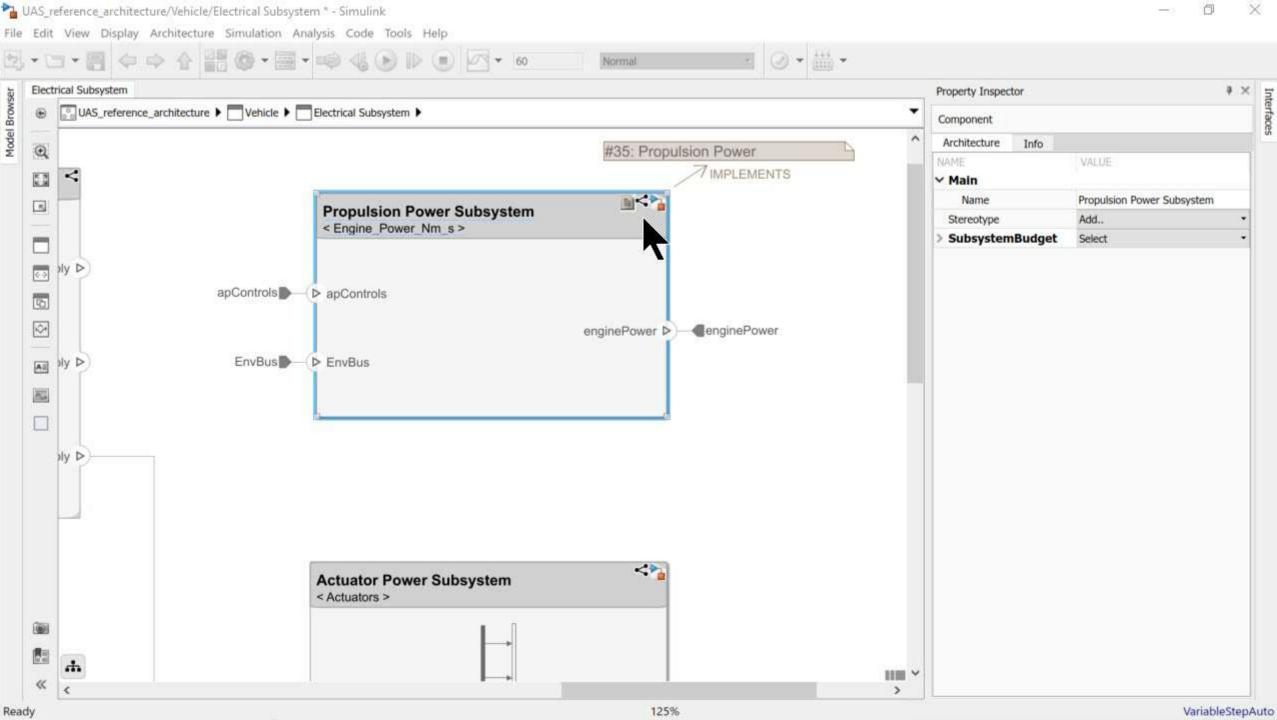




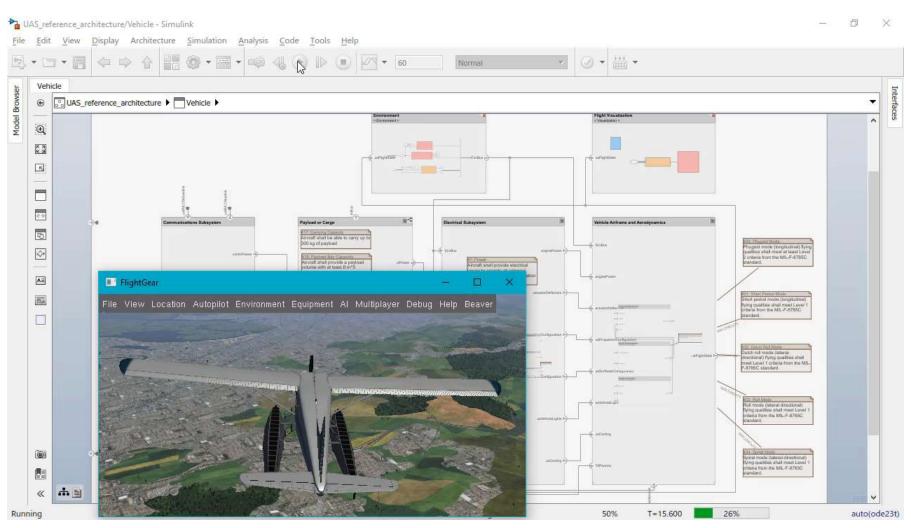


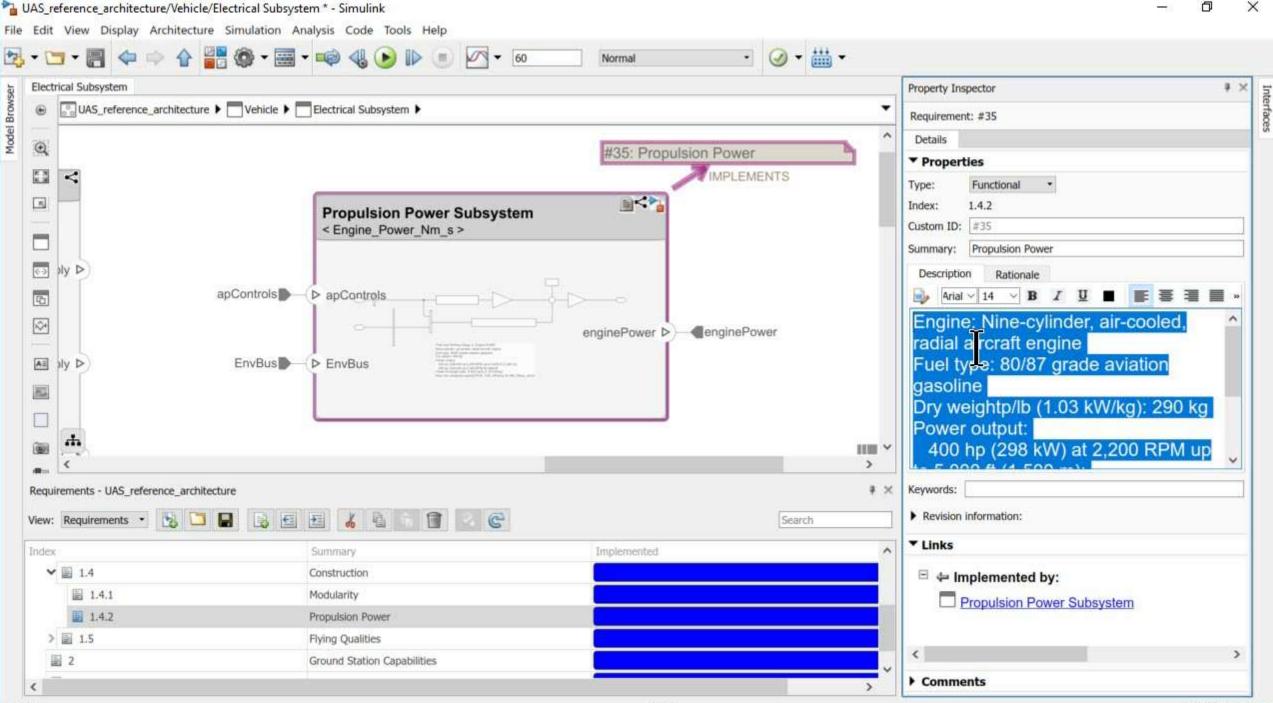


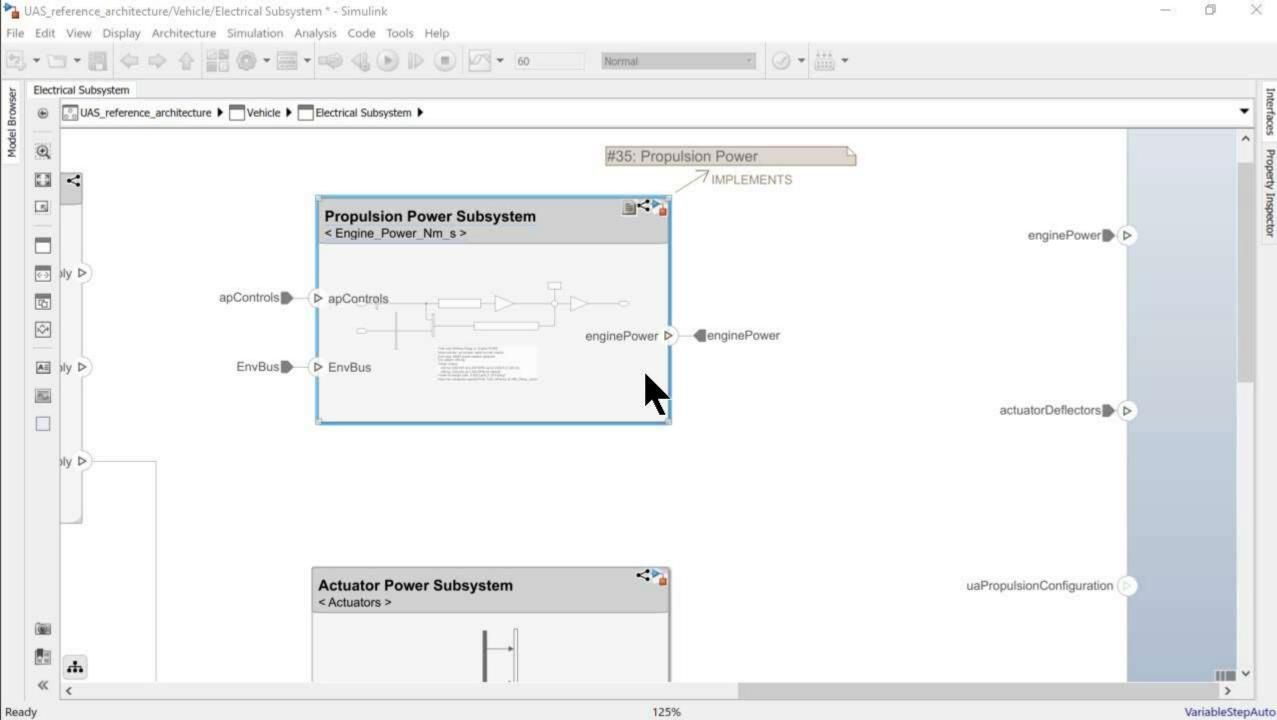


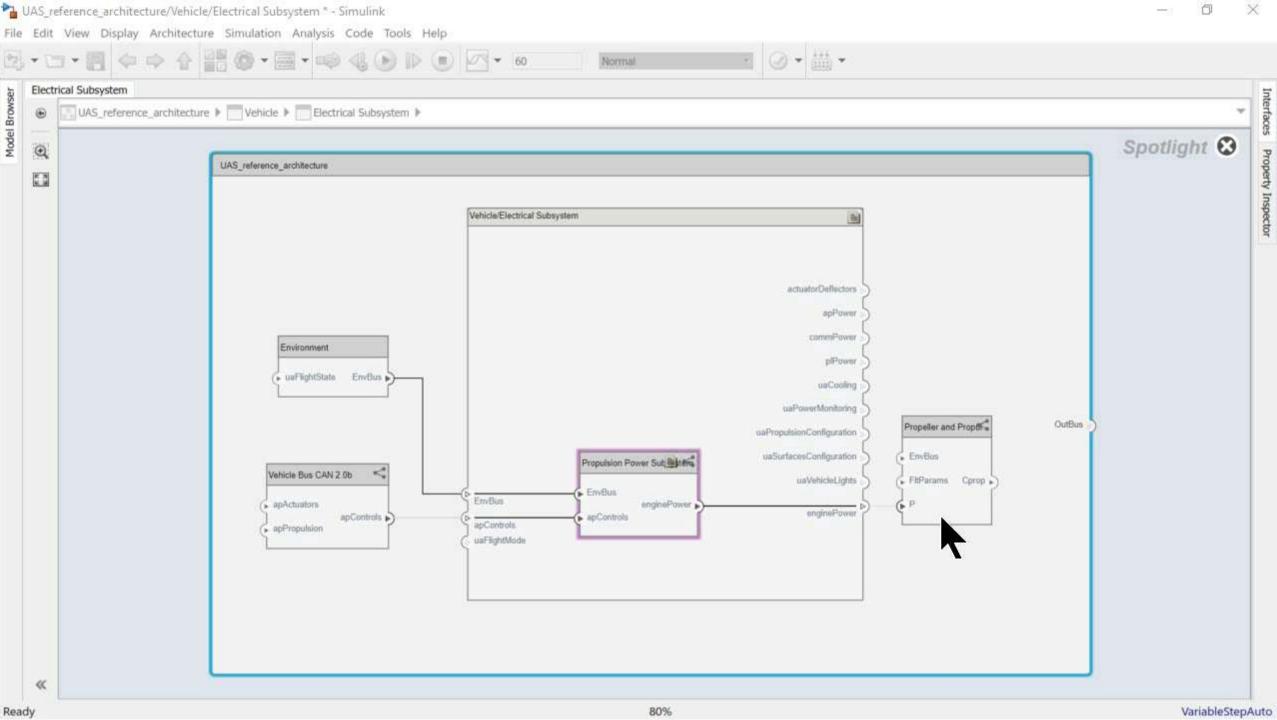


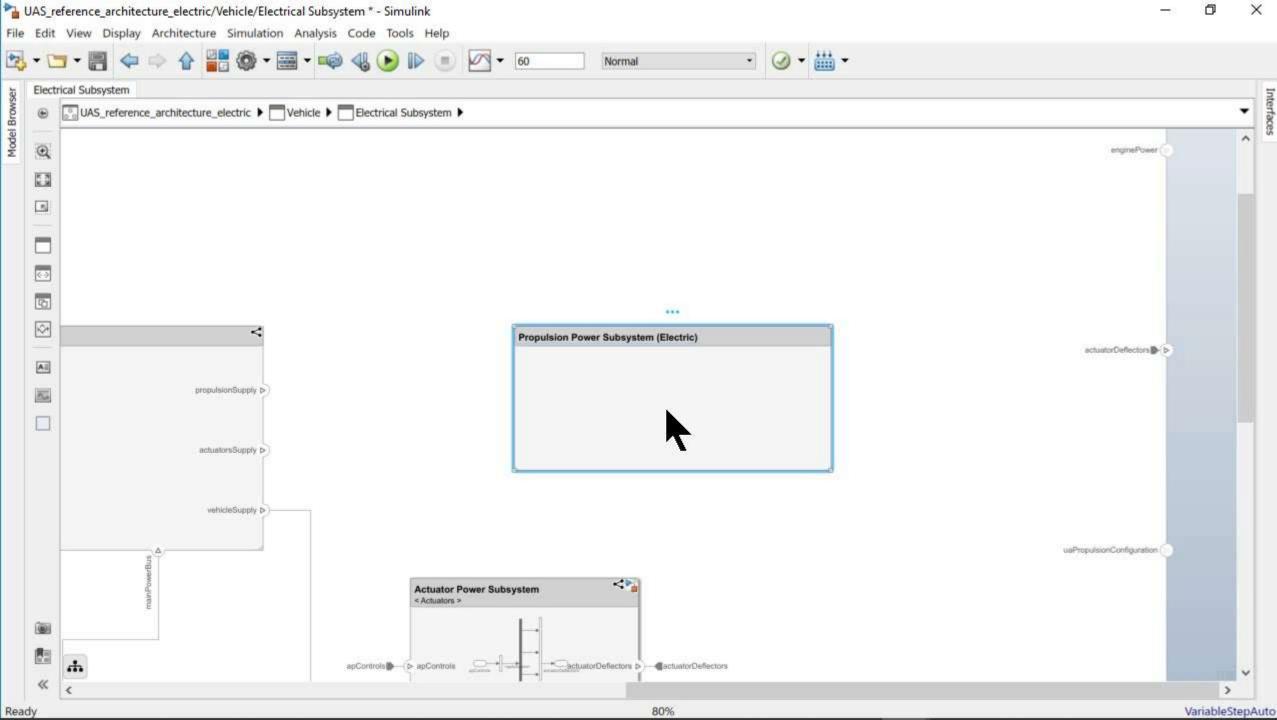


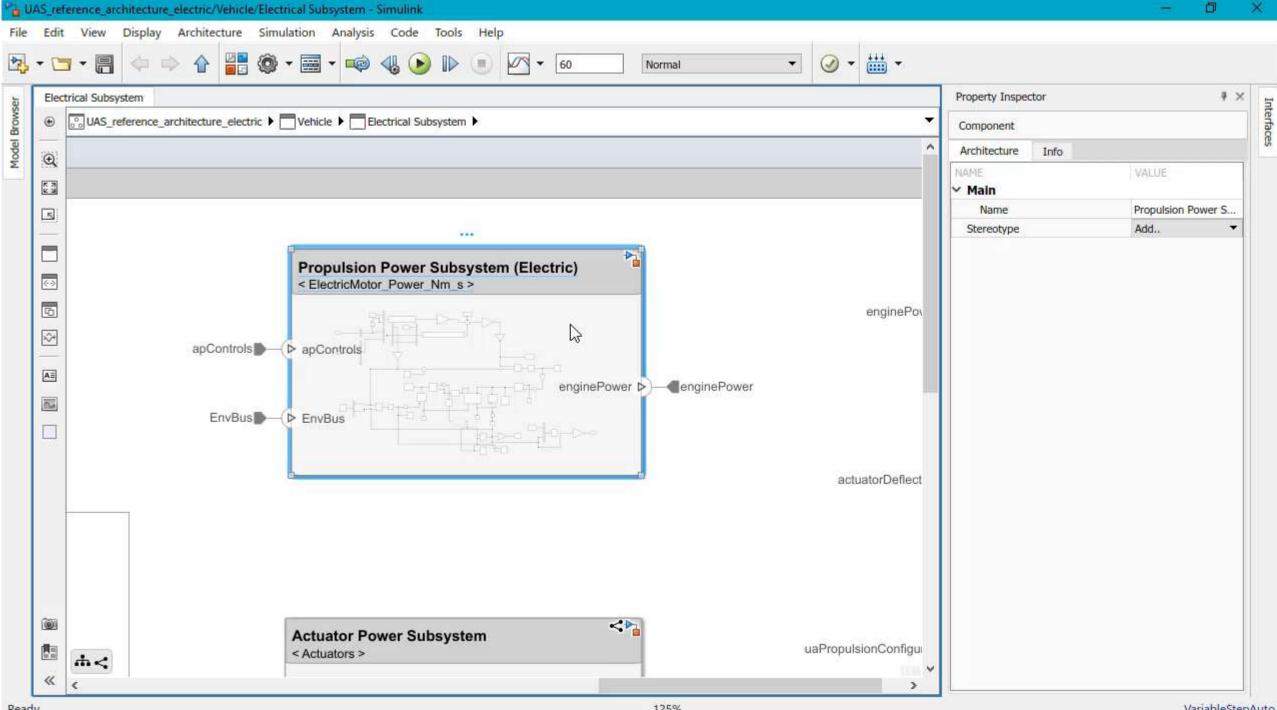


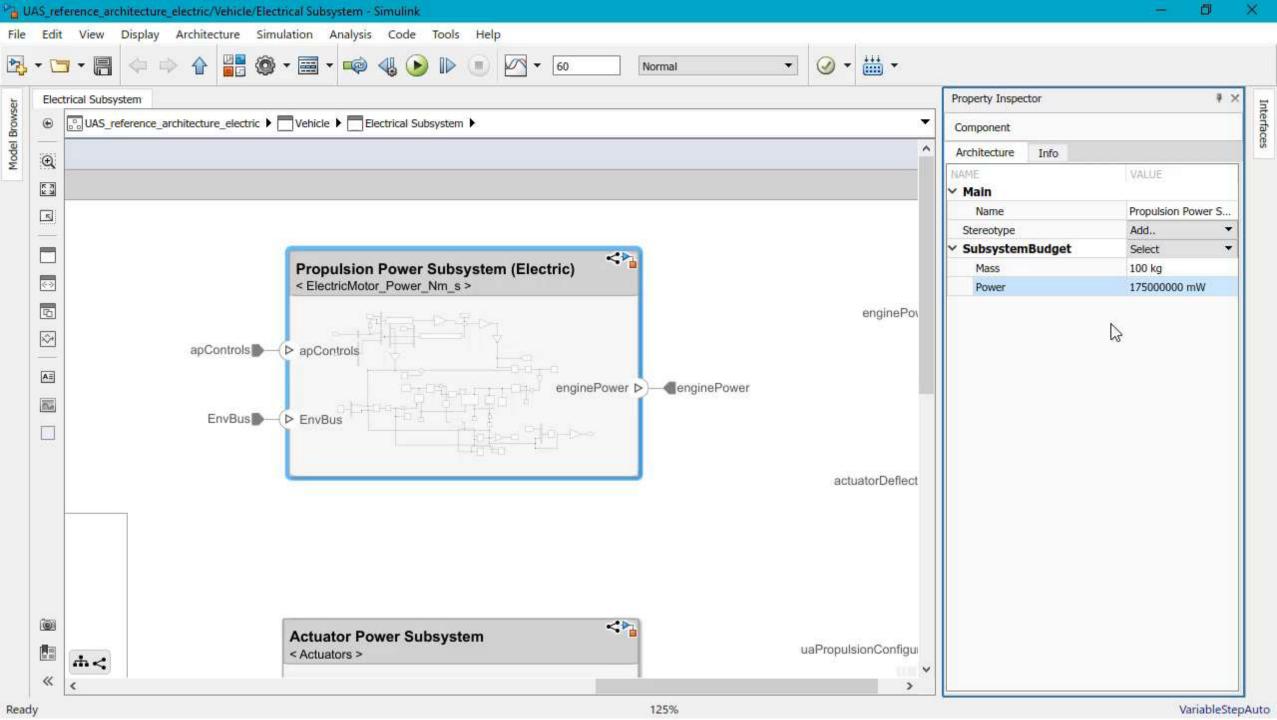


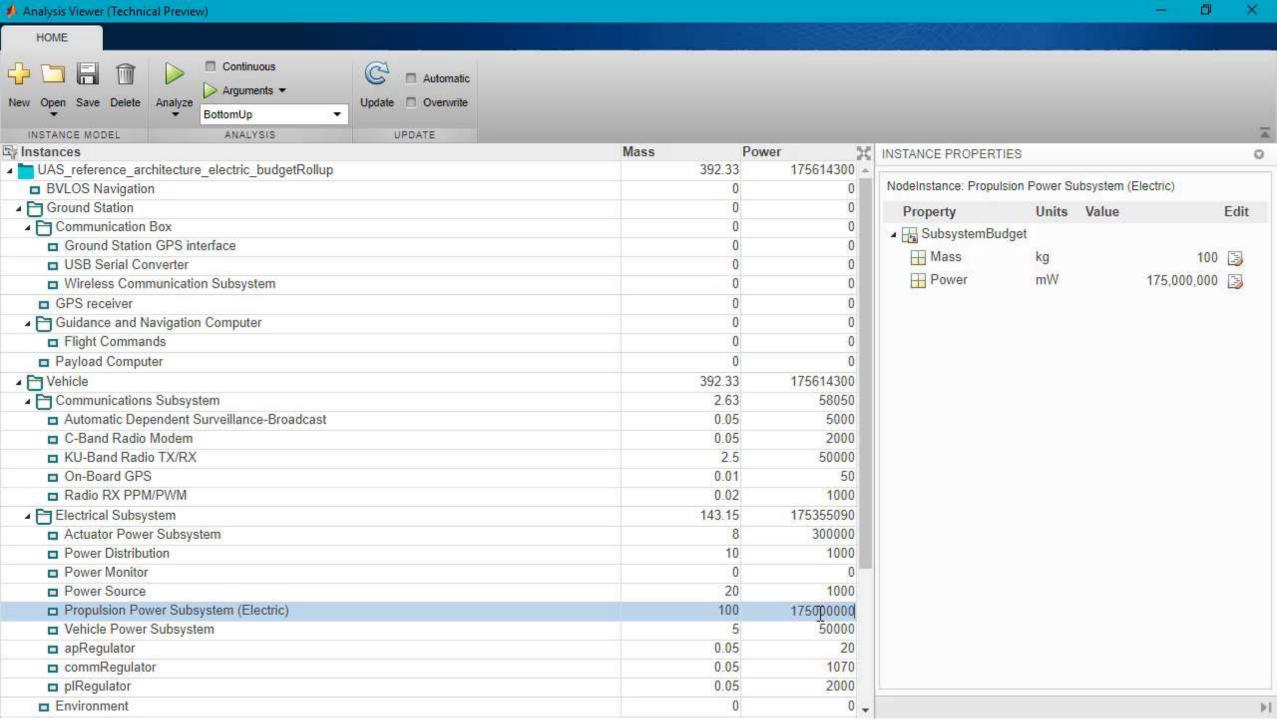




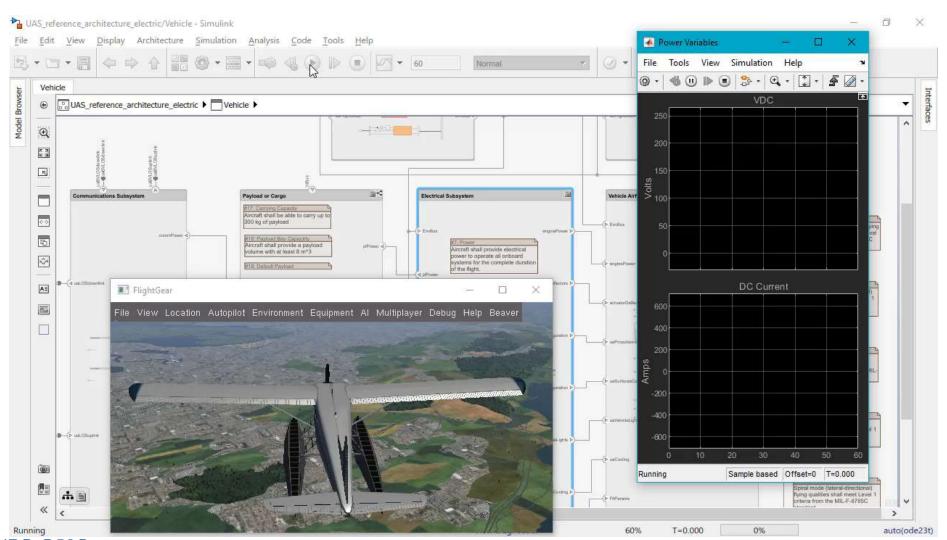










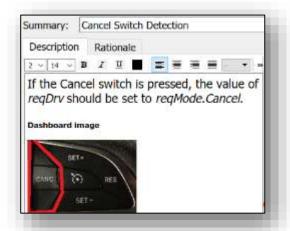




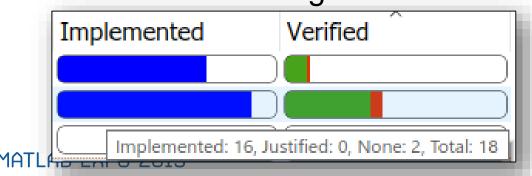
Simulink Requirements

Digital Thread from Requirements to Architecture and Design

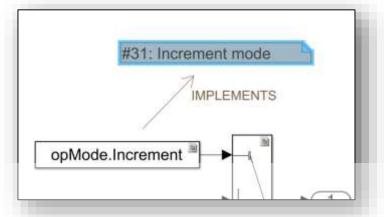
Author requirements or view from external source



Identify gaps in architecture or design



Link requirements, architectures, design, code and test



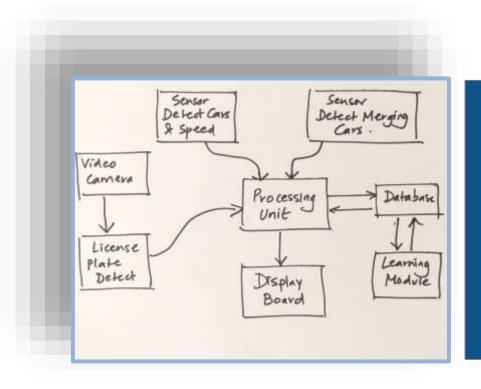
Identify impact of requirement changes





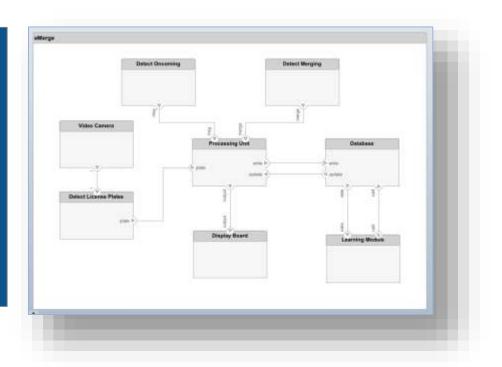
R2019a

Intuitively design system and software architectures



Description ==

Architecture

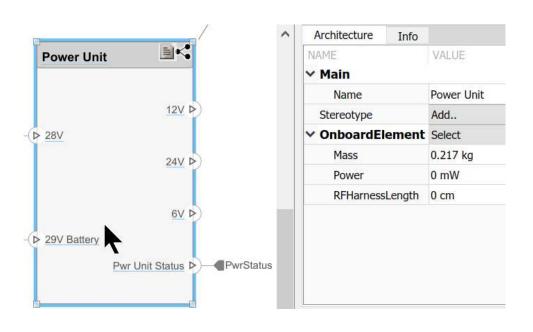




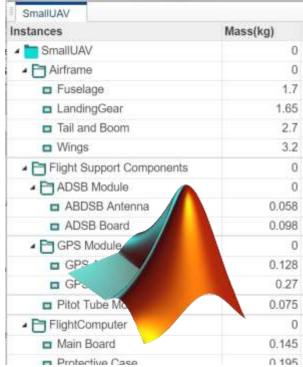
R2019a

Perform trade studies based on data driven analysis to optimize architectures

Add custom data



Create analysis model



Calculate mass roll-up data

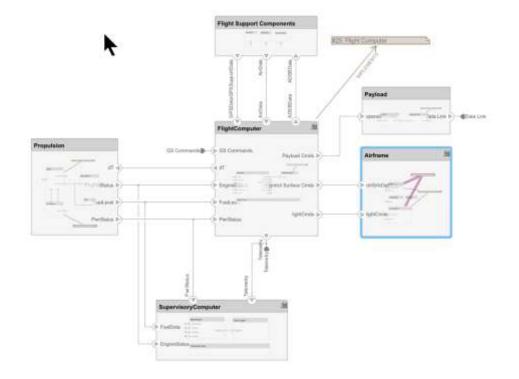
SmallUAV	
nstances	Mass(kg)
▲ SmallUAV	15.932
▲ Airframe	9.25
■ Fuselage	1.7
 LandingGear 	1.65
Tail and Boom	2.7
☐ Wings	3.2
	0.629
■ ADSB Module	0.156
ABDSB Antenna	0.058
■ ADSB Board	0.098
■ GPS Module	0.398
GPS Antenna	0.128
GPS Board	0.27
Pitot Tube Module	0.075
→ FlightComputer	0.388
Main Board	0.145
Protective Case	0.195



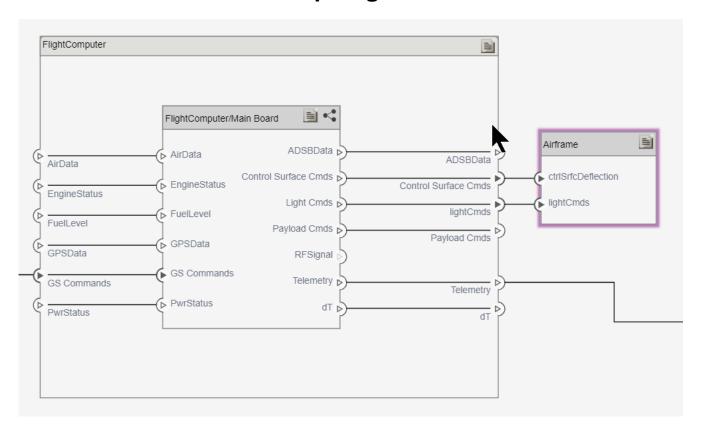
R2019a

Tackle Architecture complexity with spotlight views

Composition



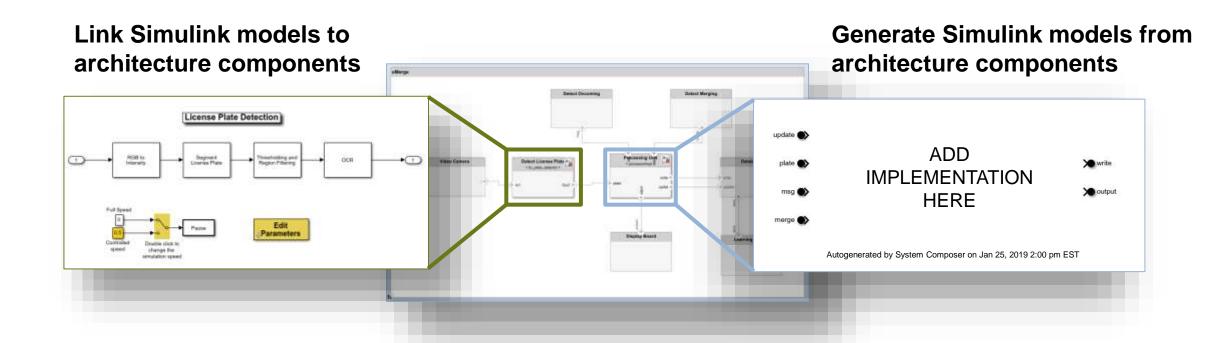
Spotlight





R2019a

System and software architectures connected to implementations in Simulink



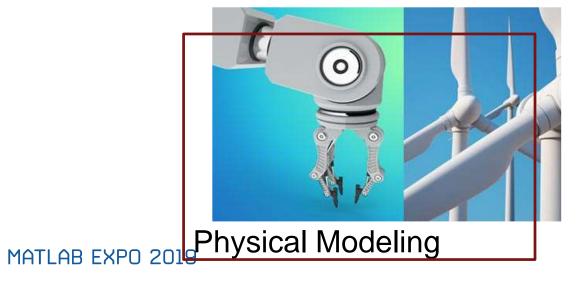


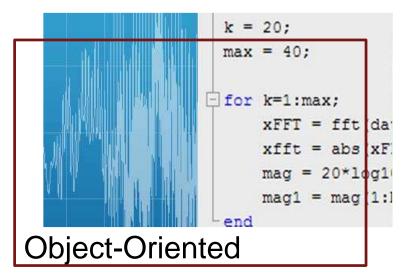
Simulink: A Multi-Language Simulation Environment













Simulink: Connecting with External Models

- Connect your simulation models or code with Simulink, no matter where they originate:
 - Industry proven S-function API
 - Emerging FMI interface
 - Call your C code directly

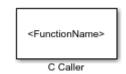
S-Functions















Learn More

- Simulink Requirement Webpage
- System Composer Webpage
- System Modeling and Simulation Webpage
- Trial