

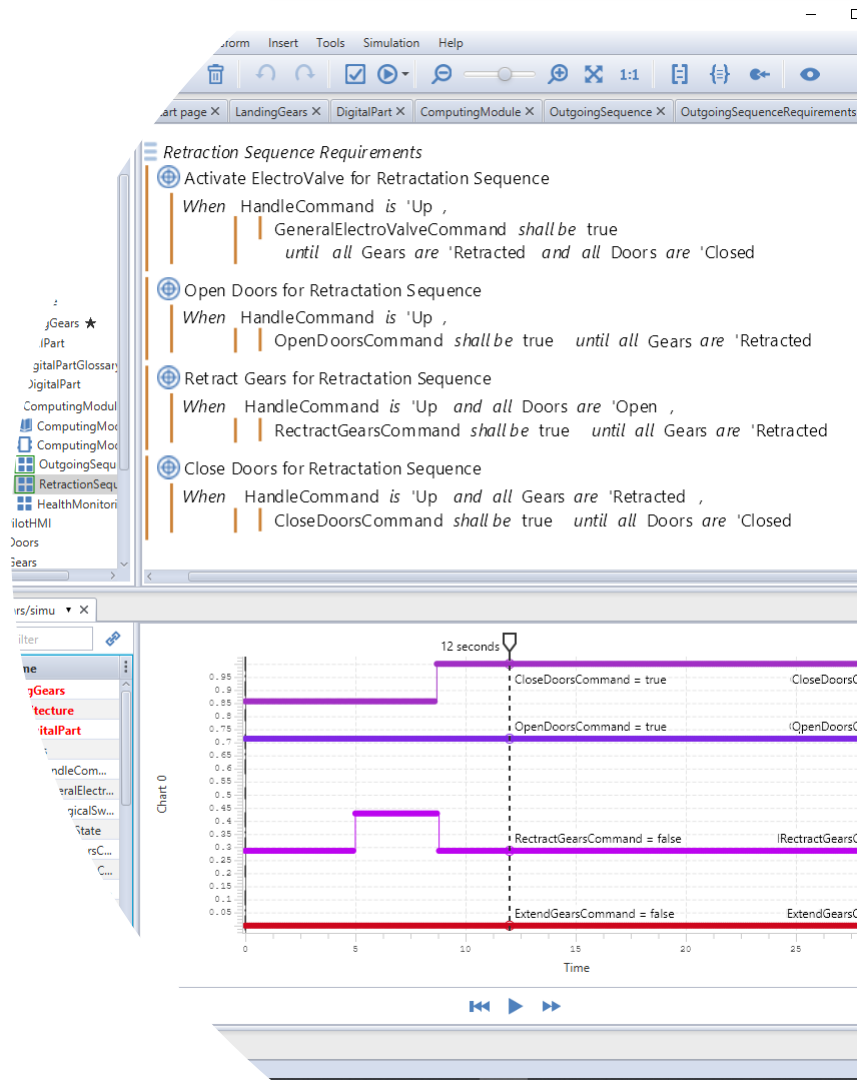


3DEXPERIENCE

CATIA STIMULUS REQUIREMENTS SIMULATION & TEST AUTOMATION

**DASSAULT
SYSTEMES** | The **3DEXPERIENCE** Company

Fabien Gaucher – fgr4@3ds.com



BEHIND THE SCENE

The experts who will answer your questions



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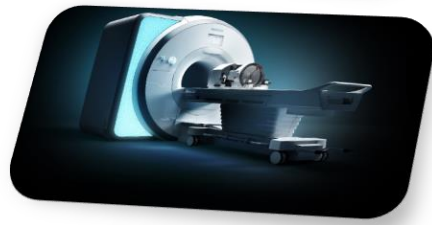
CATIA STIMULUS MARKET POSITIONING

What we do

The world's first modelling and **simulation** tool enabling you to write, debug and validate functional embedded systems **requirements**

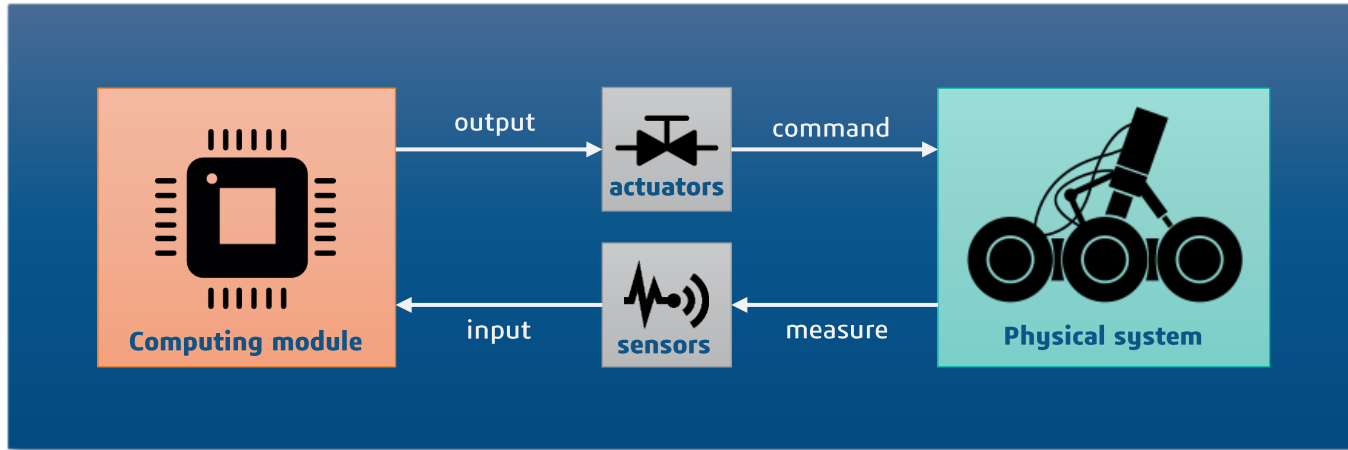
Who we serve

Systems architects, software designers and test engineers in safety-critical industries



CHALLENGES OF EMBEDDED SYSTEMS DEVELOPMENT

An embedded system is combination of a computing module and input/output devices that interact with a larger physical system (mechanical, electrical, fluid)



*What **tools** are there to design such increasingly fast-evolving complex systems?*

*How important are **requirements** in the development of safety-critical systems?*

WHAT CAN CATIA STIMULUS DO FOR YOU?

Make requirements right the first time to save project's time and costs

Pain #1

Refining system requirements into software specifications remains very challenging, resulting in incorrect, incomplete and inconsistent requirements.

Pain #2

The creation of test cases remains massively manual, tedious and error-prone, and keeping tests consistent with requirements makes maintenance even worse.



CATIA Stimulus allows to produce accurate software requirements that meet system requirements.

→ Designers implement systems faster, right the first time

CATIA Stimulus generates numerous test cases automatically and checks that the software complies with all its requirements.

→ Testers improve test coverage while reducing the test effort

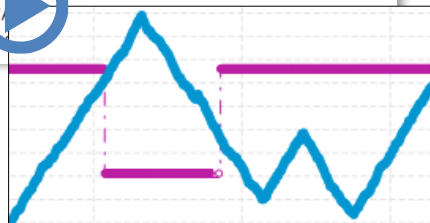
REQUIREMENTS-IN-THE-LOOP SIMULATION

A disruptive solution for the end-to-end validation of embedded systems

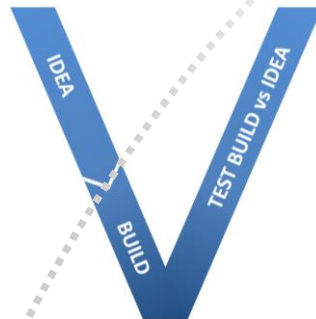
⊕ Outgoing Sequence - Open Doors
When OutgoingSequence is 'Active',
OpenDoorsCommand shall be true unless all Gears are 'Extended'

⊕ Outgoing Sequence - Extend Gears
When OutgoingSequence is 'Active' and all Doors are 'Open',
ExtendGearsCommand shall be true unless all Gears are 'Extended'

⊕ Outgoing Sequence - Close Doors
When OutgoingSequence is 'Active',
CloseDoorsCommand shall be true



GENERATE BEHAVIORS
that satisfy scenarios & requirements
and **detect incorrect, missing or
conflicting requirements**



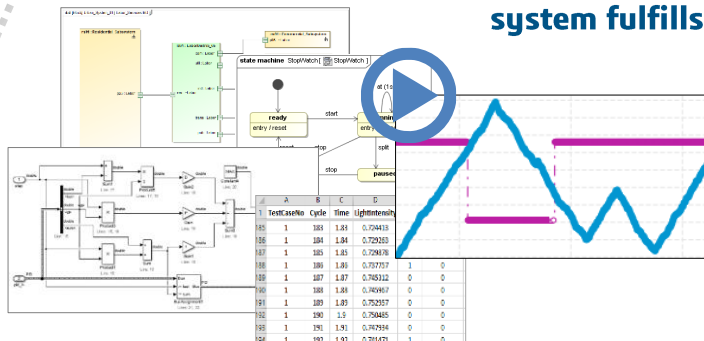
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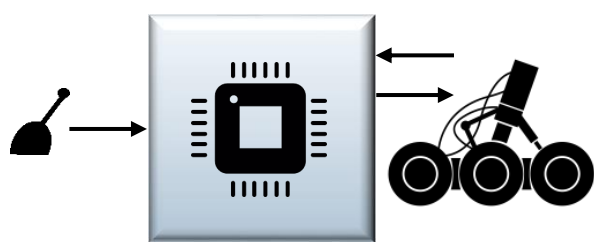
Environment
LLR_v3
LLR_v3
REQ_001
REQ_002
REQ_003

OBSERVE BEHAVIORS
of executable models, software,
or hardware logs to **ensure the
system fulfills its requirements**

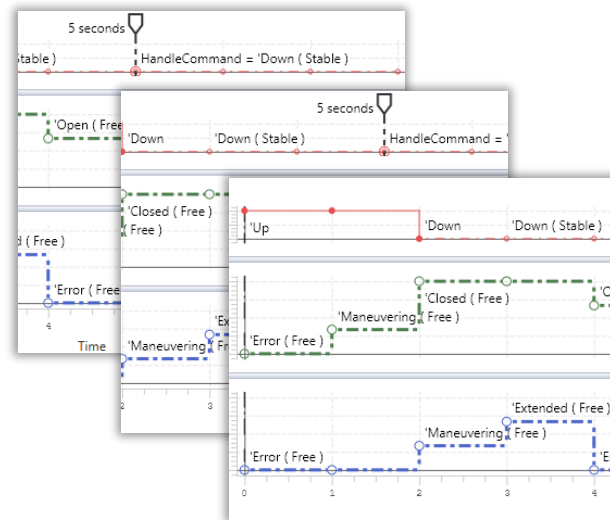
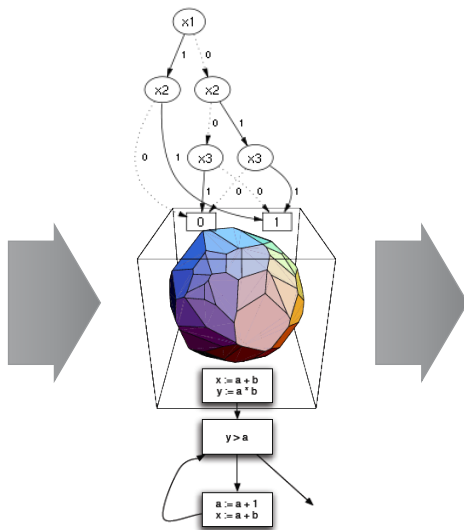


REQUIREMENTS-IN-THE-LOOP PRINCIPLES

A unique technology to generate many possible behaviors that satisfy textual requirements



When HandleCommand *is* 'Down,
all Gears *shall be* Extended *and*
all Doors *shall be* Closed
within 15 [second]



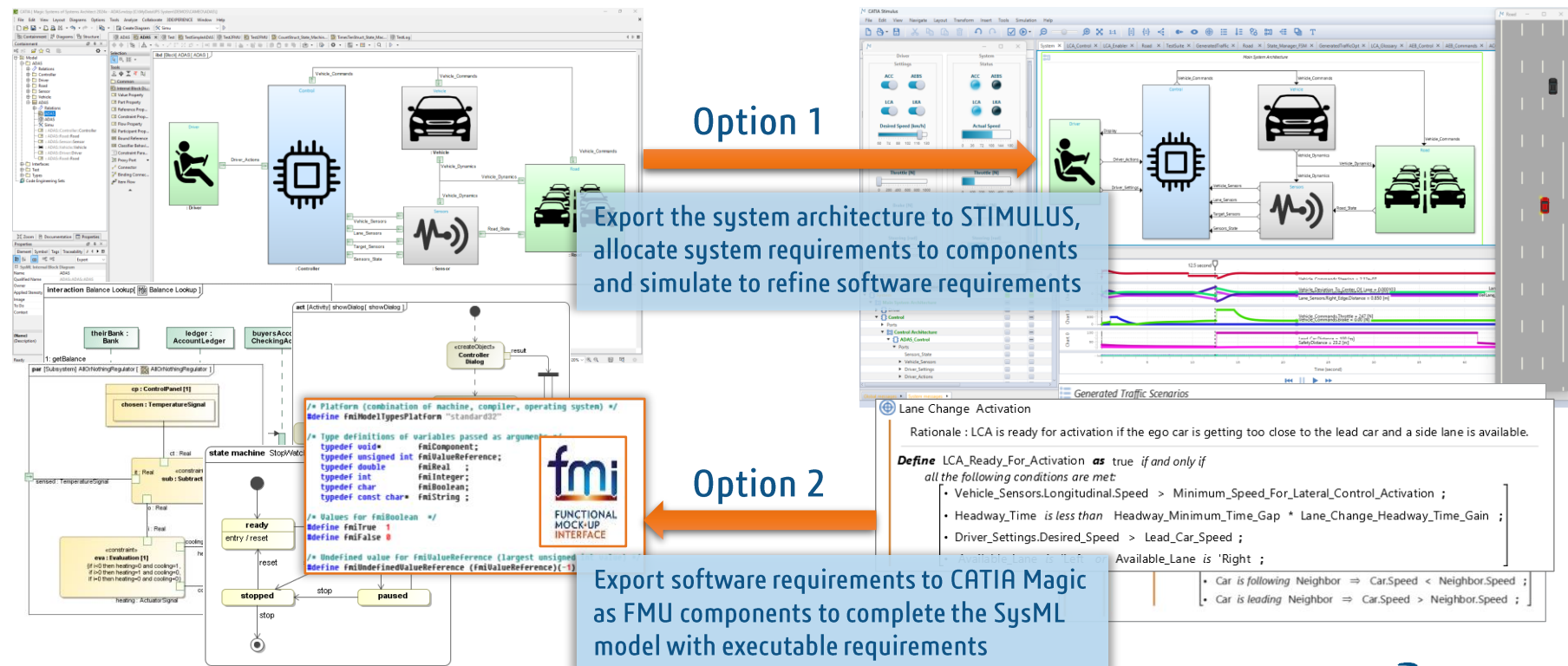
- Users formalize requirements with textual yet executable templates

- Simulator solves constraints behind formalized requirements

- Debugger detects incorrect, missing or conflicting requirements

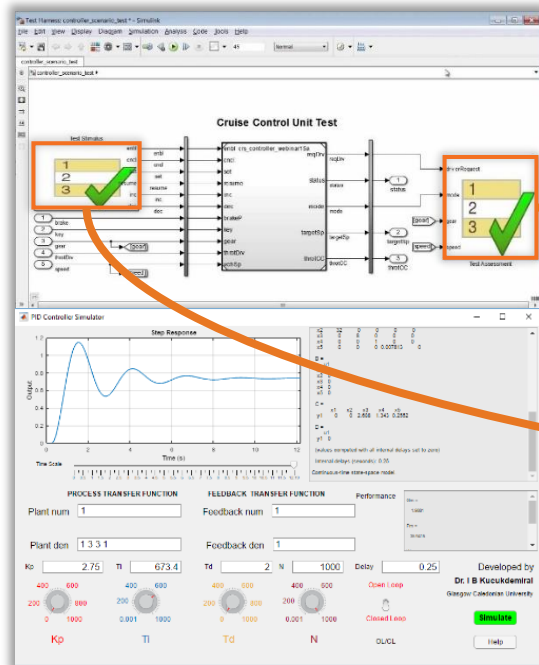
VALIDATE SYSTEM SPECIFICATIONS

Extend MBSE with Requirements-In-the-Loop Simulation



VALIDATE SOFTWARE DESIGN WITH WHITE-BOX FMI

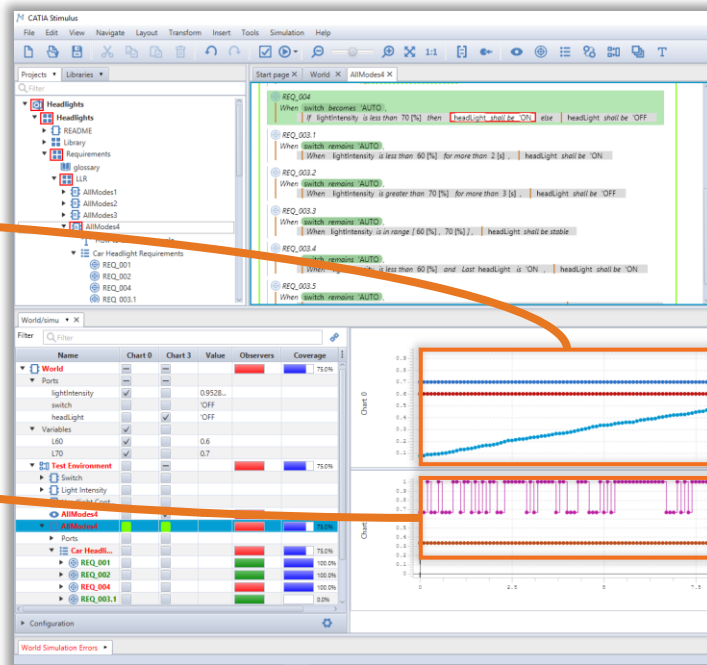
Launch a full CATIA Stimulus session from Simulink, SCAD, etc



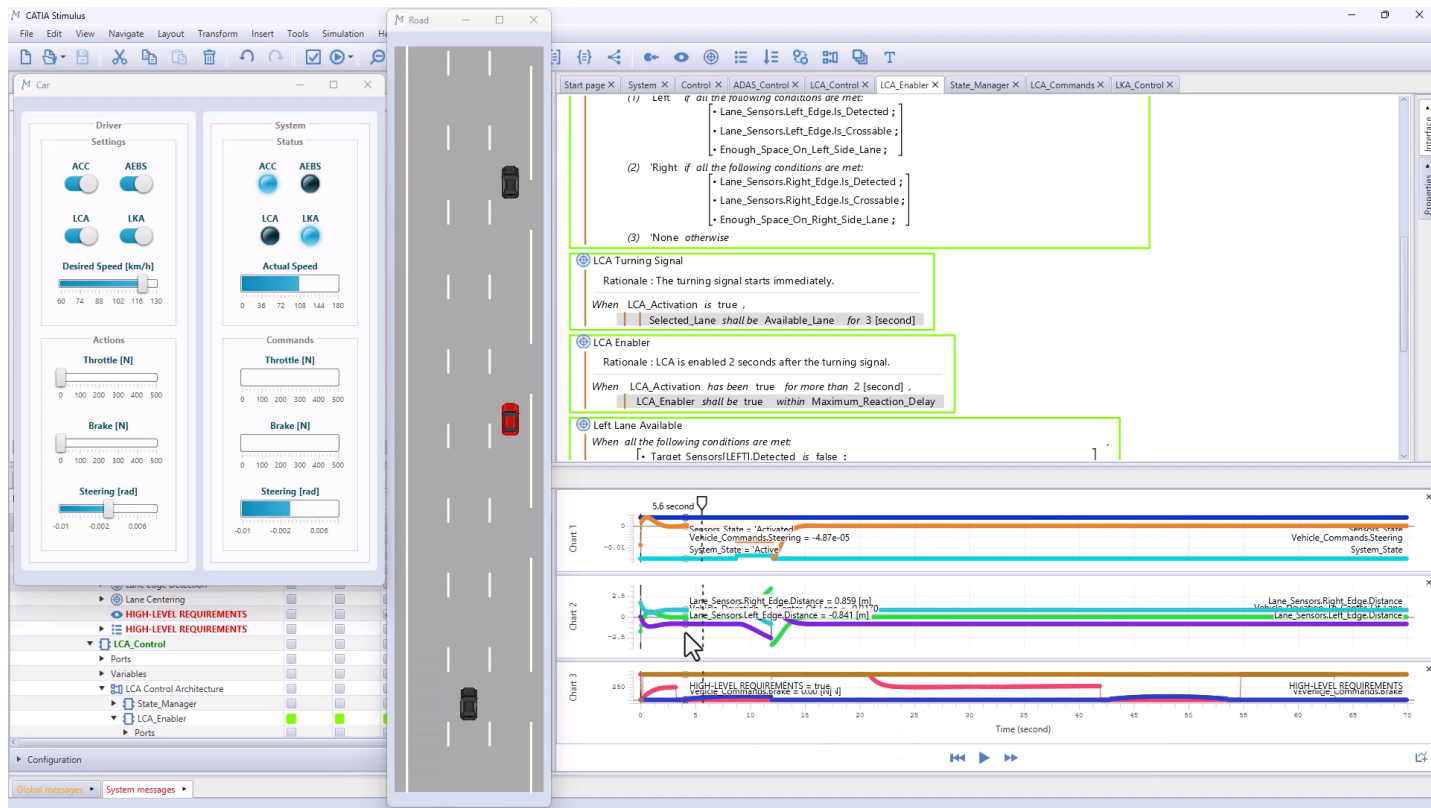
Outputs of the Simulink model can be observed by Stimulus requirements to ensure the design meets its specification



Test vectors can be generated from Stimulus and used as inputs of the Simulink model



LIVE DEMO



CONCLUSIONS & KEY TAKEAWAYS

✓ CATIA STIMULUS requirements are true models



Many system properties are easily expressed with textual requirements



Requirements and graphical models capture complementary information



Formal requirements ensure a clear and non ambiguous semantics



Requirements simulation opens the door to early validation and test automation

✓ CATIA STIMULUS integrates well with existing methods & tools



At specification phase, it extends MBSE simulation with executable requirements



At validation phase, it massively automates test case generation and requirements verification

TRY CATIA STIMULUS!

Free Access for INCOSE SE Lab Members

