

FMUs from Dymola and SimulationX on dSPACE SCALEXIO HiL



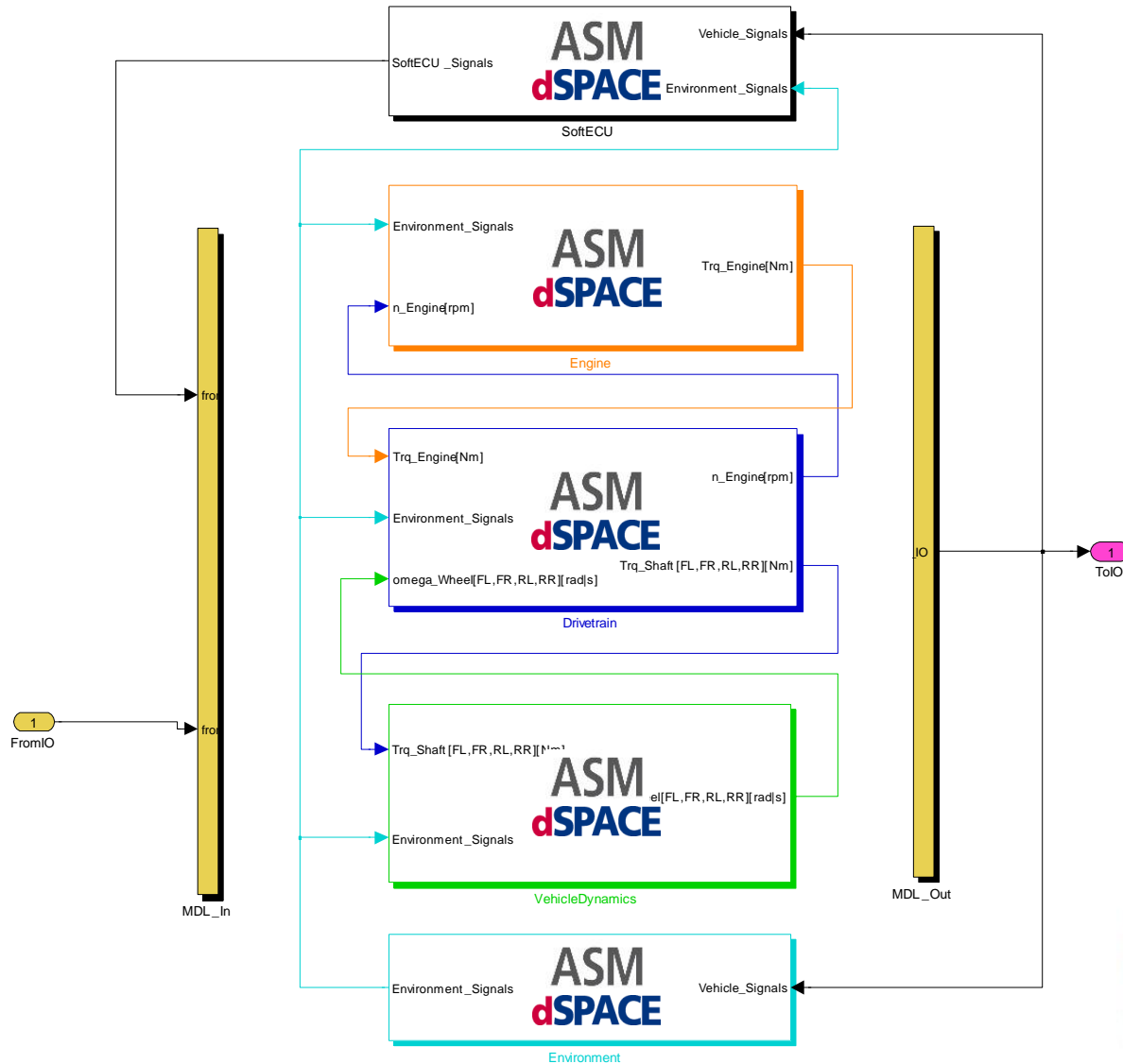
Dr. Andreas Pillekeit (joint work with ITI and Dassault Systèmes)

Product Engineer Implementation Software Tools

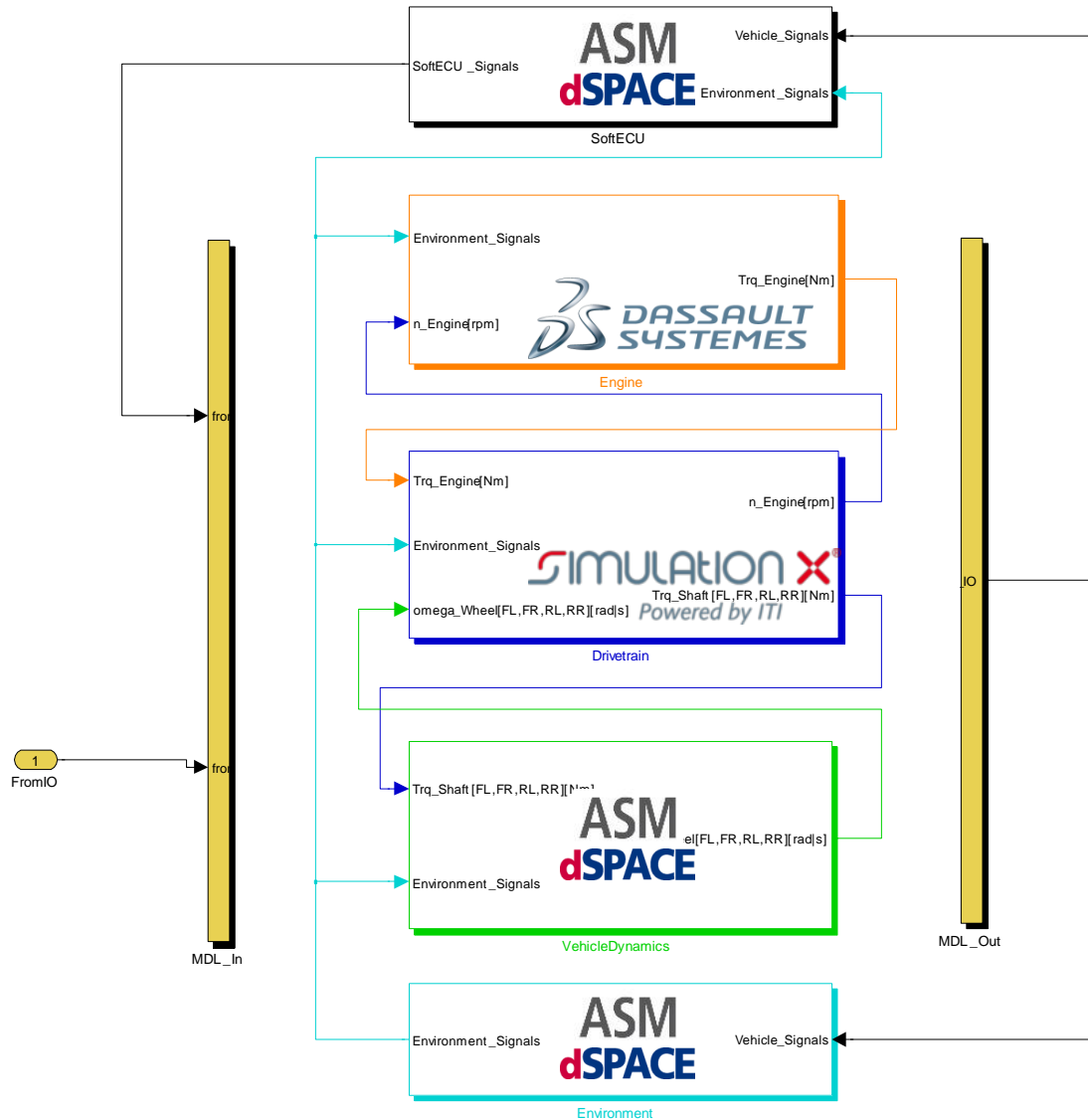
dSPACE Product Management · Paderborn

- The ESP ECU controls brakes if spin out of car is imminent
 - Uses brakes to create counter forces
- Used sensor data
 - Steering angle
 - Yaw rate
 - Lateral acceleration
 - Wheel speed

dSPACE Automotive Simulation Model (ASM) The Starting Point



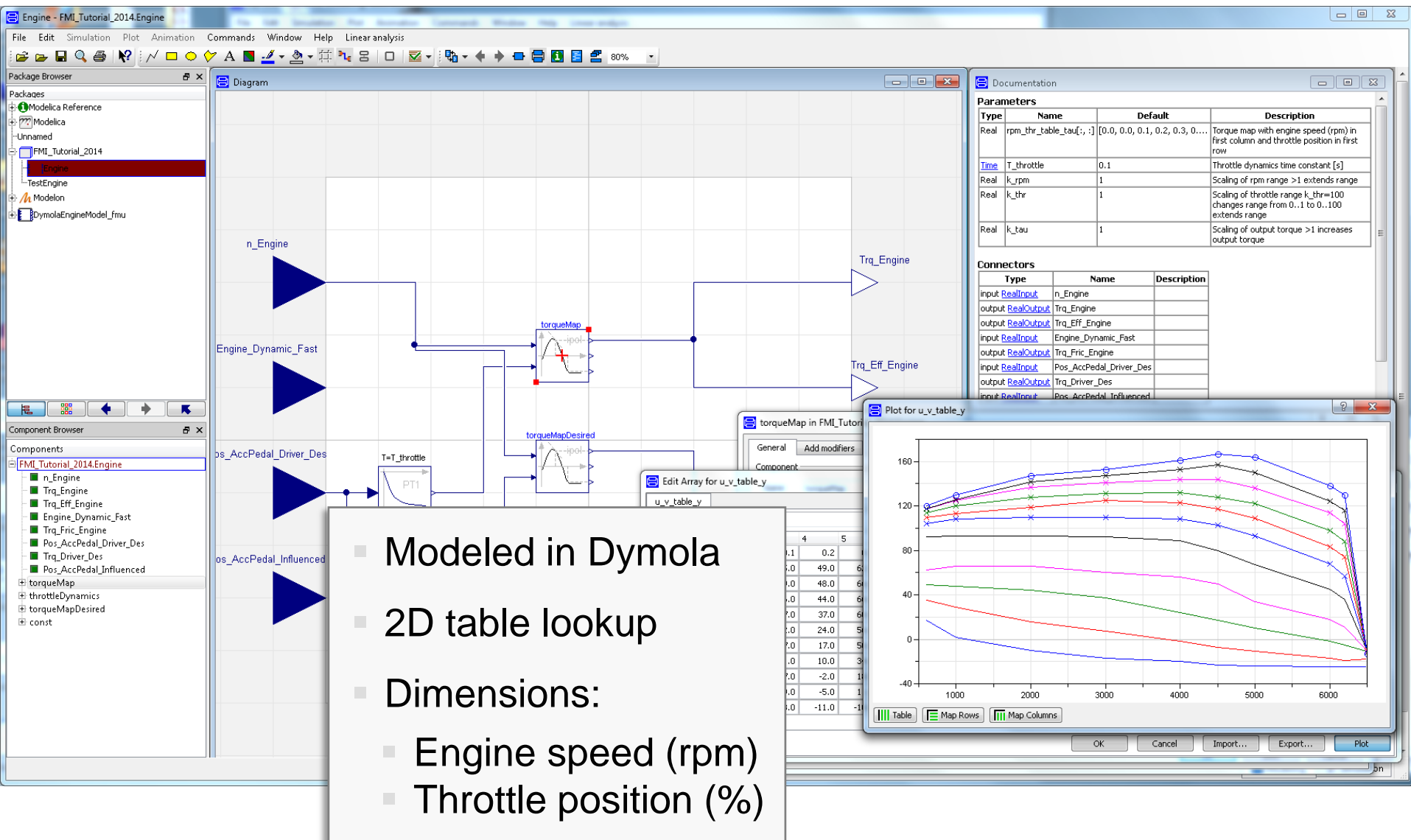
dSPACE Automotive Simulation Model (ASM) Updated Overall Model with FMUs



- Vehicle Dynamics and Environment modeled with **dSPACE** ASM
- Original Engine and Drivetrain models are replaced
- Exchange of interface descriptions between dSPACE, ITI, Dassault Systèmes
- Real-time capable c-code FMUs (sample time 1 ms)
- FMI 2.0 RC1 for Co-Simulation



Engine Model in Detail

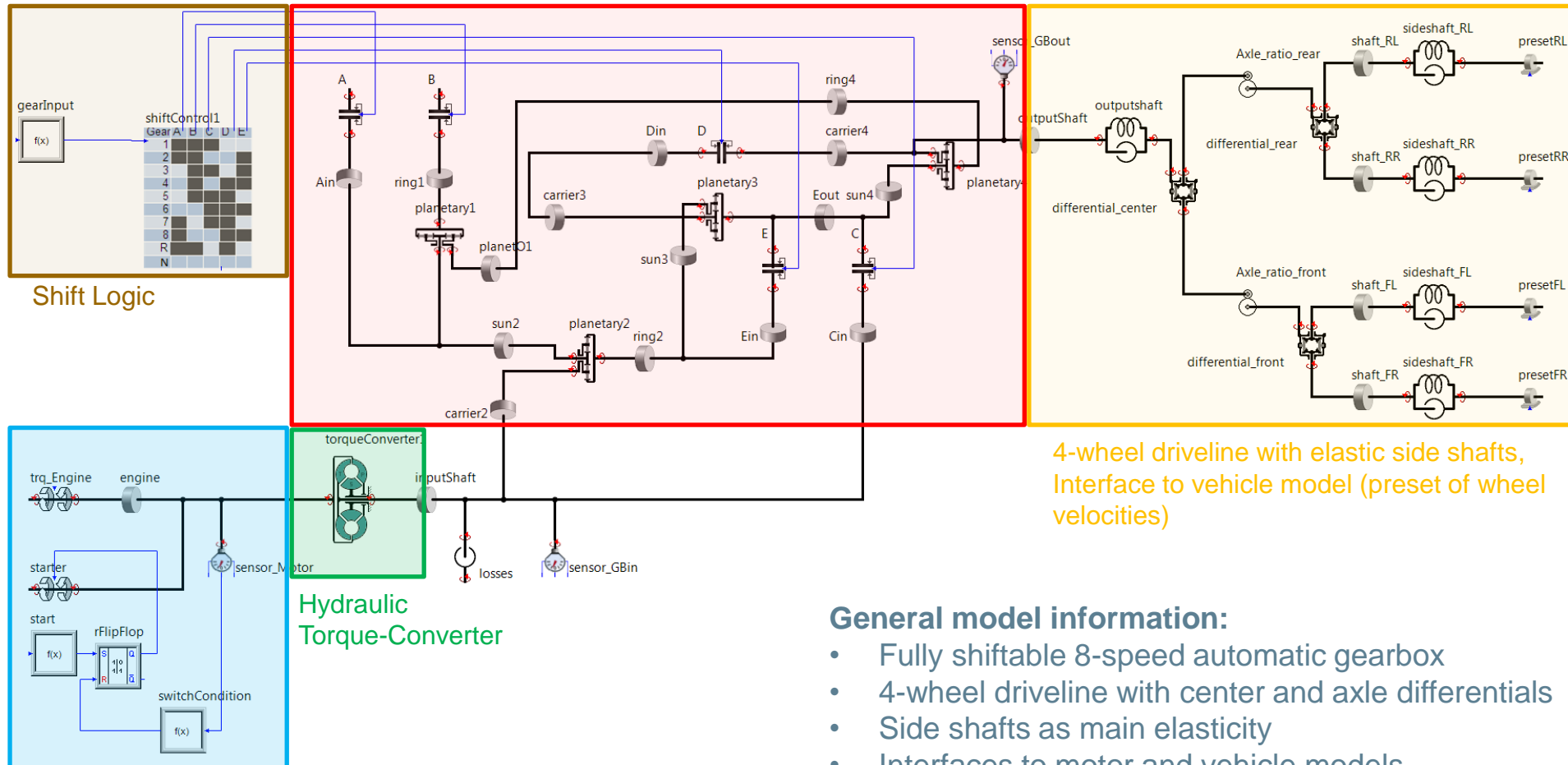


SimulationX Drivetrain Model in Detail



Supporting your vision

Automatic Gearbox (2 brakes, 3 clutches, 4 planetary gear stages)



4-wheel driveline with elastic side shafts,
Interface to vehicle model (preset of wheel
velocities)

General model information:

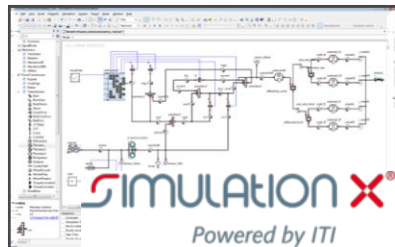
- Fully shiftable 8-speed automatic gearbox
- 4-wheel driveline with center and axle differentials
- Side shafts as main elasticity
- Interfaces to motor and vehicle models
- Starter model
- Model consists of SimulationX library elements

Interface to motor model
(preset of engine torque),
Starter

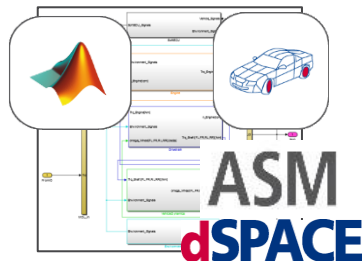
Modeling



Engine

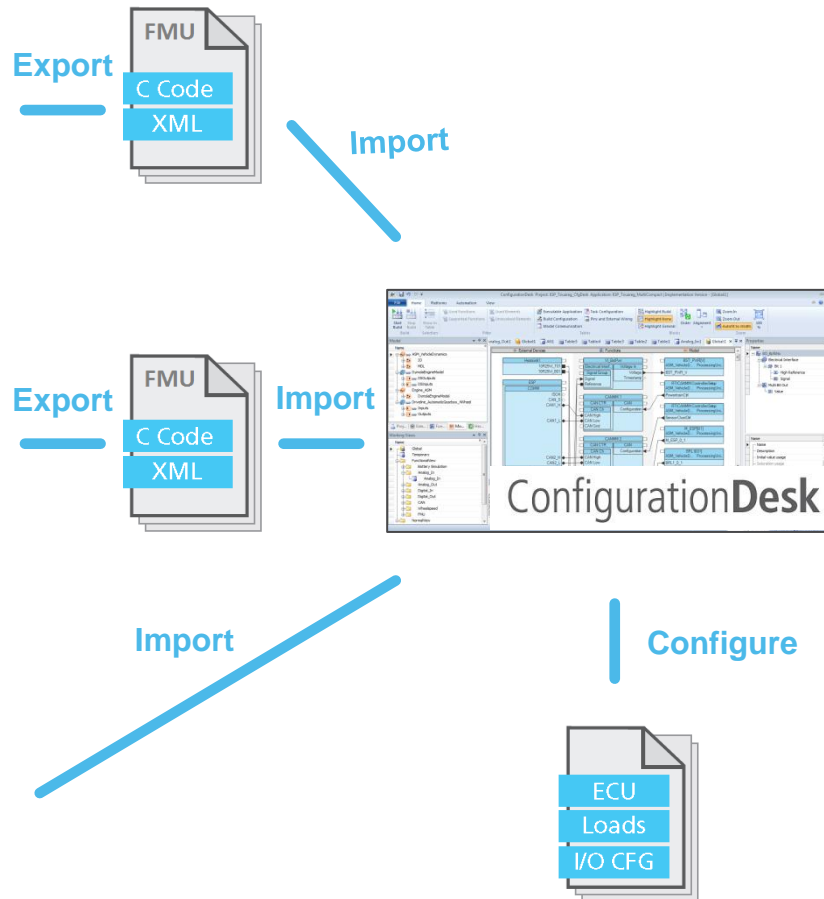


Drivetrain



Vehicle Dynamics

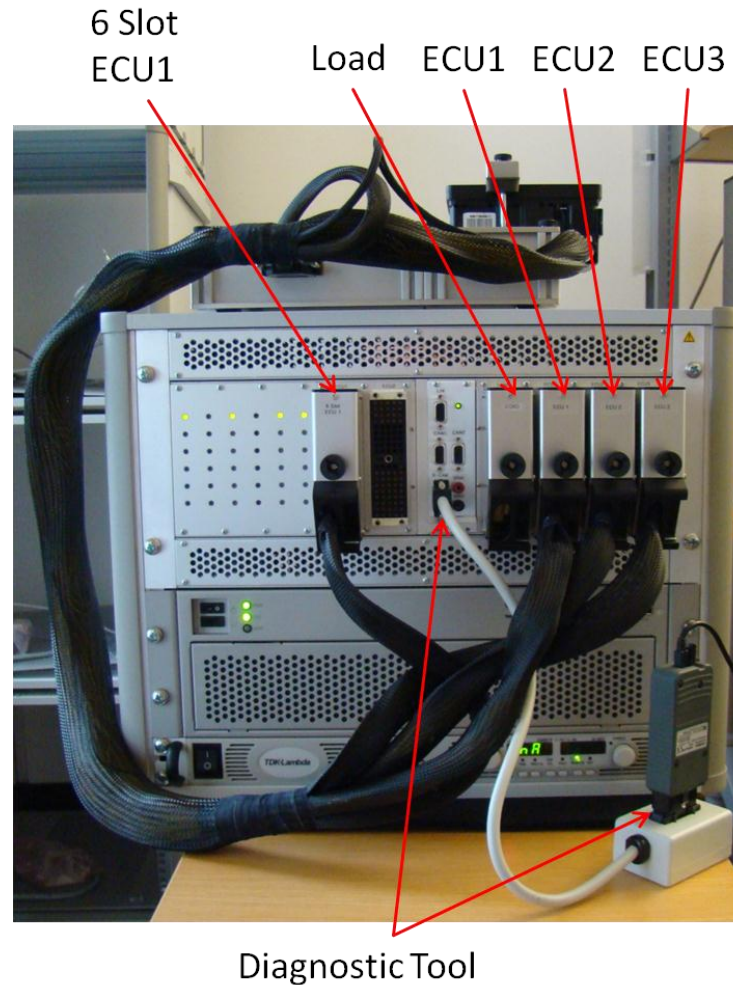
Integration



HIL Simulation



■ Live Demonstration



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