



MathWorks
AUTOMOTIVE
CONFERENCE 2018
May 2 | Plymouth, MI



Rapid Engine Control Prototyping using Simulink Real-Time and Speedgoat Target Hardware

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May 2nd 2018

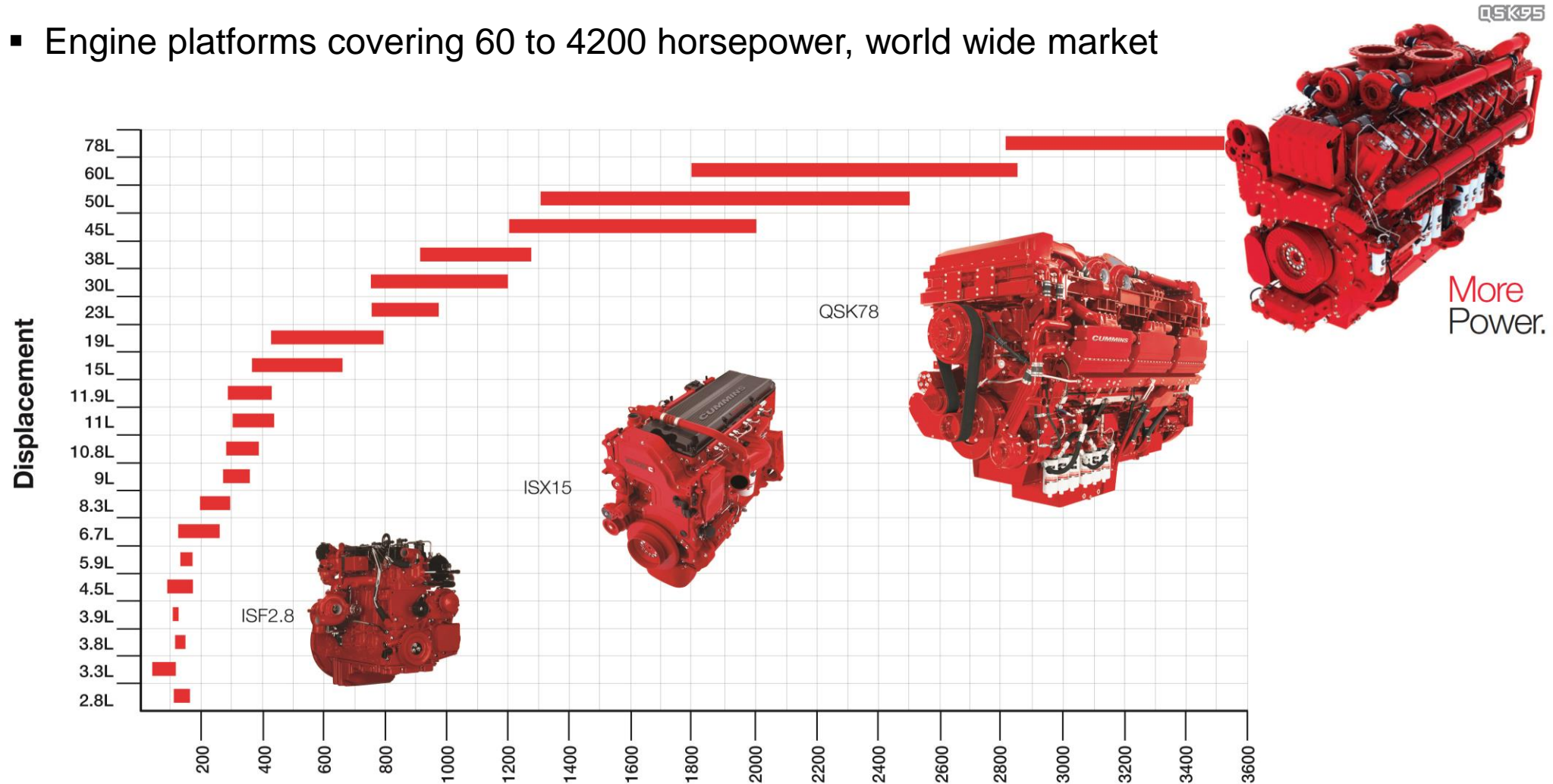
Cummins Data Classification: Public Information

Agenda

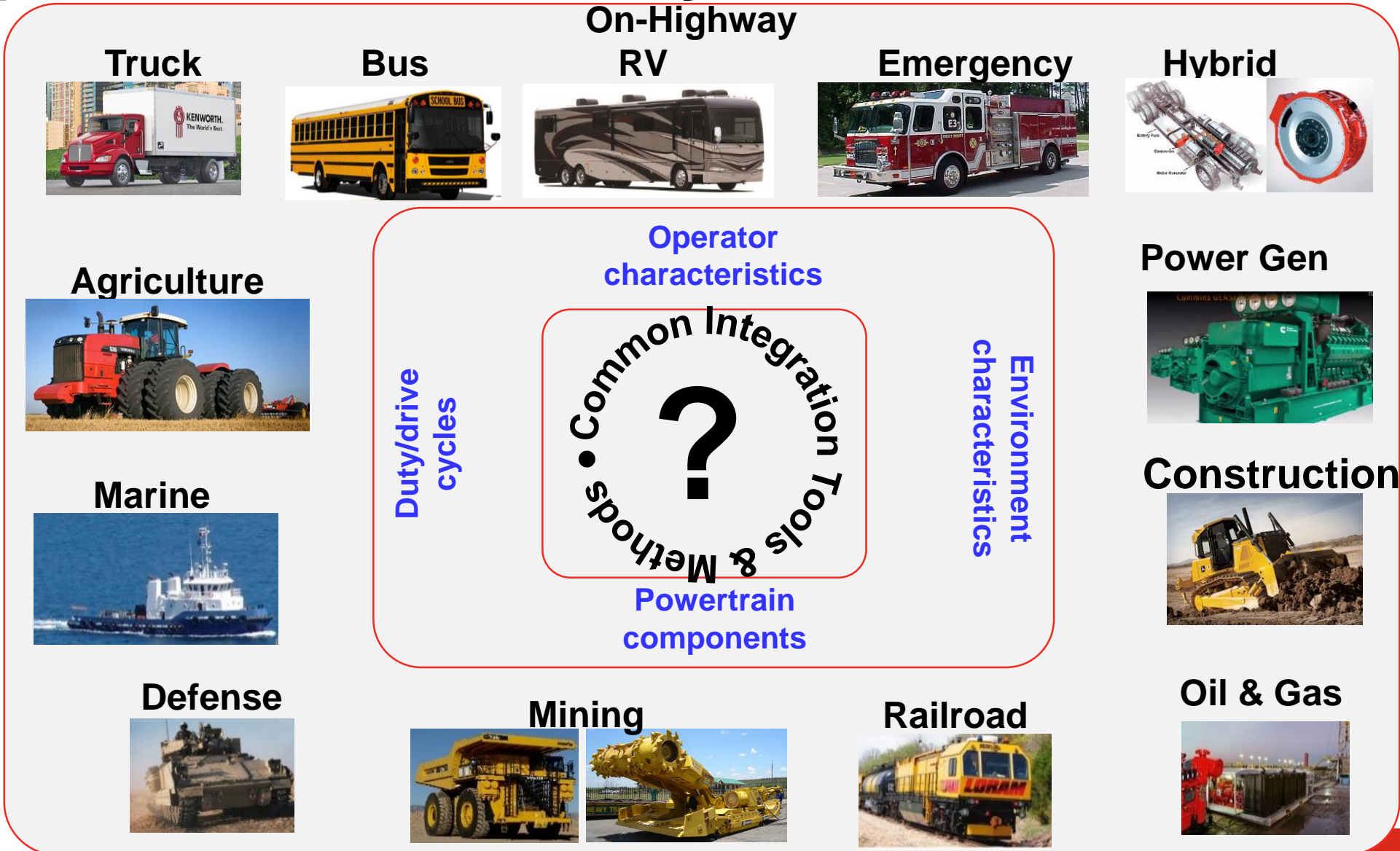
- Introduction to Cummins
- Model-Based Design @ Cummins
- Rapid Engine Control Prototyping
- Simulink Real-Time & Speedgoat
- Summary

Cummins Introduction

- Engine platforms covering 60 to 4200 horsepower, world wide market

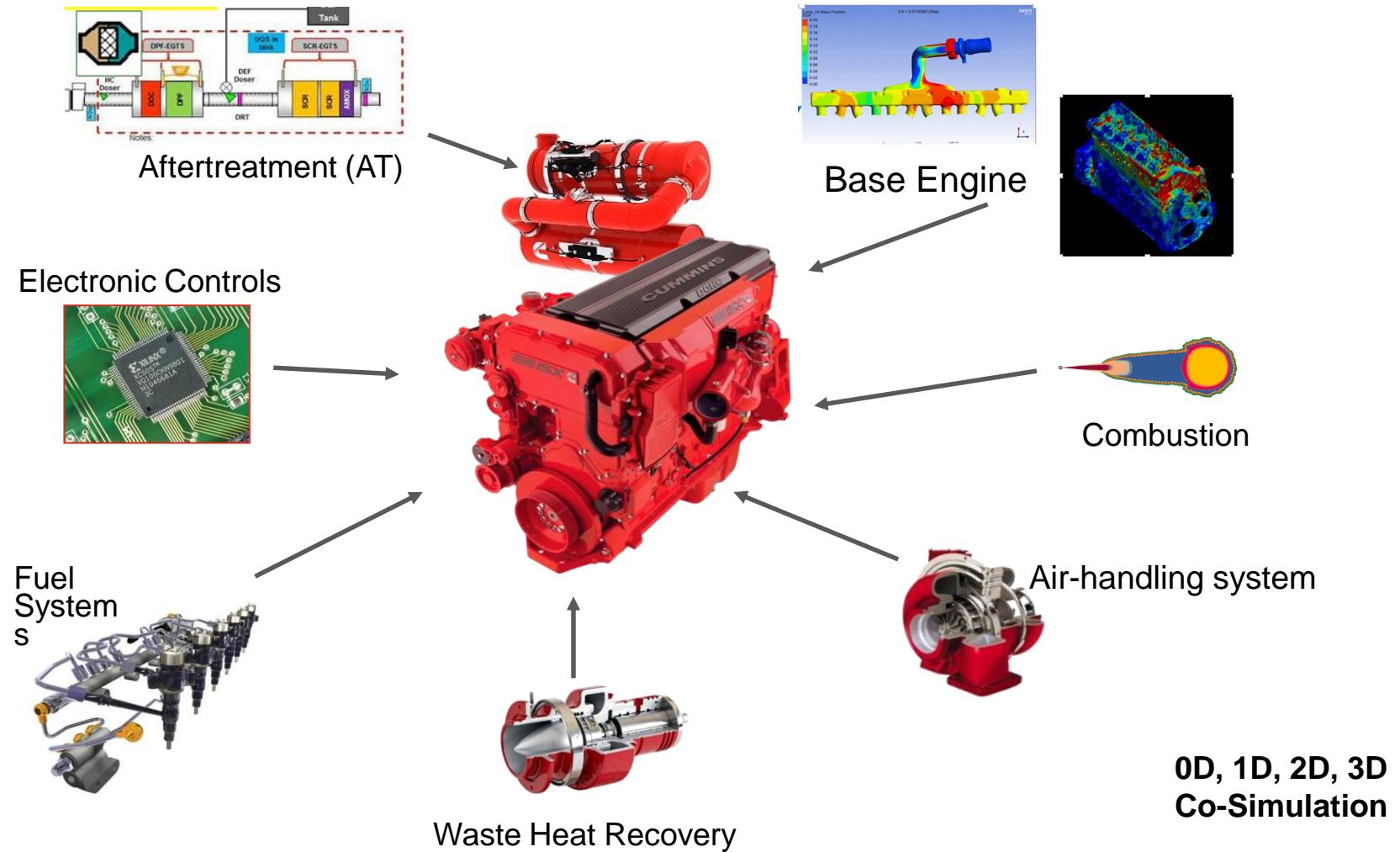


Application Diversity

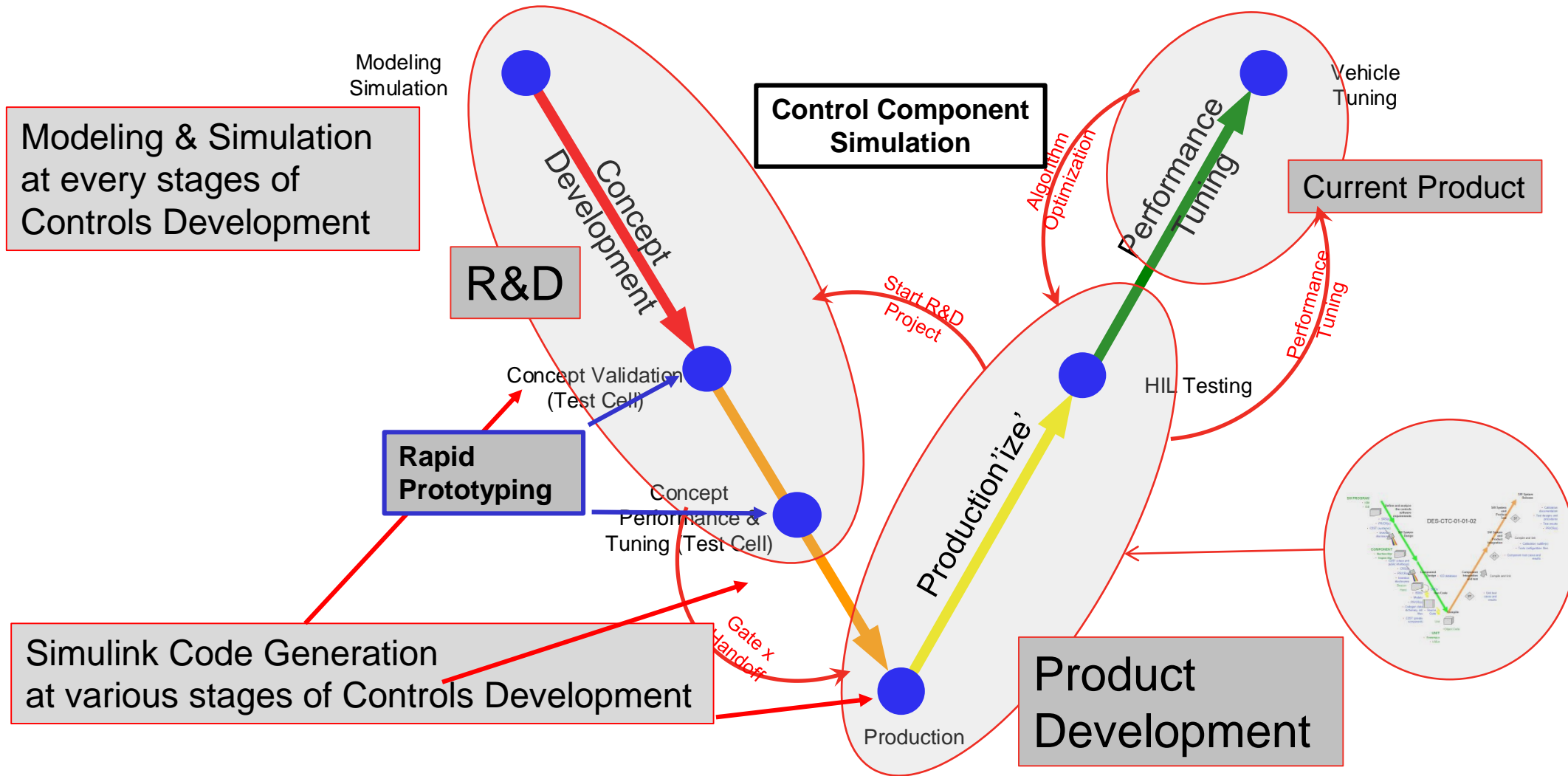


Powerplant Level Simulation Framework

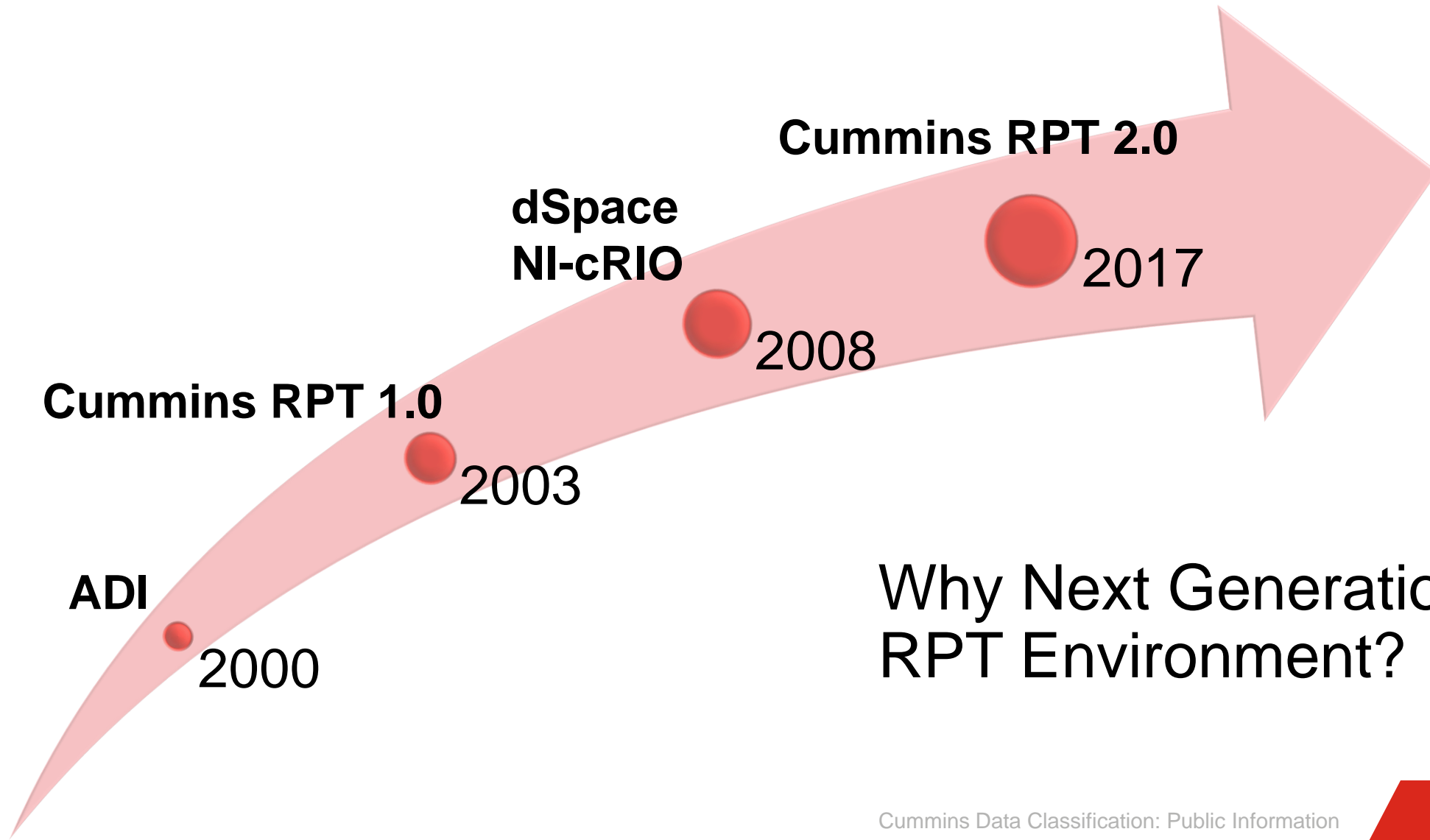
Effective Integration of complex systems requires Model-Based Design Integration



Model-Based Development at Cummins



Rapid Control Prototyping

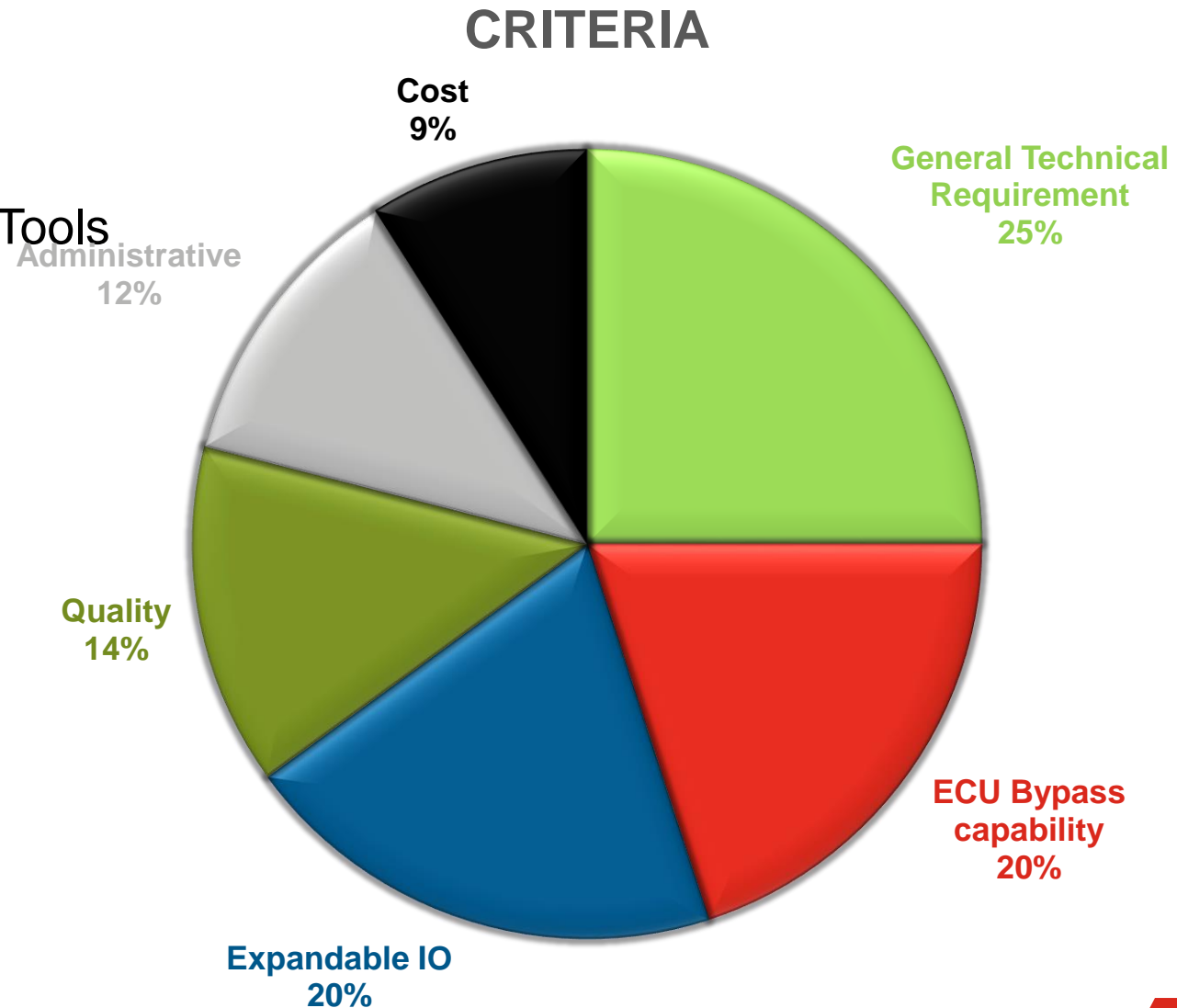


Why Next Generation
RPT Environment?

NextGen RPT – Selection Criteria and Process

■ Process

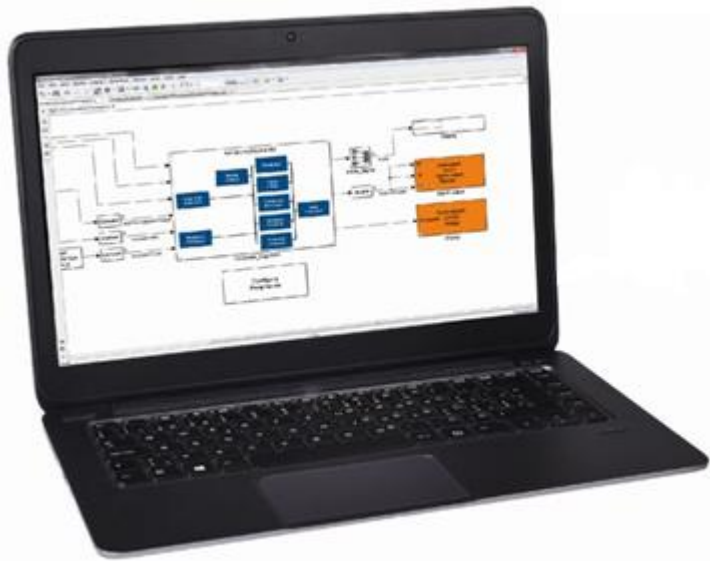
- Using variation of 6Sigma Tools
 - C&E/Pugh Style Scoring
- VOC (Cummins Internal)



NextGen RPT Hardware



MATLAB/Simulink
Simulink Real-Time



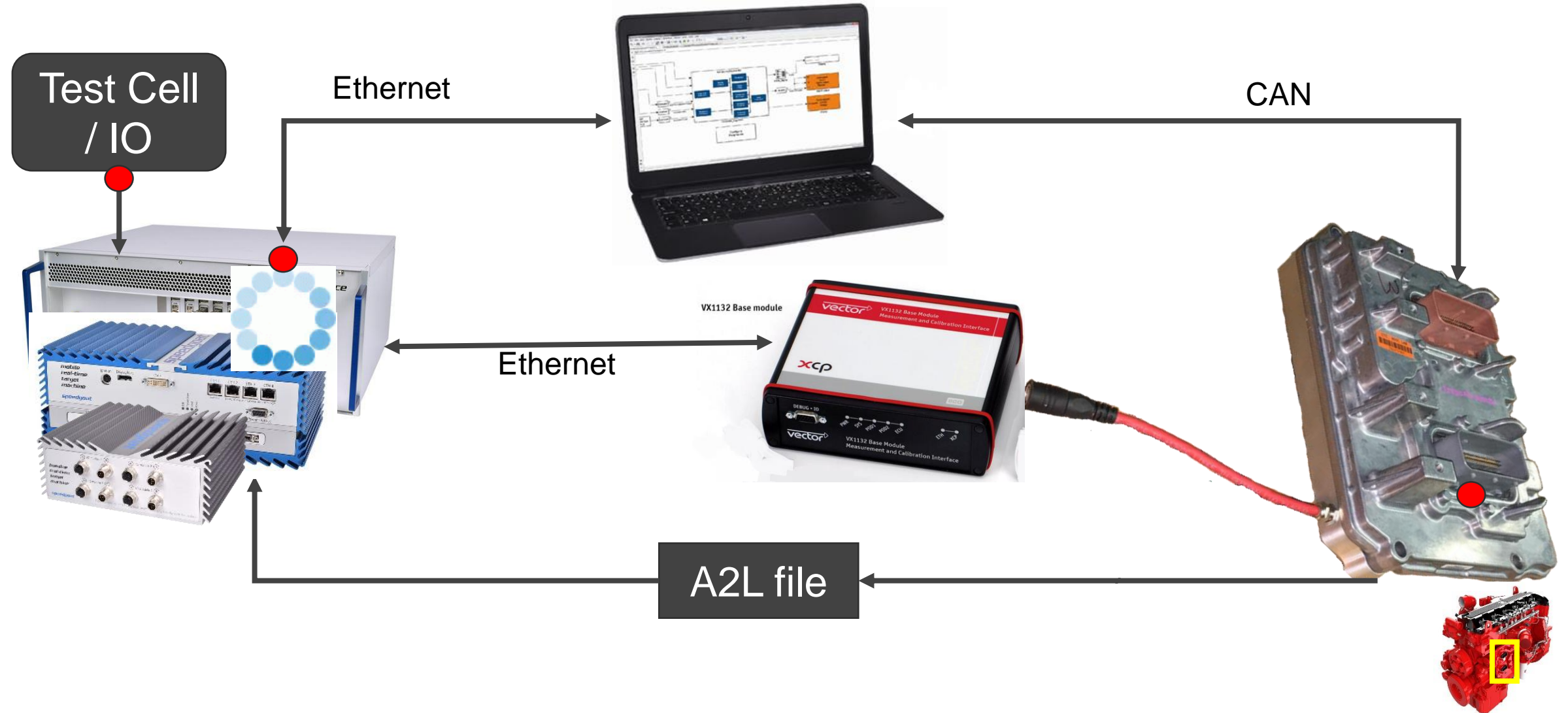
Rapid Control Prototyping



Rapid Control Prototyping - ECM Bypass



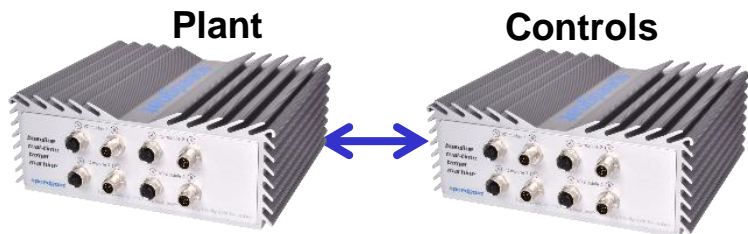
Unified, Robust, Fast Logging



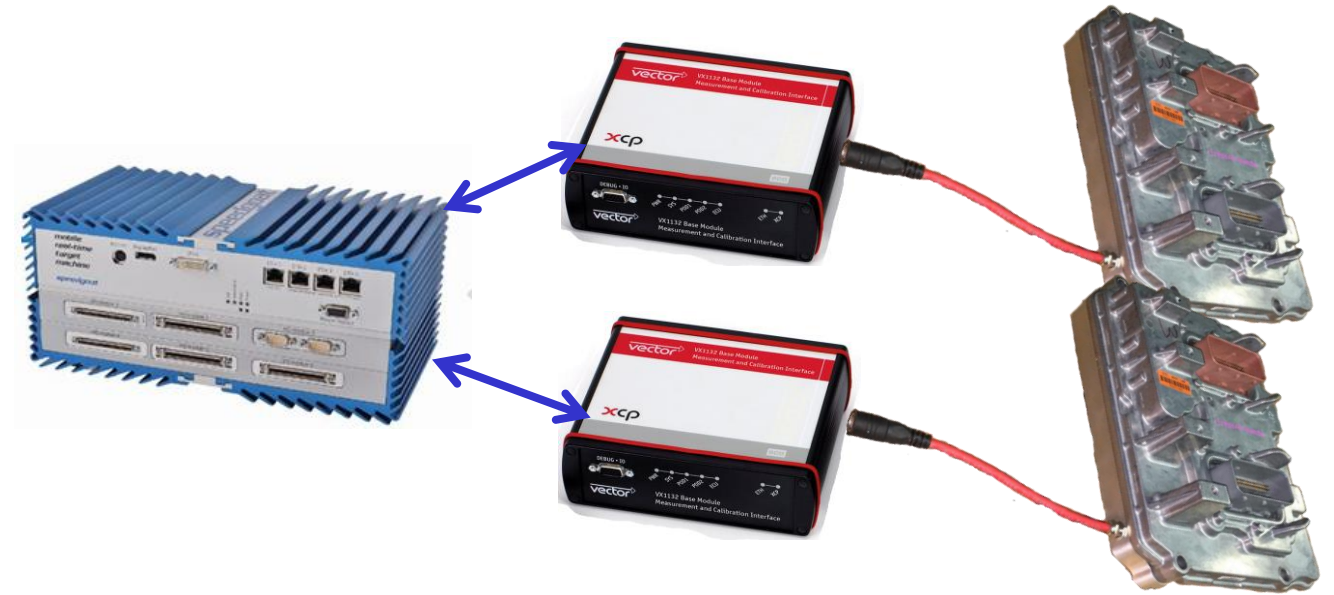
Future use cases



HIL Setup



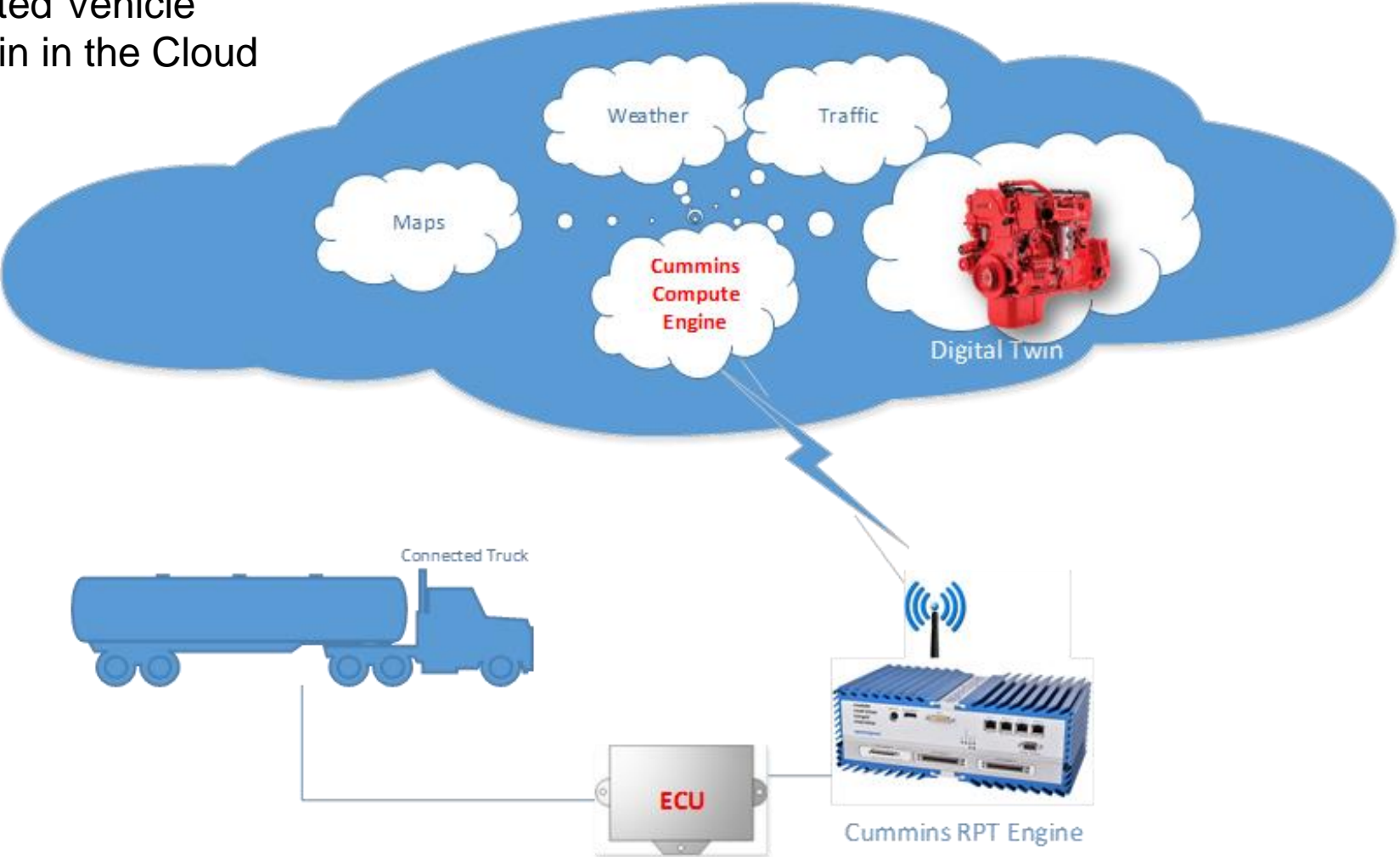
Component Model



Multiple ECU Bypass

Future use cases

Cloud Connected Vehicle
with Digital Twin in the Cloud



Summary

- After 15 months of continued effort and excellent support from MathWorks & Speedgoat, we established good Rapid Prototyping framework to be used across company.
- Invested in 8+ hardware systems supporting 5 different programs.
- Lastly, MATLAB/Simulink, Simulink Real-time and Speedgoat hardware enabled us to fulfil the goal of Digital Twin.

Q+A

