



MathWorks
AUTOMOTIVE
CONFERENCE 2018
May 2 | Plymouth, MI



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

Roopak Ingole

May 2nd 2018

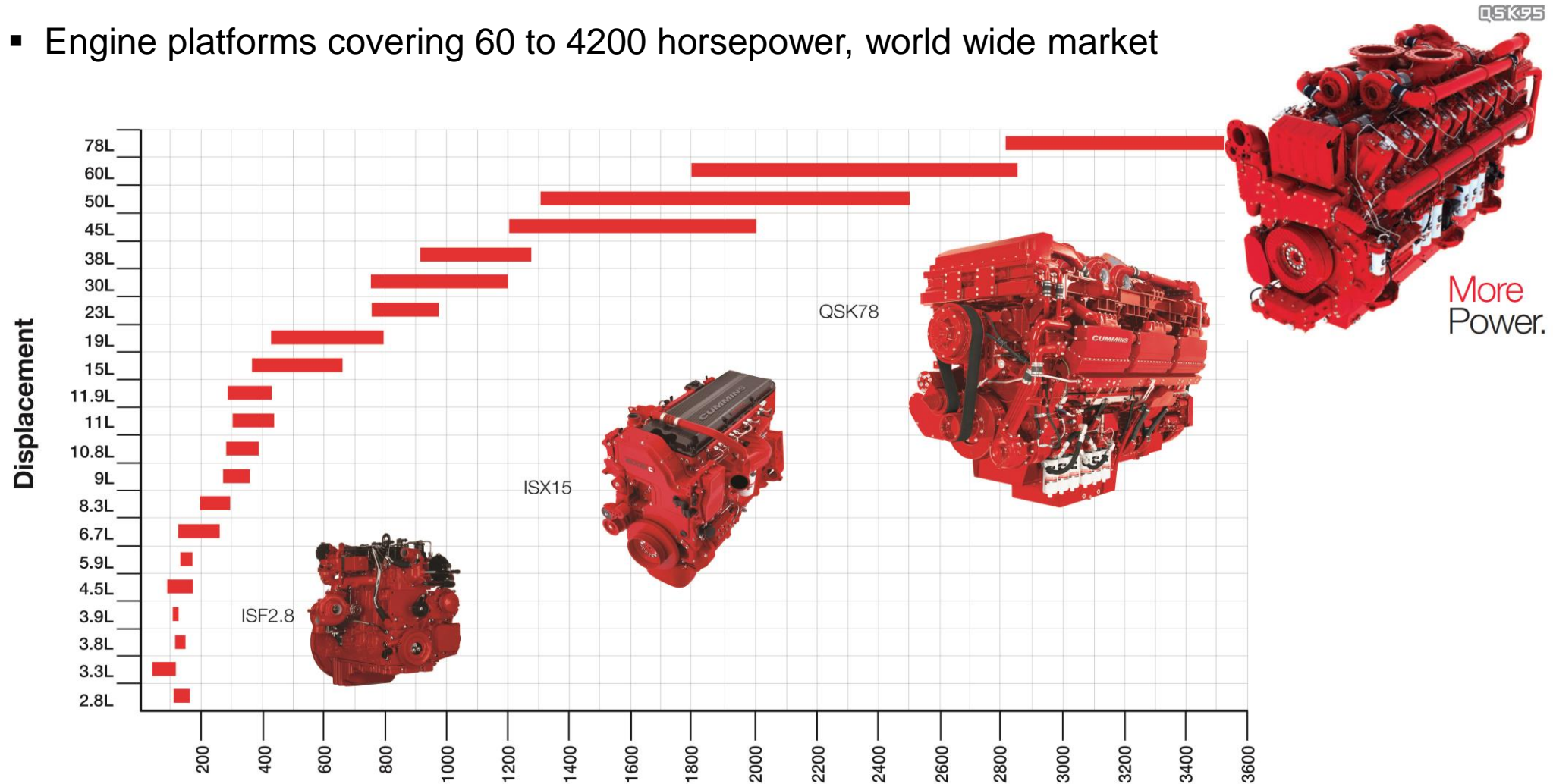
Cummins Data Classification: Public Information

Agenda

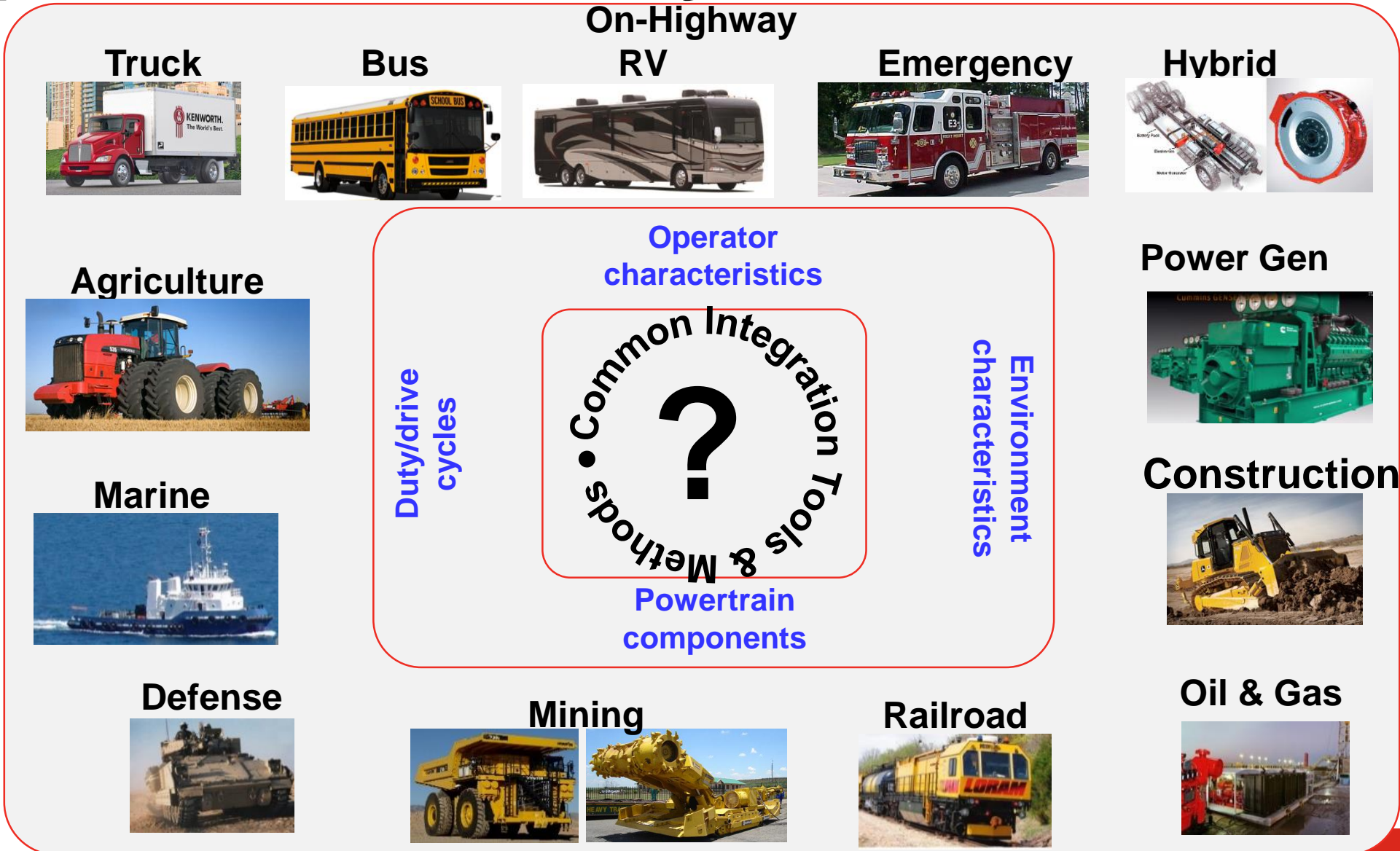
- Introduction to Cummins
- Model-Based Design @ Cummins
- Rapid Engine Control Prototyping
- Simulink Real-Time & Speedgoat
- Summary

Cummins Introduction

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

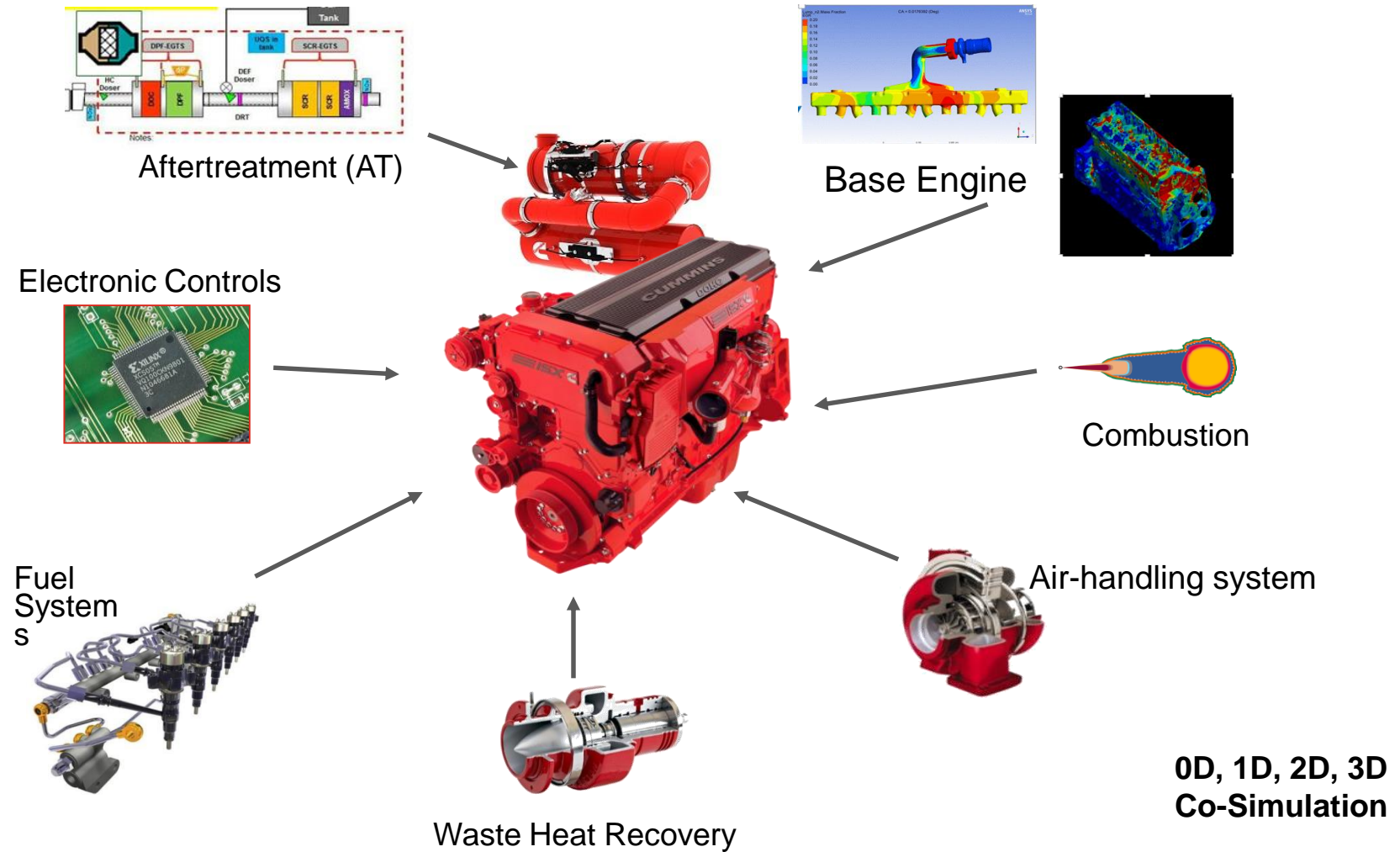


Application Diversity

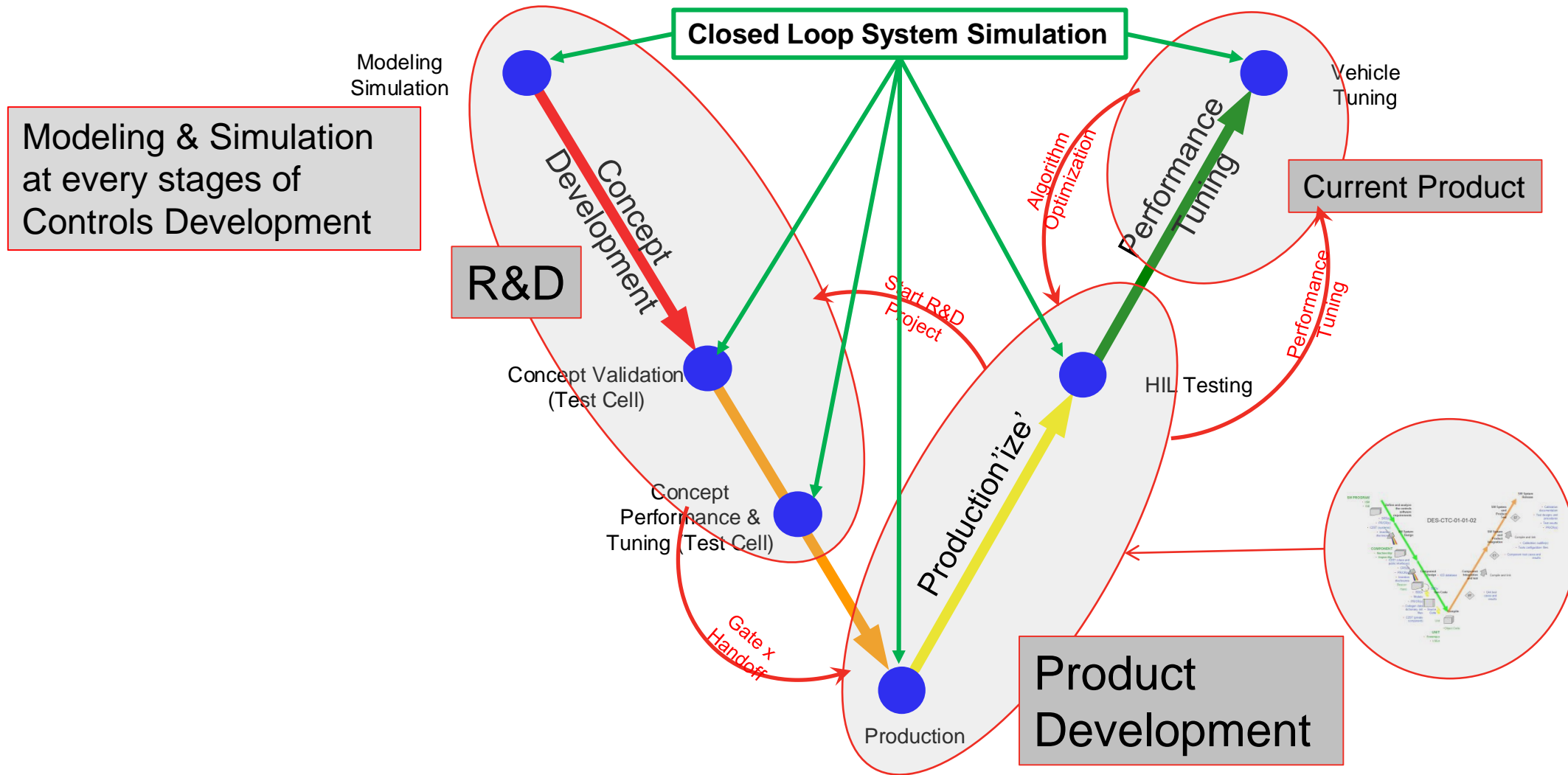


Powerplant Level Simulation Framework

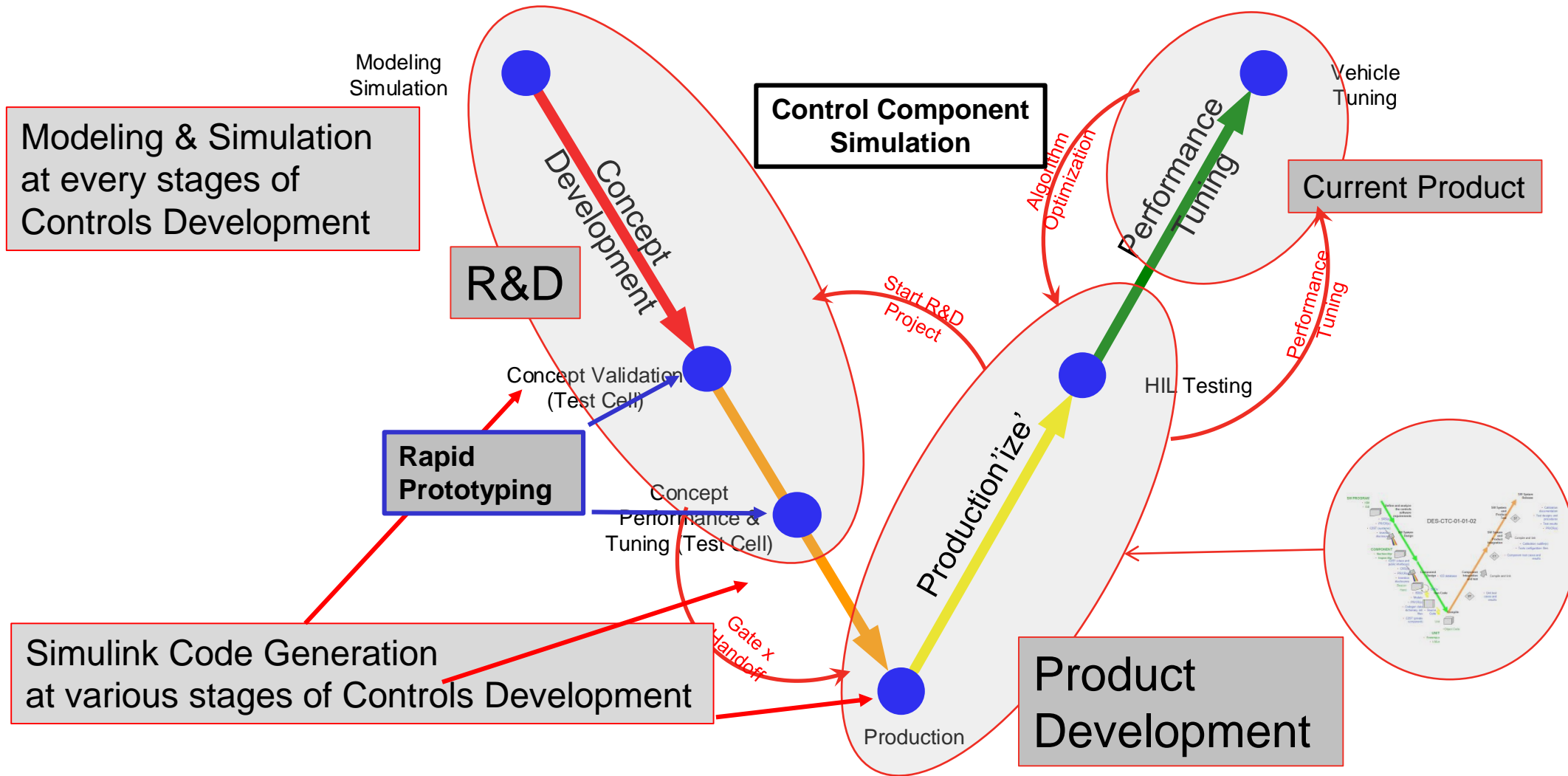
Effective Integration of complex systems requires Model-Based Design Integration



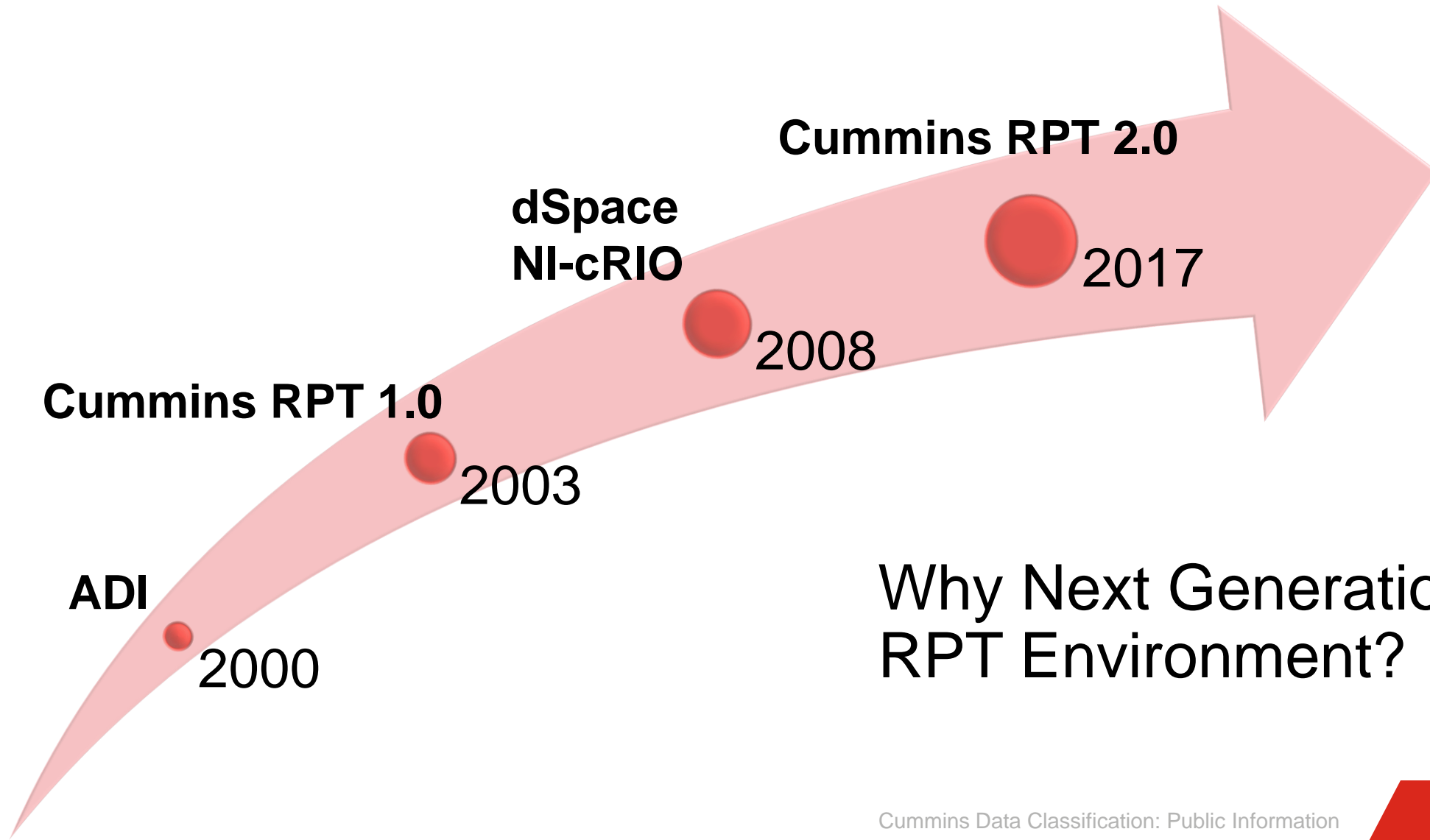
Model-Based Development at Cummins



Model-Based Development at Cummins



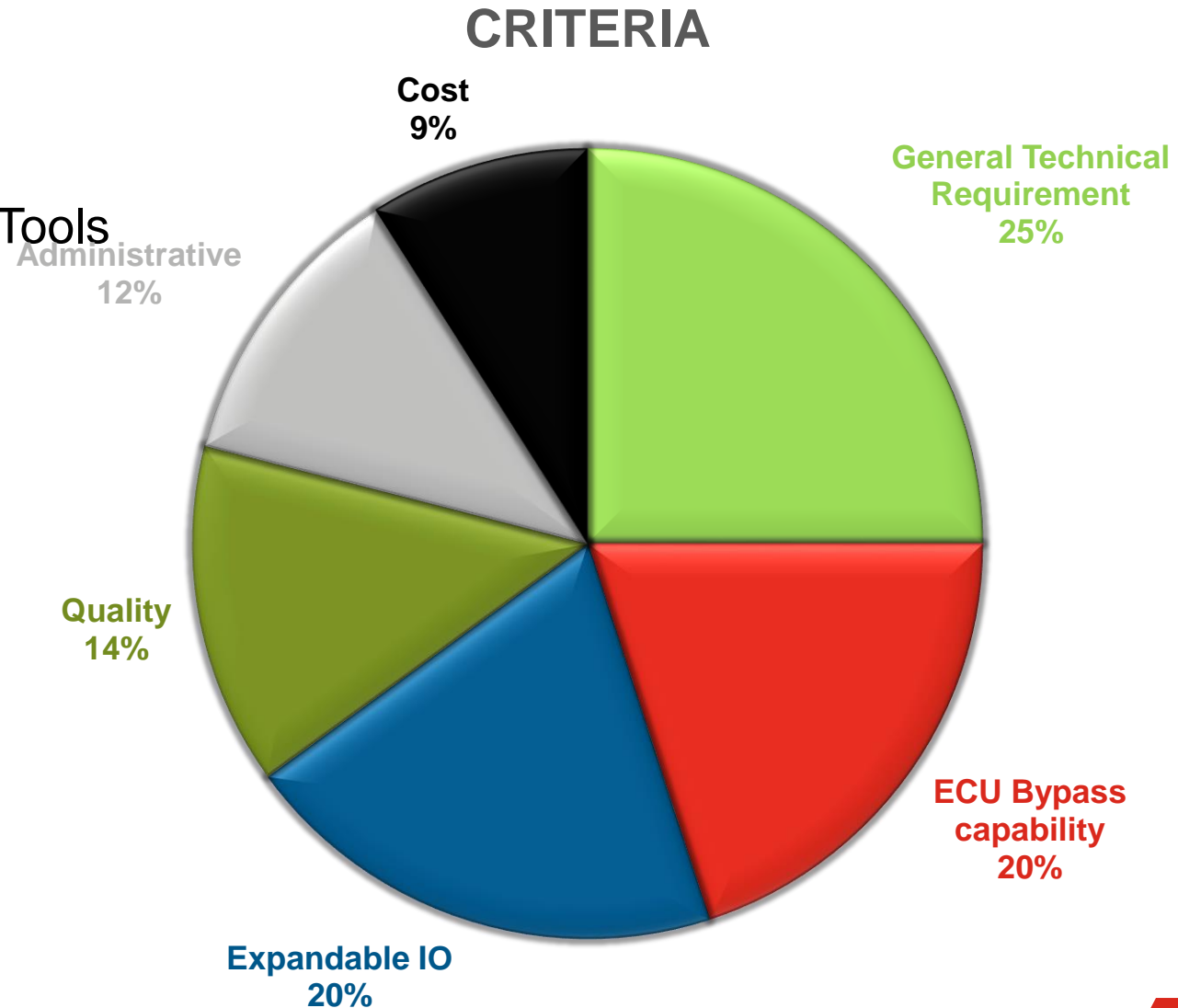
Rapid Control Prototyping



Why Next Generation RPT Environment?

NextGen RPT – Selection Criteria and Process

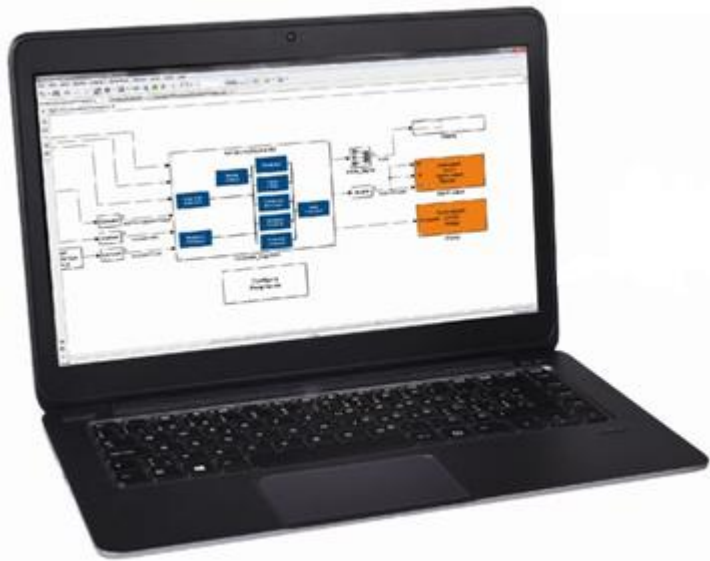
- Process
 - Using variation of 6Sigma Tools
 - C&E/Pugh Style Scoring
 - VOC (Cummins Internal)



NextGen RPT Hardware



MATLAB/Simulink
Simulink Real-Time



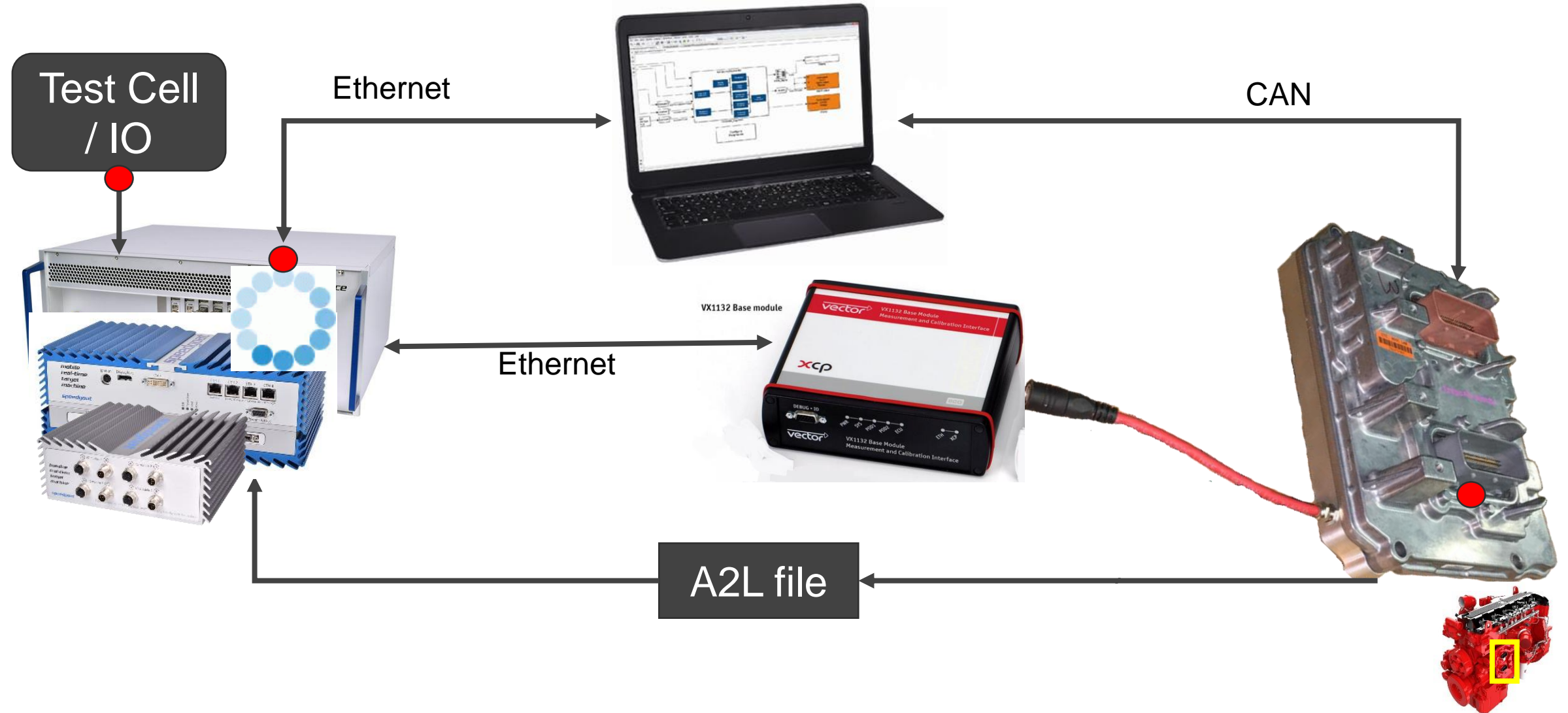
Rapid Control Prototyping



Rapid Control Prototyping - ECM Bypass



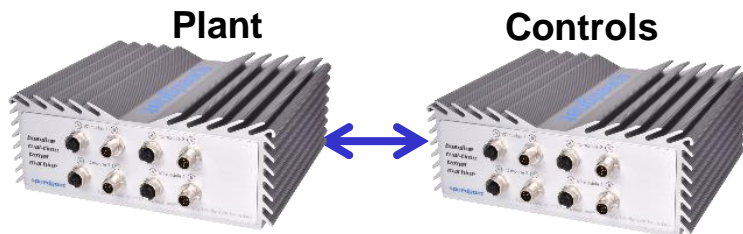
Unified, Robust, Fast Logging



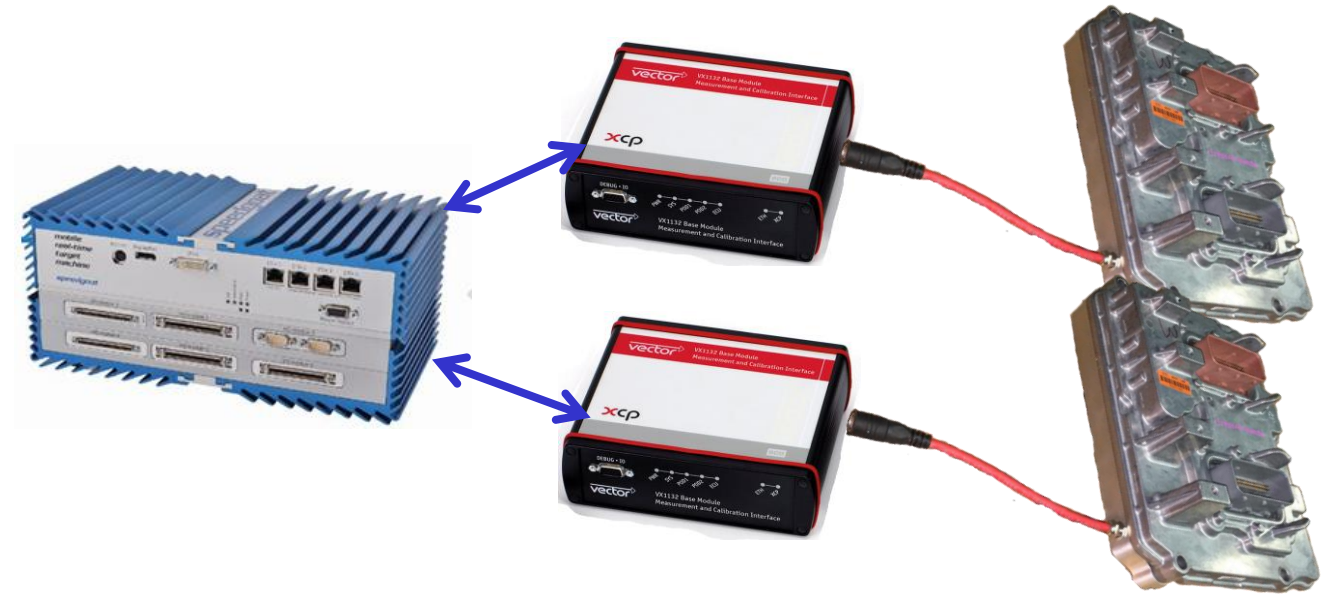
Future use cases



HIL Setup



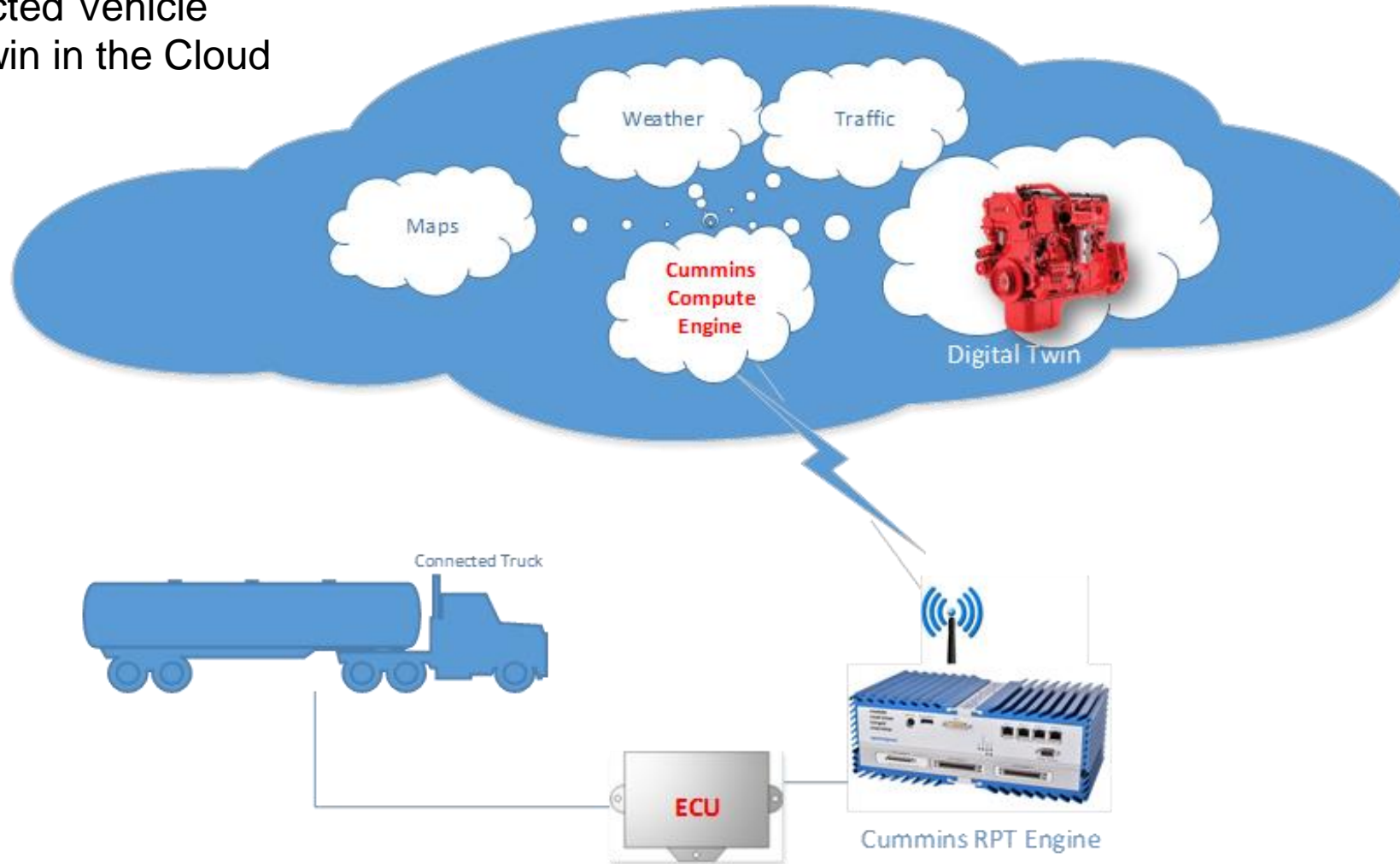
Component Model



Multiple ECU Bypass

Future use cases

Cloud Connected Vehicle
with Digital Twin in the Cloud



Cummins RPT Engine

Cummins Data Classification: Public Information

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

