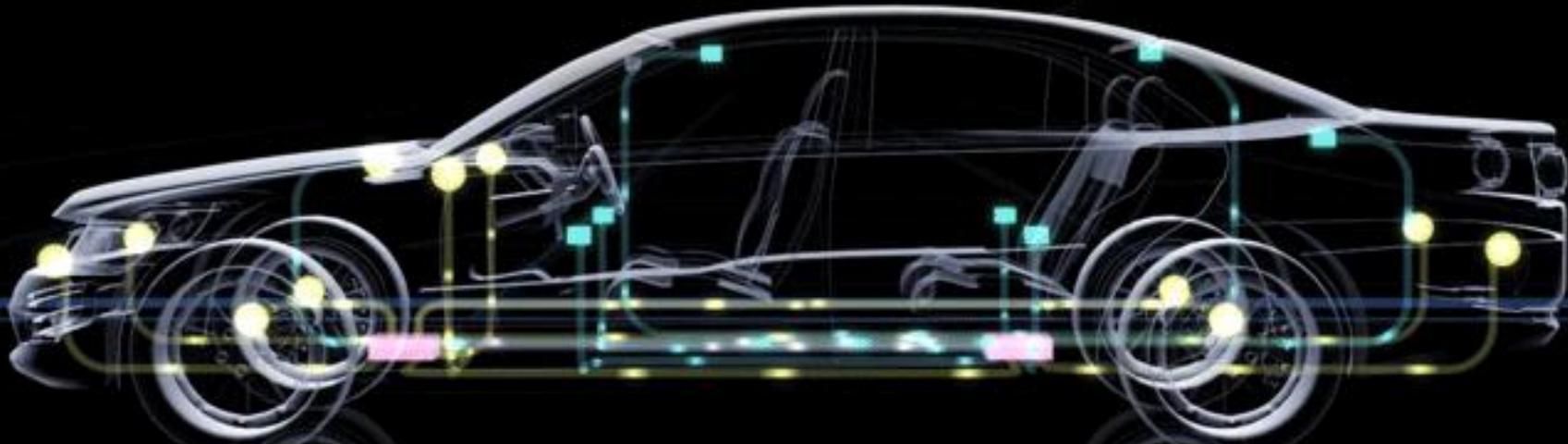


Mentor Digital Auto

Shift Left Efficiency | Architecture Optimization | ISO 26262 Compliance | Race to Autonomy



Realizing Shift-left Benefits

Mentor[®]

A Siemens Business

Top-level Challenges for Automotive



V2X & 5G



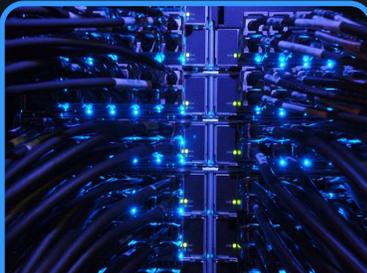
Virtualization &
Digital Twin



Security



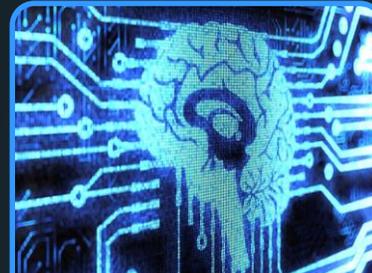
Functional
Safety



High
Performance
Computing



High
Performance
Graphics



Machine
Learning



Sensor Fusion

The Need to Shorten Development Cycles

Take a play from the consumer electronics playbook

Automotive Industry



Mobile/Consumer Electronics



	Auto	Mobile/CE
Agile SW dev	✓	✓
Continuous integration	✓	✓
OTA SW update	✓	✓
Virtual development platform	✓	✓
SW dev pre-silicon	✓	✓
Early IP access	✓	✓
Mentor Digital Auto		

Auto Ecosystem

Serial synchronization produces long development cycles

Total Users
100s
10s



Req

Req

GTM

SW Development

SW Development

Optimizations

SoC Design

SoC Implementation

Bring-Up/Test

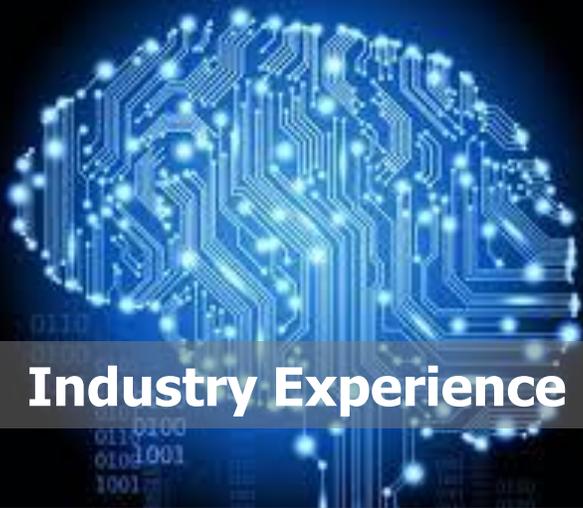
ISO Cert

SW Drivers

ISO 26262

Mentor Digital Auto

Shifting-left the development of automotive digital ICs



Industry Experience

Industry Experience

- Automotive and functional safety experience and consulting services to accelerate the path to compliance and production of automotive products



Digital Twin

Digital Twin Technology

- Virtual modeling to enable earlier development and optimization of hardware and software throughout the automotive supply chain



Functional Safety

Functional Safety

- Functional safety verification solutions to enable the development of safety critical ICs in compliance with ISO 26262

Introducing Mentor Digital Auto

A platform and methodology for pre-silicon HW & SW development and validation delivering quantifiable shift-left benefits to hardware and software teams throughout the automotive electrical value chain.

Digital Twin Technology

Shifting left the development of complex automotive ICs and software pre-silicon



Auto Ecosystem

Serial synchronization produces long development cycles

Total Users
100s
10s



Req

Req

GTM

SW Development

SW Development

Optimizations

SW Drivers

SoC Design

SoC Implementation

Bring-Up/Test

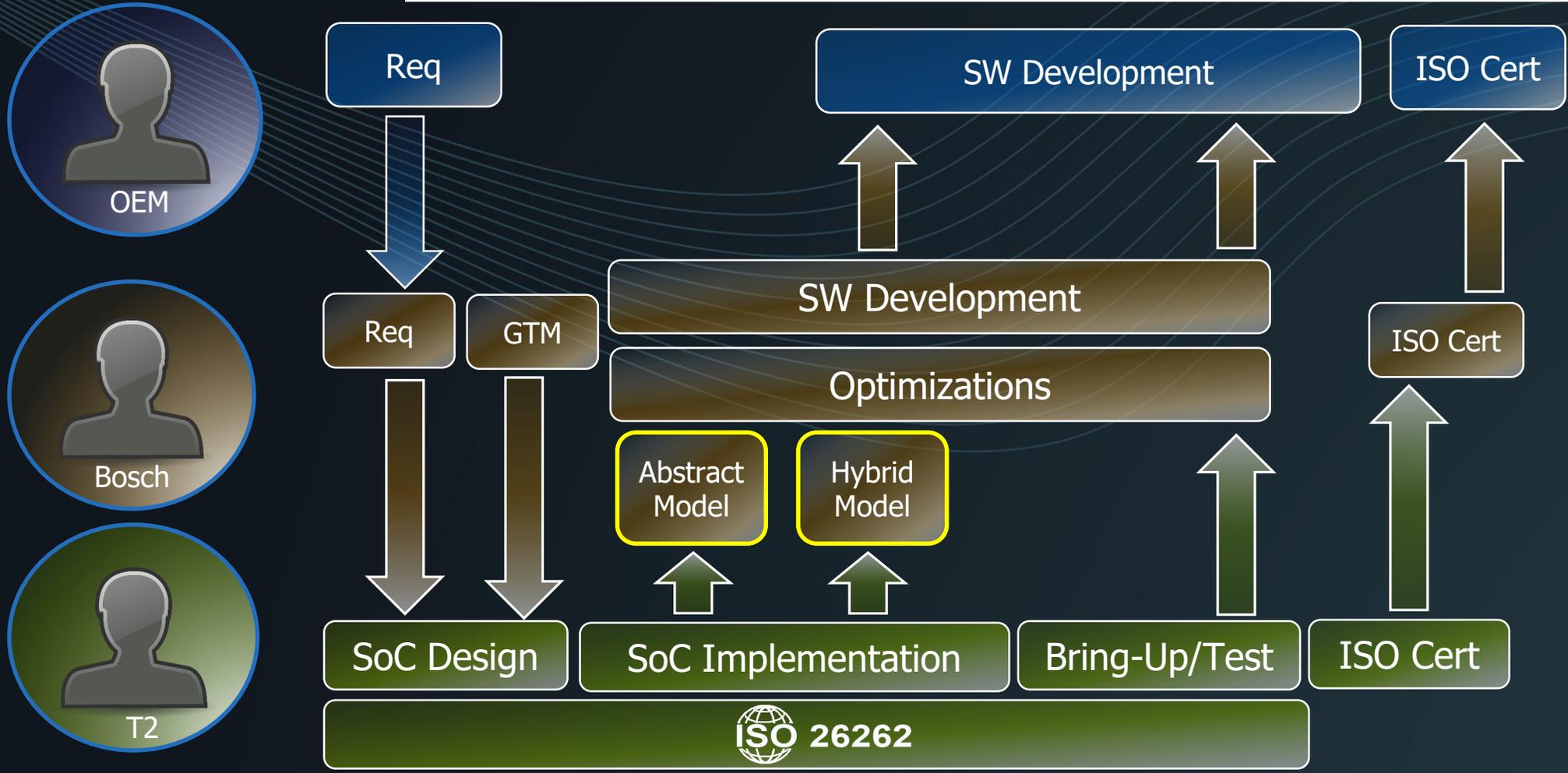
ISO Cert

ISO 26262

MDA Shift Left

Decoupled parallel development produces shorter development cycles

Total Users
100s
10s

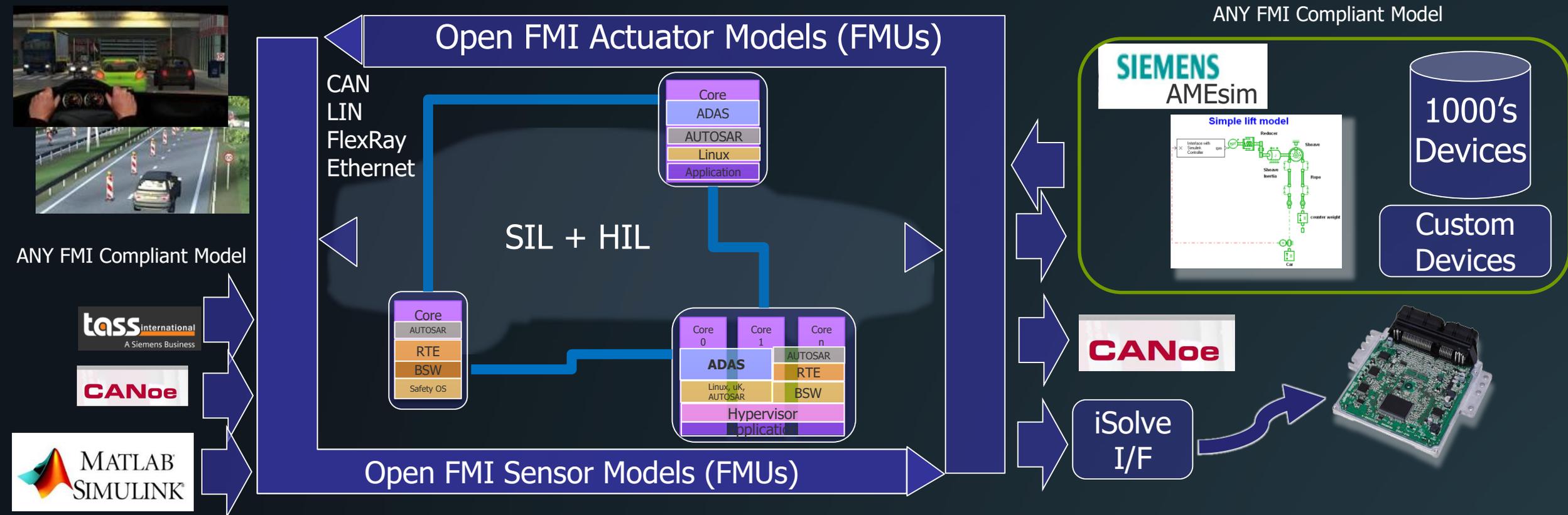


ISO 26262

Auto Digital Twin

What is an auto digital twin?

A model functionally equivalent to the final product providing testability, interoperability, programmability and debug-ability of the electrical systems of an automobile in advance of hardware availability.



A new role for emulation

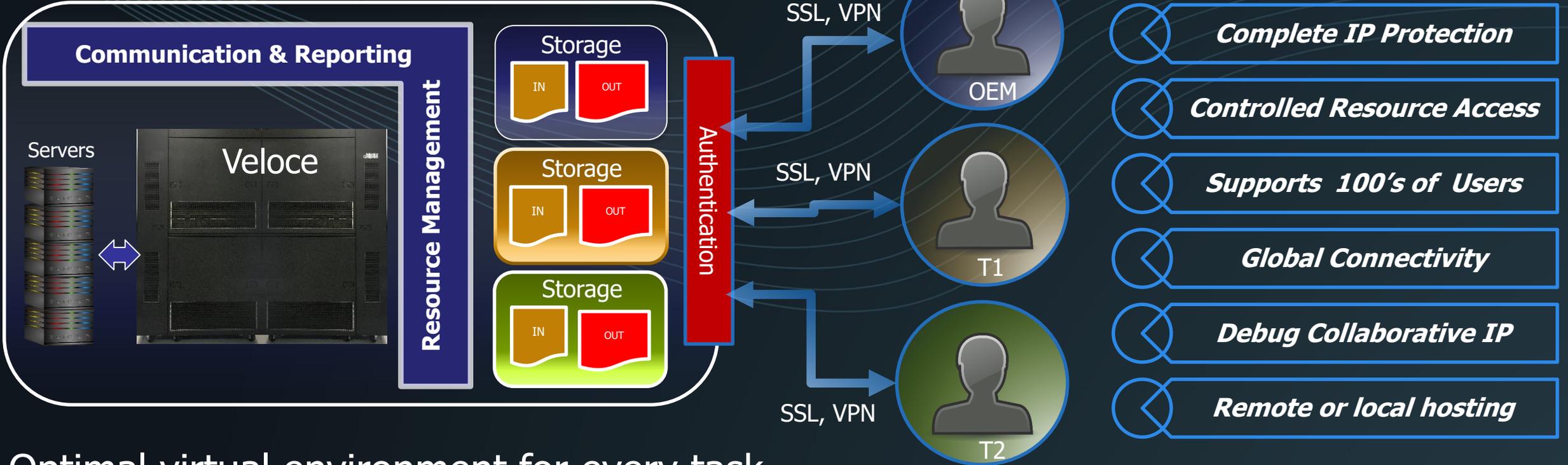
Emulation is no longer your father's verification box

- Significant shift-left benefits require a continuous HW/SW integration methodology, from abstract models to silicon
- Large SW teams need increasingly accurate models far in advance of silicon where simulation plays a major role
- As RTL becomes available hybrid modeling is required with high-speed simulation, emulation takes on the role of RTL accelerator, 1000x acceleration over RTL simulation
- Nearing tape-out more modeling shifts to RTL acceleration
- This continuity delivers measurable shift-left benefits & plays a role in systematic failure functional safety testing much earlier

Collaboration and IP Protection Solution

Leading multi-team, multi-supplier collaborative platform

Enterprise Development Platform



Optimal virtual environment for every task

Hybrid | Veloce | Questa | Formal

Horsepower to Do it All For Auto Digital Twin

Delivering massive computational power for digital auto and shift-left benefits



Unparalleled Scalability

10x Hybrid Bandwidth

1000x RTL Acceleration

Boots OS in minutes

Veloce Strato: 15B Gates

Veloce Strato-M: 2.5B Gates

to

Veloce Strato-M: 1.5B Gates

Veloce Maximus: 1B Gates

Veloce Quattro: 50M Gates

VELOCE APPS

DFT

Fault Injection

Power

Coverage

Visualizer

ES

Veloce

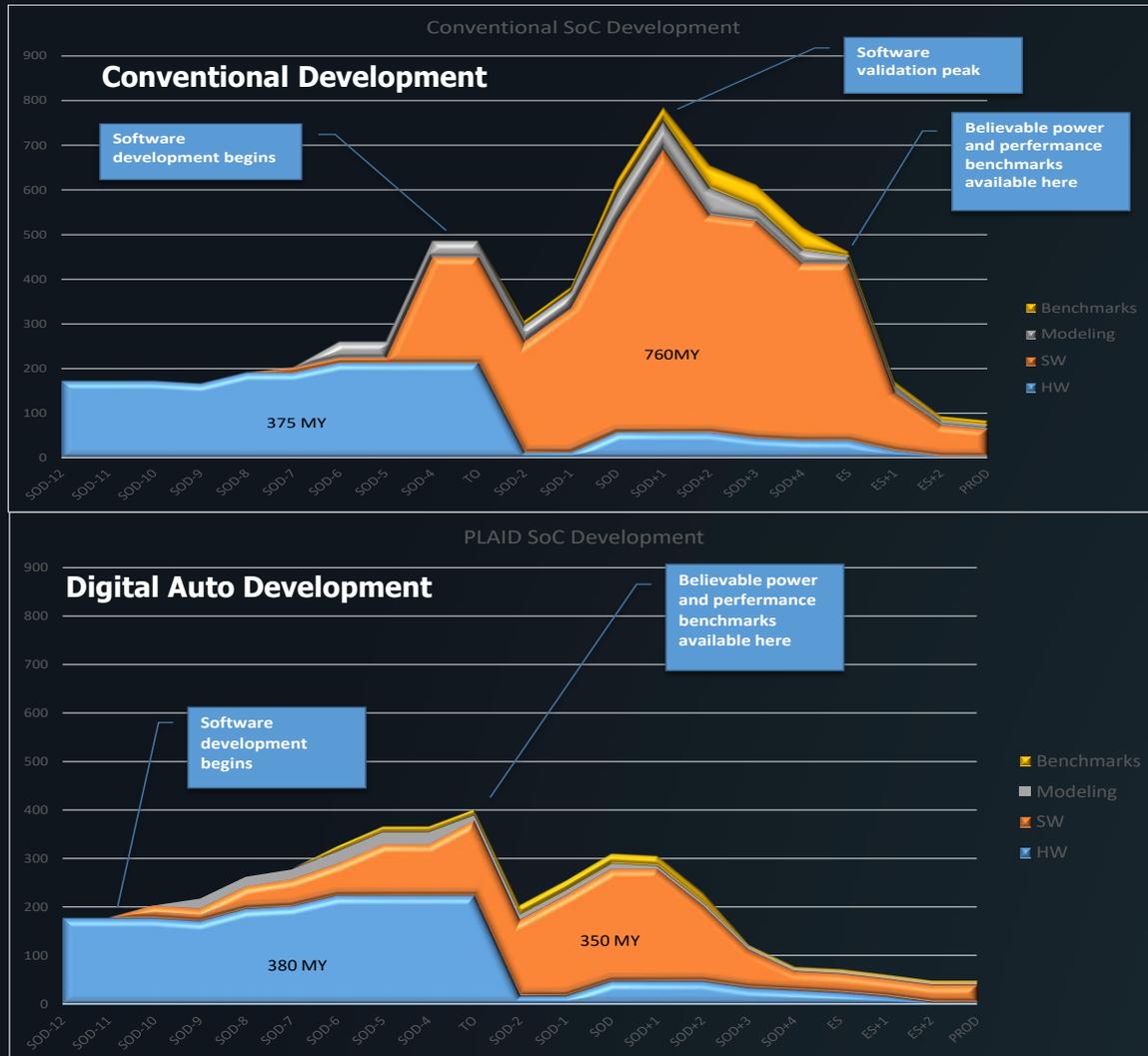
Hybrid Layer

RTL

Customizable Application

Shift-left Benefits to Software Teams

Projecting and measuring quantifiable shift left benefits




Performance and Power results months earlier

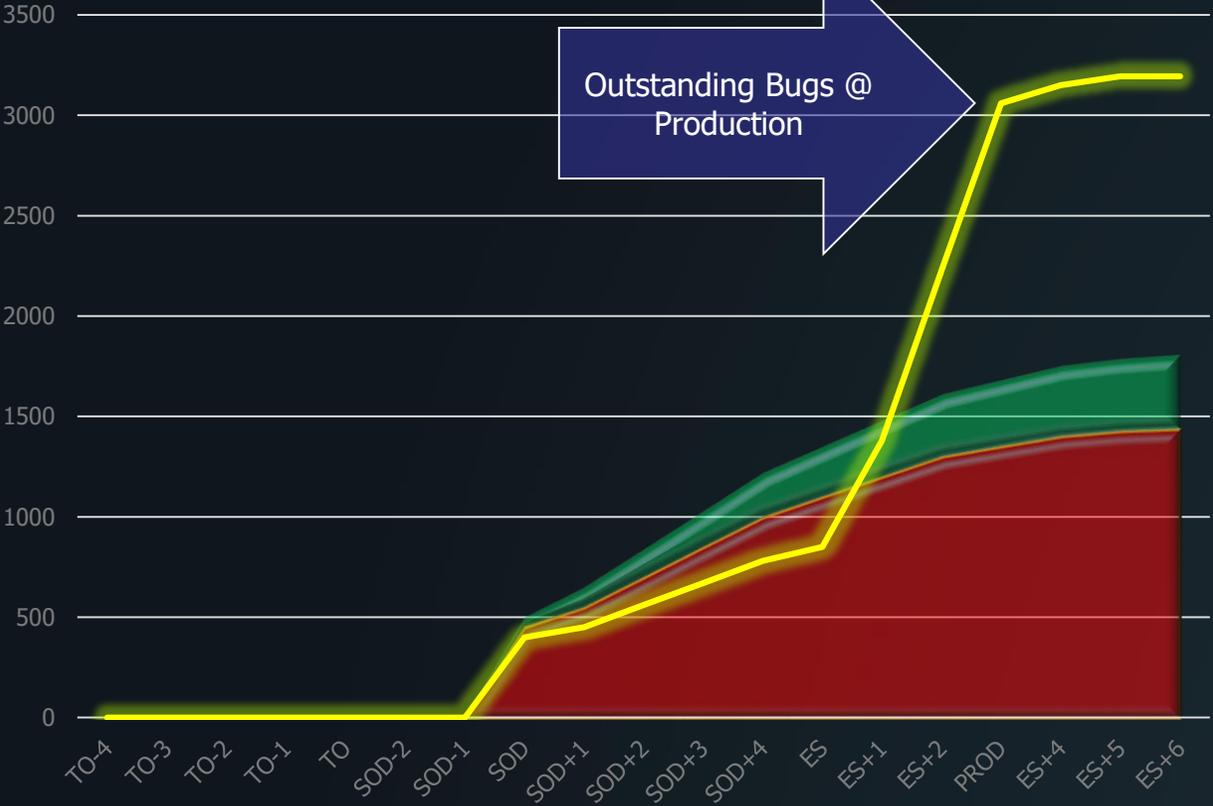

Slash software development costs by up to 44%

From Mentor ROI Calculator for actual IVI program

Software Quality Impact

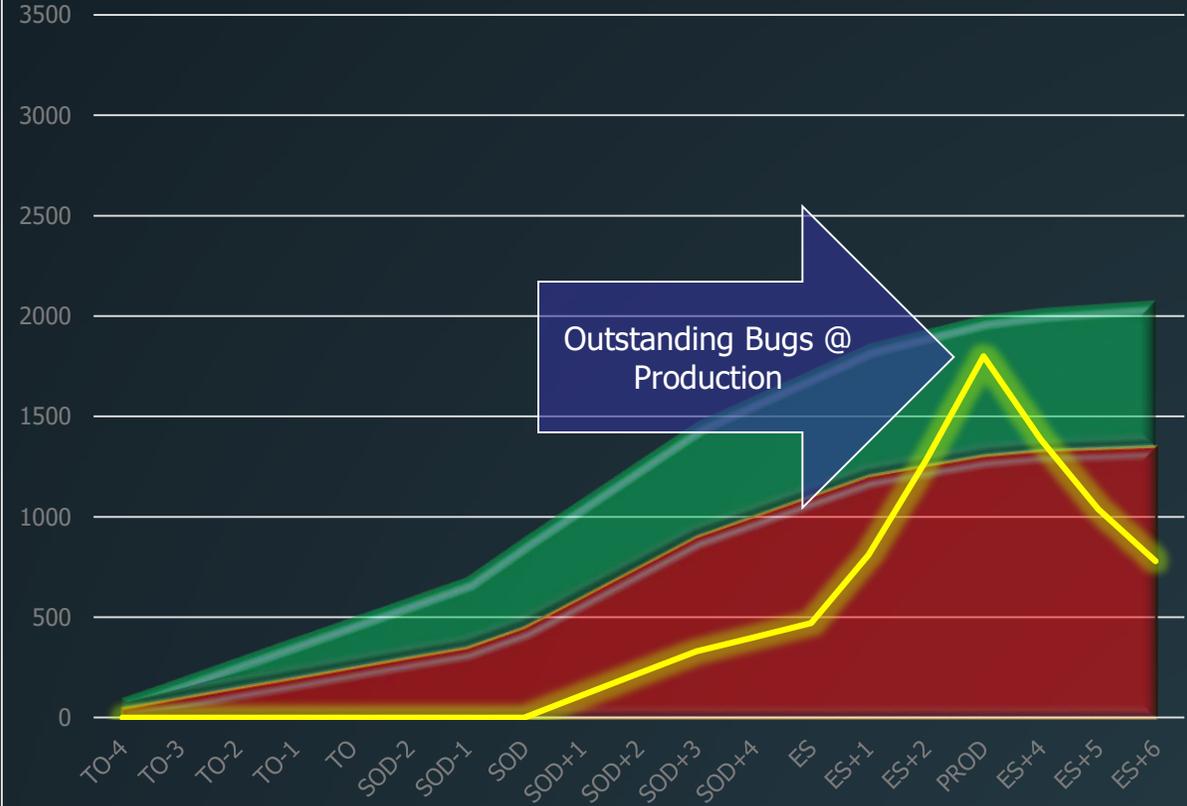
Software Quality Without Shift-Left

Bugs Found Bugs Fixed Outstanding Bugs

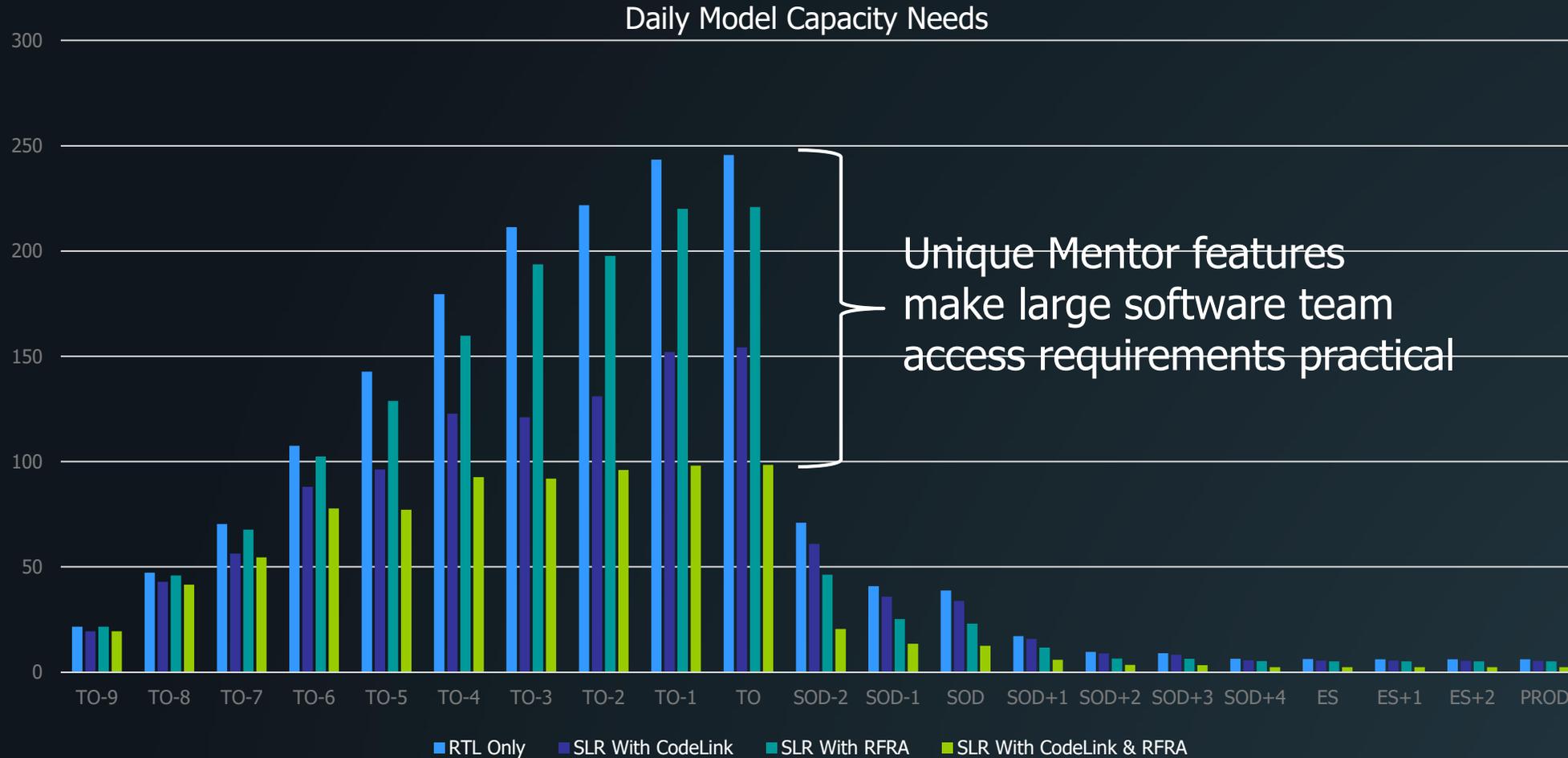


Software Quality With Shift-Left

Bugs Found Bugs Fixed Outstanding Bugs



Model Access Capacity



Thank You