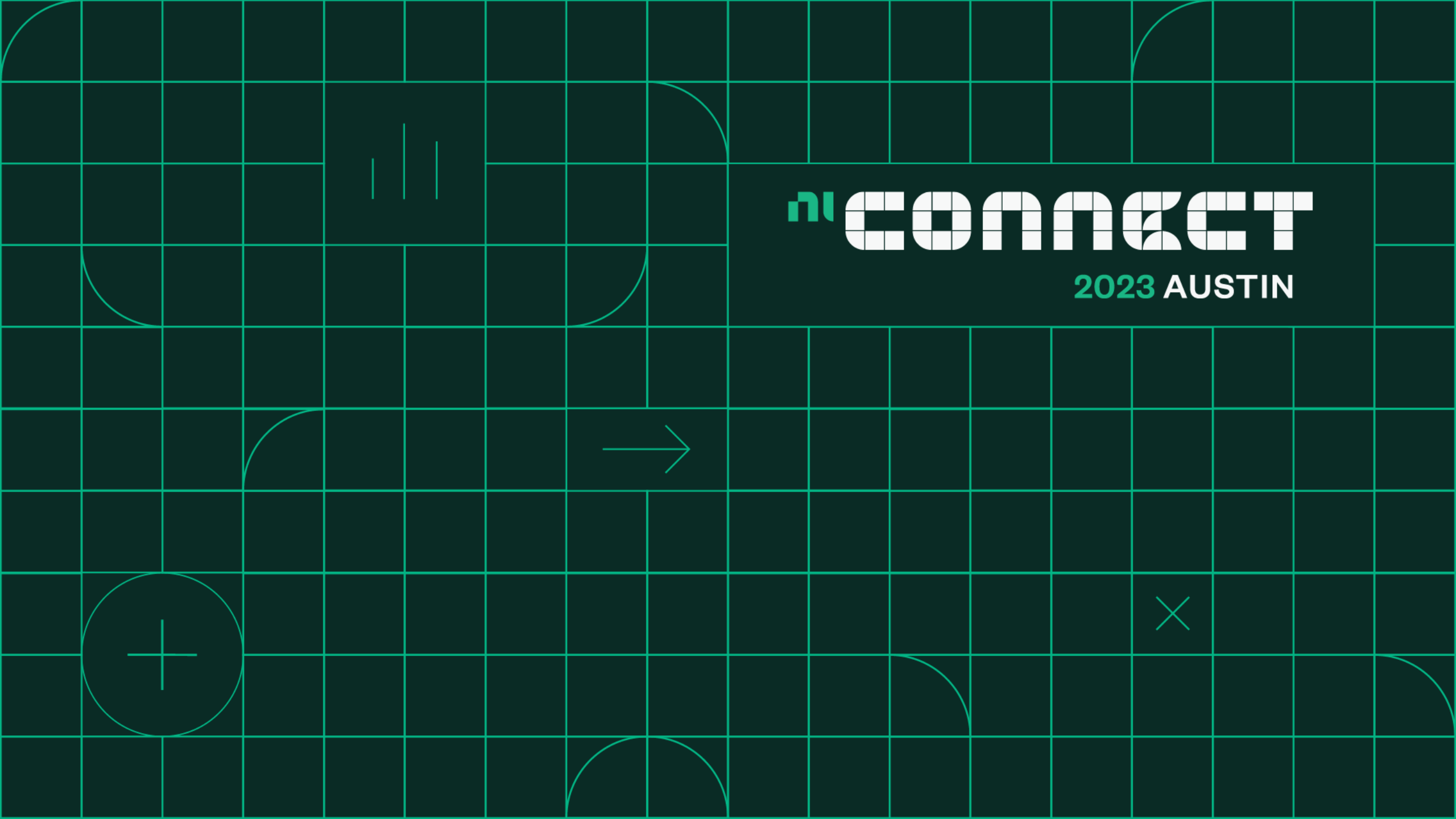

WELCOME TO AUSTIN


CONNECT
2023 AUSTIN

What Does Left Shifting Test Mean in the NI Ecosystem?

Ritesh Sharma – NI

What Does Left Shifting Test Mean in the NI Ecosystem?

Luis Elias - Aliaro

The Road to the Future is Paved with Software

Acceleration of EV and ADAS Roadmaps will Require New Tools and Process to Meet Demand

	2020	2030
Vehicle Production	77M New Vehicles	~100M New Vehicles (1.3x Increase)
Electrification	<5% Battery Electric	>30% Battery Electric (7x Increase)
Autonomy	<15% L2 Autonomy or Above	>50% L2 Autonomy or Above (5x Increase)

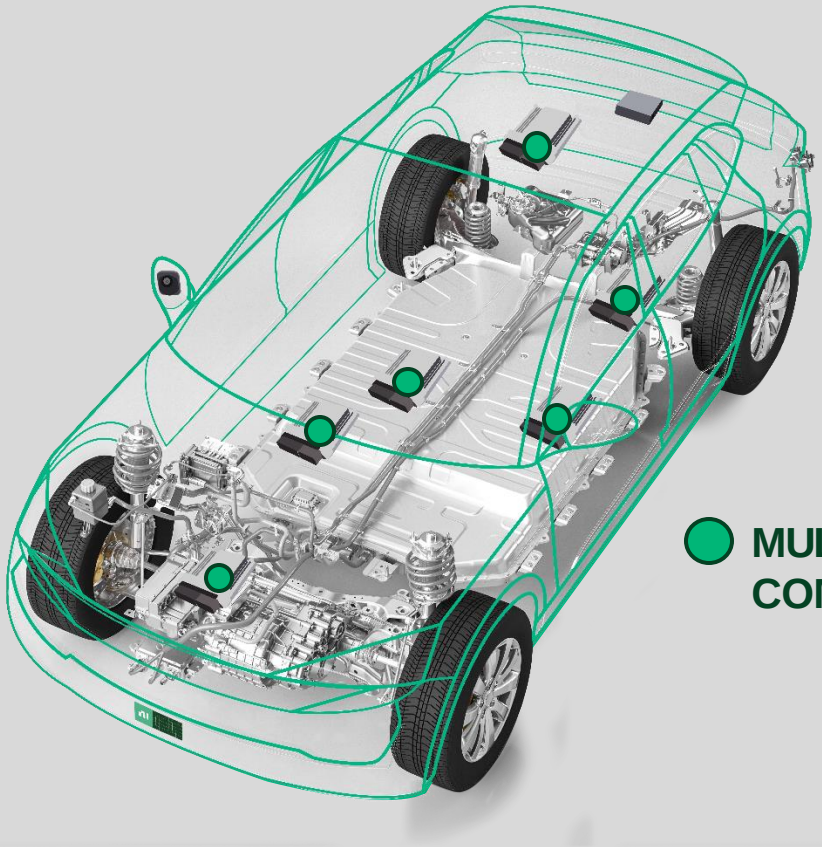
Automotive companies plan to spend

45% of 2021 R&D budget on software

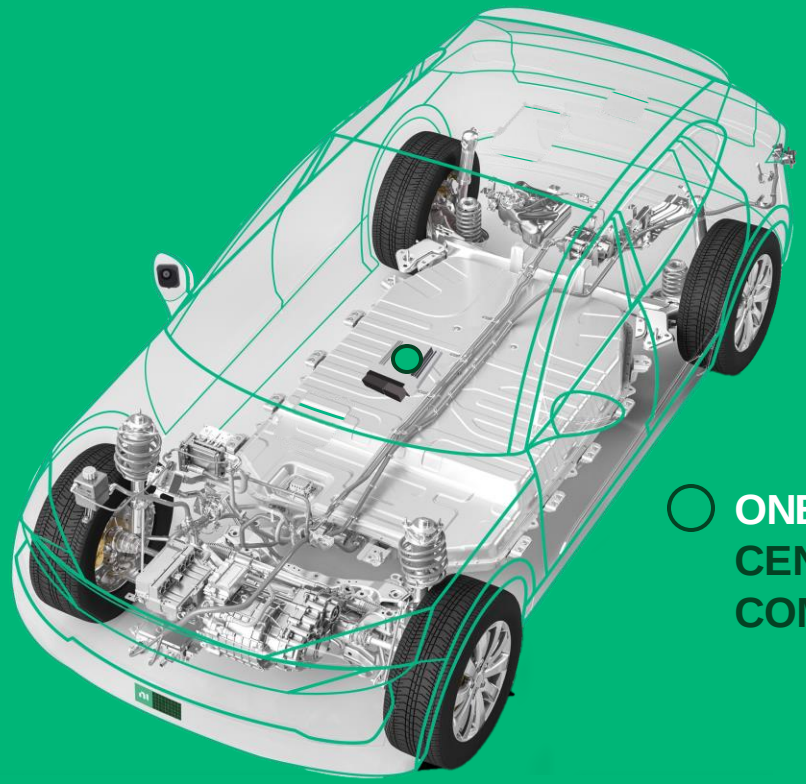
– IHS SURVEY

E/E Architecture Transformation

Moving Towards a Centralized E/E Architecture



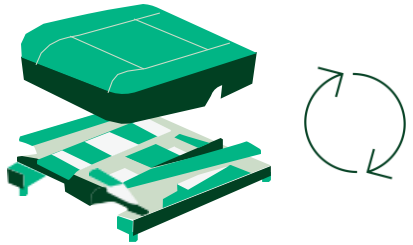
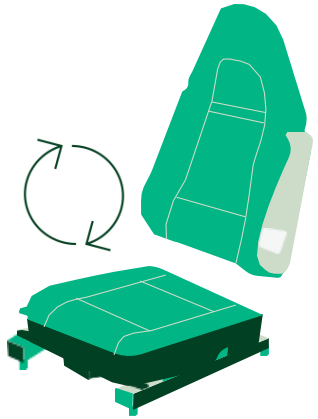
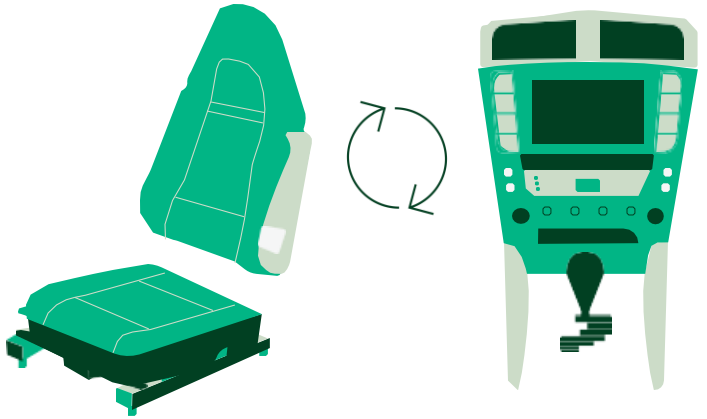
MULTIPLE COMPUTE ECUs



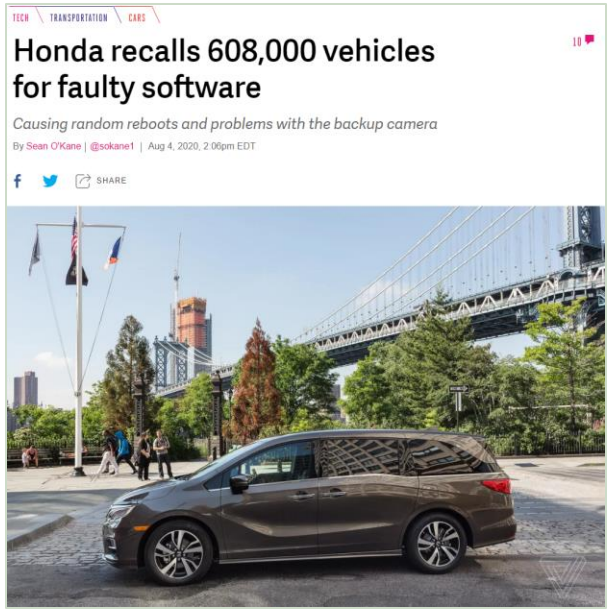
ONE CENTRILIZED COMPUTE ECU

Scaling From Subsystem to Multidomain HIL Testing Requirements

HIGH CHANNEL COUNTS | ALWAYS EVOLVING DESIGNS | WIDE RANGE OF COMPONENTS TO TEST |
INTEGRATE INTO VARIOUS VALIDATION TOOLS AND HIL SOLUTIONS | TEST REUSE | RECONFIGURABLE SYSTEMS | AND MORE

Sub-system	System	Multi-Domain
		
Verify function of a single component, such as a seat motor.	Verify the function of a collection of components, such as the complete seat (motors, heating, weight sensor, etc.).	Verify the function of two systems together, such as a seat and infotainment system. Testing is focused system integration, not single component function.

The Importance of Test



TECH \ TRANSPORTATION \ CARS

Honda recalls 608,000 vehicles for faulty software

Causing random reboots and problems with the backup camera

By Sean O'Kane | @sokane1 | Aug 4, 2020, 2:06pm EDT

SHARE

Source: The Verge

AUTO TRENDS MAGAZINE

YOU ARE HERE: HOME / SPECIAL / THE RECENT, WORRISOME SPIKE OF SOFTWARE-BASED DEFECTS IN VEHICLES

The Recent, Worrisome Spike of Software-Based Defects in Vehicles

FEBRUARY 10, 2020 BY COLE MCKEON — LEAVE A COMMENT

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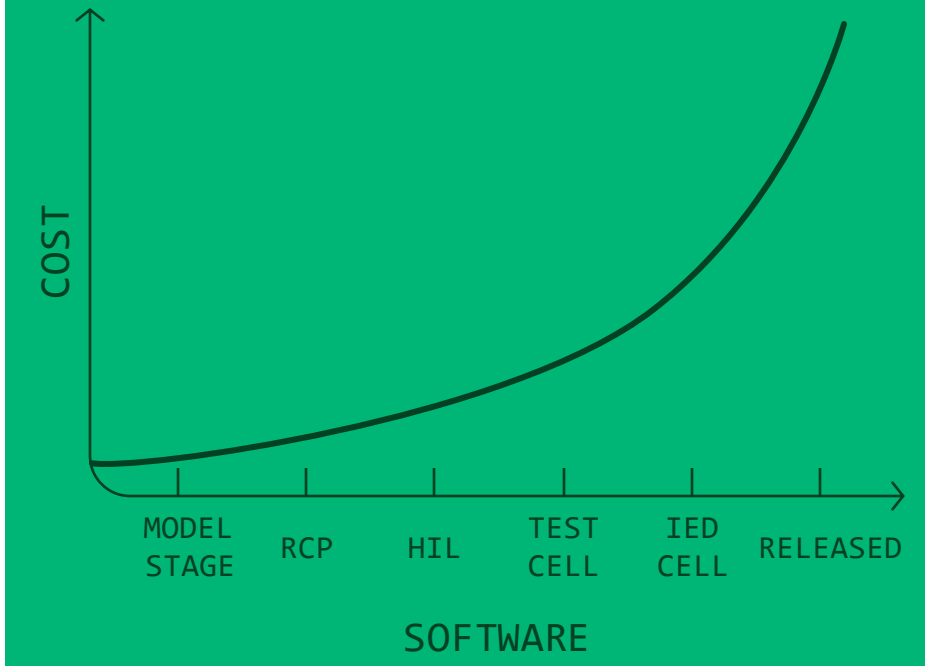
More and more technology is being integrated into vehicles in today's world. Much of this technology is complex, leading to significant problems, as seen in the skyrocketing number of software-related vehicle recalls in the past few years. These problems were especially pronounced in 2018, which was a record year for software-based defects in vehicles.

The new *Stout Automotive Defect and Recall Report*, released in late 2019, suggests the increase in software-based electronic defects was "the most significant trend of 2018." The report also reveals that 2018 had a record-breaking number of vehicle recalls based on software defects, for a total of 8 million–a higher total than the five previous years combined. 2018 also saw electronic defects accounting for the largest percentage of vehicles recalled, which was 26-percent or 6.3 million of all vehicle recalls.

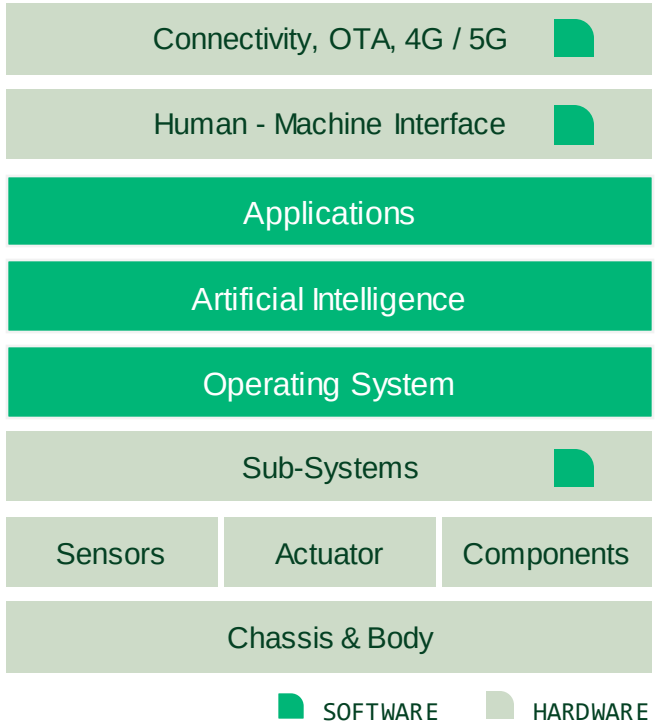
Source: Auto Trends Magazine



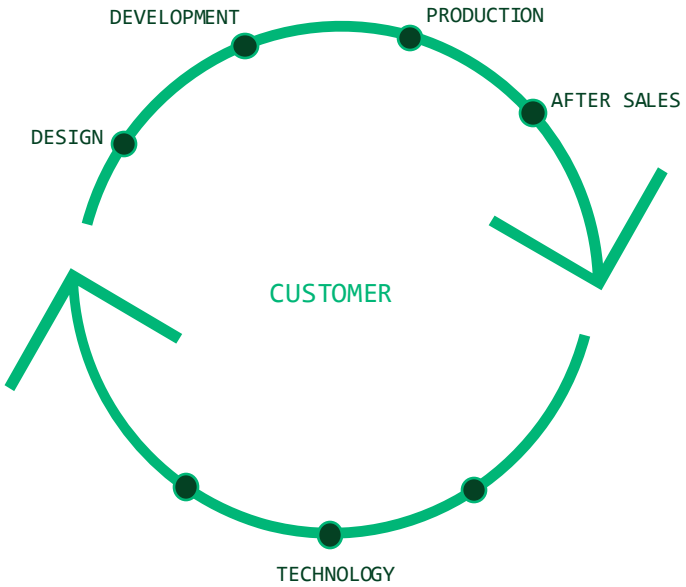
Impact of Test Escapes

Automotive Companies Challenges

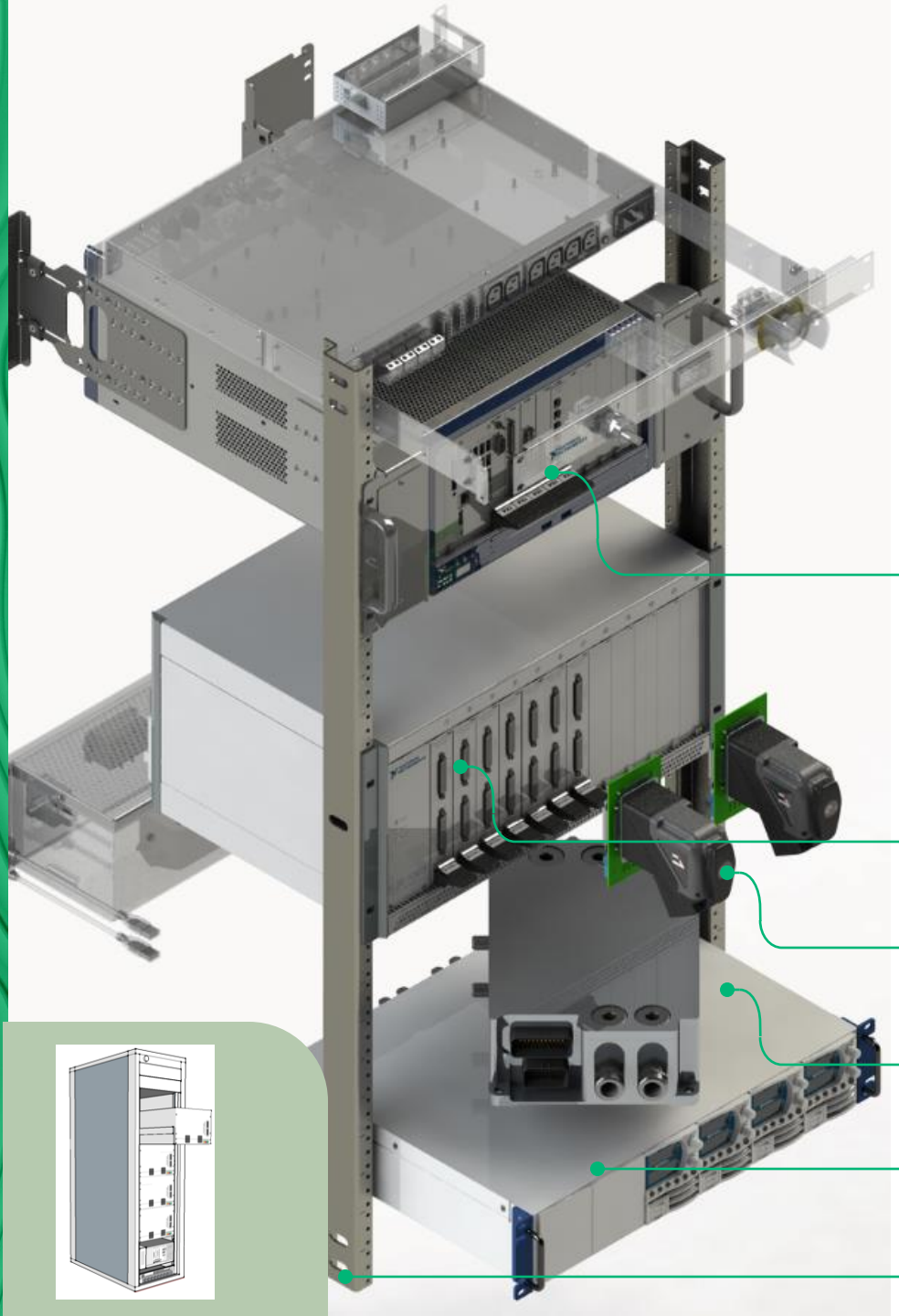
Interplay of Hardware and Software



Product and Process Lifecycle



Integrated Value Chain



ALIARO + NI

Customer defined

Flexible and scalable

High performance

Open for integration

NI Certified Partner and HIL expert ALIARO

Software	SystemLink – data and system management TestStand – test executive VeriStand – real-time test and model integration LabVIEW – programming and customization
PXI	Measurements and I/O Communications Models in FPGA
SLSC	Switch, Load, Signal Conditioning for fault insertion and routing signal paths.
Connectivity	Cabling references for flexible connections to DUTs
DUT	ECU
RMX	Programmable loads and power supplies
xMOVE Master Rack	Rack infrastructure (PDU's, Cooling, E-Stops etc.)

xMove HIL Test System

Ready-to-use Real-Time Simulation System – Configurable For Your Application

The xMove Hardware-in-the-Loop (HIL) Reference System provides a hardware in-the-loop (HIL) test environment for dynamic, closed-loop testing of many transportation control systems. The concept was designed in 2006 and have been updated over the years to adapt new requirements.

Features

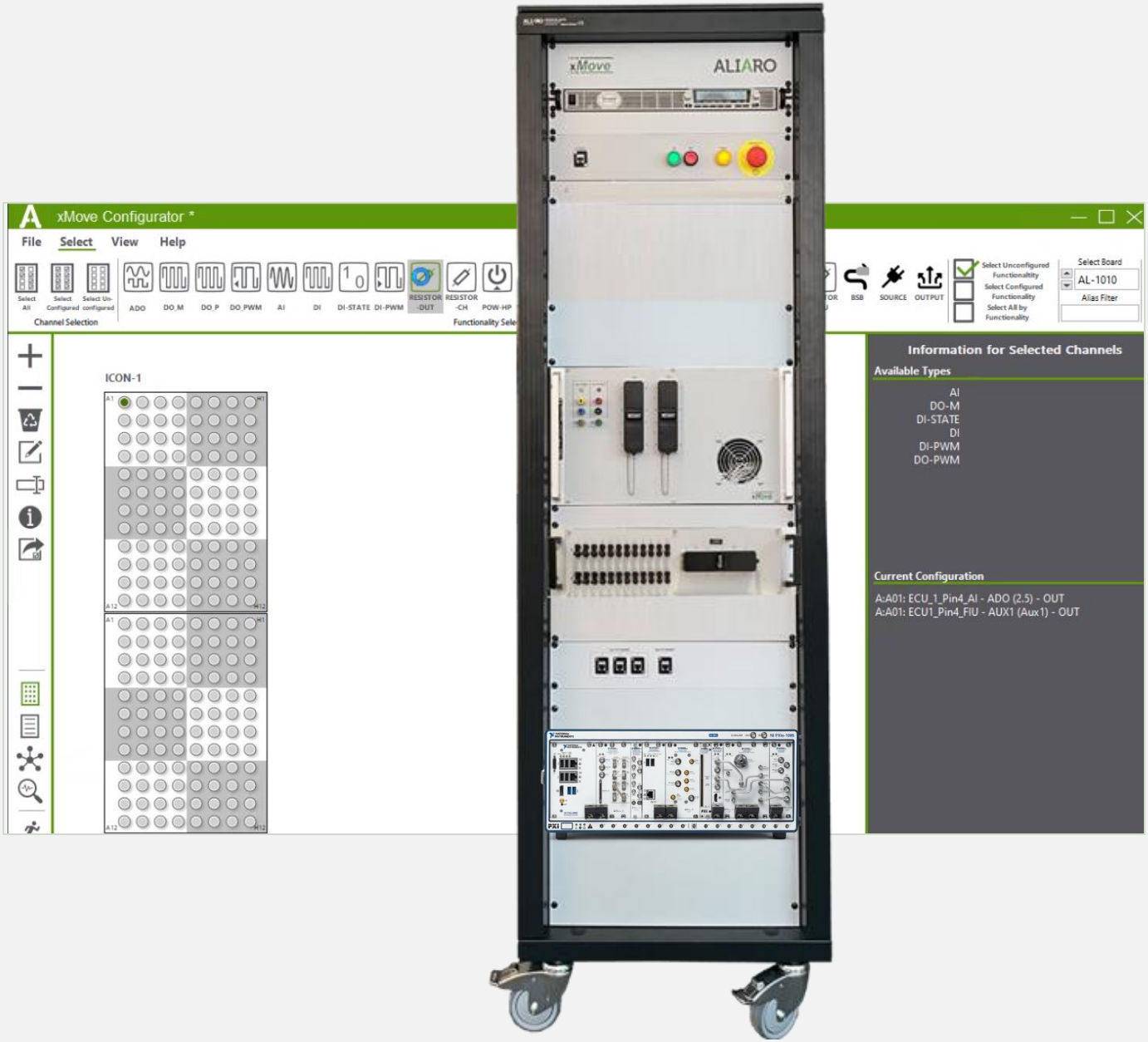
Signal Conditioning of Analog I/O and Digital I/O

Real/sim. switching for testing real actuators with the system

Standard configuration with out-of-the-box functionality for rapid delivery and commissioning

Highly-customizable & modular architecture and interfaces to meet test demand

NI Software Ecosystem (VS, TS & LV) based, yet compatible with Python & other standards



I/O Flexibility and Reconfigurability

NI-ALIARO HIL approach provides flexibility based on standard components

Modularity at both I/O board and sub-system (I/O Box) levels

Flexibility as operational advantage to evolving requirements

Scalability maximizes test coverage from component to system level validation

Reconfigurability of signal type on pin level through software

Can be packed (custom-design) into a small cabinet

I/O Modularity Concept

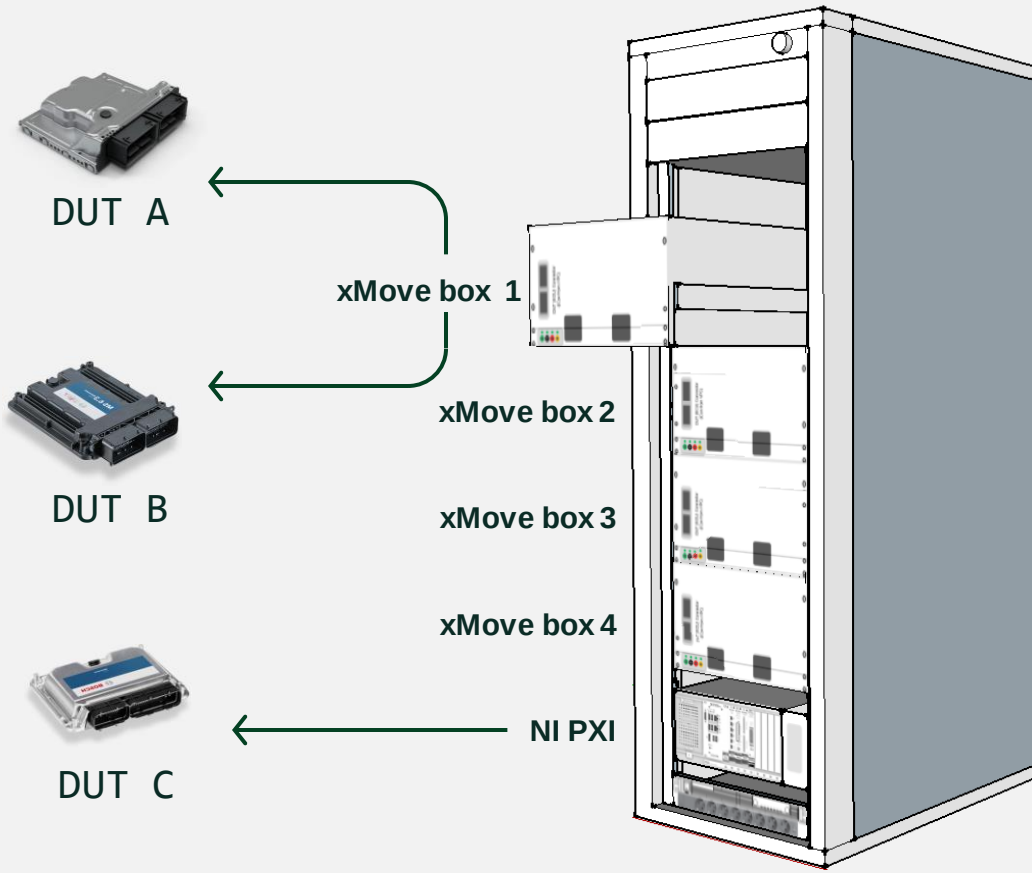
NI PXI (backend) defines the full superset of available resources (I/Os, automotive buses,…) of the system

Different DUTs may be interfaced to a **same xMove box**, selecting different software configurations

A **different xMove box** can be used to leverage **different backend resources** for specific setups (e.g. inverter test using FPGA)

xMove boxes can be easily exchanged, even when the actual number of I/O differs

No need to differentiate harnesses and connectors

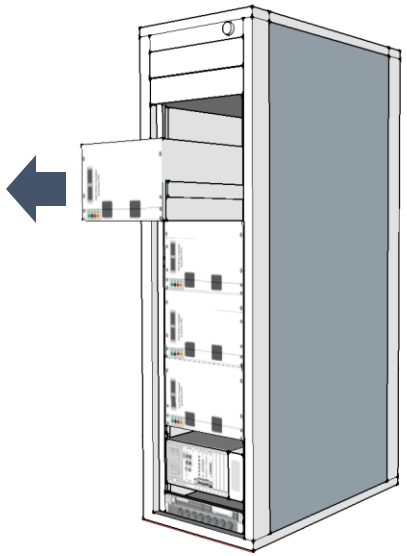


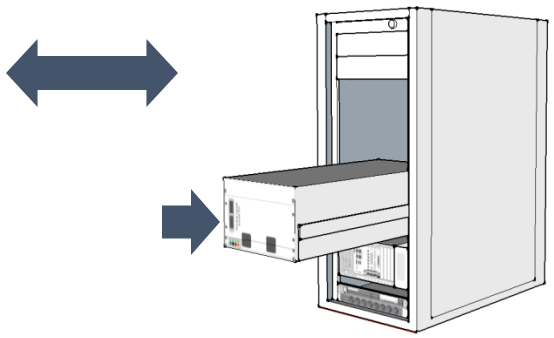
Software Based Configuration of the Test Systems

NI TestStand

xMove Configurator

NI Veristand





TestStand

Receives the software configured hardware setup

xMove Configurator

Modifies the signal types and creating alias

System Definition file is available hardware modules

HIL system

Sub-System HIL

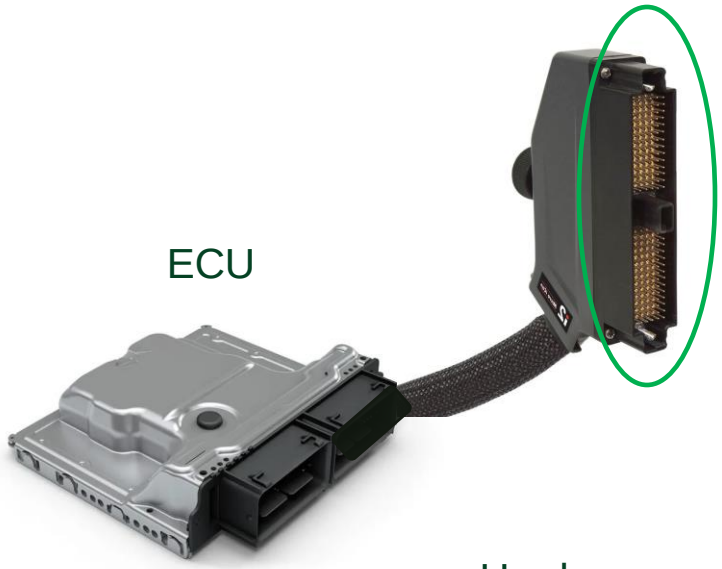
Pre-defined system definition file for Sub-system HIL + xMove Configurator for setting signal types on PIN level do create unique setup

System HIL

Pre-defined system definition file for System HIL + xMove Configurator for setting signal types on PIN level unique setup.
(Merging the system definition files to create system HIL)

Software-Based Configuration Concept

ECU

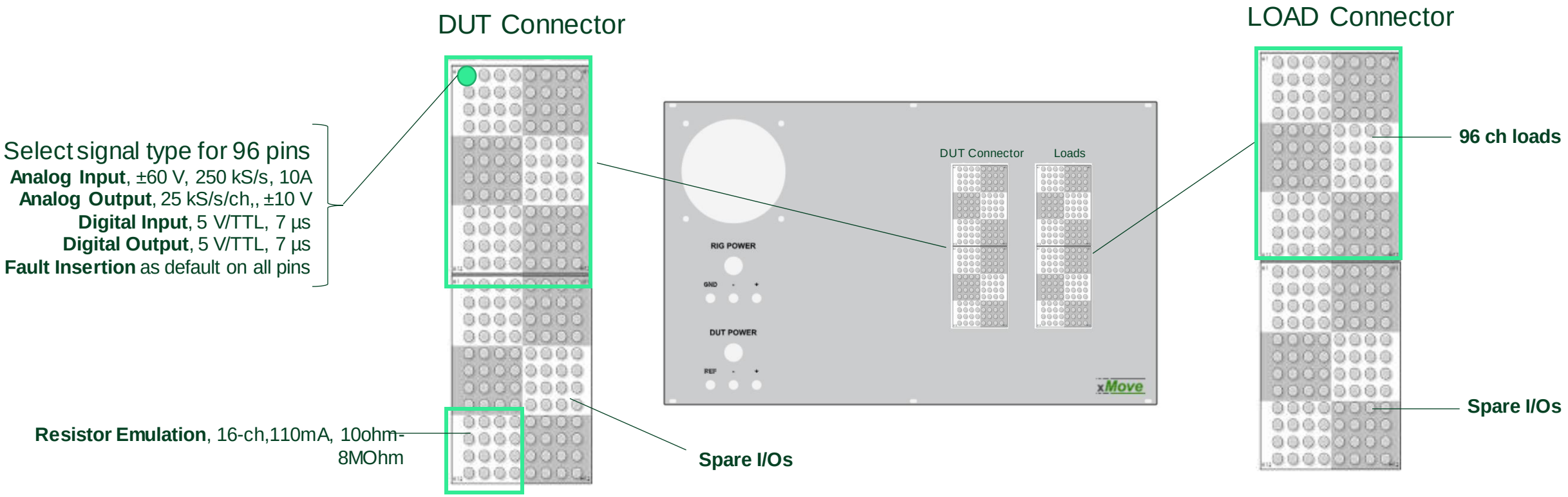


xMove
Configuration file

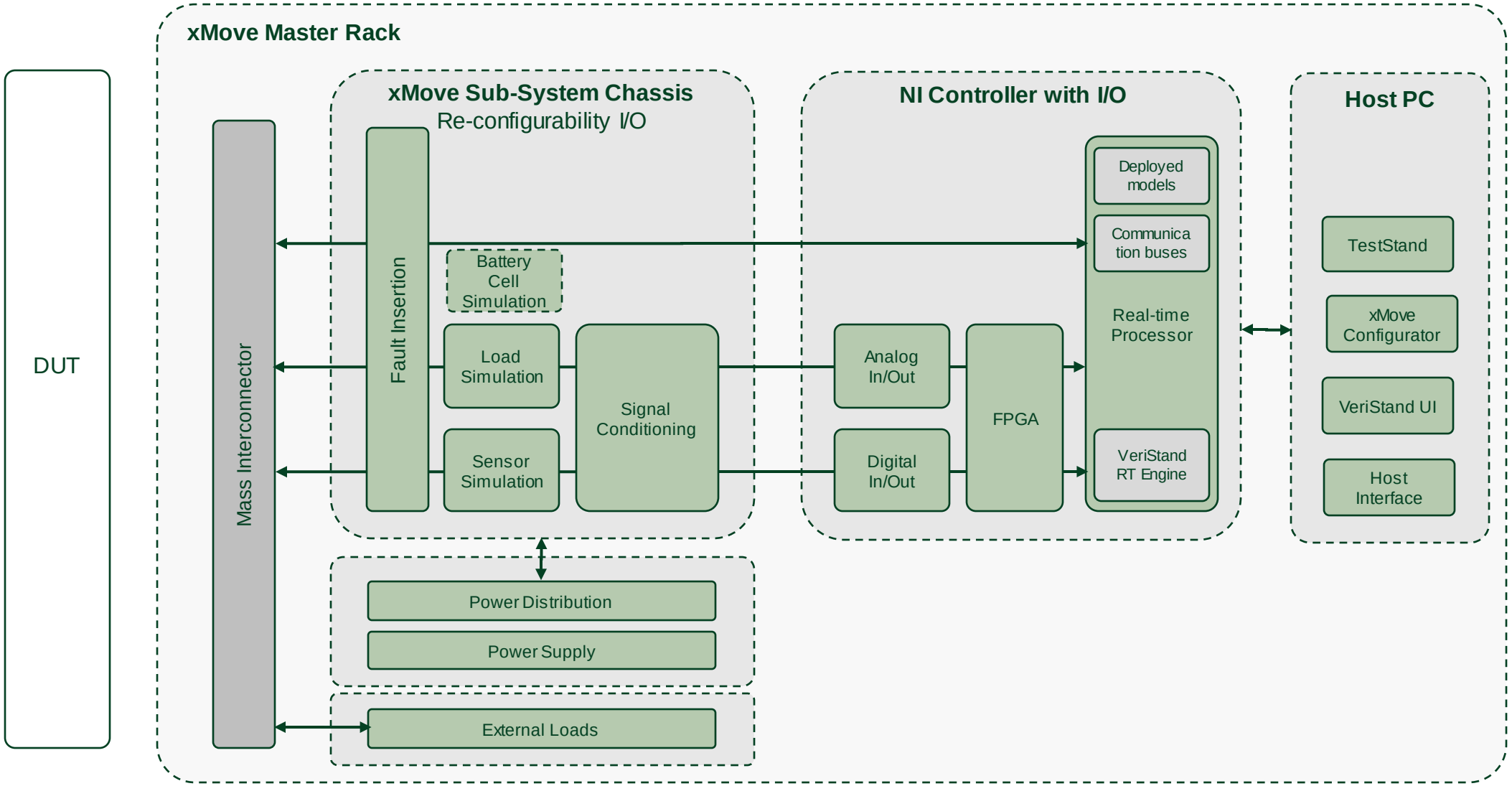
Hardware setup A ⟷ Configuration A
Hardware setup B ⟷ Configuration B
Hardware setup C ⟷ Configuration C
... ...

xMove HIL Test System Differentiator

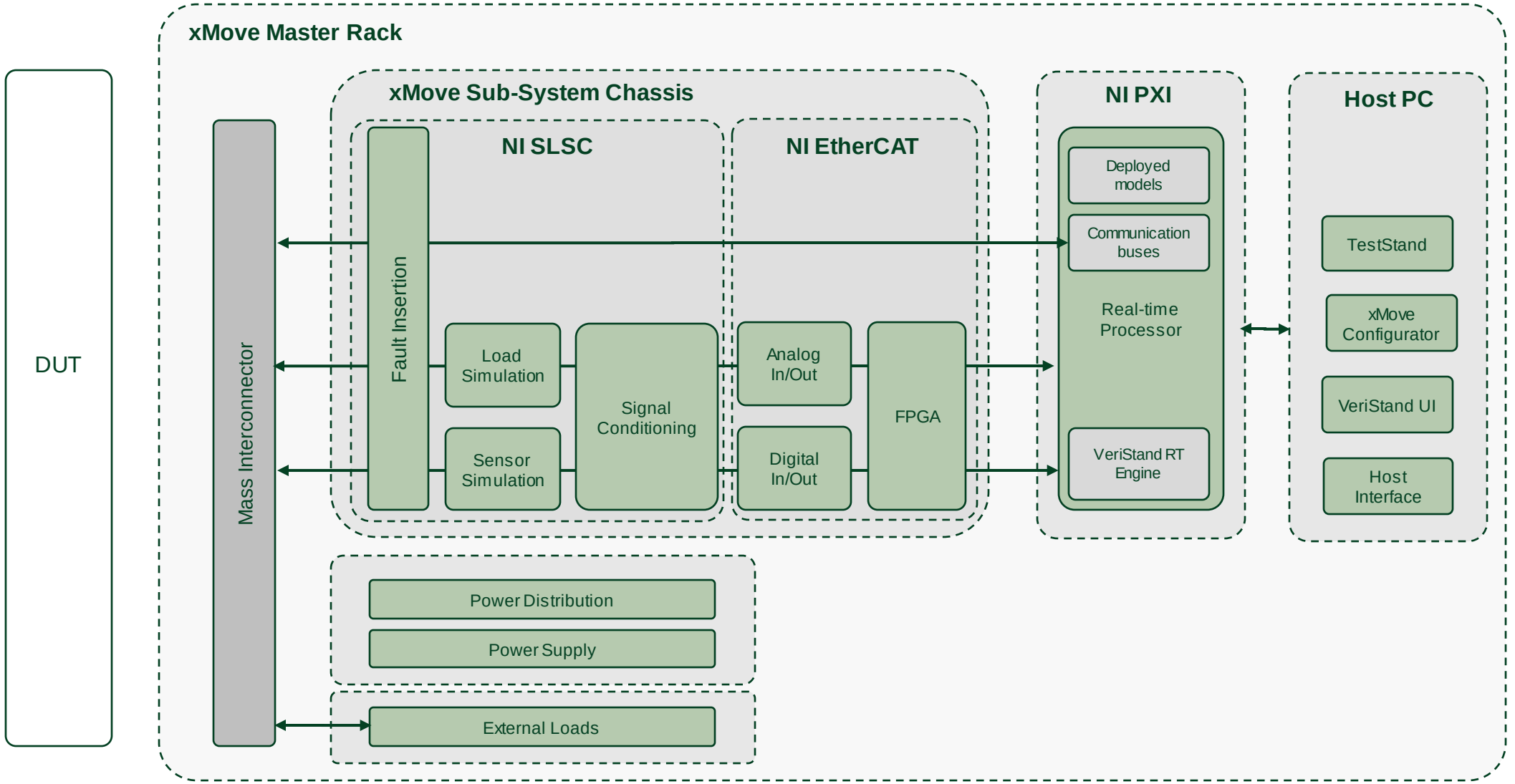
Each physical pin can switch between different signal types and by that reduce the time and cost between tests/projects/programs. Using xMove Configurator (SW) you can deploy new I/O allocations maps in minutes.



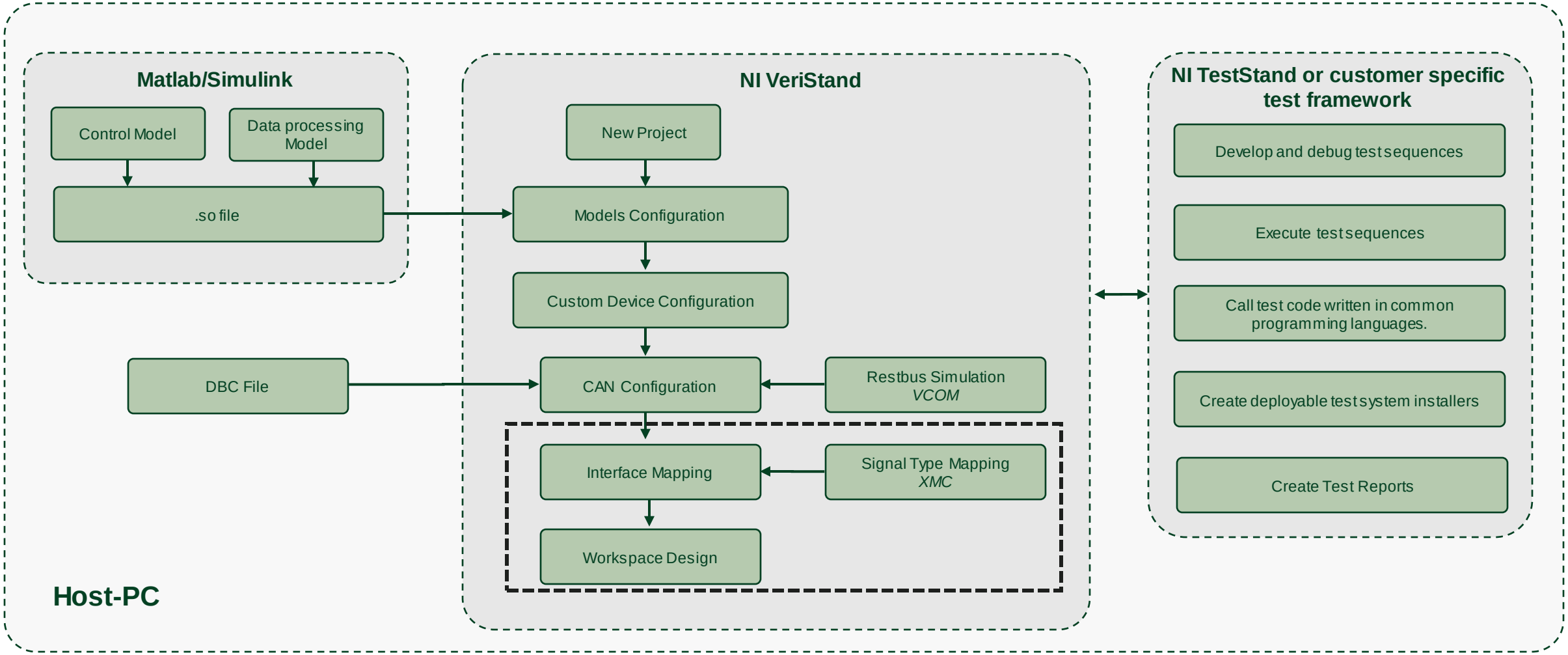
xMove HIL Test System-Level Hardware Architecture



xMove HIL Test System-Level Hardware Architecture



NI HIL System Software Architecture

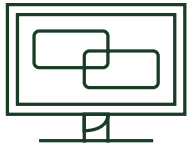


Similiar to ControlDesk

Similiar to AutomationDesk

NI HIL Solution Advantage

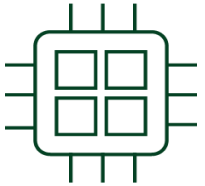
Software



Model Integration

VERISTAND | MATHWORKS COLLABORATION

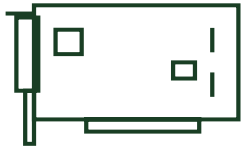
Technology



Advanced Computing

LV FPGA | ALIARO PARTNERSHIP

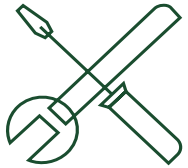
Equipment



I/O Breadth

PXI | SLSC

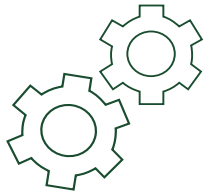
Operations



Customizability

MODULAR I/O | FLEXIBLE SOFTWARE

Integration

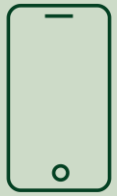


Integration

STANDARDS | OPEN ECOSYSTEM

Future Proof Your HIL System with an Open Turnkey Solution

COMBUSTION/
BODY/CHASIS

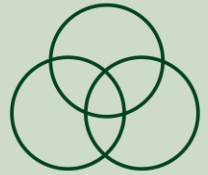


INFOTAINMENT/
TELEMATICS

V2X

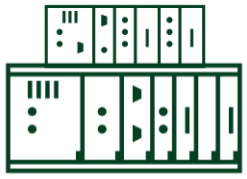
EV
POWERTRAIN

ADAS/
AD

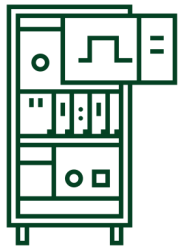


MULTI-DOMAIN

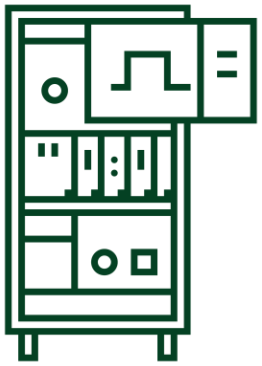
That Scales Across ECUs and Test Systems



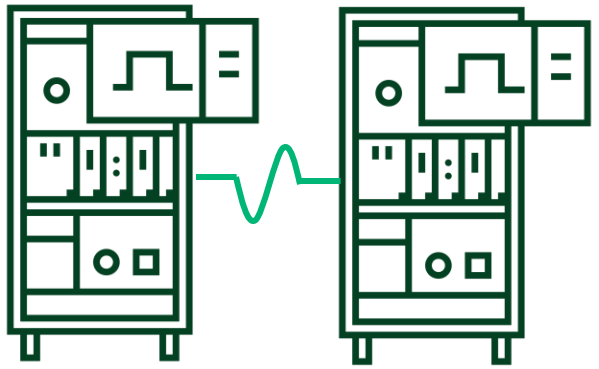
DESKTOP HIL



COMPONENT HIL



SUB-SYSTEM HIL



SYSTEM INTEGRATION HIL

Question & Answers