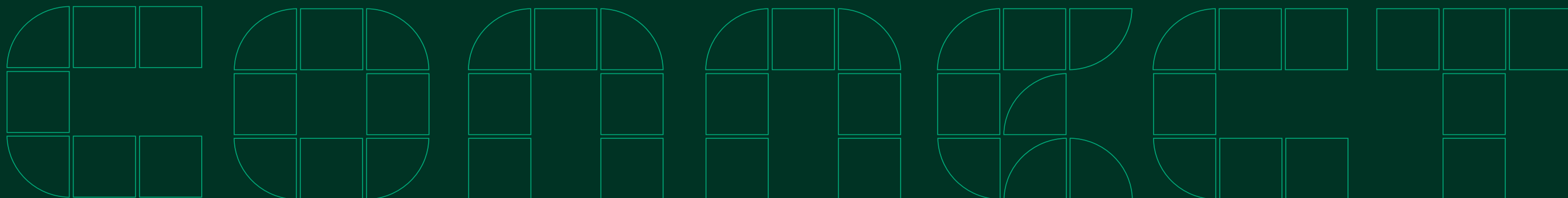




connect

2024 AUSTIN



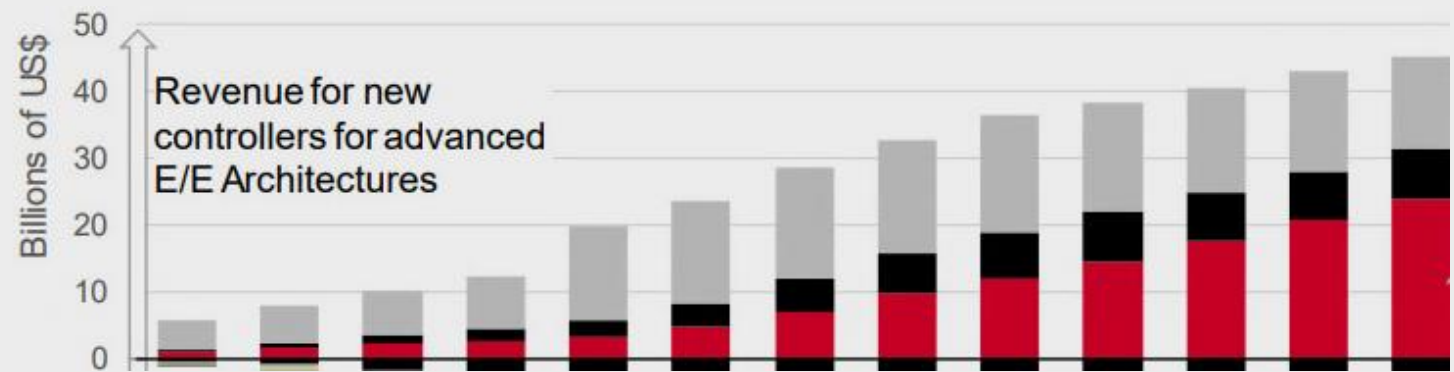


Addressing the Rapid Evolution of Technology in the Automotive Industry

Christine Sparks, ADAS Offering Manager
Robert Melody, Test Tool Coordinator
Navtej Saini, Test Tool Coordinator

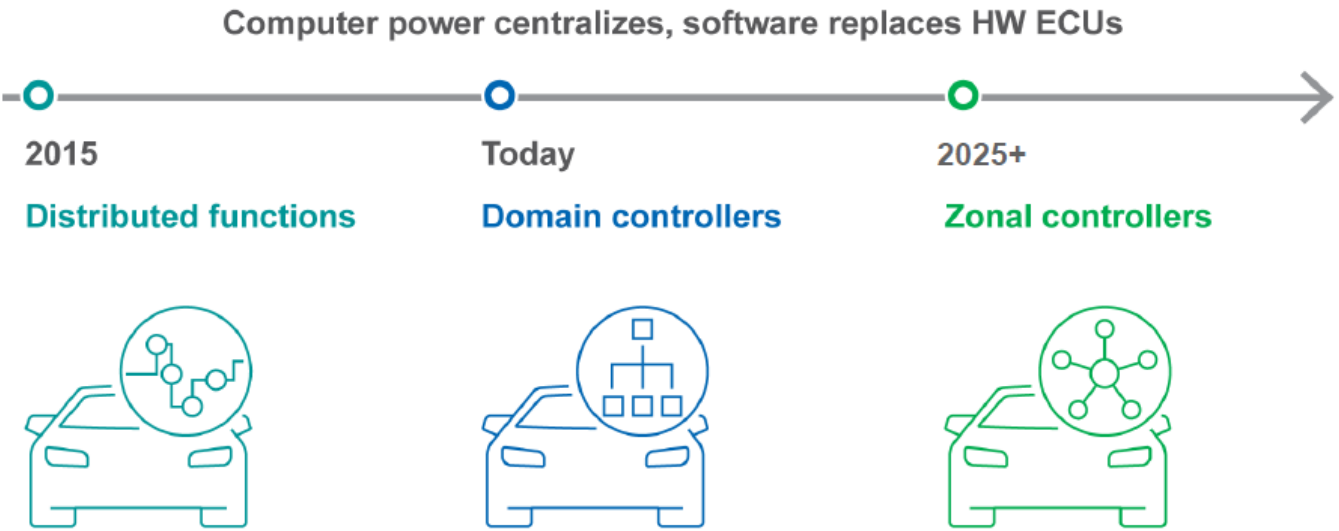
Automotive Trends in E/E

The changing landscape of Auto Electronics: Software-defined vehicle (SDV) architecture



■ Autonomy Domain Controller
■ Cockpit Domain Controller
■ Zone Controller / Vehicle Domain Controller

Impact of E/E architecture migration on ECU market



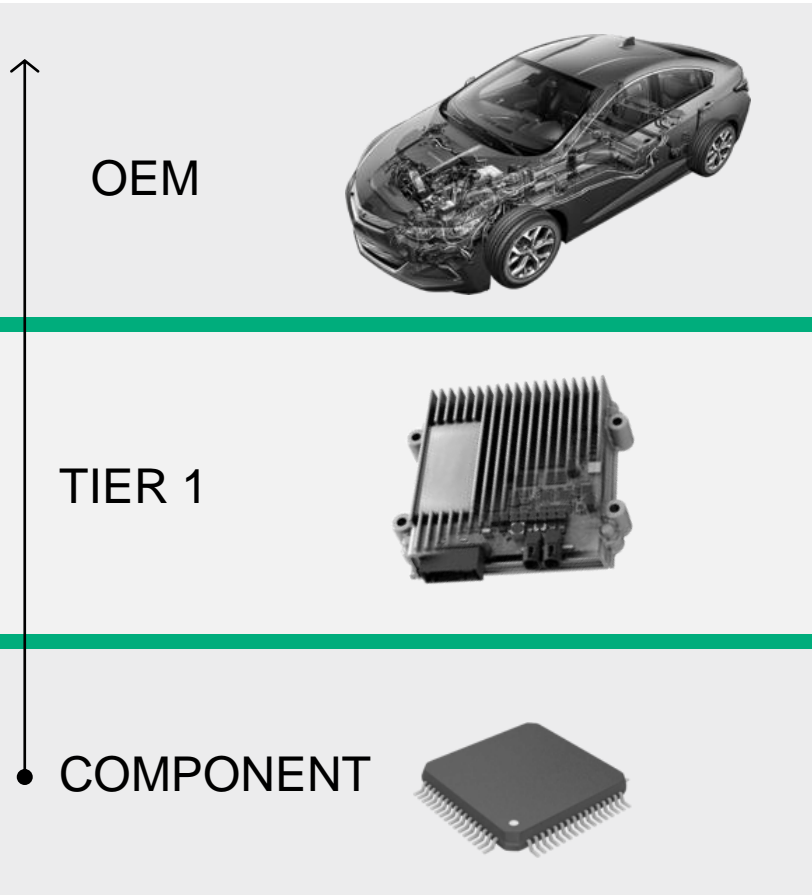
The motivations for new features

- Electrification
- Autonomy
- Connectivity over-air and new service models
- New mobility models like Robotaxis

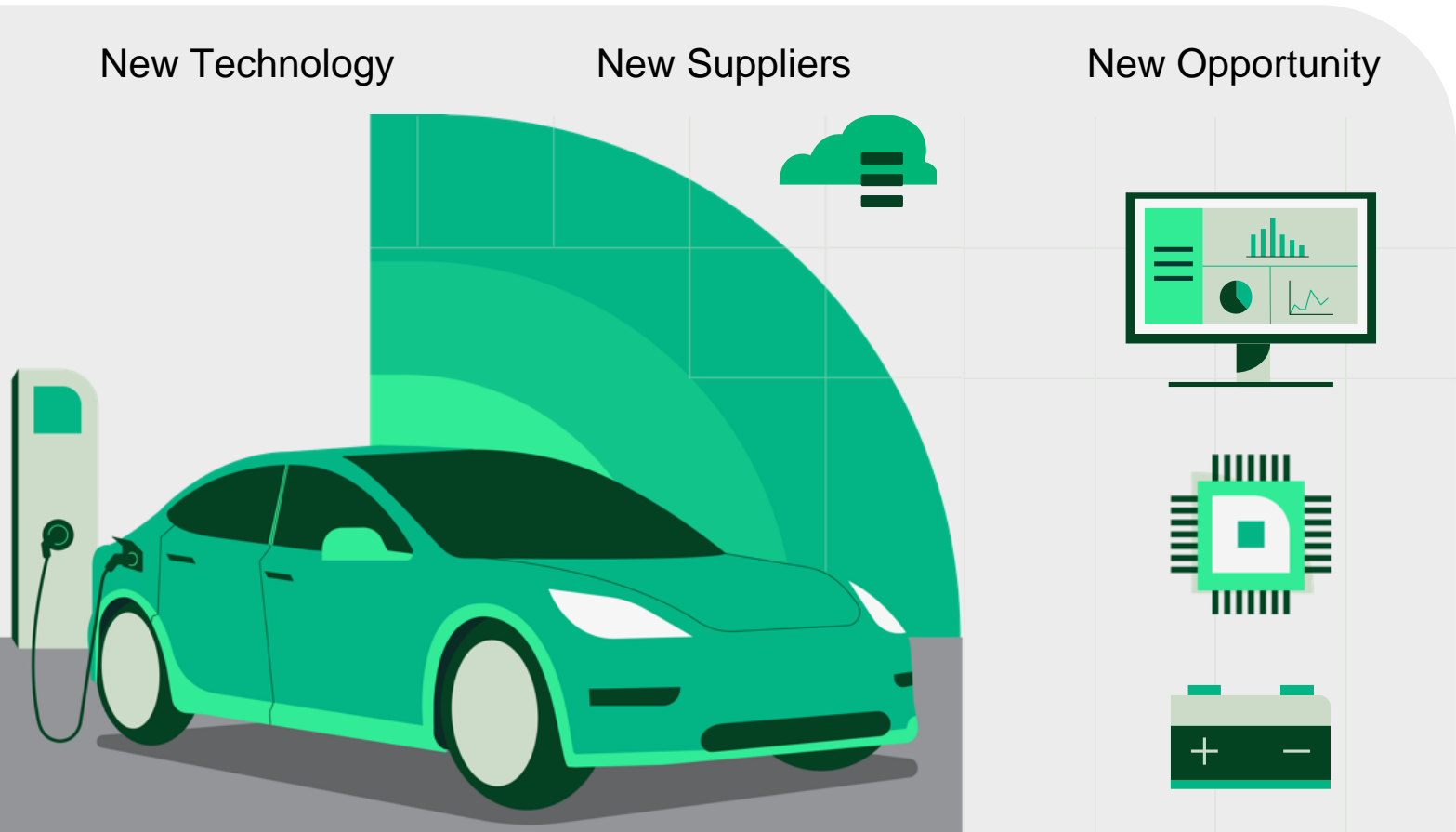
Electrification and Autonomy Adoption Accelerating

Safety and Performance Drive Innovation, Create Opportunity, and Challenge Traditional Process

Traditional Supply Chain



New Automotive Ecosystem



By 2030

30%
ELECTRIC

50%
>L2 AUTONOMY

The Struggle Is Real...

First.... Pandemic

OEMs are working differently over the last several years along with the changes to the vehicle architecture

Second.... Semiconductor Crisis

OEMs now working directly with the semiconductor suppliers

Building relationships with suppliers further upstream and are sidestepping some of their traditional Tier 1 integrators

Third.... What's next????

Geopolitical uncertainty is causing market instability and increasing costs areas such as energy and raw materials

Competing Against Each Other...

OEM TIMELINES

VS

Tier 1 Timelines

VS

Suppliers (Release Dates)

VALIDATION TIMELINES

VS

Design Freeze

SOP DATES

VS

Timing of Program Launches

QUALITY

VS

Everyone 😊

OEM

VS

Tech Companies

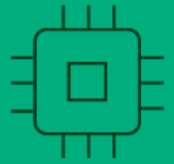
GEOPOLITICAL ISSUES

VS

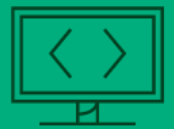
Consumer Buying Power

Necessary Pivots to Upcoming Changes

Adaptations to Integration



Partnerships: Necessary switch to service-orientated solutions
Tier 1s could transition from hardware only to hardware & SaaS solutions



Specialization: Tier 1s can focus on specific software domains like ADAS, cyber security, connectivity, EV, etc.



Software – Who Develops??: Core software developments done in collaboration with OEMs, Tier 1s and possibly tech companies.

Lines are blurring

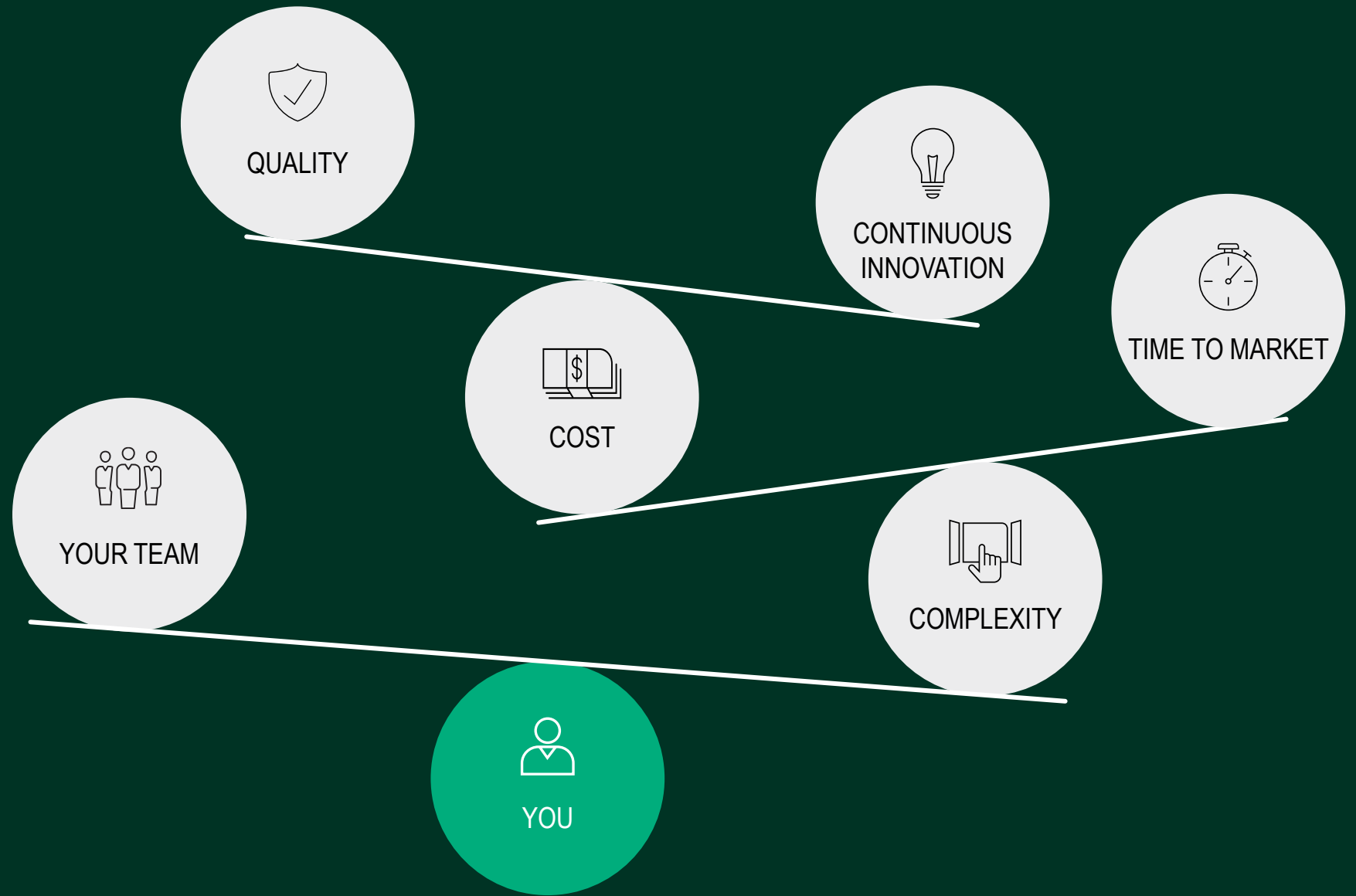
SDVs is reshaping the traditional automotive supply chain:

OEM Ownership: Balancing in-house development and external collaboration

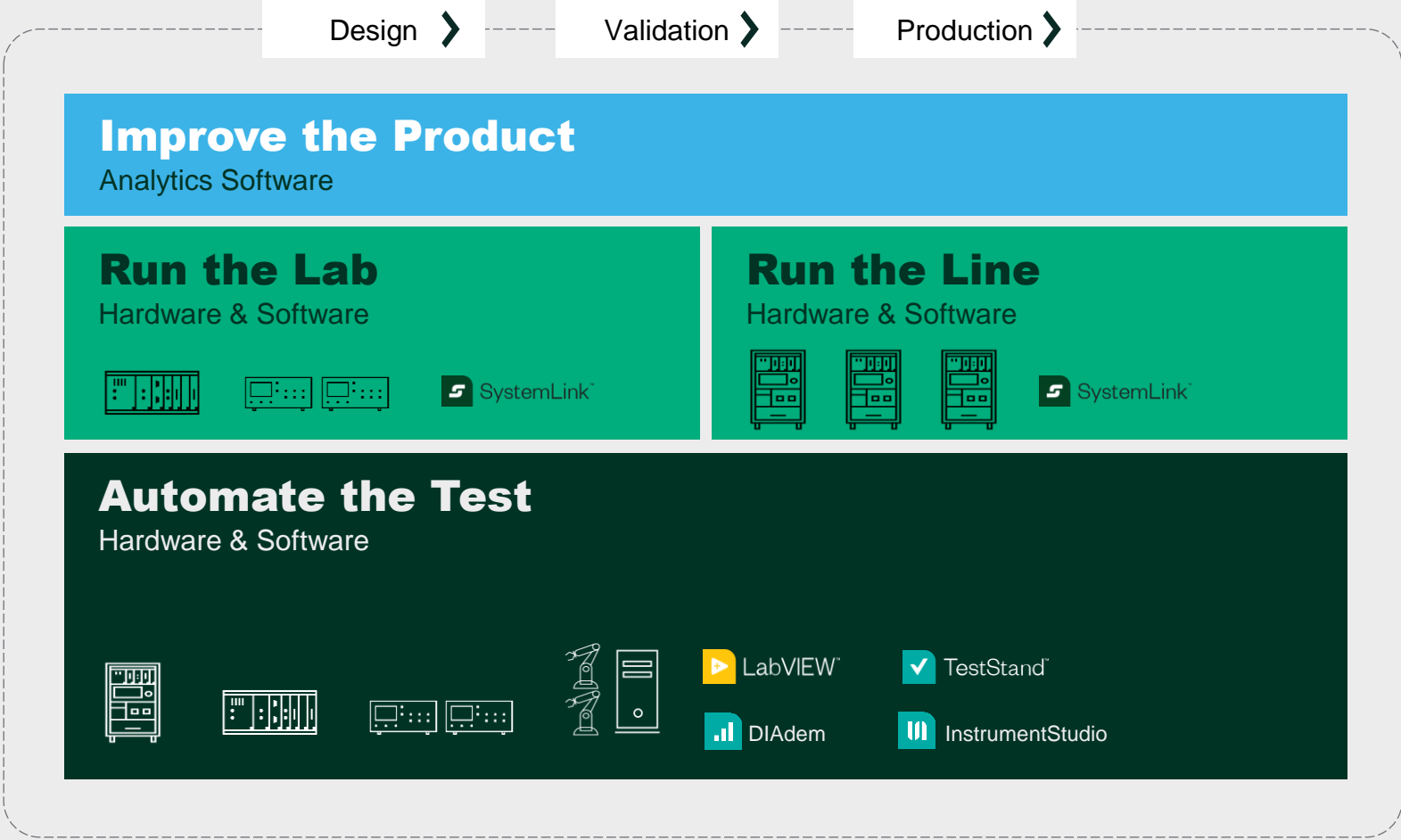
Software, Software, Software: Becoming a core competency, and growth arena in employee skill set as well as overall vehicle design.

Multi-Tiered Supplier Structure:
Specialized software vendors working alongside traditional hardware suppliers.

Test Organizations Must Balance Competing Requirements



NI's Integrated
platform scales to
your evolving needs



Tier 1 Perspectives and OEM Expectations



What We Do Know

The software-defined vehicle (SDV) architecture will bring about new technologies, features and services

- Charging Infrastructure
- Predictive Maintenance
- Connected Vehicle and Enhanced Safety Systems

SDV means a reimagining the vehicle E/E (electric and electronics) for BOTH Software AND Hardware

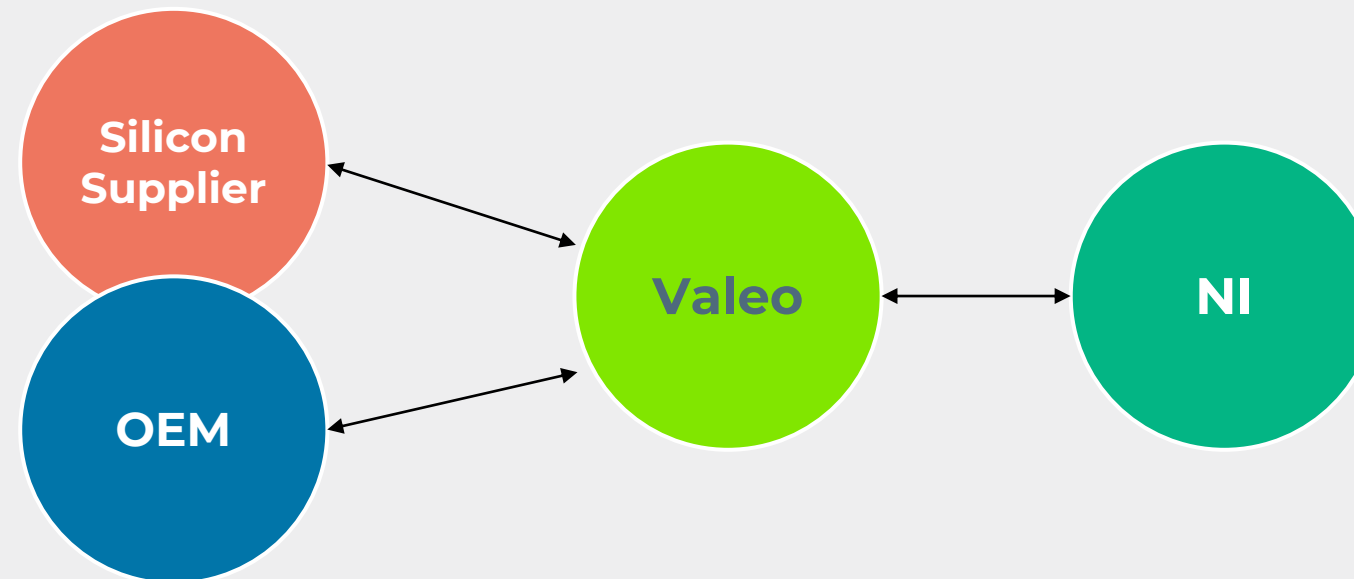
- Gradual migration from a distributed ECU to a centralized-zonal ECU including central computing and streamlined hardware designs

Many ECU's  **Domain Controllers with Central Computing**

OEMs will be jointly developing with Tech companies and in some cases contract manufacturing with Tier 1s

Roadmap Acceleration: Camera Interface

OEMs will be jointly developing with tech companies and in some cases contract manufacturing with Tier 1s





SMART TECHNOLOGY
FOR SMARTER MOBILITY

MARKET LEADERS



#1
IN ADAS

1 vehicle out of 3
on roads worldwide

EQUIPPED WITH VALEO ADAS
SOLUTIONS



#1
IN ELECTRIFICATION

1 vehicle out of 3
on roads worldwide

EQUIPPED WITH VALEO THERMAL & ELECTRIC SOLUTIONS



Valeo Brain Division

Test Tools & Infrastructure



WHO WE ARE

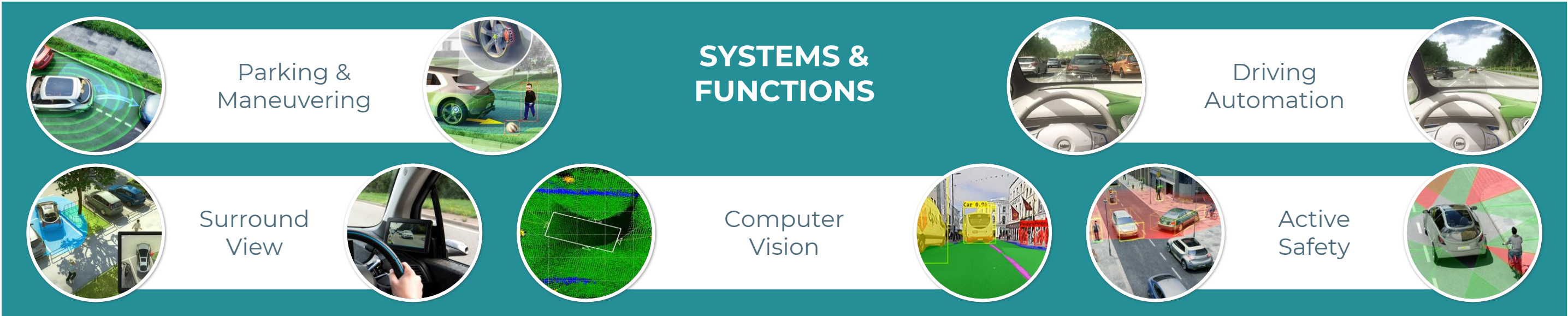


The **Valeo Brain Division** focuses on solutions for **intuitive controls, connectivity** and **driving automation** to **make mobility safer** and **more enjoyable** for everyone.

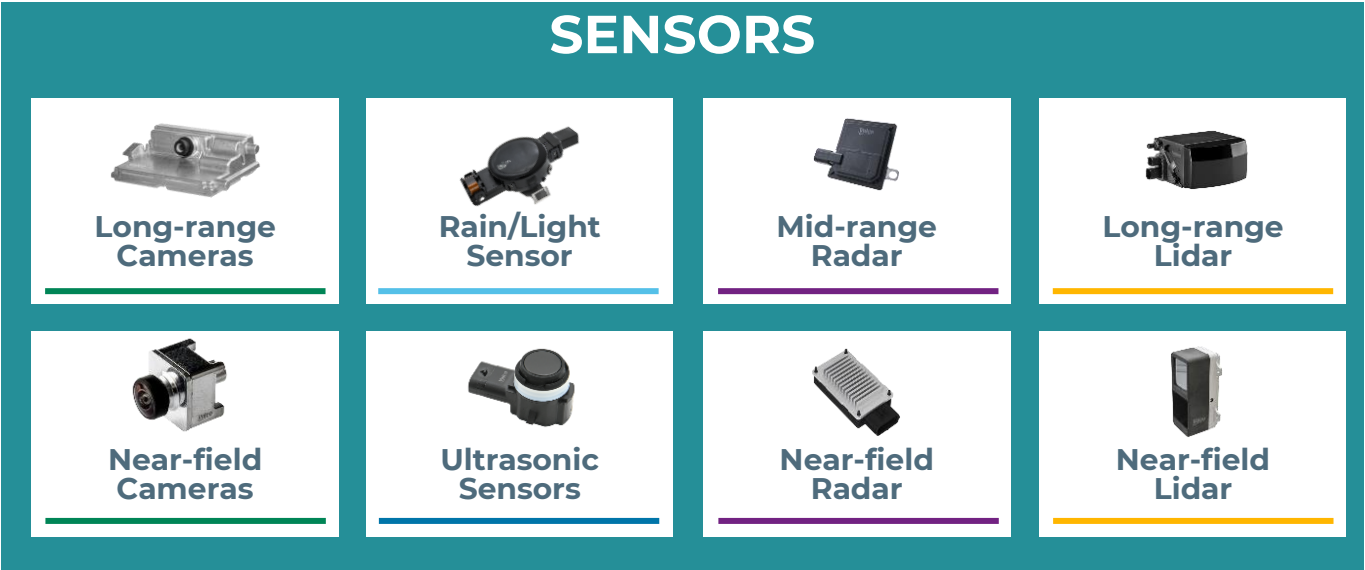
DRIVING AUTOMATION - PRODUCTS

Software

Software



SIGNAL PROCESSING · SENSOR CONTROL





Validating New Vehicle Technology

Next Gen SerDes

PROBLEM STATEMENT

Validation of a new generation of SerDes technology in Valeo's active product development. Valeo needs a robust state of the art solution to test this technology. Currently, there exists no compatible tooling to validate this product at the level demanded by our customer.

Next-Gen Vehicle Technology



Valeo's Innovative Solutions



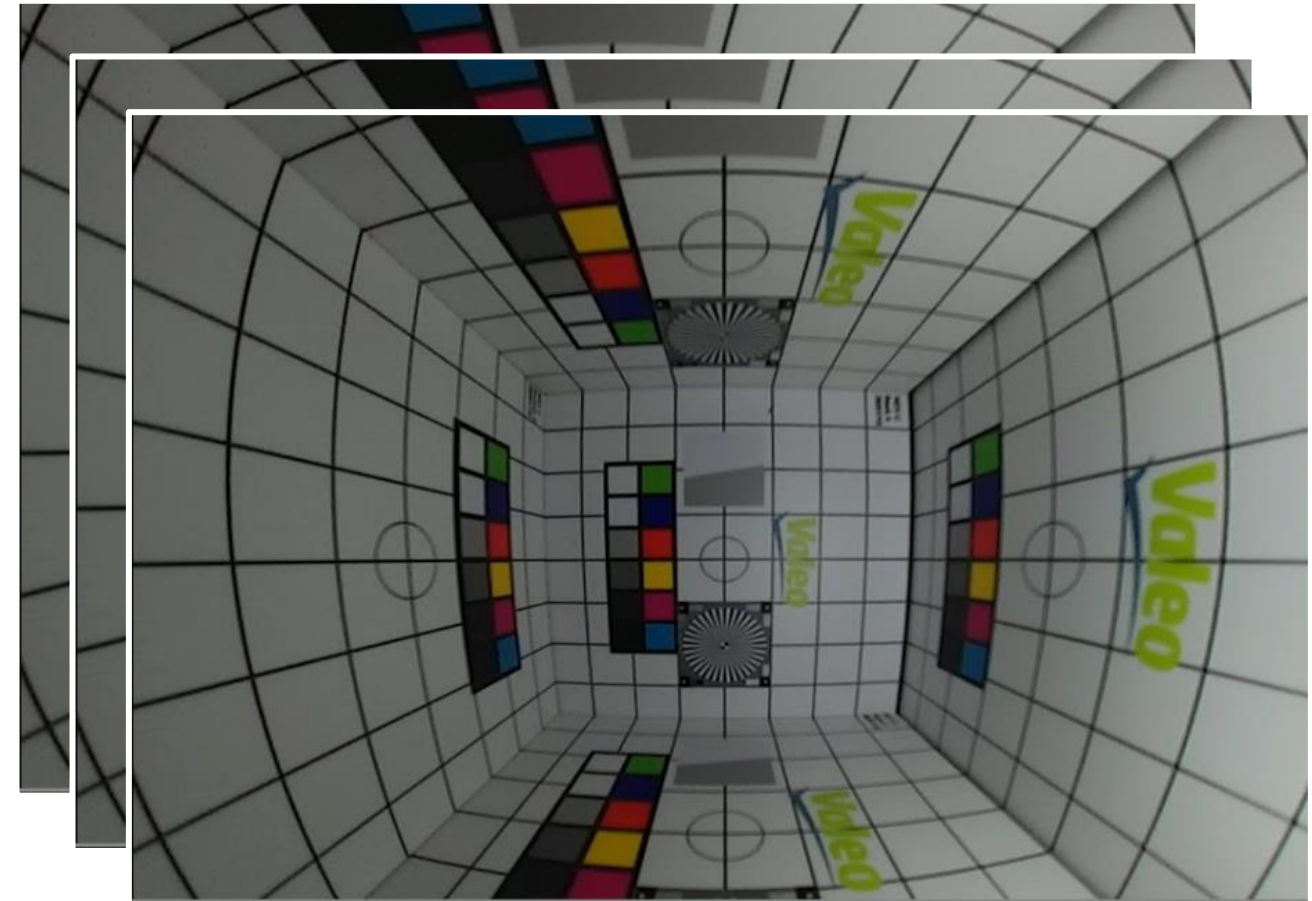
New Test Technology



Validating next gen SerDes technology

CUSTOMER EXPECTATIONS ON VALIDATION

- **Video Deaggregation**
- **Continuous Video Monitoring**
 - Frame rate (fps)
 - Datatype
 - Resolution
 - Error capture & logging
- **Backchannel I2C Communication**
 - Continuous monitoring of DUT
 - Configurations to DUT
- **Timing measurements**
- **Fault Tolerant Time Interval (FTTI) tests**



Deaggregation & frame by frame validation of multiple video streams

CHALLENGES



Next Gen Serdes

- Higher forward channel data rates (up to 10 Gbps per channel)
- Previously unexplored features & modes on SerDes
- SerDes silicon not compatible with previous generation devices



Dynamic Timelines & Silicon Maturity

- Multiple versions of the silicon to be released during the development cycle
- Tracking features changes and updates
- Alignment of timelines from suppliers to meet OEM milestones



Continuous Coordination and Alignment with suppliers & OEMs

- Shifting release dates
- Tracking feature updates & capabilities of the silicon
- Technical sync & debug sessions

Unreleased silicon with new features; dynamic timelines to be managed to meet OEM milestones



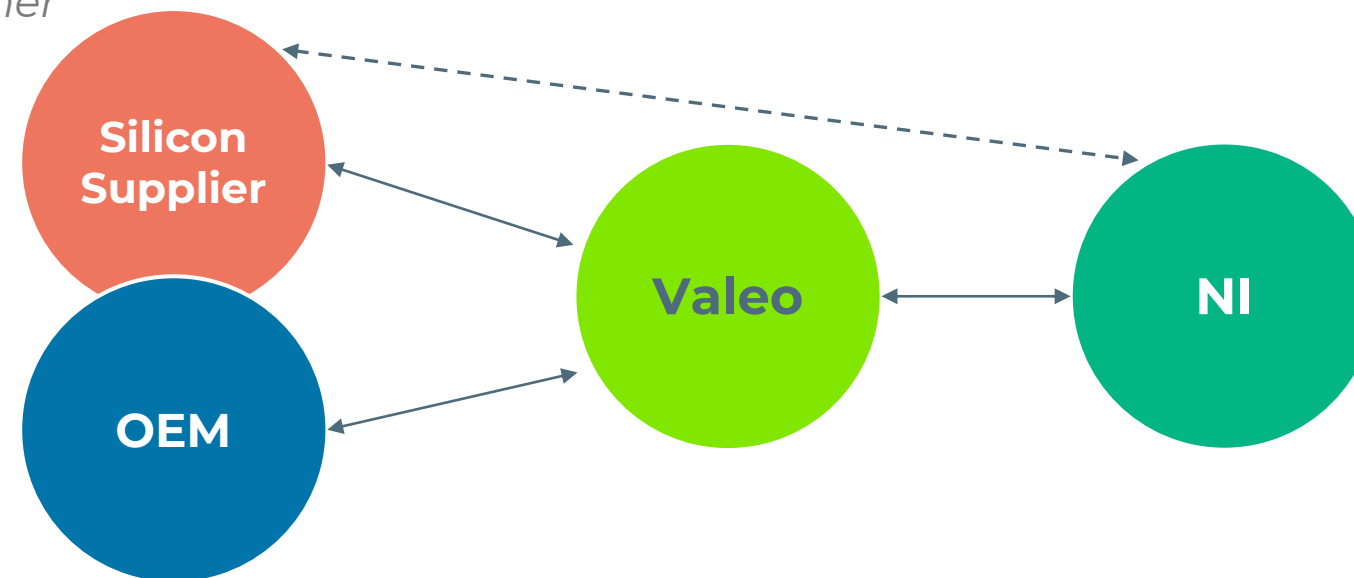
Collaborative Development

COLLABORATIVE EFFORT

Collaboration & clear communication has been a critical aspect of this development

- Clear expectations & directives from the OEM to drive the test architecture
- Continuous alignment with the silicon supplier to track feature updates and ensure timely deliverables
- Any slippage has a direct effect on NI's development & Valeo's deliverables to the OEM
- Continuous alignment with National Instruments to drive progress & mitigate risks

Valeo is responsible for timely communication between the OEM, silicon supplier & NI. Any changes in project scope or dates need to be addressed in a timely manner



Unreleased silicon with new features; dynamic timelines to be managed to meet OEM milestones

ROLES & RESPONSIBILITIES

Valeo

- Define test concept and align with OEM for approvals
- Define & review the requirements for the test solution development with NI
- Coordinate between NI, OEM and silicon supplier to prevent delays & mitigate risks
- Ensure NI receives the silicon & any support from silicon supplier in a timely manner

NI

- Design & Development of test equipment to meet Valeo's validation requirements
- Delivery of the test equipment to valeo in time to meet DV & PV timelines
- Dedicated project manager to Valeo
- Dedicated FAE & R&D support

Silicon Supplier

- Release the different revisions of the silicon as planned - release date & feature set
- Supply the requested quantities in time for development
- Technical support with the silicon - documentation, configuration scripts, debugging etc.
- Dedicated FAE for technical support

OEM

- *Define the overall product specifications & features*
- *Define validation requirements which drives tooling architecture*
- *Manage shifting timelines with different suppliers*

Each party plays a key role in driving the development

PROJECT ALIGNMENT EFFORTS

- Dates set by the OEM for DV & PV testing driving the deliverables on the validation setup
- Feature set & deliverables from the silicon supplier
- Coordination meetings between senior management from NI & Valeo to agree on project scope, cost & timelines to kick off the project without delays & to rapidly respond to & resolve any changes triggered mid development
- Coordinated technical discussions between NI, Valeo & silicon supplier
- Statement of Work between Valeo & NI documenting deliverables & change order request
- Technical team discussions between Valeo's R&D & NI's R&D teams
- Weekly sync meetings between Valeo & NI to drive progress & mitigate risks

Driving progress & mitigating risks - alignment on project dates, scope, features & deliverables



Test Solution Development

Collaboration with NI

INTERIM SOLUTION

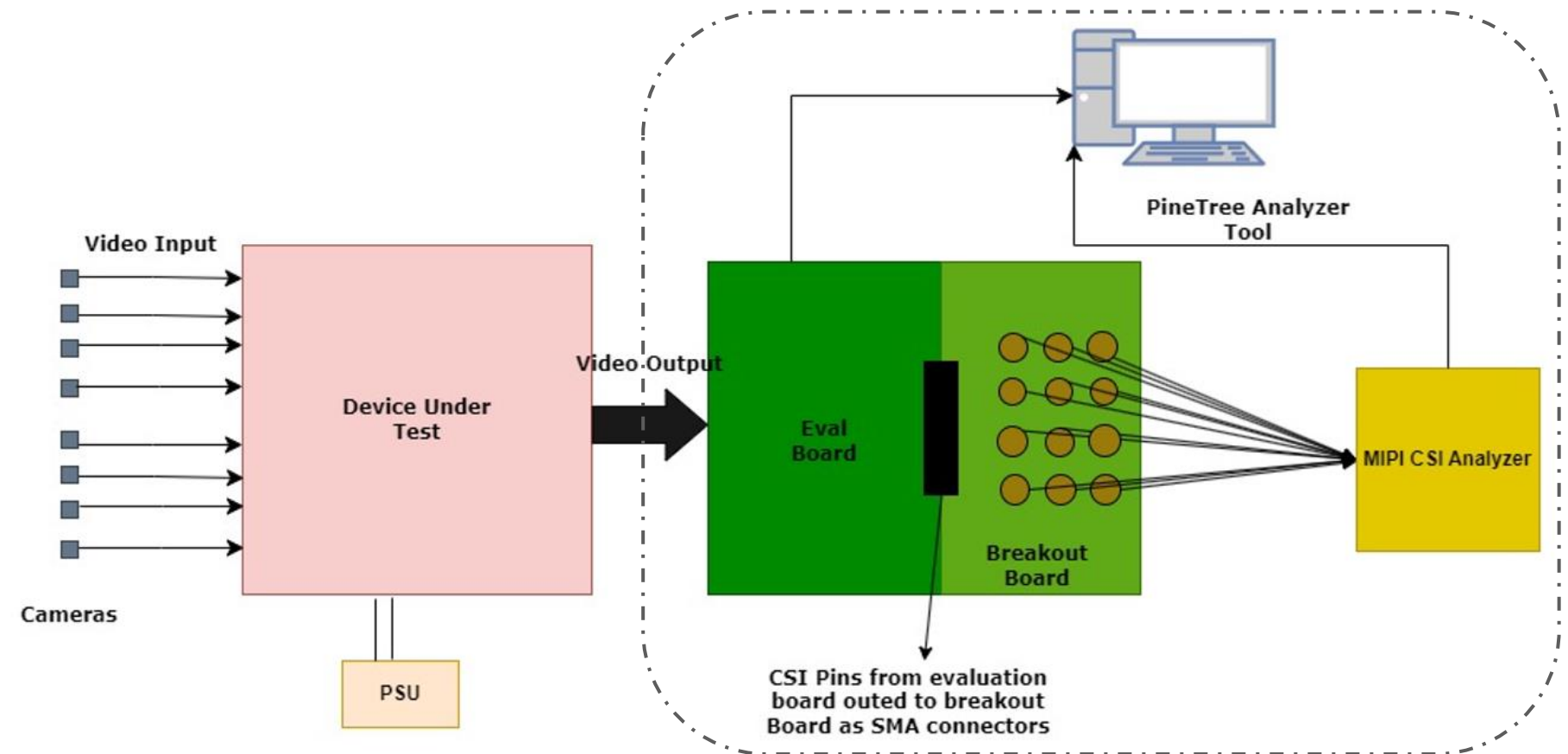
Key Features of the Solution

- Capture video frames for post run analysis
 - FPS
 - Resolution
 - Video Format
- Backchannel I2C communication
 - Debugging
 - Configuration updates

Limitations

- No live streaming of video
- No continuous video monitoring
- No continuous i2C monitoring
- No continuous error detection & Logging
- Unsuitable for DV Testing

In the initial stages of the project, Valeo used an interim solution to validate the early release HW & SW



Interim Sol - good for basic checks, but unable to cover the scope of validation required by OEM

Benefits of going with National Instruments

- ✓ Validation Scope Coverage
- ✓ Domain Expertise
- ✓ Aggressive timelines
- ✓ Validated Solution
- ✓ Long term partnership
- ✓ Modular architecture
- ✓ Dedicated Support



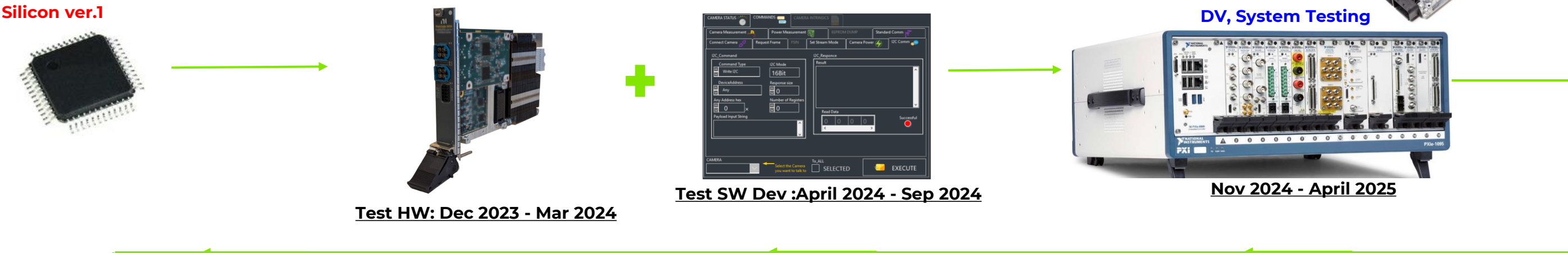
NI has delivered reliable working video testing solutions to Valeo for several projects

DEVELOPMENT TIMELINE WITH NI

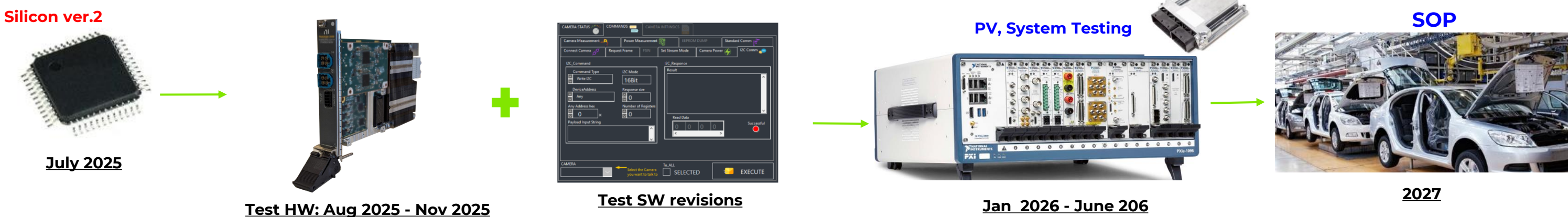


- DV, PV & SOP are major customer milestones
- Supplier’s silicon release, Valeo’s development & NI’s development must align to meet OEM timelines

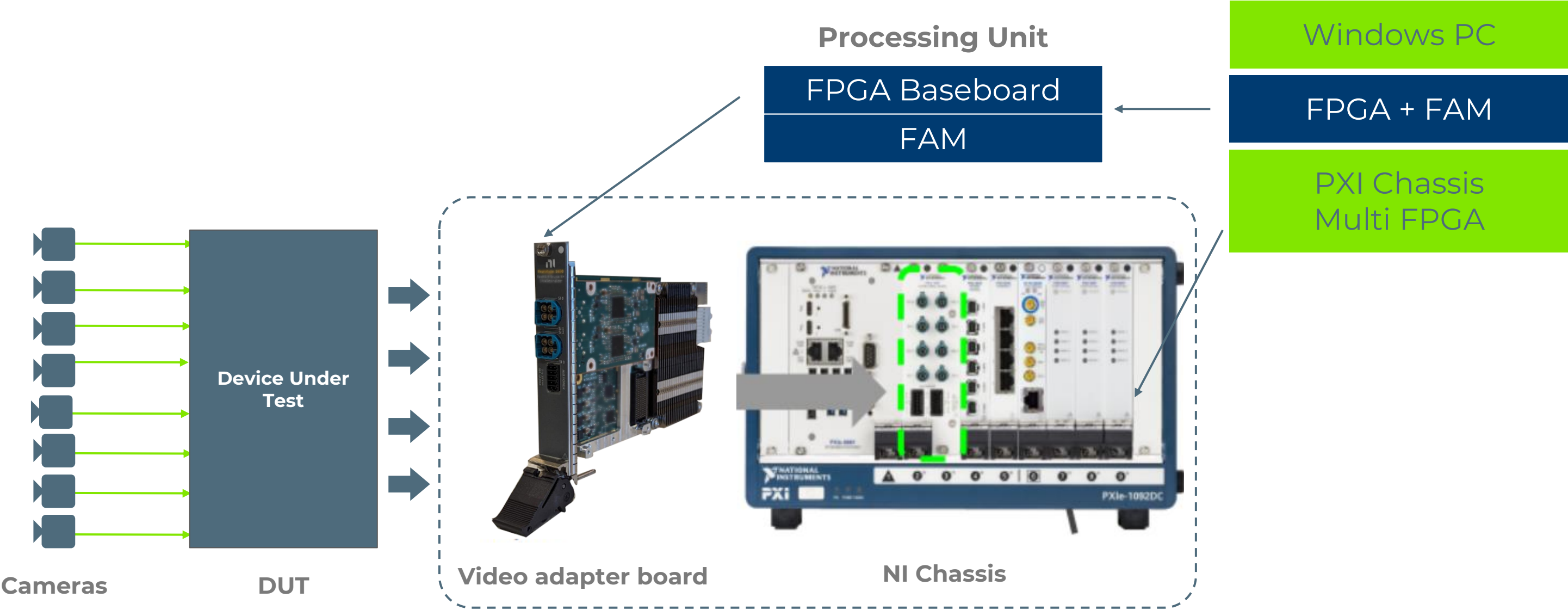
Development Phase : Valeo’s SW development on the FPGA card (ver. 1) from National Instruments



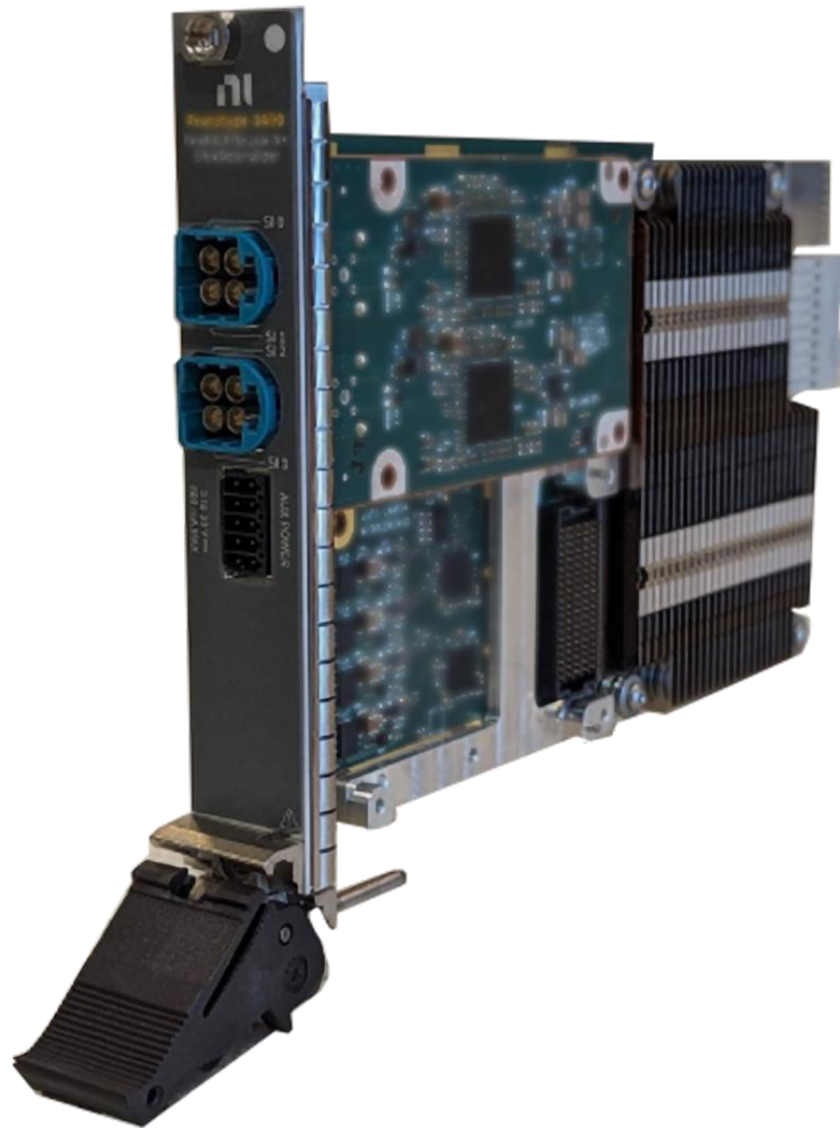
Test development on FPGA card (ver. 2) from National Instruments



NI to release test HW and Valeo to develop test SW for DV & PV on multiple Silicon versions



NI's modular test setup includes FPGA video card/s slotted into a NI chassis



FAM + FPGA Baseboard

- FAM card development for next gen SerDes
- Deaggregation of video streams (10 Gbps per channel)
- Frame by frame analysis (every 33ms)
 - Frame rate (fps)
 - Datatype
 - Resolution
- Embedded Line Monitoring
- Error capture & logging
- Communication over backchannel I2C
- Continuous monitoring of DUT status over backchannel I2C
- Configure the DUT on the fly
- GPIO Monitoring
 - Debugging
 - Time critical measurements

FPGA based video card to perform continuous video & I2C monitoring



NI Chassis

- Facilitates communication between the remote PC running the test software and the FAM + FPGA modules
- High-bandwidth backplane
- Houses multiple FPGA cards
- 9 DUTs per tester to be validated

Multiple Video Cards integrate with a NI Chassis to facilitate Valeo's test software development

VALEO & NI PARTNERSHIP - CENTER OF EXCELLENCE

- **Joint development of ADAS validation toolchain and customer deliverables for almost a decade**
- **Various modes of cooperation:**
 - Collaborative research & development
 - Early Access Programme
 - NI engineering services
 - Turnkey validation system developed by NI
- **Skills / SW / HW alignment and platform consistency are key to cover the challenging ADAS validation requirements**
 - Valeo are confident that NI and NI PXI platform will allow us to keep the pace with the industry challenges and our customer's expectations in the future

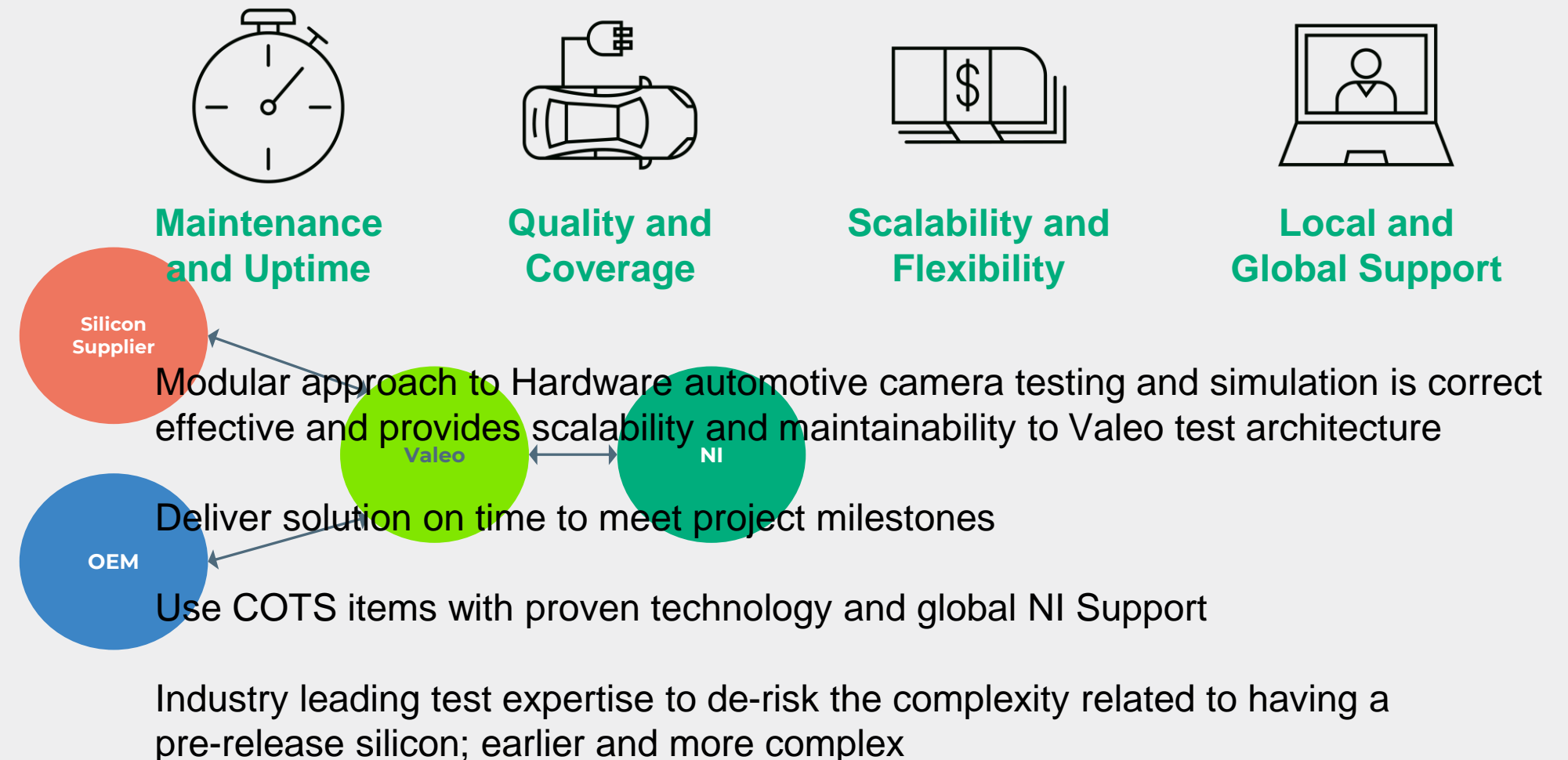


Regular Center of Excellence sync ups



SMART TECHNOLOGY
FOR SMARTER MOBILITY

NI Solution – Business Value



NI Hardware Validation Systems

NI Hardware Validation Systems are built on standard NI software products that allow customers and integrators to assemble systems built for their DUT in a reusable and leverageable framework.

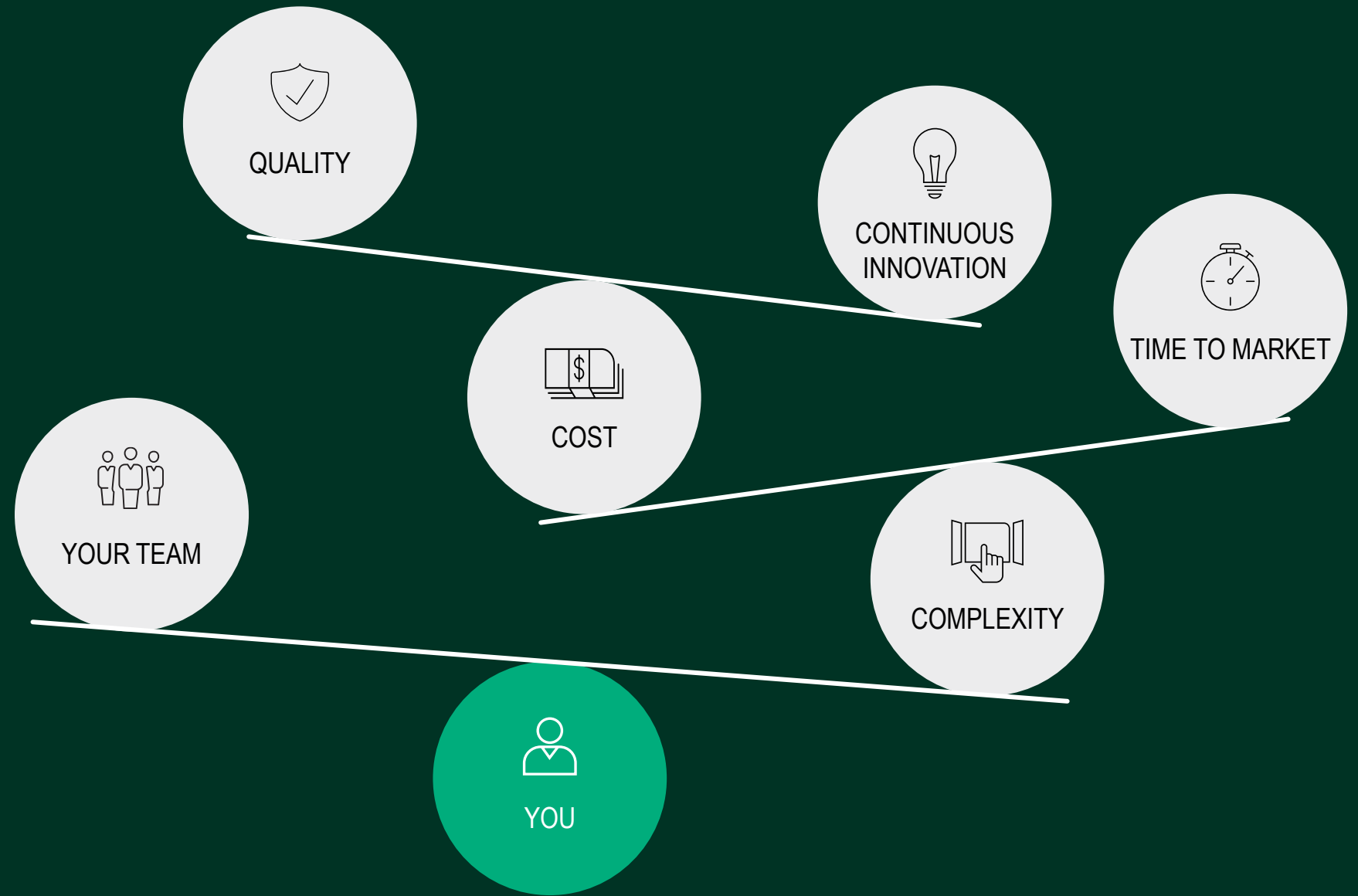
System & Data Management	NI SystemLink
Test Orchestration	NI TestStand
Test Module Software	NI LabVIEW, Python, or C#
COTS Hardware	Standard & Automotive I/O Interfaces
Integration	NI Partner Network

Certified NI Technology Partners, Konrad Technologies and NOFFZ Technologies, can handle all aspects of the project from system assembly, cabling and interfaces.



New Ecosystems =
New Opportunities

Right partnerships
can balance your
test strategy



We're uniquely
equipped to
help you
outpace change.



Trusted

Proven test automation technology delivers leading test accuracy, throughput, and reliability from the lab to beyond the manufacturing floor.

Connected

Connecting test systems, workflows, and data across the product development lifecycle and across industries delivers actionable insight and accelerated productivity.

Dedicated

Our people and partner ecosystem deliver deep domain expertise and a personal commitment to solve your current and future test challenges.

Adaptable

Software-connected test systems based on open software and modular hardware evolve with your test needs and maximize return on capital investment.

At NI, we're revolutionizing how OEMs and tier 1 suppliers use test systems and insights to drive product and business performance.



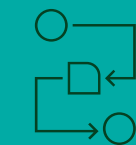
Reduce time to market by accelerating product development



Deliver customer satisfaction by improving functionality and reliability



Improve the bottom line by reducing operational cost



Prepare for the future by adapting to evolving test needs



connect

2024 AUSTIN

