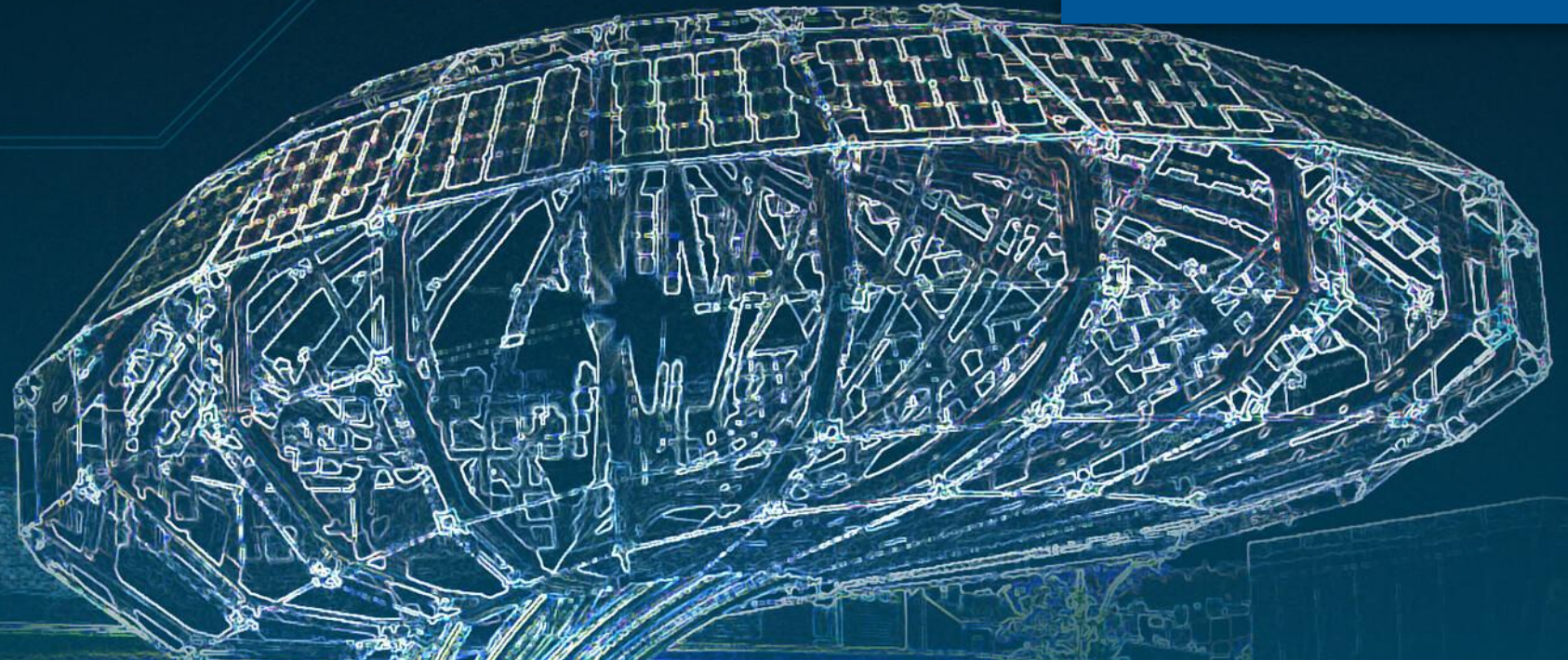


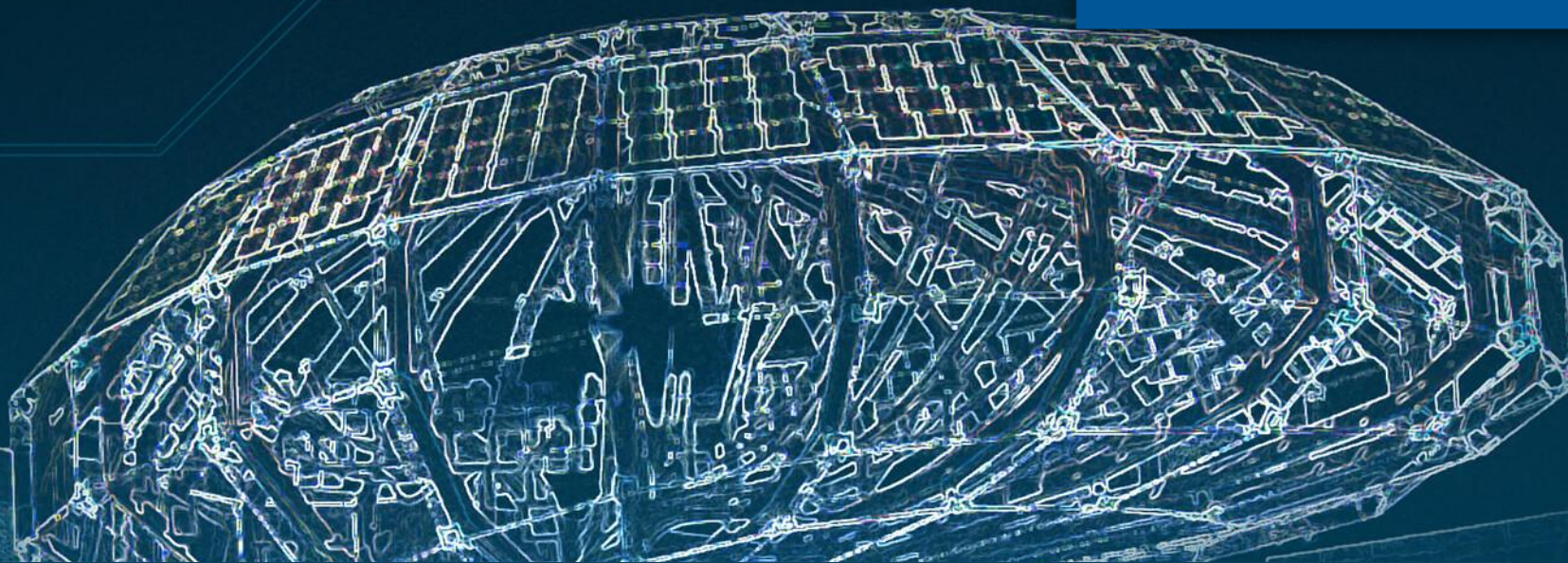
AVL Iberica S.A.



# ADV / Connectivity and Strategies for OEM

Fernando Moreno Nevado

AVL Iberica S.A.



# How to ride the wave of change in the automotive industry?

Fernando Moreno Nevado

# AVL Group – Main Figures

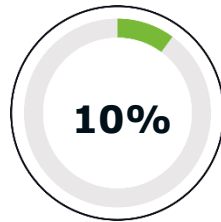
**INNOVATION 1,500**  
granted patents

**STAFF 10,400** employees

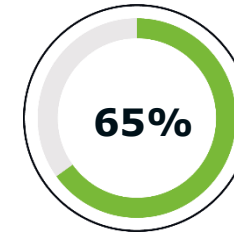
## GLOBAL FOOTPRINT

45 Affiliates  
40 Tech & Engineering Centers

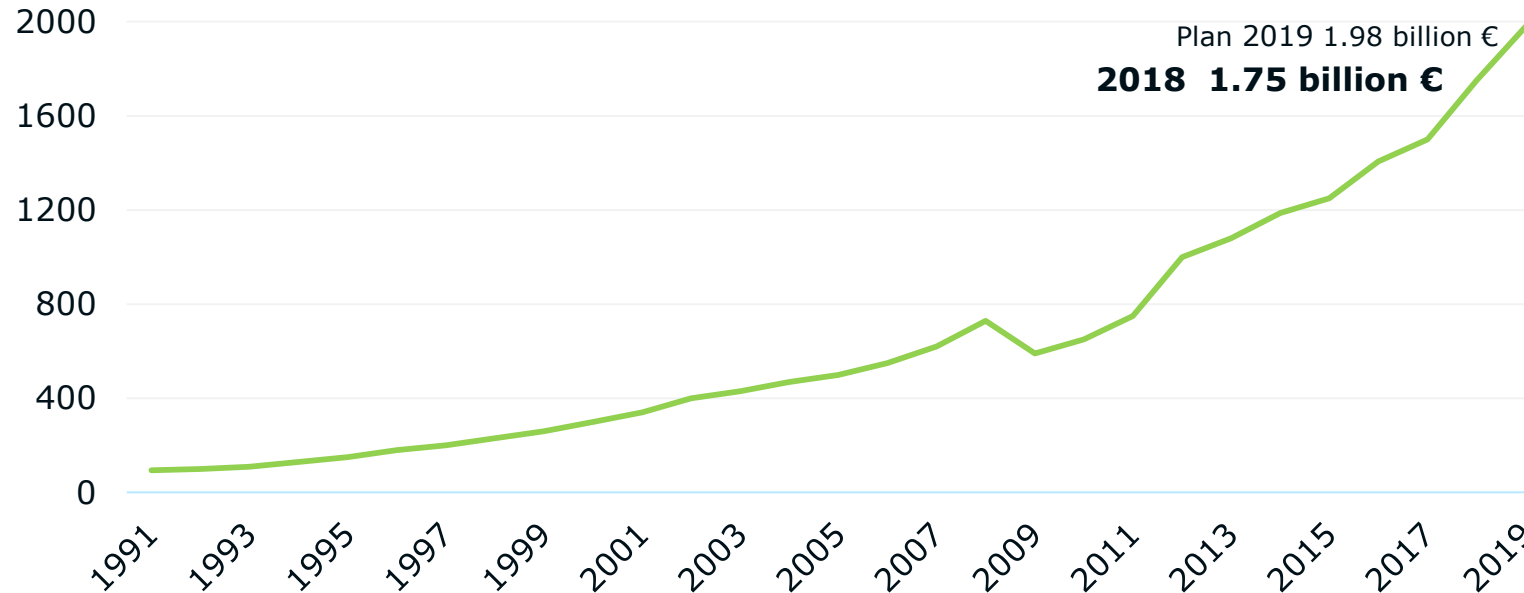
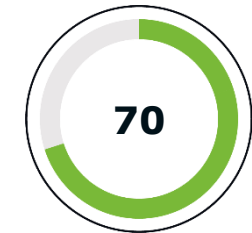
**RESEARCH**  
of turnover in-house  
R&D



**ENGINEERS  
and  
SCIENTISTS**



**YEARS OF  
EXPERIENCE**



## 3 BUSINESS UNITS

- Engineering Services
- Instrumentation and Testing Systems
- Advanced Simulation Technologies

# Engineering Services for ADAS/AD

## System Design

use & test cases,  
hazard & risk analysis,  
architecture, sensors,  
system safety,  
benchmark,  
target setting

## Tailored Controls & SW Development

AD features development  
from feasibility, concept  
to series,  
market specific  
modifications

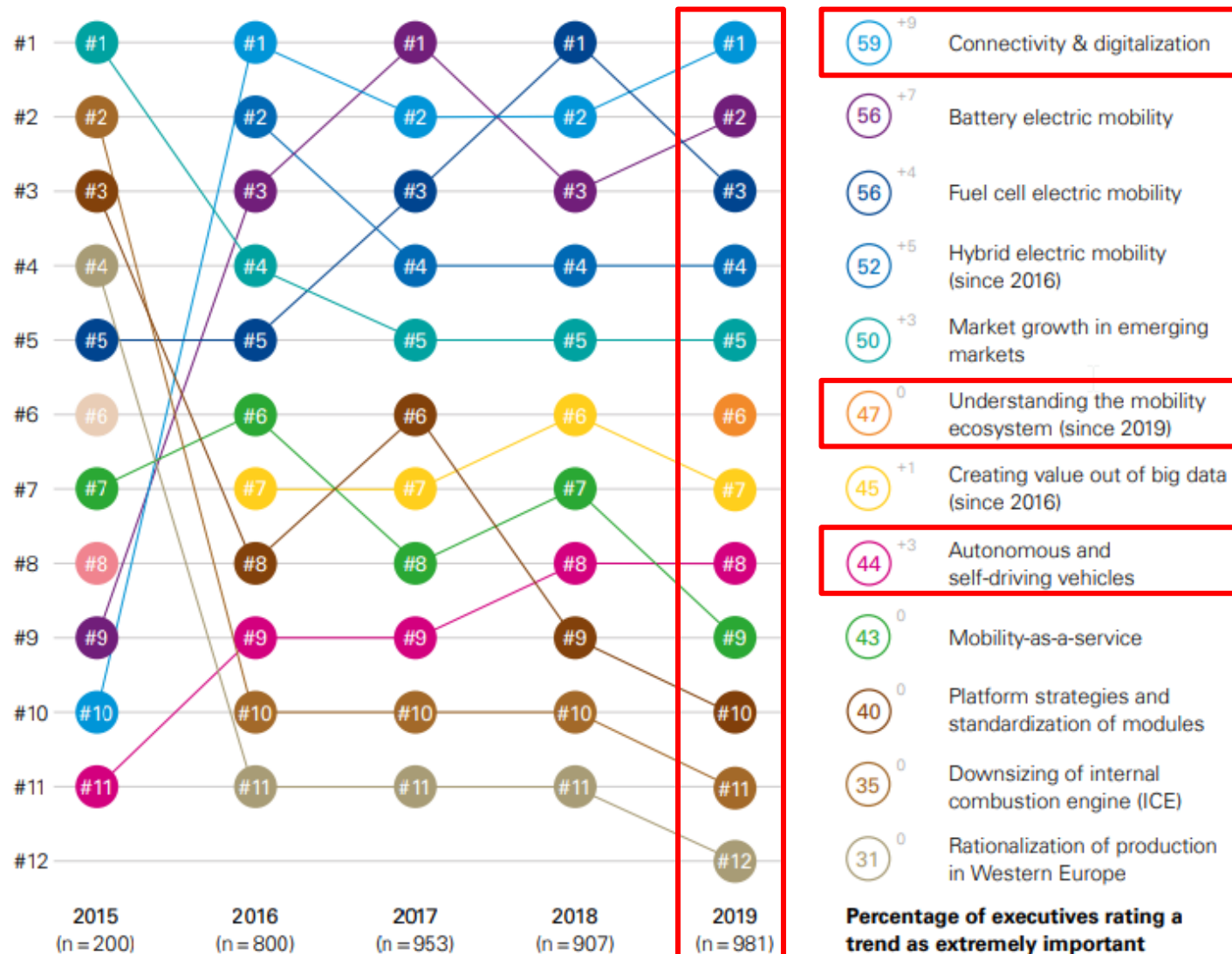
## Calibration Testing Validation

derivative integration,  
performance  
optimization,  
testing & validation  
from lab to proving  
ground and road



**For new levels of vehicle comfort, safety & efficiency**

# Connectivity and digitalization is ranked 1<sup>st</sup> at key trends until 2030 by automotive executives



**% of executives rating a trend as extremely important.**

Source: KPMG's Global Automotive Executive Survey 2019

Autonomous vehicles fall into the trough of disillusionment ... But that's GOOD!



## Gartner Hype Cycle for Emerging Technologies 2019

Plateau will be reached:

- More than 10 years
- 5 to 10 years
- 2 to 5 years

Source: <https://www.gartner.com/smarterwithgartner/5-trends-appear-on-the-gartner-hype-cycle-for-emerging-technologies-2019/>

AD has drivers but also a lot of challenges.  
One of the most important one is Technology!



## Drivers

- **Accident free driving**
- **Driver relief and comfort functions**
- **Connectivity services**
- **Improved fuel/energy efficiency**
- **Reduced operating cost / new mobility concepts**



## Challenges

- **Legislation**
- **Consumer**
- **Cybersecurity**
- **Technology**

AD has drivers but also a lot of challenges.  
One of the most important one is Technology!



## Drivers

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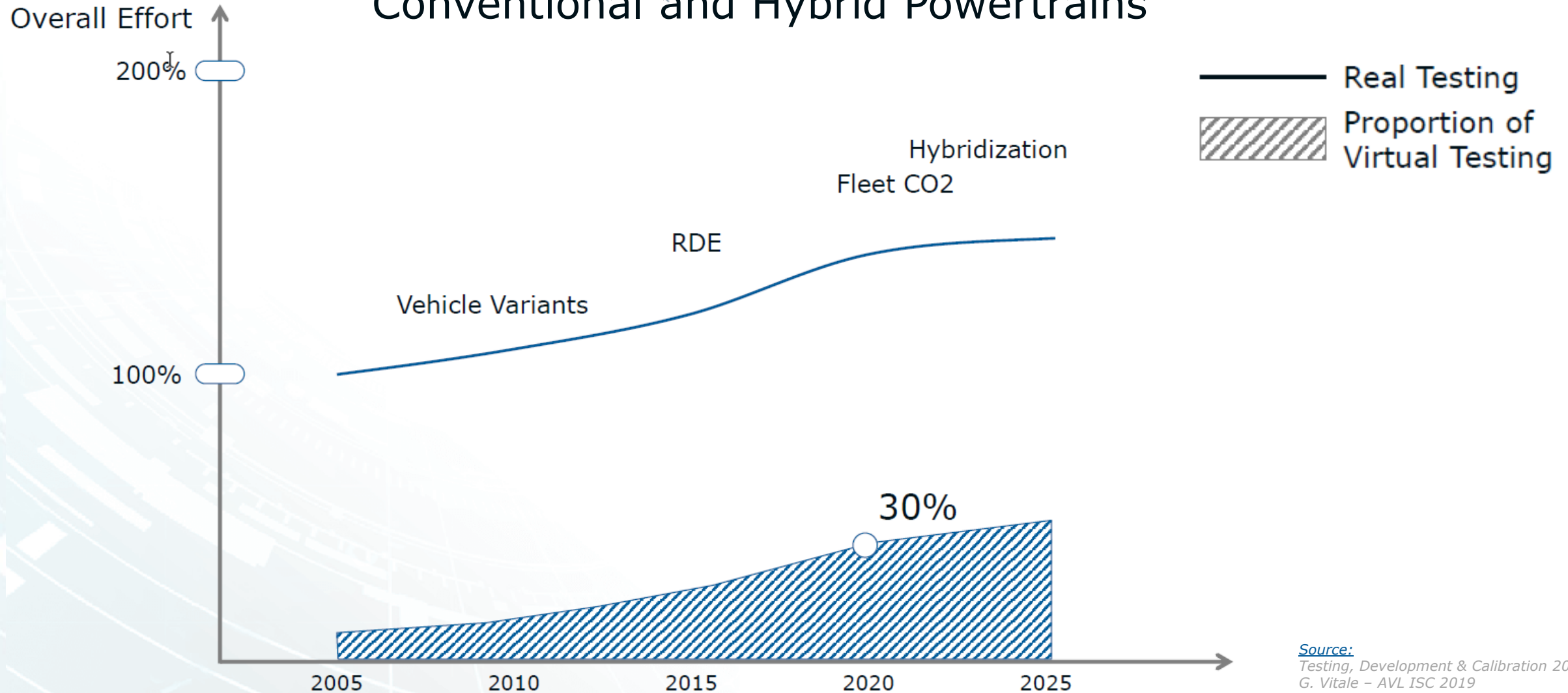
## Challenges

- **Legislation**
- **Consumer**
- **Cybersecurity**
- **Technology**

# Huge testing effort increase will force OEM to turn to simulation for ADAS/AD development activities



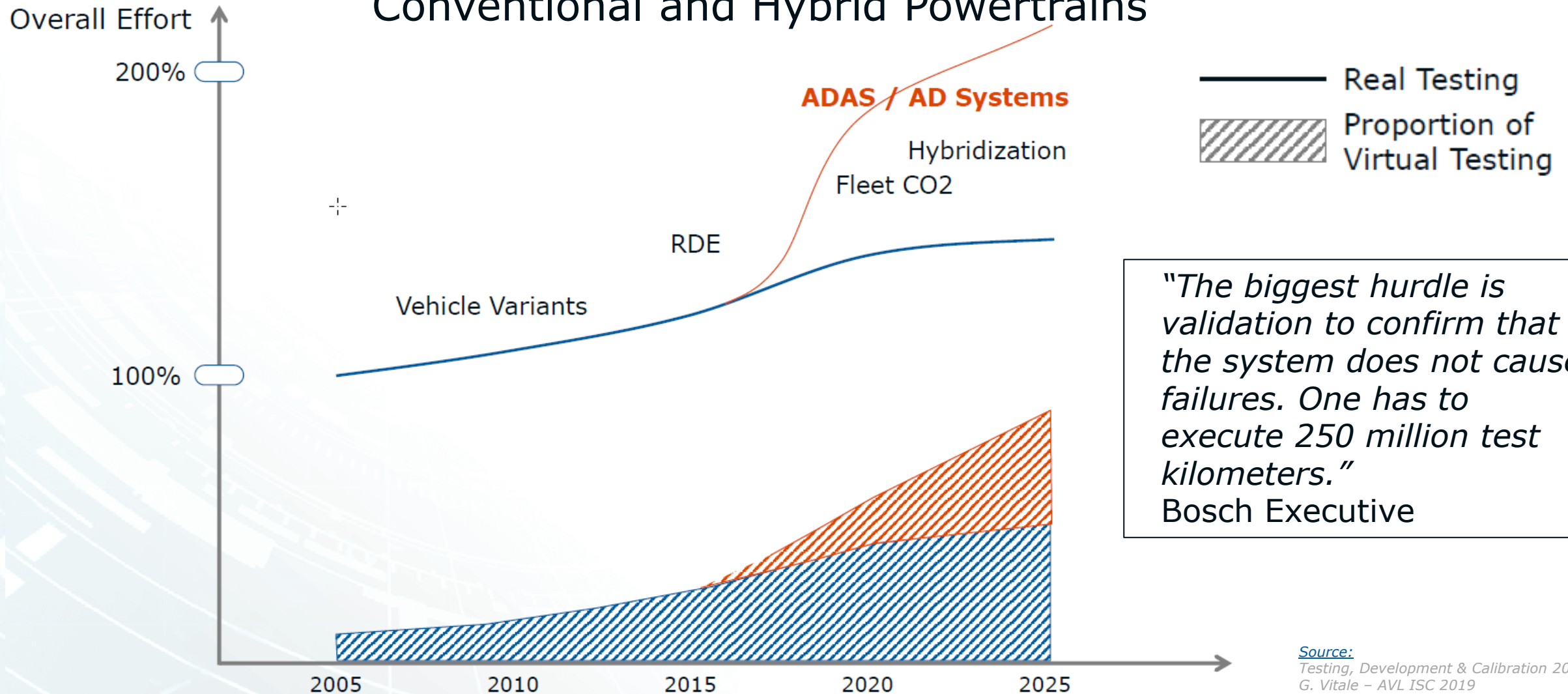
## Conventional and Hybrid Powertrains



Source:  
Testing, Development & Calibration 2025  
G. Vitale – AVL ISC 2019

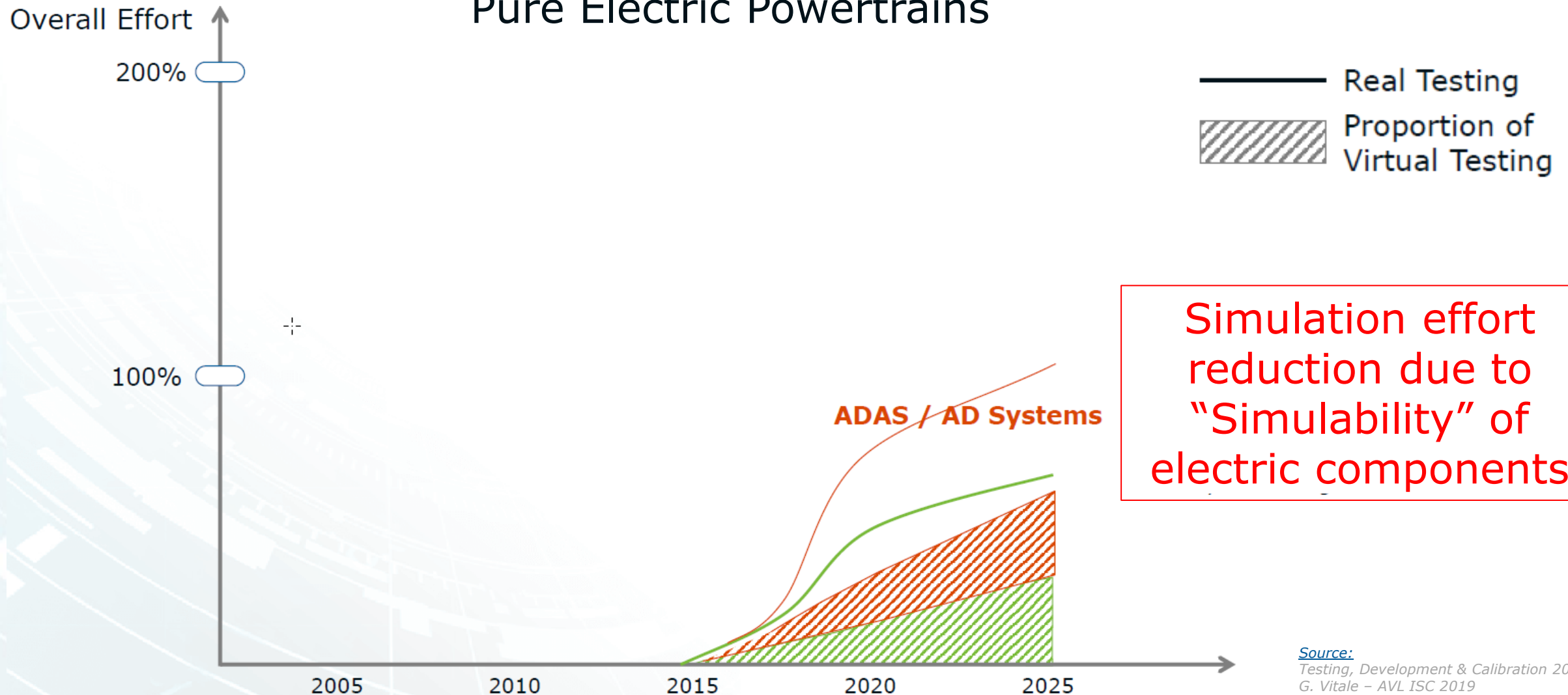
# Huge testing effort increase will force OEM to turn to simulation for ADAS/AD development activities

## Conventional and Hybrid Powertrains



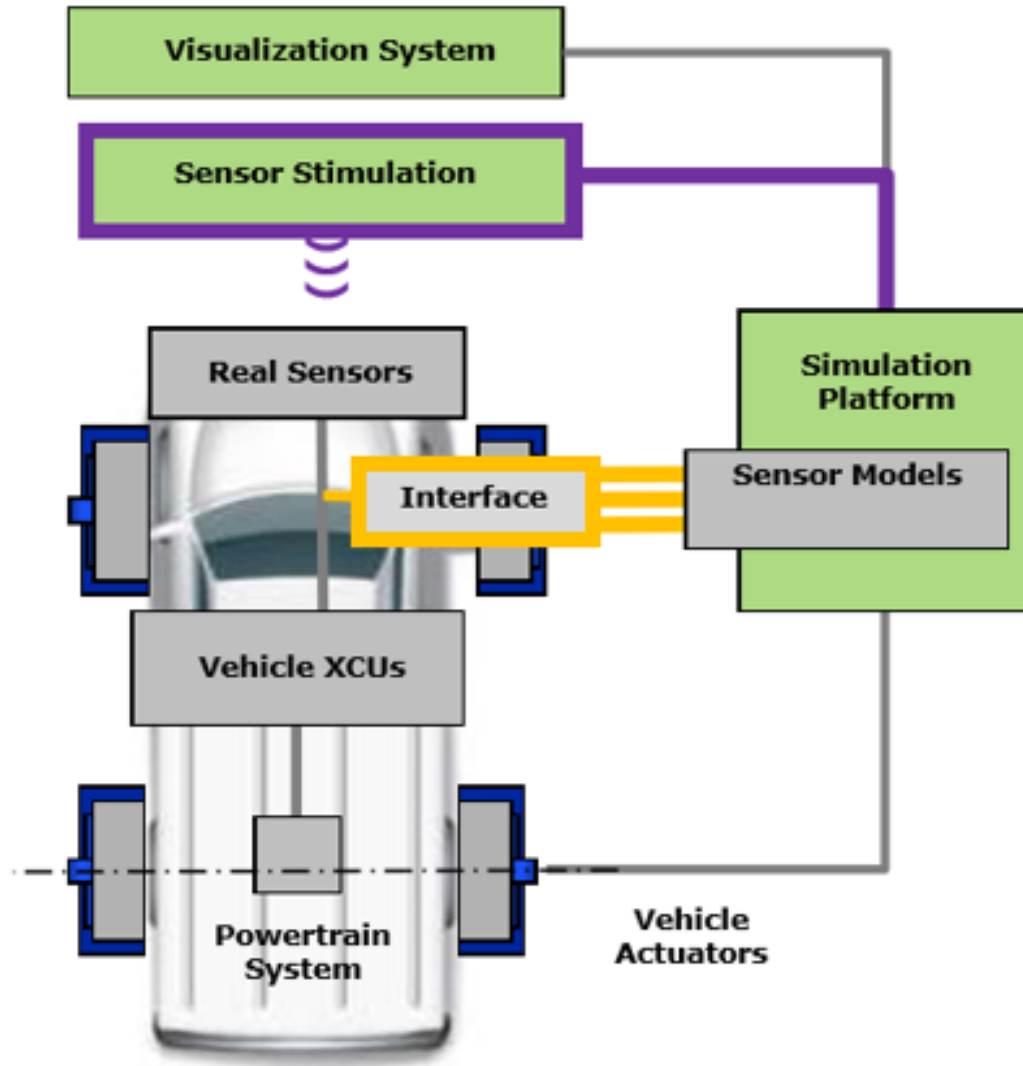
Huge testing effort increase will force OEM to turn to simulation for ADAS/AD development activities

## Pure Electric Powertrains



Source:  
Testing, Development & Calibration 2025  
G. Vitale – AVL ISC 2019

# Simulation can also be implemented to best complement hardware testing and validation

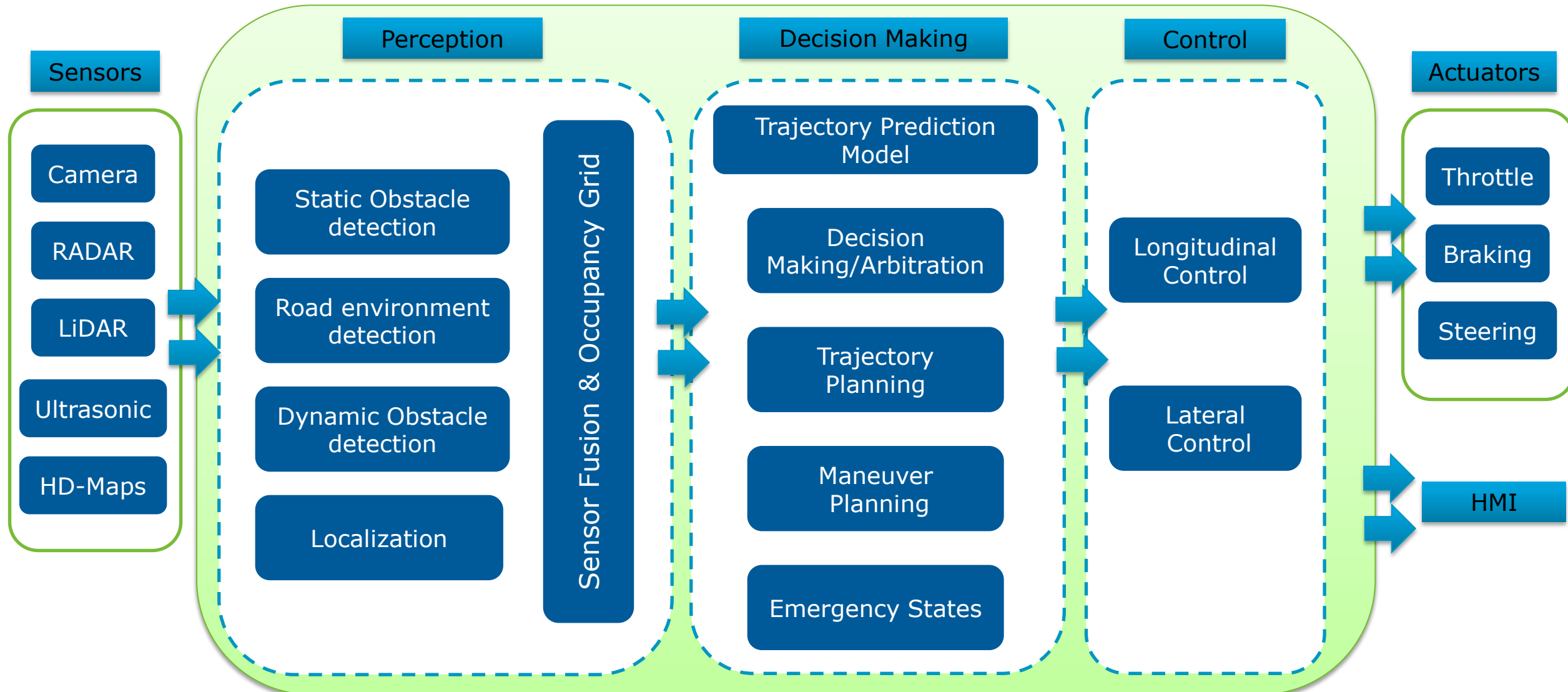


- **Real sensors in virtual environment**
- **Reproducible tests**
- **Safety critical tests**
- **ADAS and vehicle performance tests**
- **Testing and validation of entire vehicles in a virtual environment**

Simulation can also be implemented to best complement hardware testing and validation



# Autonomous driving requires central SW management and HW platforms to interpret sensor data for path planning and automated control








The resulting horizontal value chain will comprise several layers, whereas every layer will have own standards and own market leaders

## Architecture related

### Horizontal layers


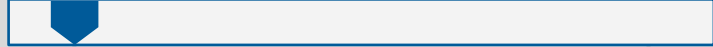

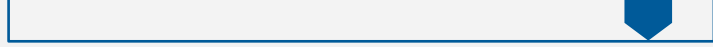


<b>HW platform</b>	CPU and complete ECU
<b>Operating system</b>	Embedded operating system, increased standardisation in the future (e.g. AUTOSAR)
<b>Sensor data fusion</b>	Interface to middleware/ applications as well as data fusion mapping
<b>Sensors</b>	Sensors incl. GPS, maps and drivers
<b>Safety</b>	Functional safety

Standard know-how <i>Buy</i>	Specific know-how <i>Cooperation / investment</i>	Core know-how <i>Internal development</i>
		
		
		
		
		



# Seven key challenges are essential for OEMs to master Level 3 and 4 autonomous driving

			Enabler	Differentiator
Competency clusters	3. System architecture	<ul style="list-style-type: none"> <li>Overall architecture (re-)definition and implementation</li> <li>Centralized domain and CU-architecture</li> <li>Modular systems ("scalability")</li> <li>Upgradeability and OTA updateability</li> </ul>		
	4. Integration and validation	<ul style="list-style-type: none"> <li>Continuous integration as part of agile development</li> <li>Continuous and virtual HiL/ SiL validation</li> <li>Statistic/ scenario-based testing of total system</li> </ul>		
	5. Functional safety and IT security	<ul style="list-style-type: none"> <li>Multi-processor HW</li> <li>High priority on IT security and protection,</li> <li>SW and HW protection ("security by design")</li> <li>Domain and gateway security</li> </ul>		
	6. Autonomous driving functions	<ul style="list-style-type: none"> <li>AI, machine/ deep learning</li> <li>3D object recognition, data fusion</li> <li>Trajectory planning ("driving strategy")</li> <li>Big data processing, Backend-based services</li> </ul>	<b>Crucial for competition with digitals</b>	
	7. HMI / User Experience	<ul style="list-style-type: none"> <li>Utilization of whole car as UI</li> <li>Seamless integration of consumer electronics</li> </ul>		

OEMs can beat Digitals on their home turf by taking advantage of being the designer of the “vehicle ecosystem” and the integrator of all of its elements



- Superior autonomous vehicles will be **differentiated by their functionality and user experience**. The best vehicles will make their passenger feel **comfortable, safe and secure**.
- **Simulation and virtual testing** will gain in importance.
- The **future value chains will become horizontalized** and will require OEMs to make deliberate choices about where they need to build own strengths and where they rely on partners.
- If OEMs want to better digital players they need to refocus and build strong competencies in the following areas:
  - **User Interface and Experience**
  - **Applications / Functionalities for autonomous Driving**
- OEMs need to be build **own core competencies** in these areas plus the following:
  - **Machine Learning / Artificial Intelligence**
  - **Sensor Data Fusion**
  - **Functional safety and cyber security**
- **All other required capabilities need to be acquired** through strategic alliances and stable supplier relationships.

# Questions?



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# Thank You



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