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## The Software-Defined Automaker's Hierarchy of Needs



SBD Automotive

# The Automaker's Hierarchy of Needs

A structured view of what it takes to commercialize software-defined vehicles

COVESA All-Member Meeting  
Dearborn, MI  
October 19, 2022



SBD Automotive Mission

# Delivering **confidence** through **clarity, insight and vision**

Our Areas of Expertise



Connected



Autonomous



Shared



Electric



Secure



# About the presenter



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Director – North America  
SBD Automotive  
Ann Arbor, MI



[/alex-oyler](#)

# Our research shows CASE activity at all-time high



	# of stories	Trending companies	Top themes
<b>C</b> Connected			The impact of the tech sector continues to grow as OEMs battle with s/w sourcing decisions
<b>A</b> Autonomous			More OEMs announce plans for L3 autonomy just as pressure from regulators/press grows
<b>S</b> Shared			Robo-taxi programs transition from testing to operational services
<b>E</b> Electric			Demand for EV's outpaces supply as OEMs explore and invest in new business models
<b>S</b> Secure			More OEMs get involved in the development of the next-generation smartphone key

● Legislative changes ● M&A ● New companies ● New partnerships ● New strategies ● Product improvements ● Product launches



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# Software Defined Vehicles

What's driving car makers forward?

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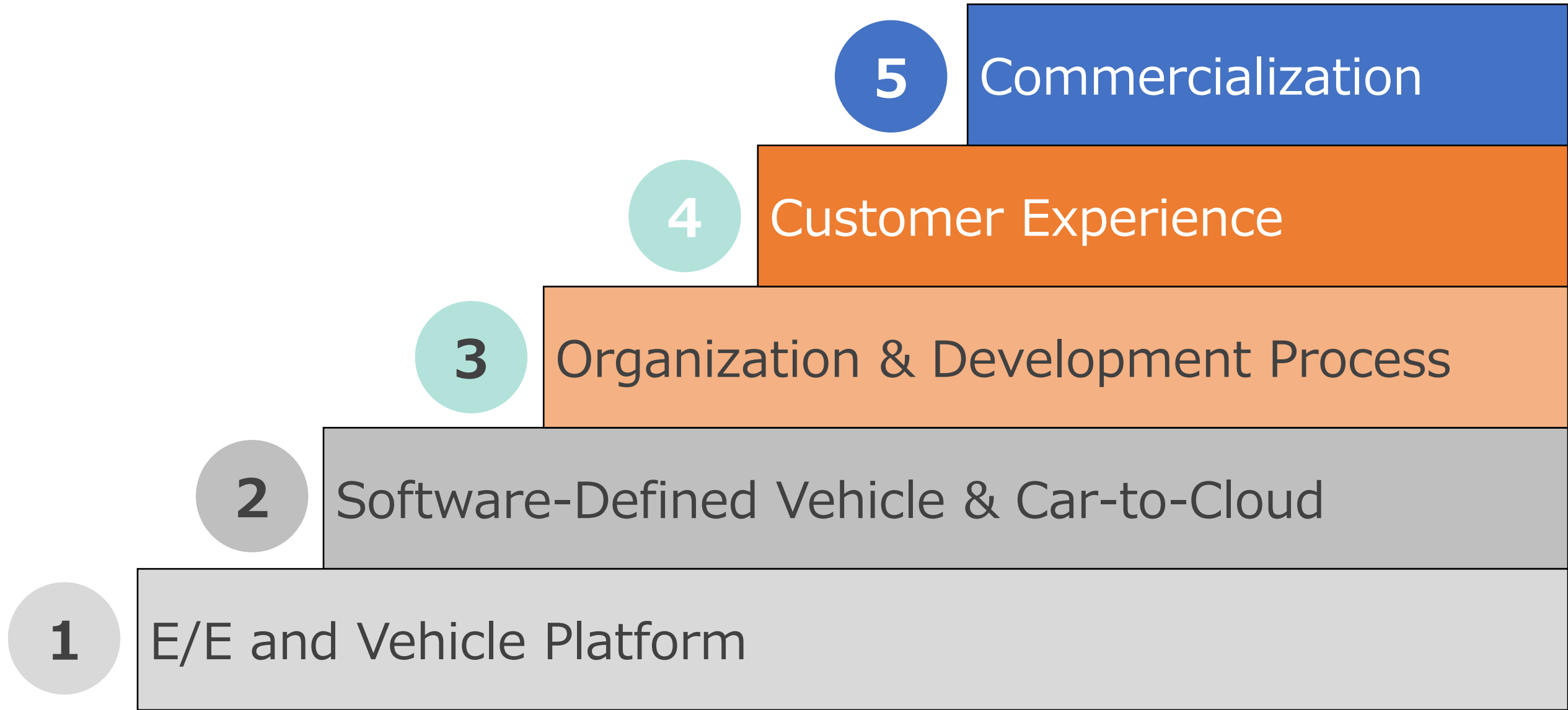


## Increase

- Speed-to-market
- Aftersales revenue
- Customer satisfaction
- Brand loyalty

## Decrease

- Bill of materials
- Recall rate
- Depreciation
- Vulnerabilities



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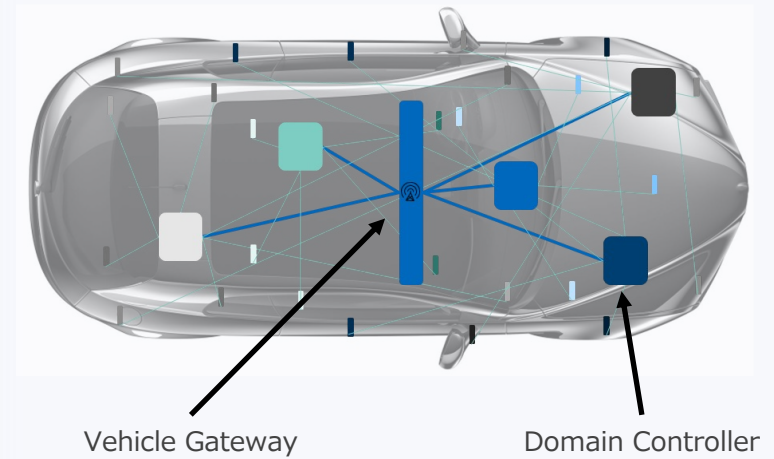
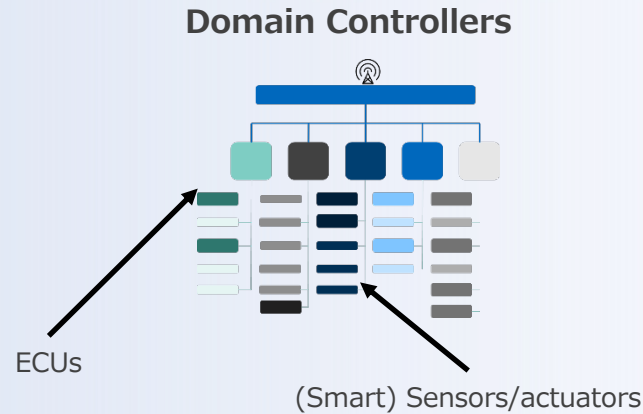
# E/E and Vehicle Platforms

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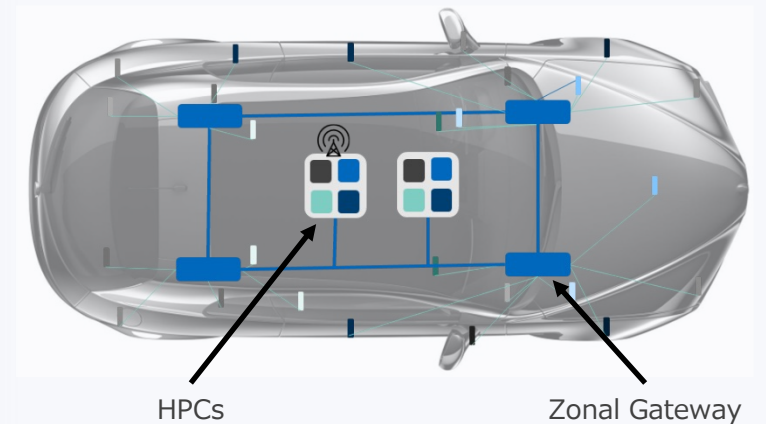
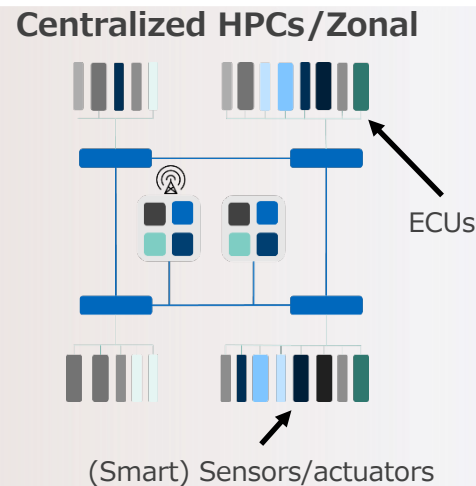


SoC scalability will drive consolidation and abstraction, enabling entry points for edge computing

## Domain Architecture

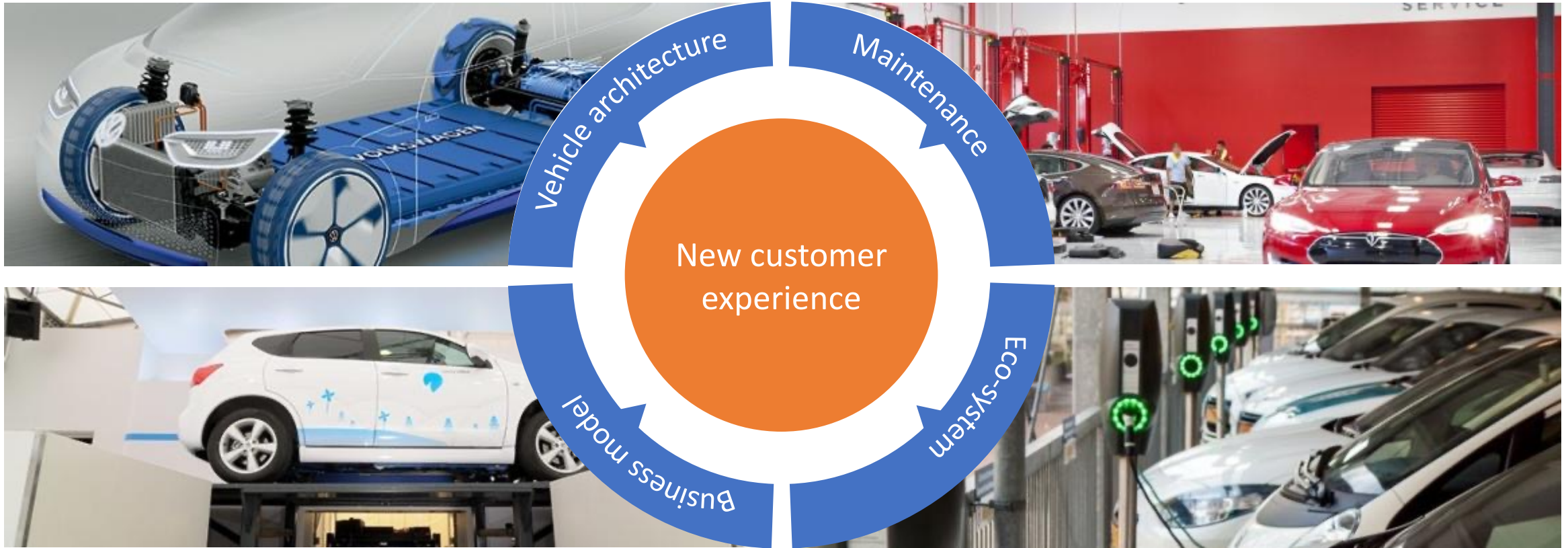


## Centralized & Zonal Architecture



# Platform investments are often tied with EV ramp-up

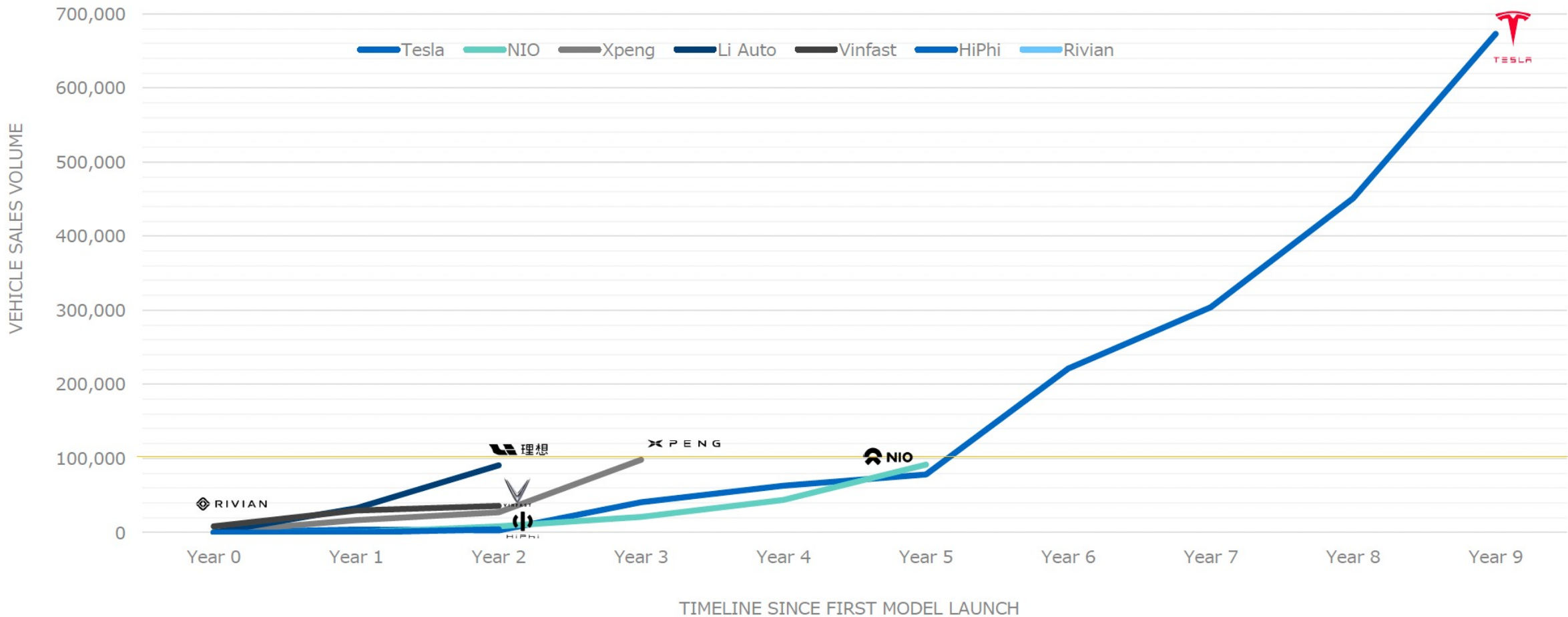
🔑 EVs will be the lion's share of the auto tech addressable market, but don't forget ICE & alternatives



# EV innovators lack leverage, supply chain but own platforms



EV startups should be taken seriously as both potential competitors as well as useful data points





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# Software-Defined Vehicles & the Cloud-to-Car Ecosystem

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# Most automakers require multiple “stops” to SDV

Key Most OEMs can't make the jump “straight” to SDV – it's a more iterative engineering journey

## Vehicle 1.0

### Functional

“New feature? Let's add a new box”

STELLANTIS

  
RENAULT NISSAN MITSUBISHI

## Vehicle 2.0

### Digital

“Let's focus on digitizing our IVI”



DAIMLER

## Vehicle 3.0

### Updateable

“Let's keep the car fresh”





## Vehicle 4.0

### Software-defined

“Let's fully decouple SW from HW”

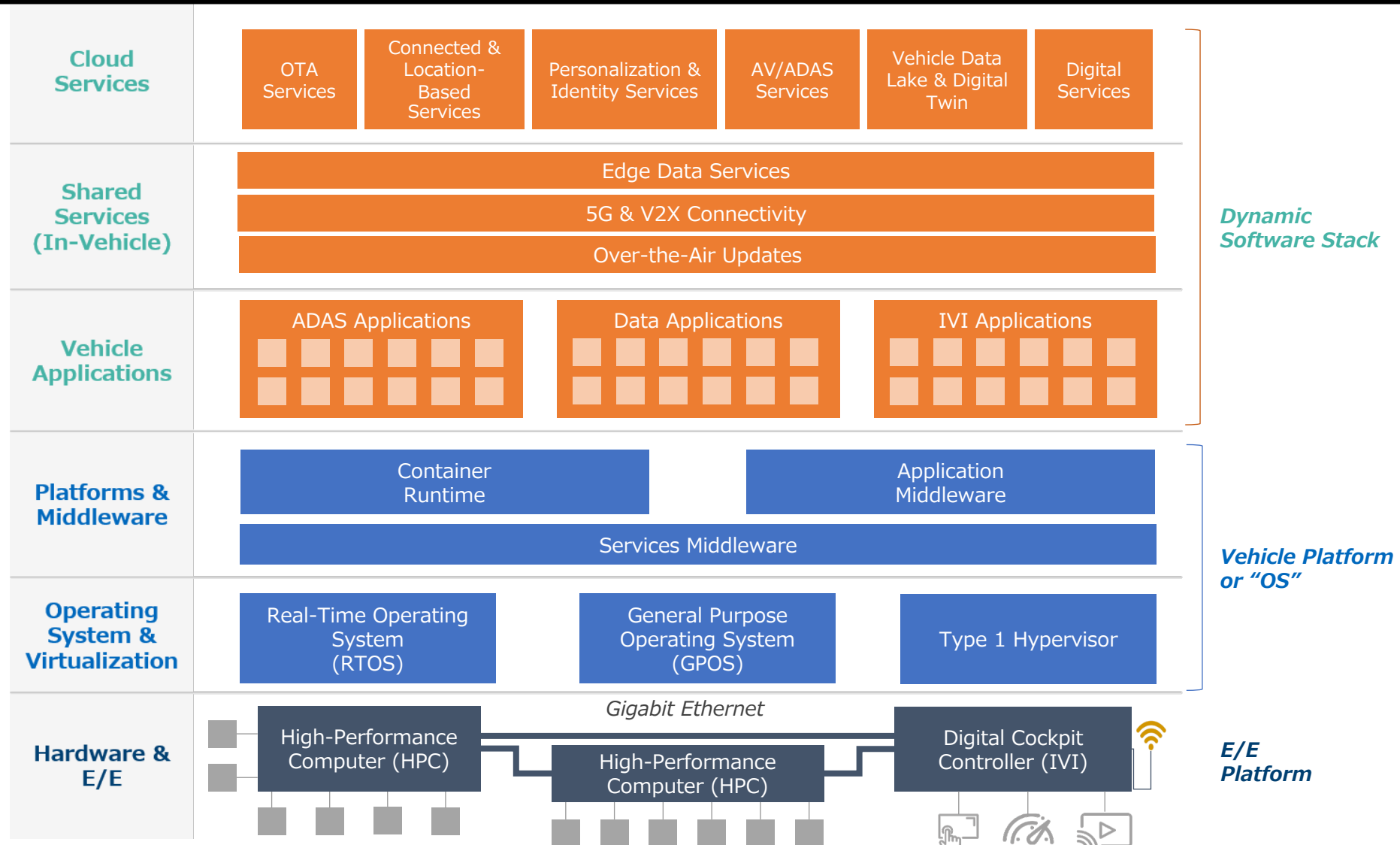


TESLA



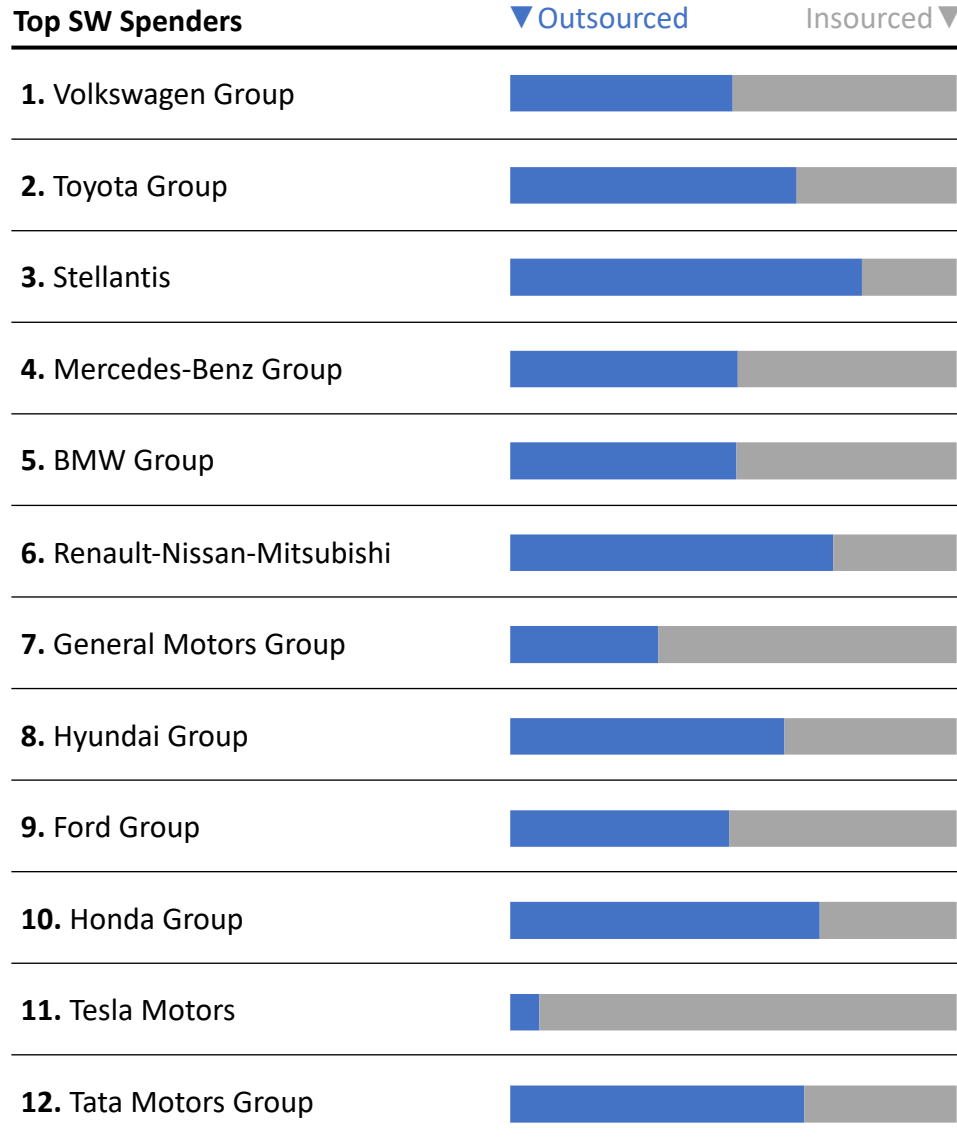
# SDV architecture starts with abstraction from car to cloud

Abstracting compute runtime from hardware opens doors for a wide range of reusable applications





# Software sourcing strategies differ, limited by recruitment



Developer ecosystems, communities, and tools are the “secret sauce” to OEM-supplier partnership

“Our #1 barrier to to achieving greater in-house software development goals is **recruitment.**”

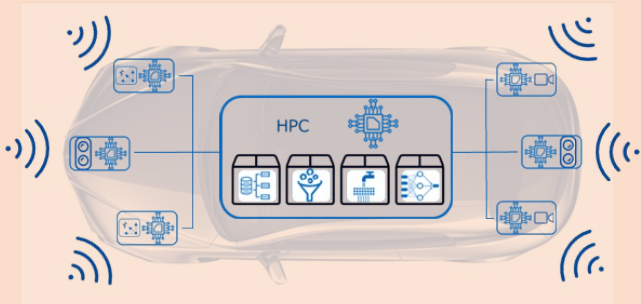
Software Director at Major OEM



# Critical interfaces & novel tech power car, edge and cloud

 The complex supply chain behind SDVs requires cooperation on definitions, interfaces, toolchain

## Far & In-Vehicle Embedded Edge



- Intelligent sensors
- Independent modules
- Containers
- Cloud-native apps
- Running in-vehicle via HPC

## Network Edge



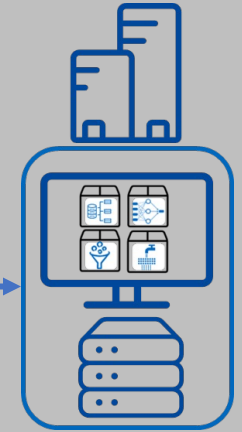
- Containers
- Cloud-native apps
- Running in network infrastructure

## Cloud



- Containers or virtual machines
- (Usually) shared data center
- Supporting regional and global workloads

## On Premise



- Centralized
- Private to OEM
- Proprietary, mission-critical or sensitive data and workloads
- Dev environments

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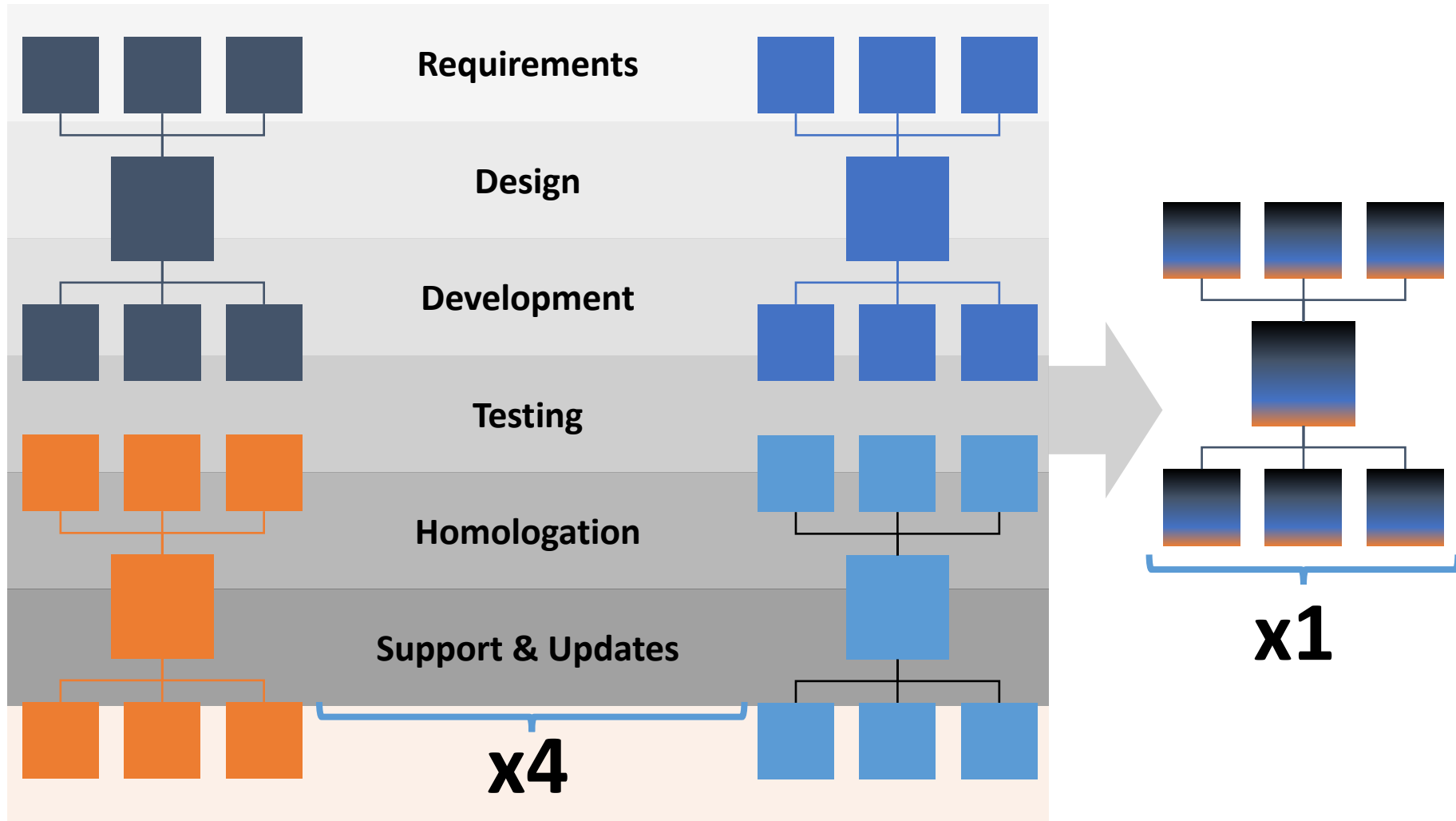
# Organization & Development Process Transformation

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# Successful delivery of SDVs requires complexity reduction

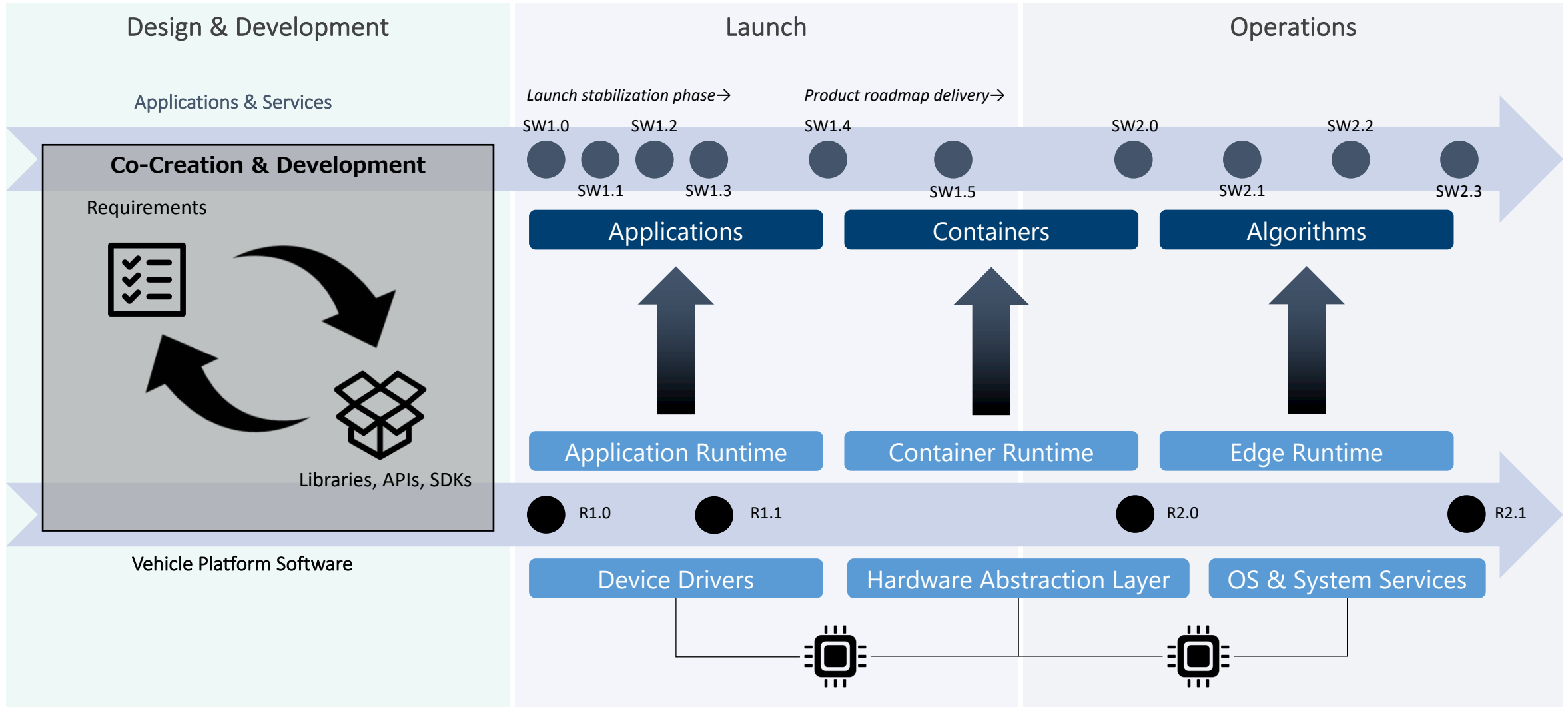
The vehicle development process doesn't scale, so legacy OEMs must simplify before mass-market SDVs



# OEMs struggling to find the balance between old & new

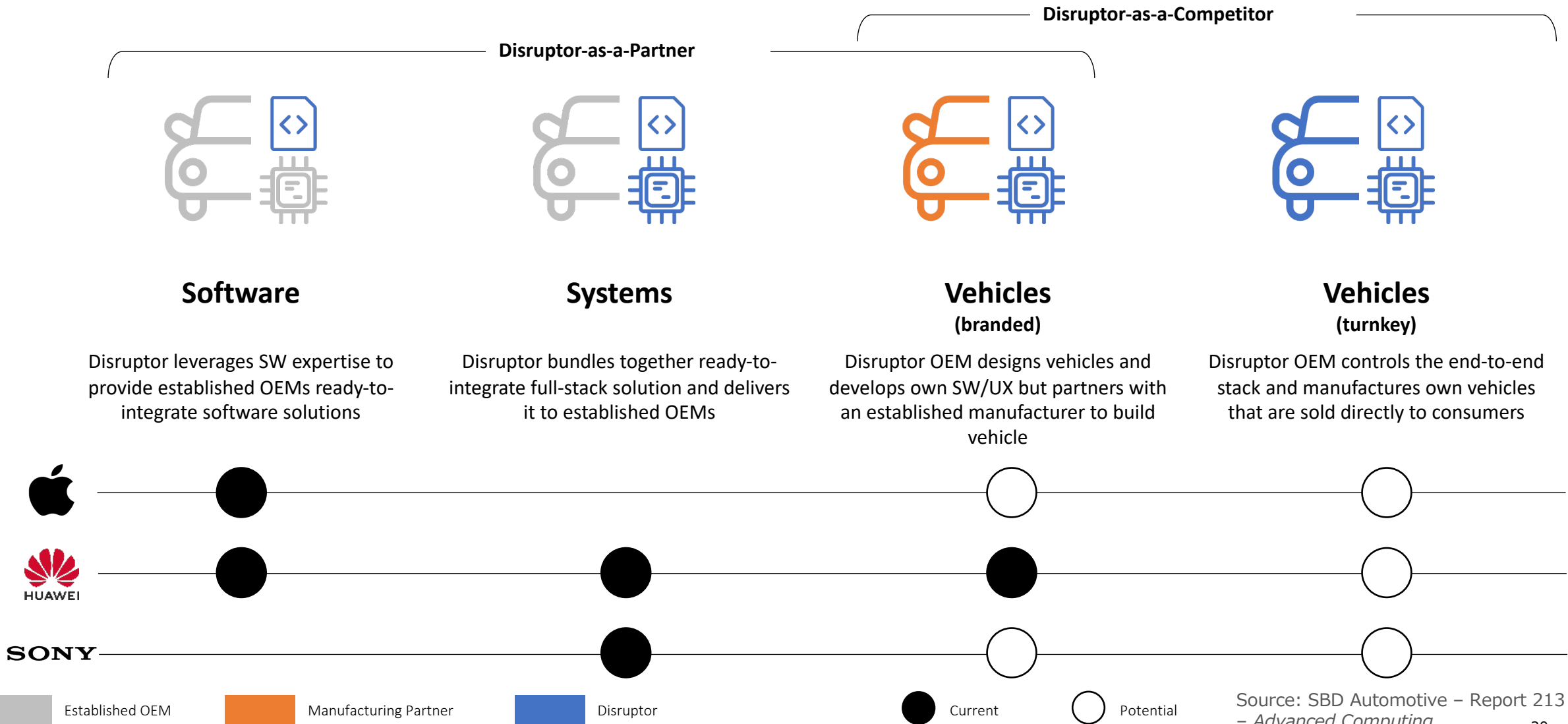


SDVs require decoupled development, but OEMs need better tools, discipline, and processes to do this



# Supplier disruptors offer a new way of working for OEMs

Vertical integration of software is only one approach – some larger disruptors see partnership paths



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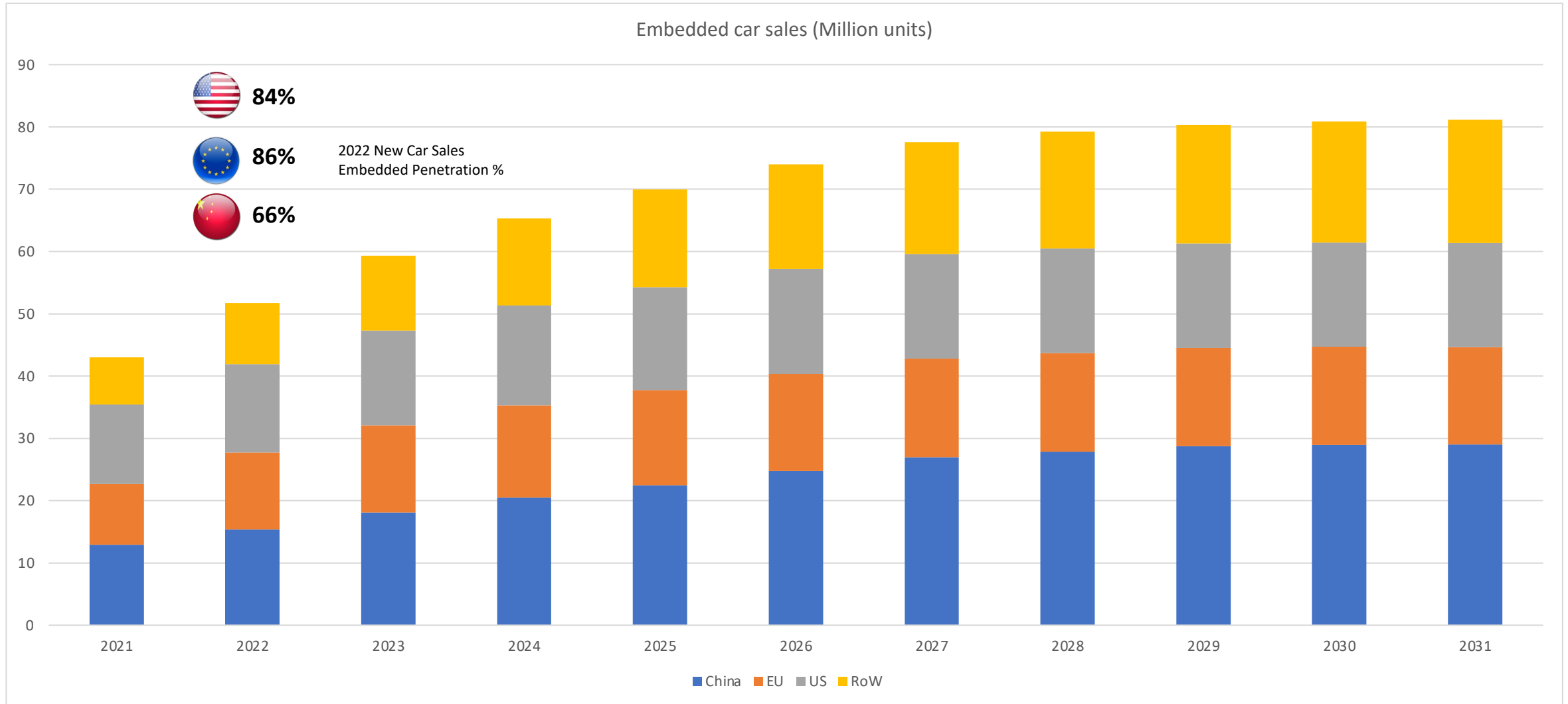
# Customer Experience

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# Connectivity is enabling a 2-way connection with drivers



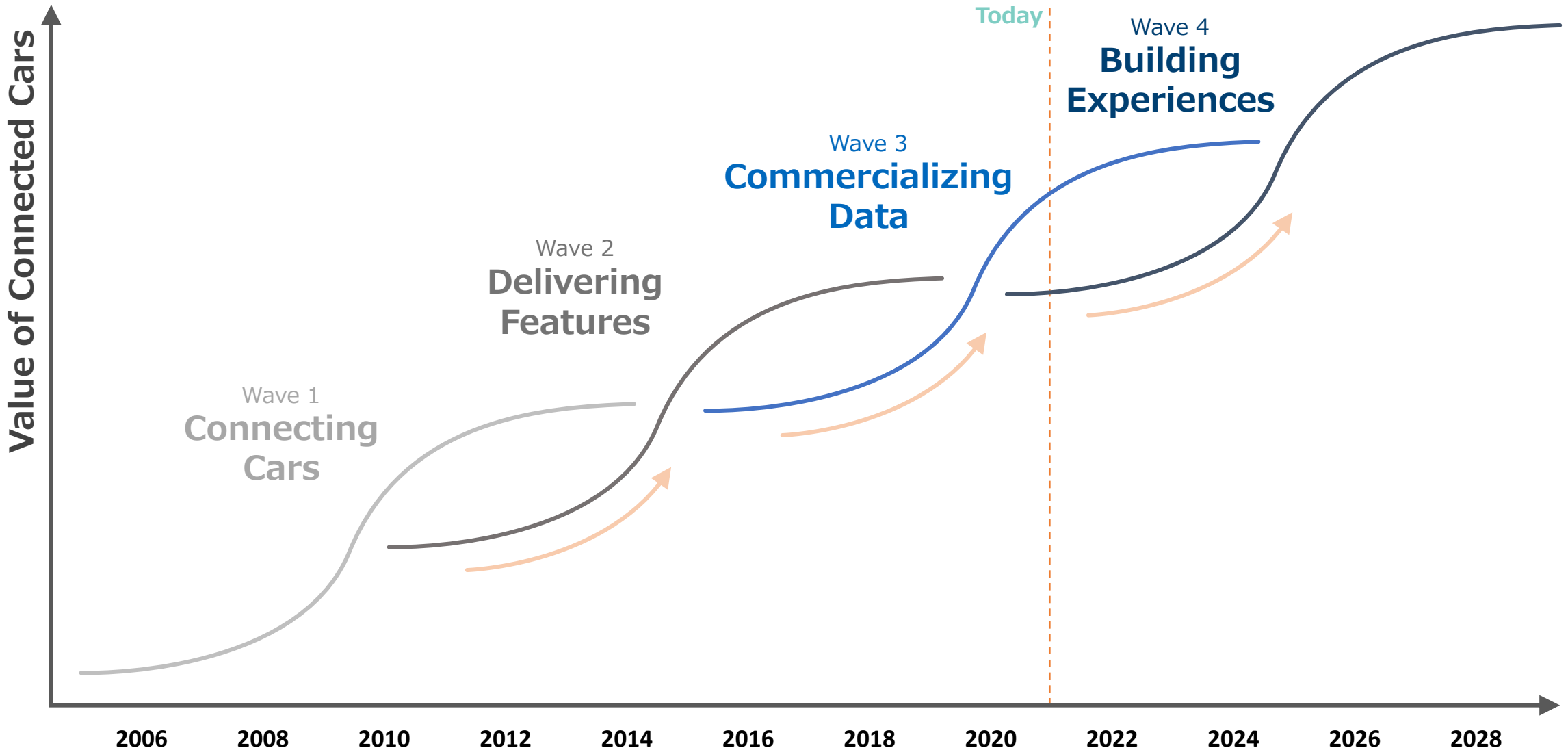
Almost all new vehicles (including non-SDVs) will be accessible, sending data to various cloud apps





# The auto industry is slowly entering the 4th wave of connectivity

The feature & data race is giving way to competing on connected experiences after the car has shipped



Helping OEMs build experiences while maximizing efficiency will be a differentiation point for suppliers



## Experiences



### Value Creation

- ✓ Brand loyalty
- ✓ Subscription loyalty
- ✓ Vehicle upgrades/FaaS
- ✓ Residual value



## Efficiencies



### Cost Reduction

- ✓ Fewer mid-cycle actions (MCAs)
- ✓ Fewer platforms
- ✓ Fewer suppliers
- ✓ Fewer parts

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# Commercialization

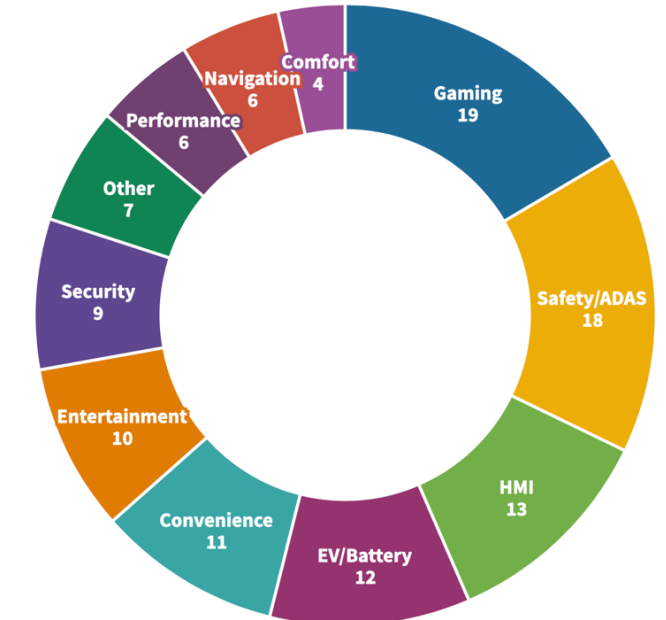
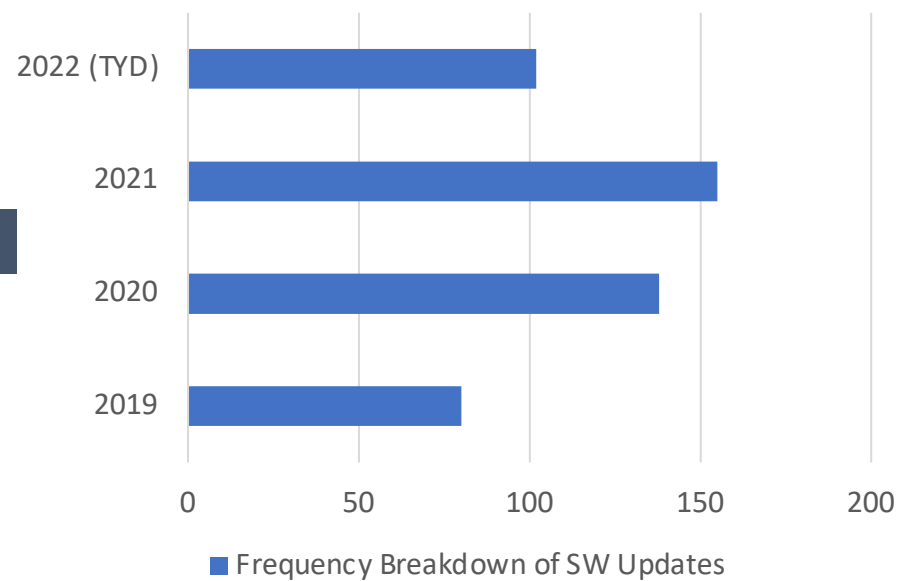
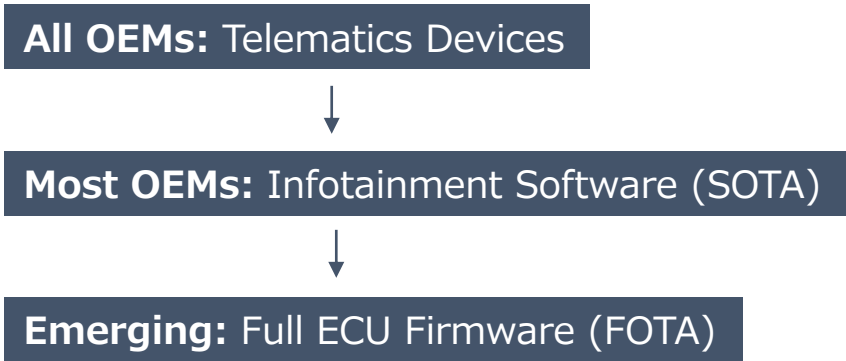
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Fresh, dynamic experiences underpin future commercialization

While platforms are coming online, OEMs need help "actualizing" the process of OTA software updates

# Over-The-Air Enablement ▶ Agile Release

Tesla has significantly **increased OTA SW release velocity** year-over-year:



FOTA Leaders:

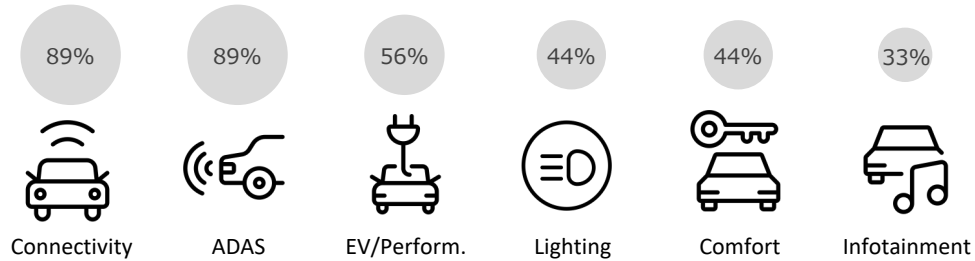


# Features-as-a-Service: the next aftersales frontier

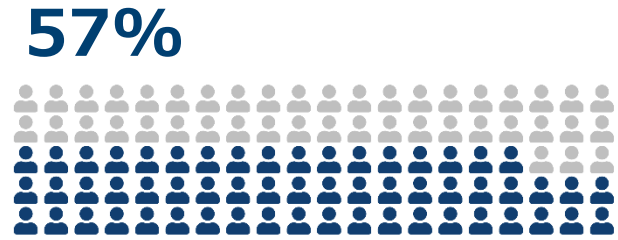
## OEMs that support FaaS in 2022:



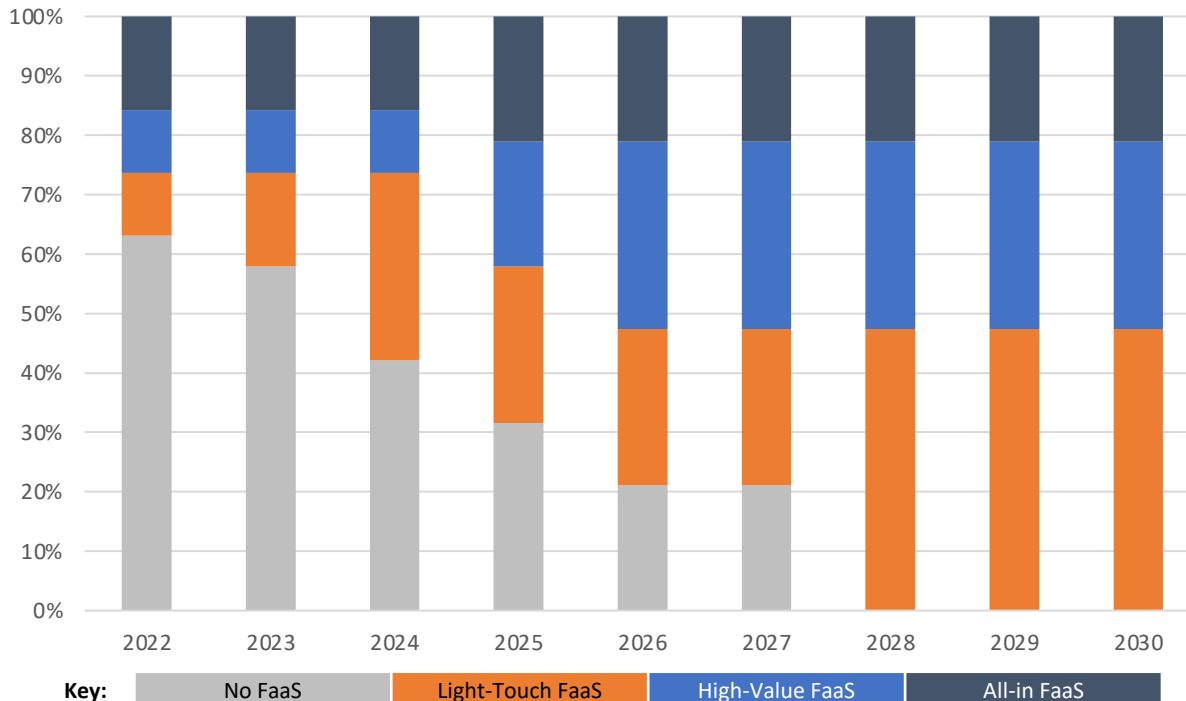
## % of feature types supported by OEMs that have adopted FaaS:



## % of consumers who are very interested in FaaS:



## Forecast growth in % of OEMs supporting FaaS:



## Key drivers & barriers for FaaS Adoption:

	OEMs	Consumers
Top-5 Drivers	Incremental revenues	Add services post purchase
	Vehicle price reduction	Get latest features
	Vehicle simplification	Improve re-sale value
	Consumer demand	Individualized feature set
	E/E Architectures	Get vehicle at lower price
Top-5 Barriers	Consumer acceptance	It's not fair
	Risky business model	OEM ability to switch off
	Operational maturity	Don't need it
	Dealer acceptance	Expect it at purchase
	Certification/insurance	Already paid enough



# Automakers are heavily competing to provide ADAS experiences

Experiential requirements for ADAS drive significant SDV requirements downstream

1

OEM offering SAE L3 feature commercially\*

24

OEM offering SAE L2 hands-on driving

12

OEM offering SAE L2+ hands-free driving

## SAE Level 0

ADAS providing safety warnings to the drivers and/or providing corrective maneuvers

## SAE Level 1

ADAS automating EITHER one of the basic human input (braking/acceleration OR steering) but not simultaneously

## SAE Level 2

Systems capable of automating both lateral AND longitudinal control (Hands-on, eyes-on)

## SAE Level 2+

Systems capable of automating both lateral AND longitudinal control (Hands-off, eyes-on)

## SAE Level 3

Systems capable of automating both lateral AND longitudinal control (Hands-off, eyes-off, intermittent supervision)

All the OEMs

All the OEMs



\*Germany (California, Nevada USA target in 2024+)

Japan in limited numbers in 2021

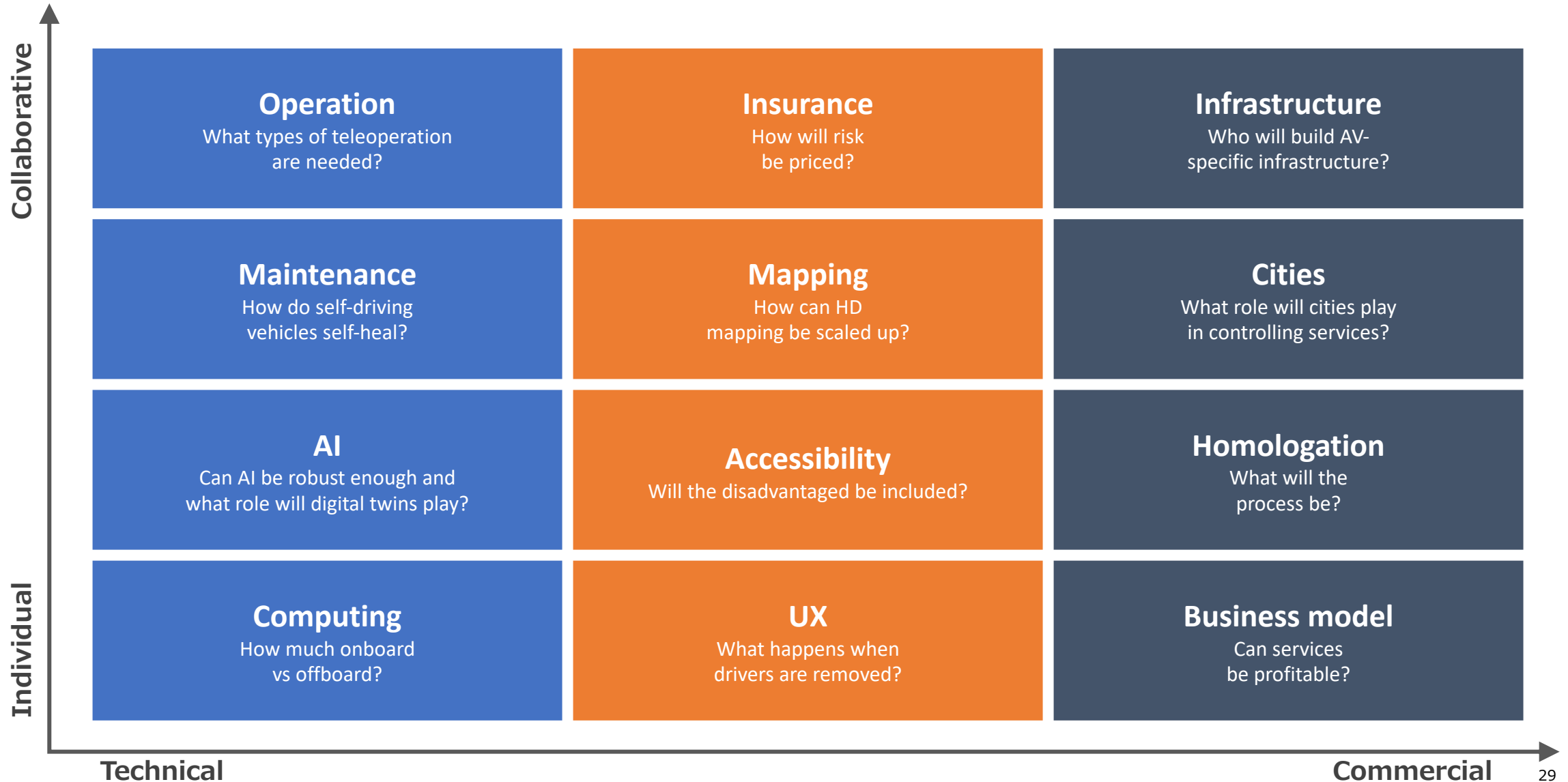


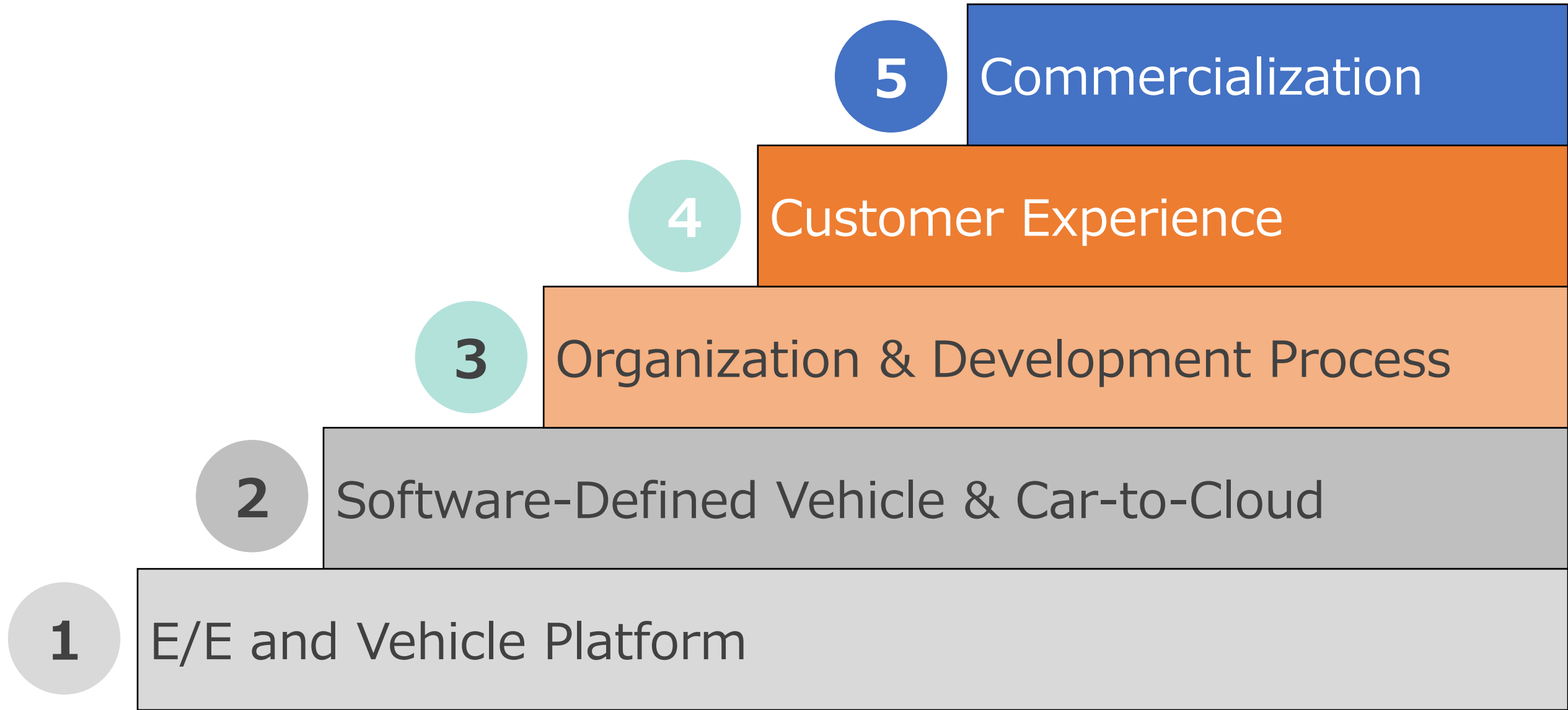
\*German Federal Motor Transport Authority (KBA) approved M-Benz for Level 3 autonomy in December 2021

# With the shift to self-driving, plenty of AV pain points to solve



Breaking down the AV evolution reveals numerous testing, in-vehicle and connected *opportunities*

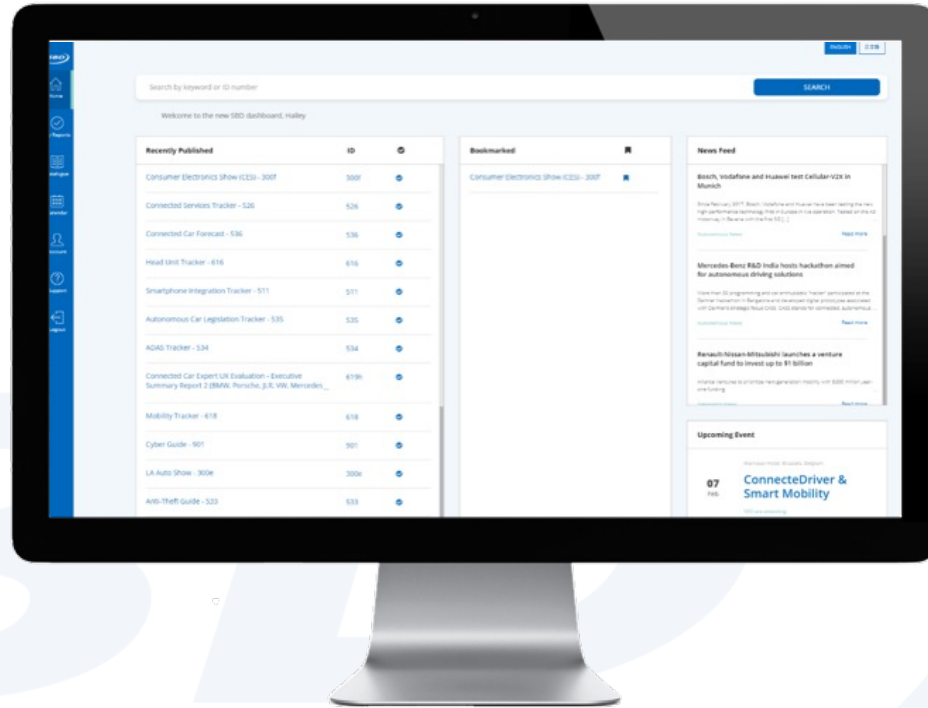




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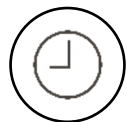
Custom projects to help you plan, test or deploy new solutions into the market



Data

Purpose-built online tools that provide you with advanced data and analytics

[Portal.sbdautomotive.com](http://Portal.sbdautomotive.com)



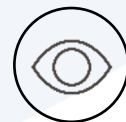
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