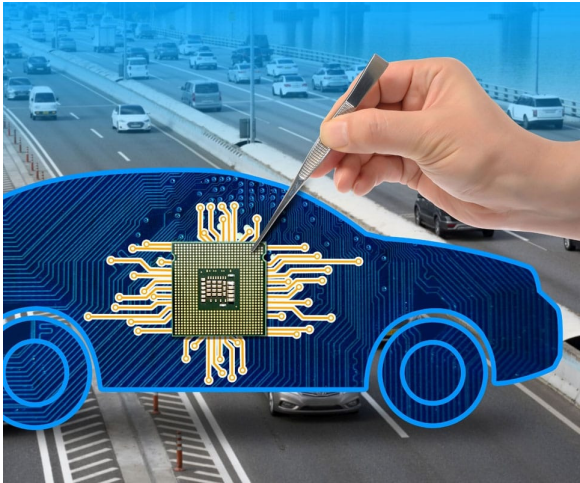




Environmental analysis of the Autotech industry

(credits to McKinsey & Company and Roland Berger)



Why capital markets love mobility



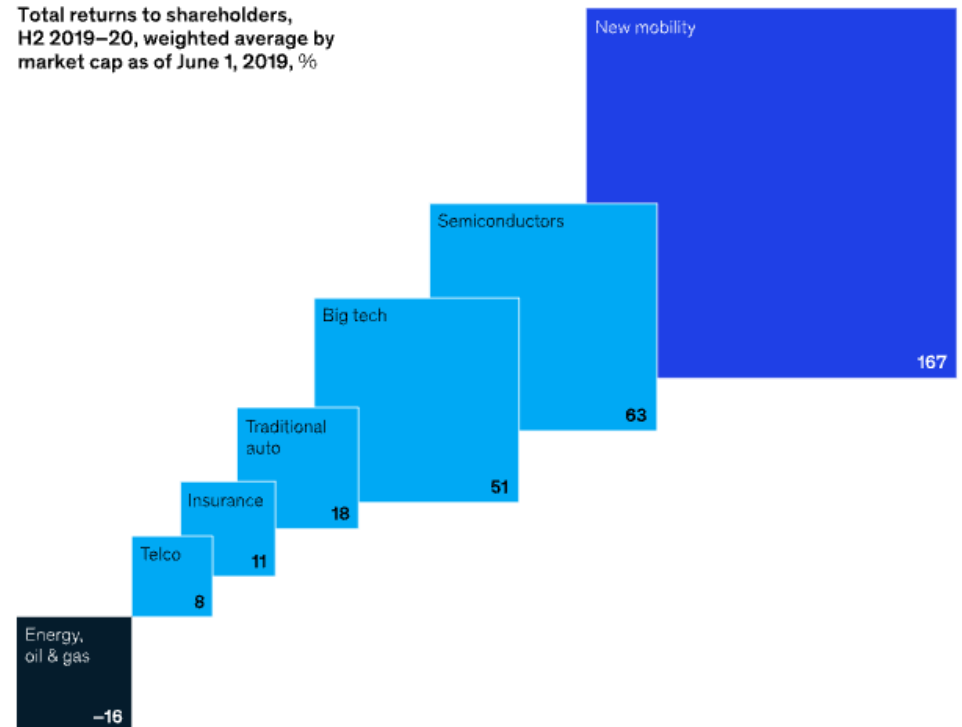
Why capital markets love mobility

Why capital markets love mobility

- Autonomous driving, connected vehicles, the electrification of the powertrain, and shared mobility (also called the ACES trends)

Capital market performance varies by industry cluster.

Total returns to shareholders, H2 2019–20, weighted average by market cap as of June 1, 2019, %



Source: S&P Capital IQ; McKinsey analysis

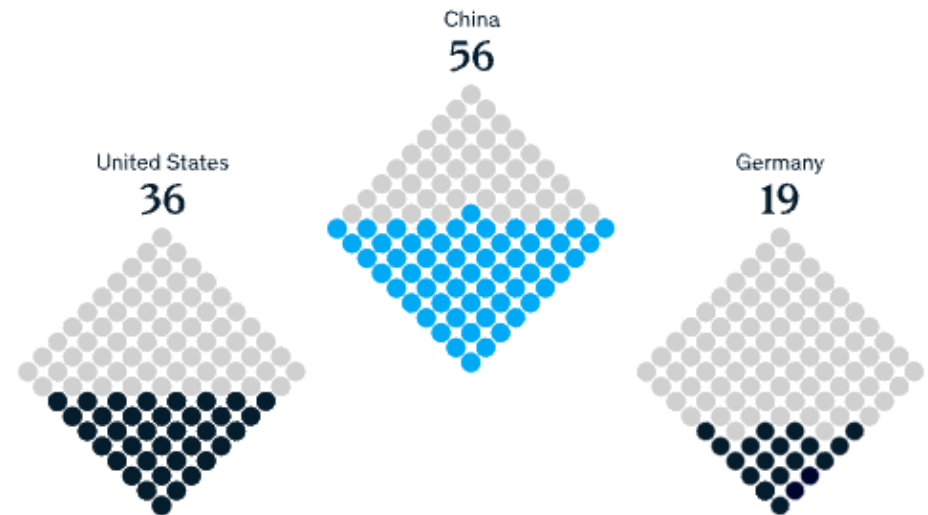
Connected consumer is the future

Connected consumer is the future

- Providing data and connected services directly to consumers, OEMs and other actors has enormous potential for the entire ecosystem of actors.
- Challenges include hesitation and lack of understanding
 - Consumer needs
 - the cost of data transfer
 - ancient software architectures
 - and difficulties in handling complex OEMs origination

Connected cars have the power to woo consumers—especially in China.

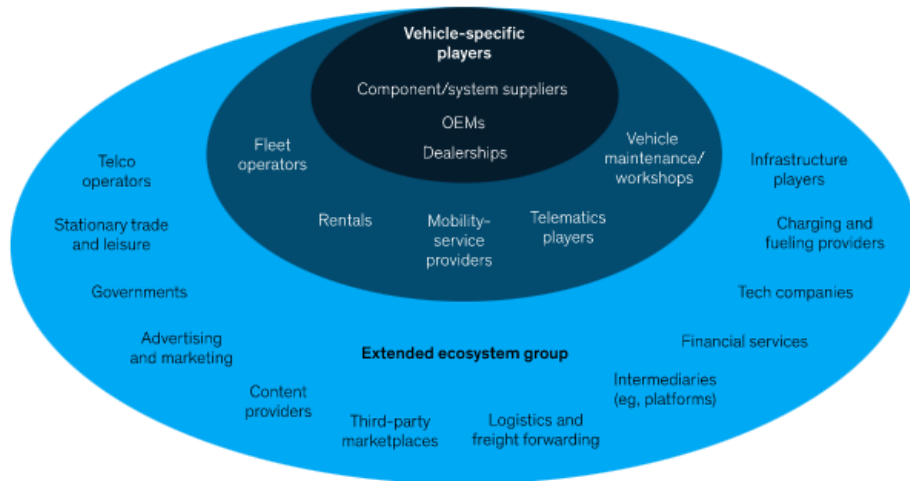
Share of respondents willing to switch auto brand for better connectivity, %



Connected consumer is the future

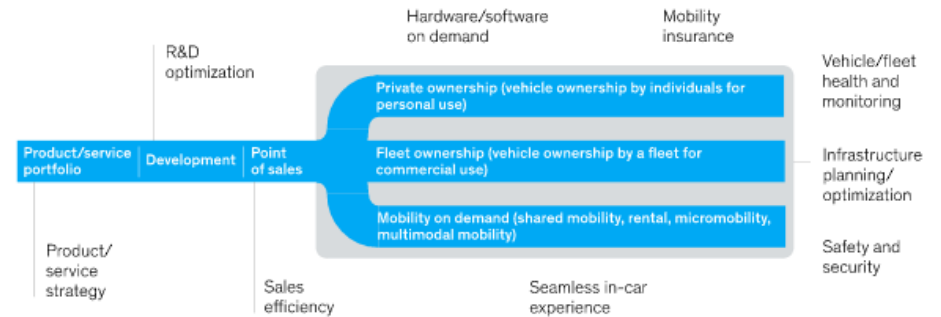
With new companies entering the mobility value chain, collaboration between vehicle-specific players and the extended ecosystem is critical.

Vehicle ecosystem, nonexhaustive



Source: McKinsey Center for Future Mobility

Use cases fall into nine clusters that deliver value across B2B and B2C applications.



Source: McKinsey Center for Future Mobility

Can electric vehicles put the brakes on climate change?

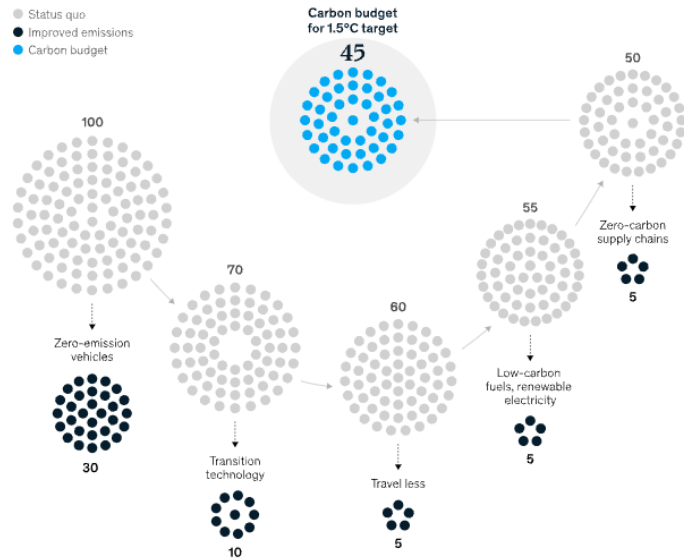


Can electric vehicles put the brakes on climate change?

Can electric vehicles put the brakes on climate change?

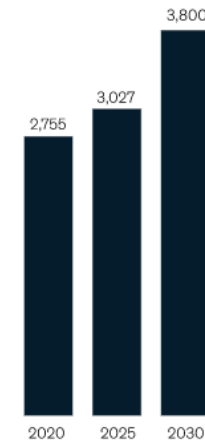
Mobility players' efforts can cut carbon emissions and help keep the global temperature increase under 1.5°C.

Cumulative CO₂ emissions from road transport, 2021–50, gigatons

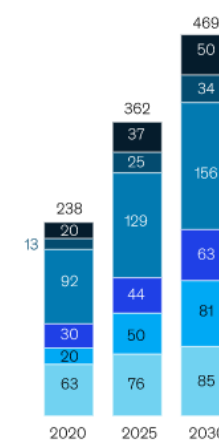


The automotive electronic and software market will see a strong growth through 2030, driven by power electronics, software, ECUs, and DCUs.

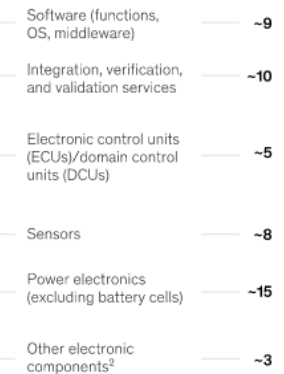
Automotive sales, 2020–30, \$ billion



Automotive software, and E/E¹ market, 2020–30, \$ billion



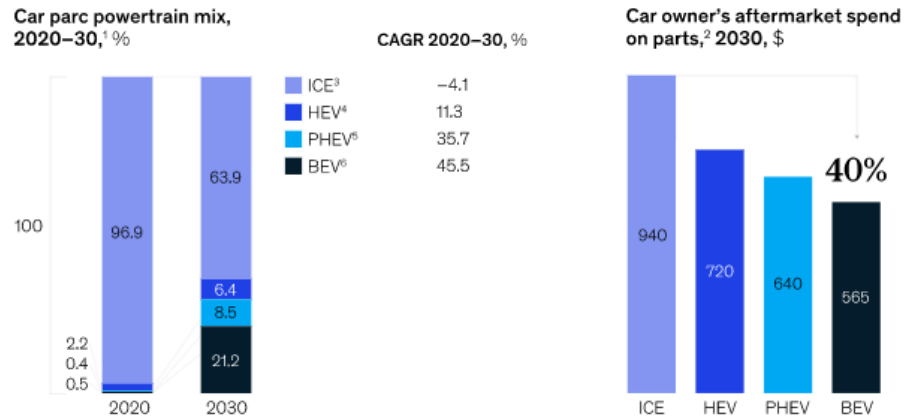
Compound annual growth rate, 2020–30, %



Note: Figures may not sum, because of rounding.
¹Electrical and electronic components.
²For example, harnesses, controls, switches, displays.
 Source: IHS; McKinsey analysis

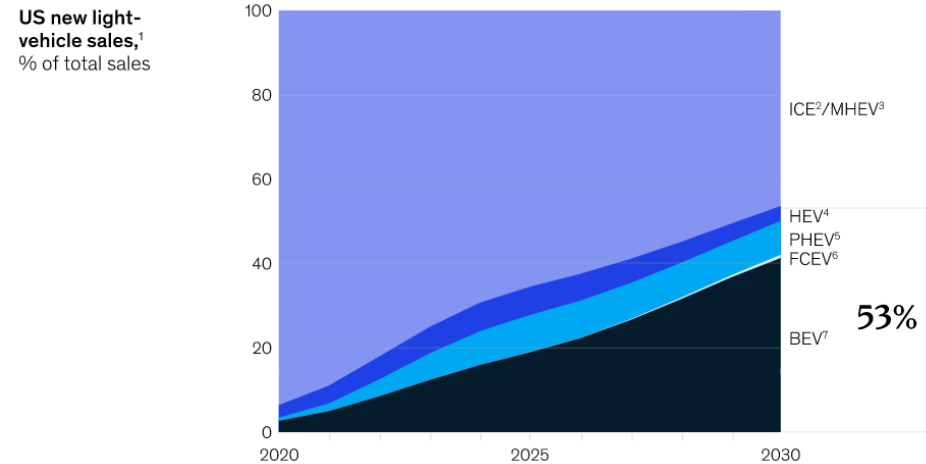
Can electric vehicles put the brakes on climate change?

Car owners will likely not need to spend as much on parts for electric vehicles.



¹Base-case scenario for parc of 4- to 7-year old vehicles across China, France, Germany, Italy, UK, and US. ²Includes routine replacement parts such as batteries, accessories, and collision costs. ³Internal combustion engine. ⁴Hybrid electric vehicles. ⁵Plug-in hybrid electric vehicles. ⁶Battery-electric vehicles. Source: McKinsey Global Aftermarket Model team

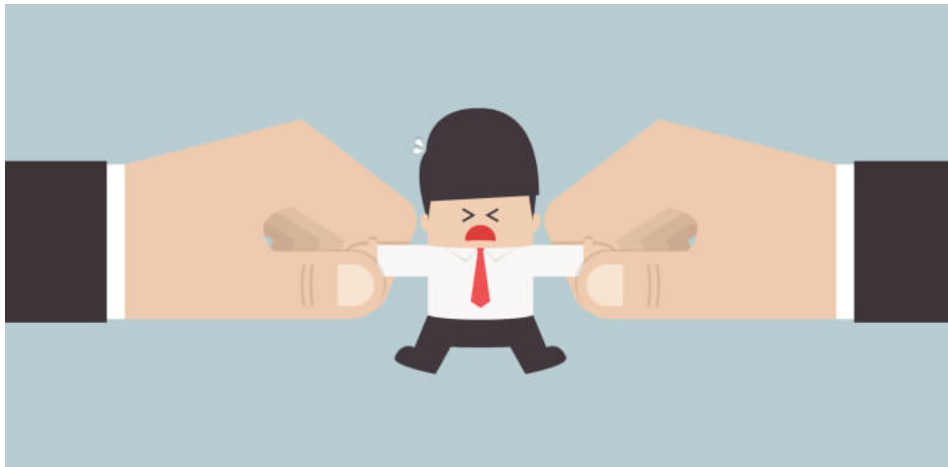
If electric-vehicle adoption continues to accelerate, EVs are likely to account for more than half of all US passenger car sales by 2030.



New mobility, new skills



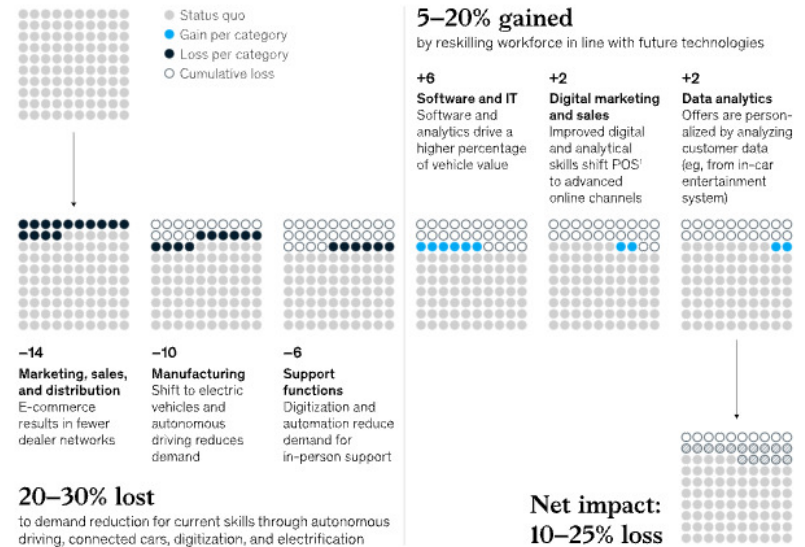
New mobility, new skills



New mobility, new skills

Today's automotive workforce will need to reskill to prepare for the future of connected, electric mobility.

Employment changes through losses and reskilling in next decade, %



New mobility, new skills

Changing architectures

The shift towards centralized architectures enables new features, less software and hardware complexity, and lower costs

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"ONE BOX – ONE FUNCTION"

DOMAIN CENTRALIZED (-2025+)

DOMAIN CONSOLIDATION

CENTRAL + ZONAL (-2030+)

"BIFURCATION"

Full abstraction of commoditized hardware

Value dominance of SoC and associated SW stack

ILLUSTRATIVE

■ Gateway
 ■ DCU
 □ ECU/sensors/actuators
 ■ Zonal ECUs (domain-independent)
 ■ Central/vehicle computer
 ☁ Cloud/backend

Source: Elektrobit, Bosch, Roland Berger

Roland Berger

OEMs' software organizations are increasingly sophisticated

The shift to centralized, cross-domain engineering and procurement structures

CONVENTIONAL MODEL
Organization around hardware silos

- Structured by silo'd domains for HW + SW development and sourcing
- Low functional orientation
- SW budgets tied to vehicle programs
- Sourcing of SW by domain

Source: Roland Berger

NEW FUNCTIONALLY-ORIENTED MODEL
Transversal organization

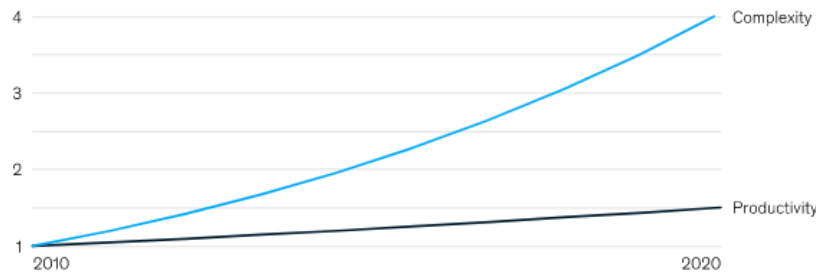
- Central transversal organizational units
- Structure reflects functional-orientation
- SW budgets independent from vehicle programs
- Central strategy-driven SW sourcing

Roland Berger

New mobility, new skills

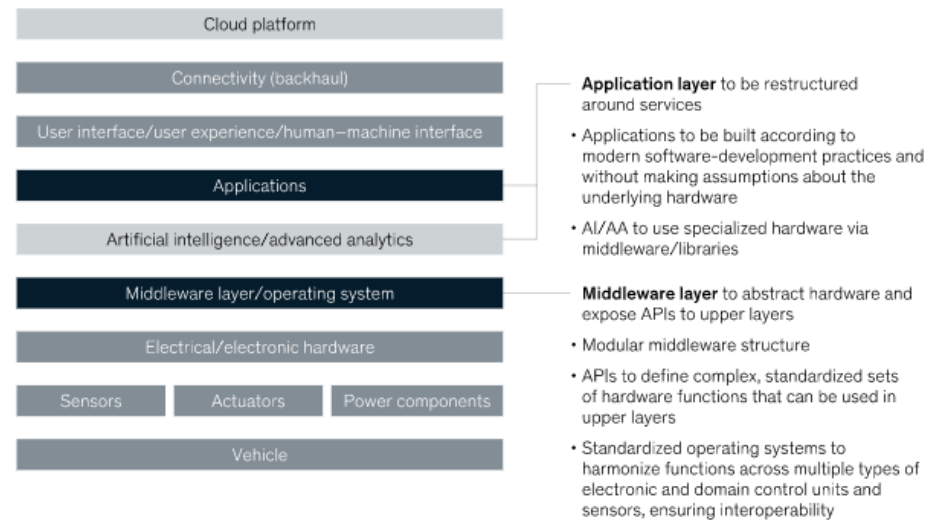
Software complexity is increasing more quickly than productivity.

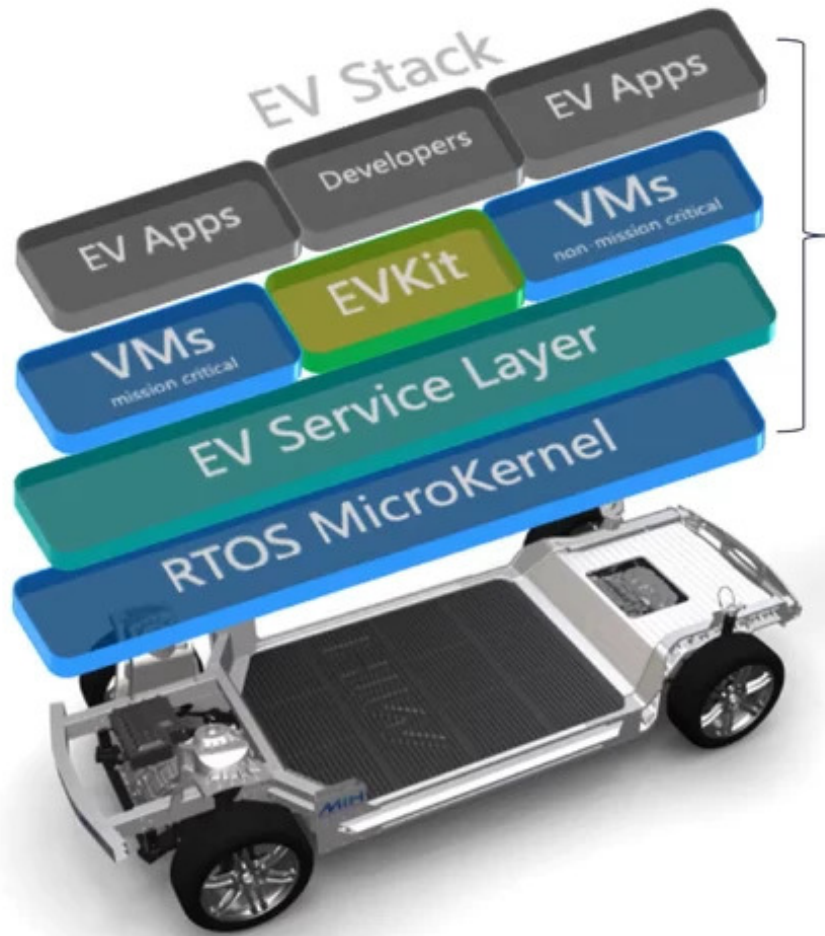
Relative growth of software complexity and productivity over time, indexed for automotive features



Source: McKinsey's SoftCoster embedded software project database

Companies should strive for a target architecture that supports decoupling of hardware and software and features a strong middleware layer.





MIH

EV OPEN Platform

William Wei
CTO, Foxconn / MIH

Foxconn pitches MIH open platform as
"the Android of electric vehicles"

Diadrom Holding

New mobility, new skills

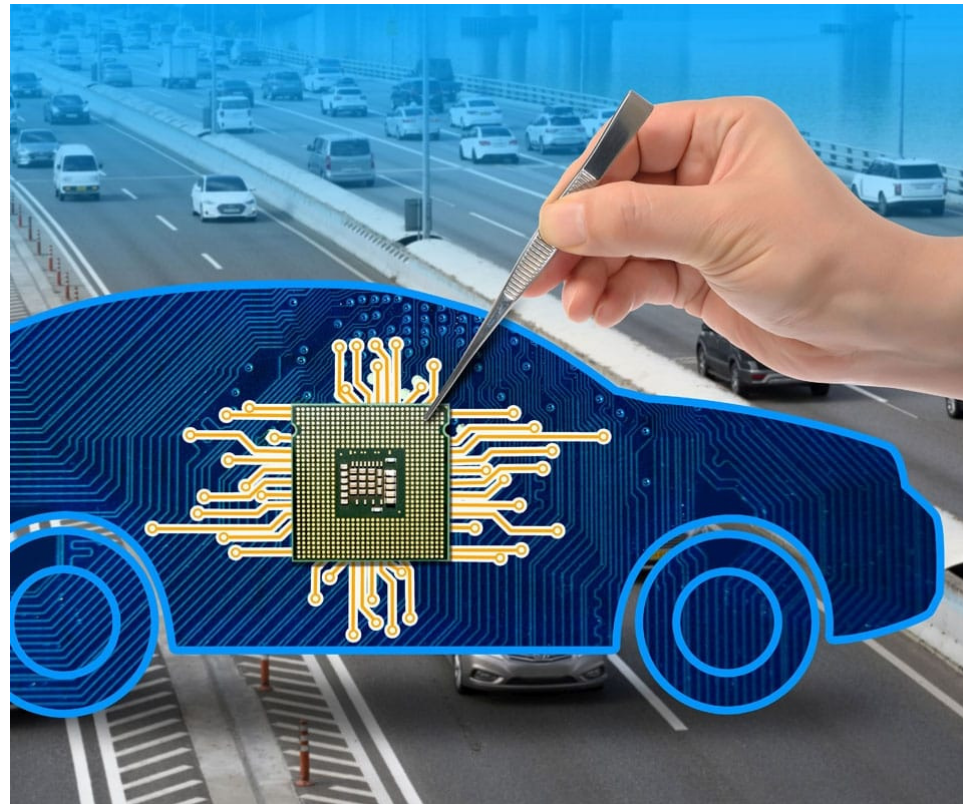
'What': Product architecture and make or buy

- The aim is to set up a target software architecture with both specific internal control points and a partnership ecosystem, allowing for efficient and competitive software delivery across platforms.

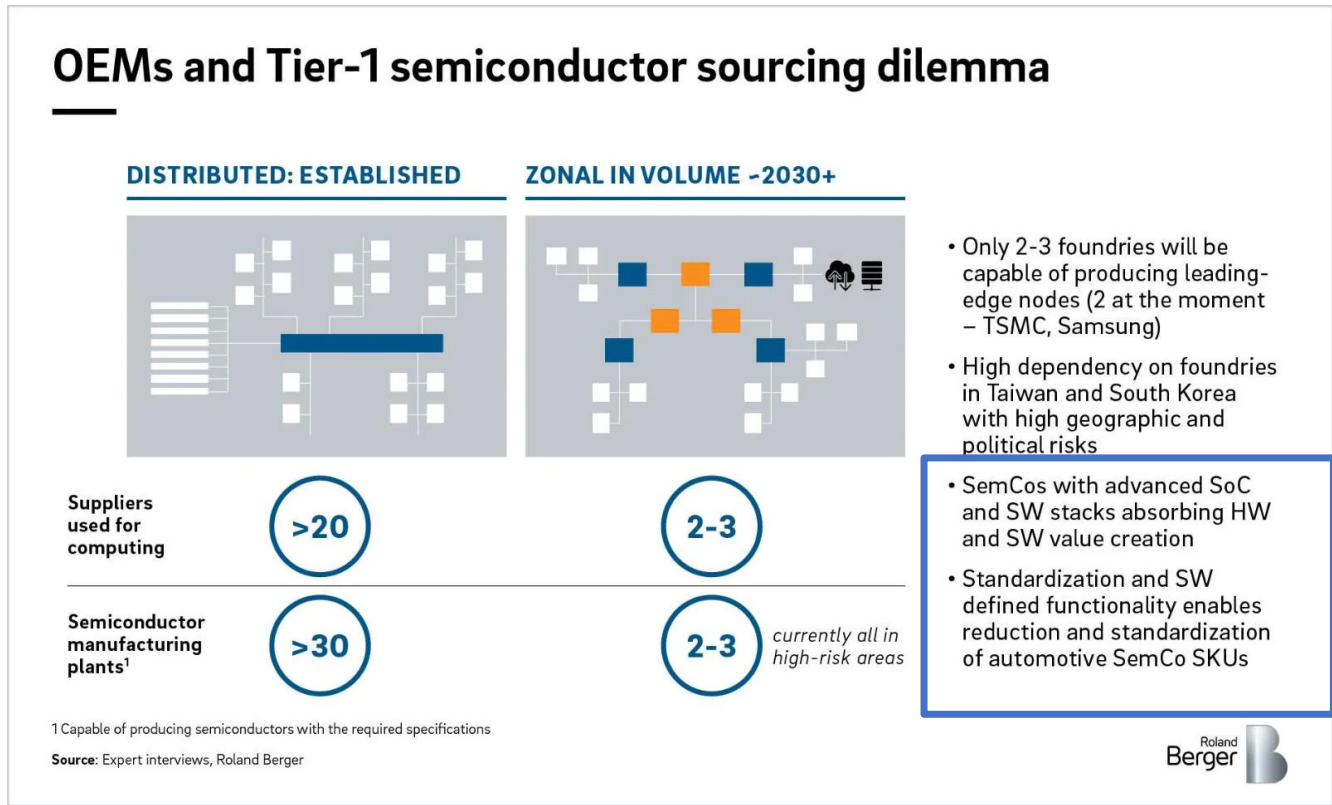
'How': Productivity boosts and software-development methodology

- The focus is on improving software R&D productivity by using a combination of key efficiency levers for software development, including agile R&D, continuous integration, and automated testing

... and what about Semiconductors



... and what about Semiconductors



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