電動車電子控制系統發展趨勢

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全方位車用電子技術研討會

Global Market Trend

Global Market Trend

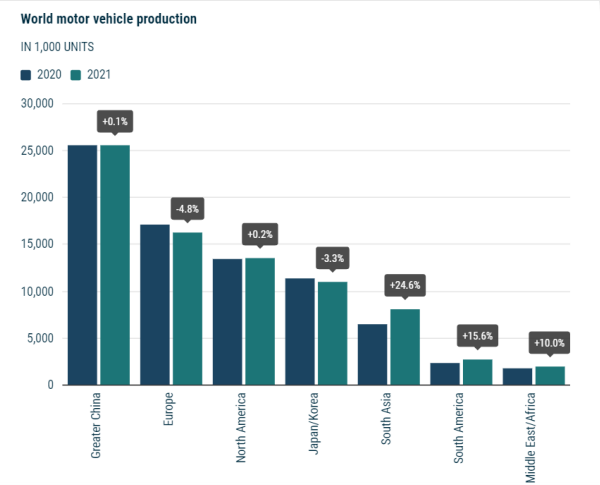
The Global light vehicles market in 2018 has broken the growth after seven years losing terrain from the previous year with total sales at 93.6 million units, down 0.7% well below any expectations.

Indeed, the first half of the year has been highly performing, projecting the market to the achievement of the milestone of 100 million vehicles in a single year. However, the second half was affected by the WLTP introduction in Europe – where sales fluctuated losing 10.6% in September – and worsened due to Chinese crisis, which is now losing since months and with negative outlook.

In 2021, 79.1 million motor vehicles were produced around the world, an increase of 1.3% compared to 2020.

Source: focus2move.com/https://www.acea.auto/figure/world-motor-vehicle-production/

World Motor Vehicle Production



Source: IHS Market

World Motor Vehicle Production

In thousand units / 2021	2021	2020	% change 21/20	% share 2021
Europe	16,247	17,070	-4.8	20.5
Greater China	25,553	25,533	+0.1	32.3
Japan/Korea	10,990	11,361	-3.3	13.9
Middle East/Africa	1,990	1,809	+10.0	2.5
North America	13,518	13,484	+0.2	17.1
South America	2,729	2,361	+15.6	3.5
South Asia	8,055	6,466	+24.6	10.2
WORLD	**79,081**	**78,084**	**+1.3**	**100.0**

Source: IHS Market

Top 15 Automakers in the World

Automaker	Year	Sold Autos	Status	World Rank
Toyota	2022	9,566,961	↑ 1%	1
	2021	9,562,483	↑ 1%	1
	2020	9,528,753	↓ 11%	1
VW	2022	8,263,104	↓ 7%	2
	2021	8,882,346	↓ 5%	2
	2020	9,305,427	↓ 15%	2
Hyundai Kia	2022	6,848,198	↑ 3%	3
	2021	6,668,037	↑ 5%	3
	2020	6,353,514	↓ 12%	4

Source: https://www.factorywarrantylist.com/car-sales-by-manufacturer.html

Top 15 Automakers in the World

Stellantis	2022	6,002,900	↓ 2%	4
	2021	6,142,200	↓ 1%	5
	2020	6,205,996	↓ 23%	5
GM	2022	5,941,737	↓ 6%	5
	2021	6,294,385	↓ 8%	4
	2020	6,833,592	↓ 11%	3
Ford	2022	4,235,737	↑ 7%	6
	2021	3,942,755	↓ 7%	8
	2020	4,231,549	↓ 22%	7

Source: https://www.factorywarrantylist.com/car-sales-by-manufacturer.html

Top 15 Automakers in the World

Honda	2022	4,074,372	↓ 9%	7
	2021	4,456,728	↓ 6%	6
	2020	4,790,438	↓ 10%	6
Nissan	2022	3,225,478	↓ 21%	8
	2021	4,064,999	↑ 1%	7
	2020	4,029,174	↓ 22%	8
BMW	2022	2,399,636	↓ 5%	9
	2021	2,521,596	↑ 8%	10
	2020	2,324,778	↓ 8%	10

Source: https://www.factorywarrantylist.com/car-sales-by-manufacturer.html

Top 15 Automakers in the World

Changan	2022	2,347,163	↑ 1%	10
	2021	2,314,547	↑ 15%	11
	2020	2,003,663	↑ 14%	12
Renault	2022	2,051,174	↓ 24%	11
	2021	2,689,454	↓ 5%	9
	2020	2,949,871	↓ 21%	9
Mercedes	2022	2,043,900	↓ 2%	12
	2021	2,093,476	↓ 3%	12
	2020	2,164,275	↓ 8%	11

Source: https://www.factorywarrantylist.com/car-sales-by-manufacturer.html

Top 15 Automakers in the World

Maruti Suzuki	2022	1,940,067	↑ 17%	13
	2021	1,652,653	↑ 13%	13
	2020	1,457,861	↓ 7%	13
Geely	2022	1,432,988	↑ 8%	14
	2021	1,328,029	↑ 1%	14
	2020	1,320,471	↓ 1%	14
Tesla	2022	1,369,611	↑ 47%	15
	2021	930,422	↑ 83%	18
	2020	509,737	↑ 40%	27

Source: https://www.factorywarrantylist.com/car-sales-by-manufacturer.html

Revenue of Major Car Manufacturers

Revenue [$Bn]

Rank	Automaker	Revenue	Status
1	Toyota	$238.6 Billion	↑ 5%
2	VW	$233.9 Billion	↑ 5%
3	Stellantis	$172.5 Billion	↑ 5%
4	Ford	$126.2 Billion	↑ 9%
5	Mercedes	$124.4 Billion	↑ 3%
6	GM	$113.6 Billion	↑ 5%
7	BMW	$108.3 Billion	↑ 9%
8	Hyundai	$98.9 Billion	↑ 3%
9	Honda	$75.1 Billion	↓ 3%
10	Nissan	$69.2 Billion	↓ 3%
11	Kia	$58.7 Billion	↑ 8%
12	Renault	$54.2 Billion	↑ 2%
13	Tesla	$47.2 Billion	↑ 74%
14	Tata	$36.7 Billion	↑ 8%
15	Volvo	$31.2 Billion	↓ 3%
16	Suzuki	$26.3 Billion	↑ 24%
17	Mazda	$25.6 Billion	↓ 2%
18	Subaru	$22.5 Billion	↓ 12%
19	Great Wall	$19.1 Billion	↑ 36%
20	Geely	$16 Billion	↑ 14%
2021 Top 20 Automakers Revenue		$1.7 Trillion	↑ 6%

Source: https://www.factorywarrantylist.com/car-sales-by-revenue.html

Top 10 Richest Companies in the World by Revenue

1. **Walmart** – $514.4 billion revenue in 2019
2. **Sinopec Group** – $414.6 billion revenue in 2019
3. **Royal Dutch Shell** – $396.5 billion revenue in 2019
4. **China National Petroleum** – $392.9 billion revenue in 2019
5. **State Grid** – $387 billion in revenue in 2019
6. **Saudi Aramco** – $355.9 billion revenue in 2019
7. **BP** – $303.7 billion revenue in 2019
8. **Exxon Mobil** – $290.2 billion revenue in 2019
9. **Volkswagen** – $278.3 billion revenue in 2019
10. **Toyota Motor** – $272.6 billion revenue in 2019

TSMC: 75.46 billion in 2022
Hon Hai Precision Industry: 220.67 billion in 2022

Source: financesonline.com

2020 Top 19 Global Automotive Suppliers -

Group by company's headquarters location

Revenue [$Bn]

Company	Land	Rank			Sales				Profitability						
		2020	2019	Δ	2020	2019	Δ absolut	Δ relativ	Type	2020 in €	2020 in %	2019 in €	2019 in %	Δ	Note
Bosch	DE	1	1	0	42.120	46.784	-4.664	-10,0%	EBIT	-654	-1,6%	756	1,6%	-3,2%	A, 1, AU
Denso	JP	2	3	1	39.122	43.260	-4.138	-9,6%	OI	-287	-0,7%	1.929	4,5%	-5,2%	B, 2, GU
Continental	DE	3	2	-1	37.722	44.478	-6.756	-15,2%	EBIT	-718	-1,9%	-268	-0,6%	-1,3%	B, 1, GU
ZF Friedrichshafen	DE	4	5	1	30.526	33.597	-3.071	-9,1%	EBIT	-743	-2,4%	853	2,5%	-5,0%	B, 1, AU
Magna	CA	5	4	-1	28.583	35.222	-6.639	-18,9%	EBIT	1.467	5,1%	2.273	6,5%	-1,3%	A, 1, GU
Aisin	JP	6	6	0	28.045	31.977	-3.932	-12,3%	OI	232	0,8%	995	3,1%	-2,3%	B, 2, GU
Hyundai Mobis	KR	7	7	0	27.220	29.149	-1.929	-6,6%	OI	1.360	5,0%	1.807	6,2%	-1,2%	A, 1, GU
Michelin	FR	8	9	1	20.469	24.135	-3.666	-15,2%	OI	1.403	6,9%	2.691	11,1%	-4,3%	B, 1, GU
Bridgestone	JP	9	8	-1	19.920	24.204	-4.283	-17,7%	OI	1.803	9,1%	2.671	11,0%	-2,0%	B, 1, AU
Weichai Power	CN	10	18	8	16.828	13.878	2.949	21,3%	OI	1.294	7,7%	1.260	9,1%	-1,4%	B, 1, AU
Valeo	FR	11	10	-1	16.436	19.477	-3.041	-15,6%	OI	-372	-2,3%	1.034	5,3%	-7,6%	B, 1, GU
Lear	US	12	12	0	14.923	17.696	-2.772	-15,7%	EBIT	537	3,6%	1.169	6,6%	-3,0%	A, 1, GU
Faurecia	FR	13	11	-2	14.654	17.768	-3.114	-17,5%	OI	406	2,8%	1.283	7,2%	-4,4%	B, 1, GU
Cummins	US	14	13	-1	14.238	17.200	-2.961	-17,2%	EBIT	1.953	13,7%	2.287	13,3%	0,4%	B, 1, AU
Tenneco	US	15	14	-1	13.464	15.587	-2.123	-13,6%	EBIT	-675	-5,0%	70	0,4%	-5,5%	B, 1, GU
Sumitomo Electric	JP	16	17	1	12.656	14.158	-1.503	-10,6%	OI	289	2,3%	594	4,2%	-1,9%	B, 2, AU
Yazaki	JP	17	19	2	12.182	13.808	-1.626	-11,8%	K.A.	-/-	-/-	-/-	-/-	-/-	A, 4, AU
Aptiv	GB	18	21	3	11.439	12.824	-1.385	-10,8%	OI	1.854	16,2%	1.140	8,9%	7,3%	B, 1, GU
BorgWarner	US	19	27	8	11.199	9.083	2.117	23,3%	OI	643	5,7%	1.164	12,8%	-7,1%	B, 1, GU

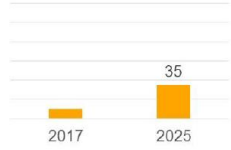
Source:https://www.berylls.com/wp-content/uploads/2021/07/TOP-100-SUPPLIER-2020-TABLE.pdf

Automotive Industry Trend

Four ACES

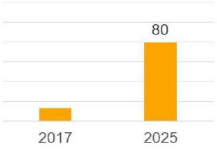
Automated Driving

TAM[2] in bn €



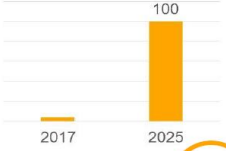
Holistic Connectivity

TAM[2] in bn €[4]



Electrification

TAM[2] in bn €[3]

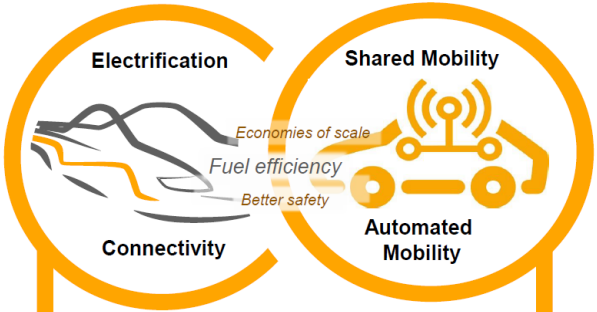


Shared Mobility

Sources: McKinsey and Continental estimates

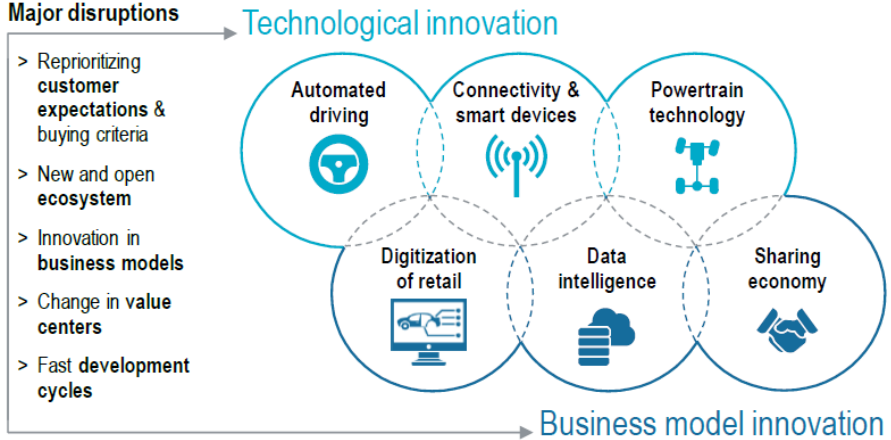
Four ACES

- **Four ACES will reduce costs per mile traveled**



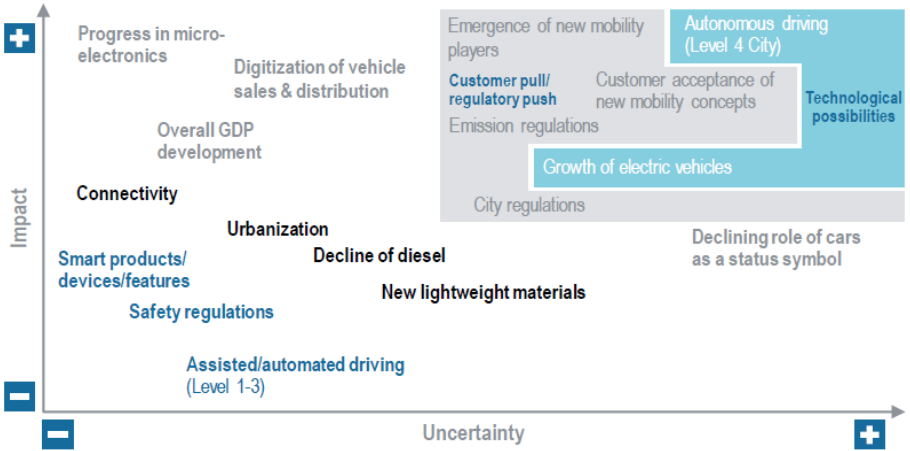
Source: Continental

Key Drivers of Disruption in the Mobility Landscape



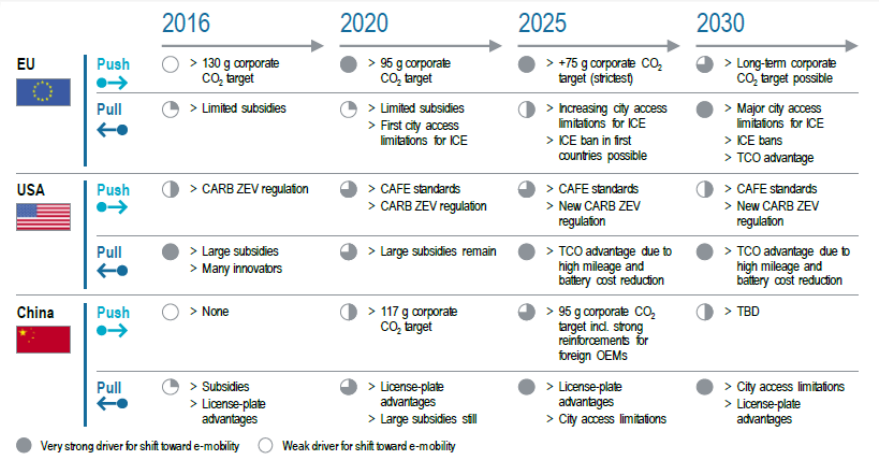
Source: Roland Berger

Key Influencing Factors and Trends Impacting the Automotive Industry



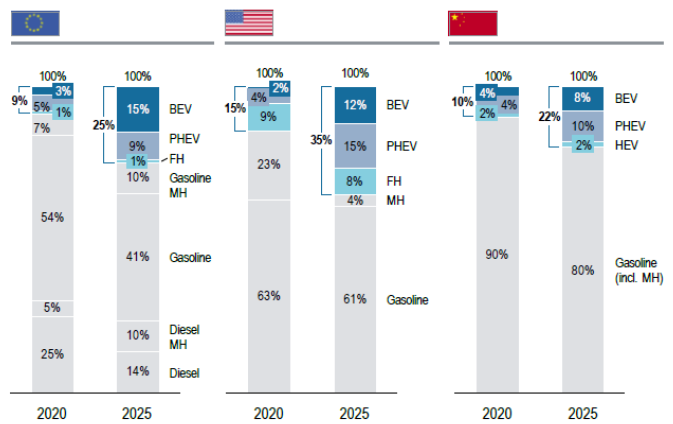
Source: Roland Berger

Drivers of Global Electrification Scenarios



Source: Roland Berger

Share of Propulsion Types in 2020 and 2025 (High Electrification Scenario)



Europe

- BEVs developing strongly
- Declining role of diesel drivetrains

United States

- Stronger focus on long-distance travel ability (PHEVs)
- Demand for BEVs, especially for California
- Strongest demand for full hybrid

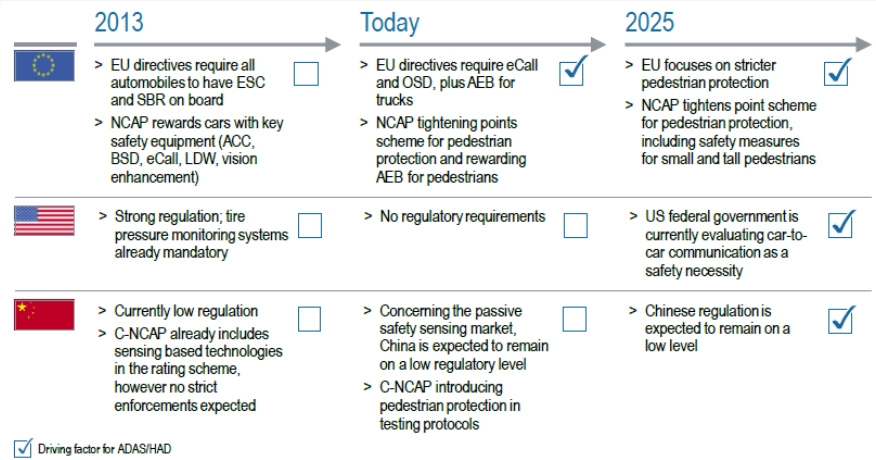
China

- Demand for BEVs and PHEVs, especially in megacities

BEV: Battery Electric Vehicle; PHEV: Plug-in Hybrid Electric Vehicle; FH: Full Hybrid; MH Mild Hybrid

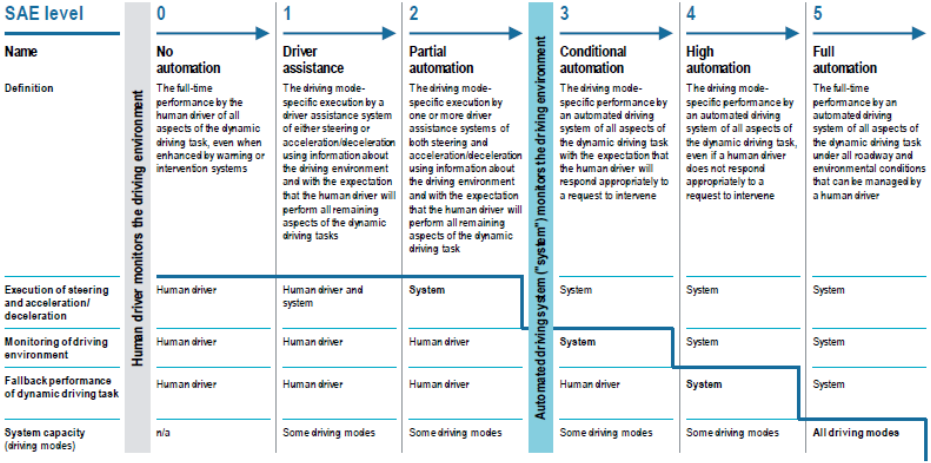
Source: Roland Berger

Summary of Push Factors for ADAS from Governments and Consumer Protection Bodies



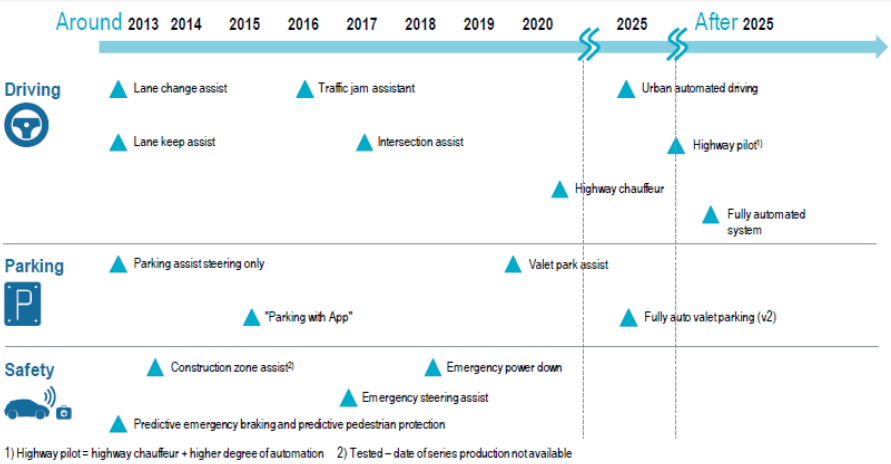
Source: EC, ETSC, expert interviews, Roland Berger

SAE Definitions of Levels of Autonomous Mobility



Source: SAE International, J3016, fka, Roland Berger

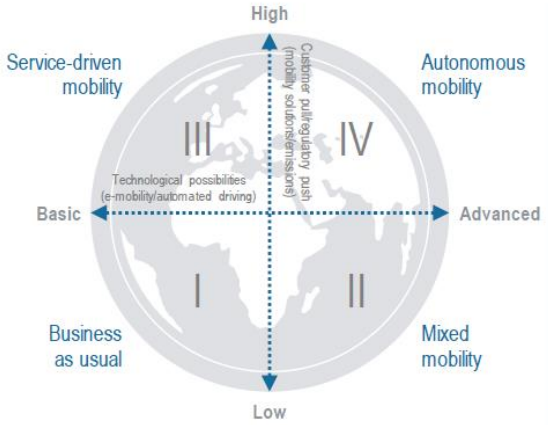
Launch Horizon for Automated Driving Functions



1) Highway pilot = highway chauffeur + higher degree of automation 2) Tested – date of series production not available

Source: Press research, conference papers, fka, Roland Berger

Overview of Global Mobility Scenarios: Possible Futures in 2030



I Business as usual

"Despite some advancements, mobility patterns remain stable"

II Mixed mobility

"Technological advancements only used by a few"

III Service-driven mobility

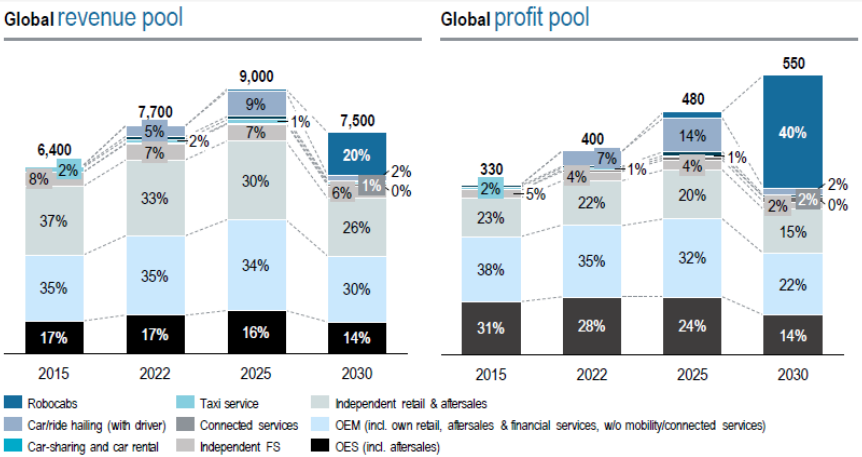
"Mobility services as a global trend"

IV Autonomous mobility

"Breakthrough of electrified robocabs"

Source: Roland Berger

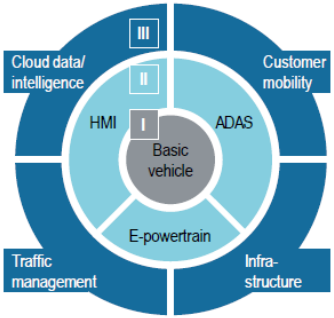
Autonomous Scenario: Estimated Revenues and Profits [EUR Bn]



Source: Roland Berger

Critical Control Points for the 2030 Technology Ecosystem

Automotive & smart mobility ecosystem



CCP (critical control point)

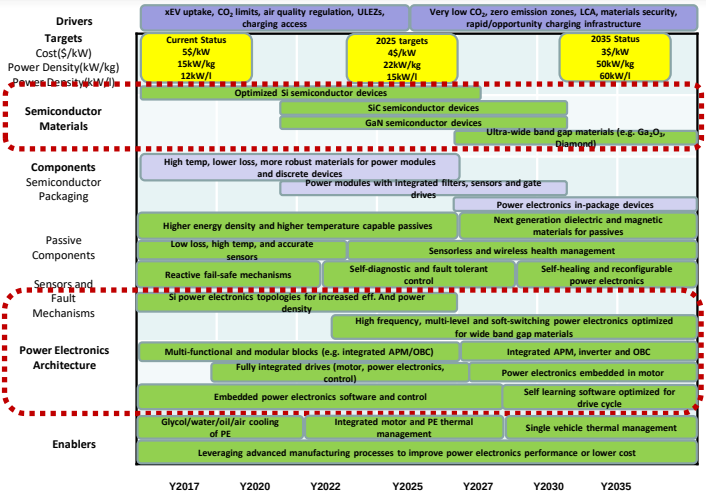
Control points

Smart mobility	Traffic management	Traffic control	Road roll/pricing	Real-time traffic analysis	Traffic prediction
	Infrastructure	Charging	Fuelling	Parking	Intermodal changes
	Cloud data/ intelligence	Mobility platforms/apps	Secure communication	HD & smart maps	Fleet mgmt./ logistics
	Customer mobility	Mobility planning	Booking & payments	Ride-sharing/ hailing	Robocabs/ taxi services
Advanced veh. tech.	HMI	Smart brought-in devices	In-vehicle infotainment	Vehicle HMI	OBD vehicle access
	ADAS	Sensor tech. (lidar, radar)	Sensor fusion & environ. model	High-perform. computing	Object recognit. & path predict.
	Future drivetrain	Electric powertrain	Batteries	Efficiency technologies	Alternative fuels, hydrogen
Basis	Basic vehicle technology	Vehicle hardware	Actuators & controls	Passive safety	Vehicle design

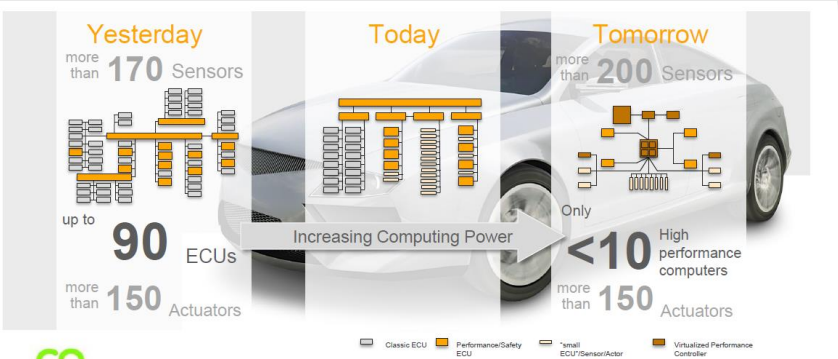
Source: Roland Berger

Technology Trend

xEV Technology Roadmap



Software Drives Architecture, Process and Organization



- Increasing computing power will lead to an centralized E/E architecture
- Hardware will be separated from software – software integration capabilities are needed
- Security supporting approach by multilayered, end-to-end solutions and services required

Source: Continental

Central Processing Unit in a Server Based Architecture

- Automated driving
- Electrification
- Connectivity
- New Mobility
- SW defined car
- Digitalization
- Internet of Things

› Automotive and cross industry trends require new approaches in EEA*

› Move towards structures known from IT industry

› The In-Vehicle server is a cornerstone of modern vehicle architectures

› The In-vehicle Server offers a HW/SW platform realizing individual use cases:

High performance computing unit. Predefined applications as well as new 3rd party SW and service integration.	Redistribution of application SW. Separation of I/O* logic from application function + application fusion across domains.	In-vehicle communication. Increasing demand of in-vehicle network bandwidth.	Master for Cyber Security, SW over-the-air updates and vehicle diagnosis. Elektrobit SW management and Argus cyber security solutions are essential elements.

[1] EEA = Electric/Electronic architecture
[2] I/O = Input / Output

Source: Continental

Thanks for Your Attention!