silesia automotive & advanced manufacturing

THE DIGITAL ECONOMY IN AUTOMOTIVE – UPCOMING TECHNOLOGIES AT THE BACKGROUND OF GLOBAL TRENDS

13.12.2023

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KSSE

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Agenda

10.00: Welcome – Luk Palmen, Innovation & Cooperation Manager Silesia Automotive & Advanced Manufacturing

10.10: Introduction: digital economy – digital twins, big data and AI – SME challenges

10.30: Discussion with participants

- The role of digital solutions in SMEs in the cluster
- The challenges SMEs face to apply digital solutions
- SME readiness to test new solutions in pilot projects
- Issues for joint action in the framework of European programs

11.25: Summary

11.30: End of the meeting

Automotive in Europe

The transition towards e-mobility results in a net loss of up to approximately 290,000 jobs in the European Union by 2035

The added value in the value chain will focus innovative drive systems and ICT systems

The European Union is weak in the battery and semiconductor value chain

The European Union is characterized by a gradual decline in car production and sales

COVID-19, interrupted supply chains and fluctuations in raw material and utility prices resulted in a deterioration of the financial situation of suppliers who rely on short-term financing instruments to finance their current operations

Inflation and the deterioration of the purchasing power of the middle class in the European Union, as well as an aging population, are causing the average European to drive their older car longer or reduce the number of cars in the family

Total employees of automotive OEMs in Europe

OEM	European employees '000	Factories (2021)
Volkswagen	417	26
Stellantis	172	11
Daimler	130	24
Renault-Nissan	103	13
BMW	88	6
Ford	45	4
Volvo	41	4
JLR	40	4
Toyota	25	3
Hyundai	15	2
Other	9	13
Total	~1,084	110

E-mobility: A green boost for European Automotive jobs? Boston Consulting Group, 2021

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Automotive in Europe

CONNECTIVITY VEHICLES

AUTONOMOUS VEHICLES

SHARED MOBILITY

ELECTRIC VEHICLES

Price data from Europe's five biggest carmakers (BMW, Mercedes, Stellantis, Renault and Volkswagen) shows that they have raised the prices of their cheapest models by up to 41% since 2019*

Percentage of respondents who do not want to pay more than EUR 400 for additional technological solutions in their car

Advanced technology category	Germany	United States	Japan	Republic of Korea	China	India
Safety	71%	60%	59%	52%	39%	49%
Connectivity	79%	66%	72%	63%	46%	52%
Infotainment	84%	75%	79%	74%	52%	57%
Autonomy	67%	58%	61%	42%	37%	40%
Alternative engine solutions	58%	54%	60%	42%	37%	39%
Unwilling to pay more than ...	€400	US$500	¥50,000	₩500,000	¥2,500	₹25,000

*Calculated for each country in local market currency (roughly equivalent to US$500).
Source: 2020 Deloitte Global Automotive Consumer Study.

*https://www.transportenvironment.org/

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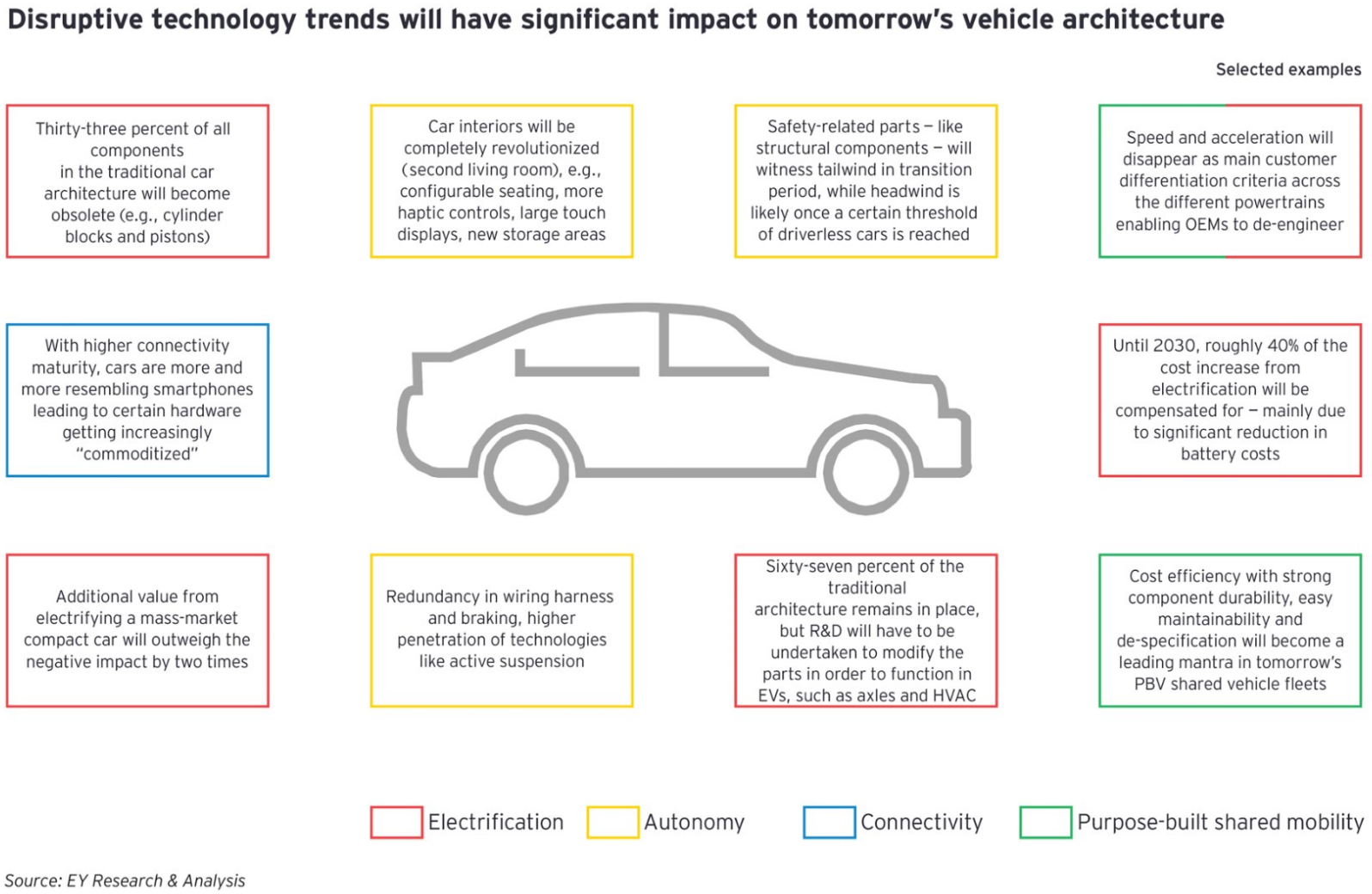
Automotive in Europe

33% OF TRADITIONAL VEHICLE COMPONENTS WILL DISAPPEAR

STANDARDIZATION OF BASIC CAR PARTS

NEW VALUE PROPOSITIONS FOR VISUAL COMPONENTS AND USER-EXPERIENCE

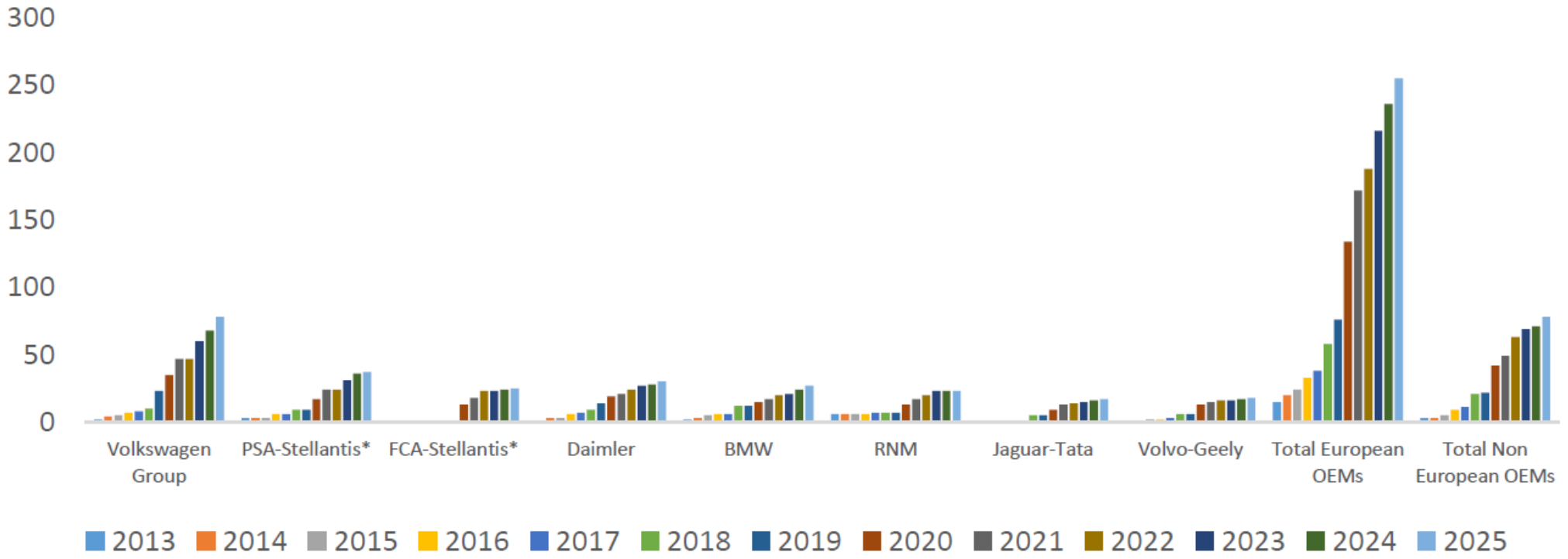
DIMINISHING MANUFACTURING COSTS WHILE MAINTAINING DURABILITY AND SAFETY



Source: EY Research & Analysis

https://www.ey.com/en_dk/strategy/how-auto-suppliers-can-navigate-ev-technology-disruption-in-four-steps

Automotive in Europe



* PSA and FCA completed a merger in 2021 to form the Stellantis conglomerate.
Source: Transport & Environment (2019).

The Future of the EU Automotive Sector, Policy Department for Economic, Scientific and Quality of Life Policies. Directorate-General for Internal Policies Authors: David BROWN, Michael FLICKENSCHILD, Caio MAZZI, Alessandro GASPAROTTI, Zinovia PANAGIOTIDOU, Juna DINGEMANSE and Stefan BRATZEL, PE 695.457 - October 2021

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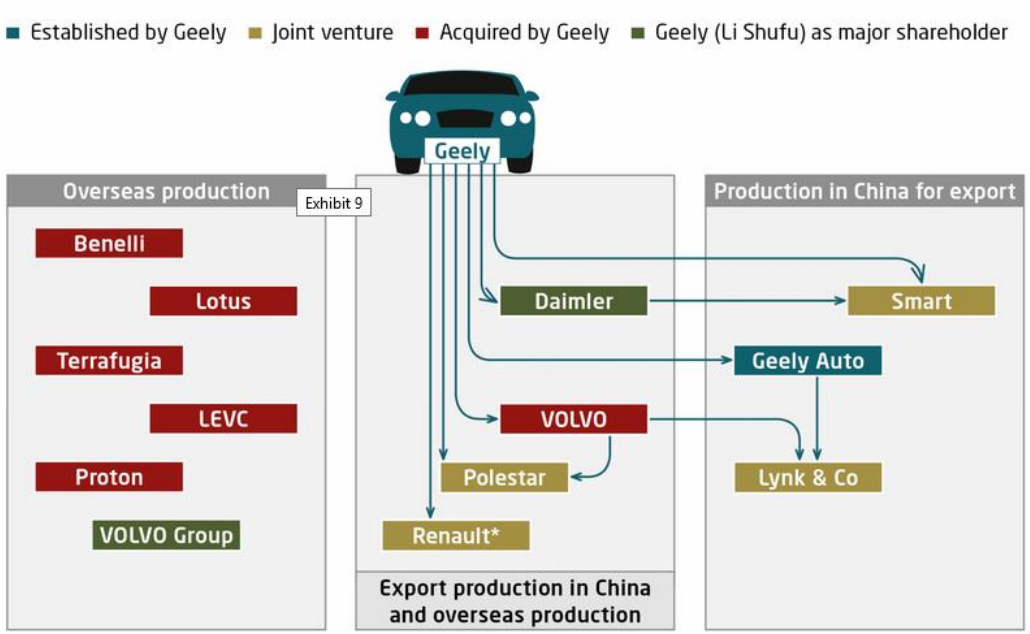
Chinese EVs steal show at Munich fair

Mercedes-Benz CEO Ola Kallenius said at the Munich fair it was necessary for European firms to stay competitive in the face of stiff competition.

"*Don't make it worse. Don't start a debate that we should work less hours at the same pay, those types of things. That would be going the wrong direction*"



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Industry 5.0 - A new European model of capitalism

Industry is an essential part of our society. It contributes to prosperity, not only for shareholders or owners, but also for employees and society. Being aware of the limitations of our planet and the shrinking and aging population in Europe, in the era of Industry 5.0, people and the environment are at the centre of attention. Emphasis is placed on the use of technological solutions to support the sustainable development of organizations, taking into account humans in production processes and the limited resources of our planet.

- A new business development model based on the principles of fairness, resilience, sustainable development and circular economy
- An active, strategic and operational approach to ESG – not only reports but also actions
- Financial institutions follow an approach towards environmental and social responsibility when assessing investment projects

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Industry 5.0 - A new European model of capitalism

People in the spotlight

Sustainable development in practice

Resilience to sudden changes

Ecological design Rethink Refuse Reduce Reuse Recycle Recover

Origin of materials/raw materials

Short supply chains

Continuous improvement within the supply chain and local ecosystem

Human and environmentally friendly production methods

Packaging

Distribution and delivery

Usage models

Models of disposal and recovery

Redesigning products

Redesigning manufacturing processes

Redesigning value chains

Redesigning business relationships

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Industry 5.0 - A new European model of capitalism

Some car companies cooperate with the Science Based Targets initiative (SBTi) - an initiative based on scientific goals.

They set targets for reducing greenhouse gas emissions and are subject to monitoring and scientific evaluation.

[see: https://sciencebasedtargets.org/]

In the context of their pursuit of carbon neutrality by 2050, car companies will pay more and more attention to their supply chain, in particular to:

- identify opportunities and threats related to greenhouse gas emissions in the supply chain;
- identify opportunities to reduce greenhouse gas emissions in the supply chain;
- expect their suppliers to actively engage in emission reduction activities.

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CSRD

In the 2024 financial year, the obligation to collect data on sustainable development begins for a larger group of companies in Europe.

The CSRD (Corporate Sustainability Reporting Directive) defines the principles of reporting by companies in the field of environmental protection, social responsibility and governance. The scope of disclosure of information on sustainable development of enterprises has been included in the European Sustainability Reporting Standards (ESRS).

In 2025, large public interest entities, including listed companies, must submit their reports. In 2026, also other large enterprises.

From 2027, small and medium-sized enterprises listed on the stock exchange will join this group.

However, it can be expected that large entities as part of their supply chains will require data from their suppliers, who will have to collect data and report it in a transparent way.

Extract from the EFRAG proposal package: "*Where applicable, the information referred to in paragraphs 1 and 2 shall contain information **about the undertaking's own operations and about its value chain**, including its products and services, its business relationships and its supply chain. […] Sustainability reporting standards shall take account of the difficulties that obligations may encounter in gathering information from actors throughout their value chain, especially from those which are not subject to the sustainability reporting requirements*."

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CSRD

Sustainability reporting

[…] The information in the report includes, among others, a short description of the entity's business model and business strategy, including:

- the resilience of the entity's business model and business strategy to risks relating to issues related to sustainable development;
- opportunities opening up to the individual in connection with issues related to sustainable development;
- the entity's plans, including implementation activities and related financial and investment plans, to ensure that the entity's business model and business strategy take into account the transition to a sustainable economy and limiting global warming to 1.5 °C in line with the Paris Agreement under the United Nations Framework Convention United Nations Agreement on Climate Change adopted on 12 December 2015 (hereinafter referred to as the "Paris Agreement") and the objective of achieving climate neutrality by 2050 as set out in Regulation (EU) 2021/1119 of the European Parliament and of the Council (*), and, where applicable, the entity's exposure to coal, oil and gas activities;
- information on how the entity's business model and business strategy take into account the interests of the entity's stakeholders and the entity's impact on sustainability issues;
- information on how to implement the entity's strategy in relation to sustainability issues;
- a description of the entity's time-bound and established sustainability-related targets, including, where applicable, absolute greenhouse gas emission reduction targets for at least 2030 and 2050, a description of the progress the entity has made towards achieving those targets, and a statement of whether the targets units related to environmental factors are based on conclusive scientific evidence.

[…]

Directive (EU) 2022/2464 of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU as regards reporting enterprises in the field of sustainable development

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CSRD

Discussions on mandatory and voluntary indicators (300-1200 indicators) are ongoing.

Example indicators for the circular economy area:

- Quantity of primary raw materials used in the reporting period
- Amount of recovered materials used in the reporting period
- The share of raw materials and recovered materials in the product
- Percentage of products designed in accordance with the principles of the circular economy
- Percentage of products and materials designed and selected in such a way that they are suitable for regeneration, recovery and reuse at the end of their life cycle
- Values of individual fractions in waste generated by the organization
- Waste management method

When carrying out circular measurement and systems assessment, it is necessary to generate, retrieve and manage data and apply this data **throughout the life cycle(s) of the product(s).** When measuring and assessing circularity, a systems approach and a life cycle perspective should therefore be used. Hence the importance of the upstream and downstream value chain in assessing materiality.

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Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles

Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles (07.2023)
The proposed regulation repeals both the 3R type-approval and ELV Directives and replaces them with a single legal instrument.

Article 4. Reusability, recyclability and recoverability of vehicles

1. Each vehicle belonging to a vehicle type that is type-approved as of […. the first day of the month following 72 months after the date of entry into force of this Regulation] under Regulation (EU) 2018/858 **shall be constructed so that it is:**

(a) reusable or recyclable to a minimum of 85 % by mass;

(b) reusable or recoverable to a minimum of 95 % by mass.

2. For each vehicle type referred to in paragraph 1, manufacturers shall take the following measures:

(a) **collect** the **necessary data** through the full chain of supply, in particular the nature and the mass of all materials used in the construction of the vehicles, to ensure continued compliance with the requirements;

(b) keep all the other appropriate vehicle data required by the calculation process referred to in point (e);

(c) verify the correctness and completeness of the information received from suppliers;

(d) the breakdown of the materials shall be managed and documented;

(e) **calculate the reusability, recyclability and recoverability rates** for the purposes of paragraph 1 in accordance with the **methodology established by the Commission** under paragraph 3 or, before such methodology has been adopted, in accordance with ISO standard 22628:2002 in combination with the elements set out in Part A of Annex II;

(f) mark the parts and components of the vehicles made of polymers and elastomers in accordance with Article 12(1);

(g) ensure that parts and components listed in Part E of Annex VII are not reused in the construction of new vehicles.

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Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles

Article 6 Minimum recycled content in vehicles

1. The plastic contained in each vehicle type that is type-approved as of [OP: Please insert the date = the first day of the month following 72 months after the date of entry into force of the Regulation] under Regulation (EU) 2018/858 **shall contain a minimum of 25 % of plastic recycled by weight from post-consumer plastic waste**.

   At least 25 % of the target set out in the first subparagraph shall be achieved by including plastics recycled from end-of-life vehicles in the vehicle type concerned.

2. By [….the last day of the month following 23 months after the date of entry into force of this Regulation], the Commission shall adopt an implementing act in accordance with Article 51(2) to supplement this Regulation by establishing the **methodology for the calculation and verification,** for the purposes of paragraph 1 of this Article, **of the share of plastics recovered from post-consumer waste, and from end-of-life vehicles respectively**, present in and incorporated into the vehicle type.

3. The Commission is empowered to adopt delegated acts, in accordance with Article 50, to supplement this Regulation by establishing a **minimum share of steel recycled from post-consumer steel waste to be present and incorporated into vehicle types** to be type-approved in accordance with this Regulation and Regulation (EU) 2018/858.

The Commission may adopt an implementing act establishing the meth**odology for the calculation and verification of the share of steel recycled from post-consumer steel waste present in and incorporated into vehicle types**.

4. By [… the last day of the month following 35 months after the date of entry into force of this Regulation], the Commission shall **assess the feasibility** of establishing a requirement on the minimum share of:

(a) aluminium and its alloys, magnesium and its alloys, recycled from post-consumer waste and incorporated into vehicle types; and

(b) neodymium, dysprosium, praseodymium, terbium, samarium or boron recycled from post-consumer waste and incorporated into permanent magnets in e-drive motors.

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Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles

Article 8 General obligations

- Manufacturers shall demonstrate that new vehicles that they have manufactured and that are placed on the market, are type-approved in accordance with the requirements of Regulation (EU) 2018/858 and of this Regulation.
- For the purposes of type-approval of vehicles to which the requirement in Article 9 applies, the manufacturer shall submit the **circularity strategy** to the type-approval authority together with the application for type-approval referred to in Article 23 of Regulation (EU) 2018/858.

Article 9 Circularity strategy

The circularity strategy shall describe which actions the manufacturers will take to follow-up on their obligations to ensure that the circularity requirements in Chapter II, which are verified in the type-approval procedures and which are applicable to the vehicle type concerned, are met.

Elements of the circularity strategy - A non-technical description of procedures implemented by the manufacturer to:

- collect the relevant data through the full supply chain;
- check and verify the information received from suppliers;
- react adequately where the data received from the suppliers indicate a risk of non-compliance with the requirements.

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Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles

Article 10 Declaration on recycled content present in vehicles

Manufacturers shall declare, for each vehicle type that is type-approved as of [OP: Please insert the date = the first day of the month following 36 months after the entry into force of the Regulation] under Regulation (EU) 2018/858, the respective share of recycled content of:

(a) neodymium, dysprosium, praseodymium, terbium, samarium, boron in permanent magnets in e-drive motors;

(b) aluminium and its alloys;

(c) magnesium and its alloys;

(d) steel.

The declaration shall concern the recycled content of these materials present in the vehicle type and indicate, per material share, whether the material is recycled from pre-consumer waste or from post-consumer waste.

Article 13 Circularity Vehicle Passport

From [… the first day of the month following 84 months after entry into force of the Regulation] **each vehicle placed on the market shall have a circularity vehicle passport**, which shall be aligned with and, where possible, integrated in other vehicle related environmental passports established under Union law.

The circularity vehicle passport shall be accessible free of charge.

The manufacturer placing the vehicle on the market shall ensure that the information in the circular vehicle passport is accurate, complete and up to date.

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Regulation establishing a mechanism for the adjustment of prices at borders taking into account CO2 emissions

The regulation entered into force in the **transitional phase** on October 1, 2023 (until December 31, 2025), with the first reporting period for importers ending on January 31, 2024 (for goods imported in Q4 2023).

Annex 1 and 2 – list of goods and emission sources

among others iron and steel (some groups are excluded from the requirement), aluminum

By 31 May each year, each authorized declarant shall submit to the competent authority a declaration (the "CBAM declaration") for the calendar year preceding the year in which the declaration is submitted.

The CBAM declaration contains the following elements:

- the total quantity of each type of goods imported in the calendar year preceding that in which the declaration is submitted, expressed in megawatt hours in the case of electricity and in tonnes in the case of other goods;
- the total embedded emissions, expressed in tonnes of carbon dioxide equivalent emissions per megawatt-hour of electricity or, for other goods, in tonnes of carbon dioxide equivalent emissions per tonne of each type of goods, calculated in accordance with Article 7;
- the total number of CBAM certificates - corresponding to the total amount of embedded emissions - to be submitted for cancellation after the reduction of the greenhouse gas emission fee paid in the country of origin in accordance with Art. 9 and the necessary adjustment to the extent to which EU ETS allowances are allocated free of charge in accordance with Art. 31.

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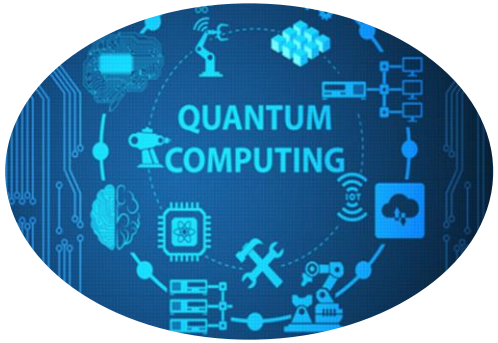
Technology trends

Transfer speed



Calculation speed

Speed of interpretation and response

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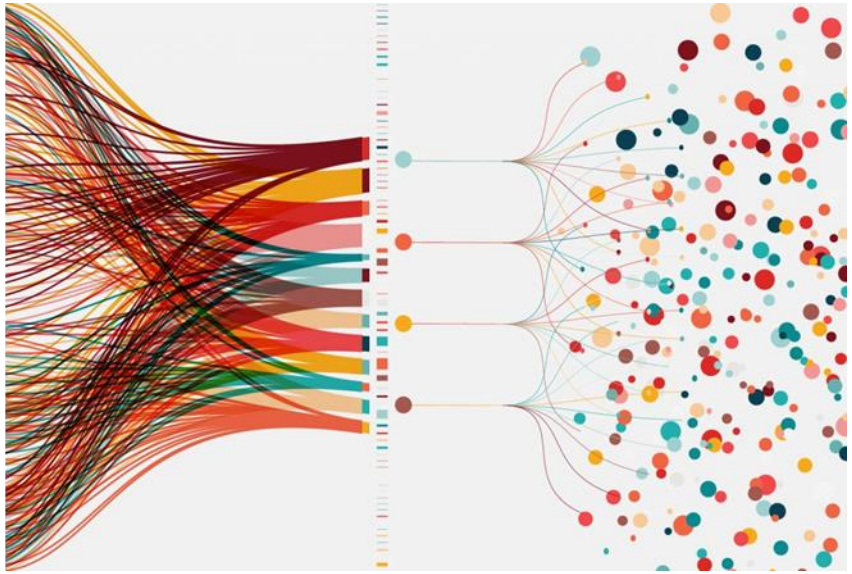
Technology trends – data overload



Lots of data
Data availability
Data quality

65% of companies claim that they have too much data, most of which they cannot use in analyses
33% of data analytics employees say they waste too much time preparing data for analysis
70% of the data collected is not used for analysis
44% of analysts' work time is unproductive and often involves updating spreadsheets

https://millimetric.ai/blog/10-stats-on-the-challenges-of-data-analysis-today/

RFID

AR/VR

PREDICTIVE MAINTENANCE

DEFECTS

Waste from a product or service failure to meet customer expectations

OVERPRODUCTION

Waste from making more product than customers demand

WAITING

Waste from time spent waiting for the next process step to occur

UNUSED TALENT

Wastes due to underutilization of people's talents, skills, and knowledge

TRANSPORTATION

Wasted time, resources, and costs when unnecessarily moving products and materials

INVENTORY

Wastes resulting from excess products and materials that aren't processed

MOTION

Wasted time and effort related to unnecessary movements by people

EXTRA-PROCESSING

Wastes related to more work or higher quality than is required

AUTOMATED LOGISTICS

KANBAN 4.0

DATA ANALITICS

MATERIAL FLOW

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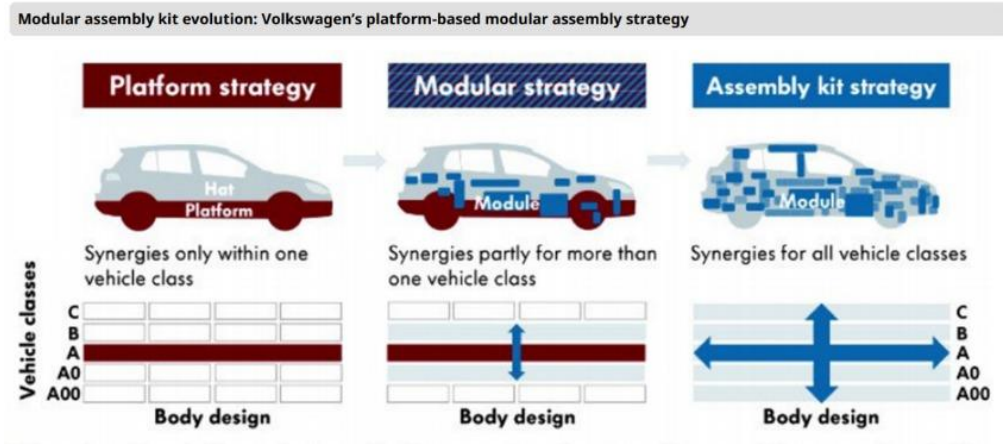
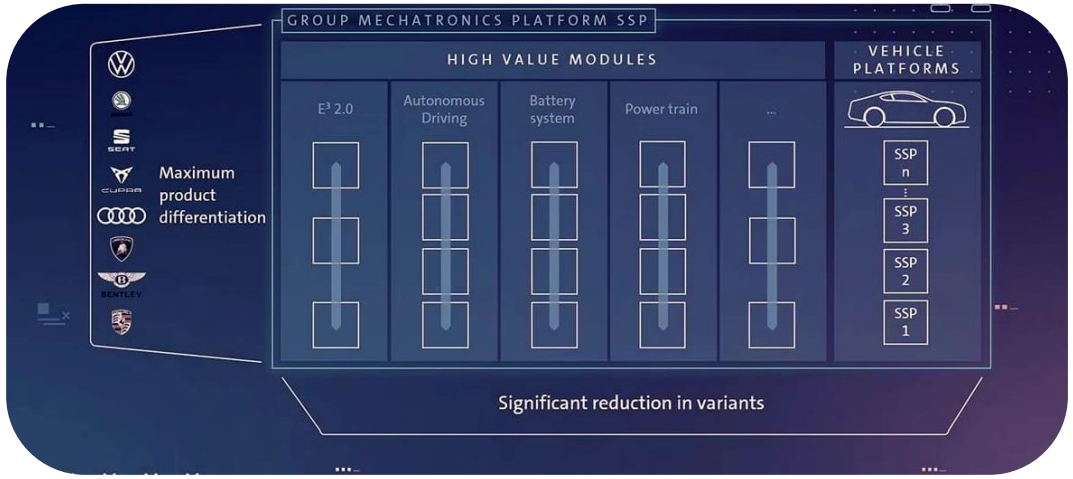
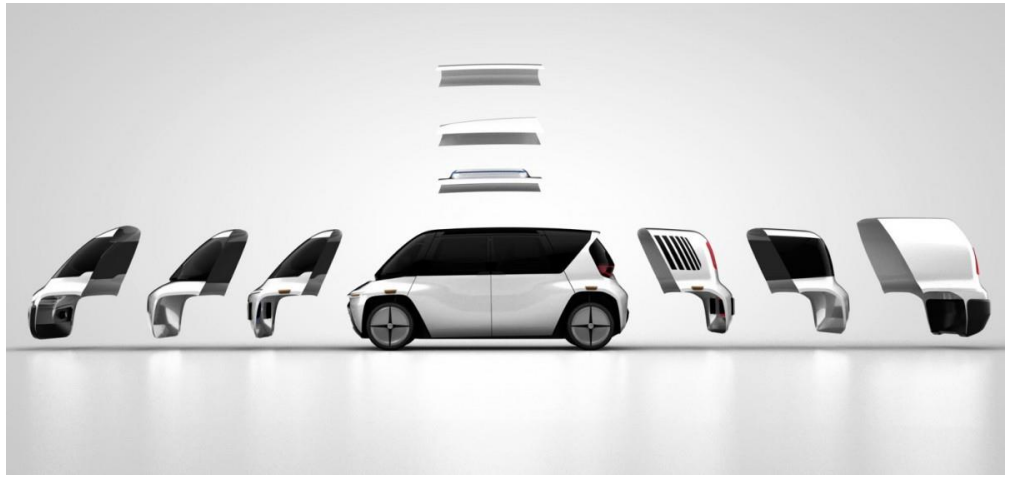
Technology trends

2026

Scalable Systems Platforms

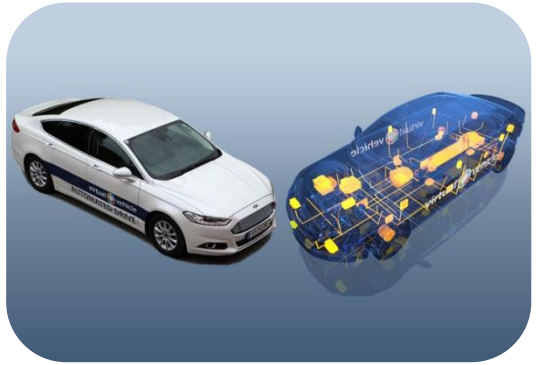




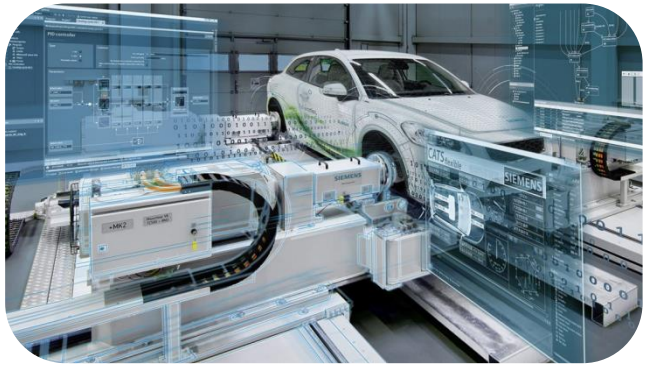


Technology trends

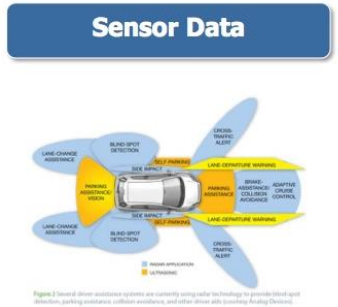
Digital twins of cars

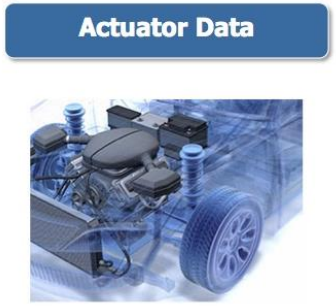


Digital twins of factories



Big data in the cloud





Overall insight in the car's life-cycle

Increased transparency in supply chains

Price pressure in the basic components segment

R&D closely related to vehicle feedback

Margins safeguarded thanks to the technological value proposition in the product (specialist) or thanks to process innovations based on the skillful use of data

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Technology trends

PERSONALISED ASSEMBLY

NO-FORM PRODUCTION

60 PIECES CAR PRODUCED IN 3 DAYS

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Technology trends

DSM

„EcoPaXX® is our bio-based, high-performance polyamide (PA410) that offers outstanding performance, while being made mainly from tropical castor beans.
EcoPaXX® belongs to the family of long-chain polyamides, which offer exceptional performance in the most demanding of environments. That includes excellent chemical resistance, low moisture absorption, combined with a very high melting point and high crystallization rate (typical for engineering plastics like PA66 and PA46).”

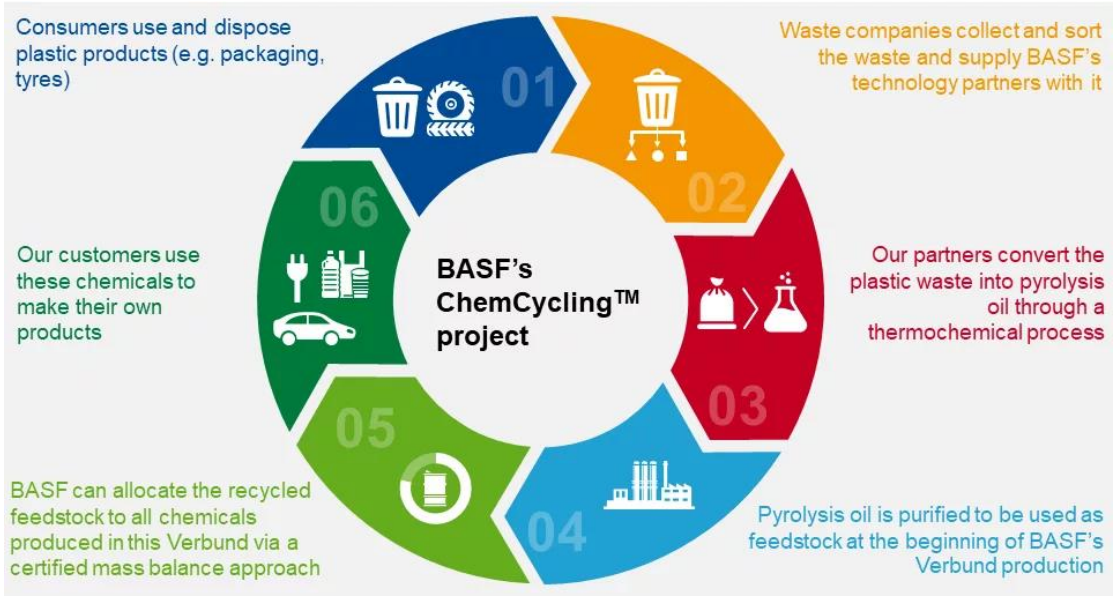
VW
50% bio-based

MERCEDES
70% bio-based

https://www.dsm.com/engineering-materials/

BASF

„We are fully committed to drive sustainable automotive innovations forward by partnering with players throughout the entire automotive value chain. Pilot projects as a pre-requisite towards commercialization of our offering are state of the art. Furthermore, BASF is an active member in various networks to develop and establish sustainable solutions and processes in the automotive industry.”



https://plastics-rubber.basf.com/southamerica/en/performance_polymers/industries/pp_automotive/transportation_sustainability.html

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New competencies

Digital skills - technological and social aspects, including understanding the context and the ability to translate human needs and goals into algorithms and commands (prompt engineering)

Data analytics skills - efficient use of artificial intelligence, efficient data analysis, critical mindset

Creative problem-solving skills - efficient combination of various techniques and multicultural cooperation

Social skills and competencies in the field of human-machine cooperation

Ability to cooperate in diverse work environments - remote work, work in multi-generation and multinational teams

Communication skills – a challenge for introverts, because more and more things need to be discussed in an increasingly shorter period of time

The ability to forget and learn from scratch - constant adaptation to a new reality

Predictive modeling tools:

- Sisense
- Oracle Crystal Ball
- IBM SPSS Predictive Analytics Enterprise
- SAS Advanced Analytics

Low-code and no-code tools:

- Amazon SageMaker
- Akkio
- Apple CreateML
- DataRobot
- Google AutoML
- Google Teachable Machine
- Microsoft Lobe
- Nanonets
- ObviouslyAI
- PyCaret

It is easier to change an algorithm than human behavior and habits

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Time for discussion

1. SMEs readiness to transform at the background of changes in automotive
2. SMEs engagement in sustainability and resilience improvement projects in your cluster
3. Specific actions undertaken in your cluster
4. Opportunities for cooperation in 2024

Thank you for your attention

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