SBD

September 2023 3000e-23

IAA Mobility Event Report

IAA Mobility 2023 - Munich

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- Shared Mobility
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- Anti-theft

Our role:

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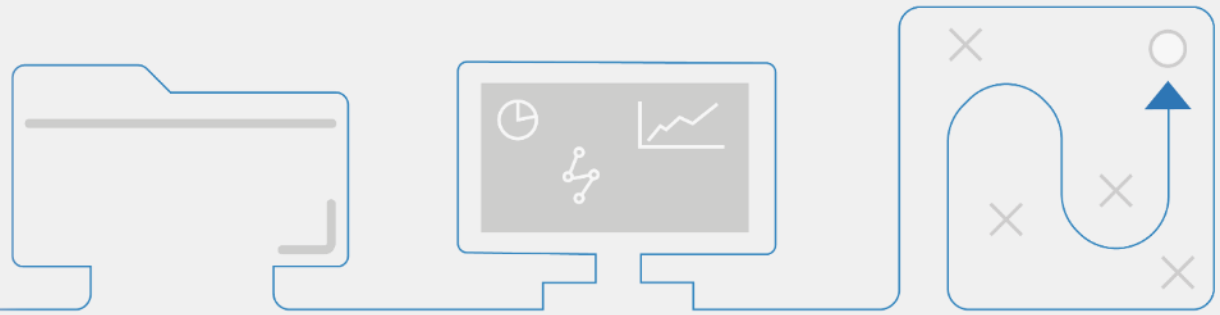

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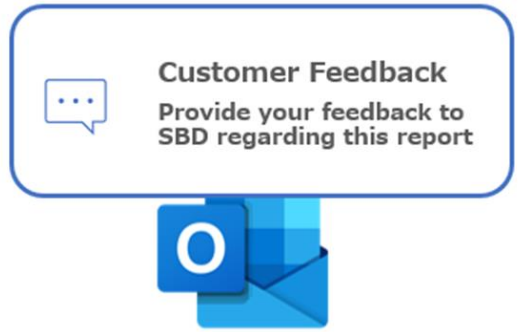

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Introduction

An introduction to the IAA Mobility Show

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What was IAA Mobility 2023?

The 2023 edition of IAA Mobility was held in Munch from 4 – 10 September. The aim of the event is to give businesses the opportunity to showcase their novel mobility solutions and for professionals working in the mobility sector to network. There was dedicated areas for startups to show their products or services.

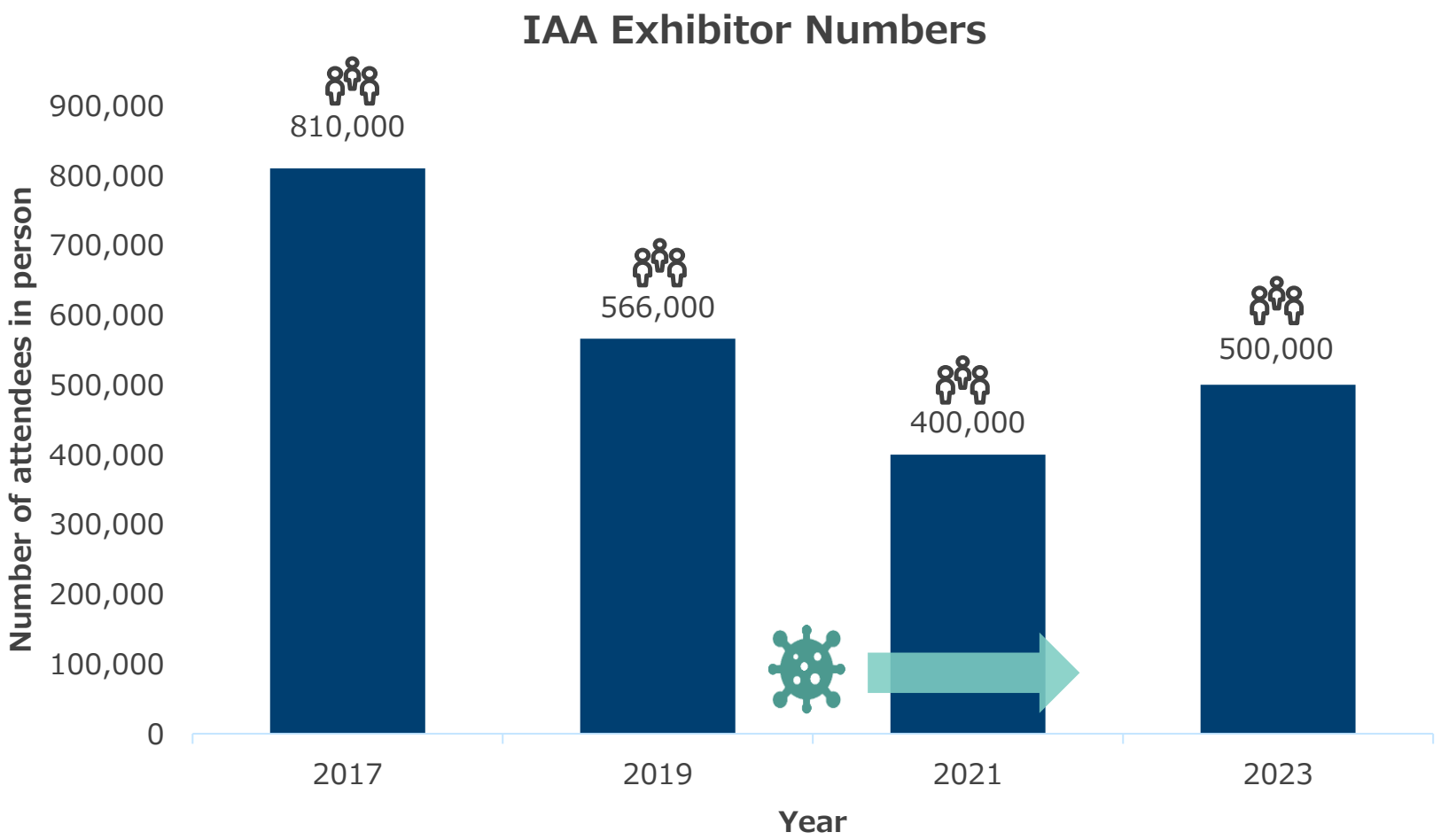
The mobility event is held every two years. The next edition will be in 2025. In 2023, the event was split between the Messe München conference center and Munich city center. Six halls of the conference center and 7 sperate locations in the center of Munich were used. The open space in Munich city center was consumer facing and free for the public.

IAA Mobility is attended by vehicle manufacturers, technology companies, component suppliers and service providers.

Mobility and personal mobility is an area of interest for Governments and OEMs. Governments are encouraging personal mobility and micro mobility solutions to decarbonize journeys and reduce the impact on climate. For automobile manufacturers, mobility is an area of interest because vehicles are becoming more automated and vehicle ownership is less common.

This report provides a summary of the main trends from IAA Mobility 2023. This includes OEM trends, latest research announcements, novel products, and significant announcements.

Visitor numbers are returning to pre-COVID levels



OEM attendance	
2017	24
2019	20
2021	16
2023	18 (41% from Asia)

Exhibitor attendance	
2017	1000
2019	800
2021	744
2023	750

At IAA 2023, exhibitors focused on sustainability

2017 (Frankfurt)

Advanced Driver Assistance

2019 (Frankfurt)

Electric Vehicles

2021 (Munich)

New Energy Vehicles

Volkswagen Group

Circular economies and sustainable manufacturing methods were on show at IAA Mobility 2023. Chinese OEMs and suppliers dominated the show, but underlying the event was a push by OEMs and Tier 1s to decarbonize their supply chain and use materials more responsibly. This includes material recycling and not using fresh water.

2023

Sustainable Manufacturing

Keynotes

An overview of Continental and Deep Route AI keynote

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Continental are investing in artificial intelligence

Keynote Summary

- Philipp von Hirschheydt, Continental Executive Board Member and Head of Automotive announced a new partnership between Google Cloud and Continental AG.
- Continental will offer Generative Artificial Intelligence integrated into their products. The AI model will have access to vehicle information, allowing it to inform the user about a wide range of vehicle parameters. This could be the correct tire pressures or where nearest charging point is.
- The Conti Cityplus concept tire, optimised for inner city driving was presented in the keynote. The tire is more efficient, to extend range the range of electric vehicles (EVs) and has a low rolling noise level. Continental also detailed a path to using renewable materials for their tire manufacturing operations.
- High performance computers (HPC) and software visualization were also outlined. By the end of 2024, Continental HPCs will be available on 30 vehicle models across different manufacturers. Their software visualization process allows hardware to be tested virtually, reducing total development time from 3-5 years to 18 months. With this, vehicles will have more up to date hardware and software.
- Though not outlined in the keynote, Continental have reduced their range of HPC models from 4 to 3. This is to reflect how the organizational structures of OEMs is being adapted.

Key takeaway

There is a potential application of Generative AI on board. Continental and Google demonstrated their system capabilities on a vehicle based on the VW ID Buzz. The user could say ‘Hello Buzz’ to initiate the companion. Commands like ‘find the nearest charge point’ could. Continental and Google expect to make this available on vehicles in 2024.

Continental Press conference

Partnership between Google Cloud and Continental

Deep Route AI are moving away from maps

Keynote Summary

- DeepRoute AI announced that they are expanding to Europe. DeepRoute AI provide vision based automated driving systems. The system uses Lidar, cameras and radar for the purposes of automated driving. They are already partnered with Volkswagen, Geely and NVIDIA and Robosense provide lidar sensors.
- At IAA Mobility 2023, DeepRoute AI announced that they will be moving to Europe, setting up a hub in Germany.
- Deep route AI also debuted their Driver 3.0 solution. Through continued development, DeepRoute AI have reduced the cost of materials of their autonomous system from USD 35,000 per vehicle (Driver 1.0) to USD 1000 – 2000 per vehicle (Driver 3.0). Driver 3.0 is a L2+ to L4 system that requires standard definition maps only. There is claimed to be no ODD restrictions.

Progression of DeepRoute AI products

Key Takeaway

- The system does not require HD maps. DeepRoute AI expect HD maps to be expensive and hard to maintain. DeepRoute AI is expecting there to be discussions about potential regulatory requirements for HD maps. This would be to protect privacy of certain infrastructure.
- Xpeng have moved away from HD maps in favor of a vision-based system because creating an HD maps takes time and money. Ideally the map would be updated frequently, every 1-2 weeks, but in reality, it may not be that much.
- Currently, HD maps mainly cover highways. For vehicles used by commuters in urban areas, not having map coverage may mean autonomous functionality isn't available. DeepRoute Ai hope to address this by using a vision-based system.

DeepRoute AI partners

Key Trends

The key trends from IAA Mobility 2023

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IAA Mobility 2023 - Top Trends

IAA MOBILITY

2023 Trends

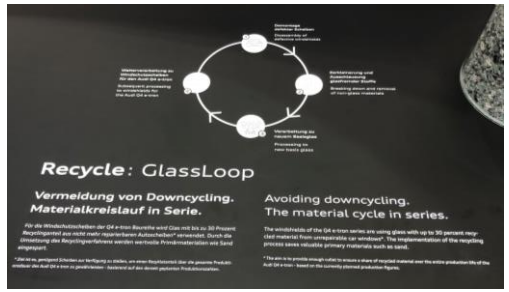
Core trends

Supporting trends

Announcements and Keynotes

Sustainable manufacturing processes

OEMs are making their supply chains more sustainable



Audi Circular Economy Loop

Volkswagen Manufacturing Facility

...suppliers are doing the same

ZF motor without magnets

- At IAA Mobility 2023, Volkswagen Group provided details on their e-fuel production facility in Chile. The plant recycles carbon dioxide from the atmosphere and combines it with water to create e-fuel. The plant uses wind energy and is a proof of concept. In 2027, Volkswagen Group intend to open another plant in the same location.
- In the Open Spaces area of the IAA Mobility event, Audi detailed its efforts to create a more sustainable vehicle lifecycle. Their focus is on recycling end-of-life vehicles as feedstock for new models. This includes battery and glass recycling to create a continuous loop of materials. They do not use fresh water in production.
- SBD noted multiple benefits to these efforts: 1. Reduced consumption of virgin material, and 2. reduced energy costs and less exposure to fluctuating prices. This is particularly important for EU based manufacturers that import a large amount of energy. Manufacturers will likely choose countries where the prevailing atmospheric conditions are favourable for renewable energy.

- At IAA, there was a trend of suppliers looking make their products more sustainable. Ascorium Industries offer a spray on material for dashboards. The product is currently used by Porsche and Polestar. The process is carried out by robots, so OEMs bring the dashboard finishing process in house. The main advantages are minimal waste and reduced human interaction.
- SBD noted that suppliers of Tier 1 companies are asked where raw materials for components are sourced, how they are processed and if company car fleets are EVs or ICEs. Going forward, Tier 1 suppliers will likely ask for further evidence, and in the long term, ask how sustainability is being improved.
- Examples of sustainability improvements outlined at IAA include electric robots instead of pneumatic, energy recuperation from robot movements and capturing waste heat. Manufacturers that do not have experience of reducing energy consumption will be at a disadvantage in future.

ascorium INDUSTRIES

PORSCHE

MARSILLI

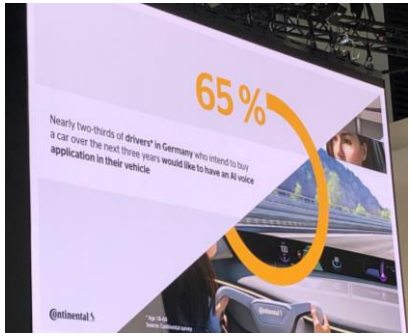
Generative Artificial Intelligence

Generative AI can be used to streamline organization information flow

Cognizant Mobility Very Enhanced Road Assistant

- Reply are using Amazon Web Services to run their Generative Artificial Intelligence (AI) service. Audi is using the Reply AI service to streamline data sharing. Colleagues at Audi can ask the AI model a question and receive an answer.
- The AI model has access to corporate files and documents and uses these to create answers to questions. Currently, the model uses internal documents, but potentially could be expanded to include external websites and online meeting transcripts.
- The aim of deploying AI is to smooth out data sharing processes within the organisation. Colleagues can ask the model a question and receive an answer. On a wider scale, Audi could use this to identify common questions with a view of reforming areas of the organisation to improve information flow.

It also has the potential to enhance user experience



Continental AI survey result

- Continental have partnered with Google Cloud services to offer an in-vehicle Generative AI companion. This was a new announcement at IAA Mobility 2023.
- The Generative AI model can provide restaurant recommendations, find local charging points and plan routes. At this stage, the companion is unable to carry out vehicle commands, like adjusting temperature or operating electric windows.
- Continental is expecting the model to be introduced to production models by 2025. The AI model listens to the driver, converts speech into a command and then interrogates an API. The API has information like charge point locations and restaurant locations. The API can be a third party. The AI model demonstrated at IAA is cloud based.

800-volt architecture

Next generation vehicles will be built on 800-volt architecture

Mahle 800-volt components

BMW Vision Neue Klasse

- Production versions of the vehicles exhibited by BMW and Mercedes-Benz will be based on platforms that support 800-volt architecture.
- The BMW Neue Klasse will use an 800-volt sixth-generation drivetrain with lithium iron phosphate (LFP) and lithium nickel manganese cobalt oxide (NMC) batteries.
- The Mercedes-Benz MMA-Platform (Mercedes Modular Architecture) uses 800-volt architecture. The production version of the CLA concept car, as shown at IAA Mobility 2023, will be based on MMA 800-volt platform.
- Audi exhibited the Q6 e-tron, which will also be based on an 800-volt platform (premium platform electric).

Components are already available to support roll out

Audi Active Sphere (800 volt)

ZF motor without magnets

- ZF exhibited an 800-volt electric motor with novel windings (without magnets). The motor was displayed alongside the EvBeat concept car. The concept car is based on a Porsche Taycan.
- Mahle exhibited 800-volt compatible products and indicated a potential trend of increasing voltages. Mahle, in partnership with Siemens, also exhibited a wireless charging solution.
- SBD expects 800-volt systems to be deployed more widely in the near future. Higher voltage systems allow a lower current to be used, which reduces overheating and allows better power retention. Retained power can be used towards a longer driving range.

Dimmable Glass

Renault offer dimmable glass on Scenic E-Tech Electric

Renault Scenic E-Tech dimmable glass

- Renault debuted the new Scenic E-Tech Electric at IAA Mobility 2023. The vehicle is available with a dimmable glass panoramic roof. The front and rear sections of the roof can be adjusted independently. The glass can be adjusted with voice commands.
- Manufacturers may be looking to balance the need for headroom in the cabin with a body that is aerodynamic. Dimmable glass removes the need for a fabric blind and rolling mechanism, which saves space. This increased headroom enables a sleek body profile to still be achieved.
- SBD expects dimmable glass to receive more interest from OEMs. Plain panoramic roofs with fabric blinds are not as flexible and cannot be customized by the user. Dimmable glass could also support the wider trend of the habitat on wheels.

Suppliers also exhibited dimmable glass

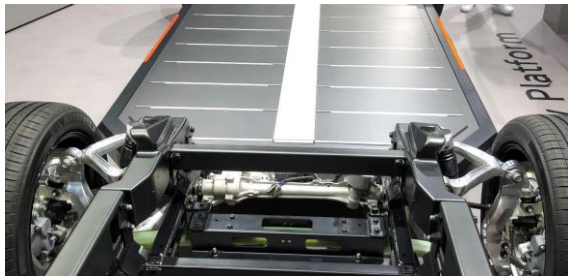
Webasto sunroof

Gentex dimmable HUD glass

- Webasto demonstrated dimmable glass at IAA 2023. The transparency of the glass can be adjusted, and OEM logos can be incorporated. Webasto are discussing with OEMs the possibility to include logos in the glass and the opportunity allow the user to change the color of the backlighting.
- Gentex Corporation demonstrated a range of dimmable glass products. The products included dimmable sun visors, windscreen and panoramic roof. A separate pain of glass in the interior to cast head up display information on was also shown.
- SBD expects the rollout of dimmable glass for windscreens and sun visors to be slow. Approval regulations related to the visibility of windscreens may need to be amended first. Also, in some regions, sun visors must be made of an absorbing material. Based on this, SBD expects dimmable glass technology to be limited to panoramic roofs.

Battery Management and Protection

A range of battery protection products were shown



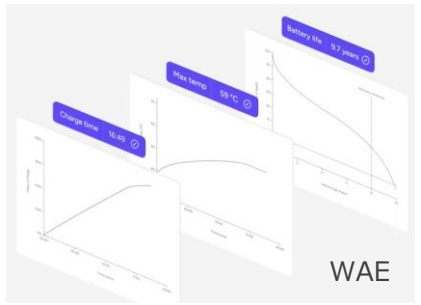
Battery casing and chassis

Battery cell pressure sensor

- Novel battery casings and safety structures were exhibited at IAA 2023. Innovation in the shape complexity of battery casings as well as improvements in crash protection were the most common.
- Suppliers are looking to provide more complex shapes for battery casings to make better use of available space. Magna exhibited a novel composite battery case that could be shaped to fit around other components.
- Magna demonstrated the capabilities of a new manufacturing process that can give deep sections, with near perpendicular angles. The objective is to offer a battery case that is deep and does not need to be welded. The aim is to prevent water ingress.

Companies specialising in battery management also exhibited

Example of battery casing



WAE battery health software

- As well as casing and battery support structures, other methods of battery protection were exhibited.
- Innovation Lab demonstrated pressure measurement components that can detect high pressure inside a battery. This information can be then used to adjust charging strategies. Changes to charging strategy can lead to improvements in battery life. Improvements can be as much as 40%.
- WAE demonstrated a battery health monitor for fleet managers and OEMs. The software uses inputs like acceleration, driver behavior and temperature to determine battery health.

Screen evolution

Screens took all shapes and sizes

Samsung OLED Capacity

Mini Aceman concept

- A range of display sizes and types were shown at IAA Mobility 2023. These ranged from augmented reality HUDs to holographic projections.
- ZEISS presented a holographic product that can show information on passenger windows. The technology is expected to be used in aircraft but was previously used in space missions. Holographic technology in a vehicle can make being a passenger more interactive.
- The BMW Neue Klasse uses a 3D head up display that projects information at ideal points on the windscreen. With the Neue Klasse concept, BMW is highlighting new solutions for innovative screen and display technologies.

Screens appeared on the interior and exterior

Samsung exterior screen

Valeo exterior lighting

- Samsung and Valeo exhibited exterior screens for vehicles at IAA Mobility 2023. The exterior screens could potentially show battery charge information or indicate the direction of passing emergency vehicles to pedestrians.
- The new Mini Cooper and Countryman will be available with a single central screen. The screen will show speed and other important information to the driver. A HUD is also available.
- Samsung exhibited rollable, extendable and folding screens. This technology can be used by OEMs to create an interior that can be customized to suit the needs of the user.

Driver Monitoring

Driver facing cameras were exhibited

Magna driver monitoring

- The Fraunhofer Institute showcased cameras which can detect heartrate through reflections in the skin. Detecting heartrate can be used to determine drowsiness.
- The technology can also be used to determine stress levels. This can then be used to change temperature controls or adjust ambient lighting to alleviate stress.
- Magna demonstrated the capabilities of a rear-view mirror system. Rear view camera system is less likely to be obstructed and can be used to detect passengers in rear seats.

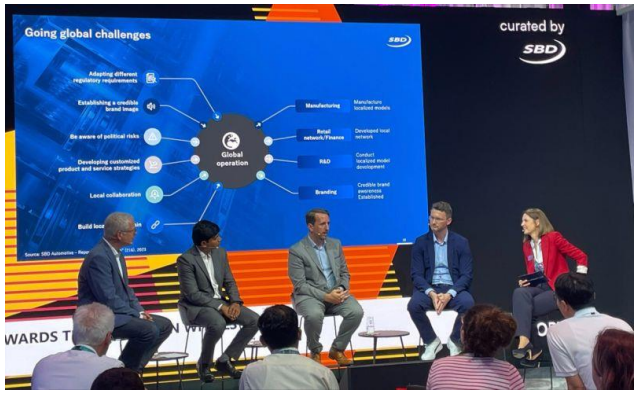
They were applied to a diverse range of applications

Mercedes-Benz E-Class driver facing camera

- With the introduction of the General Safety Regulation in Europe, manufacturers are required to fit driver distraction monitors. OEMs demonstrated their intention to try to recover the costs of fitting the sensors required to comply with the Regulation.
- A range of approaches to driver facing cameras were on display at IAA 2023. Approaches to driver monitoring are likely based on vehicle architecture. On the new Mercedes-Benz E-class, shown at IAA, the driver facing camera is mounted on the dashboard and can be used for video conferencing.

Habitat on Wheels

The habitat on wheels was discussed at IAA 2023



SBD Automotive at IAA Mobility 2023

- SBD Automotive and digital.auto (Bosch) had a panel discussion about what future vehicles will mean to the user
- The habitat on wheels had many meanings to the panel of experts. Soon, the vehicle could be like the home, and home is always changing. For example, for the digital.auto (Bosch) speaker, based in Bangalore, can spend 3.5 hours in the car each day commuting to work. Whereas people in China like to take a comfort break in their car. It is important for OEMs to ask a local question and seek a local view.

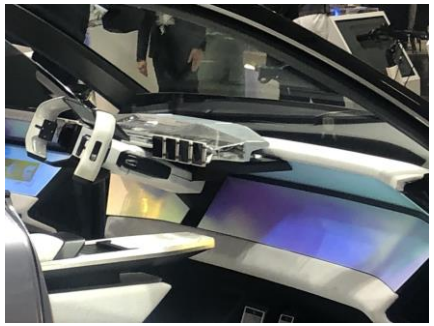
OEMs and suppliers are ready to realize the benefits

Forvia Lumiere concept

- Forvia exhibited a vision for the habitat on wheels. The Forvia "Lumières" cockpit shown at IAA 2023 is designed to demonstrate how a vehicle can be used for different purposes. The concept demonstrates how ambient lighting can be used in the cockpit.
- LG electronics also expect future cockpits to be used for different purposes, like watching films or as an office. As discussed in CEO keynote, LG will be developing products to support this transformation.

Minimalist interiors

A range of concept interiors were exhibited



Renault concept interior

Avatr 12 interior

Minimalist design was a common trend

Audi activesphere

Mercedes-Benz CLA concept

- Mercedes-Benz Vision One Eleven concept and Mercedes-Benz CLA concept use versions of a pillar-to-pillar display and limited physical controls. Steering wheel controls are still used, however.
- Opel experimental concept follows a similar trend of using a pillar-to-pillar screen combined with a head up display.
- There is limited use of screens and physical controls in the interior of the Audi activesphere Concept.

- The update to the Tesla Model 3 does not have physical stalks on the steering column and is equipped with a fast-responding touchscreen in the rear. The lack of physical stalk could be a potential negative to the user interface.
- Minimalist interiors could be a longer-term trend for vehicle cockpits, but advancements in other areas may be required for it to be realizes. Reducing the number of buttons will be dependent on other forms of interface like voice recognition technology and generative AI companions.
- The BMW Neue Klasse concept is fitted with a full width head up display. The Neue Klasse demonstrates minimalist interiors with its innovative display technologies.

Announcements and CEO Keynotes

Highlights of OEM announcements and CEO keynotes

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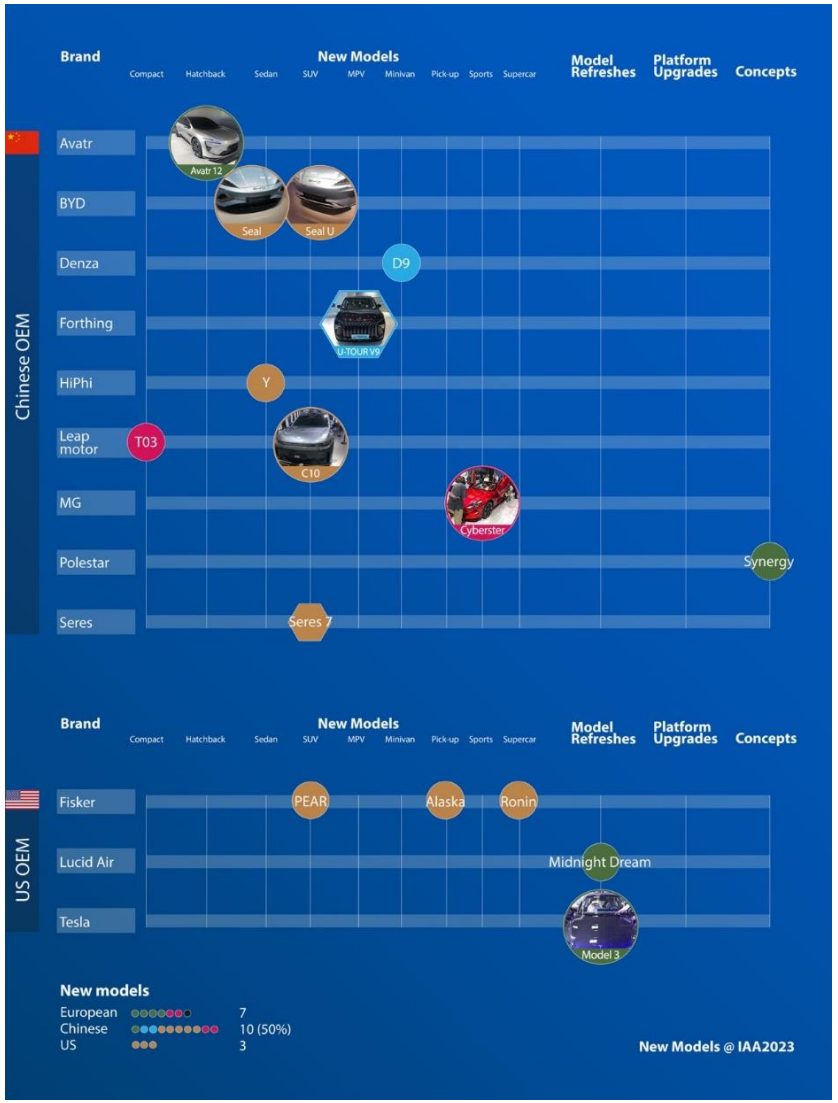
IAA Mobility 2023 model launches



IAA Mobility 2023 – CEO messages

Renault

Luca de Meo (CEO of Renault Group)

Renault are pushing for EV price reductions but do not want a price war. A re-commitment towards initial Public Offering of Renault EV brand, Ampere. Luca de Meo also acknowledged that Chinese OEMs have a more advanced supply chain than European OEMs.

Qualcomm

Cristiano Amon (CEO)

Qualcomm are expecting automobiles to continue to become safer and more automated. They expect future vehicles to become a software defined living space. To support this, Qualcomm are developing a scalable digital chassis capable of supporting OEM and 3rd party apps and services.

BMW

Oliver Zipse (CEO)

Expect to remain profitable with EVs when they launch Neue Klasse. EU rapid transition away from ICEs is 'reckless'. EV charging deployment not mature enough for EV mandate. 2035 EU Sales Ban on ICE Cars Will Fuel Price War With Chinese OEMs. Move away from FaaS premium subscriptions due to low demand

Mercedes-Benz

Ola Källenius (CEO)

Mercedes-Benz are expecting the variable costs of EVs to remain higher than ICEs and that sales in Europe are unlikely to be all-electric by 2030. Olla Kallenius acknowledged the pressure on OEMs to get more driving range using less energy.

Volkswagen Group

Oliver Blume (Chairman)

Volkswagen do not expect price parity of EVs to be reached until end of the decade. Despite this, they feel ready for the 2035 combustion ban in Europe. The Volkswagen Group sees itself as well positioned over Chinese OEMs and is bullish on Chinese economy.

BYD

Michael Shu (Managing Director, Europe)

BYD discussed intentions to grow market share of passenger cars in Europe. BYD's efforts to achieve more sustainable manufacturing were highlighted. Batteries as home energy solutions were also mentioned. BYD vehicles are now available in 15 European countries.

Next Steps

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Expert Insight

Tracking sustainability initiatives is important

Underlying OEMs' activities at IAA Mobility 2023 was a push for more sustainable operations. This was both macro level decisions, like the location of production facilities, to small scale energy saving techniques that can be used day-to-day. OEMs that have existing experience of reducing energy consumption will be better placed when life cycle sustainability becomes more important.

Mike Levet, Report Author

IAA is regaining momentum

The IAA halls were busy, and the open space was welcoming to specialists and the broader public. For families, it was a fantastic opportunity to visit booths and see new vehicles and developments. In future, I expect more OEMs will attend, to show concepts, and production versions of the concepts exhibited this year.

Zafer Uyanik, SBD Germany

Electrification development is relentless

The industry's continuous R&D efforts into electrification are broad and aimed at leveling up the entire EV package. Innovations are coming in the form of increasing powertrain voltages to enable super fast charging and enhanced battery architecture and management techniques. Super fast charging in particular will ease the transition from ICE to EV, yet charging infrastructure will need to keep pace.

Rob Fisher, Domain Principal - Electrification

Watching Generative AI closely

We all expected to see a rapid roll out of conceptual AI driven applications, but I've been surprised that OEMs are already using Generative AI for real applications. I'm looking forward to watching this space carefully in our 2024 AI for Automotive Guide.

Simon Halford, Analytical Reports Manager

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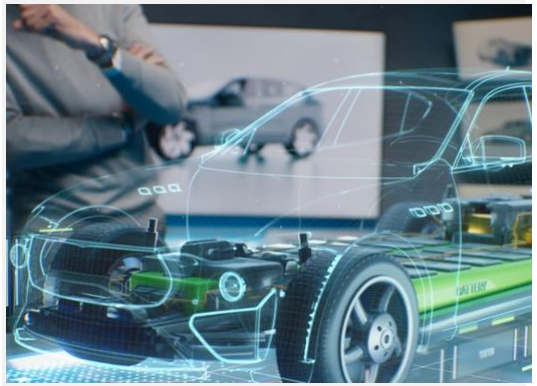
SBD Automotive's Digital Cockpit & Infotainment Forecast provides an outlook on the penetration of cockpit elements and key cockpit features, showing their fitment rate by market ten years into the future.

Learn more



EV Battery Technologies & Ecosystem

SBD's new battery report dives deep into the technologies, chemistries, and players in the battery industry.

Learn more

AI for Automotive Guide

Identifying which players are driving innovation and how OEMs will need to adapt is key for s/w functions, corporate strategy, marketing and partnership identification divisions.

Coming in 2024

Contact SBD Automotive

Do you have any questions?

If you have any questions or feedback about this research report or SBD Automotive's consulting services, you can email us at info@sbdautomotive.com or discuss with your local account manager below.

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