

MARKET REPORT

Digitization of the Automobile Industry

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Introduction

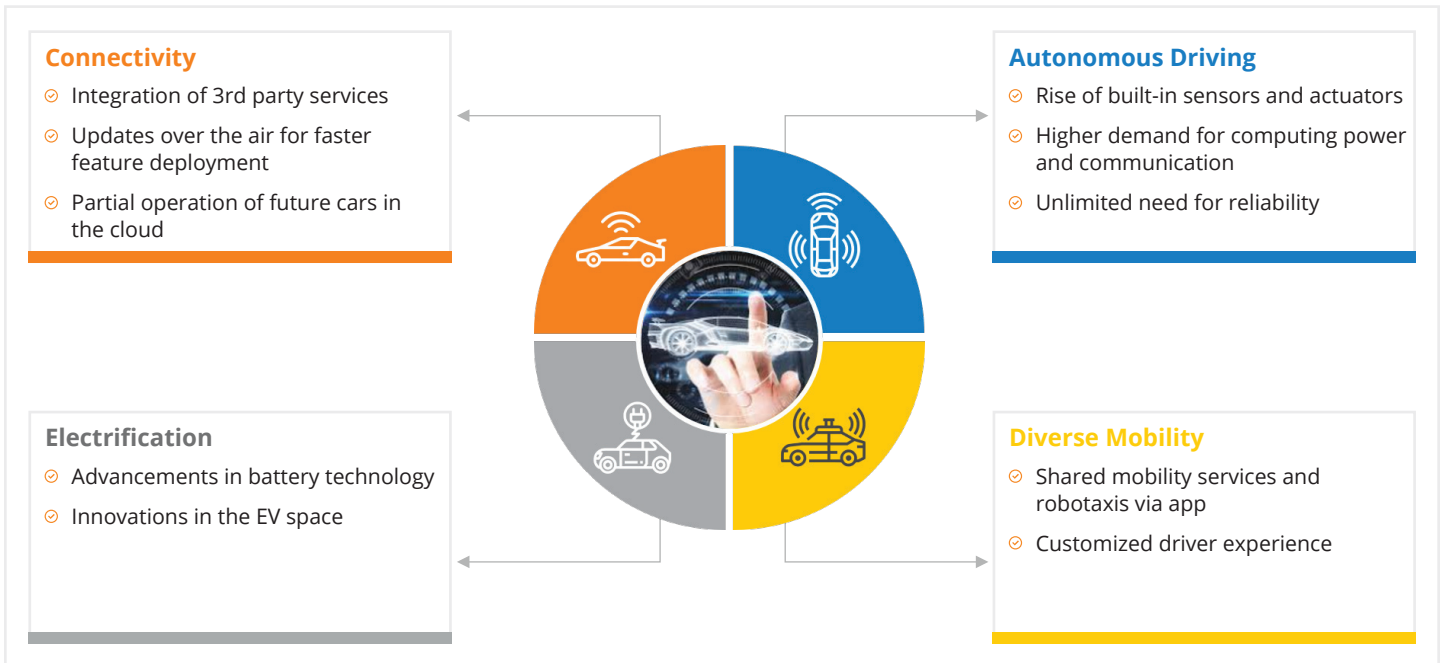
The automobile is being reinvented.

The vehicle of the future is electric, autonomous, and connected. And it's being shaped by parallel developments in the automobile and technology industries, through innovations and collaborations, both in terms of technology and business model.

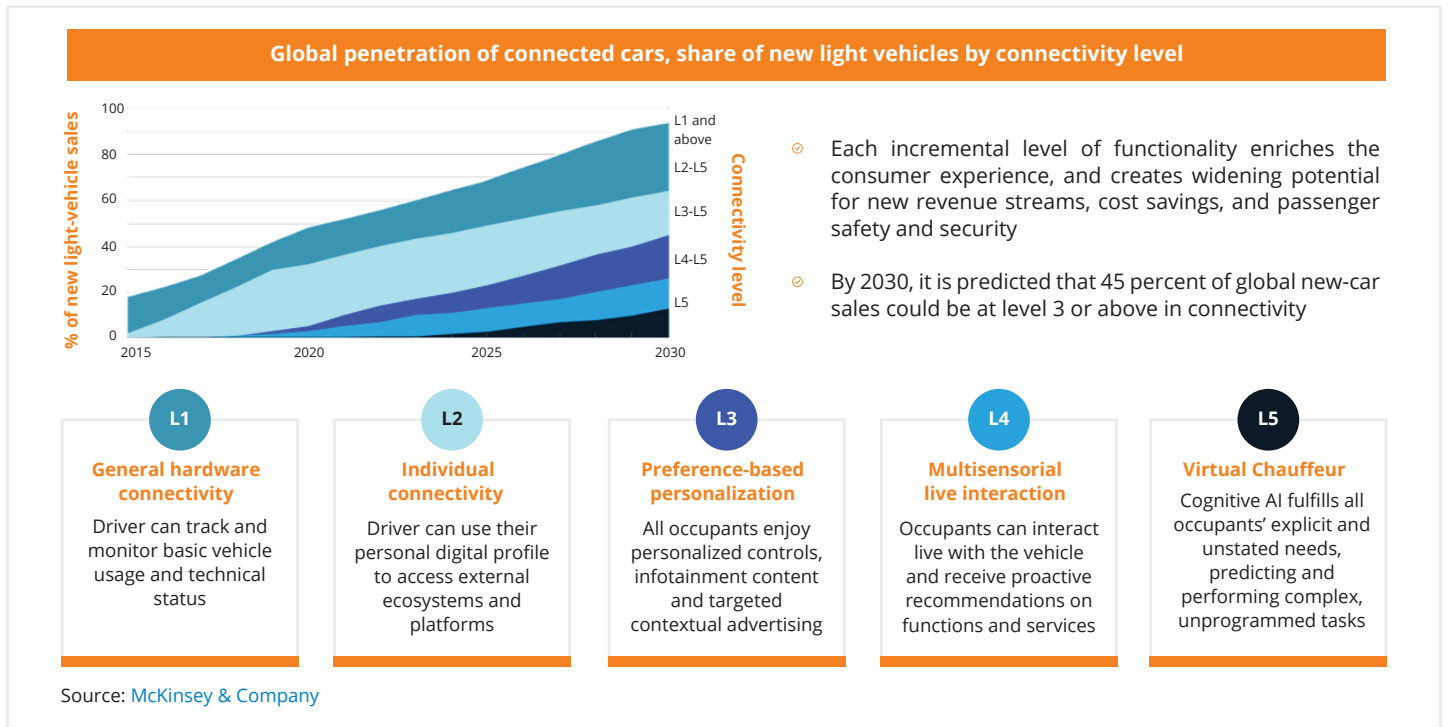
The growth of new technologies such as artificial intelligence, cloud computing and the Internet-of-Things, along with the emergence of a digitally demanding consumer, are fast moving the automobile industry towards next-generation digital transformation. Additionally, economic considerations are also driving forward the shared mobility space as companies look to reduce the costs of buying and maintaining a car through innovative licensing and other models.

In effect, the entire industry is gradually evolving into a new ecosystem in which automobile industry players collaborate with players in the technology and telecom sectors, as well as government agencies, to shape the new automobile reality. In some cases, it is a fight for share between players from both automobile and technology industries. In other spaces, such as building a connected transportation ecosystem, partnerships are the way ahead. Altogether, these developments are fast changing the automobile industry and making digital the next normal.

New technologies are driving the digitization of the automobile industry in diverse ways

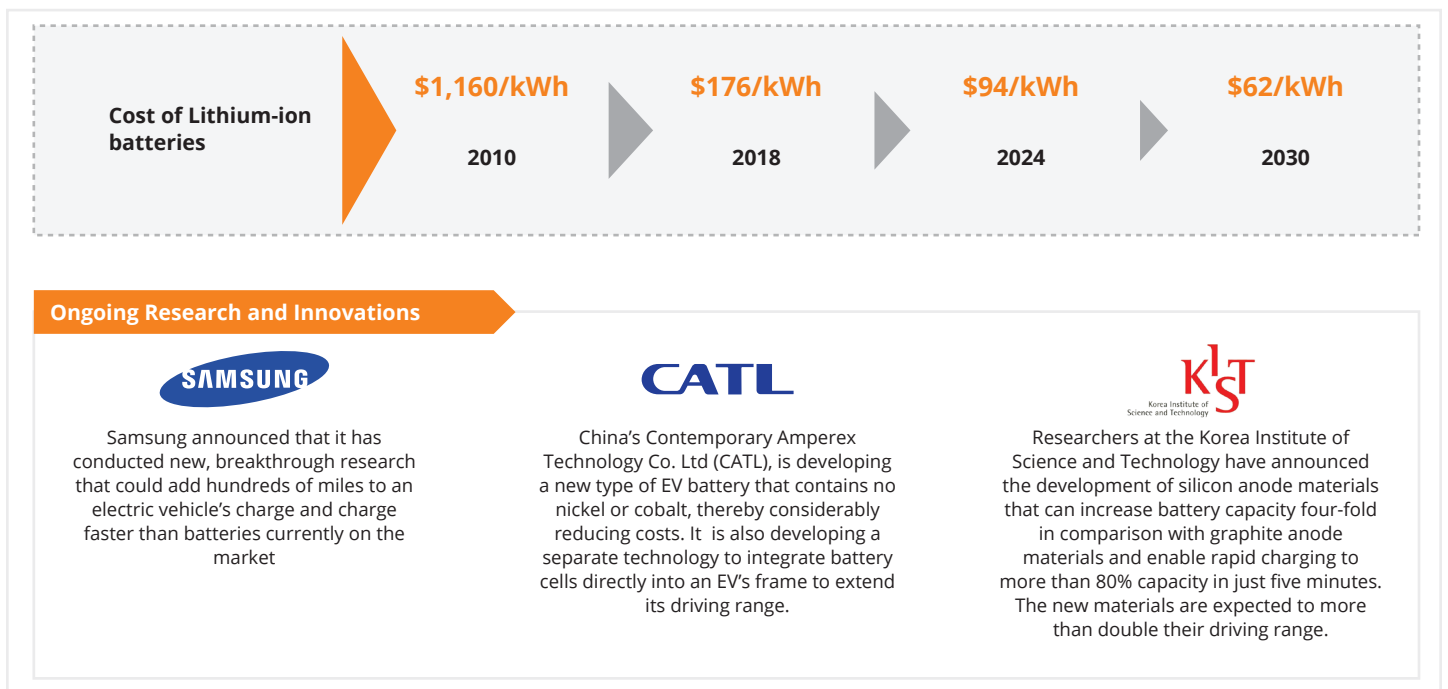


Sales of connected cars are gaining momentum as the industry moves from providing basic connectivity to building preference-based personalization in cars

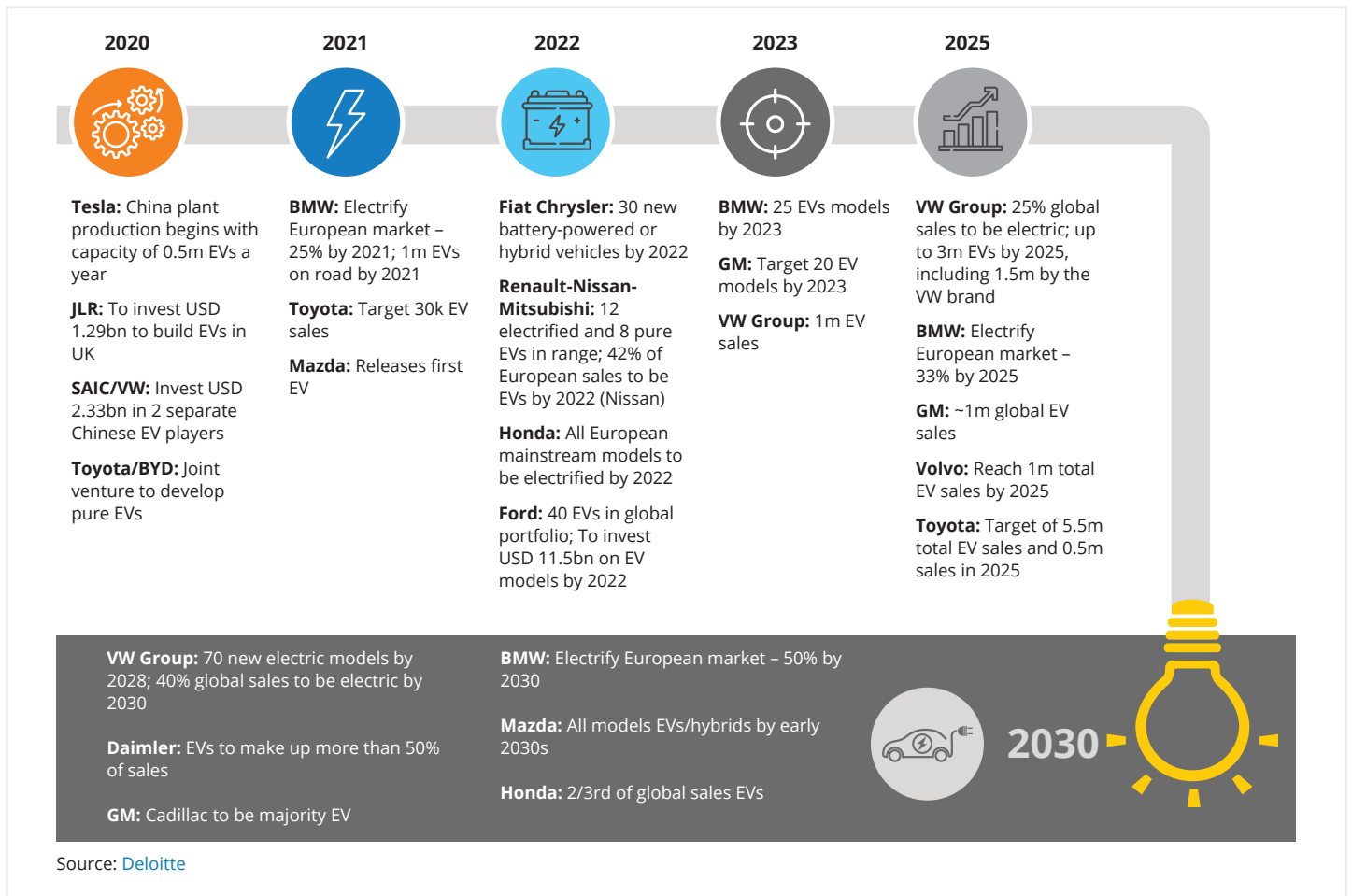


This rising demand for connected cars has led to efficient electrification of vehicles by technology companies through development in battery technology

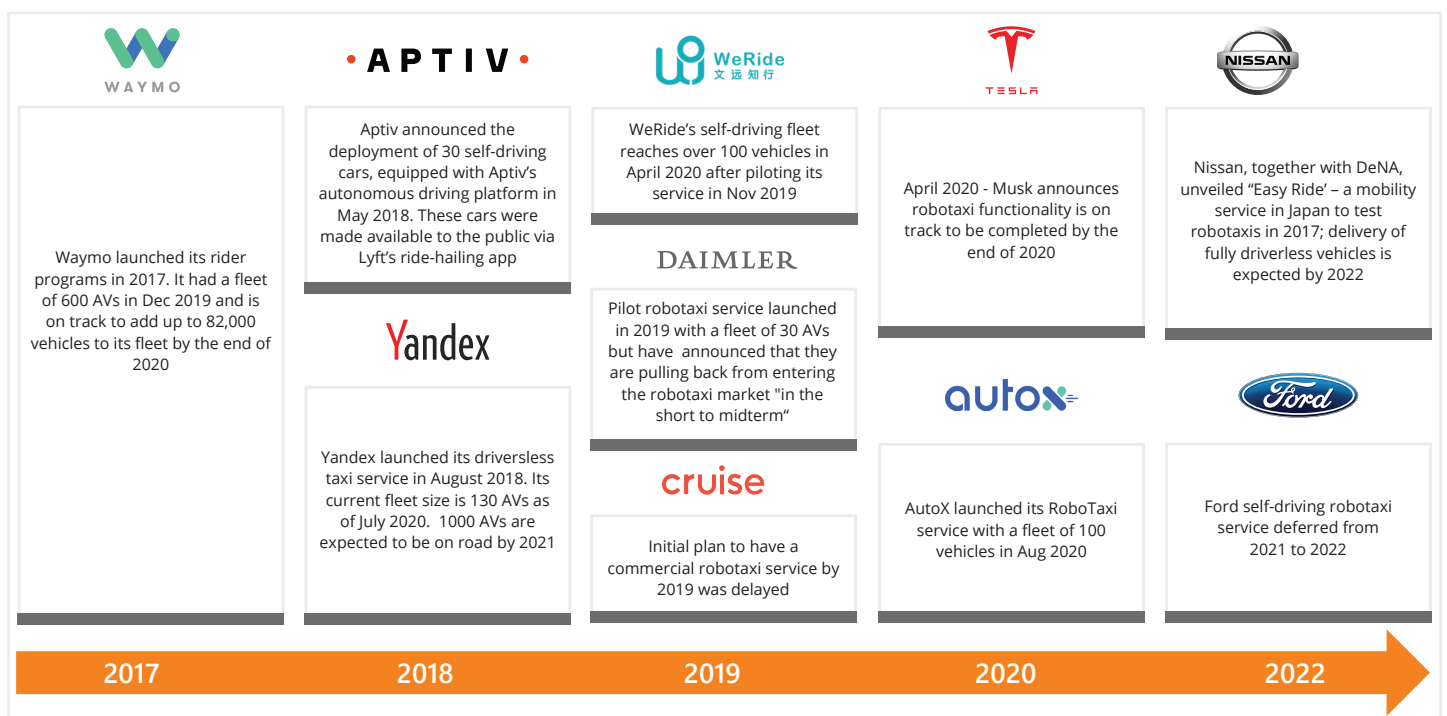
Improvements in battery technology: Manufacturers have made substantial advances in the chemistry of their batteries. One such advance is a move away from cathode batteries that are dependent on cobalt, toward nickel-based systems. At around USD 33K to the metric ton, cobalt is the most expensive element in a lithium-ion battery. In contrast, nickel-based cathodes benefit from a higher energy density, longer life cycle, and a lower cost than cobalt-based cells.



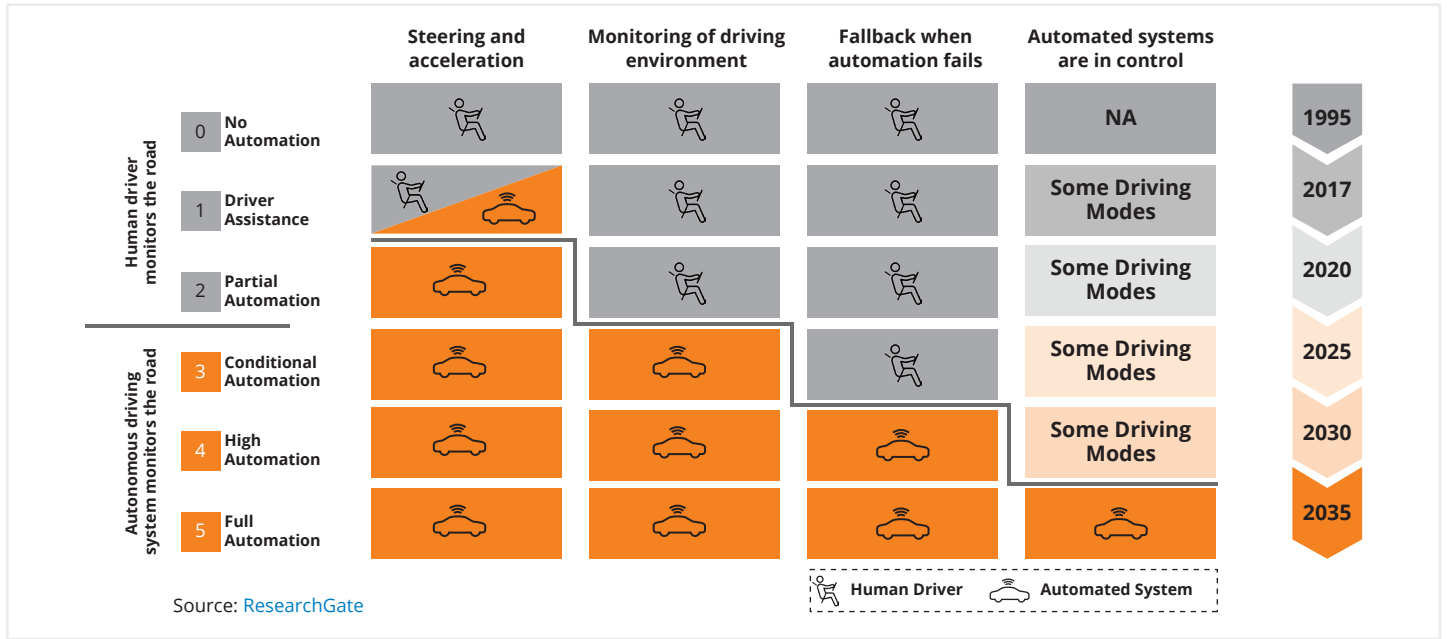
The current popularity of Electric Vehicles (EVs) have led to some prominent OEMs announcing strategic commitments for the next few years



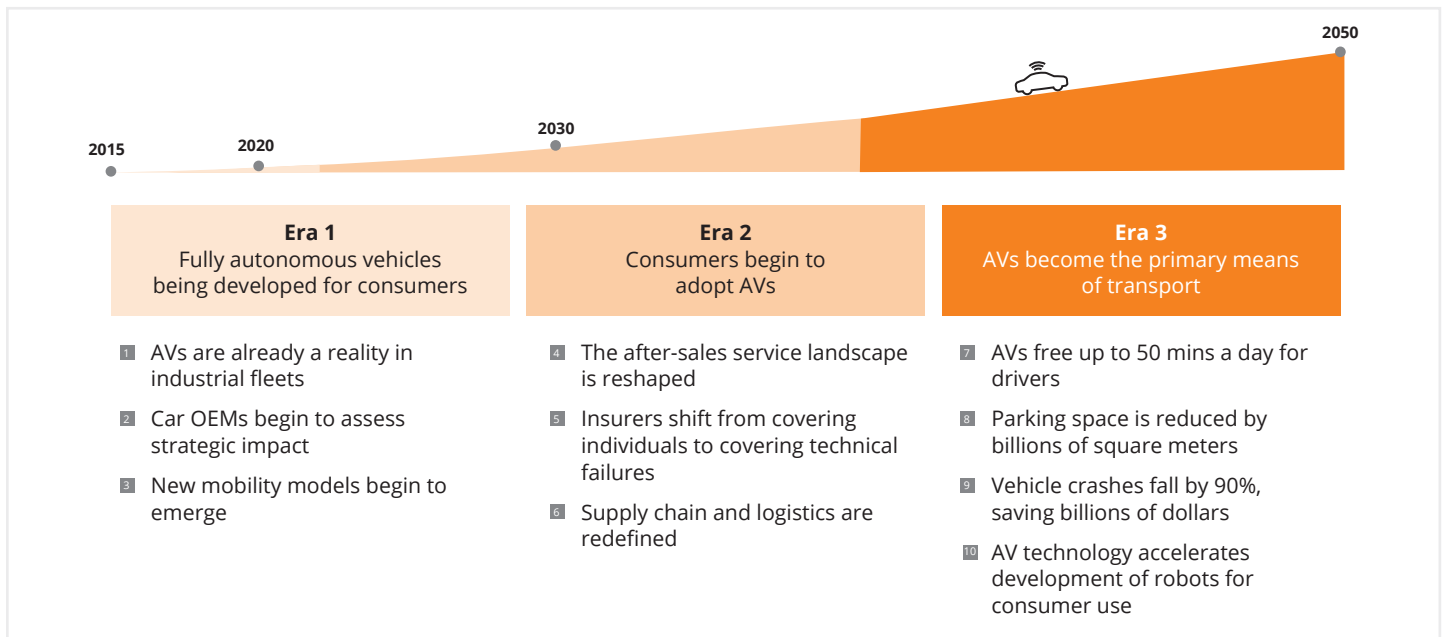
On the other hand, technology players are leveraging technology in their Autonomous Vehicles (AVs) to introduce Robotaxis and Mobility-as-a-Service (MaaS)



The significant growth of AVs is being driven by technology companies through advancements in technologies such as electrification & connectivity, & services like MaaS



The advancements in AV technology are transforming several interlinked sectors, spurred by digitization of incumbent OEMs and growing involvement of technology companies



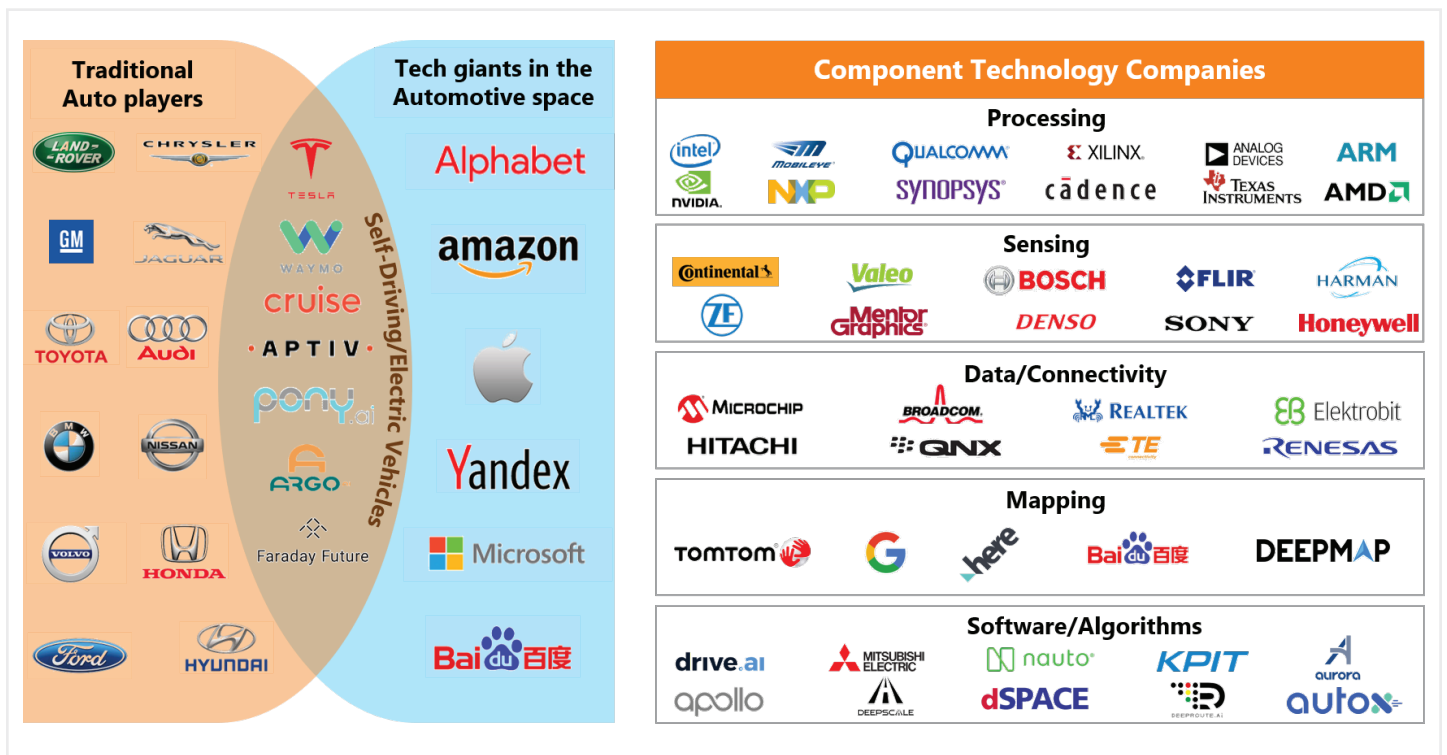
Source: McKinsey & Company

The Blurring of Lines between Automobile and Technology Industries











Digitization is the new technological disruptor in the automobile industry and traditional automobile companies are turning to technology to keep up with changing consumer needs. On the other hand, tech giants like Apple, Google and Amazon are entering this industry to capitalize on the technology side of things. Technology-focused companies like Samsung (acquiring Harman), Intel (acquiring Mobileye), Google (with Maps and Waymo) and Apple (with Titan) are building mobility products and entering the automobile industry. Similarly, automobile companies and manufacturers are responding to this trend by forming tech-focussed partnerships or focusing on technological innovations to stay future-ready. Robert Bosch, Harman International, Continental, Magneti Marelli and Denso are focusing on digital initiatives. Companies such as Ford, GM, Tesla, Volkswagen and Toyota that focus on connected cars, autonomous driving, and mobility, would be competing with technology firms, semiconductor manufacturers and other mobility companies.

These developments are leading to a complete overhaul of the industry, slowly interconnecting the entire supply chains of both industries. The primary benefit from connected supply chains is cost reduction through a better managed end-to-end process. Historically, the supply chain has been characterized by long lead times in a complex structure. Digitization would lower costs and accelerate supply chain transparency through continued partner system integration, and data gathering and analytics would reduce the number of defects and speed up the whole process of component design, manufacture and delivery. Much of this integration will be facilitated through the cloud, where every party in the chain will be looking at the same data, thereby creating better flexibility and stability.



The automobile industry is undergoing rapid transformation with traditional OEMs now competing with technology companies that aim to make automobiles fully autonomous




Technology giants are investing more and more in capabilities to facilitate driverless vehicles as well as partnering with third parties to develop their own connected vehicles


Alphabet		amazon		Apple	
Autonomous Driving Technology	 The former Google self-driving car project has spun off into an autonomous vehicle business  Remote-control self-driving car platform, Scotty Labs, received investment from Alphabet	In-Car Experience	 Either through direct integration with a few manufactures or through its Echo Auto device, Amazon has introduced Alexa to the automobile industry 	Vehicle Operating System	 Apple already had a stake in the auto industry through its CarPlay automotive OS software
Vehicle Operating System	 Android Automotive is an automobile OS developed for use in vehicle dashboards	Recent activity in EV and AV verticals	Amazon has been aggressively investing in the AV and EV space, most likely for the purpose of last-mile delivery Investments:  Acquisitions: 	Project Titan	 Apple's "Project Titan" started out as an effort to develop Electric Vehicles in 2014. However, it has become increasingly evident that it has now transformed into a project to develop autonomous driving systems with signs that point toward Apple being a tech provider rather than a car maker
Alternative Mobility	 Alphabet has backed companies such as Uber, Lyft, Lime and Gojek that are in the alternative mobility space	Aftermarket Auto parts Retail	Amazon entered the auto parts retail market in 2017 and has since built partnerships with key retailers. They also hold a patent for AR technology that allows users to preview auto parts before purchase		


To combat the rising intrusion of technology companies in the automobile space, OEMs are transforming themselves to either build their own tech capabilities or partnering with tech companies


 **Mercedes-Benz and NVIDIA have entered a cooperation to create an in-vehicle computing system and AI computing infrastructure** 

Mercedes' Car of the Future



 Full software stack for automated driving



 Regular software updates


 Automated parking functions


 **Volkswagen is reducing its reliance on software partnerships and shifting gears to developing its own in-vehicle software**

Volkswagen's answer to tech giants



 Announced that its 'Car.Software' arm will run as an independent unit and will be tasked with developing its proprietary car OS 'VW.OS' by 2025


 VW plans to increase the share of its own car software from 10% to 60% by 2025


Innovations on the software front




Ford has partnered with Bosch and Bedrock to introduce automated valet parking in future Ford models



Toyota to implement AWS's data analysis to help advance progress toward Connected, Autonomous, Shared and Electric technologies



Volkswagen, AWS, and Siemens to open up the Industrial Cloud to other companies so they can contribute to optimizing production processes



Tata Motors has announced a partnership with Tata Elxsi to develop a unified connected vehicle platform that will power the Nexon EV range of electric cars

The entry of technology giants in the automobile industry is expected to alter the economic value of this industry and its adjacent markets forever

It is projected that the global automotive industry will grow to just under nine trillion U.S. dollars by 2030, automotive technology will evolve considerably in the next decade, and that one in five new car sales globally would be battery electric vehicles, and millions of new self-driving cars will be added to the world's fleet.

The entry of existing tech companies and start-ups might lead to a complete change in the value chain. Here are some speculations about the future:



With the entry of data-driven companies in the industry, how will traditional OEMs transform their organization in order to deliver products and services that meet customer needs?



As the future of mobility services is predicted to be fully autonomous, how will traditional OEMs compete against mobility start-ups and technology giants?



As the industry transitions towards a customer-centric approach, would the car of tomorrow be sold via the channels of yesterday?



With tech giants like Google, Amazon and Apple entering the autonomous vehicles market, will they ever compete with traditional OEMs for a piece of the mainstream passenger car market?

The road ahead may not be smooth, with a number of challenges like changing value chain dynamics, consumer needs, and compliance issues that will need to be handled. Yet, these challenges are driving a gradual evolution in the industry that will result in a new ecosystem in which the traditional players in the automobile industry collaborate with major players in the technology and telecom sectors, as well as Government agencies. Thus, the competition and partnerships between various sectors would help drive the automobile industry forward.

Research Methodology

This report was created based on all-inclusive secondary research. Data was collated from syndicated sources and publically available information in analyst reports, news pieces, blogs, and other online sources.

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