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Tectonic shifts in automotive added value – what is to be done now by suppliers and policy

The work done everyday in the workshops of automotive suppliers has one goal in mind: to design the mobility of tomorrow with their own hands and innovations. Companies are advancing technological change. Alternative drives, digitization, networking – you have to constantly review and continuously develop your own product portfolio. New expertise, huge R&D efforts and changed production structures are in demand.

In a current study, experts from Oliver Wyman and VDA identify parallel trends that will characterize the automobile, its production and use until the year 2030 (see figure). In addition to new mobility concepts and digital services, this also includes the growing demand for custom solutions, especially among the young generation of customers. The bottom line is: The automobile value added chain will change fundamentally. The cycles of innovation are getting increasingly shorter, while the diversity of products and cost pressure are continuing to increase.

In particular, for small and medium-sized suppliers with limited capacities, the technological transformation is a tremendous task with many opportunities and risks. Companies have to be flexible and become resilient. New industrial logics are arising. Larger suppliers find it easier to independently develop the necessary expertise. Small and medium-sized companies have to look for allies beyond the traditional industry limits. For example, in order to develop digital skills. International competition is tough. Players from the tech and IT industry are also getting wind of their opportunities.

This demanding environment demands everything from companies. One thing is correspondingly clear: The political framework should give operators as much tailwind as possible on their way to innovation and not place any unnecessary barriers in the way. However, there are currently some serious disadvantages for German companies, because in addition to quality and the degree of innovation, costs above all play an important role in international competition.

The highest energy prices in the EU are therefore a considerable barrier to investment for the entire German industry. More and more energy-intensive fabricators are turning their backs on Germany. There is still an urgent need for action in tax policy. For example, we suggest eliminating or limiting the income-independent elements of the trade tax that are detrimental to the system as well as introducing a tax-related R&D grant across all company sizes.

¹ For the third time already in close cooperation with strategy consultant Oliver Wyman, the VDA has conducted a comprehensive study that looks at the future structure of the automotive supply chain (FAST -Future Automotive Industry Structure) by 2030 and outlines options for the German automotive industry. More information can be found at: www.vda.de/Dokumente

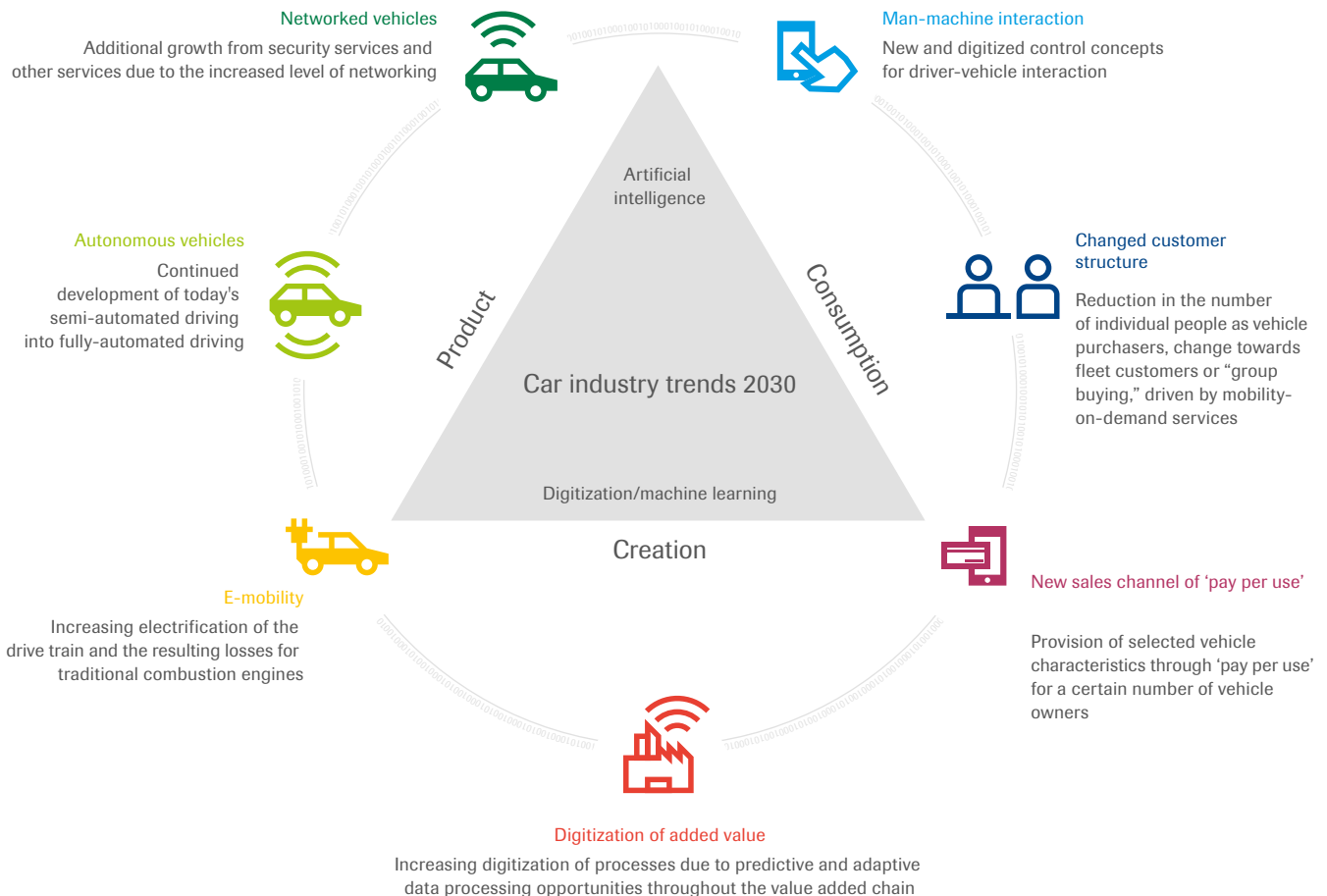
The political focus should also be placed on the necessary infrastructure for future automotive technologies. A comprehensive and dynamic mobile network coverage along all traffic routes is as indispensable for automated driving as sufficient charging options are for electromobility. Last but not least, it is imperative to decidedly oppose the protectionist tendencies that are increasingly observed globally. They hold the great danger that international supply chains will break - with devastating effects for the companies concerned as well as their customers.

from being a given. Quite the contrary. Surveys suggest: The mood barometer of companies is currently showing negative tendencies.

That is why it is clear in the end: We cannot rest with a sense of false security - not when it comes to policy or the industry. Rather, additional efforts are needed to permanently secure growth and employment in Germany during this suspense-packed time.

Next year, German manufacturers will produce more than twice as many cars abroad as at home for the first time ever. At the same time, we are seeing a pleasing record level of employment here in Germany - also in the supplier industry. But continuing this success story is far

Seven fundamental trends that are changing the automotive world



“Sharing is Caring” – Political need for action for the mobility of tomorrow



Even better air in the cities, fewer traffic jams, no traffic while searching for parking space and getting to your destination as quickly as possible – there are many requirements for the mobility of tomorrow. With the introduction of new mobility services, the German automotive industry is making a decisive contribution towards our transport system meeting these requirements. However, some political changes are needed so that innovative mobility concepts can be effective.

The automotive industry is the pioneer and driver of innovative mobility solutions: With a market share of over 75 percent, German automobile manufacturers are the leading providers on the carsharing market in Germany. The automotive industry is currently launching its first ridesharing offers. In the medium term, they are to form a new pillar of local traffic, which is available ‘on-demand.’ With these offers, the automotive industry is taking the third step of its transformation: from automobile construction to the car as a service offer (e.g., example carsharing) to mobility as a service offer (see graphic). The first two points here of course remain on the agenda.

In urban spaces in particular, people need to get from A to B as quickly and flexibly as possible. Intermodality and multimodality are the keywords that describe this new mobility behavior. Automotive industry companies are key partners of a holistic mobility system, also through cooperation agreements with start-ups, taxi or public transport companies. Apps can be used to choose different services and by linking different modes of transportation, users can quickly decide which way to their destination is the best. For this purpose, the automotive industry offers comprehensive information and booking platforms linking different modes of transportation.

New mobility services have another advantage. Innovations, such as electromobility for cars, bicycles or scooters, can be made available to many people, regardless of the respective income or asset structure. This makes users aware of new technologies and gives companies the opportunity to try out new concepts and get direct feedback.

The correct framework conditions must be created to be able to introduce new technologies in the future in the

context of such mobility concepts. When it comes to alternative drives, the charging and refueling infrastructure needs to be expanded. The public sector needs to promote a demand-based expansion of the digital infrastructure for the use of networked and automated driving functions.

In addition, existing legal uncertainties in the Passenger Transport Act have to be clarified so that there can be a comprehensive use of commercial ridesharing concepts.

Multimodal and intermodal information and booking services can be set up more easily if public transport companies disclosed their delay and distribution systems to third parties. The aim should be to ensure customers an individual freedom to choose their own mode of transport.

Value added chain for mobility

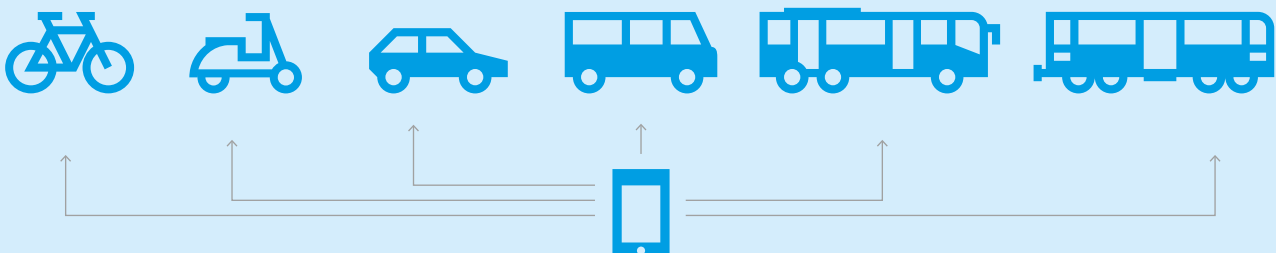
Level 1: Automotive engineering



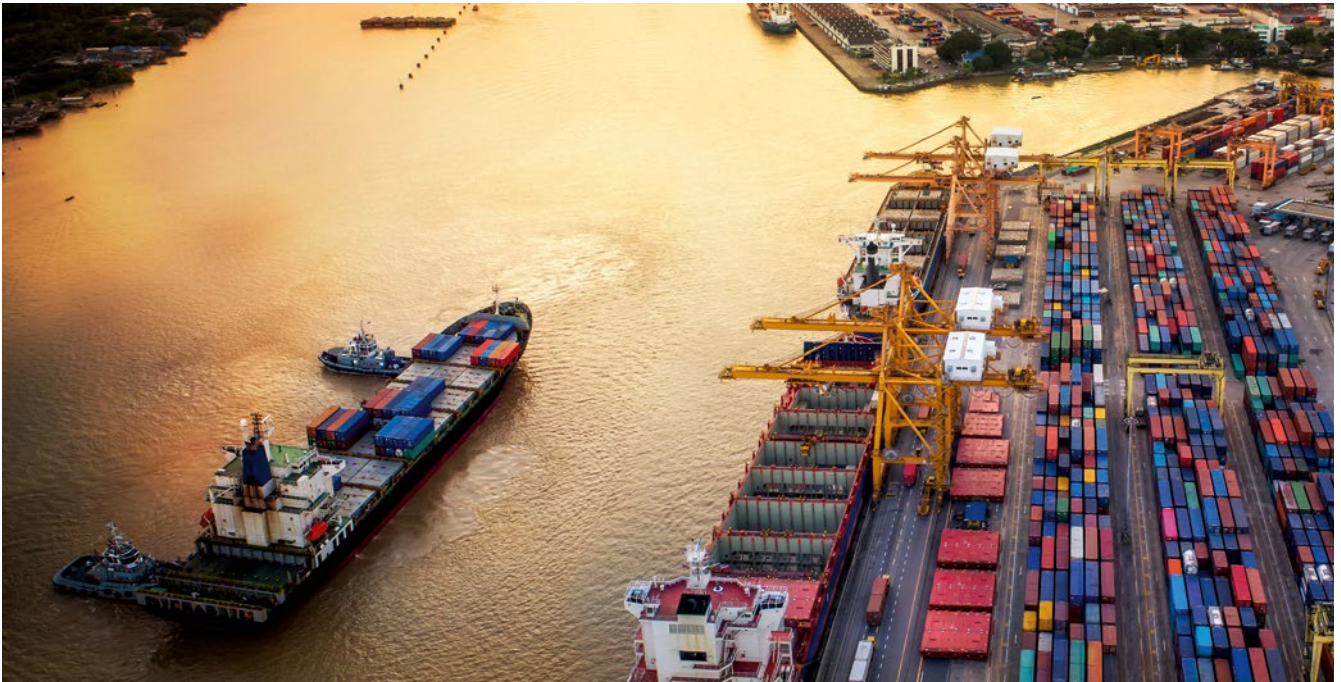
Level 2: Car as a service (e.g. carsharing)



Level 3: Mobility as a service



Balancing act in trade policy



Europe must ensure a strong partnership with the US and at the same time advocate for open markets and act against protectionism.

For decades it was a natural success factor for the world's economy. Now it's starting to falter: rules-based international trade regulations. A new protectionism is arising, triggered above all by the policy of the US administration. The escalating trade war with China, protective tariffs on steel and aluminum from Europe and the abolition of NAFTA – around the world the US is disregarding the rules of the WTO. What's more: They are torpedoing them by rejecting reform proposals and blocking the appointment of judges to the highest world trade court.

All this is alarming, especially for Germany with its strong export industry. One in four jobs in Germany is dependent on exports. In industry, the number is even more than one in two. Access to international markets and the dismantling of trade barriers are key prerequisites for ensuring our competitiveness and thus our growth and employment.

The German automotive industry has long advocated free and fair trade, because three out of four cars built in domestic factories are exported. In terms of value, the USA is our most important trading partner. At the same time, we are an important part of the US economy. Our companies employ more than 118,000 workers in over

300 plants. Every year, German manufacturers produce more than 800,000 vehicles in the United States. Half of these are exported.

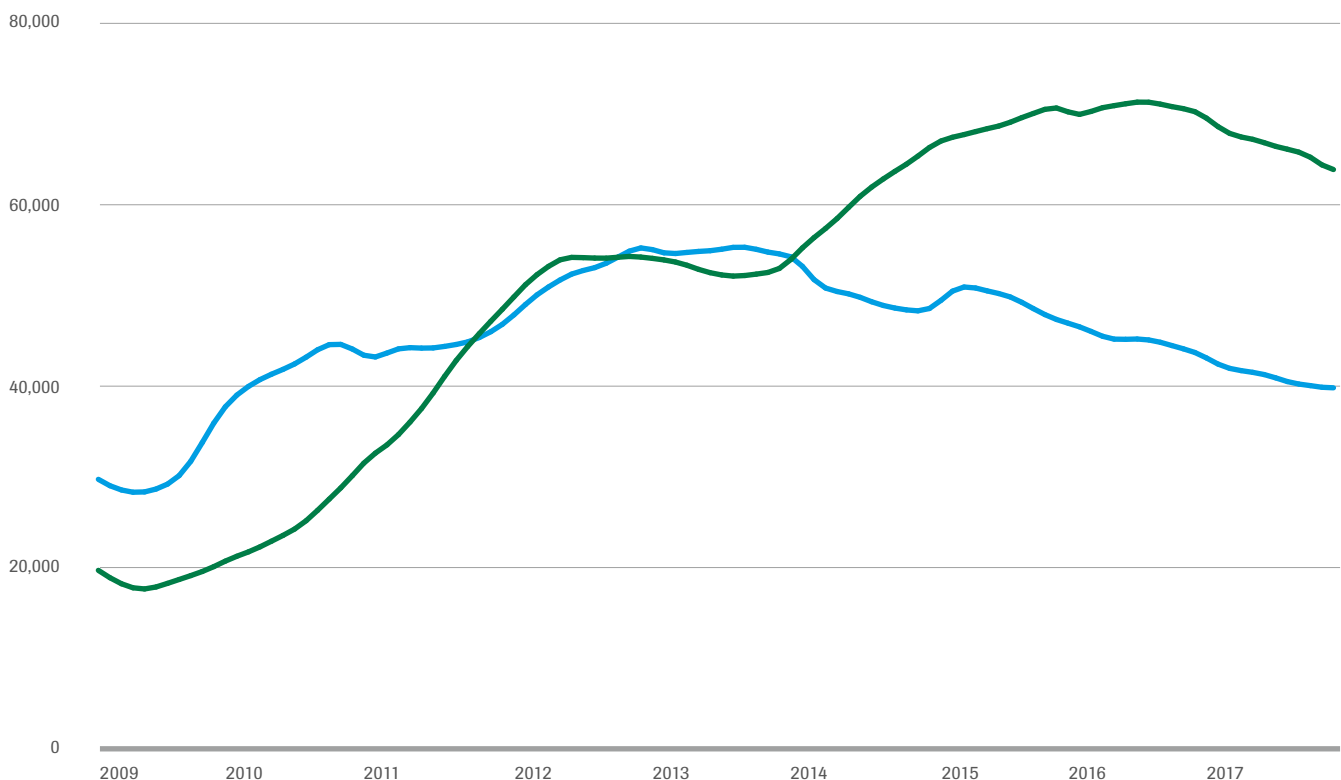
In the former NAFTA region in particular, the value added chains of manufacturers and suppliers are closely interlinked, and they in turn are interlinked with Europe and Asia. However, the new "USMCA" agreement (United States-Mexico-Canada Agreement) puts well-established and proven networks at risk through stricter regulations on local value creation. Such regulations must not be allowed to set a precedent. Protectionist restrictions do not make sense in a free trade agreement. Equally worrisome are considerations of introducing a points system for the allocation of car import quotas, which would favor manufacturers with a proportion of production in the US. These kinds of rules are contradictory to the spirit of open markets and fair competition. The introduction of additional external tariffs on automobiles would also have significant impacts. This would provoke further counter-measures and negatively impact world trade.

The main goal of additional negotiations must therefore be to prevent such measures. A good transatlantic

relationship is key, both economically and politically. The EU and the US together account for 50 percent of world trade. Solutions are needed that comply with the rules of international trade. Our objective is to reach a WTO-compliant transatlantic agreement that includes industrial tariffs. However, such an agreement cannot and must not exclude the automotive sector. The same applies to agreements regarding regulatory cooperation. The EU must act in a decided and consistent manner here. It is important to maintain the partnership with the US and at the same time do everything we can in advocating for open markets and acting against protectionism.

The European Union should also expand its trade relationships with other parts of the world. An attempt should be made to conclude free trade agreements with Malaysia, the Philippines and Thailand. The negotiations with India and the Mercosur countries must also be advanced with great commitment, despite all the difficulties. It is also crucial to modernize the WTO, thereby giving it new effective force. This is the only way despotism in the world economy can be prevented in the long term and the success principle of global trade regulations and thus fair competition can be ensured.

Export of brand-new passenger cars and station wagons to the USA



■ Car production of German OEM in the USA (trend) ■ Car exports from Germany to the USA (trend)

Source: VDA

Why sometimes you have to wait longer for good things – from NEDC to WLTP

What is the WLTP?

To measure how much fuel an automobile consumes and whether it complies with exhaust gas limits, the legislator prescribes standardized test procedures EU-wide. The previously valid measuring procedure - the NEDC (New European Driving Cycle), which had been in force since 1992 - was replaced by a new test on September 1, 2017. Since then, the new laboratory test WLTP (“Worldwide Harmonized Light-Duty Vehicles Test Procedure”) has applied to the type approval of new passenger cars. The WLTP has been required for all new passenger car registrations in the EU since September 1, 2018.

The new test cycle is more contemporary, because it better reflects today’s models and traffic situations and also takes into account the customer’s individual vehicle with the optional extras installed. Thanks to the new driving profile and more precise framework conditions, the WLTP yields much more realistic consumption data than was the case with the previous measuring procedure.

The Real Driving Emissions (RDE) procedure for newly type-tested passenger car models also came into force on September 1, 2017, which for the first time measures pollutant emissions on the road. Its specifications have been mandatory since September 1, 2018.

Why are there currently delays with the WLTP certification?

German passenger car manufacturers are working at full speed to convert their entire model ranges to WLTP. The introduction of the WLTP is a challenging task for the participating testing organizations, the responsible authorities and the companies in the automotive industry. This is because on the one hand the implementation provisions of the procedure did not formally enter into force until July 2017. Before then, no official certificates could be issued according to the WLTP standard.

On the other hand, there are stricter requirements for the test implementation, the result evaluation and its documentation. The amount of work for each individual test according to the WLTP procedure is also significantly more than before: not just because the new test cycle takes 50 percent longer, but above all because several body versions, equipment levels and tires of a vehicle have to be tested. Already in advance of the actual laboratory tests, the influence of many individual optional extras on CO₂ emissions has to be determined separately and tested by the technical services that accompany the measurements. Experts say that the amount of work required to determine fuel consumption values is about twice as much.

In addition, not only must new vehicle types be tested, but also those that are already on the market and will continue to be produced. This results in a large number of tests that are required. However, the test bench capacities are limited and are fully utilized.

In December 2016, it was decided that the introduction of WLTP on September 1, 2018 would also make the RDE specifications for particulate emissions mandatory. On this day, a particulate filter, which is already standard for diesel engines today, thus became necessary for gasoline engines. Originally, the new particulate limit values were part of the RDE introduction on September 1, 2019. The installation of a gasoline particulate filter normally requires a development and production lead time of three years. The reason for this is that, in addition to development, it requires the construction of new tools, conversions in the factories and changes to product planning. The bottlenecks of the test bench capacities were further intensified by the fact that the schedule was brought forward by a whole year.

Why are some manufacturers faster than others?

German manufacturers are characterized by a variety of versions, such as when it comes to the engine version. That is why the tests take very long for each vehicle type. Other manufacturers have a small selection of vehicle versions. That is why the tests are shorter per vehicle type.

The reform of the exhaust and consumption measurement procedure is important and good. Customers get more clarity and reliability, which makes the purchasing decision easier. So the longer wait time is worth it.

More dynamic, more accurate, longer: Why WLTP is closer to becoming a reality



Based on determined driving data



More detailed measurement methods



Higher average and maximum speed



Longer test distances



Varying vehicle weights, because extras are taken into consideration



Temperature conditions are closer to the European average



Greater range of driving situations (urban, suburban, federal highways, interstates)



More powerful acceleration and braking



Lower tire pressure



Shorter downtimes

Data security for networked mobility



The increased networking of vehicles makes road traffic safer, more efficient and more environmentally friendly. Connected vehicles can warn each other of black ice or suddenly emerging obstacles. Cars that communicate with traffic lights can make much better use of green phases. Intelligent traffic management systems evaluate vehicle data in real time, suggest alternate routes to drivers when they are in traffic jams or guide them to free parking spaces. Around one fifth of all traffic jams and one third of traffic caused by looking for a parking space could be avoided by networked driving. The technology for this is fully developed. Numerous pilot projects are testing different types of networking.

Data forms the basis for networking vehicles - and this data needs to be protected. With "NEVADA - Share & Secure," the German automotive industry has therefore developed a concept that precisely controls the secure transmission and transfer of data generated in the vehicle to third parties and also makes it usable for public authorities and companies. "NEVADA" stands for "Neutral-extended Vehicle for Advanced Data Access."

By evaluating the data generated in the vehicle in connection with traffic infrastructure data, for example obstacles on the road or traffic jams, can be identified immediately once they occur. If public authorities, such as fire brigades, police or traffic control centers, use this data generated in the vehicle, they can significantly

increase road safety. Driving cars in the city and on the motorway becomes more efficient and stress-free.

The "NEVADA - Share & Secure" concept also makes it possible to develop new business models by making the data generated in the vehicle usable for companies - but only if the vehicle owner has agreed to this. Service providers can then get this data from servers of vehicle manufacturers or neutral servers without receiving direct access to the vehicle. Access to the vehicle data for repair and maintenance measures via the OBD-2 diagnostic interface that is built into the vehicle remains preserved.

The simple structure of the concept on the one hand contributes to protecting the vehicle infrastructure and the vehicle's safety sphere, while on the other hand it ensures the economic efficiency of the data use. This creates a fair market for the data, in which free international competition for new business models can develop. Then only the vehicle manufacturers remain responsible for the data transfer between their servers and the vehicles and can thus use their individual security systems.

Since access can occur via existing vehicle manufacturer servers as well as through neutral servers, "NEVADA - Share & Secure" can be implemented throughout Europe on short notice. German vehicle manufacturers are currently implementing their realization of the "NEVADA - Share & Secure" data access concept. The first

implementation was presented in May 2017 with BMW CarData. Another market launch by a German automobile manufacturer will occur by the end of the year.

The vehicle owner retains full sovereignty over his personal data transferred from the vehicle at all times. The vehicle owner himself can decide which data he would like to provide, to whom, for which purpose and for how long. To protect vehicle safety, only the vehicle manufacturer may receive authorization remotely in order to query vehicle-generated data directly from the vehicle or perform remote access updates. By transferring the data from the vehicle manufacturers' servers to neutral servers, it is not necessary for others to remotely access the vehicle. This procedure protects the vehicle from attacks

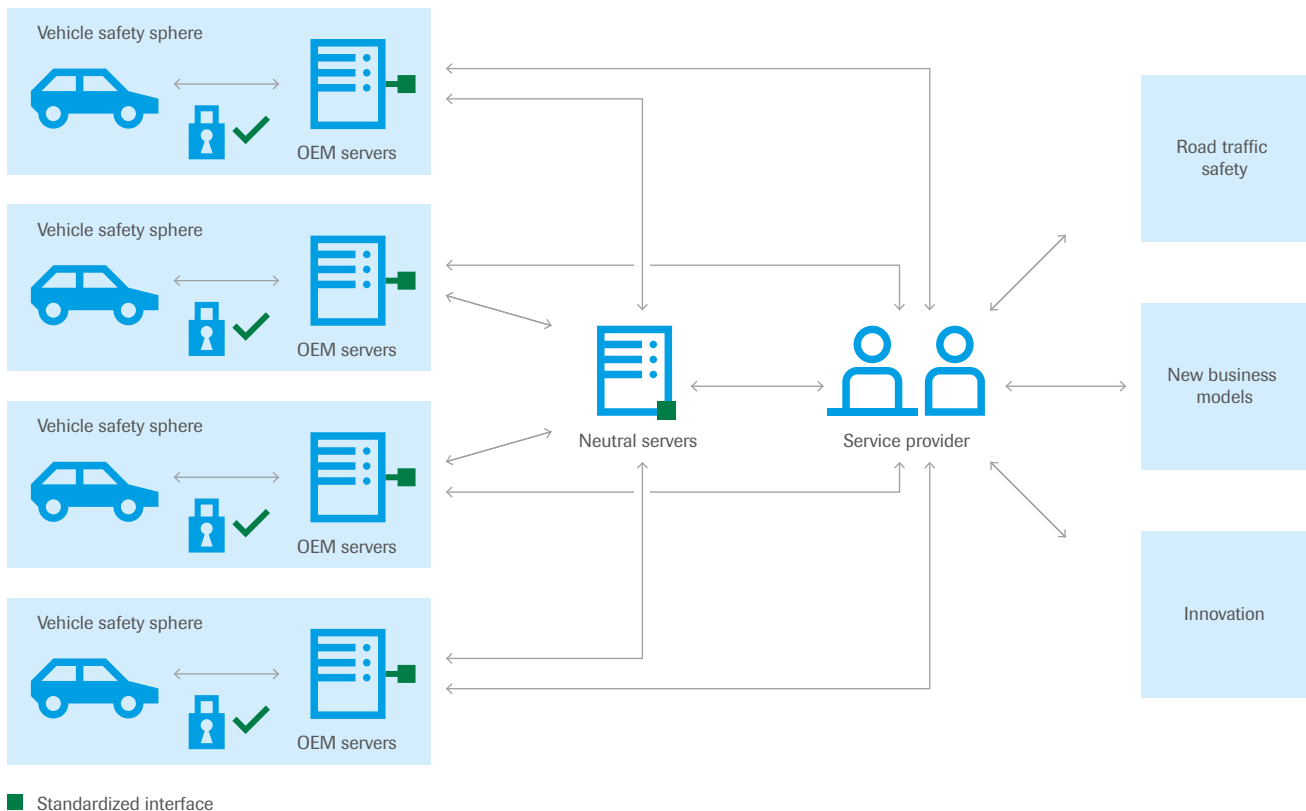
on the vehicle systems and at the same time ensures the data is handled fairly.

The data transfer and use provided for by the "NEVADA - Share & Secure" concept complies with the regulations of the European Union, German laws and the guidelines of the "Ethics Commission on Automated Driving."

Additional information and an extensive Q&A document about the "NEVADA - Share & Secure" concept is available at www.vda.de/NEVADA

Access to the vehicle and vehicle-generated data
Target state: Protect the vehicle - Share data - Create added value

The "NEVADA - Share & Secure" concept of the German automotive industry is secure, promotes innovation and is free of discrimination. It reinforces digital innovation and free competition. The concept solves the problem of different interfaces by using a standardized one, thereby creating the possibility of secure, fair and easy data use.



* "NEVADA - Share & Secure" is the name of this concept for access to the vehicle and to the data generated in the vehicle. "NEVADA" (Neutral-extended Vehicle for Advanced Data Access) describes the technical implementation.

CO₂ regulation: Commercial vehicles make their contribution

The European Union also wants to regulate the CO₂ emissions of heavy-duty commercial vehicles in the future. For the first time, the new set of rules should set specific goals to reduce CO₂ emissions in heavy-duty trucks. The commercial vehicle industry has always supported more transparency and a realistic regulation of heavy-duty trucks.

However, these vehicles are fundamentally different from passenger cars: Heavy commercial vehicles are used exclusively with commercial considerations in mind. Truck operators have always demanded lower fuel consumption and increasingly economical vehicles. Commercial vehicle manufacturers have therefore reduced CO₂ emissions of new trucks by about 8 percent in the last five years alone. This shows that commercial vehicles are also making their contribution to reducing CO₂.

According to the EU Commission, CO₂ emissions are to be reduced after 2019 by another 15 percent by 2025 and by a total of 30 percent by 2030. The European Parliament is advocating even more ambitious goals. However, certified data regarding CO₂ emissions of new trucks will not be available until 2020. From the perspective of the commercial vehicle industry, a reduction target of 7 percent by 2025 and 16 percent by 2030 would therefore be very challenging, although realistic and feasible. In addition, there is a need for much better regulations for the crediting of vehicles with low or zero emissions. This applies, for example, to electric buses or electric delivery trucks.

It is also critical that important fuel-saving technologies that are already available today are not even taken into account in the EU Commission's calculation methodology. This applies, for example, to GPS cruise control systems or hybrid drives. The significant efforts of commercial vehicle manufacturers thus are contributing to the effective reduction of CO₂ emissions. However, this is not recognized in the regulation. The potential of e-fuels is also not sufficiently taken into account.

ELAB study on effects of electromobility

The electrification of the drive train is leading to significantly lower personnel requirements. The transformation may succeed if the right framework conditions exist. This is what the ELAB study by the Fraunhofer Institute for Industrial Engineering IAO concluded. In Germany, electrification and productivity will mean that around 75,000 jobs in drive technology will be eliminated on balance. This already takes about 25,000 new jobs for batteries or power electronics into consideration. IG Metall is therefore calling on policy and companies to develop strategies for this transformation. Policies must flank structural change in the automotive industry through targeted industrial and employment policy. Companies would have to use a huge qualification offensive to ensure that employees can survive the change. The study was initiated by IG Metall, BMW, Volkswagen, Daimler, Bosch, ZF Friedrichshafen, Schaeffler, Mahle and the VDA.

Comparison: Fuel efficiency of trucks in Europe and USA

It is difficult to compare CO₂ emissions of heavy-duty trucks in the EU and the USA, since the transport efficiency greatly depends on the legal requirements. These are very different in the USA and the EU.

Cargo space comparison		
Interior length	13.62 m	16.00 m
Interior width	2.47 m	2.50 m
Interior height	2.75 m	2.80 m
Volume	92.5 m ³	112.0 m ³

Examples:

- European trucks fare worse when it comes to cargo space, since US trucks are permitted to carry 21% more load
- Speed limits are higher in the USA

Comparing the fuel consumption per ton-kilometer (CO₂ g/tkm) then shows: European truck emit 16 % less CO₂ than US trucks

Competitive edge in danger?

How research policy framework conditions can help to secure Germany's technological competitiveness

The automotive industry in Germany is one of the country's strongest and most innovative industries with its over 833,000 direct employees. Every year, our company invests over EUR 40 billion in research and development (R&D), of which more than half goes to Germany. It pays off: Today, the German automotive industry has a 48 percent share in the global patents in networked and automated driving. Together with the public sector funding measures, the industry is making an important contribution to ensuring Germany is a technology location.

The federal government has set itself the goal of increasing total R&D expenditures in Germany from 2.9 percent of GDP today to 3.5 percent by 2025. This requires corresponding research and innovation policy framework conditions, such as the de-bureaucratization of the entire funding process by designing future funding instruments to be agile.

This also includes efficient tax research funding, as is currently being discussed in the debate regarding the use of additional tax revenues. Many empirical studies prove a strong positive effect of input-oriented tax R&D incentives on the innovation work of companies. Most OECD countries already use such a tool. Germany is one of the few industrialized countries that favors research and development exclusively within the context of direct project funding. With all necessary changes, the successfully established project funding must persist without any restrictions. Only in this way can the necessary transfer of knowledge and technology between science, major companies and small and medium-sized companies be further strengthened.

The German automotive industry also sees the following need for action:

- Presenting the research topics and goals transparently requires long-term, cross-topic technology road maps in the context of industrial policy. The German automotive industry would like to achieve this through dialog with policymakers.
- The cross-departmental coordination and allocation of future funding topics must be strengthened.
- Ad hoc funding for highly innovative topics should be introduced due to the ever shorter innovation cycles.
- Uniform and transparent evaluation criteria must be integrated into the funding guidelines at the state , federal and EU level.
- The bureaucratic effort from the application to report on expenditure of funds must be significantly reduced.

The technological advantage ensures the success of the German automotive industry. The industry will make its contribution to securing Germany as a technology location in the future too. Efficient and agile research policy framework conditions would support us in doing so.

Extensive VDA position paper at:
www.vda.de/Dokumente

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