THE FUTURE
IS SMART

Connected vehicles and autonomous mobility

Mobility reinvented

Connectivity, higher levels of vehicle automation and the move toward near or full autonomous driving are megatrends that are transforming mobility. Although linked, these megatrends develop independently from each other. Connected cars and rising levels of vehicle automation will play a key role in creating a transportation infrastructure that is sustainable and can handle the requirements of an increasingly urbanised world. In an ecosystem where more people make better use of shared or personally owned electric vehicles, pressures on the infrastructure will ease and environmental impact will be reduced. Moreover, shared mobility and MaaS (Mobility as a Service) will open up new transportation possibilities for elderly and disabled people.

Connected and automated vehicles generate data, which holds great potential for the auto industry. Under the right framework conditions, the availability of automotive data will allow the development of new business models that help finance the innovation that will assure continued European leadership in the global mobility market. Connected mobility – and, eventually, highly automated and driverless cars – will be instrumental in making transportation safer and more sustainable.

The auto industry is **working with telecommunications companies and regulators** to make sure that vehicles have the ability to communicate; that standards are implemented for V2V (Vehicle to Vehicle) and V2X (Vehicle to Everything); that the appropriate infrastructure is created; and that vehicle connectivity can be assured at all times. Also, European suppliers are keen to develop a common European standard that enables the free flow of data that makes these data available to all market participants in a fair and balanced way. In this context, cyber security is critical, but should not limit market access.

> *'As we prepare for a future of electric, shared, autonomous and connected urban mobility in cities, I see the car as a key enabler of the smart and sustainable city of tomorrow'*
>
> **Jacques Aschenbroich,**
> Chairman of the Board and CEO, Valeo

Better accessibility to both drivers and road users

Increased road safety and reduction of fatalities

Opportunities for intermodal mobility concepts

Main benefits of connected and automated driving

More sustainable & environmentally friendly transportation

New jobs and wealth creation in Europe
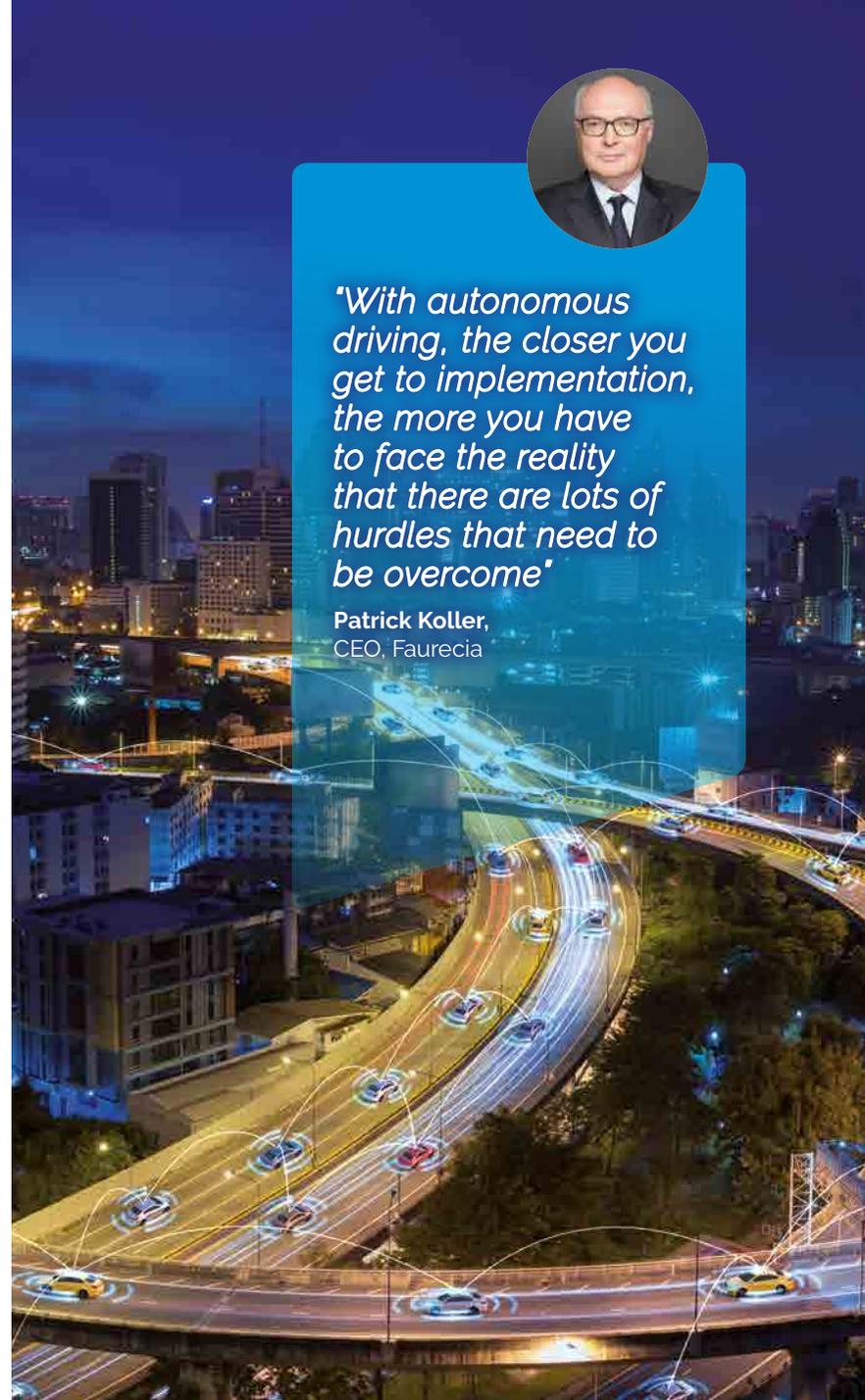
European technology leadership

Economic growth, opening chances for SMEs

"With autonomous driving, the closer you get to implementation, the more you have to face the reality that there are lots of hurdles that need to be overcome"

Patrick Koller,
CEO, Faurecia

Platooning technology, example of transport automation

Trucks communicate directly with each other by using connectivity technology and automated driving support systems. Platooning vehicles autonomously adapt the distance, speed and direction and adjust to the vehicle in front.

Social value

Business value

Benefits of truck platooning
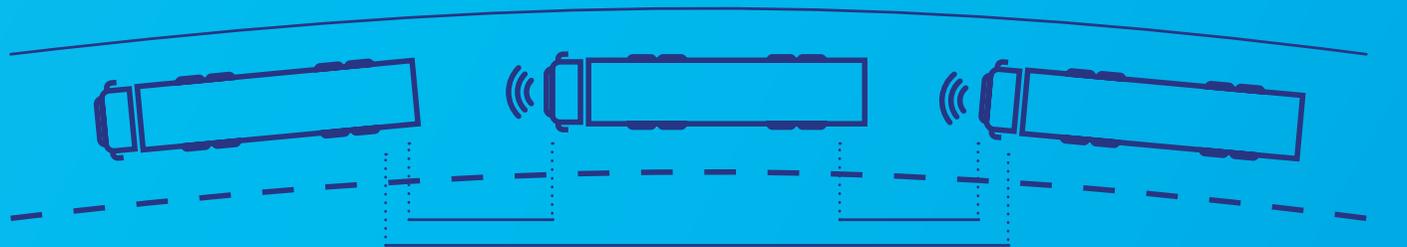
Emission reduction
Up to -15% CO_2

Road capacity optimisation
Less congestion

Safety improvement
90% of road accidents are
caused by human error

Lower fuel consumption

Fleet use optimisation

Improved driver efficiency

Platooning technology contributes to make road transport safer, cleaner and more efficient

(Source: 8)

> *"The auto industry has to learn to deal with software as a product, which the IT industry has been doing for 20 years"*
>
> **Elmar Degenhart,** CEO, Continental

Software in focus

In the near term, European suppliers will continue to develop connected technologies, focusing on adding value to the personal mobility experience and making transportation smarter, cleaner and safer. Longer term, this progress could help make highly automated and fully autonomous cars a reality.

European suppliers are committed to providing the core technologies that will drive the trend. As the smart mobility ecosystem takes shape, **software will play an even bigger role than today** in facilitating the safe and efficient interplay between vehicles and the infrastructure. We are investing heavily in software capabilities to meet these growing requirements. Artificial intelligence and machine learning will be key enablers, but the supplier industry is also working on many other technologies. Research and innovation funding, for example in the Horizon Europe programme,

Electronics on the rise
(% of total car cost)
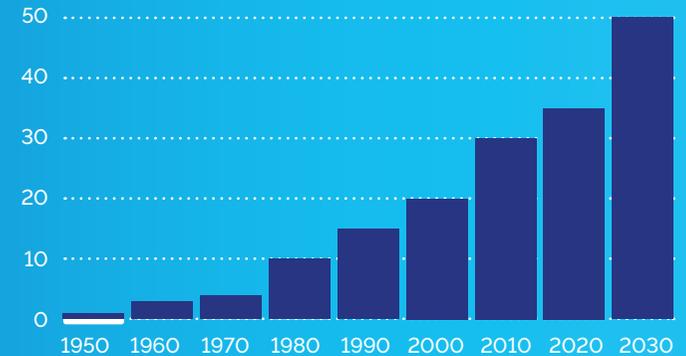
(Source: 9)

is important to defend European leadership, and budgets need to compete with those in regions such as the USA, China, Korea and Japan.
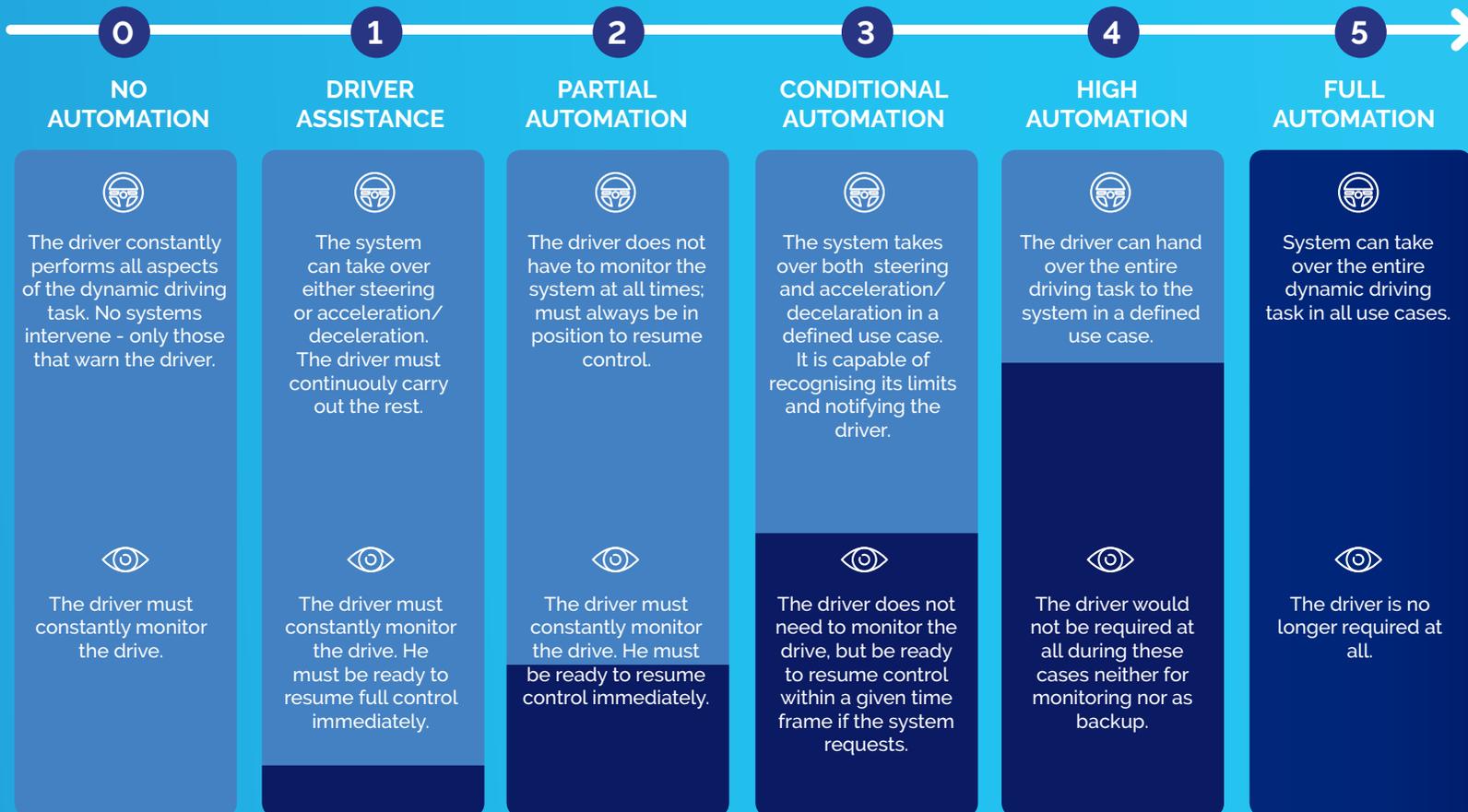
There has been an impressive technology leap in autonomous-driving systems in the past three years and increasingly **autonomous vehicles are being successfully tested on public roads** in many countries.

Driving automation levels for vehicles

Driver

Automated vehicle

0 **1** **2** **3** **4** **5**

NO AUTOMATION	DRIVER ASSISTANCE	PARTIAL AUTOMATION	CONDITIONAL AUTOMATION	HIGH AUTOMATION	FULL AUTOMATION
The driver constantly performs all aspects of the dynamic driving task. No systems intervene - only those that warn the driver.	The system can take over either steering or acceleration/deceleration. The driver must continuouly carry out the rest.	The driver does not have to monitor the system at all times; must always be in position to resume control.	The system takes over both steering and acceleration/decelaration in a defined use case. It is capable of recognising its limits and notifying the driver.	The driver can hand over the entire driving task to the system in a defined use case.	System can take over the entire dynamic driving task in all use cases.
The driver must constantly monitor the drive.	The driver must constantly monitor the drive. He must be ready to resume full control immediately.	The driver must constantly monitor the drive. He must be ready to resume control immediately.	The driver does not need to monitor the drive, but be ready to resume control within a given time frame if the system requests.	The driver would not be required at all during these cases neither for monitoring nor as backup.	The driver is no longer required at all.

(Source: 10)

A concerted effort

The next steps on the road to **driverless mobility** will require even more intensive and broader collaboration than in the past. Advanced driverless technology needs to be embedded in a regulatory framework, more testing of systems has to be conducted, trials have to be scaled up, and, equally important, public acceptance of future driverless cars and trucks needs to be increased. Suppliers are working closely with automakers to develop the vehicles that will be at the centre of tomorrow's traffic ecosystem.

With the first steps towards automated mobility already behind us, a regulatory system is now required that ensures that vehicles are placed on the market in a way that **reassures authorities and road users of their safety**. Developing type approval rules is an international effort to create similar regulation for a global market. Particularly safety performance evaluation is important to ensure automated vehicles are safe and contribute to road safety. Automotive suppliers contribute to this initiative at the UNECE in Geneva and work closely with EU institutions to facilitate alignment of rules.

Furthermore, an agreement on the use of specific communication technologies for V2V and V2X and further close consultations between all stakeholders on **a framework for vehicle data sharing** is required. Rules governing **liability** also need further intensive discussion. A kind of "digital single market for mobility" in Europe would go a long way toward creating a traffic ecosystem that can reap the full benefits from autonomous driving.

"Mobility will become much more diverse. I wouldn't call it a revolution, but rather an accelerated evolution"
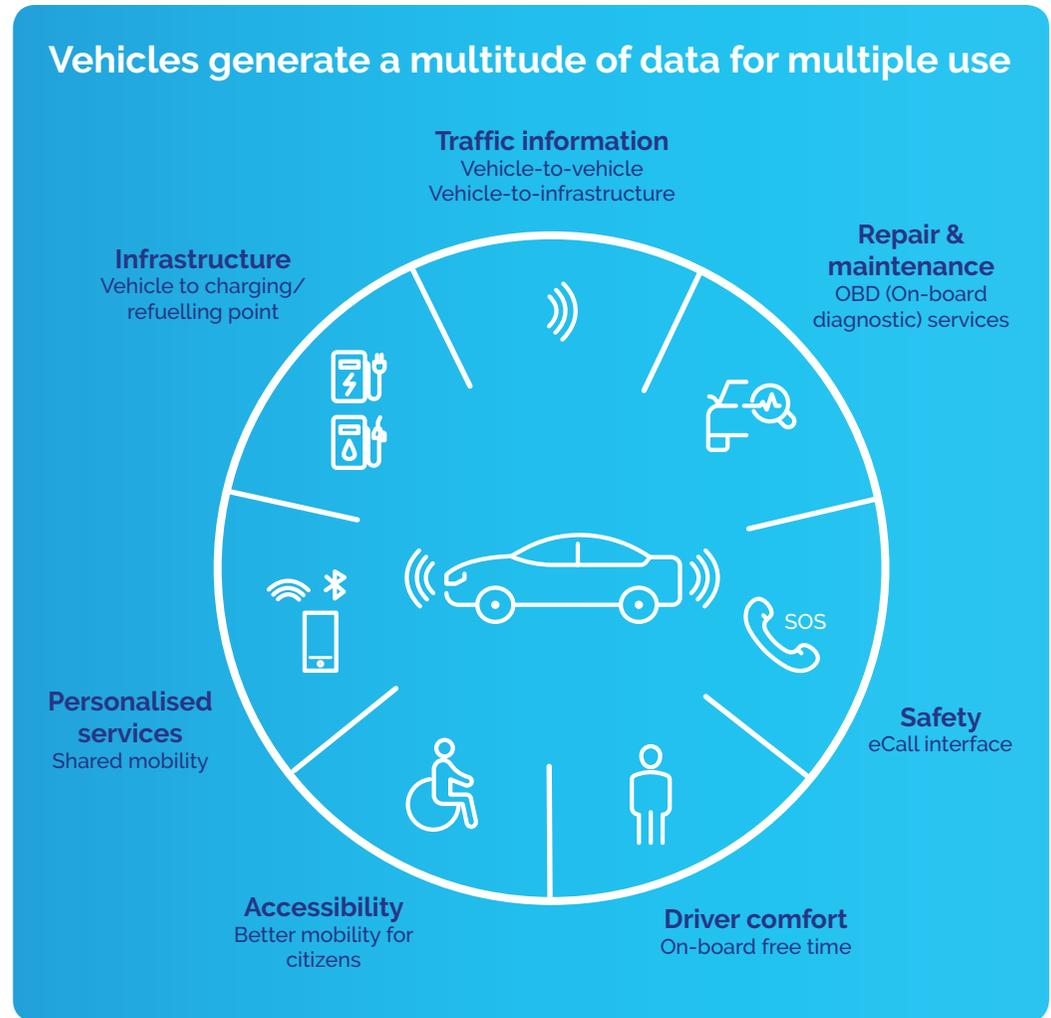
Olivier Rabiller,
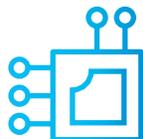President and CEO,
Garrett

Data are the gateway to new services

Automated and connected vehicles will generate large amounts of data, which hold an enormous potential to create new services and products, revolutionise existing business models and lead to the development of new ones. Whilst certain traditional jobs may become redundant through automation, we believe in the opportunities for growth and employment in this innovative economy. Suppliers are already developing successful **new services and applications**, for example, new concepts for shared, automated and connected mobility, as well as new repair and maintenance offerings in the automotive aftermarket which increase choice and reduce cost for consumers.

For the success of new services, especially in the independent repair and aftermarket, it is crucial that **access to vehicle data and a direct link to the vehicle and the driver** are available. Vehicle manufacturers and digital platforms currently have privileged access to car data. They also are in a position to propose services directly to drivers and passengers through in-car infotainment systems.

Vehicles generate a multitude of data for multiple use

Traffic information
Vehicle-to-vehicle
Vehicle-to-infrastructure

Infrastructure
Vehicle to charging/
refuelling point

Repair & maintenance
OBD (On-board diagnostic) services

Personalised services
Shared mobility

SOS

Safety
eCall interface

Accessibility
Better mobility for citizens

Driver comfort
On-board free time

Actions to support **connected and autonomous mobility**

Setting standards to **V2V (Vehicle to Vehicle) and V2X (Vehicle to Everything)** connectivity.

Testing **driverless technology** in real-world environments.

Launching multi-purpose **autonomous test vehicles.**

Helping **regulatory bodies and EU** and **national governments to set priorities** that further this transformation.

Collaborating across sectors to include telecommunications companies to **improve connectivity**.

Policy priorities for *smart mobility*

Create an **internationally harmonised type approval system** at UNECE level that ensures automated and autonomous vehicles are safe.

Enable road testing by giving clear and consistent **guidelines to manufacturers** seeking exemptions.

Assure European R&I funding, for example in Horizon Europe, with a focus on key new technologies such as artificial intelligence, machine learning, and smart sensors.

Use IPCEI (Important Projects of Common European Interest) to support developing a European value chain for automated mobility.

Ensure free and non-discriminatory access to data created by vehicles for a competitive market for new products and services.

Large scale deployment of Cooperative Intelligent Transport Systems (C-ITS) infrastructure as well as making data available and ensure interoperability of data to create "readable roads".

Consistent rules on cyber security, data protection and liability issues around highly automated and, eventually, fully autonomous vehicles.

Initiate and support **trust-building measures** and communication campaigns to **create societal acceptance** for connected and autonomous driving.