



WELCOME

Patron Mr. Oliver Luksic

Parliamentary State Secretary to the Federal Minister for Digital Affairs and Transport

The periodic technical inspection (PTI) of vehicles is of crucial importance for road safety and environmental protection in Germany and Europe. This ensures that vehicles comply with the necessary legal requirements.

By the PTI of safety-relevant systems such as brakes, but also modern modern driver assistance systems to support the driver, potential safety risks are identified and rectified, which helps to prevent accidents and to save lives. In addition, the inspections help to reduce pollution by ensuring that vehicles comply with applicable emissions regulations. Given the concern about climate change and air quality, this is crucial. Overall, it makes vehicle operation more efficient and environmentally friendly. Another important aspect of the PTI is its role in detecting technical changes to vehicles.

This neutral, independent and regular inspection of vehicles must of course be further developed in line with technical progress. Modern vehicles can already monitor the condition of their own safety and environmentally relevant systems. The present Charter 2030 shows concepts in this regard and makes it clear that that the authorities, alongside the scientific community and the automotive industry, are intensively working on this.

We will continue to work together in the exchange of expertise in order to further develop a modern and innovation-promoting legal framework. The development and refinement of technical solutions will play a central role in the future, so that the safety and environmental diagnostics of all vehicle systems can keep pace with the rapid development and digitalization of applications at all times.

Yours, Oliver Luksic

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CLASSIFICATION AND OBJECTIVES

What does Charter 2030 cover?

With Charter 2030, the inspection organisations, comprising more than 18,000 inspectors in Germany, take a position on the further development of technical vehicle inspection amid rapidly advancing developments in the mobility sector. More than 30 million periodic technical inspections (PTI) are carried out in Germany each year. The positions expressed in Charter 2030 include technical innovations, concrete contributions to the achievement of climate and road safety policy objectives, and calls for the formation of a modern and innovation-promoting legal framework in the field of technical vehicle inspection at national and international level.

Who is Charter 2023 aimed at?

Charter 2030 is intended for the general public as well as for representatives of the legislative and executive branches of government. In addition, Charter 2030 is addressed to representatives of national/international bodies and associations (including CITA), as well as representatives from business, science and specialist media.

Charter 2030: Concretising the Charter for Vehicle Inspection 21

The Charter for Vehicle Inspection 21, with a particular focus on highly automated and connected driving, was published back in 2018 and remains relevant today in terms of its positions and technical priorities. Based on Charter 21, it was possible to successfully initiate relevant developments and projects (e.g. the collaborative project ErVast funded by the Federal Ministry for Digital and Transport (BMDV)). Charter 2030 now concretises Charter 21 and expands its focus to the key issues of digitalisation, (mobility) data, alternative drives and emissions, specifying the corresponding need for action up to the year 2030.

What do the positions and further development steps enshrined in Charter 2030 contribute to technical vehicle inspection?

For several decades now, the inspection organisations have been ensuring people's safety and their trust in the use of technology and vehicles, in particular.

Since the introduction of the PTI in 1951, as well as the single and type approvals in the context of vehicle development and approval, the inspection organisations have made a significant contribution to ensuring a high level of safety for today's vehicles and compliance with environmental regulations.

The use of innovative inspection technologies and procedures will also enable safe and environmentally compatible mobility in the future amid the rapid automation and electrification of vehicles. In the age of increasingly digitalised and connected vehicles, inspection organisations are developing solutions to meet new challenges, such as the safe handling of – and neutral access to – mobility and vehicle data. Corresponding data trust centres protect the interests of consumers and ensure the data sovereignty of vehicle owners and users.

With modern and innovative technical vehicle inspections and vehicle monitoring, the inspection organisations also make a significant contribution to achieving, among other things, the following climate and traffic safety policy objectives.

Climate targets

- By 2030: "Fit for 55" – reduction in greenhouse gas emissions in the EU (compared with 1990)
- By 2050: "Green Deal" – 90% reduction in greenhouse gas emissions from transport in the EU
- By 2030: 15 million electric vehicles registered in Germany

Road safety objectives

- By 2030: 40% reduction of road deaths and serious injuries in Germany compared with 2021 (BMDV Road Safety Pact)
- By 2030: 50% reduction of road deaths and serious injuries in the EU between 2021 and 2030 (Stockholm Declaration)
- By 2050: Achieving Vision Zero in the EU

KEY MESSAGES



Holistic inspection of modern vehicles

As inspection organisations, we ensure a high level of safety and sustainability throughout the entire life cycle of a vehicle – from development through approval to operation.



Sustainable protection of people and the environment

The inspection organisations ensure compliance with environmental standards and contribute to the introduction of environmentally compatible vehicle technologies and new mobility solutions.



Digitalisation and interconnectivity for safe and sustainable mobility

The experts and PTI inspectors of the testing organizations act as independent third parties for, among other things, the safety of connected vehicles and user-centric access to (mobility) data.



Modern, innovation-friendly legal framework

The inspection organisations support the further progress and harmonisation of requirements for the development, approval and inspection of modern vehicles.



Holistic inspection of modern vehicles

Testing organisations ensure safety, security and sustainability throughout the entire life cycle of the vehicle (development, approval and operation).

Position and requirement

- Current test contents (electronic test procedures, wheels, chassis, lights, brakes, ...) within the scope of the periodic technical vehicle inspection (PTI)) are supplemented and further developed in a targeted manner - including automated and connected vehicles
- Vehicle inspections as part of the PTI and approvals are becoming more dynamic. Functional and performance tests are, in particular, dynamic, effective and efficient and supplement (static) electronic status inspections.
- The conformity and integrity of software as an elementary component of electronically controlled vehicle systems must be checked for all safety-relevant vehicle systems (including checks of software updates as part of the PTI).
- The provision of (by vehicle manufacturers) and access (via OBD/OTA vehicle interfaces) to all vehicle information relevant to the inspection must be legally anchored and adapted accordingly to the technical progress of the vehicles.
- The periodic on-site inspections must be supplemented by event-driven remote-assisted inspections. The vehicle information should serve as a basis for detecting abnormalities of components, assemblies, and systems that are relevant to safety, security and the environment and for checking that the target state has been restored.



Sustainable protection of people and the environment

The inspection organisations ensure compliance with environmental standards and contribute to the introduction of environmentally compatible vehicle technologies and new mobility solutions.

Position and requirement

- Further development and extension of the emission inspection within the PTI to determine and eliminate damage, ageing and manipulation of the exhaust gas after-treatment:
 - › Extension of the tailpipe measurement during the PTI with the measurement of nitrogen oxides for diesel engines and particle counting - for gasoline engines
 - › Determination of validated vehicle sensor data in the type approval for an inspection procedure via OBD/OTA interfaces in the periodic emissions inspection
 - › Supplementation of previous measures (PTI, In-Service Conformity, Market Surveillance) by independent field monitoring of all vehicle classes
- Monitoring of environmental regulations and standards during the development, approval and periodic inspection of vehicles of all types of propulsion:
 - › non-discriminatory access to environmental relevant data of the motor vehicle
 - › manufacturer-independent, cross-model, standardised determination of the safety status and energy efficiency of the batteries of electric vehicles
 - › inspection requirements for all vehicles should be extended to CO₂, fuel consumption and electrical energy efficiency



Digitalisation and interconnectivity for safe and sustainable mobility

As independent third parties, inspection organisations are committed to the safety of connected vehicles and user-centric access to (mobility) data.

Position and requirement

- Secure handling of – and neutral access to – mobility and vehicle data is enabled by appropriate TrustCenter solutions for user-centric use and sharing of data and information. Data access to all inspection-relevant vehicle information for sovereign vehicle inspections must be ensured without restriction.
- In line with the AI act is the certification and testing of AI/ML algorithms in automated networked vehicle systems increasingly supported by simulation and ensured by functional/performance inspection on the real vehicle.
- Compliance with data protection and cyber security requirements (based on UN Regulation 155) for electronic, connected vehicle systems are verified as part of the PTI by means of electronic software integrity checks.
- A check of connected functions (Car2X) is required in order to protect especially vehicle occupants, other road users and traffic infrastructure.



Modern, innovation-friendly legal framework

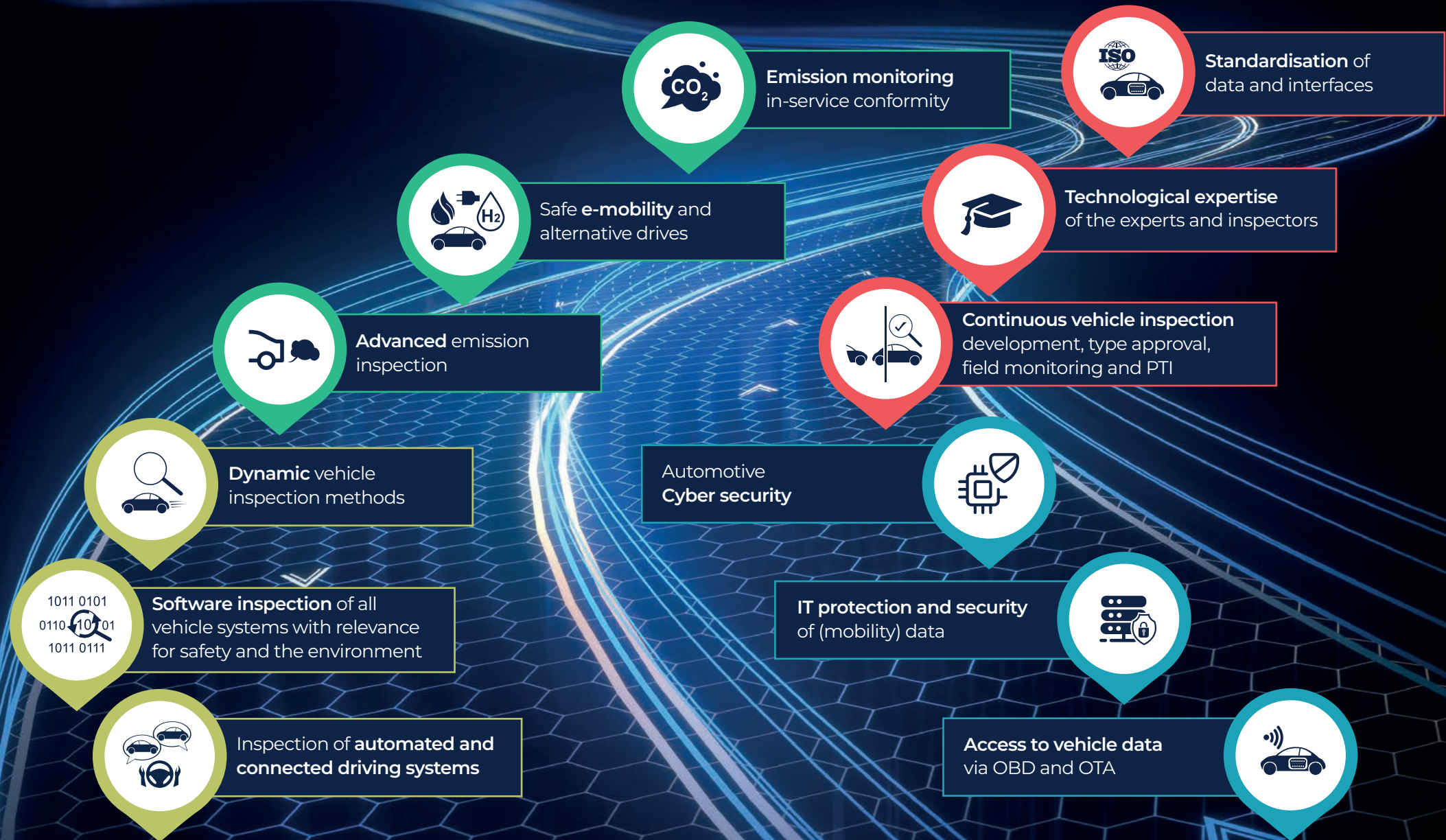
The inspection organisations call on policy-makers and legislators to adopt a modern and innovation-friendly legal framework that supports technological developments and innovations in the automotive industry, while achieving the common objectives of road safety and environmental protection.

The inspection organisations pave the way for new technologies and innovations in industry, and also ensure the safe and clean operation of current vehicles over their entire life cycle by means of independent and periodic technical inspections. This is done with the use of modern inspection technologies and procedures, as well as through the further development and harmonisation of national and international/European standards and regulations for the development, approval and inspection of modern vehicles, their systems and assemblies.

In particular, the further development of the following regulations is essential for the future activities of the inspection organisations to ensure road safety and environmental protection

- International standards for vehicle approval (UN regulations), which are intended to promote progress and innovation in vehicle technology, as well as to ensure safety and conformity with standards
- National and European regulations for the assessment and (periodic technical) inspection of modern vehicles, including for the focal points
 - › Data access to the vehicle via both the physical and the remote interface (OTA)
 - › Data standards (including ISO 20730: electronic periodic technical inspection)
 - › Automotive cyber security and software updates (based on UN Regulations 155 and 156)

AREAS OF FOCUS



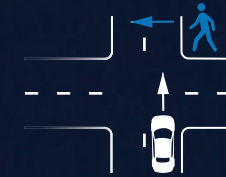


Dynamic scenario-based inspection of automated and connected driving systems

- The development and equipment of (highly) automated, connected assistance and driving functions is progressing dynamically.
- To be able to fully exploit the accident prevention potential (Vision Zero) of these driving functions and to avoid risks for society, they must function without errors and be regularly checked for possible safety risks.
- Furthermore, it remains necessary to ensure the proper and professional inspection of these functions by a neutral third party with regard to fitment and condition, as well as function and performance in particular. The inspection organisations provide this with expertise and technical competence.
- New inspection methods and tools for monitoring of automated, connected assistance and driving functions are currently being developed and prepared for near-term implementation in the inspection bodies.
- In addition to static methods, scenario-based test methods offer the possibility of testing the response of the vehicle during a specific scenario by suitably depicting the traffic environment (virtually/physically). Several methods, including a dynamic vehicle inspection with a moving target or on functional test benches with environmental simulation, are being evaluated in appropriate pilot environments.

Inspection scenarios

Pedestrian detection



Turning assistant



Cyclist detection

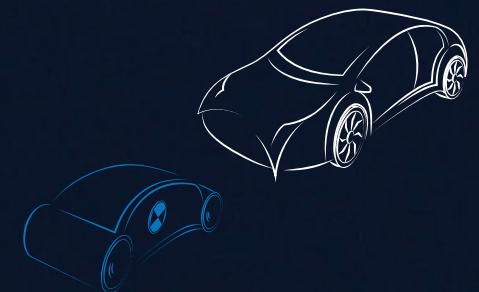


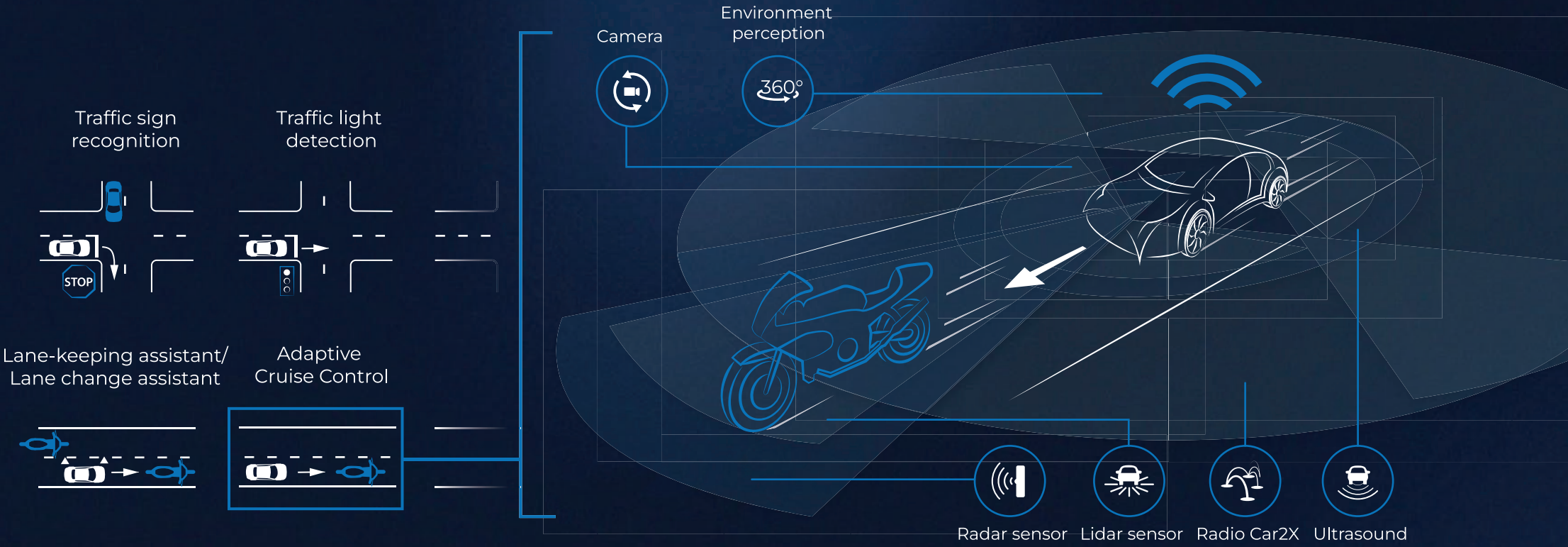
Automatic emergency brake



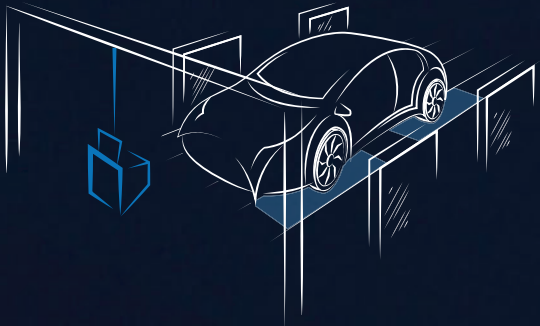
Dynamic inspection technologies

Performance inspection with target

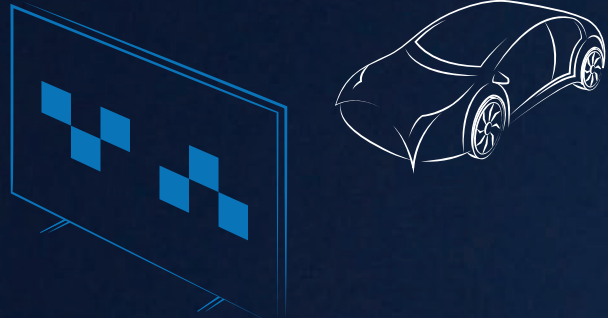




Performance inspection with steerable function test bench and environmental simulation



Static inspection technology





event-driven remote-assisted inspections



- Defects and wear
- Software updates
- Manipulation
- Technical changes



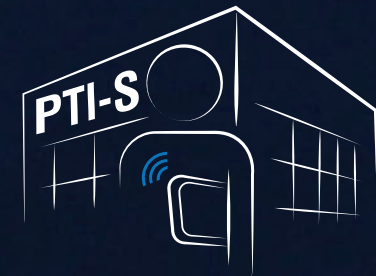
Vehicle homologation and type approval



First registration



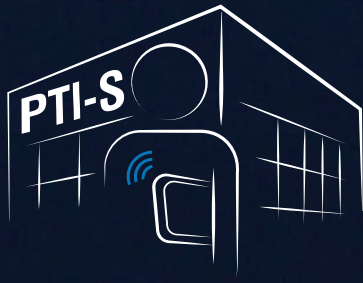
Periodic on-site inspections





Event-driven remote-assisted inspection of automated and connected driving systems

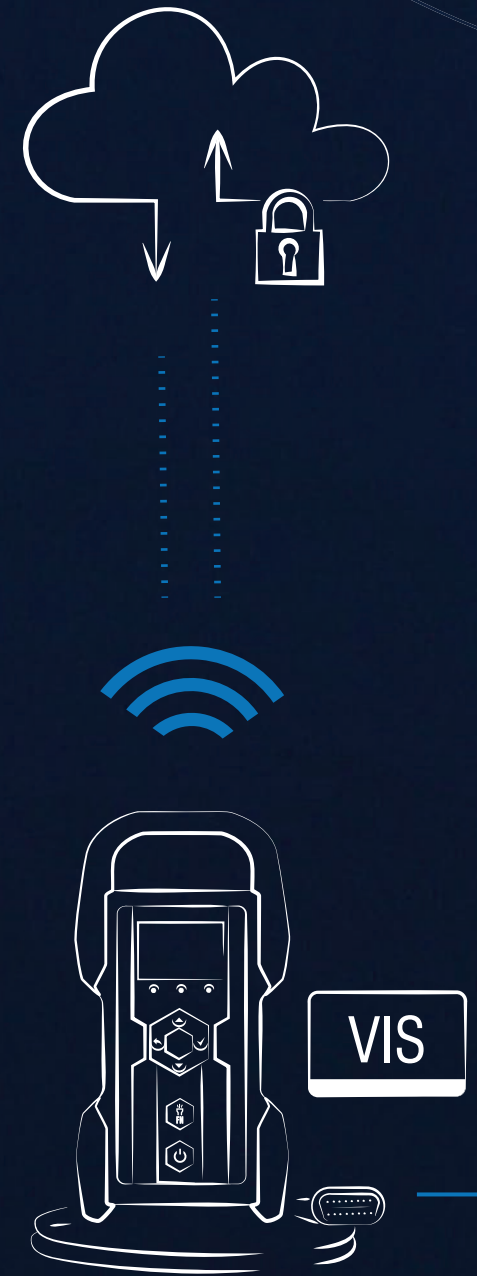
- On the basis of defined, remotely transmitted vehicle information, abnormalities during operation can be quickly detected and any necessary steps, like repair initiated.
- In supplementing periodic on-site inspections, event-driven remote-assisted inspections ensure a high level of road safety over the entire service life of the vehicle.
- Requirements on safety and environment relevant systems, and their abnormalities must be defined and adapted dynamically by official bodies, as is the case today for periodic vehicle inspections.

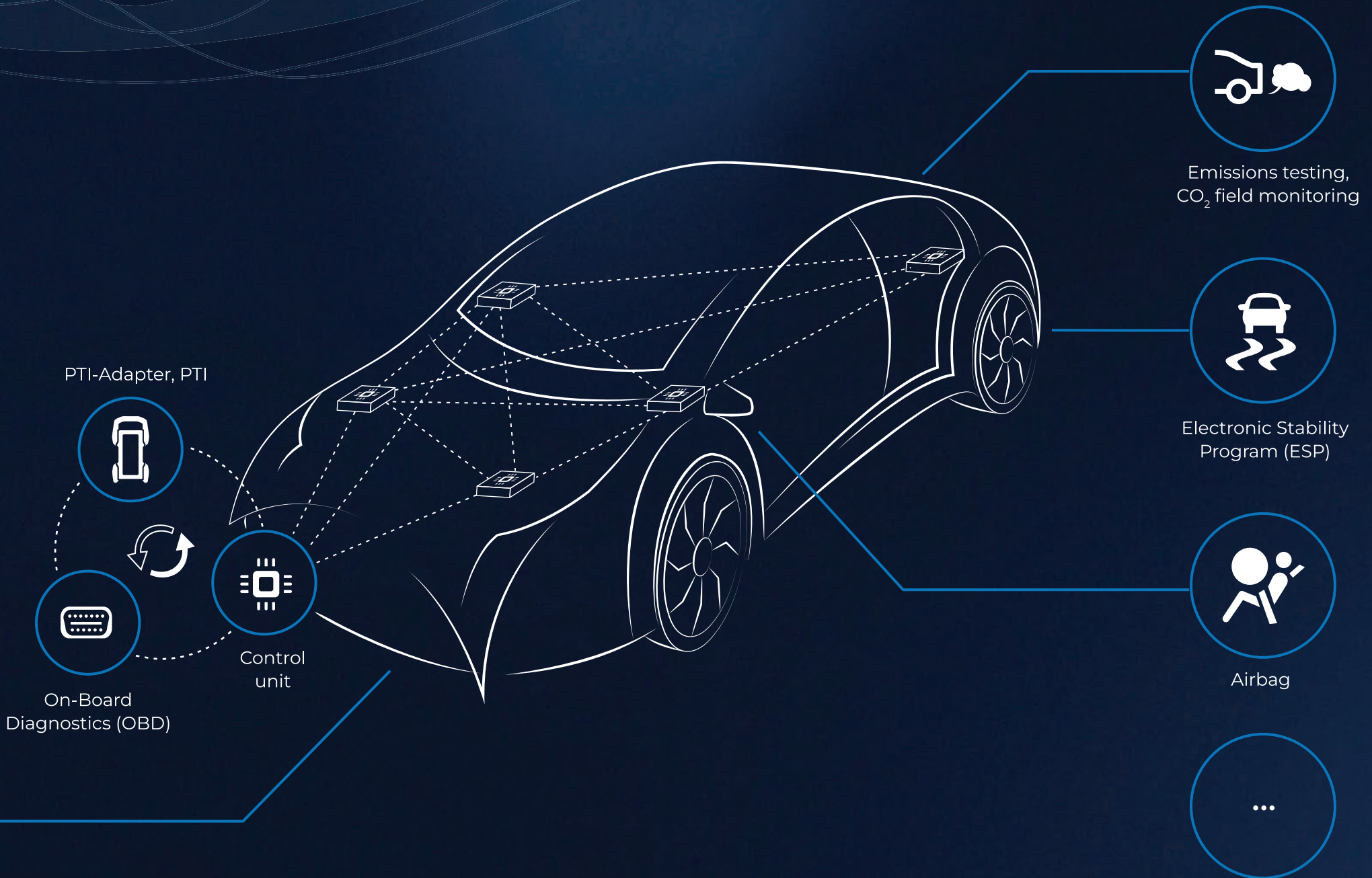




Software inspection of all vehicle systems with relevance to safety and the environment

- Software and corresponding updates, in particular for safety-relevant systems (e.g. driving dynamics, driver-assistance systems, engine management), must be able to be checked for conformity and integrity.
- In the event of software updates causing a risk to road users or a deterioration of environmental performance, measures must be taken ranging from recalls ordered by the authorities to the revocation of the operating licence.
- Software checks using the PTI-Adapter are already an integral part of the PTI. They are carried out e. g. following software-related recalls initiated by the German Federal Motor Transport Authority (KBA).
- With entry into force of the General Safety Reg. (GSR), new safety relevant systems have become mandatory and the software of these systems is certified in the type approval. Functionality and software integrity are inspected in PTI as software-checks.
- The authorities must have access to comparison values for software and corresponding updates (including software numbers and integrity features such as checksums) in order to be able to implement a corresponding conformity check.

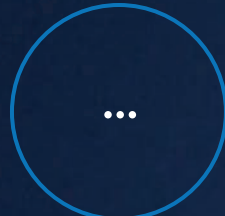




Emissions testing,
CO₂ field monitoring

Electronic Stability
Program (ESP)

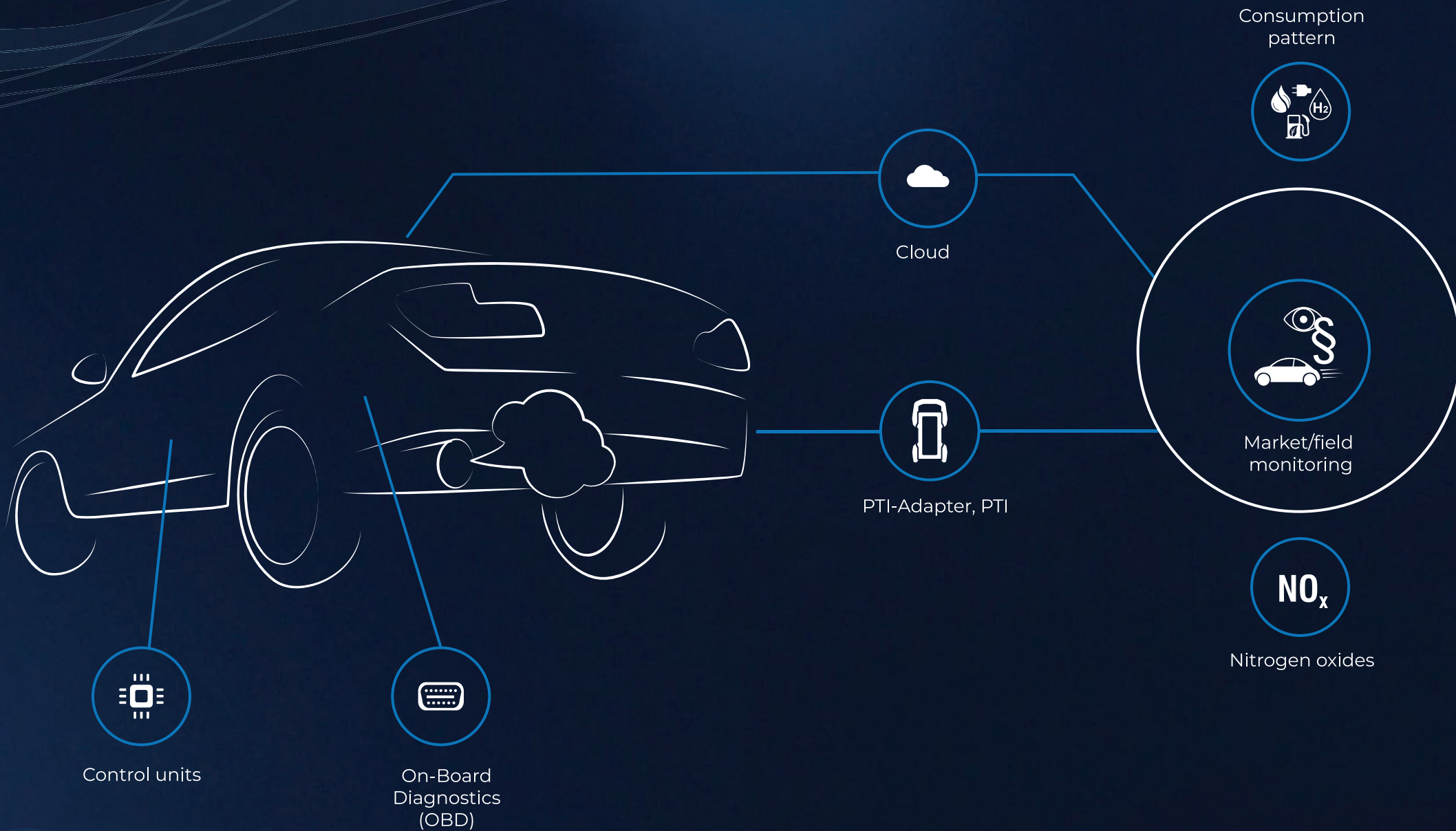
Airbag



PTI-Adapter, PTI

On-Board
Diagnostics (OBD)

Control
unit





Holistic inspection of vehicle emissions for better air quality



Testing for compliance with thresholds



Energy efficiency



Emissions testing, CO₂ field monitoring

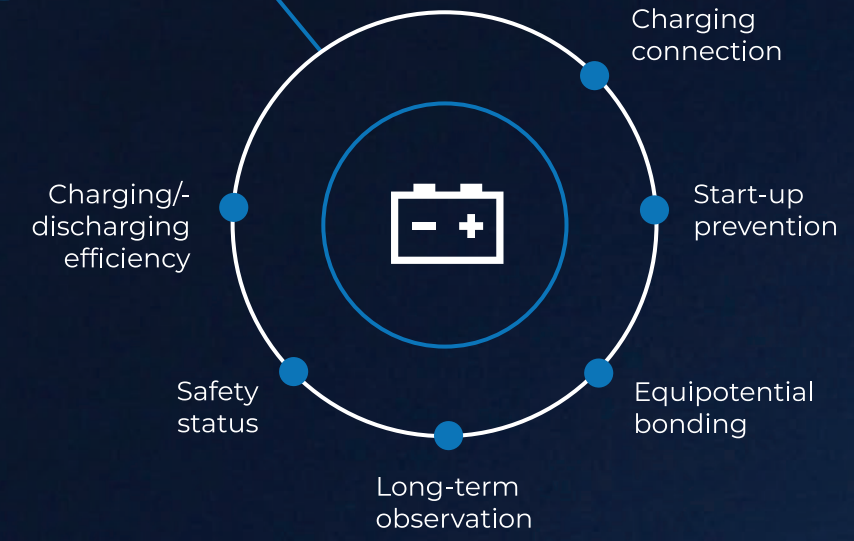
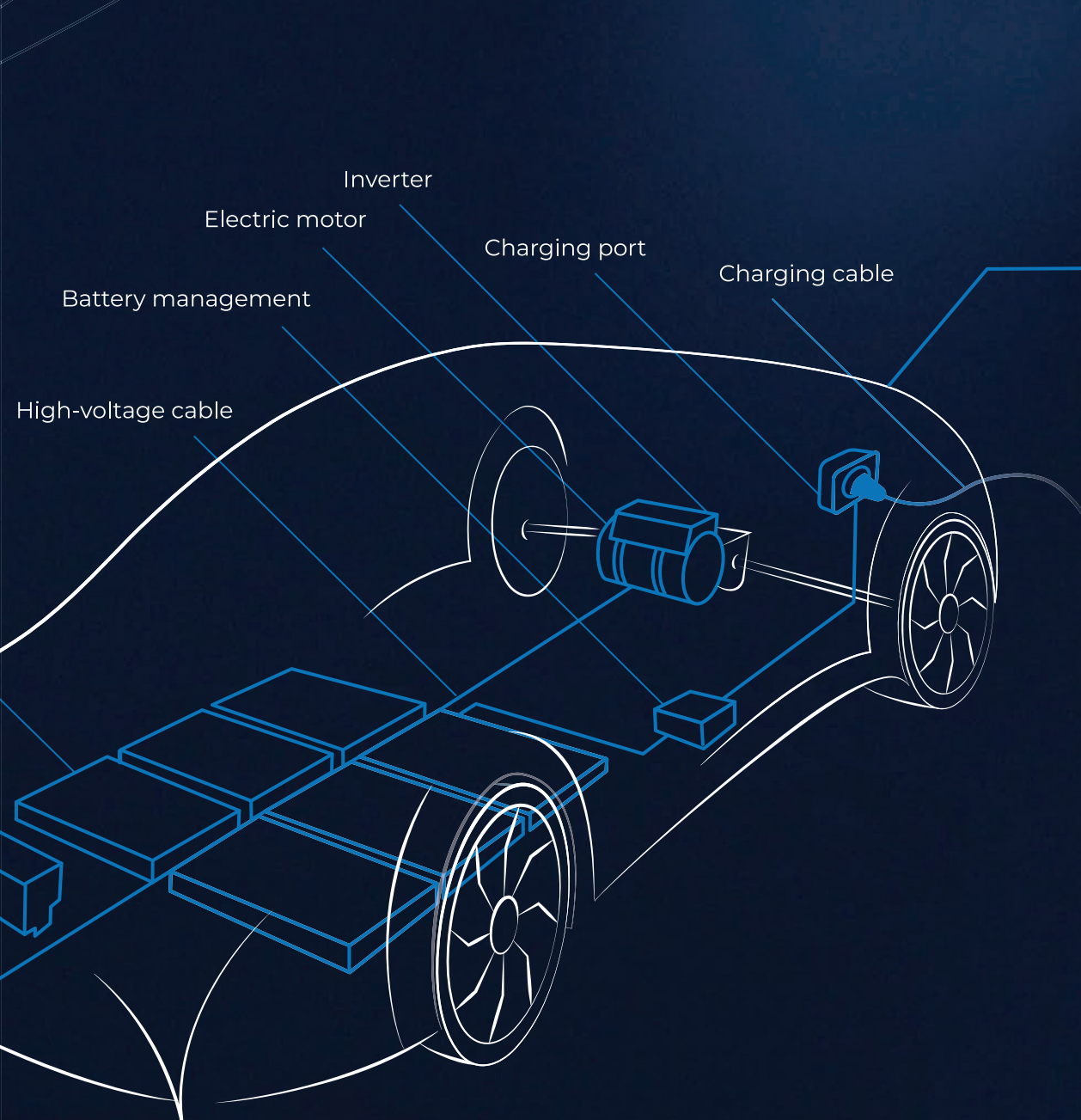
- A holistic life-cycle review of applicable emission thresholds is ensured through synchronised requirements for certification, type approval and periodic inspection within the context of the PTI.
- Appropriate combination of on-board diagnostic values and extended tailpipe measurement as part of the PTI: measurement of the particle count also in gasoline engines and further development of efficient nitrogen oxide measuring methods for diesel engines, taking into account load points in the entire spectrum of the combined exhaust gas after-treatment systems.
- Supplementation of the PTI by independent monitoring of the fuel and/or power consumption of conventional vehicles and hybrid vehicles, as well as the purely electric distance travelled by hybrid vehicles.
- Independent consistent field monitoring based on remotely transmitted vehicle information complements market surveillance and product monitoring measures by the vehicle manufacturers (in-service conformity).

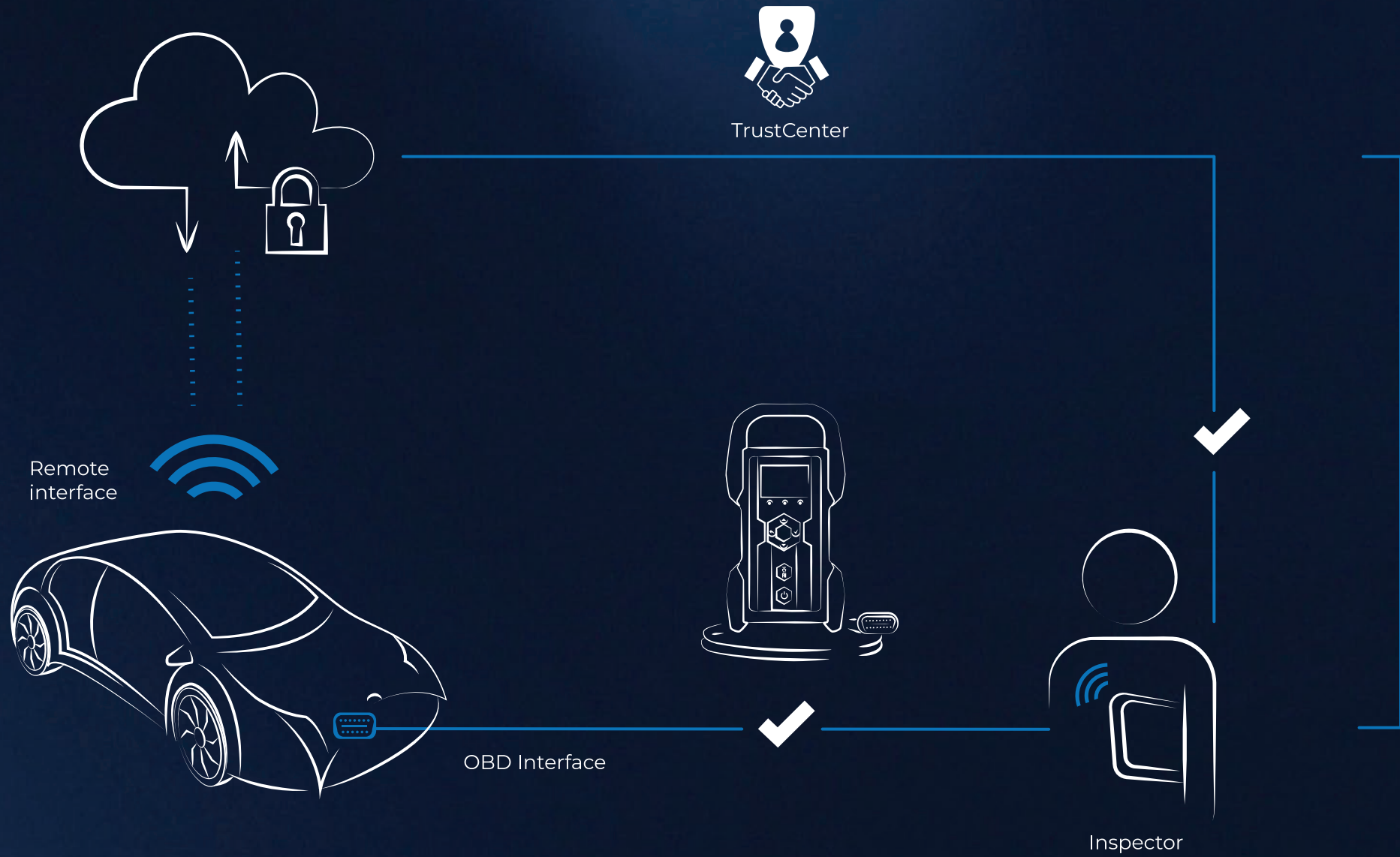


Safe e-mobility

- High-voltage (HV) components and the high-voltage storage system are checked for faults via the electronic vehicle interface, but visual inspection of the components, lines, markings, etc. also continues to play an important role.
- Reliable inspection of HV safety is implemented quickly and efficiently by measuring equipotential bonding and insulation resistance at the charging port.
- The complexity of high-voltage cells and battery management require continuous field observation and further development of test methods and technologies. Not only the charging/discharging efficiency and the durability, especially the safety state of the high-voltage storage system is highly relevant in this context. The evaluation is also based on data from long-term observation.
- In combination with field data, dynamic inspection and vehicle diagnostics, essential functions of the HV drive must be tested:
 - › Testing of the HV insulation or insulation monitoring devices
 - › Testing of start-up prevention during charging processes
 - › Inspection of the electrical efficiency
 - › Checking of the traction batteries for safety-critical features, such as ageing effects or mechanical damage







Applications



Research



Field monitoring



EDR/event data recorder



PTI



CO₂ field monitoring



Other services



Access to vehicle data via OBD and remote interfaces

- Independent and unrestricted access to vehicle data via both the physical interface (OBD) and the remote interface (OTA) are necessary for performing sovereign tasks such as the PTI.
- Secure handling of – and neutral access to – mobility and vehicle data is ensured by suitable TrustCenter solutions for authorisation management.
- The vehicle owners or users are the key players and they decide on the (private, non-official) use and sharing of the mobility or vehicle data they have generated.

THE PERIODIC TECHNICAL INSPECTION – INNOVATIVE AND DIGITAL

- As a recurrent on-site inspection, the periodic technical inspection (PTI) will continue to ensure the safety, environmental compatibility and compliance of increasingly digitalised traffic with highly intelligent vehicles alongside today's vehicles.
- In an increasingly digitalised environment, experts are carrying out – and will continue to carry out – all relevant main aspects of the examinations with expertise, customer proximity, efficiency and commitment.
- Real-time data exchange, including by means of an electronic vehicle file, ensures that all necessary data and inspection sequences for the individual vehicle are available to inspectors at all times on demand.
- Innovative inspection technologies and methods adapted to the further development of vehicle technology are integrated into the PTI.
- The simple connection and the flexible use of new operating devices, such as smartwatches and smartglasses, in combination with novel test equipment, such as vehicle targets and simulations, enable experts to choose the best inspection setup depending on the type and configuration of the vehicle.

✓ Real time data exchange

✓ Innovative inspections

✓ Flexible use of devices

Efficient, modular
vehicle testing

Vehicle inspection

Inspection setup

Inspection

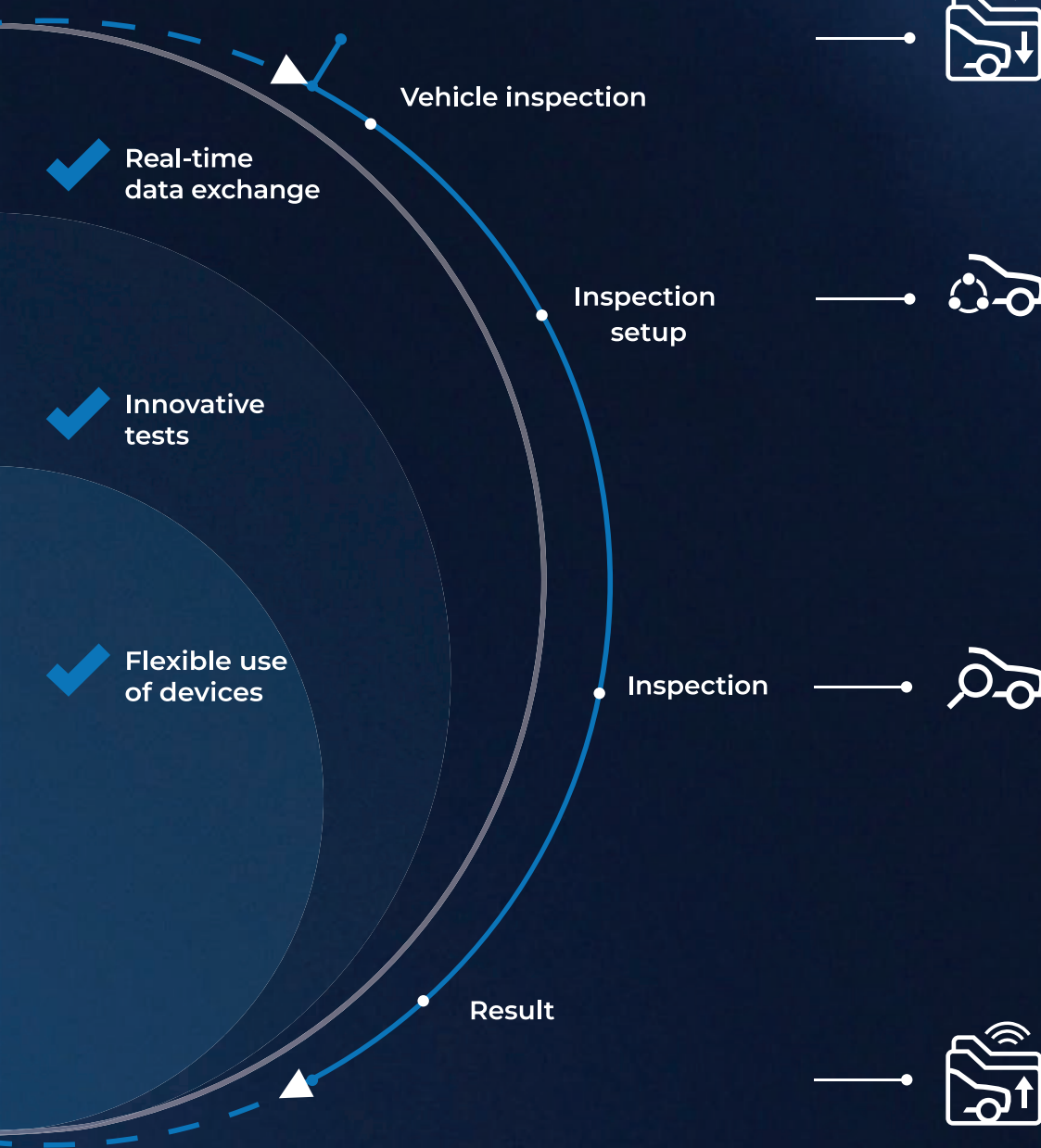
Result

PTI-Net

VIS



Efficient, modular
vehicle testing



- ✓ Read in digital vehicle registration document (PTI code)
- ✓ Automatic retrieval of the electronic vehicle file
- ✓ View electronic vehicle file (e.g., defect history, recalls)
- ✓ Other inspections provided by third parties
- ✓ Automatic connection of all devices via PTI-Net
- ✓ Automatic inspection- and information setup via electronic vehicle interface
- ✓ Conditioning/test drive
- ✓ Conducting of dynamic inspection (including automatic driving functions and axle damping)
- ✓ Visual/manual inspection of vehicle
- ✓ Inspection of fitment, condition, function, efficiency of components, assemblies and systems via electronic vehicle interface
- ✓ Use of brake/function test benches and other test equipment (e.g. Car2X test unit)
- ✓ Check of environmental compatibility (exhaust emissions inspection, inspection of engine management and exhaust emission control systems – AU/UMA)
- ✓ Check of data protection and data security
- ✓ Creation of digital PTI report
- ✓ Transmission of PTI report to electronic vehicle file
- ✓ Transmission of PTI results and technical inspection results

- The PTI is characterised by an efficient and modular inspection process.
- Based on the digital vehicle registration certificate, inspectors can gain real-time access into the electronic file of the vehicle. This contains all the relevant data, such as the defect history, or pending recalls.
- The automatic connection of all relevant inspection equipment and test devices is efficiently realised via a uniform network on site in the inspection center (PTI-Net).
- The required information- and test setup for a vehicle is determined automatically via the electronic vehicle interface. In combination with the electronic vehicle file, each PTI can thus be tailored to the individual requirements of a vehicle.
- In addition to visual and manual vehicle inspection, inspections via the electronic vehicle interface are increasingly being established. New means of inspection, such as dynamic targets or function test benches, enable modern status and function inspection of automated and connected driving systems.
- All PTI results are prepared on a vehicle-specific basis, are transmitted to the electronic vehicle file, and are available in real time, for example for revision of test procedures.

THE AUTHORS OF CHARTER 2030

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TÜV Saarland
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TÜV Hanse GmbH



Auto Service



Verkehrssicherheit und Überwachung
von Kraftfahrzeugen (VÜK) GmbH

TÜV SÜD Auto Partner GmbH



Auto Partner

TÜVNORD

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GTÜ Gesellschaft für
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KÜS

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FSP Fahrzeug-Sicherheitsprüfung
GmbH & Co. KG



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TÜV-Verband e. V.



DEKRA Automobil GmbH

TÜV Technische Überwachung
Hessen GmbH



FSD Fahrzeugsystemdaten GmbH

GLOSSARY

(Automotive) cyber security

All measures for the prevention of and defence against attacks and attempts to manipulate electronic systems and data data communication in the vehicle

AU (UMA)

Exhaust emissions inspection (inspection of engine management/exhaust emission control system)

BMDV

German Federal Ministry for Digital and Transport

Car2X (Car2Car, Car2Infrastructure)

Wireless communication of vehicles with each other or between vehicles and transport infrastructure, e.g. to warn of critical situations

CITA

Comité International de L'Inspection Technique Automobile (worldwide association of authorities and authorised companies active in the field of vehicle compliance)

EDR/DSSAD

The Event Data Recorder (EDR) is a data memory that records driving-dynamic data shortly before, during, and immediately after an incident (accident or critical driving situation). The Data Storage System for Automated Driving (DSSAD) is a data memory that records the times of switching between manual and automated driving in (partially) automated vehicles.

Electrification

Term for the increasing use of battery-powered (and hybrid) electric vehicle drives

GSR

General Safety Regulation (Regulation (EU) 2019/2144, in force since July 2022): lays down extensive safety requirements for the approval of motor vehicles in order to improve the safety of modern vehicles and obliges manufacturers to integrate advanced safety systems into new vehicle types, like emergency brake assistants and lane departure warning systems

PTI-Adapter

Universal communication and measuring device for use in the electronic PTI (mandatory equipment in German PTI)

PTI

The Periodic Technical Inspection (PTI) is a recurrent technical inspection of vehicles

HV (drive)

High-voltage system or high-voltage: term used in vehicle technology for systems that operate with AC over 30 V to 1 kV or with DC over 60 V to 1.5 kV

In-service conformity

Verification of compliance of vehicles during the period of use

GLOSSARY

KBA

German Federal Motor Transport Authority

AI/ML algorithms

Methods and procedures in the fields of artificial intelligence and machine learning, which are also increasingly used in automated vehicles

OBD/OBD-II

OBD refers to the on-board diagnosis of electronically controlled vehicle systems and serves as a term for the standardised electronic (wired) vehicle interface

OBFCM

On-Board Fuel Consumption Monitoring means a device installed in the vehicles that measures fuel/power consumption during driving operation on the basis of EU Regulations (EU) 2019/631 and (EU) 2021/392 and is intended for use in determining deviations from official laboratory values.

OTA interface

Over-the-air interfaces are increasingly being used for wirelessly uploading vehicle software updates and for reading diagnostic information

(electronic) Periodic Technical Inspection (ISO ePTI)

ISO ePTI according to ISO 20730 describes an international standard for carrying out an inspection of systems, assemblies and components via the electronic vehicle interface as part of the periodic technical inspection

PTI-Net

Future IT network for the automatic connection of all test equipment and devices relevant to the PTI in the inspection bodies

TrustCenter

Independent trusted institution responsible for issuing certificates and depositing digital keys and digital signatures.

UN Regulations

International technical regulations for the development and approval of motor vehicles (including for cyber security UN Regulation 155 and software updates UN Regulation 156)

VIS

Software application for providing (inspection) specifications for the electronic periodic technical inspection in Germany

Vision Zero

In the context of road safety, vehicles, traffic and road infrastructure will in future be designed so safely that road fatalities and serious injuries will no longer occur in road traffic. In the context of environmental protection, climate-neutral mobility solutions – including electric vehicle drives – are being sought

Gender note: *In the interests of easier reading, this text forgoes the use of the masculine, feminine and diverse forms of address. All references to persons apply equally to all genders.*

Legal notice

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