Workshop B3

Al Bustan Rotana Hotel, Harayer & Salsabeel

Priorities for New Testing Procedures – Other Systems

Chaired by Frank Leimbach

CITA Policy Expert for Europe – Safety Systems

Workshop B3

Presentation 1

Feedback Following Workshop on Implementation of EU Roadworthiness Directive

Hens Peeters Weem

Manager PTI, RWD, The Netherlands

RDW

EU workshops November 2014 Amsterdam

Hens Peeters Weem

Manager PTI RDW

Bundesministerium
für Verkehr und
digitale Infrastruktur

Ministry of Infrastructure and the Environment

Our reference	Date	Email
VT2014/7707	22 August 2014	PTIworkshop@rdw.nl

Subject
Pre-invitation PTI Workshop

Dear Sir / Madam,

The 2014/45/EU directive of May 2014 has consequences for periodic technical inspections (PTI) in the European member states. Both technical and policy adjustments will be required. The RDW and BASt (Bundesanstalt für Straßenwesen) are intending to organise a workshop concerning this topic in November 2014 in Amsterdam, the Netherlands.

The workshop is open to all European government agencies and non-profit organisations that are involved in the PTI process. The objective of this meeting is to exchange knowledge and experience and in this way to help each other to implement the directive successfully.

With this pre-invitation the RDW and BASt want to investigate which organisations are interested in attending this workshop. Furthermore, we are interested in additional subjects that your organisation would like to be addressed in the workshop.

The subjects that this workshop may address include:

- The EU directive
- Experiences with mutual recognition
- Inspection of tractors
- Advantages and disadvantages of OBD use
- *Your subject* (please forward your wishes to the RDW)

If you are interested in participating in this workshop , please make this known prior to 5 September by mailing your personal details to: PTIworkshop@rdw.nl.

If there is sufficient interest, more information will follow and the programme will be arranged. If you have suggestions for the agenda, please make them known.

We await your reply with interest,

Yours faithfully,

Hens Peeters Weem
RDW

Rainer Krautscheid
bast


INVITATION
EU
PTI WORKSHOP
5 & 6 November 2014
Location:
Van der Valk Schiphol - Amsterdam - The Netherlands
Workshop subjects:
• EU Directive
• Inspection of tractors
• (Dis)Advantage of OBD use
• International data exchange possibilities
• Supervision of inspection stations
• And more ...
RDW
bast
Bundesanstalt für Straßenwesen

Reason en motivation

- Meeting with gouvernmental and non-profit organizations
- Who is who
- Sharing our challenges with the new directive on PTI
- Our (only) drive: road safety and environment

Participants: 18 countries delegate of the EU commision

Plenary presentations

- Walter Nissler: EU directive
- RDW: Data exchange
- BASt/FSD: OBD use
- ADAC: Odometer fraud
- RDW: Supervision on PTI
- Carpass Registration Odometer

Workshops

- PTI on Tractors
- OBD testing of emission and electronic components
- EU directive
- Mutual recognition / data exchange

Results of the workshop

- Tractors:

- Inventarisation on registration and PTI
- Practical problems
- Tractor groups to be tested

Results of the workshop

- OBD

- Euro 6 problems with measurement
- Combination / separate OBD / tailpipe
- OBD devices

Results of the workshop

- Directive

- Odometer storage and fraud
- Excluding of vehicles
- Supervision of inspectionsstations

Results of the workshop

- Data exchange and mutual recognition

- What data?
- Different PTI requirements in countries
- No acceptation PTI date at re-registration
- *On the road*: mutual acceptation of PTI
- *On paper:* no mutual acceptation

Next Workshops

- Croatia Zagreb March 2016

RDW

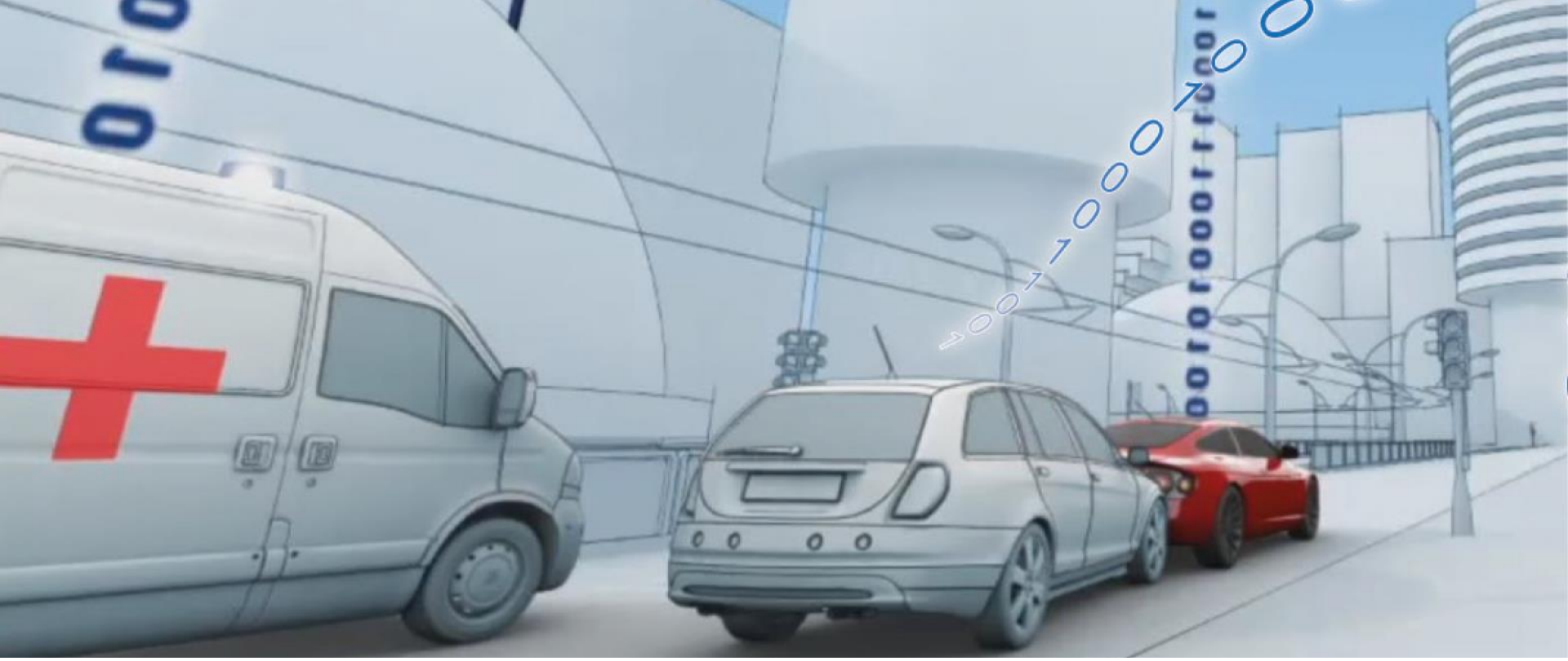
Workshop B3

Presentation 2

eCall Test Methods within the Context of PTI

Dietmar Bönninger

Central Agency for PTI, Germany



Enhancing the Value of Vehicle Inspection

eCall test methods within the context of PTI

2015 CITA Conference, 14-16th April 2015, Dubai, UAE

FSD Zentrale Stelle

Central Agency for PTI, Germany

Mr. Dietmar Bönninger, Project Manager ITS

eCall PTI
AGENDA

- Motivation for eCall inspection
- Benefits and limits of vehicle self-diagnosis
- eCall inspection concept
- Outlook

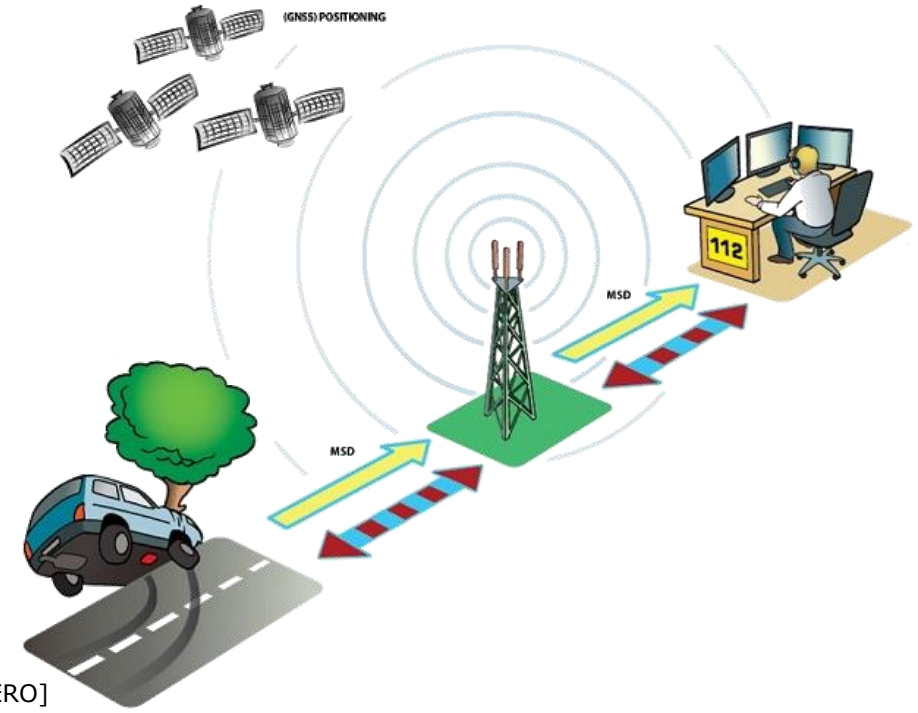
MOTIVATION

MOTIVATION
HISTORY

- **2,500 road traffic fatalities / year** in Europe potentially could be saved by reduced rescue times
- **Voluntary Agreement** (started 2005) of eCall implementation **failed**
- 2011 the EU Commission made a **recommendation to support** an EU-wide eCall service **until 2015**
- 03/2018: **Start of mandatory deployment** for all M1 & N1 vehicles

MOTIVATION
HOW IT WORKS

- eCall is **manually or automatically triggered** in the case of a crash
- **Minimum Set of Data (MSD)** is generated and routed as an emergency call via mobile network to the next **Public Service Answering Point (PSAP)**
- After the transmission of MSD, a **two-way voice communication** is established



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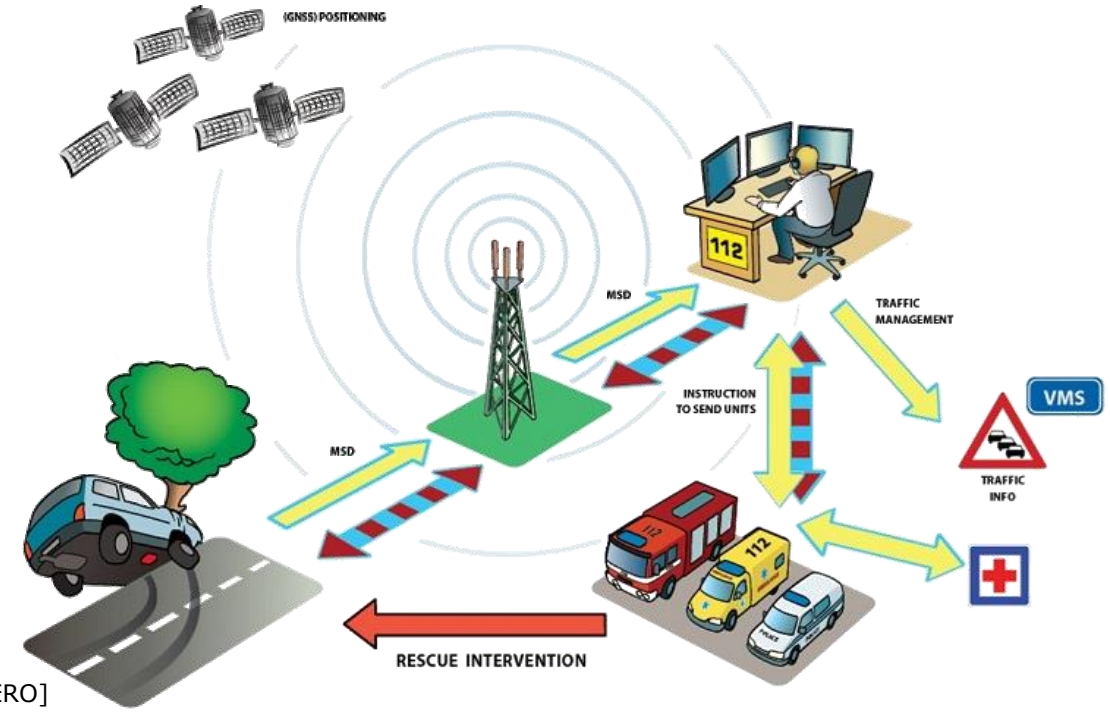
MOTIVATION
HOW IT WORKS

- Responsible **PSAP** evaluates eCall and possibly **induces rescue actions**
- Alerted rescuers drive to the crash site
- Possible information of the traffic control center



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MOTIVATION
CURRENT LEGISLATION

Inclusion of eCall as system to be tested into § 29 StVZO (German Road Traffic Licensing Regulation)

The proposal of the EU-Parliament to include the PTI in the eCall type-approval requirements (COM 2013/316), approved on March 2nd 2015 by the Council (not yet puplished in the Offical Journal)

Development of an appropriate testing procedure

REGULATION (EU) 2015/…
OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of …

concerning type-approval requirements for the deployment of the eCall in-vehicle system based on the 112 service and amending Directive 2007/46/EC

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 114 thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee[1],

Acting in accordance with the ordinary legislative procedure[2],

.

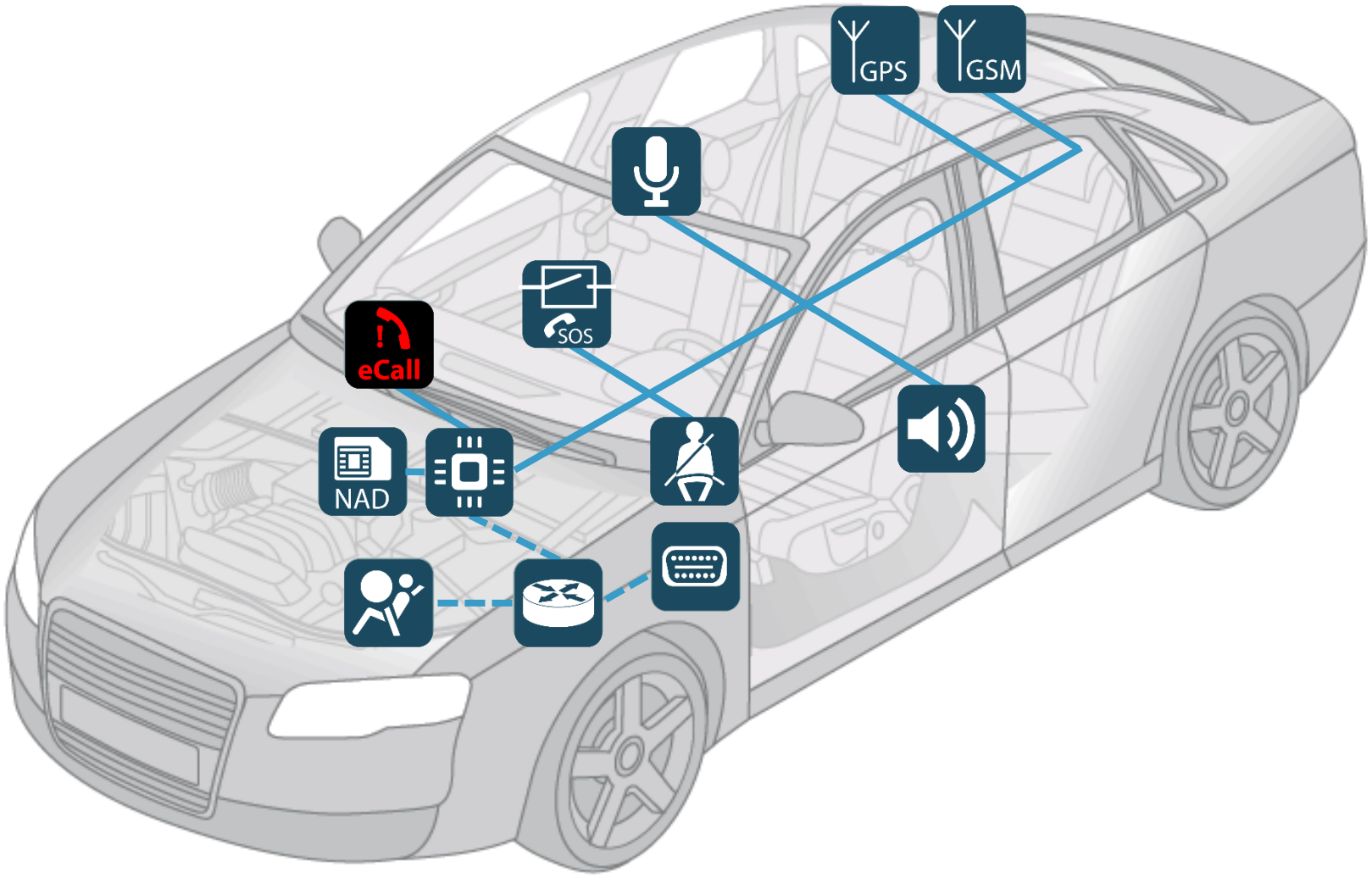
.

(18) The 112-based eCall in-vehicle system, as an emergency system, requires the highest possible level of reliability. The accuracy of the minimum set of data and of the voice transmission, and quality, should be ensured, and a uniform testing regime should be developed to ensure the longevity and durability of the 112-based eCall in-vehicle system. Periodic roadworthiness tests should therefore be carried out regularly in accordance with Directive 2014/45/EU of the European Parliament and of the Council[3].

1 OJ C 341, 21.11.2013, p. 47.
2 Position of the European Parliament of 26 February 2014 (not yet published in the Official Journal) and position of the Council at first reading of … [(OJ …)] [(not yet published in the Official Journal)]. Position of the European Parliament of … [(OJ …)] [(not yet published in the Official Journal)].
3 Directive 2014/45/EU of the European Parliament and of the Council of 3 April 2014 on periodic roadworthiness tests for motor vehicles and their trailers and repealing Directive 2009/40/EC (OJ L 127, 29.4.2014, p. 51).

MOTIVATION

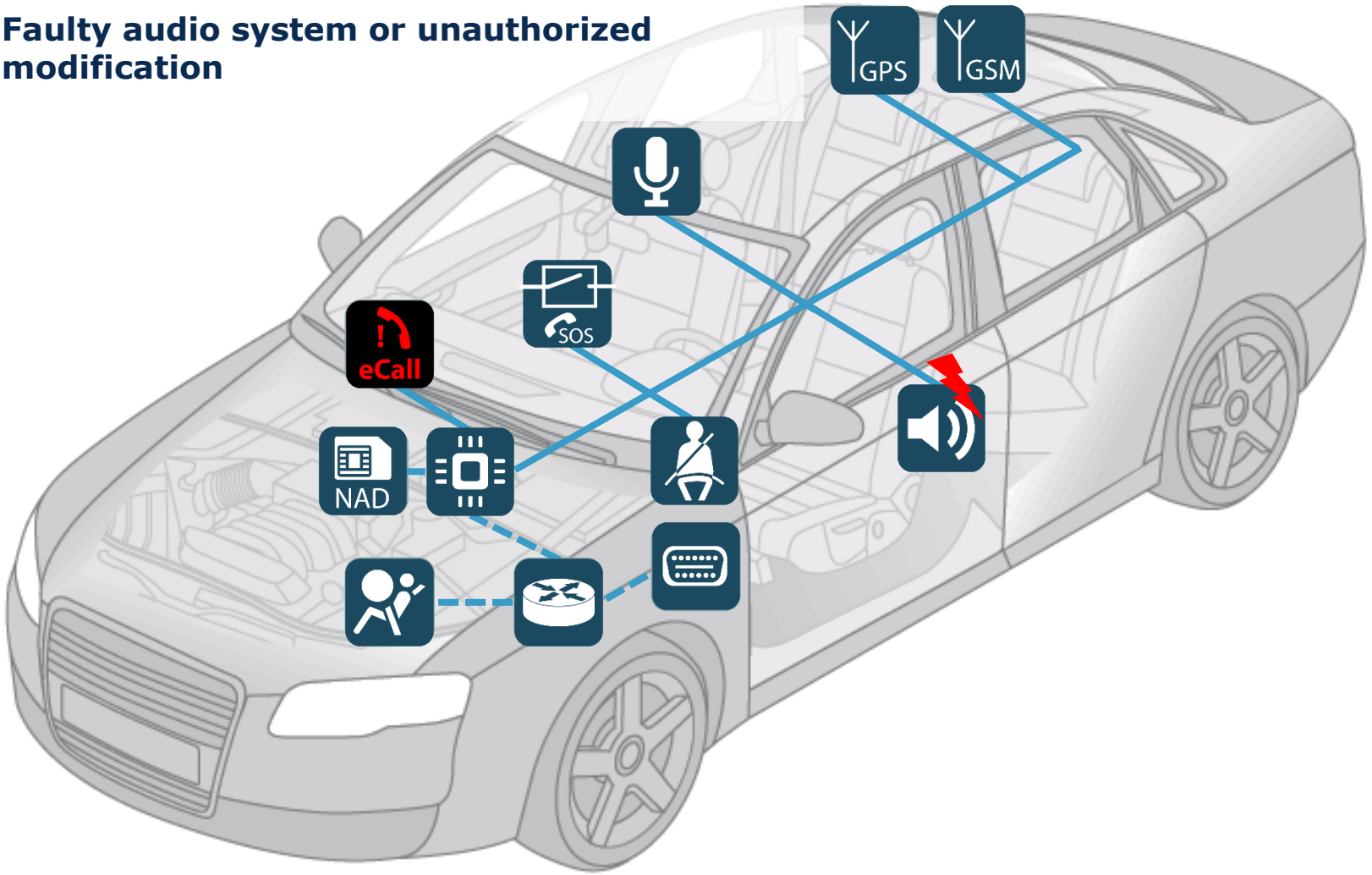
COMPONENTS AND POSSIBLE DEFECTS



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

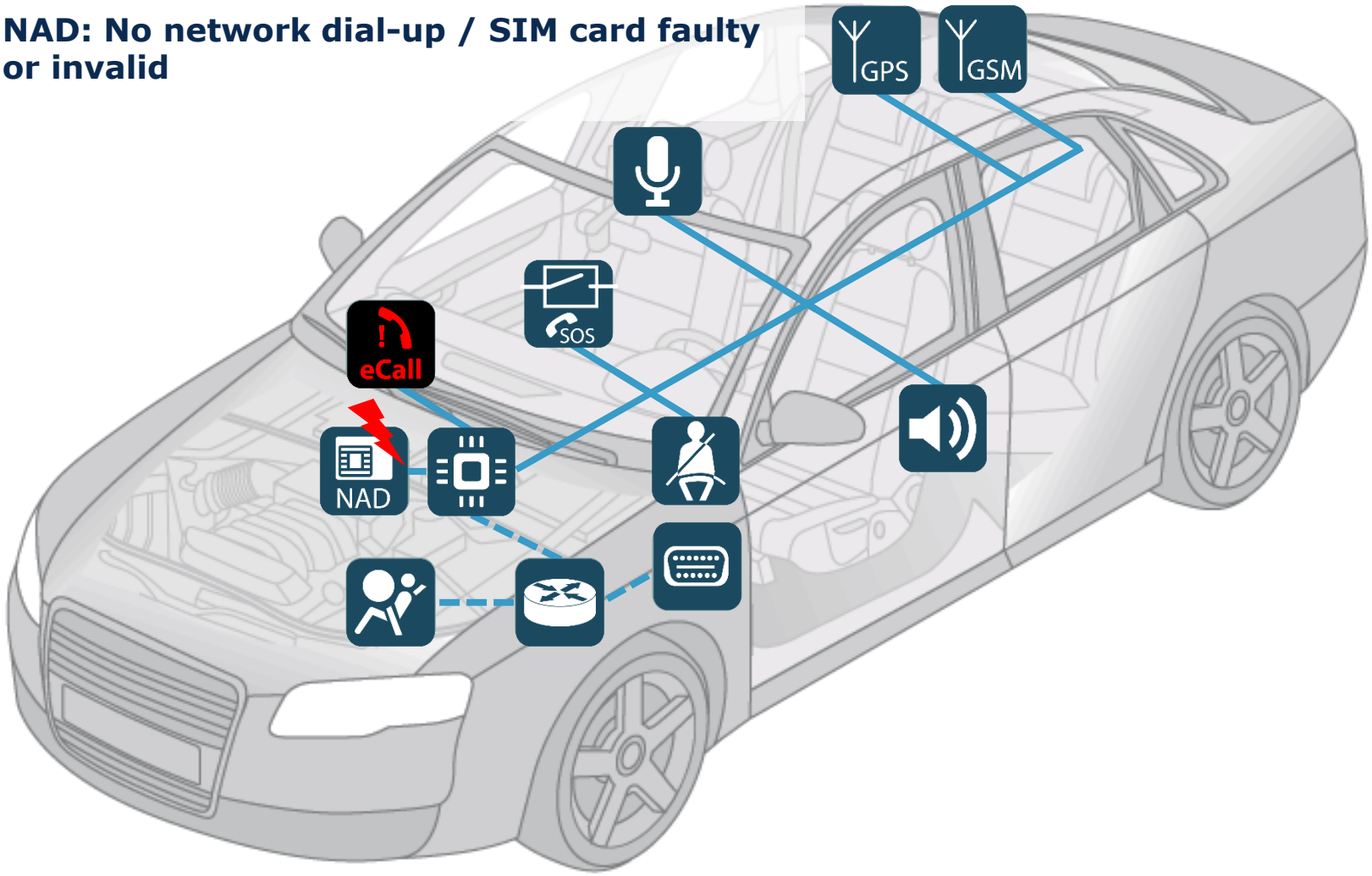
- **Faulty audio system or unauthorized modification**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

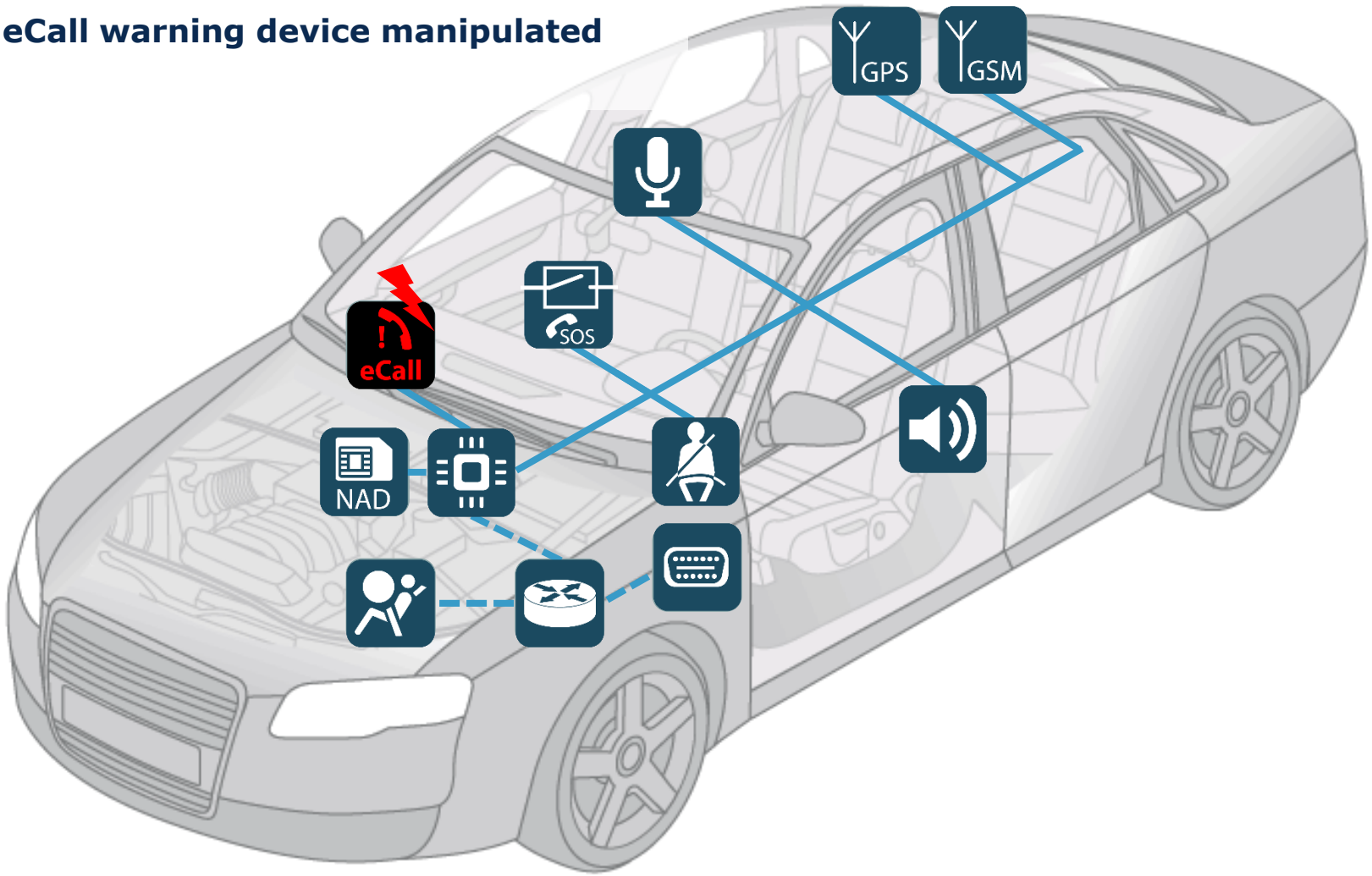
- **NAD: No network dial-up / SIM card faulty or invalid**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

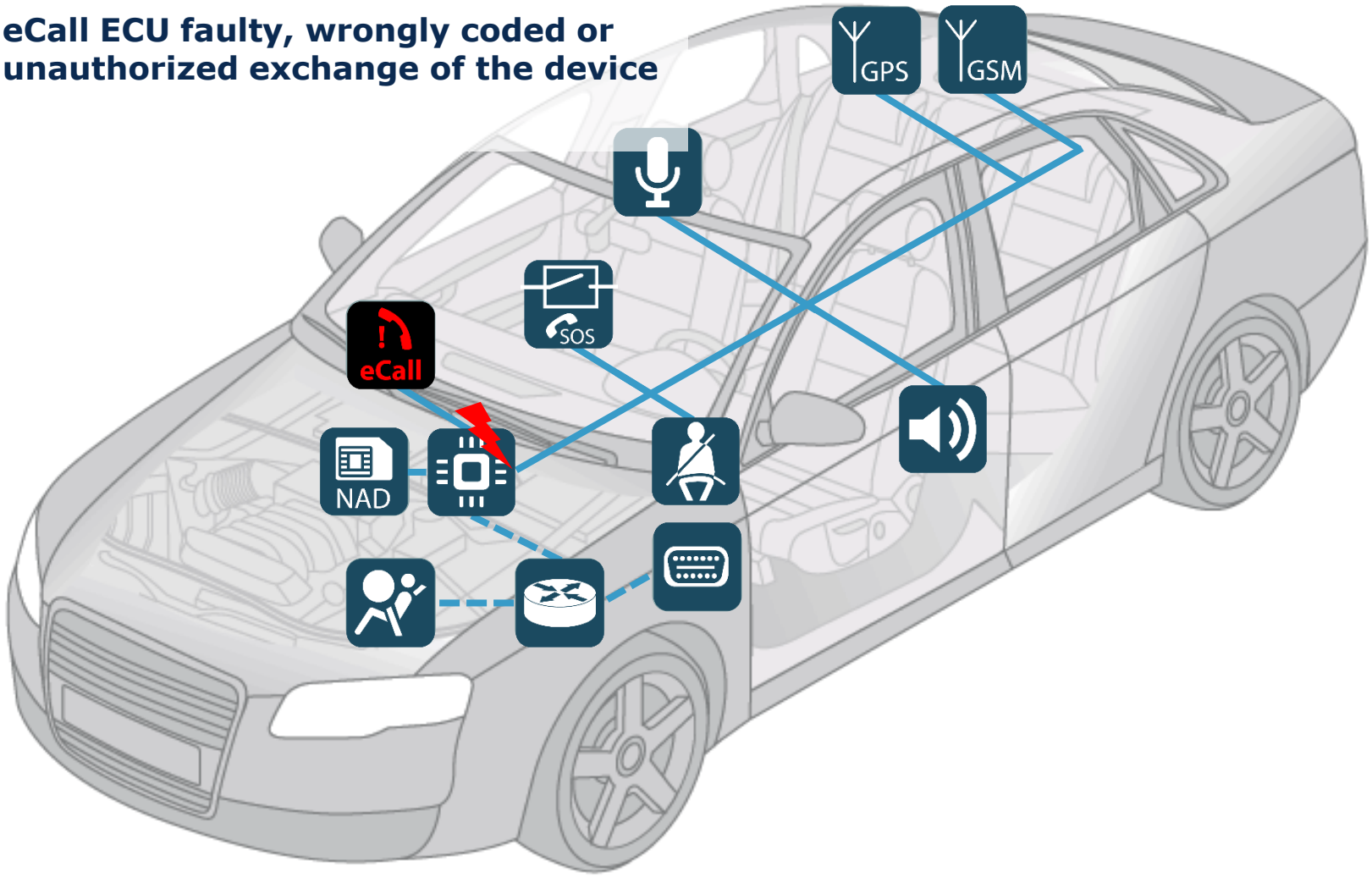
- **eCall warning device manipulated**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

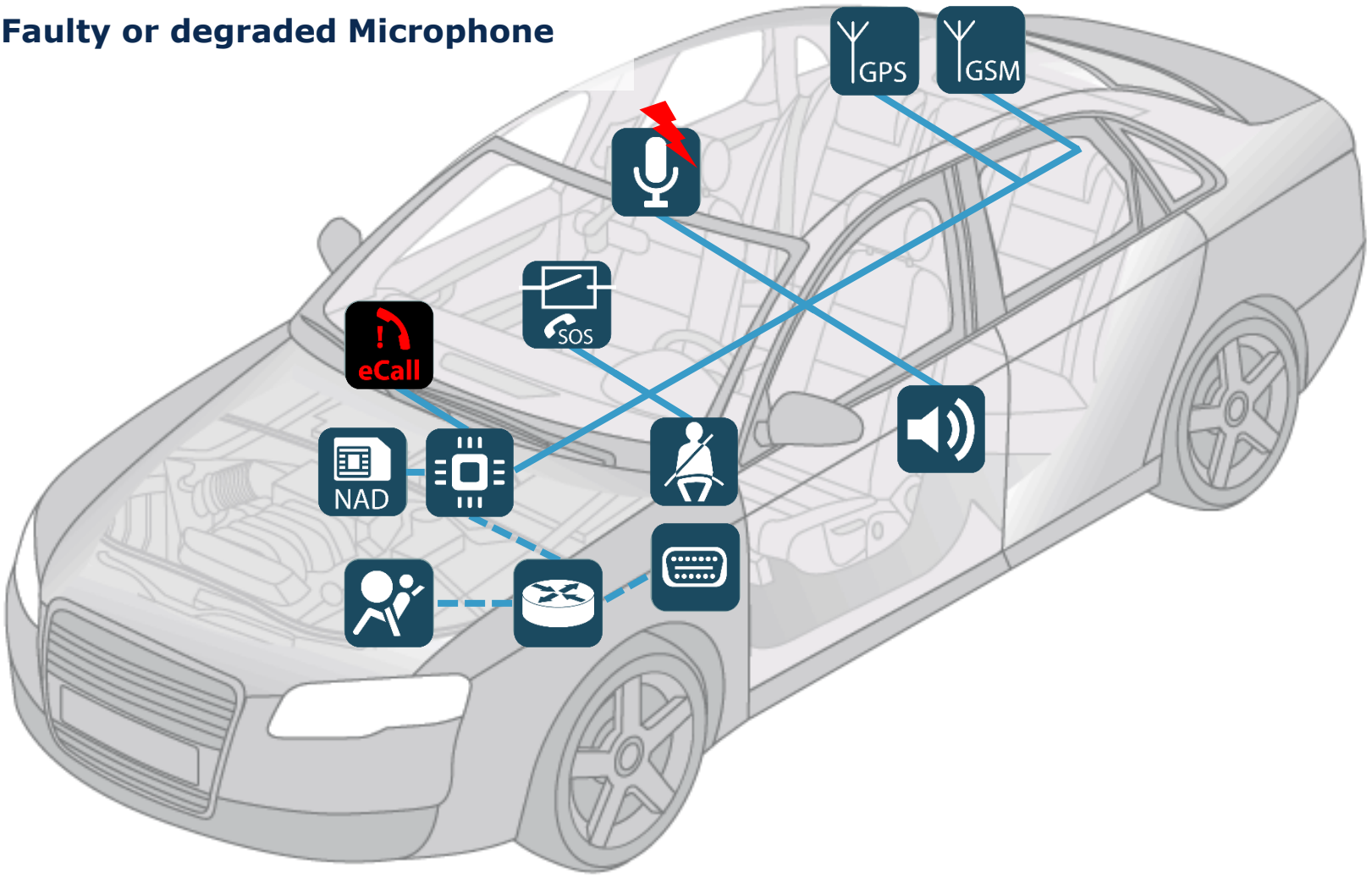
- **eCall ECU faulty, wrongly coded or unauthorized exchange of the device**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

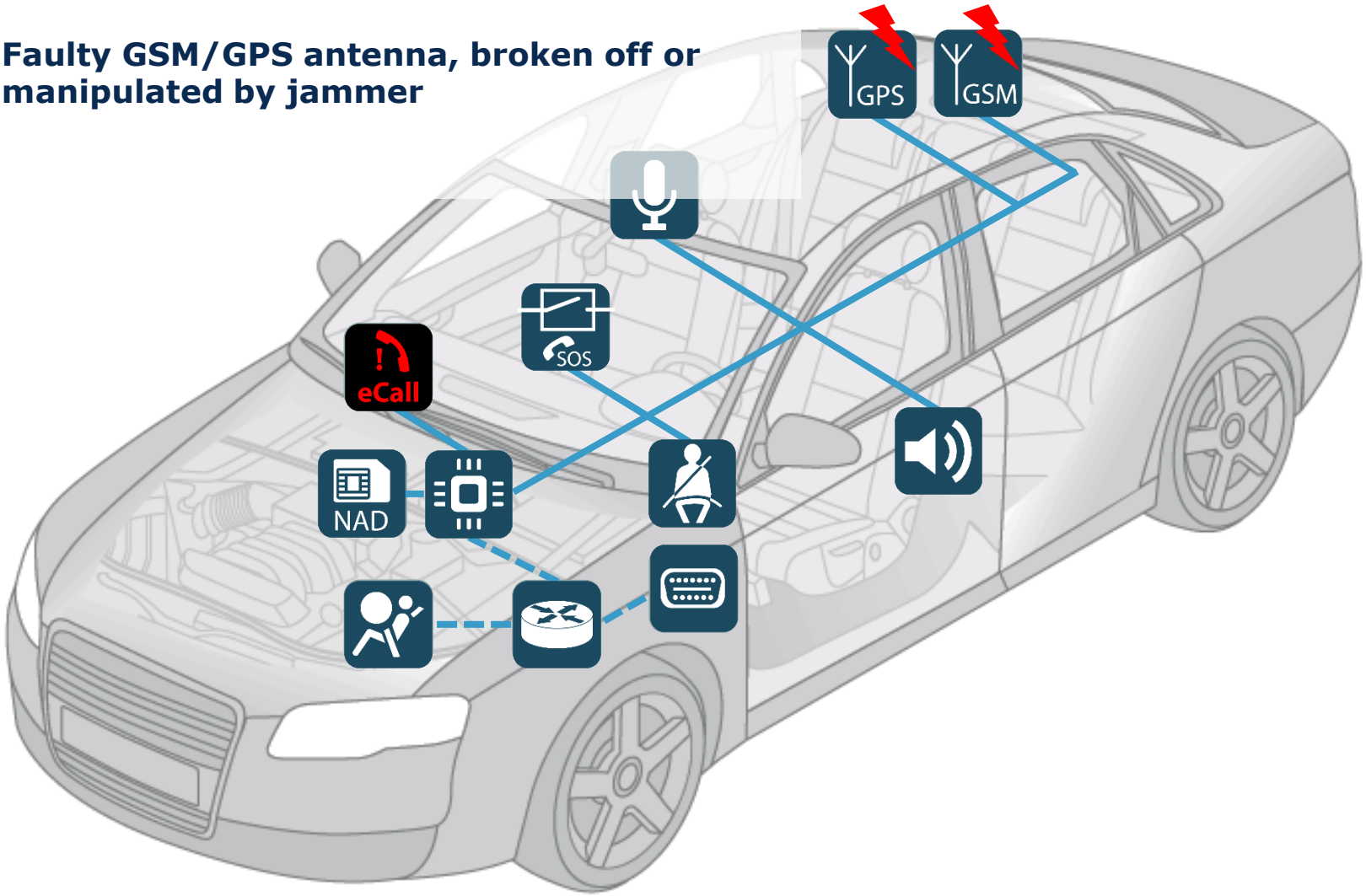
- **Faulty or degraded Microphone**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

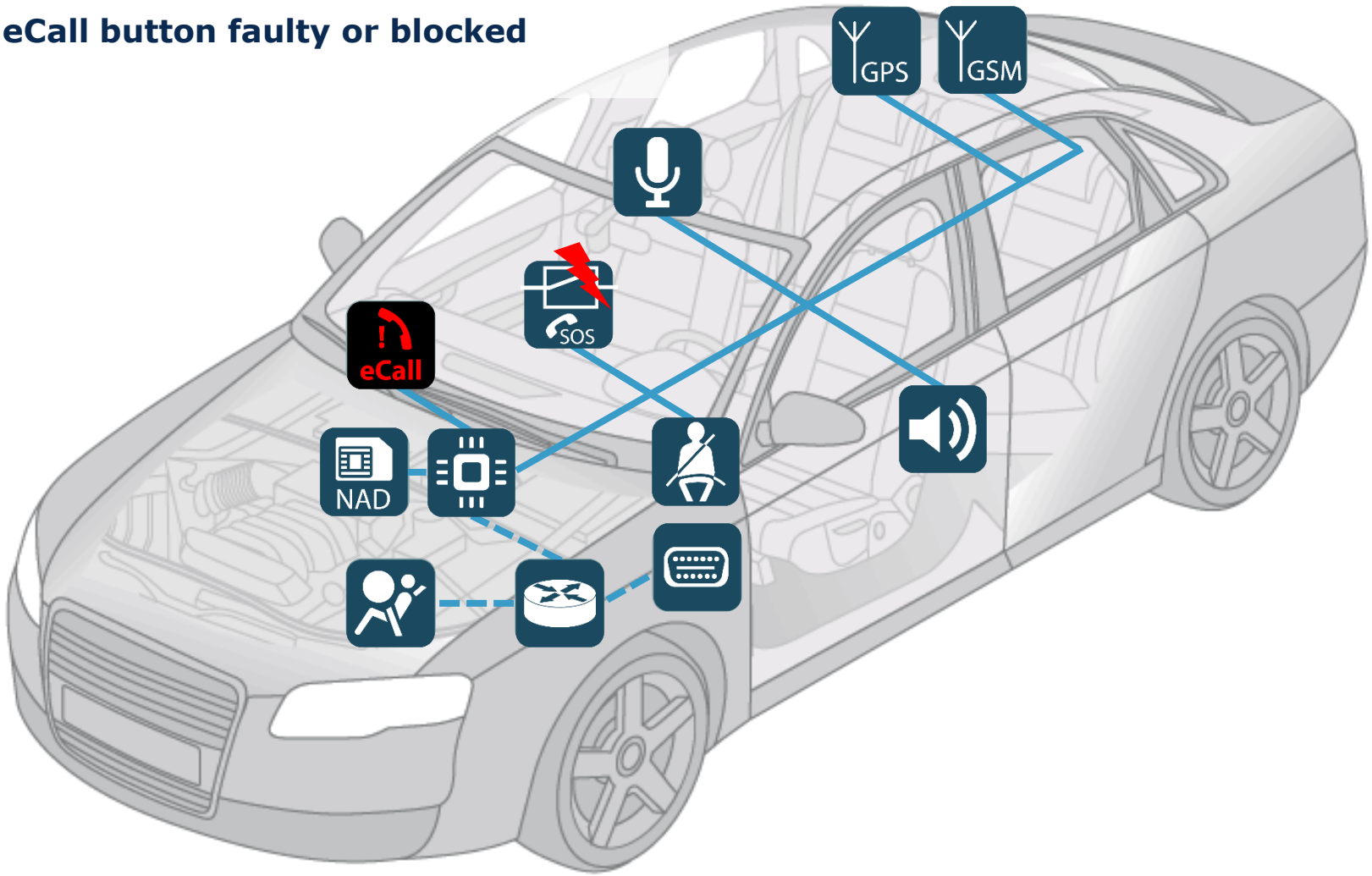
- **Faulty GSM/GPS antenna, broken off or manipulated by jammer**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

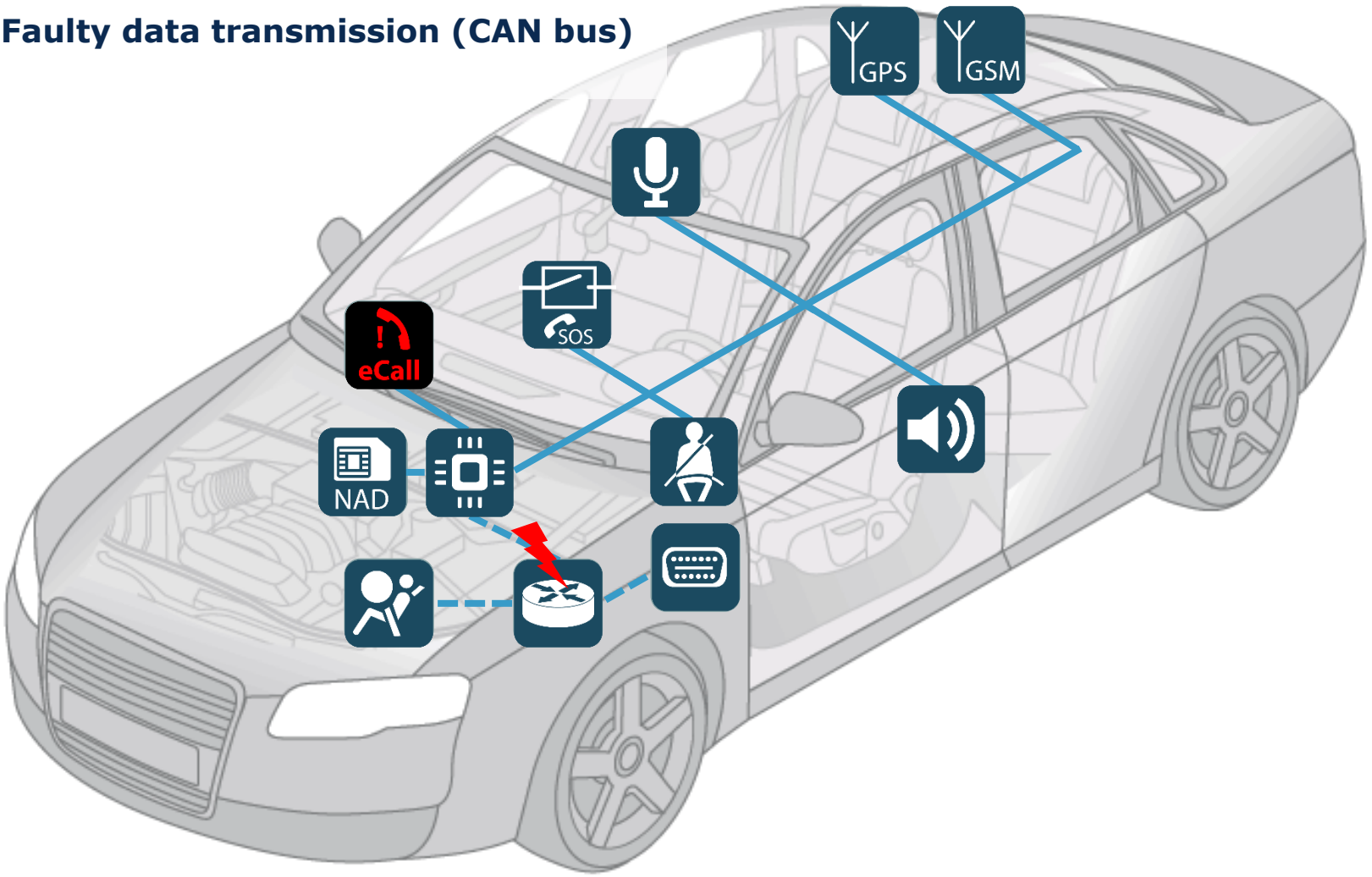
- **eCall button faulty or blocked**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

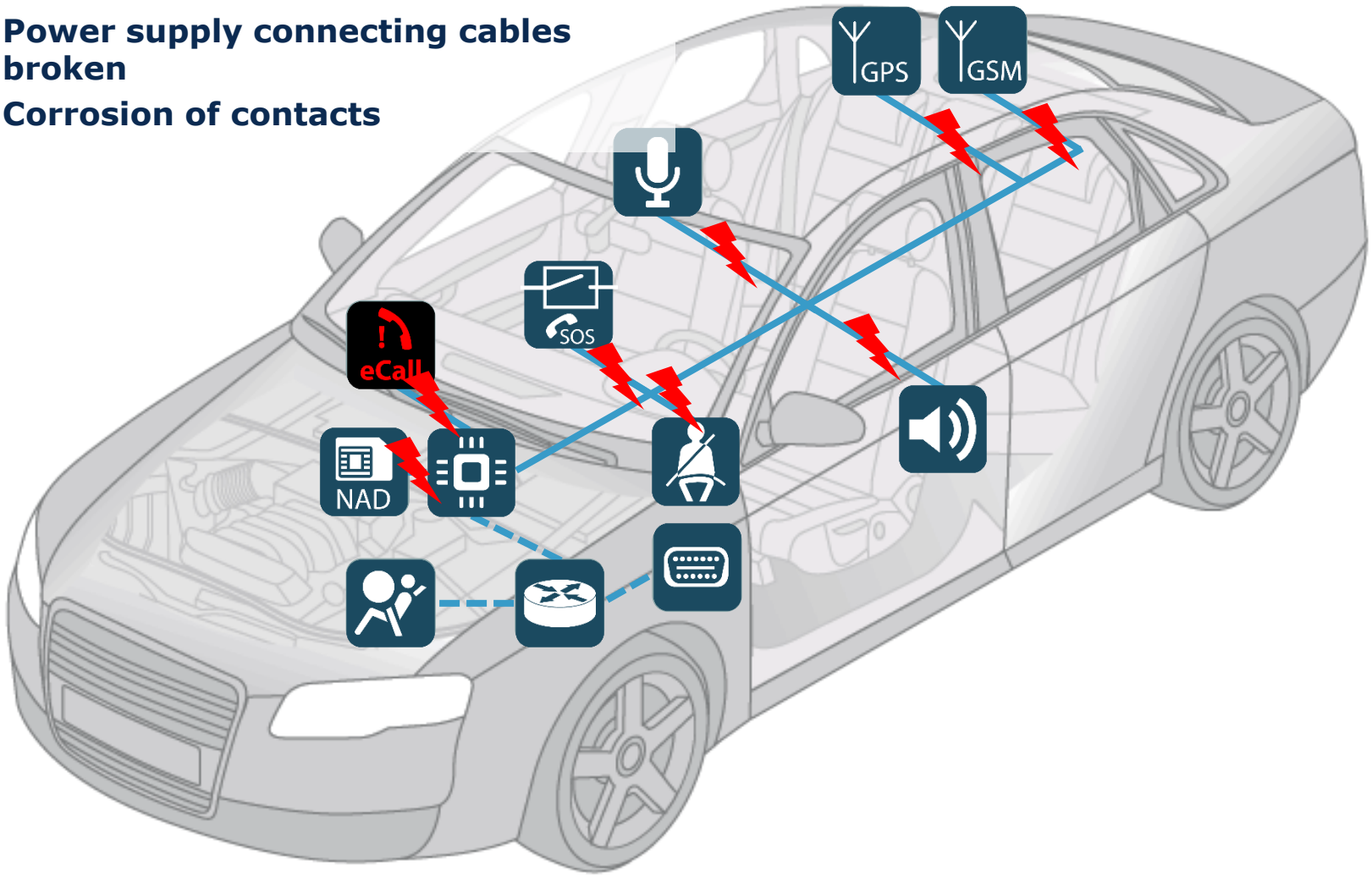
- **Faulty data transmission (CAN bus)**



MOTIVATION

COMPONENTS AND POSSIBLE DEFECTS

- **Power supply connecting cables broken**
- **Corrosion of contacts**



VEHICLE SELF-DIAGNOSIS
REGULATIONS IN STANDARDS

- In **EN 16062** determined:

  → **Self-test** after power-up is claimed

  → **Scope** of included components **not specified**

  → **Type and design** of required warning and checking device **not predefined**

→ **Study on self-diagnosis limits** of existing TPS systems were carried out

VEHICLE SELF-DIAGNOSIS
DIFFERENT TPS SYSTEMS

Excerpt of failure examples	OEM TPS A	OEM TPS B	OEM TPS C
Broken speaker cable	✓	✗	✓
Disconnected microphone	✓	○	✓
Interruption signal wire pushbutton	✗	✗	✓
Failure of ECU communication	✓	✓	✓

No DTC
No active MIL

DTC
without active MIL

DTC
and active MIL

- Different coverage of monitored components at different car models and manufacturers
- Electrical defects (disconnections) are recognized
- In case of a failure the driver doesn‘t get necessarily a warning

VEHICLE SELF-DIAGNOSIS
LIMITS OF SELF-DIAGNOSIS

- Beside the electrical faults, further defects can occur:

  → **Degradation, external damage of components**
  e.g. porous surround of speakers, broken antenna

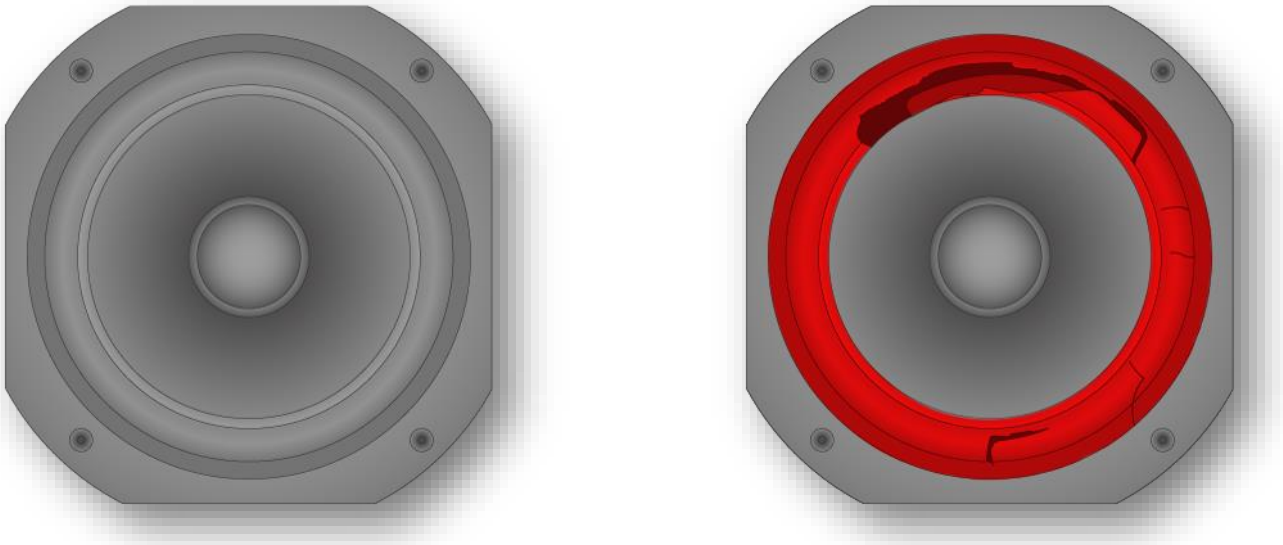
  → **Incorrect maintenance**
  e.g. installation of an invalid speaker system

  → **Manipulation**
  e.g. usage of a GPS / GSM jammer, manipulation of the warning and checking device

VEHICLE SELF-DIAGNOSIS
COMPONENT EXAMPLES

Example 1: Speaker characteristics declined

- Membrane can rip or crumble away through aging and environmental influences
- Distinct deterioration of the speech quality

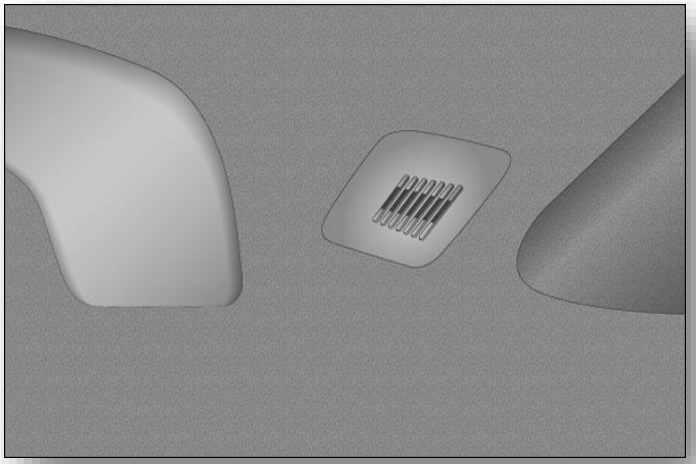


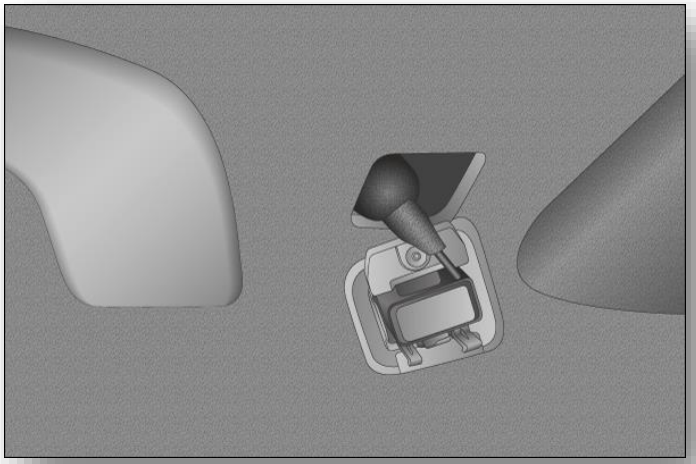
Analysis of function necessary

VEHICLE SELF-DIAGNOSIS
COMPONENT EXAMPLES

Example 2: Microphone orientation not optimal

- Wrong orientation of the microphone
- Directional characteristic of microphone and installation location not optimal anymore → silent calls



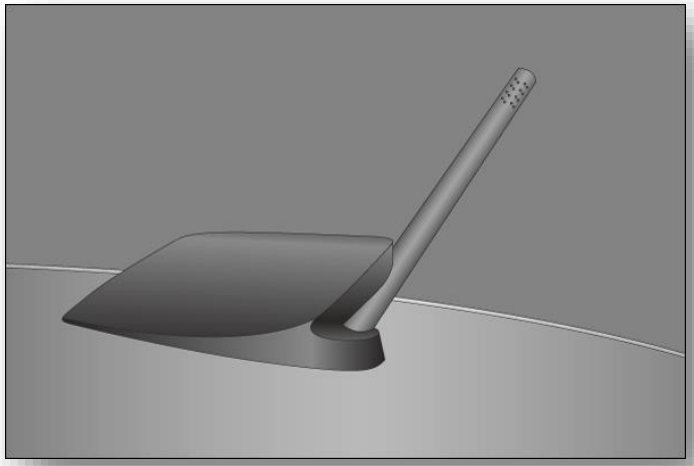


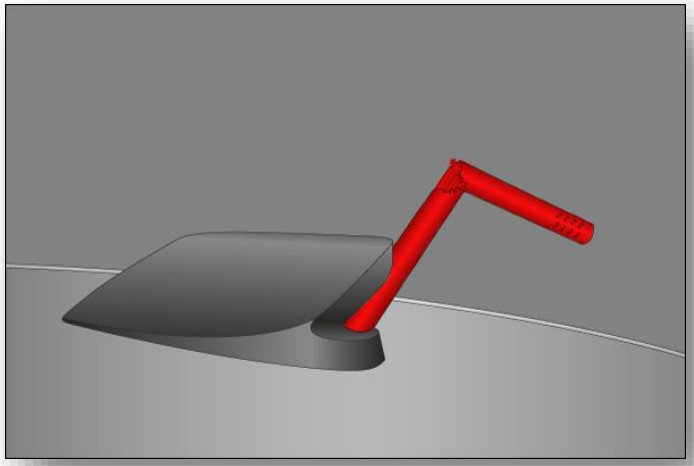
Analysis of visual condition necessary

VEHICLE SELF-DIAGNOSIS
COMPONENT EXAMPLES

Example 3: Mechanical defect of the antenna(s)

- Reception power affected by a mechanical defect
- No available GSM or GNSS-signal



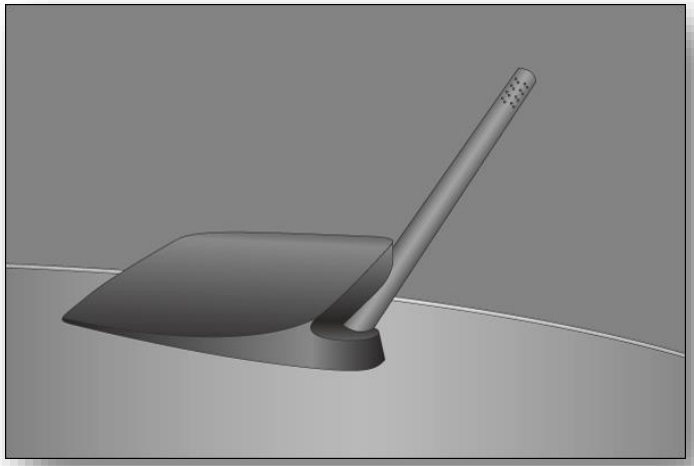


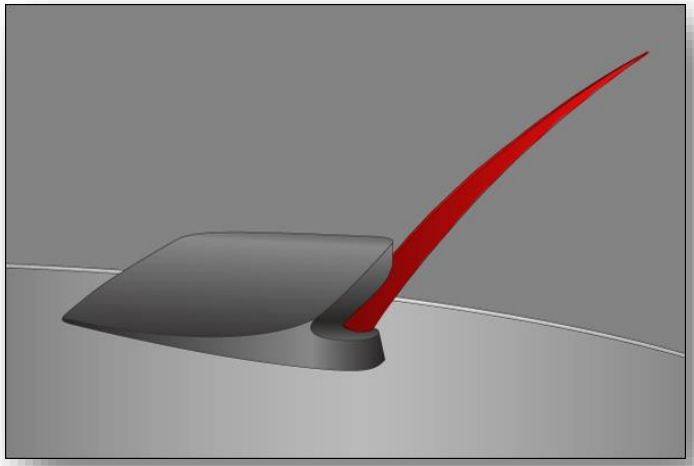
Analysis of visual condition necessary

VEHICLE SELF-DIAGNOSIS
COMPONENT EXAMPLES

Example 4: Unauthorized modification of the antenna

- Reception power can be affected by substitution of the antenna with a retrofit solution



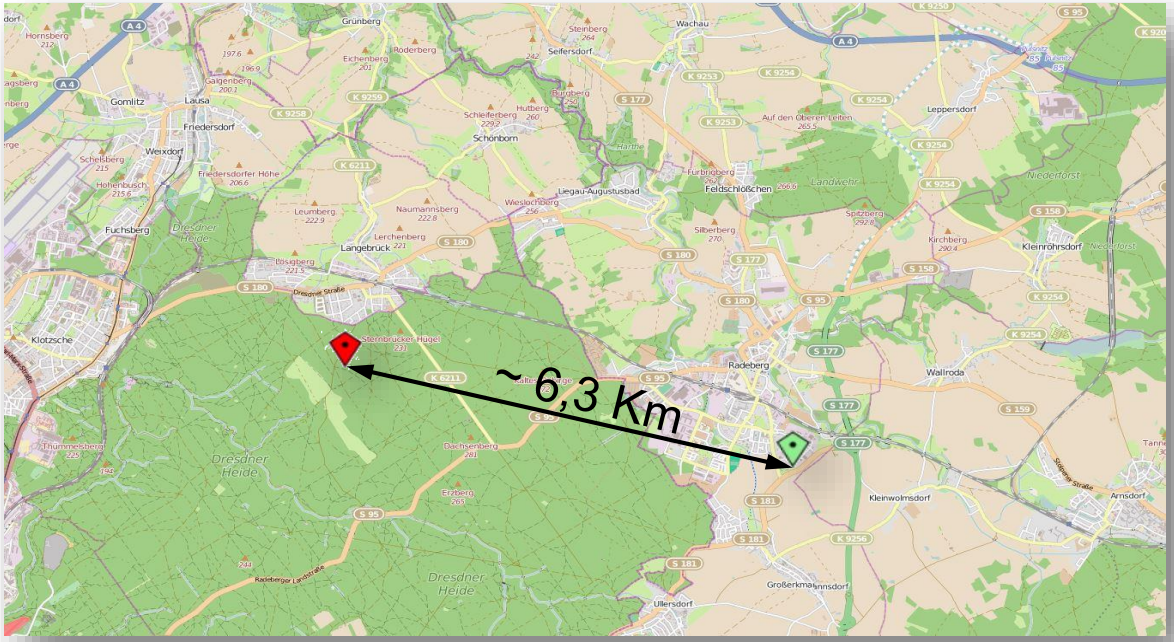


Analysis of function and efficacy necessary

VEHICLE SELF-DIAGNOSIS
COMPONENT EXAMPLES

Example 5: Shielding of GPS antenna

- Real location differs from the indicated location



Analysis of function and efficacy necessary

VEHICLE SELF-DIAGNOSIS
COVERAGE OF THE PTI

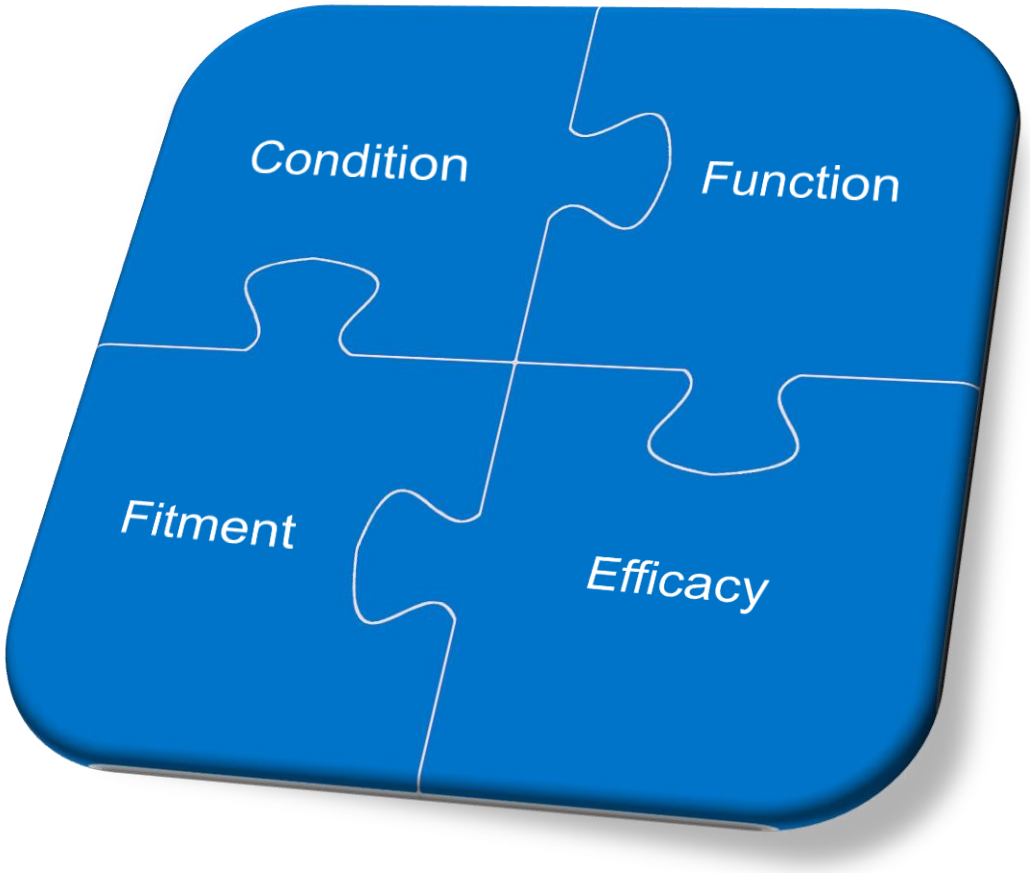
Excerpt from exemplary defects	TPS A	TPS B	TPS C	PTI
Ex.1: Speaker degradation	X	X	X	?
Ex.2: Microphone degradation	X	X	X	?
Ex.3: Microphone orientation	X	X	X	?
Ex.4: Mech. defect antenna	X	X	X	?
Ex.5: Retrofitting antenna	X	X	X	?

- Presented examples can not be recognised via self-diagnosis

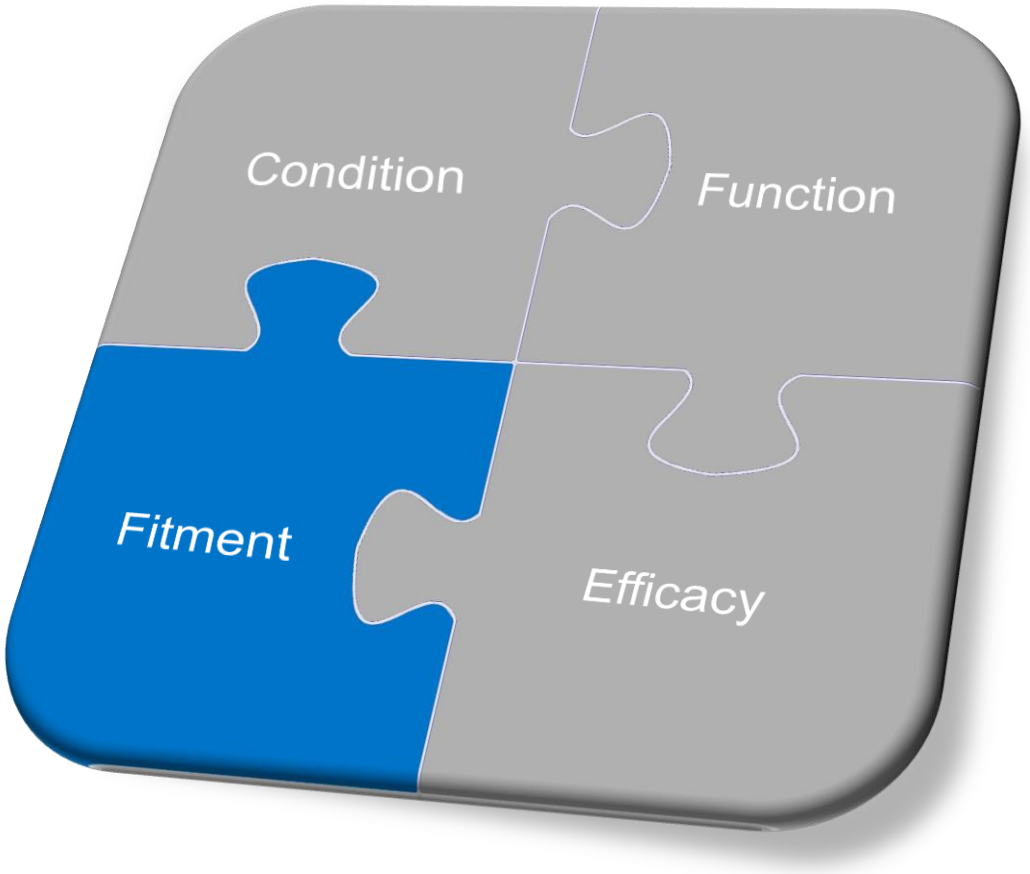
Can these defects be recognised by testing in scope of PTI?

ECALL INSPECTION CONCEPT

eCall PTI
TESTING CRITERIA



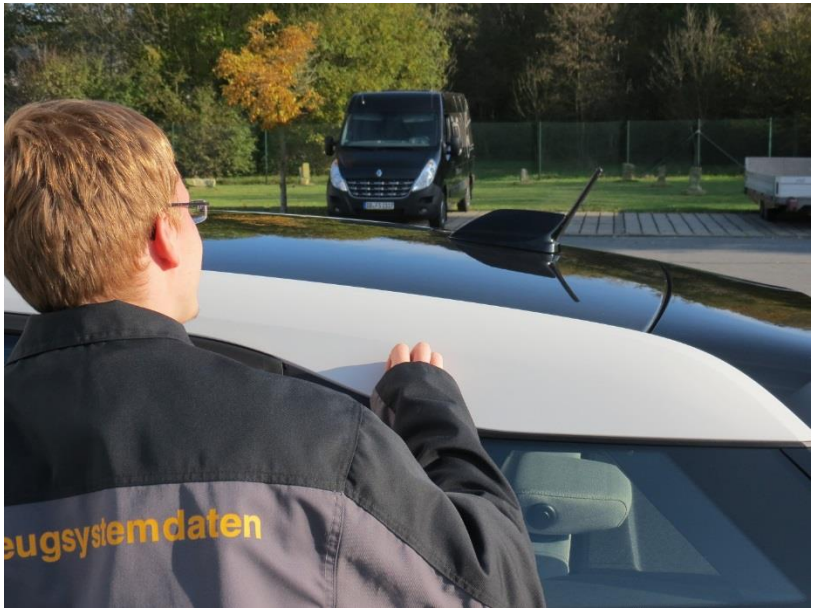
eCall PTI
FITMENT TEST



eCall PTI
FITMENT TEST

Visual Fitment inspection:

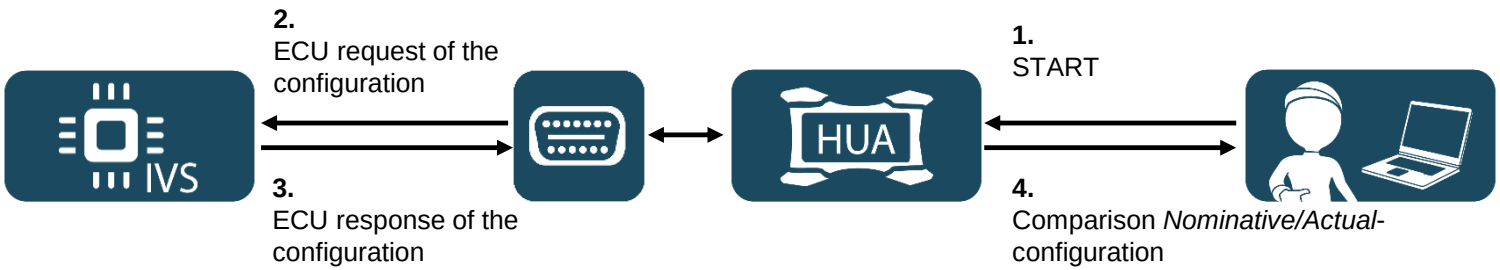
Optical identification of the installed eCall system and its components in the vehicle



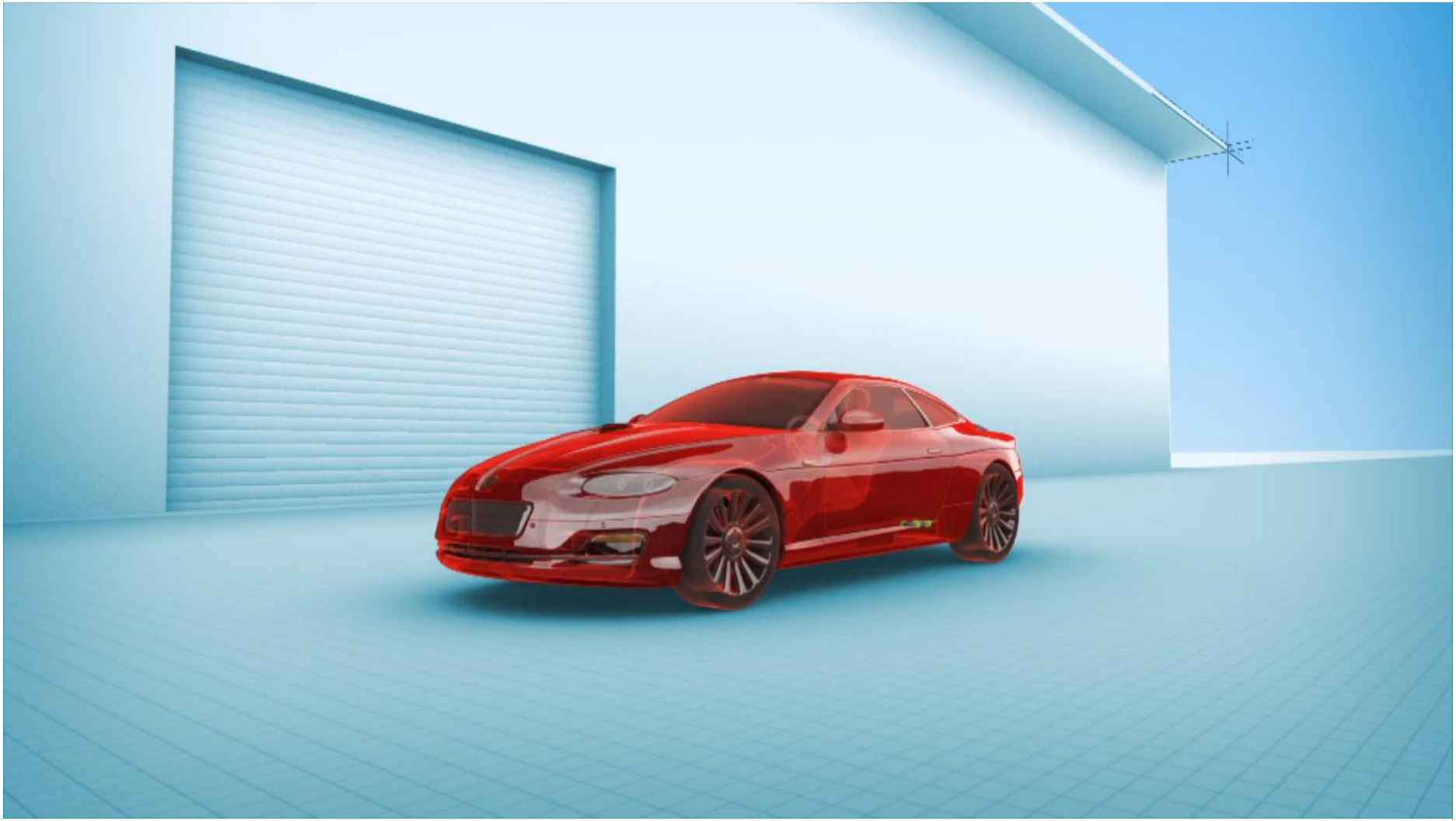
eCall PTI
FITMENT TEST

Electronic Fitment inspection:

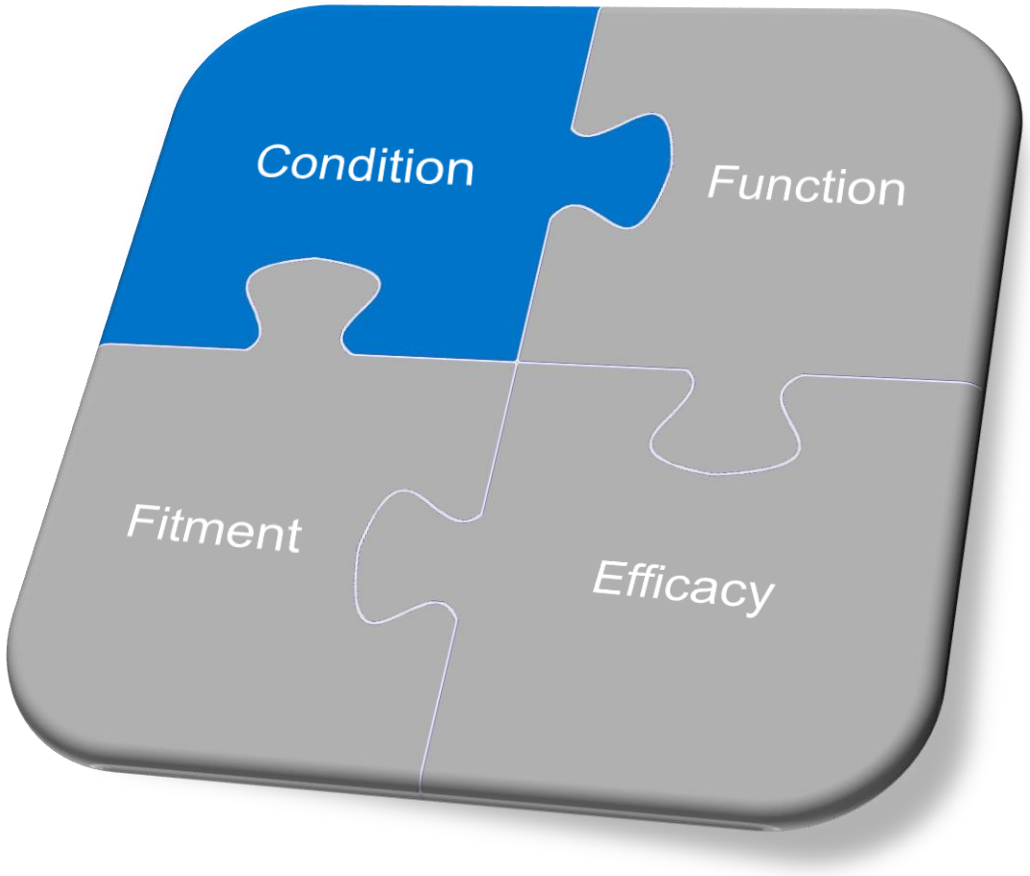
Communication with eCall ECU and request of the configuration



eCall PTI
FITMENT TEST



eCall PTI
CONDITION TEST



eCall PTI
CONDITION TEST

Visual Condition inspection:

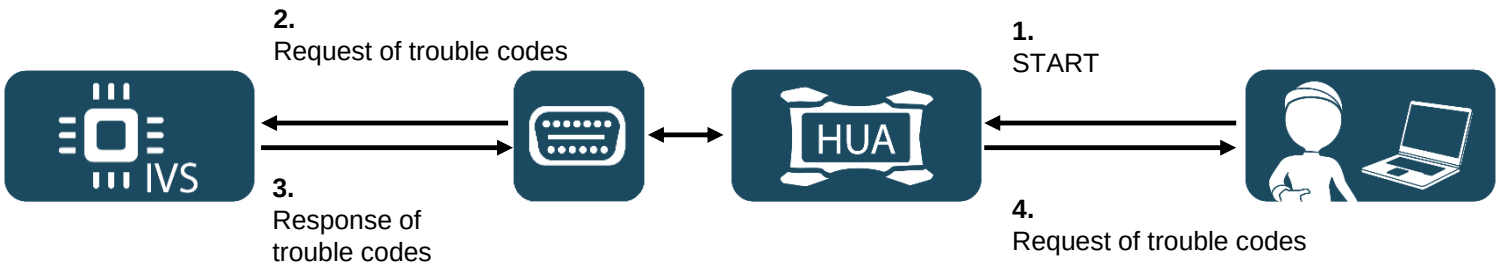
Assessment of the accessible eCall components

eCall PTI
CONDITION TEST

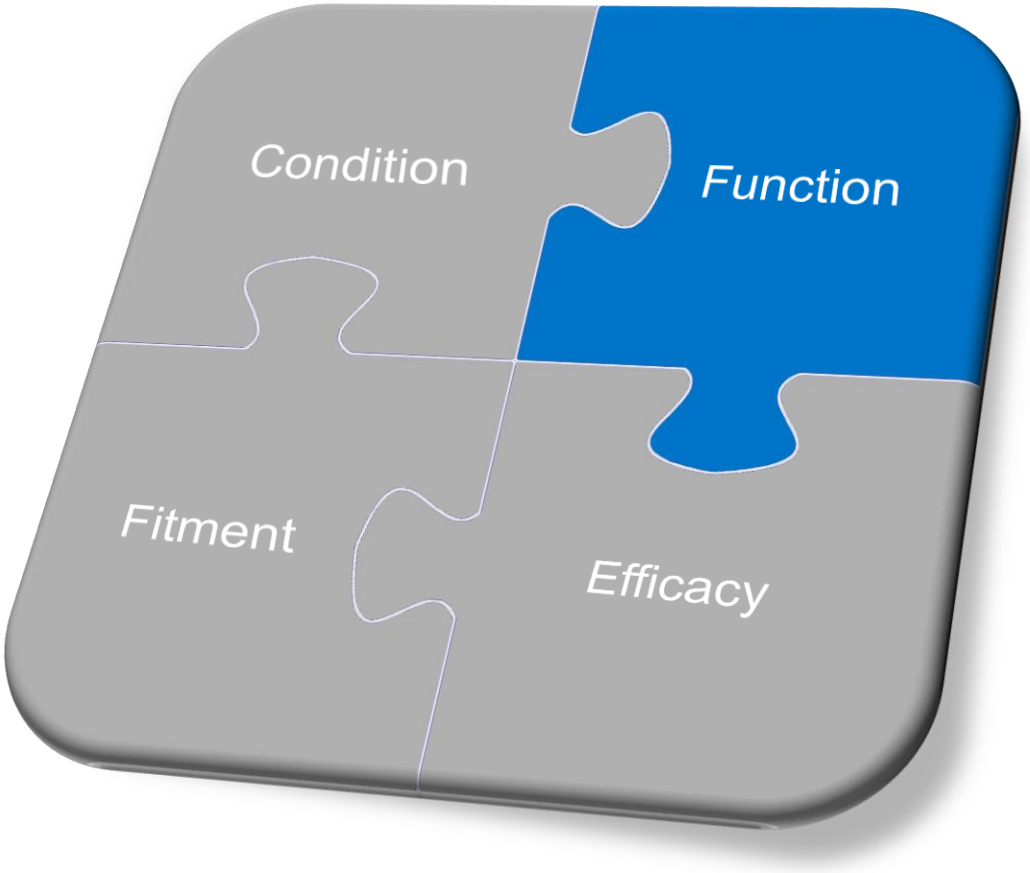
Electronic Condition inspection:

Electronic request of the trouble codes in the ECU

No. #	Defect Description
F-01	GPS-Antenne: Kurzschluss nach Masse
F-02	GSM-Antenne: Unterbrechung
F-03	GSM-Backup-Antenne: Kurzschluss nach Plus
F-04	Interner Steuergerätefehler
F-05	Kein Zugriff auf interne SIM-Karte
F-06	Mikrofon 1: Kurzschluss nach Masse
F-07	Notruf-Lautsprecher: Kurzschluss nach Plus
F-08	Notruf-Lautsprecher: Unterbrechung
F-09	Notruf-Taster: Unterbrechung

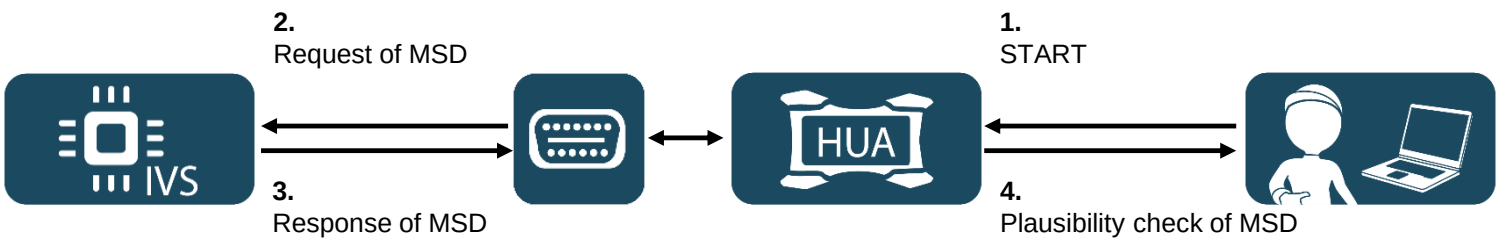


eCall PTI
FUNCTION TEST



eCall PTI
FUNCTION TEST

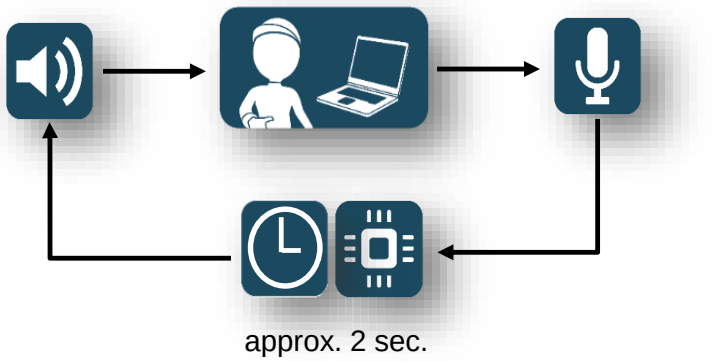
Electronic function testing:
Read out the Minimum Set of Data and the check availability of mobile networks



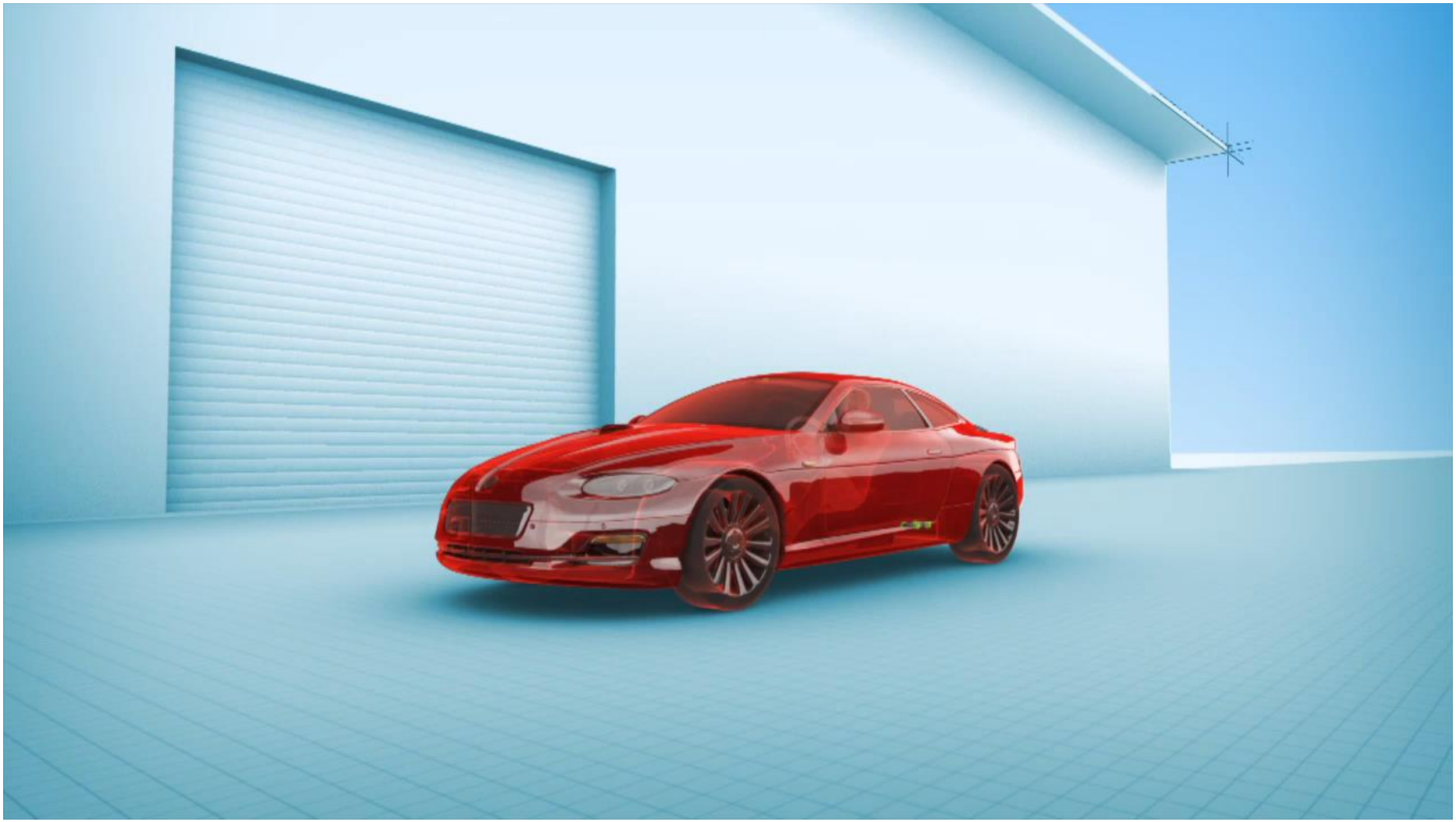
FUNCTION TEST – AUDIO COMPONENTS

Function testing of audio components:

Activation of the „Voice Prompt Mode“ → Time-delayed echo test for subjective voice evaluation



eCall PTI
CONDITION AND FUNCTION TEST



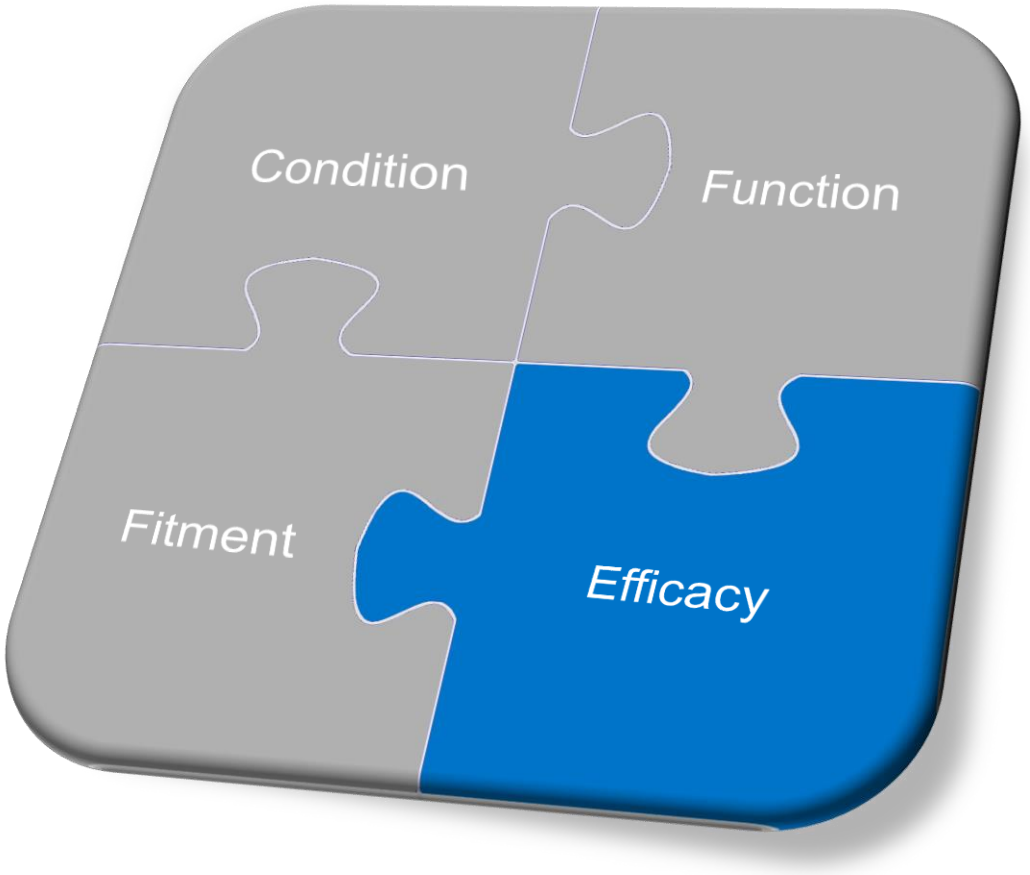
eCall PTI
FUNCTION TEST – SUMMARY

- Testing via vehicle diagnosis interface (OBD-connector)
- Starting in 2018: OBD scan-tool mandatory for PTI (2014/45/EU)
- Very efficient and reliable testing of MSD plausibility, signal reception and audio components (echo test)
- No changes in any exitisting standards, diagnosis-architecture needed
- Limits: Network-Access-Device can not be fully tested

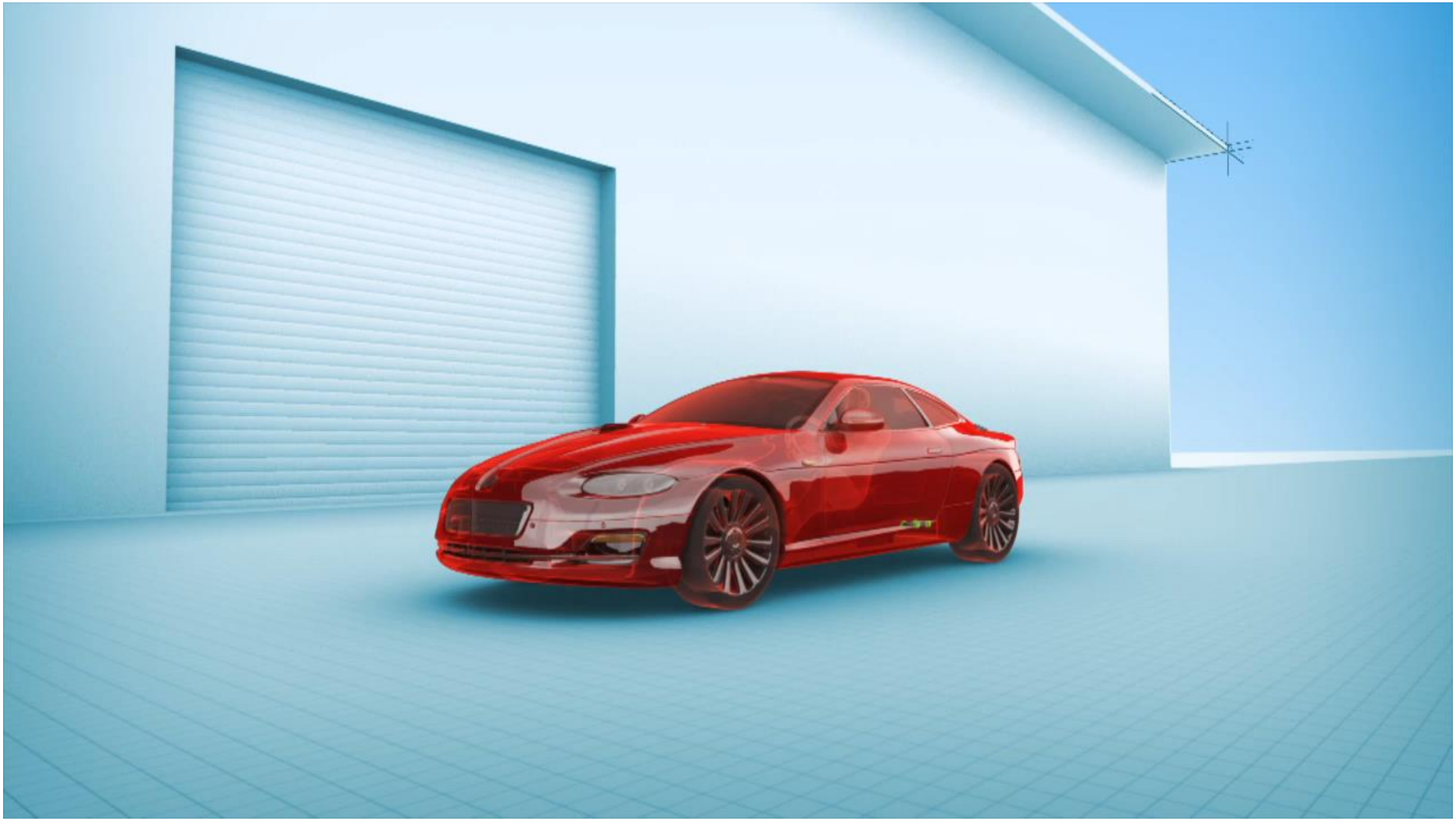
Function test method is recommended

Covered components of the eCall-IVS

eCall PTI
EFFICACY TEST



eCall PTI
EFFICACY TEST



eCall PTI
EFFICACY TEST – SUMMARY

- Advantage: All eCall components can be tested via test-call
- Disadvantages: No distinction between fault of the eCall system or fault of the mobile network
- Expected duration of test-call would lead to high costs → not comparative to the benefit
- Not clarified who bears for the test-calls, setup and providing of a test-server
- Today there is no requirement to implement a free long-dialing-number → Modification of relevant ETSI standards is necessary

Covered components of the eCall-IVS

Efficacy test via test-call is not recommended

eCall PTI
COVERAGE OF THE PTI

Excerpt from exemplary defects	TPS A	TPS B	TPS C	PTI
Ex.1: Speaker degradation	✗	✗	✗	✓
Ex.2: Microphone degradation	✗	✗	✗	✓
Ex.3: Microphone orientation	✗	✗	✗	✓
Ex.4: Mech. defect antenna	✗	✗	✗	✓
Ex.5: Retrofitting antenna	✗	✗	✗	✓

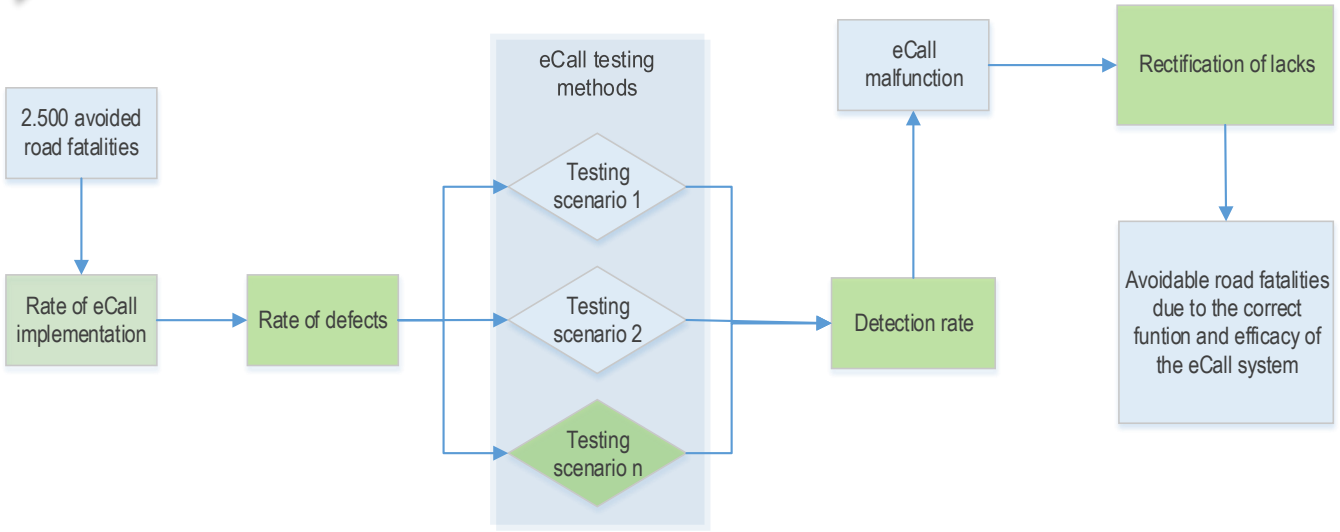
Previously shown inspection concept is able to recognise these defects

OUTLOOK

eCall
OUTLOOK

- Analysing the benefits and costs of the various testing procedures in a cost-benefit-analysis → carried out by IERC and FSD
- Regard of the PTI into UN/ECE regulation of AECS (WP.29)
- Inclusion of eCall testing into the PTI directive 2014/45/EU (Definition of required data deliveries and detailed test procedure, 2015 - 2016)

→ Available testing procedure from 03/2019 on



VISION ZERO.

KEINER KOMMT UM. ALLE KOMMEN AN.

Workshop B3

Presentation 3

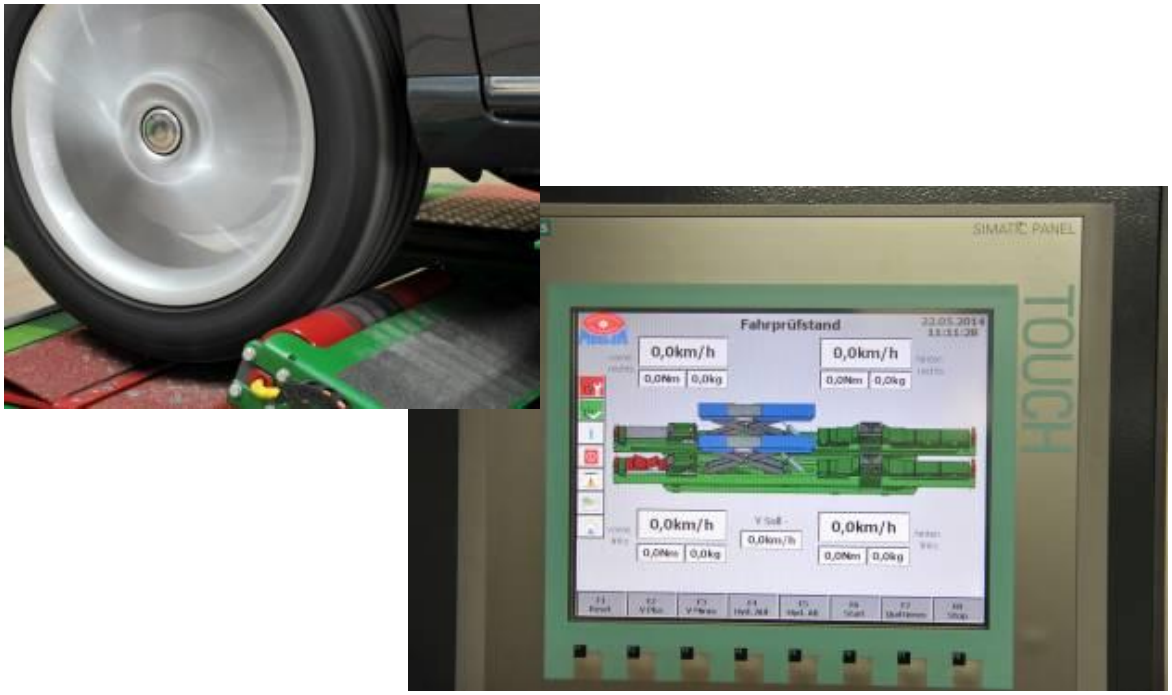
FAPS – PTI – Testing of Dynamic Assistance Systems

Hans-Jürgen Mäurer

Head of Department for Technical Development, DEKRA Automobil GmbH, Germany

Enhancing the value of vehicle inspection

FAPS
PTI - Dynamic Testing on Driver Assistance Systems



Modern Driver Assistance Systems

ACC

Emergency Brake

Line Keeping Assistance

Line Change Assistance

Park Assistance

Advanced Headlight Systems

Night Vision

Traffic Sign Recognition

ESP

Motivation

All these systems are triggered by dynamic sensor devices

➔ While vehicles are standing still – only basic conditions are able to be tested

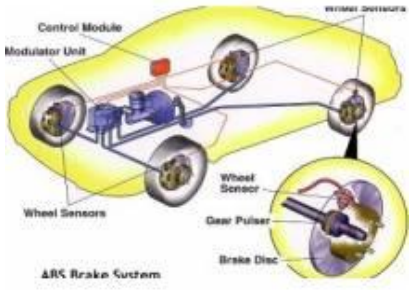
➔ PTI is requires as full test of all relevant functions and components

Diagnostic methods are the first step into the area of PTI – testing on dynamic assistance systems –

Further improvement is required for sufficient testing of functions…

Evaluation of Options

Most important dynamic sensor data is related to wheel speed of all four wheels



it is challenging to simulate synchronal running speed of all wheels.

Options

Test ride around the station – time consuming and complicated

electronically simulation of speed sensor data – no standardized communication interface

Conventional four wheel test bench – very expensive investment – a lot of additional space needed – floor preparation necessary

Idea and Solution

use of the **power lift** and turn all wheels simultaneously

Advantages

1. Low wheel load ➔ easy to be turned up to 60km/H w

1. Maser – Slave compelling of both axles
   ➔ front wheel drive – is triggering the wheel speed on real axle – and vise versa –
2. All wheel roller engines can be used in a four quadrant function
3. Independent or strict synchronized speed control
4. Steering angels are also possible because of smart roller positioning

Potential of this method

Real test of :

- ABS – ESP – functions
- Advanced headlight functions
- ASR – Test
- Line keeping assist
- Automatic traffic sign recognitions
- Disable low cut off speed of engine management for diesel FAS – Measurement
- Recuperation function of EV –
- Odometer test – or calibration
- Tire pressure monitor systems (indirect solutions) – by using different wheel speed between left – right

Life demonstration – video clip -

Outlook – further development

- ➔ Optimization of rear roller positioning for different wheel bases / data
- ➔ More dedicated function for other assistance systems
- ➔ Development of a data base for relevant information according the vehicle specific functions

Optimization of costs and functions in general

DEKRA

Alles im grünen Bereich.

Thanks for your Interest

Hans-juergen.maeurer@dekra.com

Workshop B3

Presentation 4

Battery Diagnosis in Order to Fulfil Exhaust Emission Standards for Vehicles with Stop-Start Systems

Roger Eggers

Head of Quality and Technology, TÜV NORD Mobility, Germany

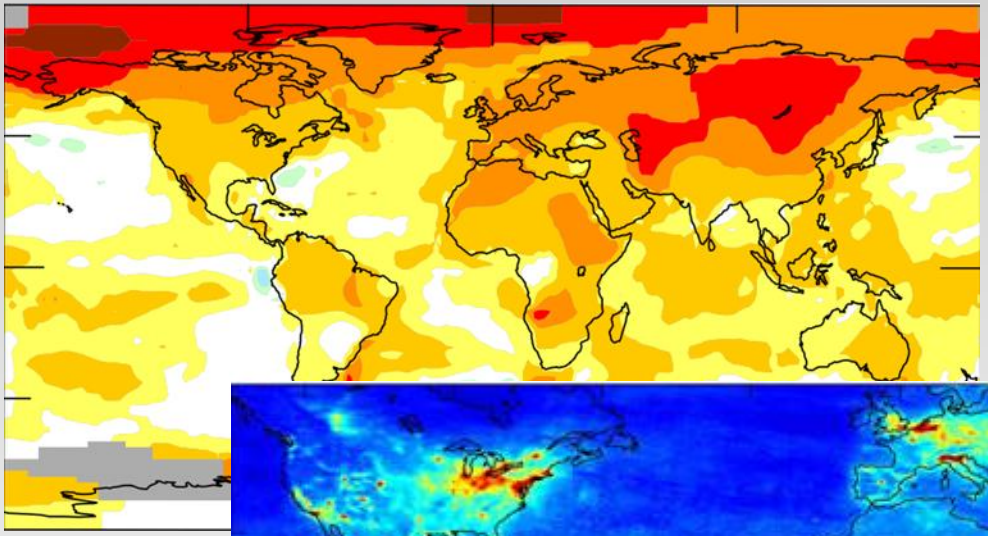
2015 CITA Conference
14 - 16 April 2015, Dubai, UAE

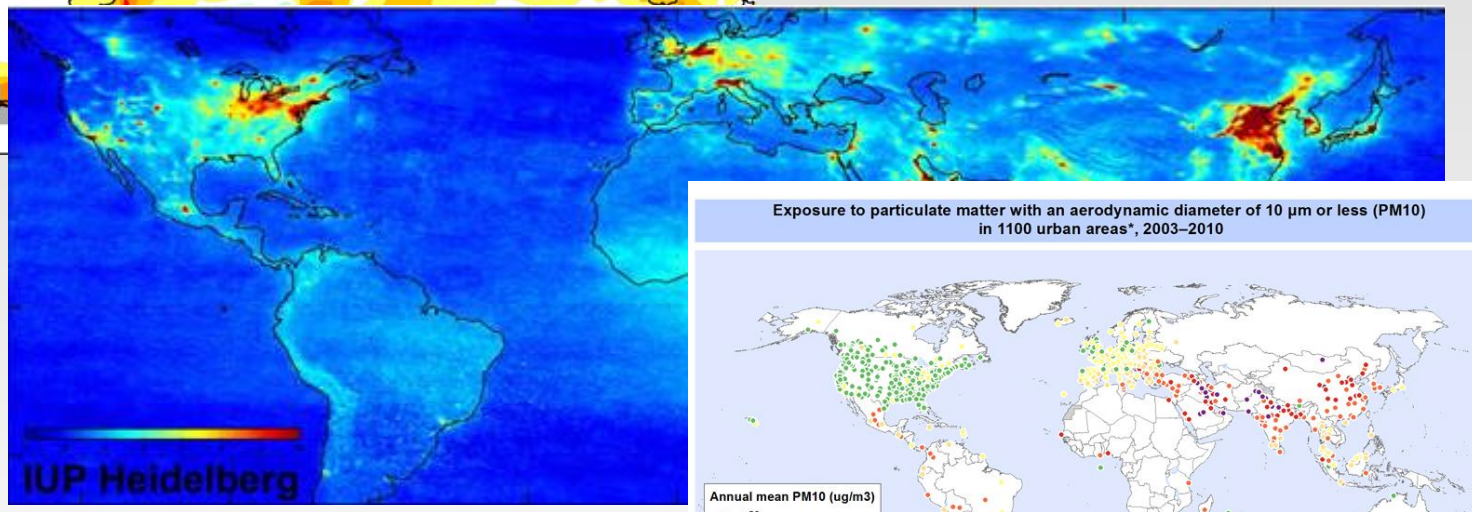
Enhancing the Value of Vehicle Inspection

Battery Diagnosis in order to fulfil Exhaust Emission Standards for Vehicles with Start-Stop Systems

Roger Eggers, Head of Quality & Technology
TÜV NORD Mobility, Germany

Road Traffic related Air Quality Issues

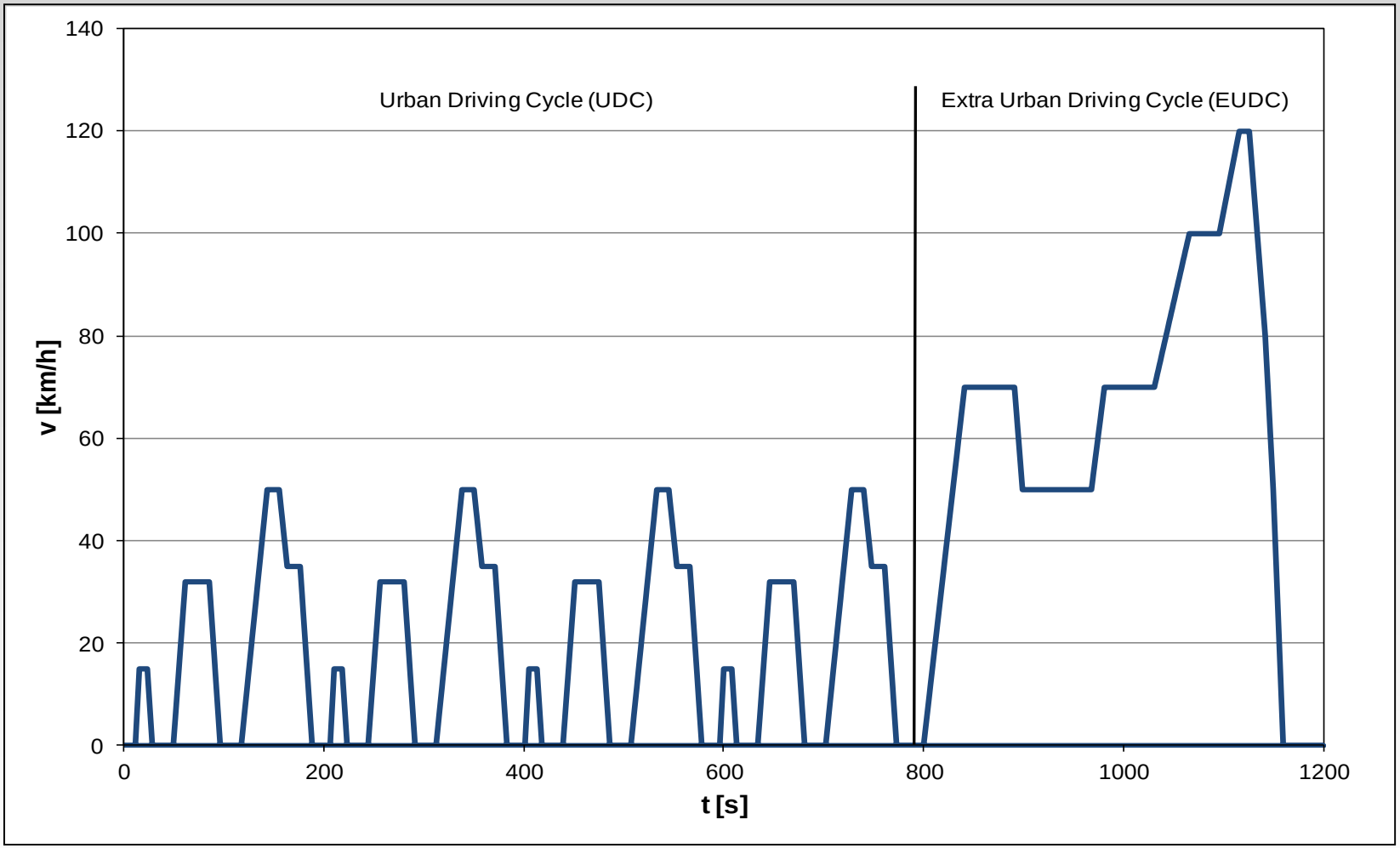




CO_2
NOx
Particles

New European Driving Cycle (NEDC)

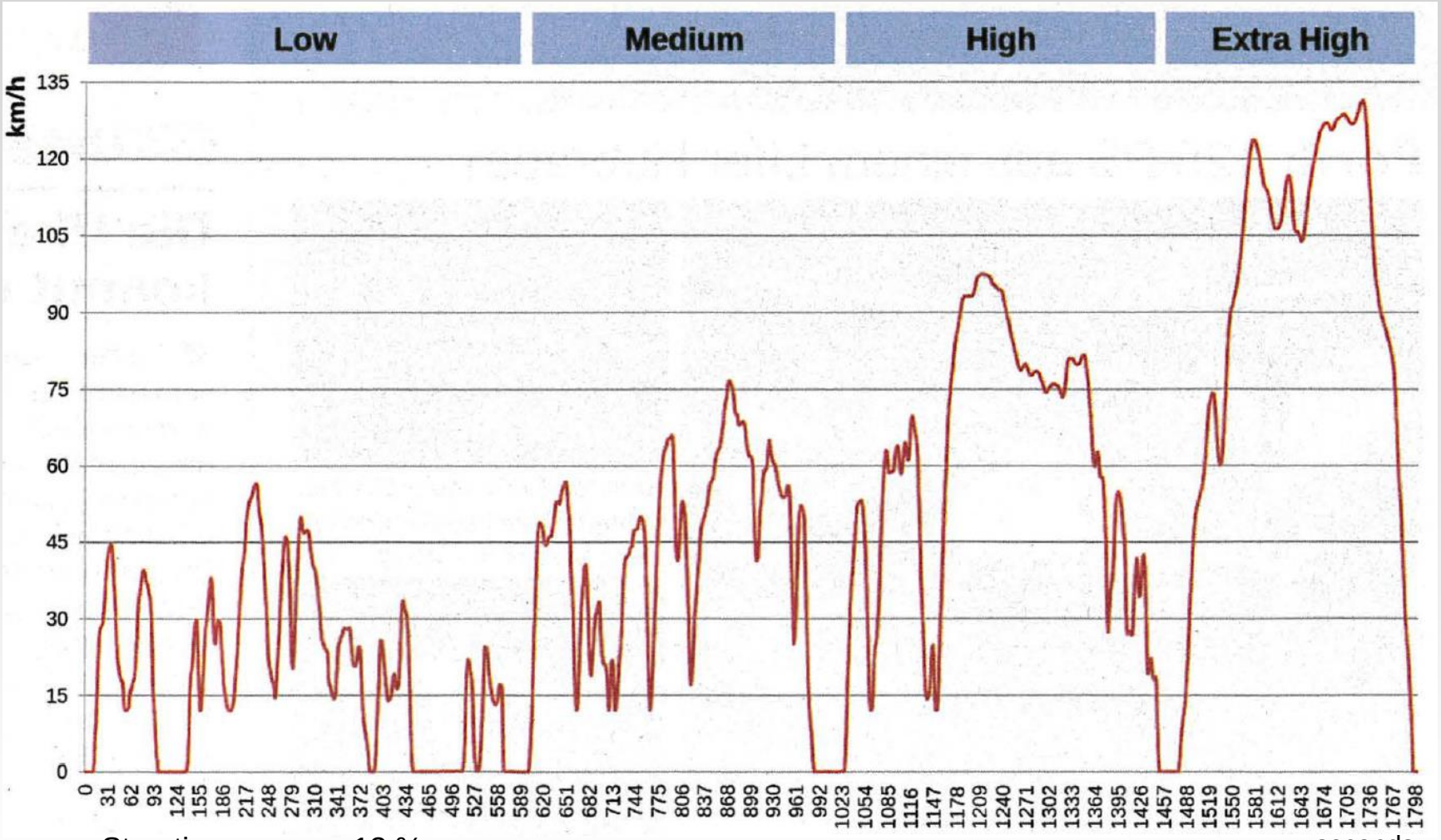
NEDC valid since 1996



Stop time approx. 20 %

Worldwide Harmonized Light Vehicles Test Procedure (WLTP)

WLTP will probably replace NEDC from 2017



Stop time approx. 13 %

Current Situation

Lead-acid battery aging effects:

- Active mass degradation
- Corrosion of positive grid
- Water loss (electrolyte)
- Sulfation

lead to

Capacity decrease (C/20)

Increasing internal resistance (R_i)

Effects are difficult to measure in a car during today`s Periodical Technical Inspection (PTI).

→ The challenge is to develop an appropriate solution that permits tracking battery performance over battery's life-time.

Efficient Start-Stop depends on a fully functional Battery

STOP at red traffic light
→ Engine off

State of Charge (SoC)

Battery is
DISCHARGED

START at green traffic light
→ Engine crank

SoC

Battery is
DISCHARGED

Driving phase

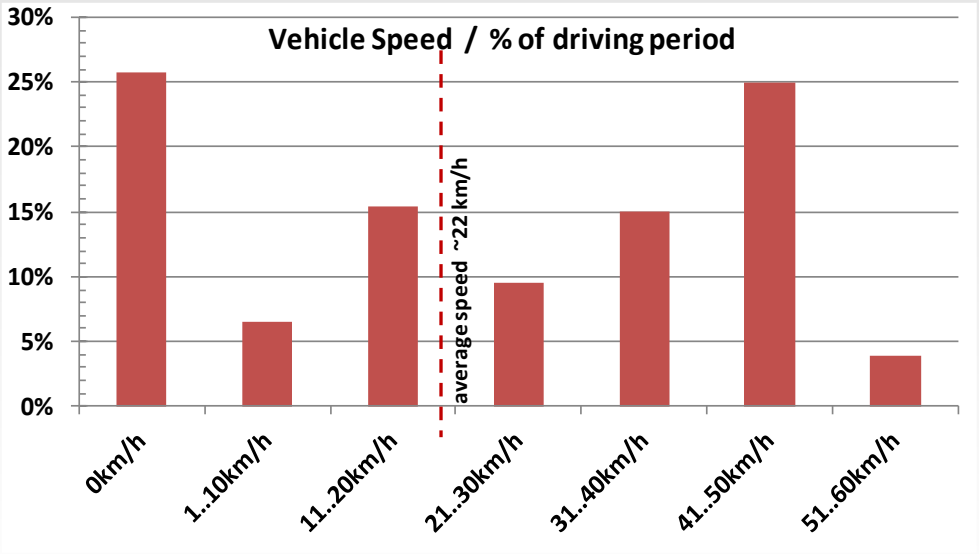
SoC

Battery is
RECHARGED

Practical Road Test

Hannover Road Test (more than 1.5 years, ongoing)

- Urban driving cycle
- 2 x 1.5 hours driving time per day (Monday to Friday)
- 30 km round trip with 140 “stop opportunities” e.g. traffic lights
- State-of-the-art Start-Stop vehicles



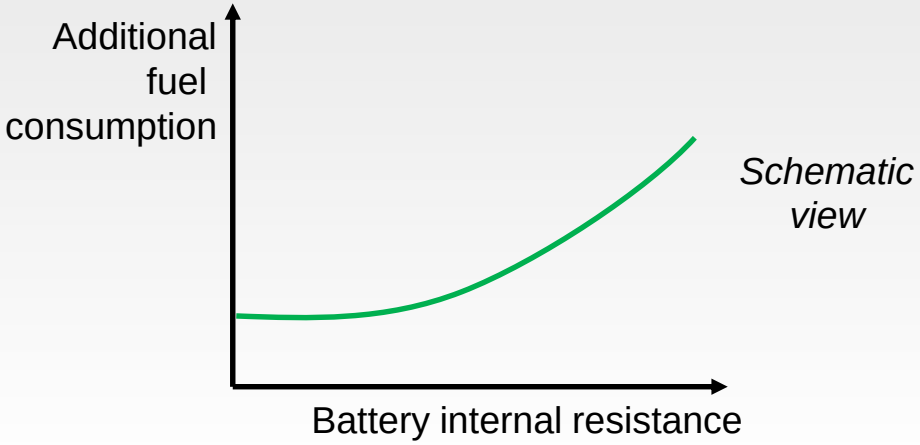
Hannover Road Test

Results (after one year)

- Battery aging leads to reduced Start-Stop performance.
- Aging effects will be accelerated at higher battery age.

Average battery performance losses observed in one year:

State of charge (SoC)	-5 %	(minor effect)
Internal battery resistance (R_i)	+20 %	(significant)
Battery voltage drop during warm crank	-500 mV	(significant)
Charge acceptance (for regenerative braking)	-75 %	(very significant)



Roller Dyno Tests

Additional tests

- A car (same type as used in road tests) was first equipped with a new battery and later with an aged battery to compare fuel efficiency and Start-Stop characteristics
- Controlled environmental conditions on a roller dyno
- Measurement of CO_2 and other emissions (NEDC and WLTP)
- Repeated tests for statistical significance

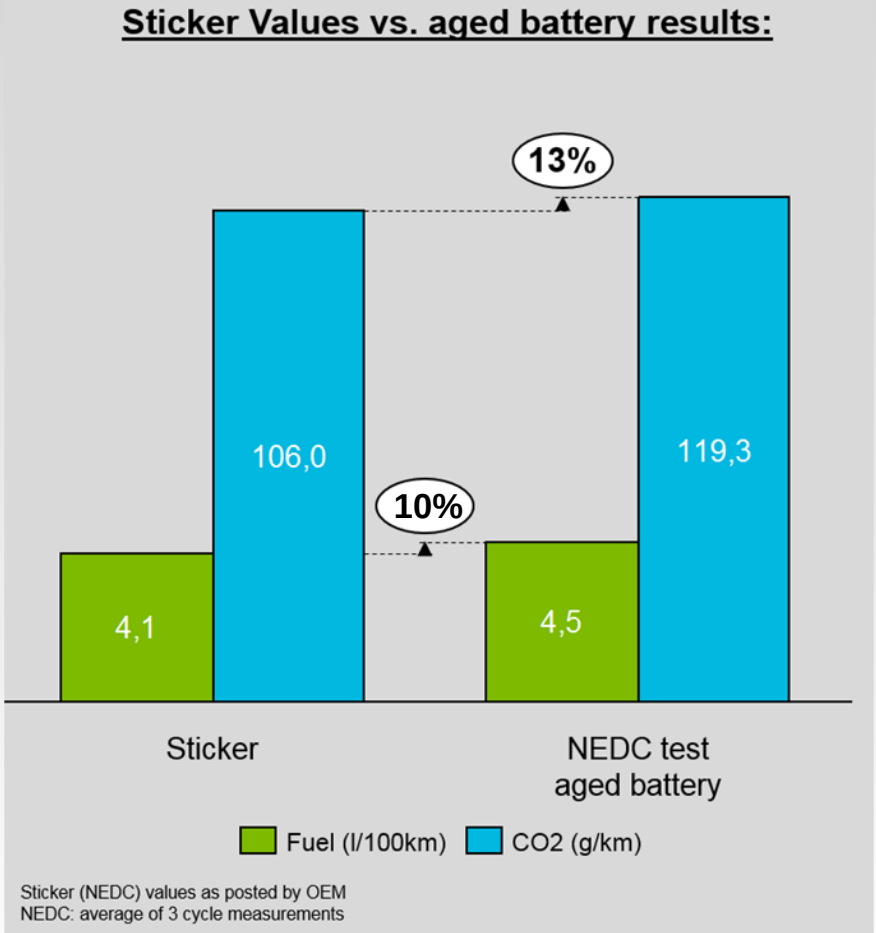
Results of Roller Dyno Tests

Test data vs. fuel efficiency sticker

(1) Test results:

Car with aged battery vs. fuel efficiency sticker:

+ 13 % CO_2 emissions
  compared to sticker value
+ 10 % fuel consumption
  compared to sticker value



Results of Roller Dyno Tests

(2) Increased emissions for an aged battery (vs. fresh battery):

NEDC	Total drive cycle	Urban part
CO_2 emissions	+ 2.7 %	+ 6.4 %
Fuel consumption	+ 2.7 %	+ 6.3 %

WLTP	Total drive cycle	Urban part
CO_2 emissions	+ 2.9 %	+ 9.3 %
Fuel consumption	+ 2.9 %	+ 9.2 %

Conclusions

Aged battery:

- Compared to a fresh battery CO_2 emissions are **3%** higher in NEDC and WLTP due to the compromised Start-Stop system.
- In NEDC urban driving CO_2 emissions are more than **6%**, in WLTP even **9%** higher.

Proposed actions:

- As an aged battery strongly limits Start-Stop performance, a suitable battery status check should be included in Periodical Technical Inspection (PTI).
- An efficient method shall be developed that permits tracking battery performance over its life-time.


Let`s face the future!
Thank you for your interest.