Audi
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# Future Trends of Vehicle Safety in a Globalized World

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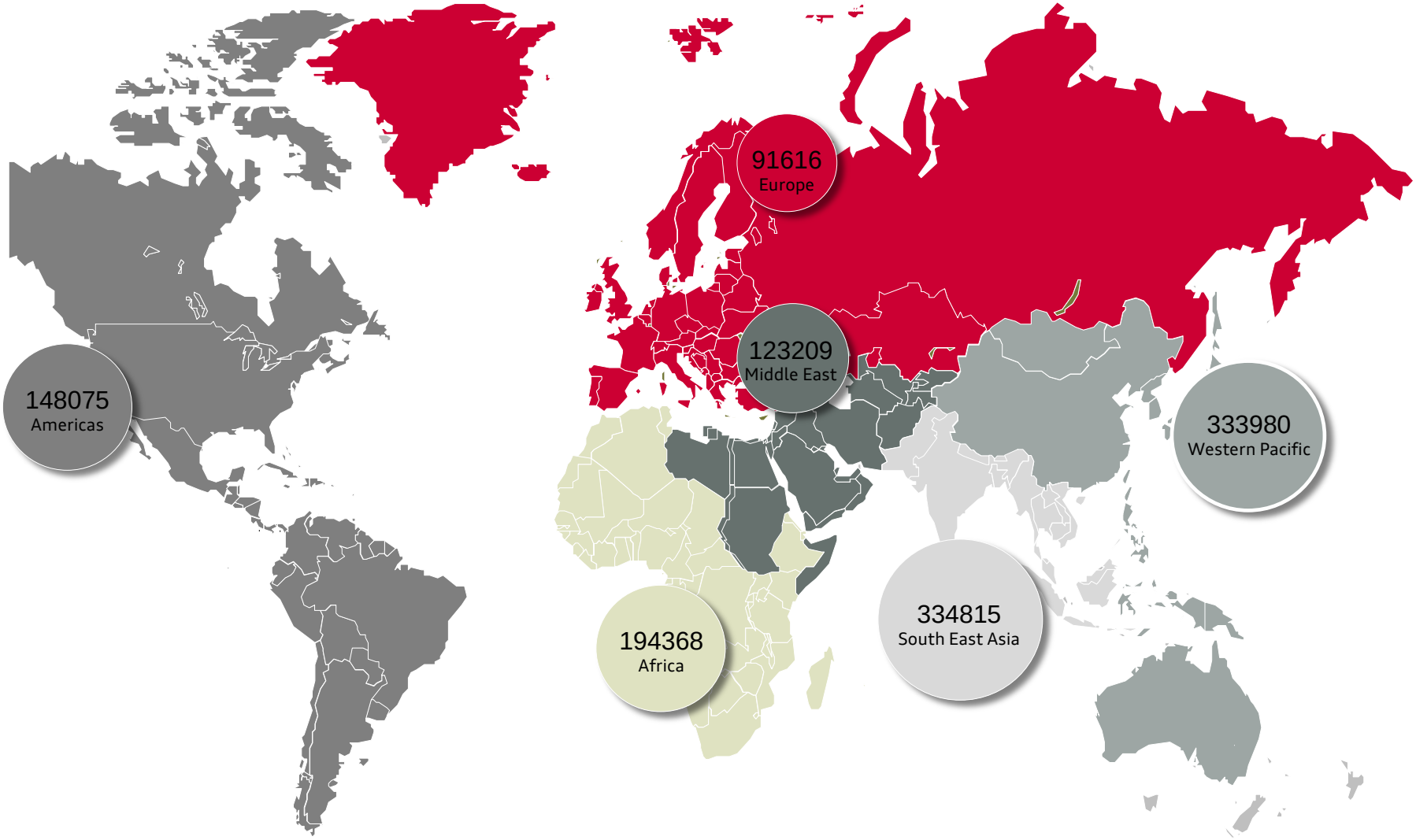
# Future Trends of Vehicle Safety in a Globalized World
## Agenda

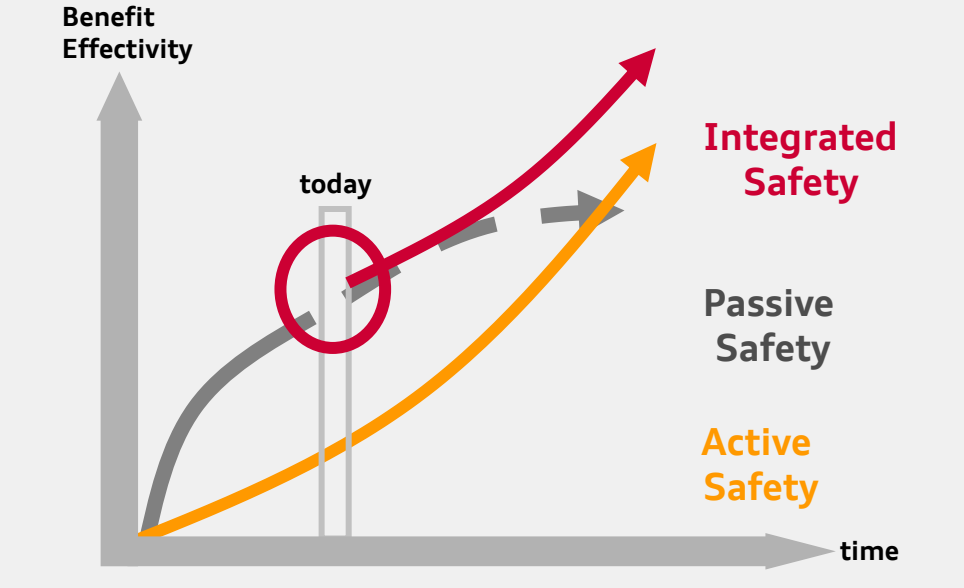
# Future Trends of Vehicle Safety in a Globalized World

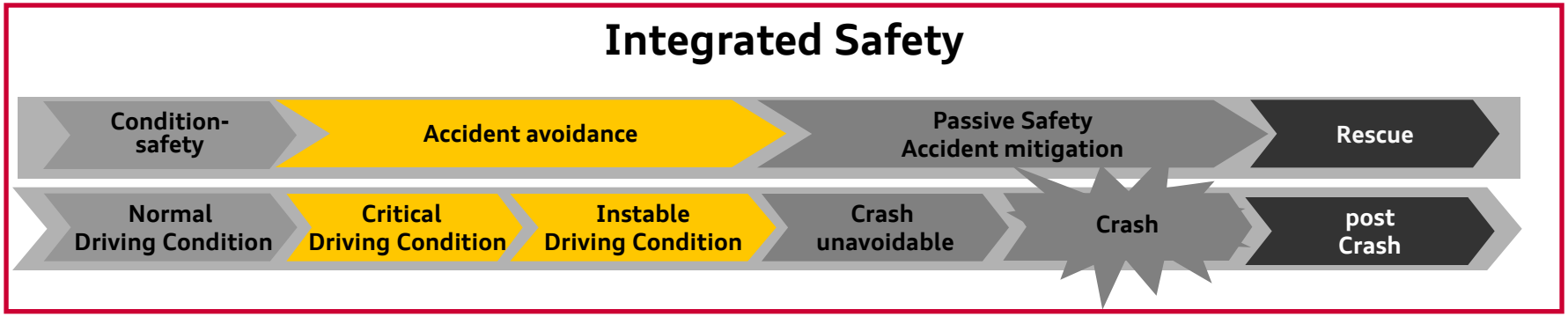
## Introduction – Accident Statistics on a Global Level



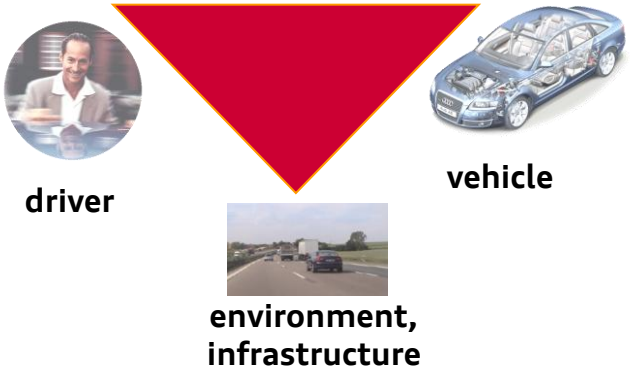

- In 2010, about 1,23 mio people died in traffic accidents

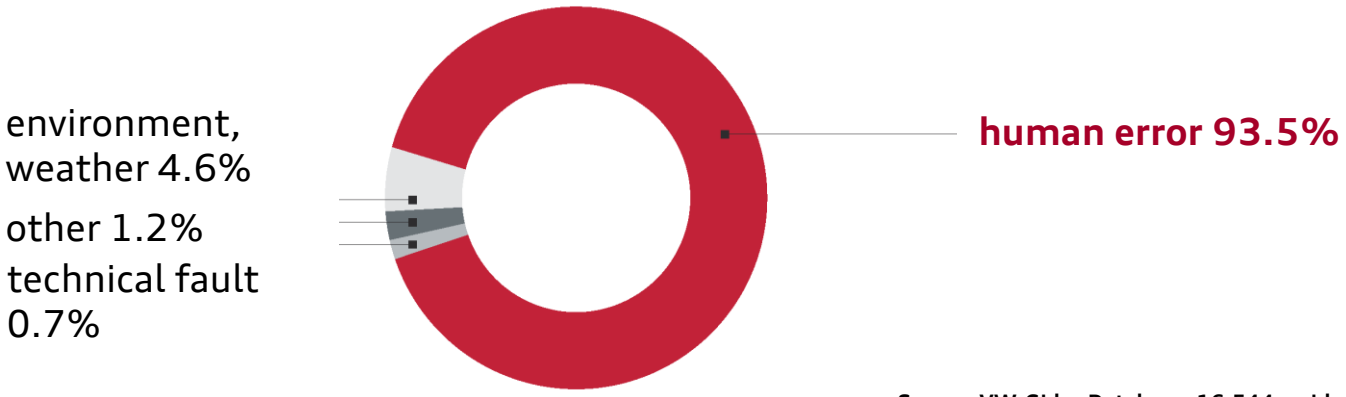
# Future Trends of Vehicle Safety in a Globalized World
## Introduction – Integrated Safety



# Future Trends of Vehicle Safety in a Globalized World
## Introduction – The Safety Triangle




Source: VW-Gidas Database, 16.544 accidents,
up to four accident causes

- Most accidents occur due to human errors,
  therefore future systems should assist the driver
- Optimized Human-Machine-Interface can prevent misuse / misinterpretation

# Future Trends of Vehicle Safety in a Globalized World
## Introduction – Infrastructure – Example 1

Source: AARU (Audi Accident Research Unit)

- Simple infrastructure changes can further improve traffic safety and are very cost effective

# Future Trends of Vehicle Safety in a Globalized World
## Introduction – Infrastructure – Example 2

Source: AARU (Audi Accident Research Unit)

- Atlantas Buford Highway

# Future Trends of Vehicle Safety in a Globalized World
## Introduction – Regulation

**Crash**

- EG: 96/79, 96/27, 74/297, (91/662)
- ECE: R 12, R 32, R 33, R 34, R 94, R 95
- US: FMVSS 208, FMVSS 214, FMVSS 301 FMVSS 204, FMVSS 212, FMVSS 219
- Canada: CMVSS 204, CMVSS 208, CMVSS 212, CMVSS 219, CMVSS 301, CMVSS 214
-Japan: TRIAS 33, TRIAS 47
- Australien: ADR 69, ADR 73

**Sicherheitsgurt, Gurtautomat, Schlösser, Höhenversteller, pyrotechnische Gurtstraffer**

- ECE: R 16.04
- EG: 81/576, 82/319
- USA: FMVSS 208, FMVSS 209, FMVSS 213
- Australien: 4/01, 5/02
- China: CNCA-02C-026

**Lenkrad**

- EG: 74/297, (91/662/EWG)
- ECE: R 12
- USA: FMVSS 203
- Australien: ADR 10/01
- Japan: 11-4-01 TRIAS 27 1983

**Innenraum**

- EG: 74/60, (78/632/EWG)
- ECE: R 21
- USA: FMVSS 201
- Australien: ADR 11/00, ADR 21/00
-Japan: 11-4-06 TRIAS 34 1975, 11-4-07 TRIAS 40 1975
- China: CNCA-02C-060

**Kinderrückhaltesystem**

- ECE: R 44.03
- USA: FMVSS 213
-Canada: CMVSS 213

**Sitze, Sitzverankerungen und Kopfstützen**

- EG: 78/932, 74/60, 74/408, 96/37
- ECE: R 17, R 25
- USA: FMVSS 207, FMVSS 201, FMVSS 202, FMVSS 202a Docket 89-20
- Canada: CMVSS 213
- Australien: ADR 3, ADR 22
-Japan: TRIAS 35, TRIAS 36, TRIAS 32,
- China: CNCA-02C-063

**Außenform**

- EG: 74/483
- ECE: R 26

**Radabdeckung**

- EG: 78/549

**Dacheindrückung**

- USA: FMVSS 216

**Rollover**

- USA: FMVSS 208, FMVSS 216 upgrade
- Schraubtest (Audi Anforderung)

**Fußgängerschutz**

- EG: 78/2009, 631/2009
- TRIAS 63

**Ladegutsicherung**

Ladeguttest nach Gemeinschaftsforderung der deutschen Automobilhersteller
- Frontalcrash (Schlitten) 2x18 kg Eurokisten 55 km/h Geometrie und Aufbau nach DIN 75 410-2
-ECE: R 17

**Schlösser, Scharniere**

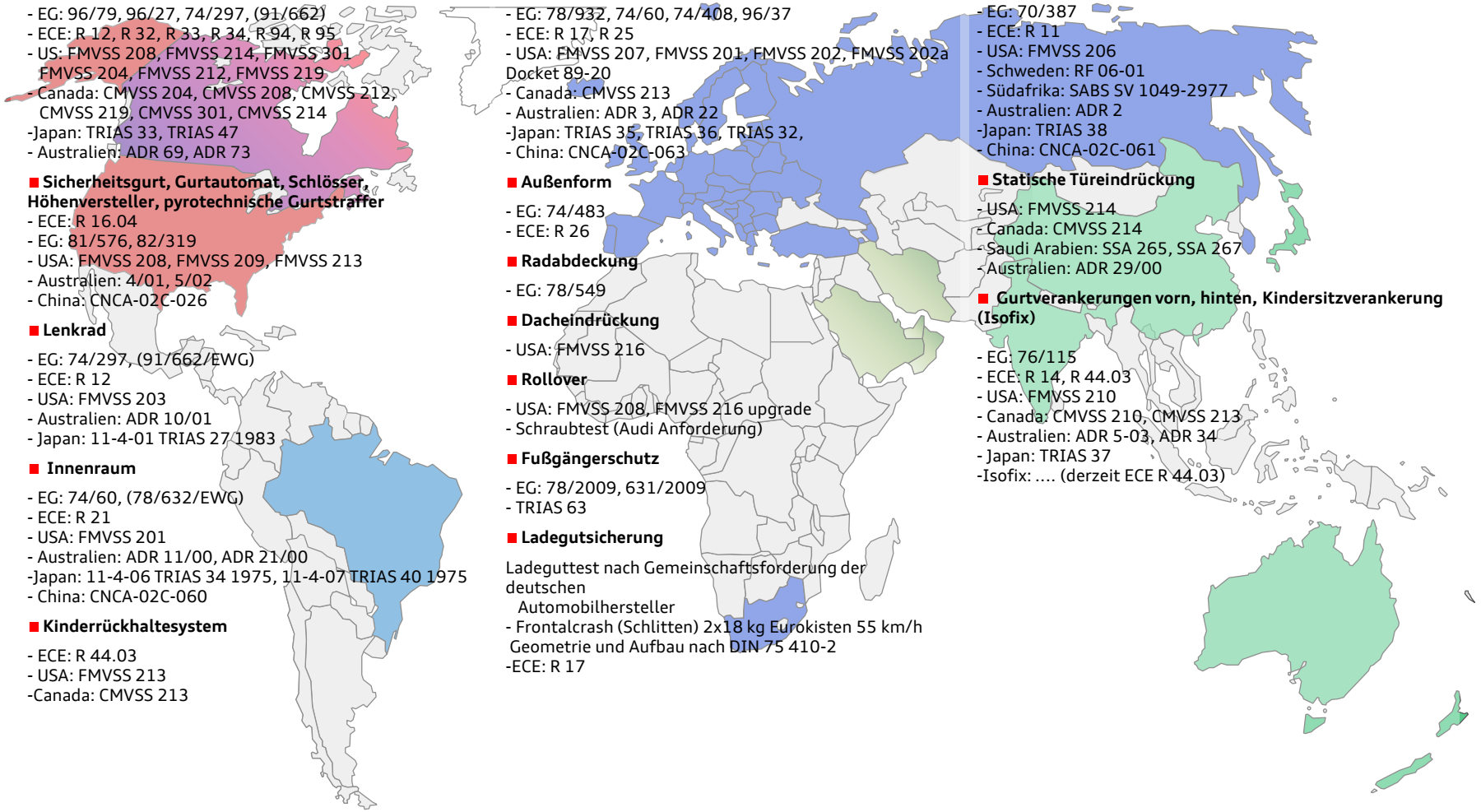
- EG: 70/387
- ECE: R 11
- USA: FMVSS 206
- Schweden: RF 06-01
- Südafrika: SABS SV 1049-2977
- Australien: ADR 2
-Japan: TRIAS 38
- China: CNCA-02C-061

**Statische Türeindrückung**

- USA: FMVSS 214
- Canada: CMVSS 214
- Saudi Arabien: SSA 265, SSA 267
- Australien: ADR 29/00

**Gurtverankerungen vorn, hinten, Kindersitzverankerung (Isofix)**

- EG: 76/115
- ECE: R 14, R 44.03
- USA: FMVSS 210
- Canada: CMVSS 210, CMVSS 213
- Australien: ADR 5-03, ADR 34
- Japan: TRIAS 37
-Isofix: .... (derzeit ECE R 44.03)



- Objective: Harmonization of Requirements

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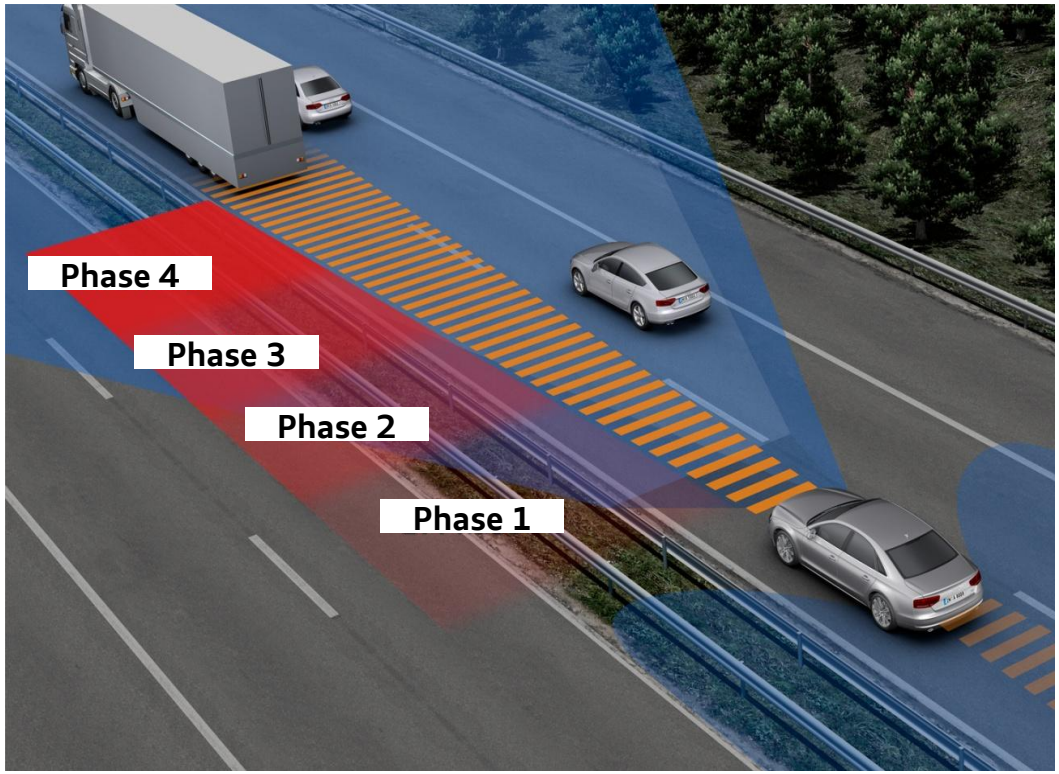
# Future Trends of Vehicle Safety in a Globalized World
## Integral Vehicle Safety – Audi Presense Plus in the A8




**Phase 1**
- Optical and acoustic warning
- Prefilling of brake sys.
- Adj. of shock absorbers

**Phase 2**
- Warning jolt
- Belt slack reduction
- Partial braking 1 (approx. 30%)

**Phase 3**
- Partial braking 2 (approx. 50%)
- Hazard lights
- Close roof/windows

**Phase 4**
- Reversible belt tensioners
- Full braking

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# Future Trends of Vehicle Safety in a Globalized World
## Global Technical Regulation – Requirements from a car manufacturer‘s perspective

- Harmonization world wide
- Clear and unambigous, especially in view of self certification markets
- Effectivity – field relevance
  - Proven by cost-benefit analysis in the presence of field behavior and injury severeness
- Dummies and impactors must be biofidelic and valid
- Technically viable for all cars
- Integral approach allowing for compensation of passive measures with active systems

Example of conflicting requirements between pedestrian protection and operational safety for light trucks, taken from the current discussion about the bumper test area. The bumper is supposed to offer good pedestrian protection and a step tread for the driver to allow for cleaning the windshield.

Source: VW Nutzfahrzeuge

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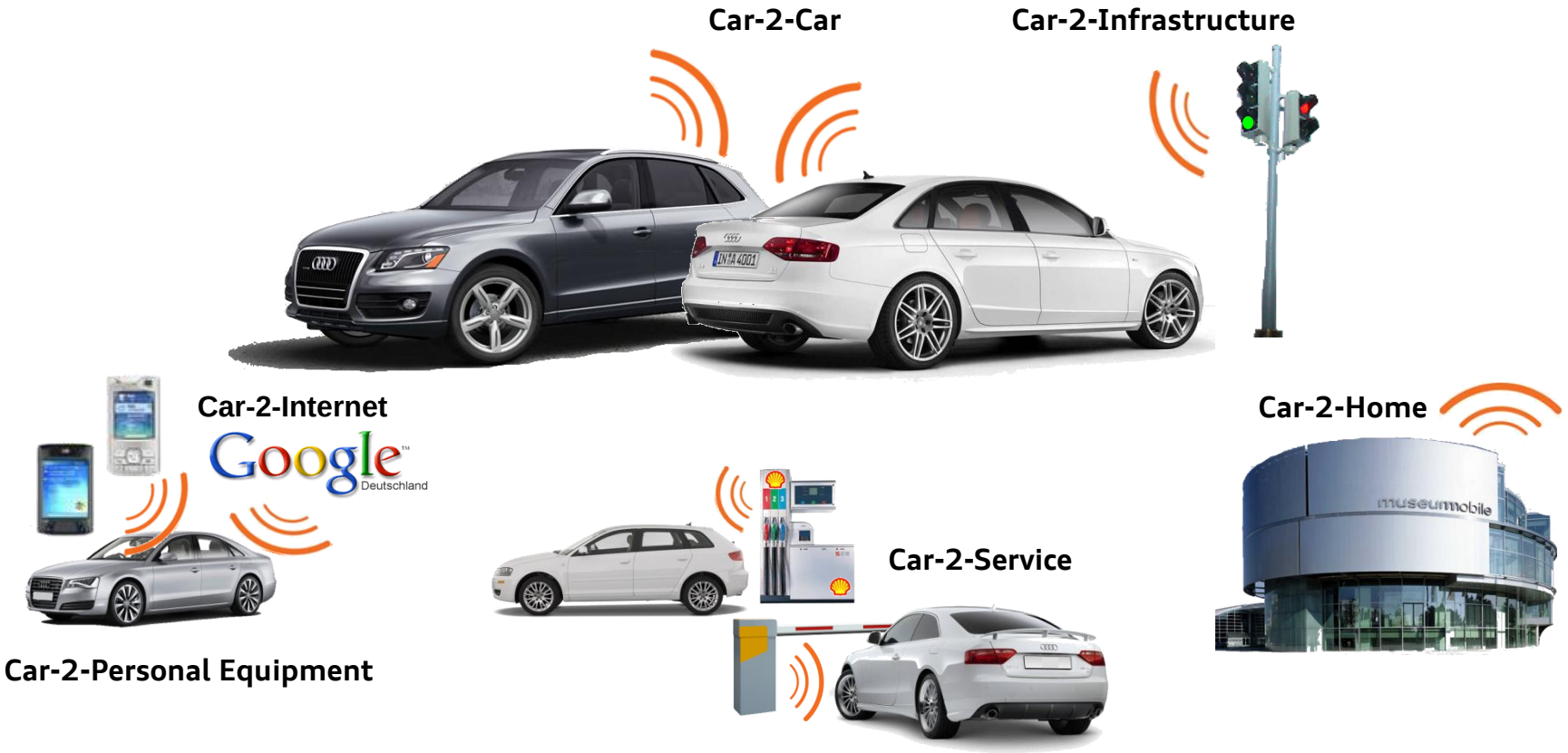
## Megatrends – Connected Car

**Car-2-X communication** = wireless communication between car and environment




- **Goal: The vehicle as part of the networked world**

# Future Trends of Vehicle Safety in a Globalized World
## Megatrends – Piloted Driving


- In October 2014, a piloted driverless  RS7 raced the Hockenheimring at top speed. A brief film was shown in the ASECAP with a life comment of the event.

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# Future Trends of Vehicle Safety in a Globalized World
## Summary

- Premium vehicles/manufacturers enable future technologies

- Main challenge remains the development of affordable and real world effective new safety systems, especially systems for accident avoidance and accident mitigation

- Technical Regulations for Safety should be harmonized globally, biomechanically meaningful and require valid testing tools.  Collision avoidance systems should be recognized as a substitute for passive measures provided they offer at least equivalent protection.

- Vehicle-to-vehicle and vehicle-to-infrastructure communication will offer additional safety opportunities

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# Thank you for your attention!