Continental
The Future in Motion

Future Systems for Vulnerable Road User (VRU) Protection

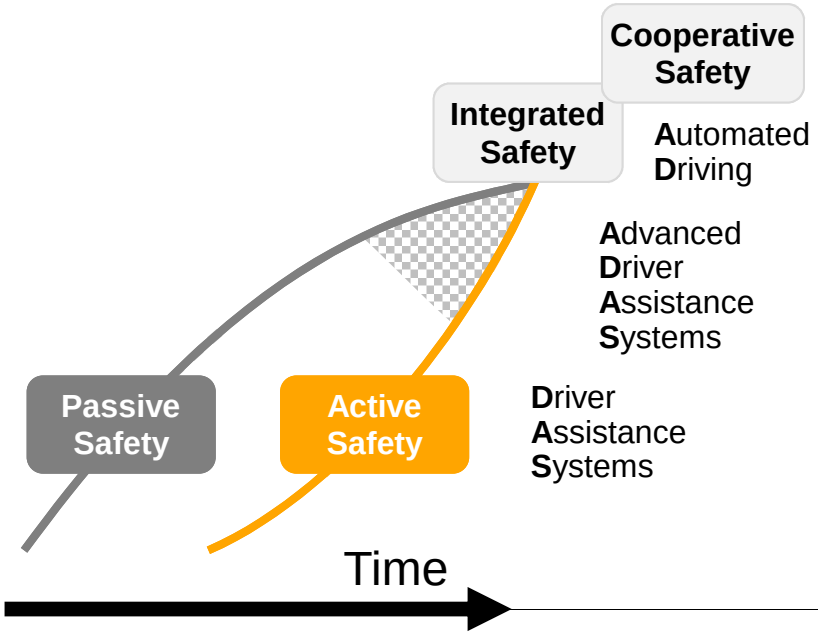
SensePlanAct

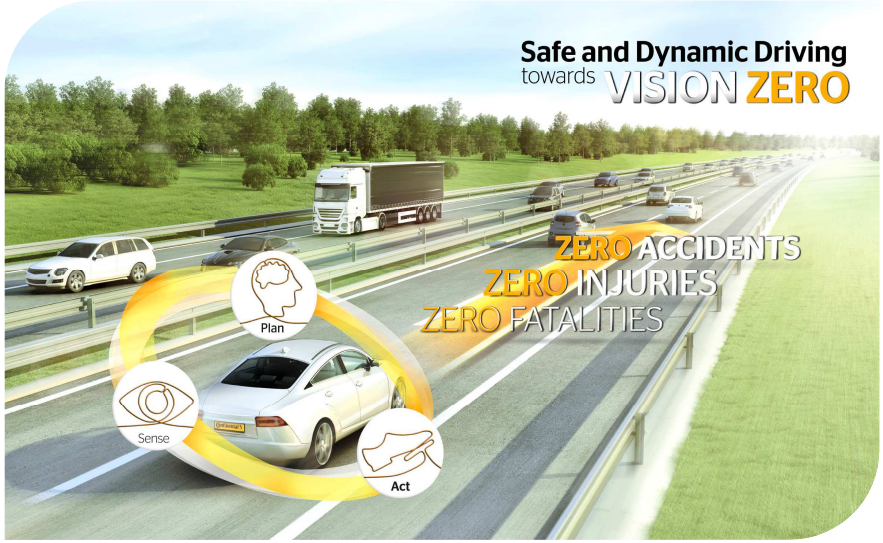
Chassis & Safety

SensePlanAct

The Fundaments of Vehicle Safety

Integration of Active and Passive Safety



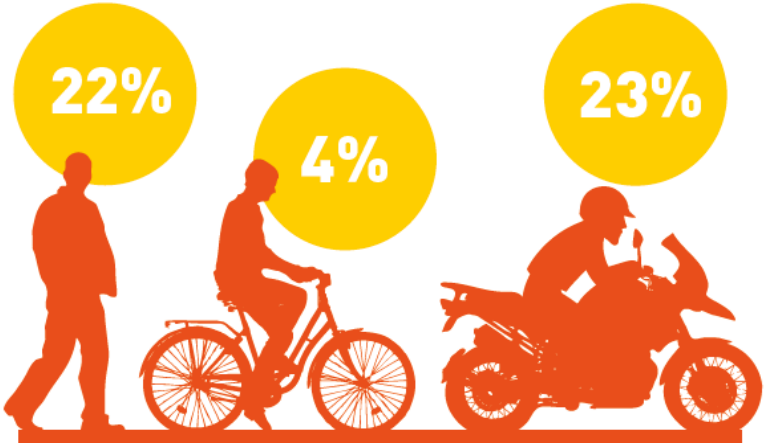


Accident Rates at a Glance

Road Traffic Deaths by Type of Road User (Worldwide)

1.25 million

road traffic deaths occur every year



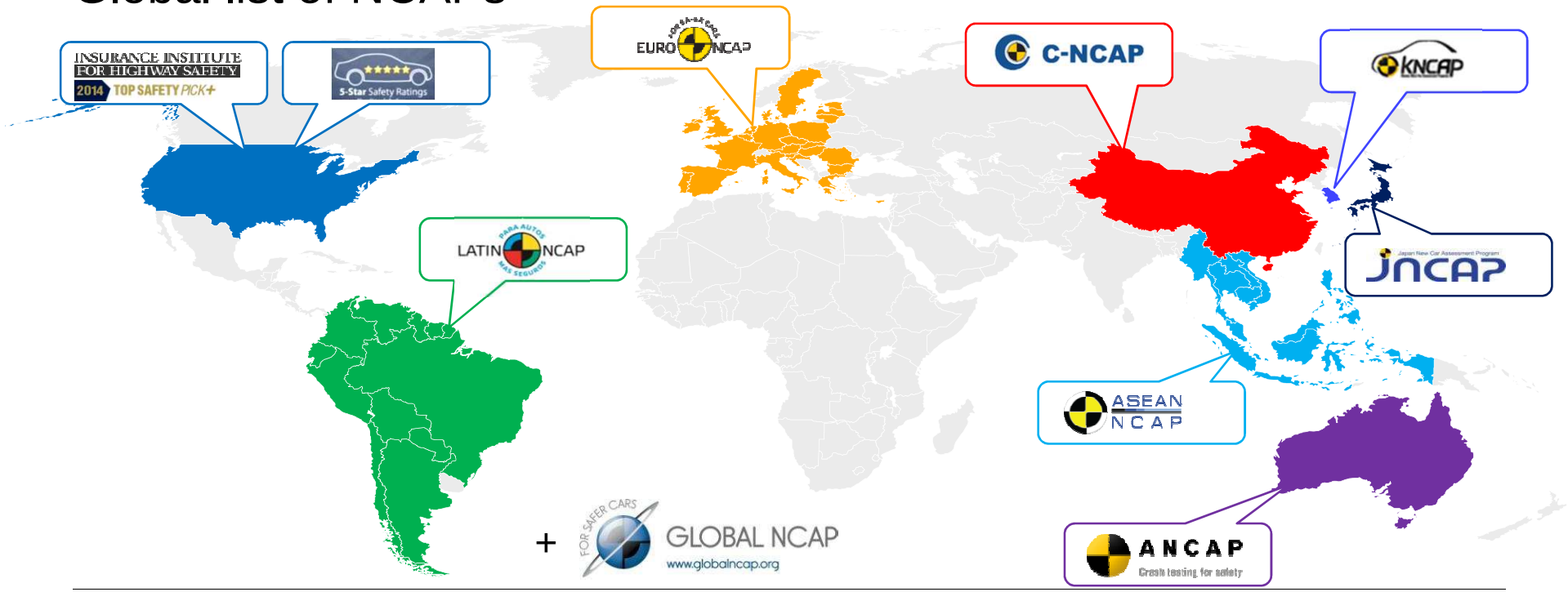
49%

of all road traffic deaths are among pedestrians, cyclists and motorcycles.

Source: World Health Organization (WHO),
„Global Status Report an Road Safety 2015“

NCAP Worldwide

Global list of NCAPs



Partners of Global NCAP Campaign “Stop the Crash”

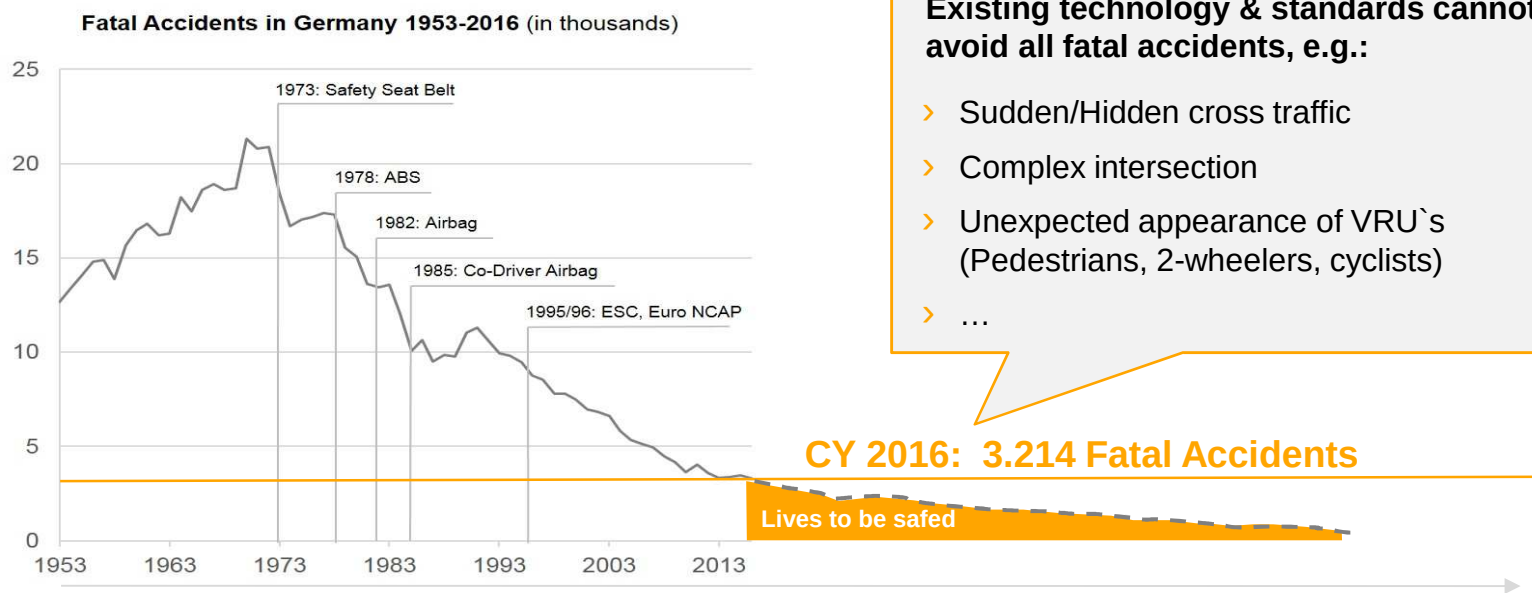
Promoting Safety Technologies in Emerging Markets

Continental´s Divisions Tires and Chassis & Safety are official Partner of the Global NCAP “Stop the Crash” Campaign together with other leading Automotive Suppliers, the **ADAC** and Thatcham

- **Technology focus:**
  ESC, AEB, Motorcycle ABS + Tire Pressure & Tread Depth
- **Targets:**
  Create awareness of leading crash avoidance technology in emerging markets
  Increase customer demand for vehicles to be equipped with these technologies
- First Event held in Brazil in November 2015

Accident Statistics - Germany

Development during the past 60 years

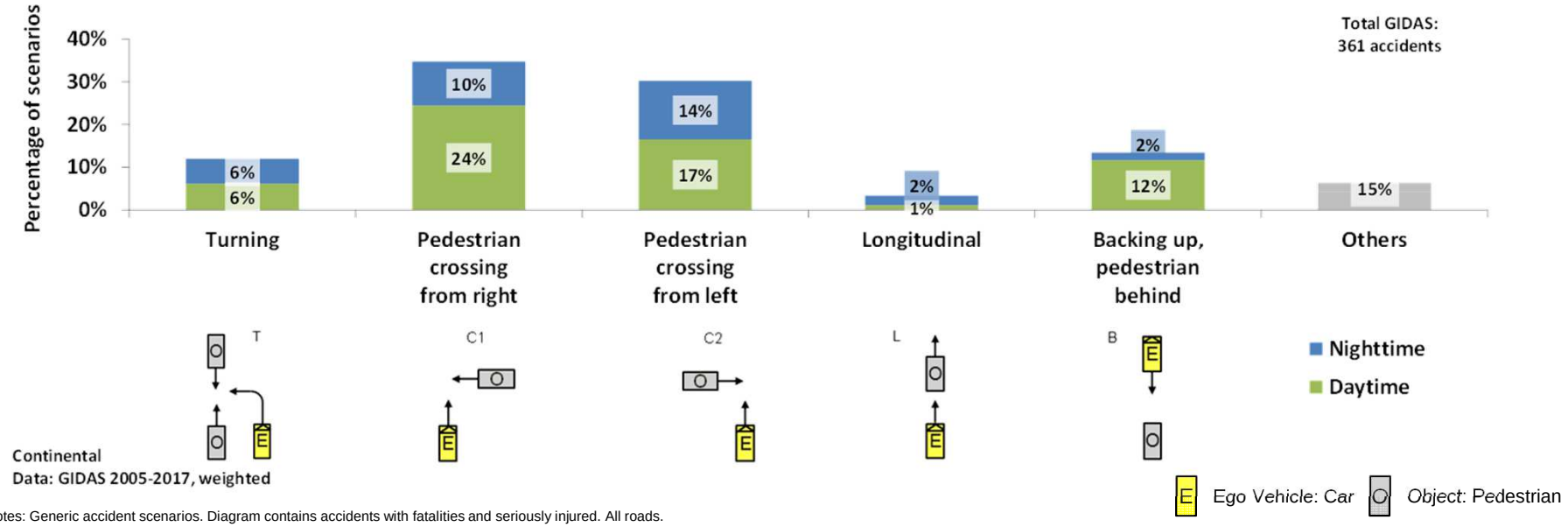


Existing technology & standards cannot avoid all fatal accidents, e.g.:

- Sudden/Hidden cross traffic
- Complex intersection
- Unexpected appearance of VRU`s (Pedestrians, 2-wheelers, cyclists)
- …

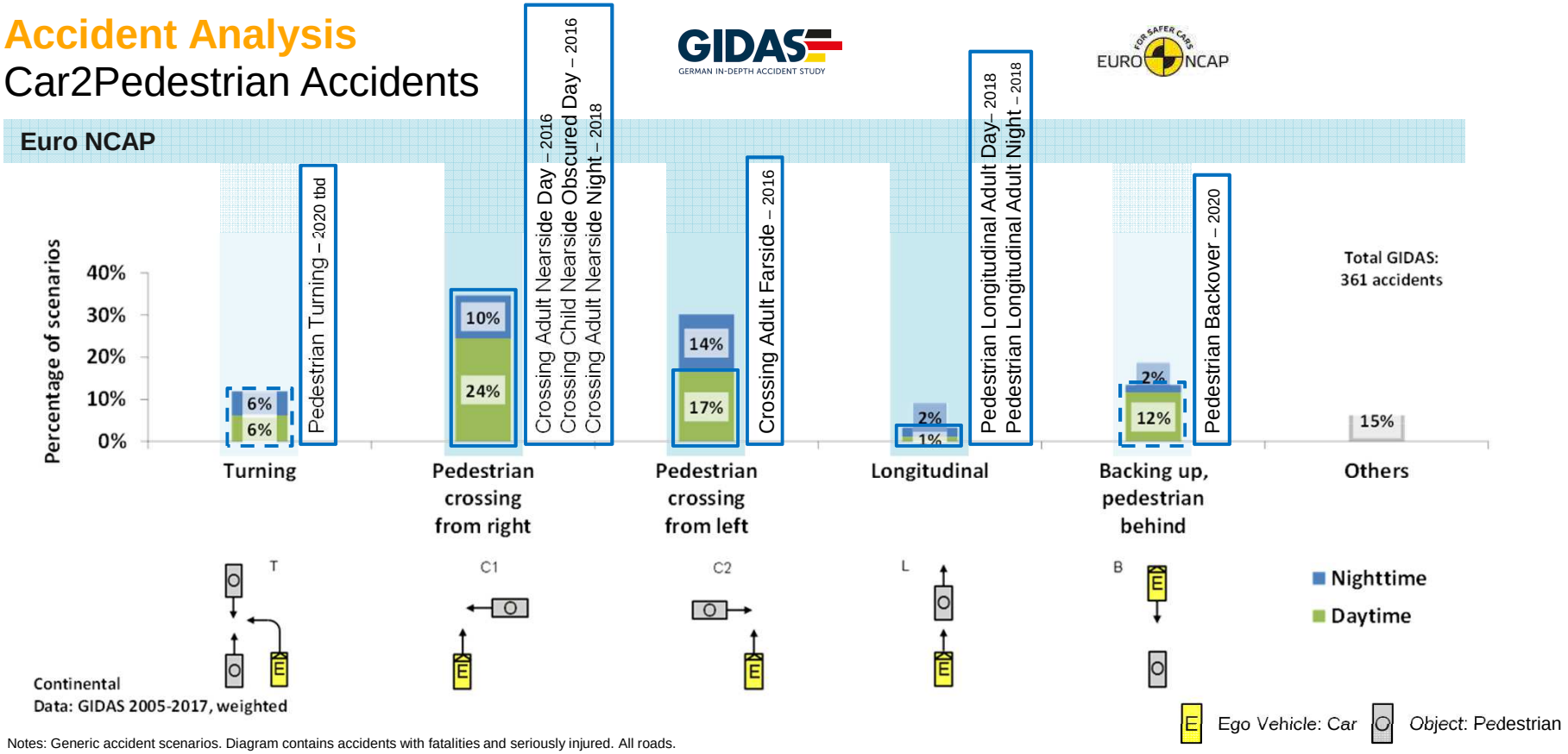
* Source: Federal Statistics Office Germany DESTATIS, figures 2016

Accident Analysis
Car2Pedestrian Accidents



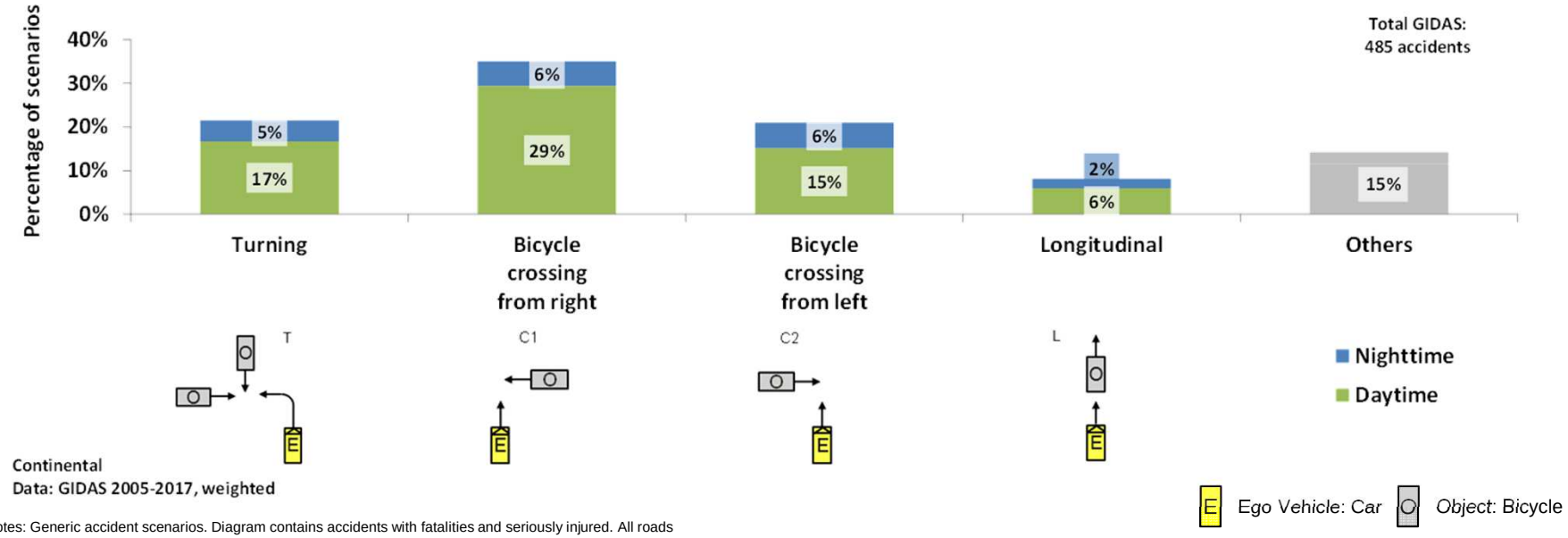
Notes: Generic accident scenarios. Diagram contains accidents with fatalities and seriously injured. All roads.
Data: German In-Depth Accident Study (GIDAS), 2005-2017.

Accident Analysis
Car2Pedestrian Accidents



Notes: Generic accident scenarios. Diagram contains accidents with fatalities and seriously injured. All roads.
Data: German In-Depth Accident Study (GIDAS), 2005-2017.

Accident Analysis
Car2Bicycle Accidents



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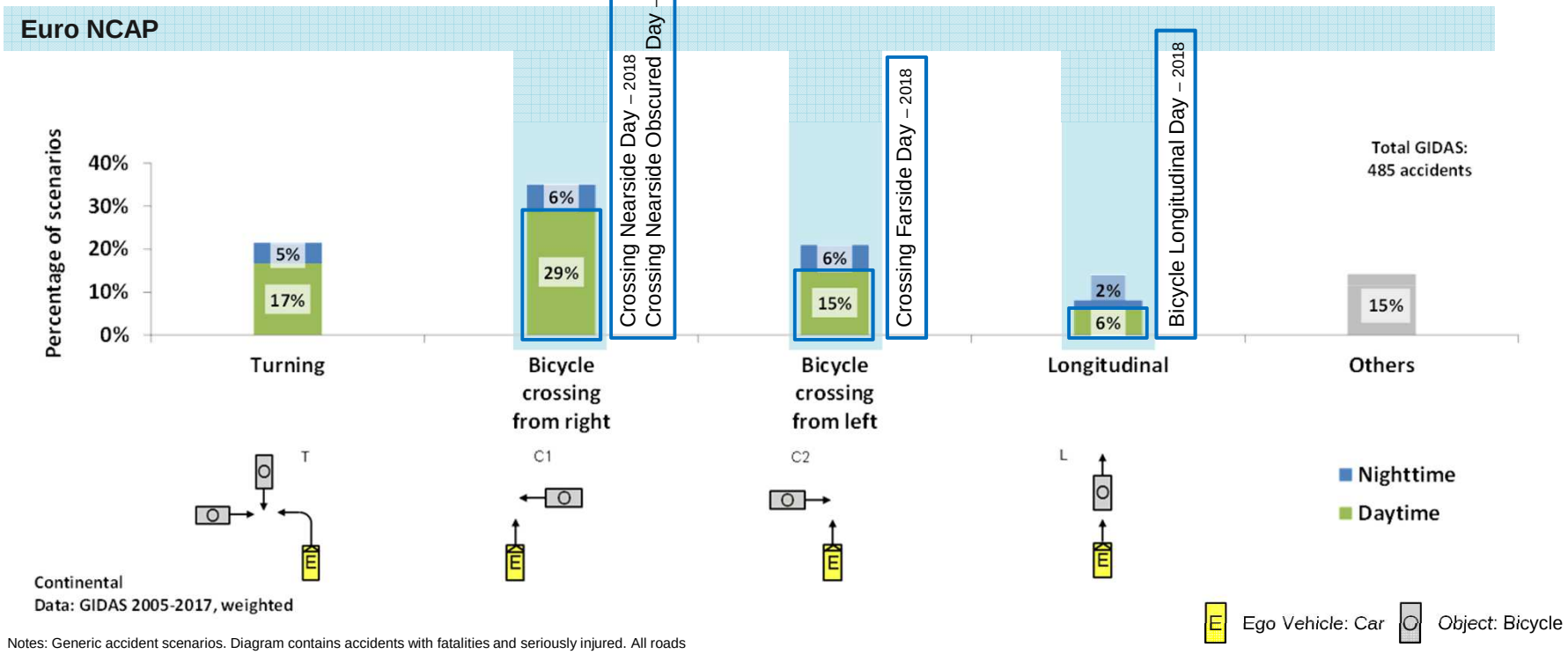
Data: German In-Depth Accident Study (GIDAS), 2005-2017.

Accident Analysis
Car2Bicycle Accidents



Notes: Generic accident scenarios. Diagram contains accidents with fatalities and seriously injured. All roads
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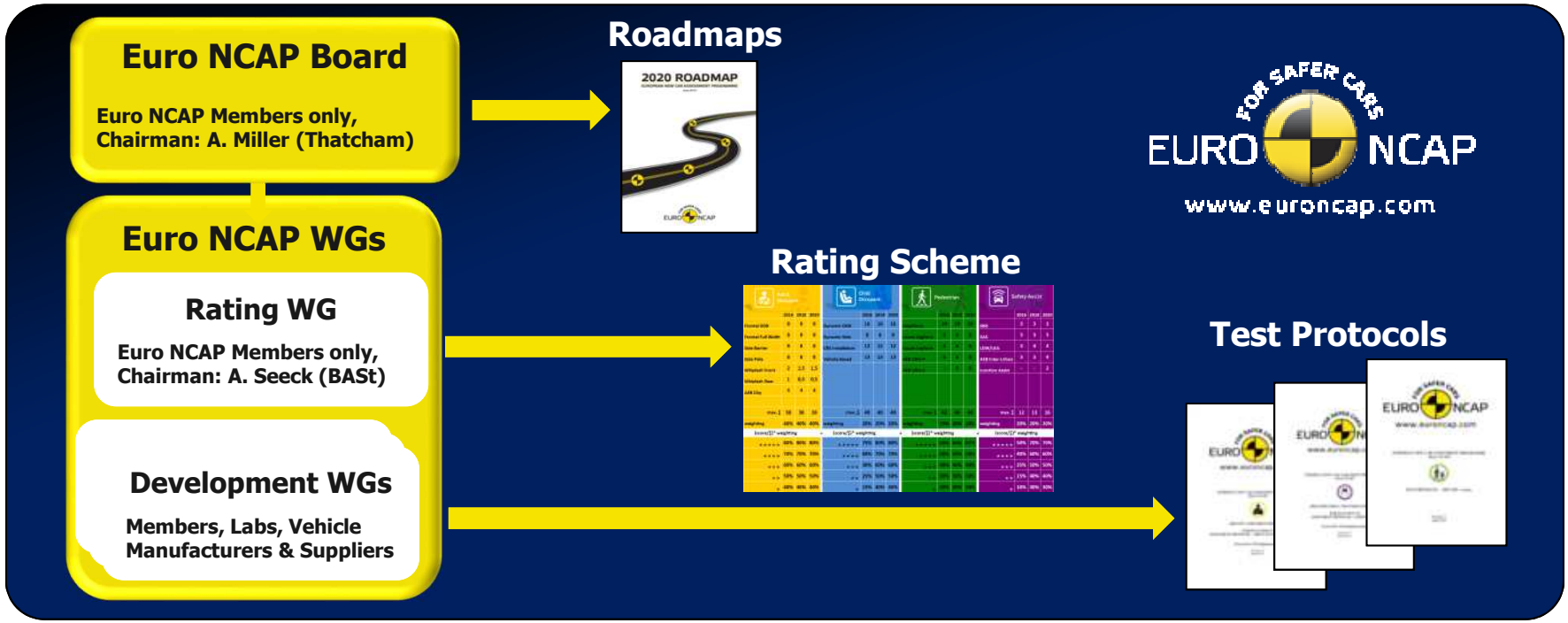
Advanced Driver Assistance Systems
Market Drivers

Euro NCAP
Organization



Euro NCAP Roadmap
Overview

Occupant Protection

- Include 6y & 10y child dummy in front/side crash tests — *2016*
- Seat belt reminder on rear seats demanded — *2017*
- Far side tests for driver and front passenger — *2018*
- Offset front impact protection in crash tests — *2020*

AEB (C2C & VRU)

AEB Pedestrian @ night

AEB Bicycle

Lateral Assist

- Lane Keeping Assist (LKA) assessment — *2016*
- Extend LKA-test including
  - Unintended road departure
  - Critical lane change
  - Head-on collisions (narrow off-set)
  — *2018*

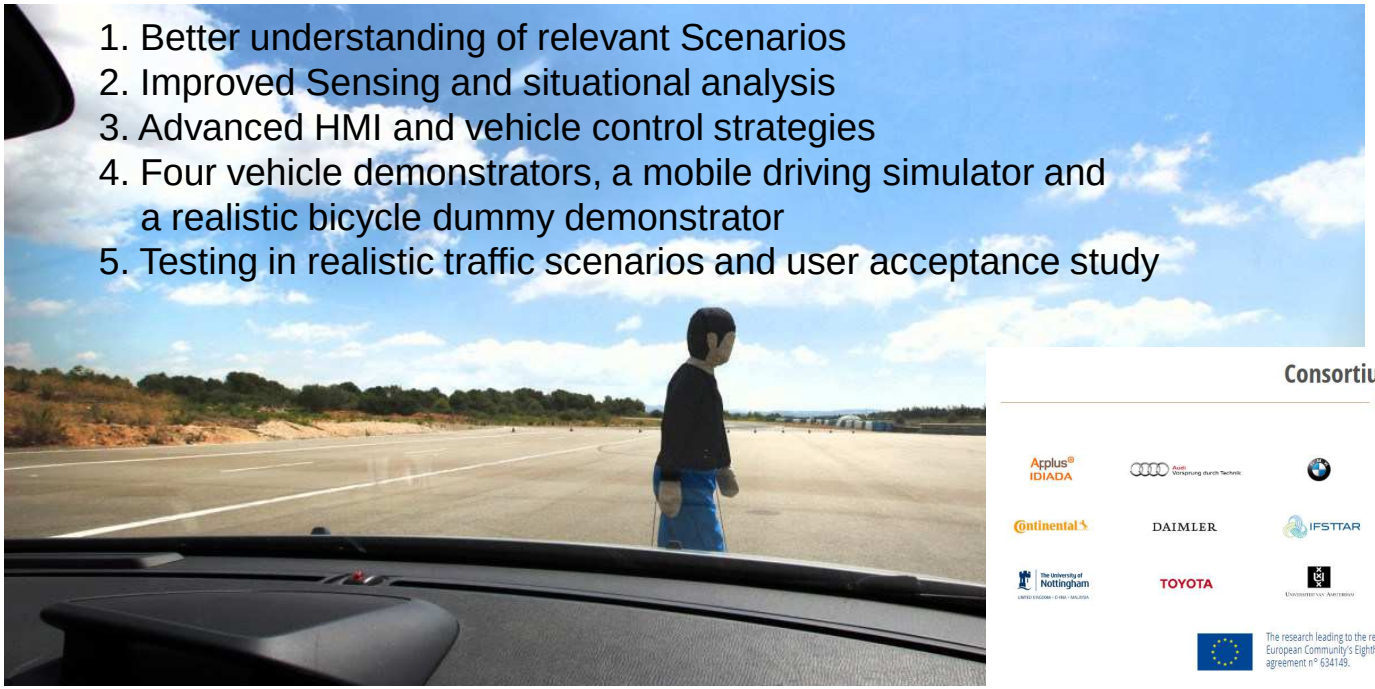
Speed & impaired Driving

- Update Speed Assistance (SAS) protocol to include
  - Traffic signs
  - Conditional speed limit
  - Digital map
  — *2016*
- Reward for virtual co-pilot
  - Driver support technologies
  - Driver state monitoring
  — *2016 Award*
- Reward + Campaign for partial automated driving — *2016 Award*, *2017 Campaign*

AEB: Autonomous Emergency Braking
C2C: Car-to-Car, HMI: Human Machine Interfa
NCAP: New Assessment Program
VRU: Vulnerable Road Users

PROSPECT

Proactive **S**afety for **Pe**destrians and **C**yclis**t**s



Consortium Partners

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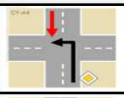
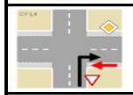
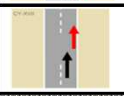
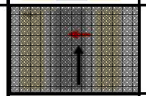
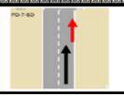
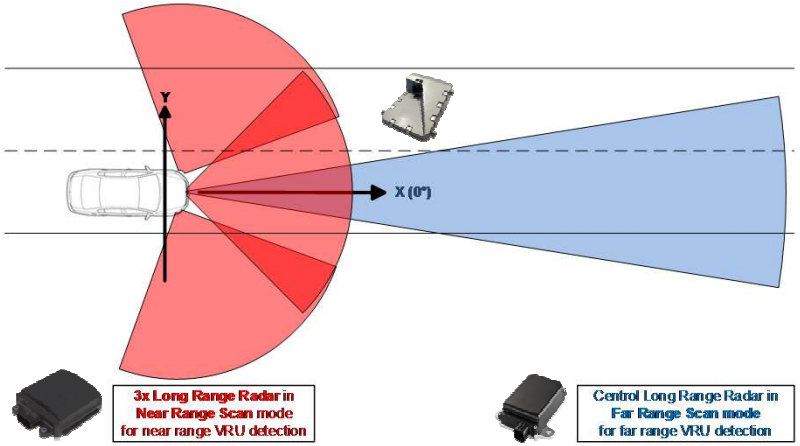
Use Cases & Sensing

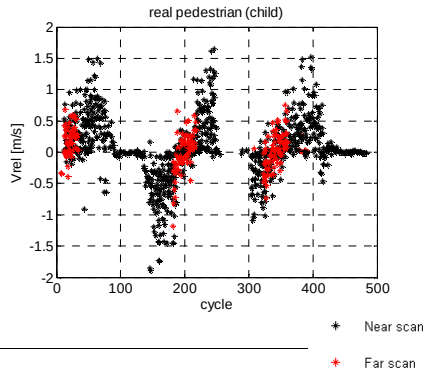
High Resolution Radar with Micro-Doppler

PROSPECT Proactive Safety for Pedestrians and Cyclists

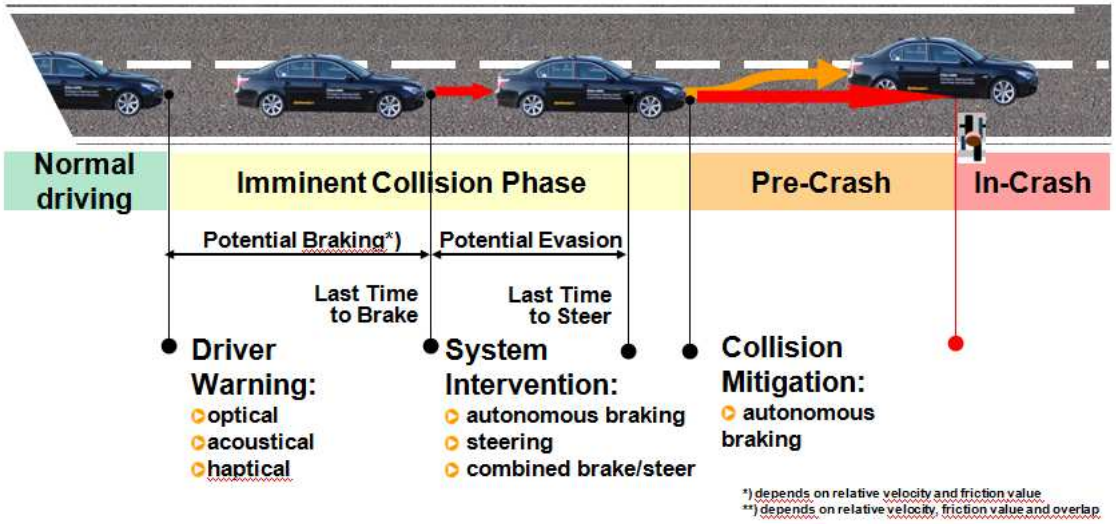
VRU	Illustration	Median velocities at hit point (HP) (from D3.1)
Cyclist		$v_{EGO@HP} \approx 40$ km/h $v_{VRU@HP} \approx 22$ km/h
		$v_{EGO@HP} \approx 15$ km/h $v_{VRU@HP} \approx 15$ km/h
		$v_{EGO@HP} \approx 15$ km/h $v_{VRU@HP} \approx 18$ km/h
		$v_{EGO@HP} \approx 40$ km/h $v_{VRU@HP} \approx 15$ km/h
Pedestrian		$v_{VRU@HP} \approx 3$ km/h
		$v_{VRU@HP} \approx 3$ km/h

- Moving pedestrians and cyclists generate periodical movement pattern of parts (torso, arms and legs)
- Every part has its own specific motion velocity

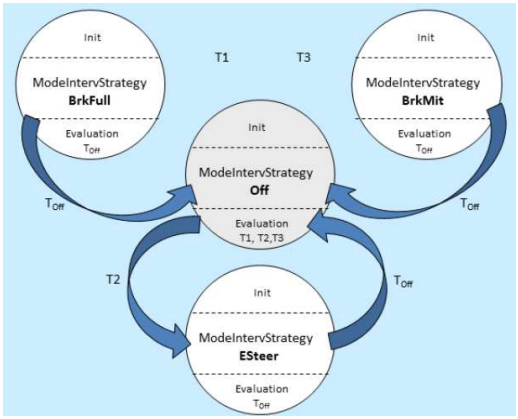




Optimized Vehicle Control Strategy
Decision for Braking or Evading



- Dependent on the situation the system decides for and initiates a dynamic brake maneuver or an evasion maneuver within the ego driving lane.



Improved Actuation

MK C1 - Successful Customer Launch

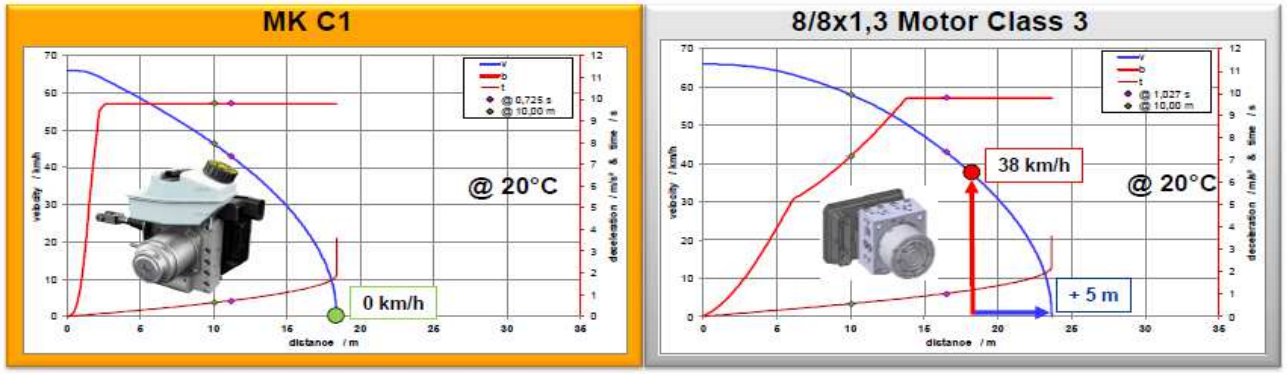
Picture Source: Alfa Romeo

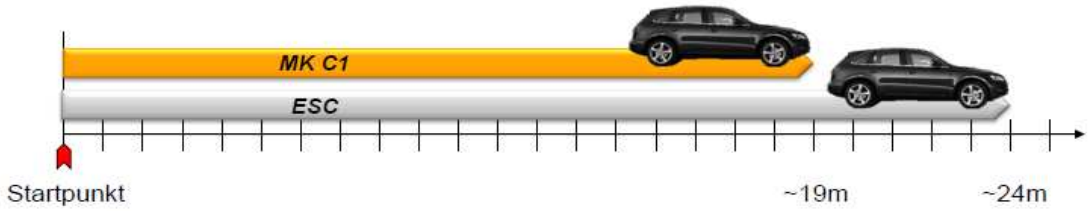
Faster braking, shorter braking distances

With 50% more braking power for Advanced Driver Assistance Systems including Emergency Brake Assist, Adaptive Cruise Control, and Pedestrian Protection Systems, the system helps to avoid accidents thanks to short braking distances and to reduce the severity of any accidents that do occur

MK C1 vs. Standard Actuator

Stopping Distance @ AEB Maneuvre





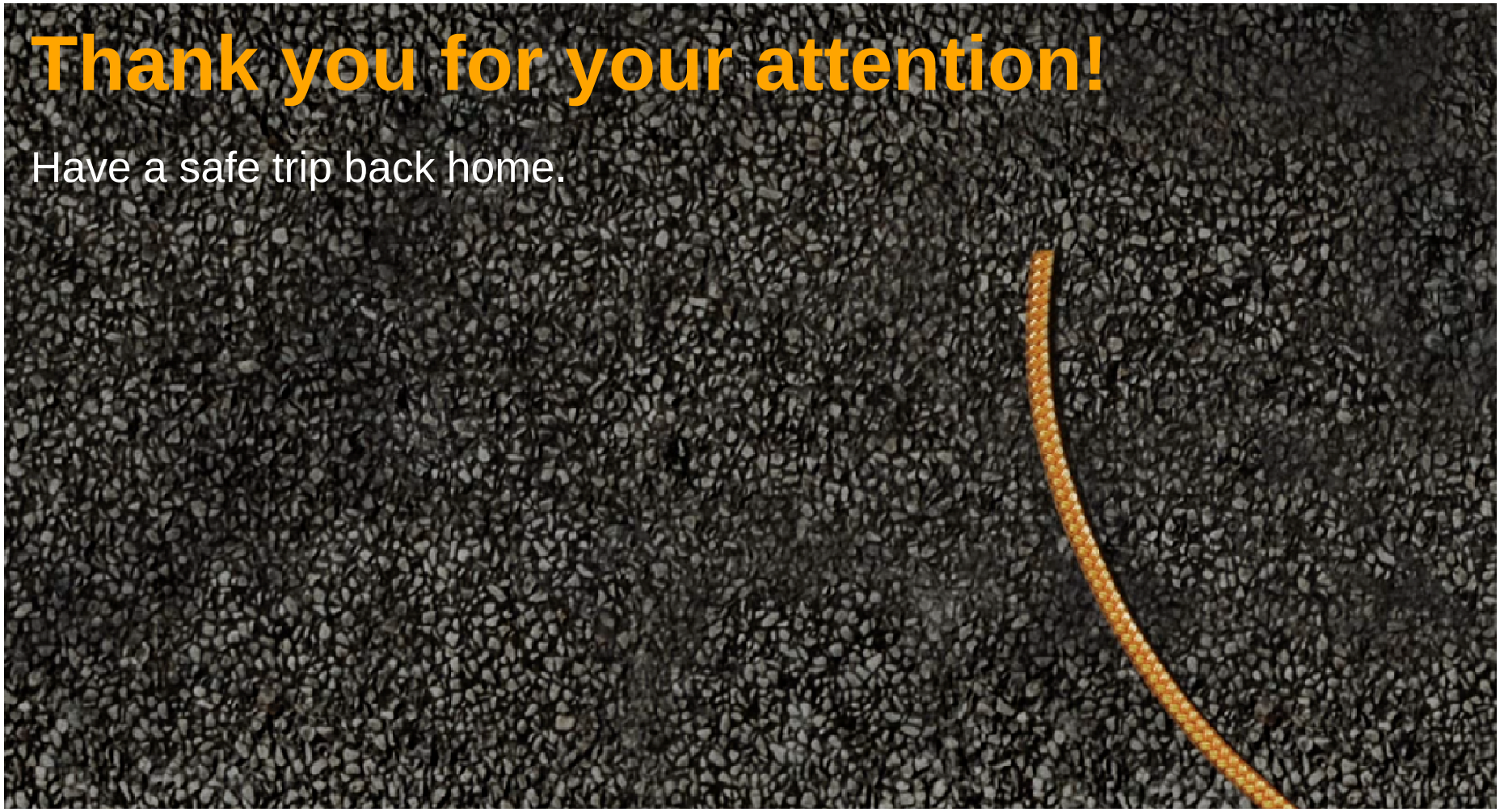
* Audi Q5 unloaded only driver

simulated from
66 km/h

PROSPECT
Continental Demo Vehicle in Test

Thank you for your attention!

Have a safe trip back home.



Safe and Dynamic Driving
towards Vision Zero