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Új technológiák a közlekedésbiztonság jövőjéért

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Outline

1. Active and Passive Safety - definition
2. Driver Information Functions
3. Driver Assistance Functions
4. Predictive Safety Functions
5. Combined Active and Passive Safety Systems
6. Summary and Outlook

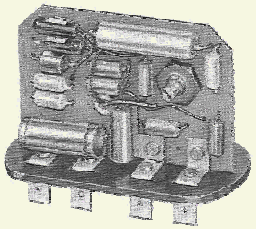
1960: Vision

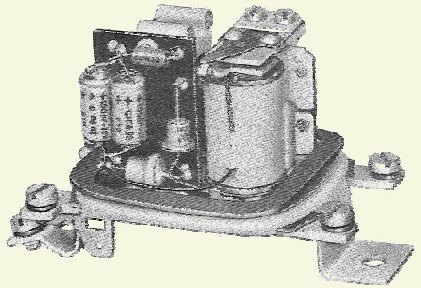
source: R. Bosch GmbH, Dr. Callsen, „The Importance of Semiconductors for the Electrical Vehicle Equipment". FISITA congress, 1960.

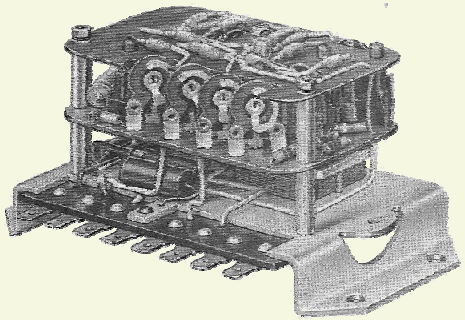
"The development of semiconductors is just at the beginning…

Using semiconductors, ideas like electronic gasoline injection as well as control systems that allow steering, accelerating and braking through a small control stick, or steering systems that guide the car automatically on the road, or radar units that show obstacles even in dense fog, as well as some others, can become reality…

Electronics is starting to change and to improve the electric vehicle system and is thus adding increased safety to the car."







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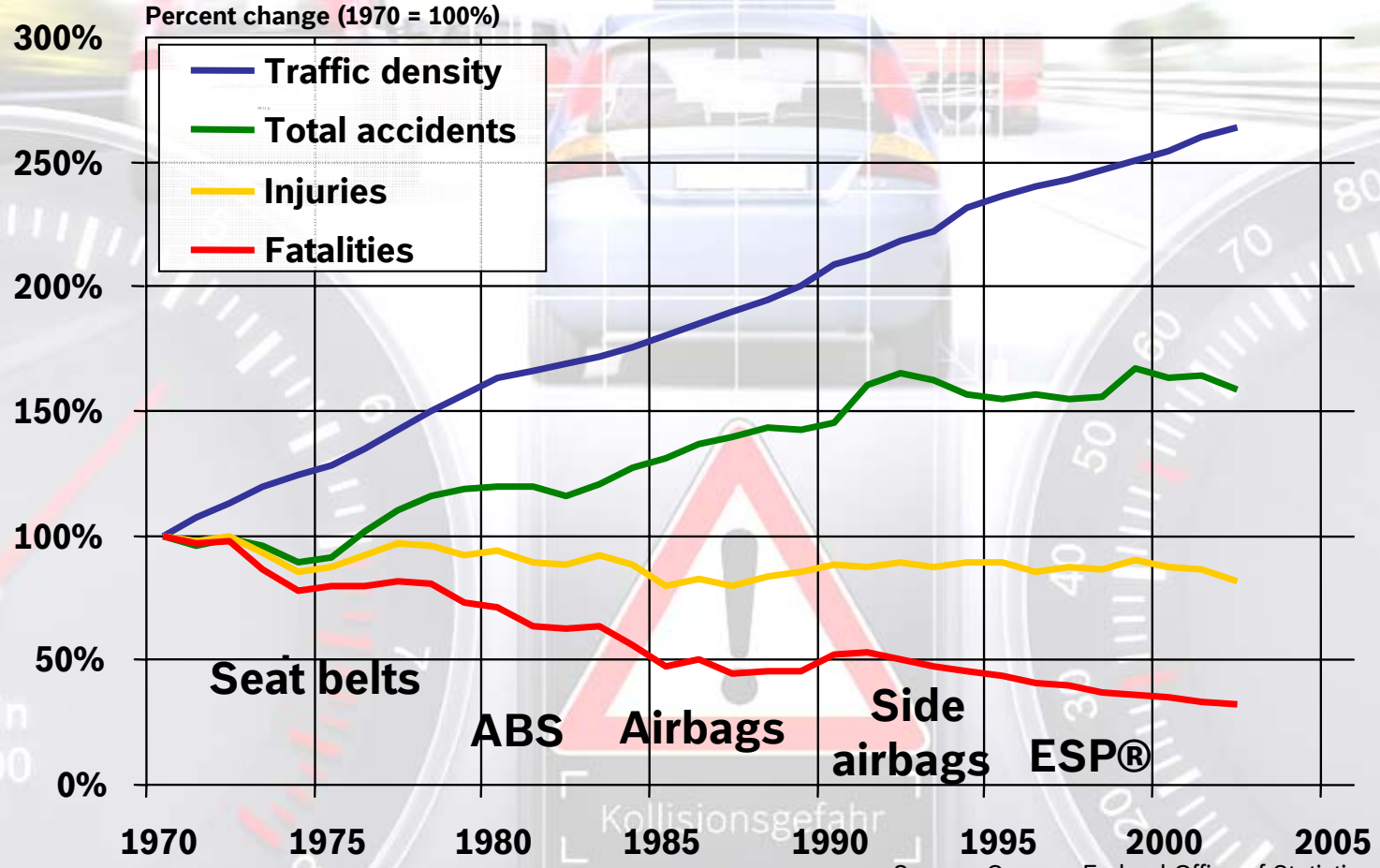
Accident Statistics in Germany



Source: German Federal Office of Statistics and Bosch

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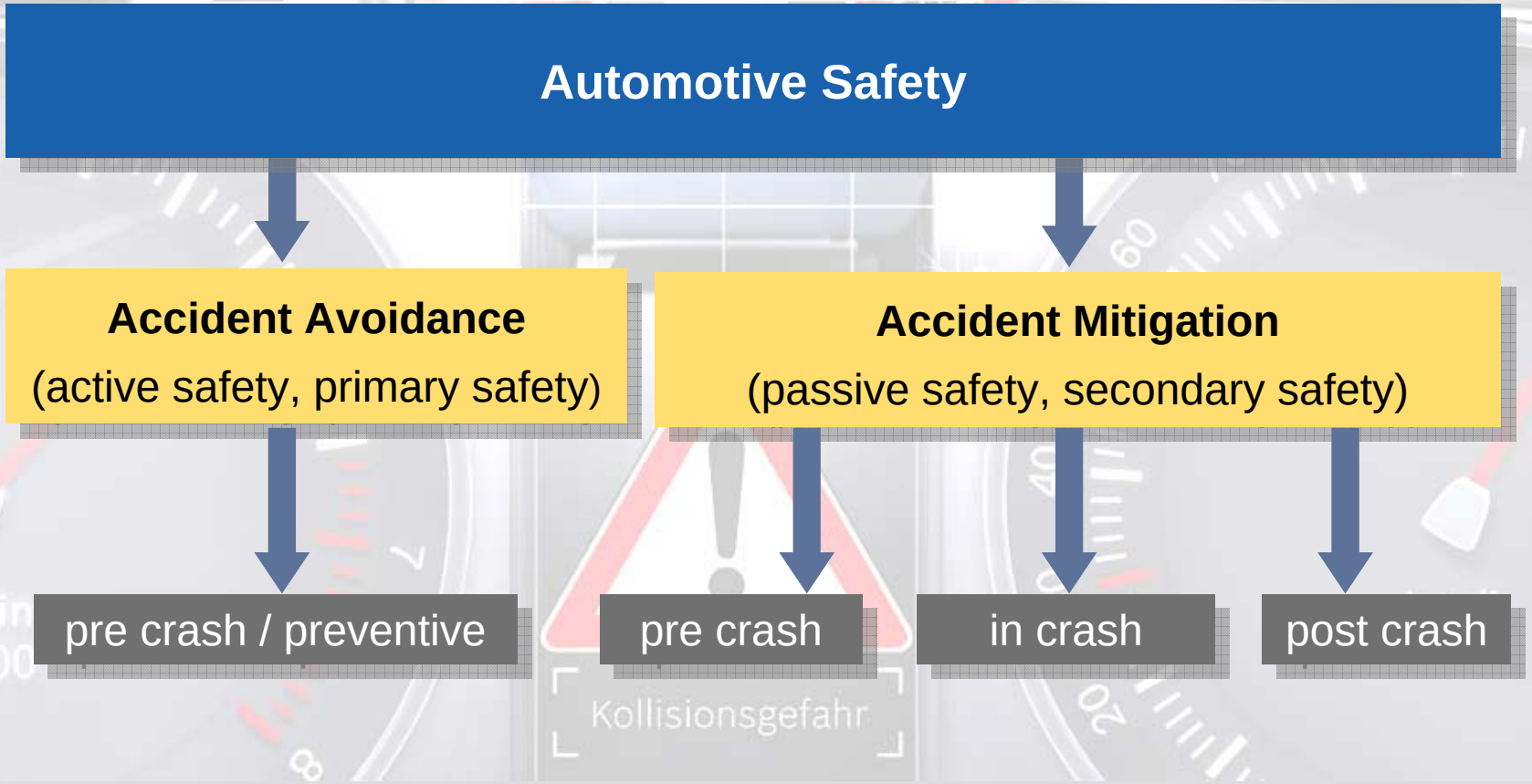
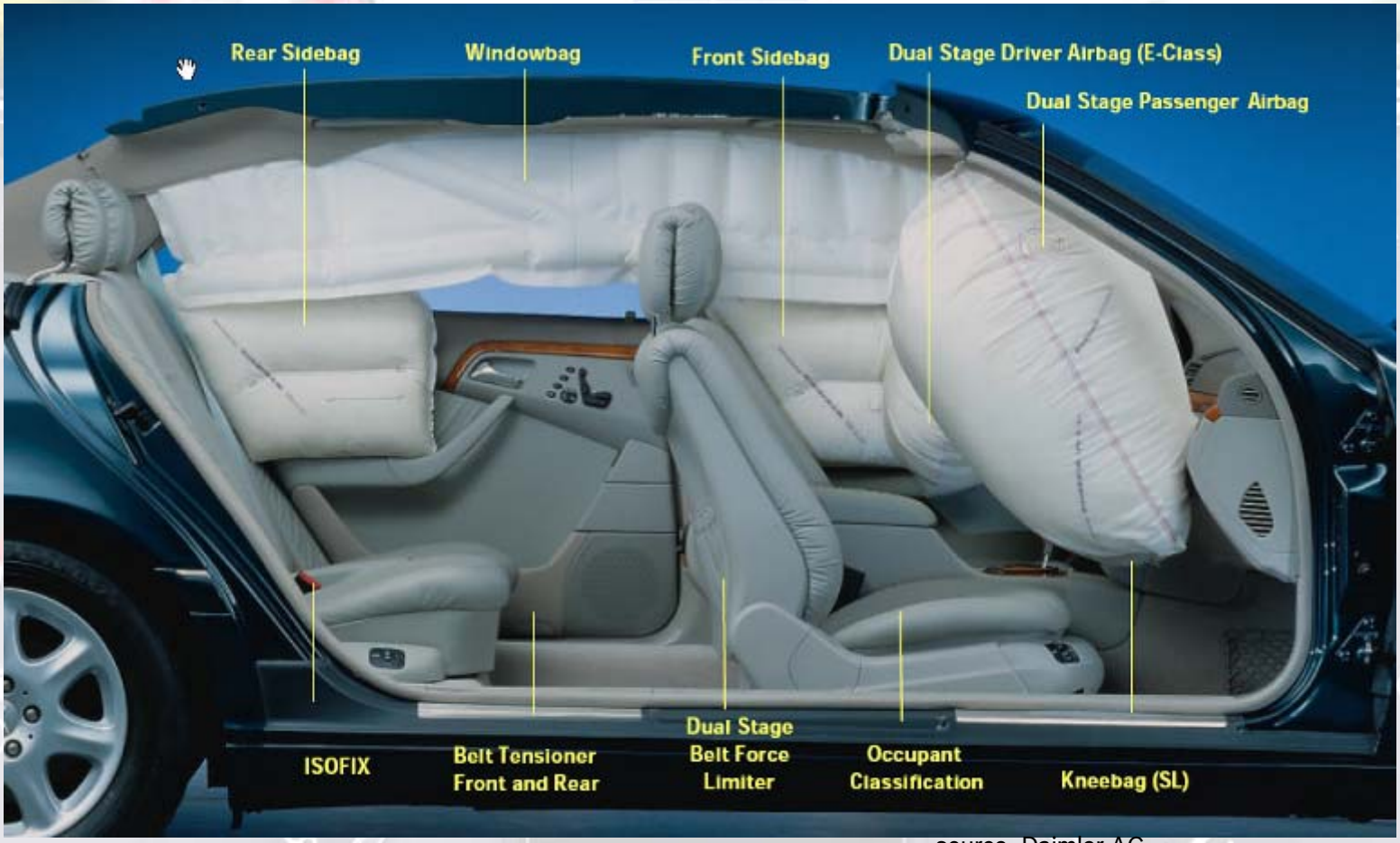
Active & Passive Safety - Definitions



Accident Mitigation - Passive Safety Today



source: Daimler AG

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Influences on Active Safety

Accident Avoidance
(active safety, primary safety)

Driver

- Perception
- Handling (Driver - Vehicle - Environment)
- Driver status (physical, mental)

Vehicle

- Chassis
- Brake, Acceleration
- Steering
- Handling & HMI
- Comfort, Acoustics, Climate
- Lighting, Visibility

Environment

- Weather, Road condition
- Road Network, Street course
- Road signals
- Other road users
- Information systems

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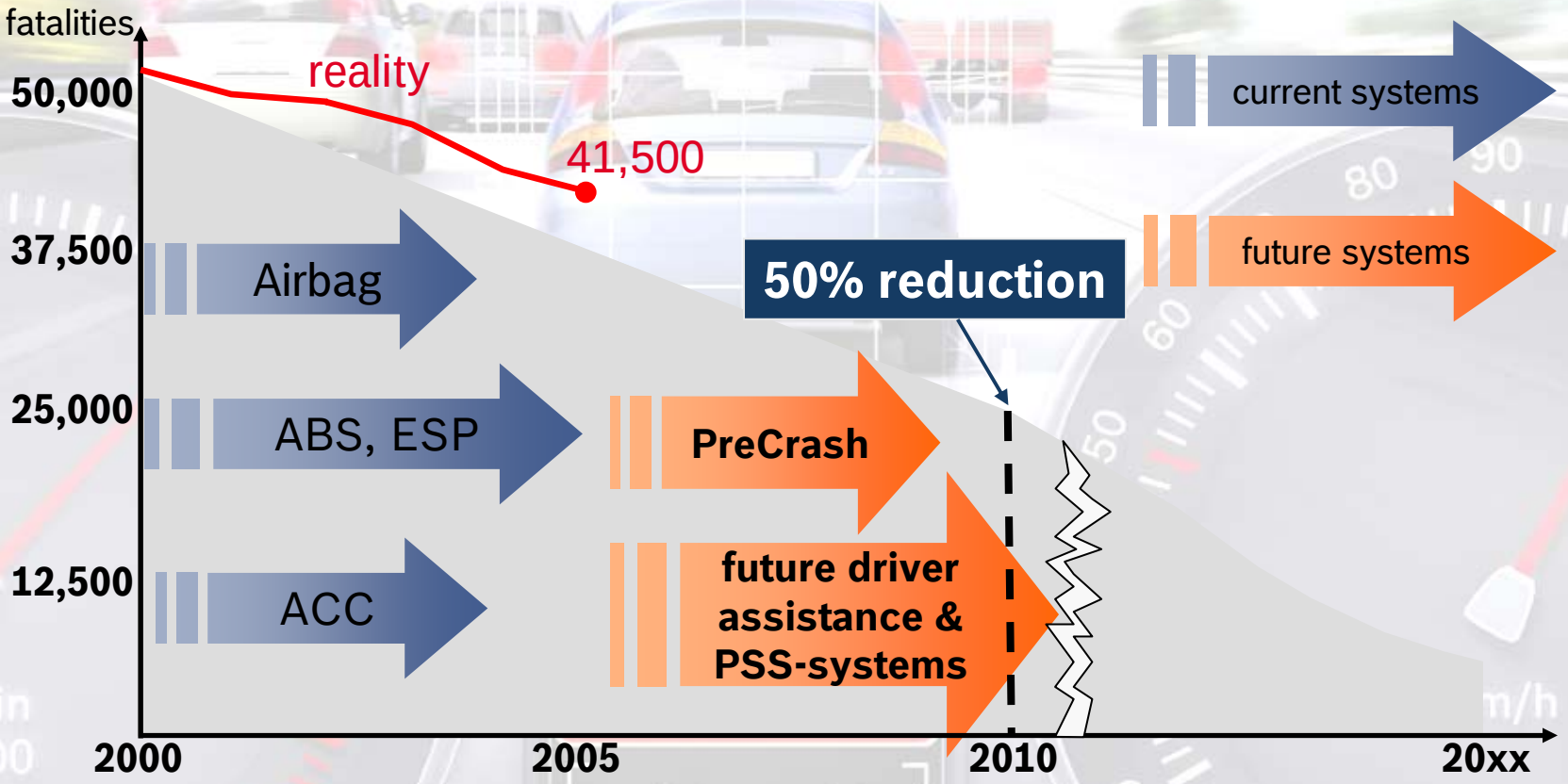
Road Safety Action Plan - EU25



Goal until 2010: reduction of fatalities from 50,000 (2001) down to 25,000

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Our Vision: the sensitive vehicle

Long Range Radar	Infrared Light	Video	Ultrasonic	Short/Mid Range Radar	Video
long range ≤ 200 m horiz. opening angle: ± 8°	night vision range ≤ 150 m horiz. opening angle: ± 10°	mid range ≤ 80 m horiz. opening angle: ± 22°	ultra short range ≤ 4 m horiz. opening angle: ± 60° (single sensor)	short range ≤ 20 – 70 m horiz. opening angle: ± 30°	rear area horiz. opening angle: ± 60°

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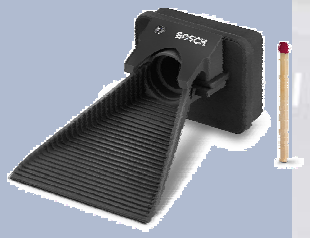
Driver Information Functions:
support the driver actively for his tasks

Road Sign Recognation

- Night Vision

- Pedestrian-/ Object-Detection



Video Camera

Park Steering Measurement

Park Steering Information

Ultrasonic Sensors

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Information Functions: Road Sign Recognation

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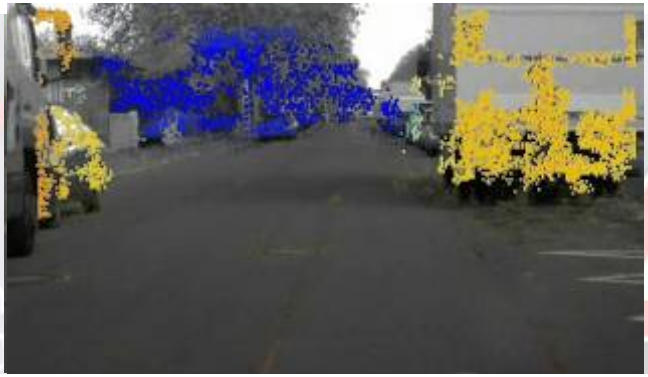
Stereo-Video for Robust Pedestrian Detection

Crossing Pedestrian

Flow Evaluation



Disparitiy Evaluation

Combination Flow/Disparity

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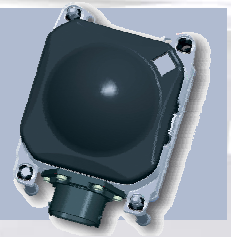
Driver Assistance Functions: relieve the driver of routine tasks

Full-Range ACC
ACCplus

Future:
Integrated
Cruise Assist
Combination of longitudinal and lateral guidance control

Long Range Radar



Lane Keeping Support
haptic (steering) feedback,

Video Camera

Park Steering Control

Future:
Fully Automated Parking
longitudinal+lateral guidance control

Ultrasonic Sensor

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Lane Keeping Support

Bots Dots (USA)

Robustness

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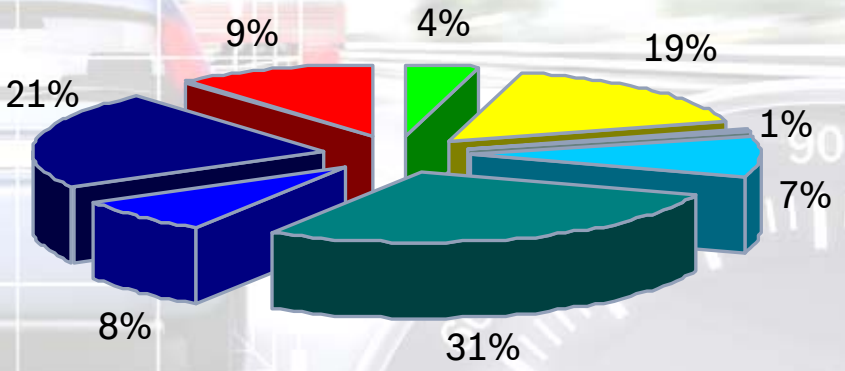
Accident Causes in German Traffic

- Collision w. Obstacle
- Pedestrian Collision
- Crossing collision
- Frontal collision
- Rear end collision

} ***PSS****



- Lane change } *Blind Spot Detection*
- Lane departure } *Lane Keeping Support*

- other

Source: Statistisches Bundesamt, 2004

Predictive Safety Systems PSS*:
60% less rear end collisions and 30% less frontal collision if the driver could **react earlier** by 0.5 sec!

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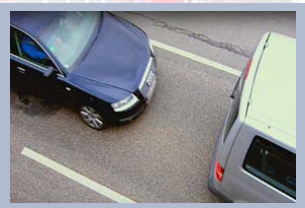
Predictive Safety Functions:
reduce accident frequency and severity

Predictive Brake Assist *SOP 2005*

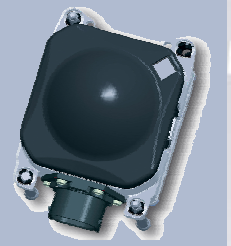


Predictive Collision Warning *SOP 2006*

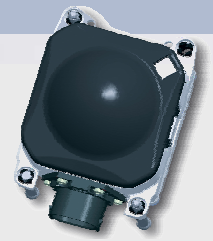
Predictive Emergency Braking

Vision: Preventive Safety Functions
Collision Mitigation/ Avoidance

Long Range Radar



Long Range Radar + Video Camera



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Predictive Emergency Braking (PEB)

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CAPS – Combined Active and Passive Safety

Active Safety


Vehicle stabilizing


Brake functions


Vehicle dynamics

Driver Assistance

Radar based systems

Ultrasonic based systems

Video based systems

CAPS

- Preventive information
- Coordinated interaction
- Added value functions

Targets: Accident mitigation and reduced accident severity


Detection & sensing


Occupant protection


Pedestrian protection

Passive Safety

Navigation systems

Visualization

Car-to-x communication

Communication

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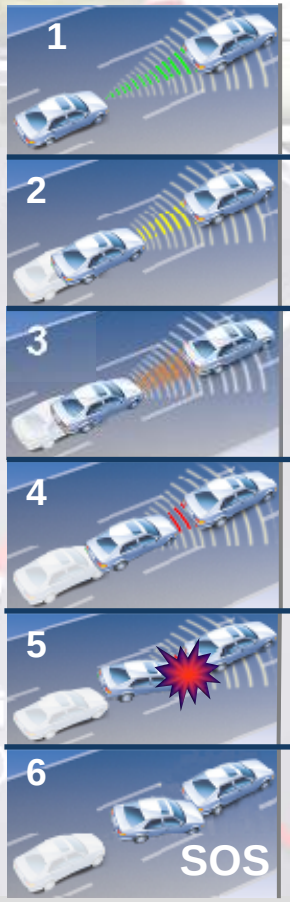
Multiphase Safety Concept

Risk phases (e.g. front crash)



Risk avoidance: Route guidance
Warn driver in advance in case of e.g. traffic jam or improper speed

Increased risk: Brake preparation
Raise brake efficiency

High risk: Driver warning / accident mitigation
Guide the drivers attention towards crash avoidance

Crash inevitable: Accident preparation
Prepare occupant protection, slow down vehicle

In-crash: Passenger protection
Optimize occupant protection, crash mitigation

After crash: Rescue and information/ protection
Inform rescue services, warn following traffic

CAPS: Secondary Collision Mitigation (SCM)


Features:

- Addresses accidents with a minor initial collision and impending subsequent collision
- Automatic brake intervention - with or without deployment of irreversible restraint systems

Customer benefits:

- Reduced kinetic energy of impending subsequent crashes
- Improved controllability by driver due to reduced velocity

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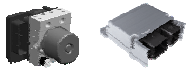
CAPS: Early Pole Crash Detection (EPCD)



Features:

- Deployment of restraint devices if a door intrusion is experienced after a lateral trip of the vehicle (indicated by a high lateral velocity).
- Side airbags are triggered using pressure sensors in doors and additional ESP sensor informations (yaw rate, velocity, steering angle,..)

Customer benefit:

- Early deployment in case of real world pole crashes - no waiting for plausibility signal from central acceleration sensor

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Summary and Outlook

- Cars will soon have 360-degree “surround sensing” which is the basis for innovative driver assistance systems.
- Key components are intelligent Radar and Video sensors. Significant developments regarding performance of cost improvements.
- Radar offers excellent measurement of distances and speeds. Video allows determination of size and shape of objects. By combination of Radar and Video, the relevance of recognized objects for predictive safety functions can be solidly derived.
- Further develoments in Video Algorithms allow detection of object movements and improved object classification. Complex scene interpretations will allow for future accident mitigation functions.

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Köszönöm a figyelmet!

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