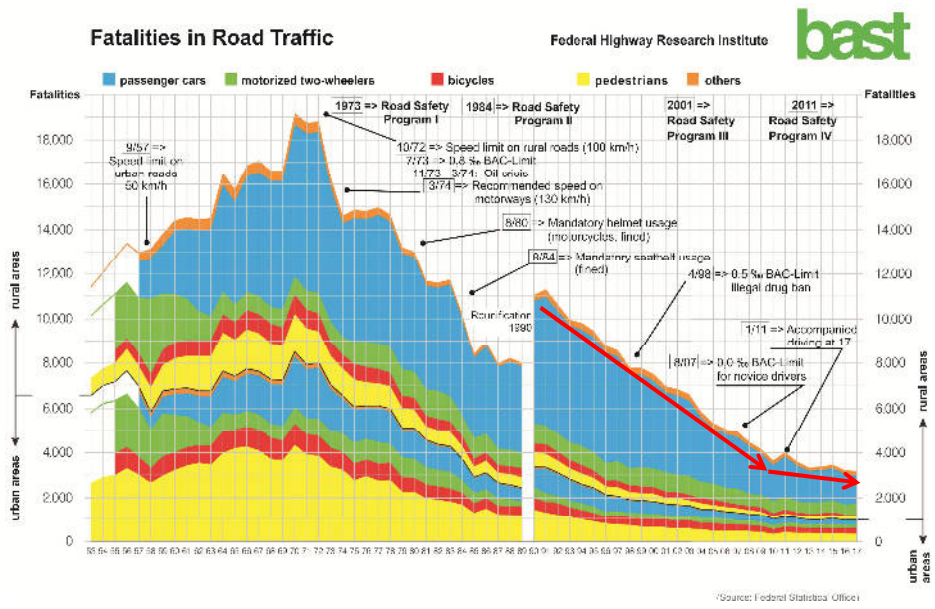
Vision Zero in der Fahrzeugsicherheit bei Euro NCAP

Direktor und Professor

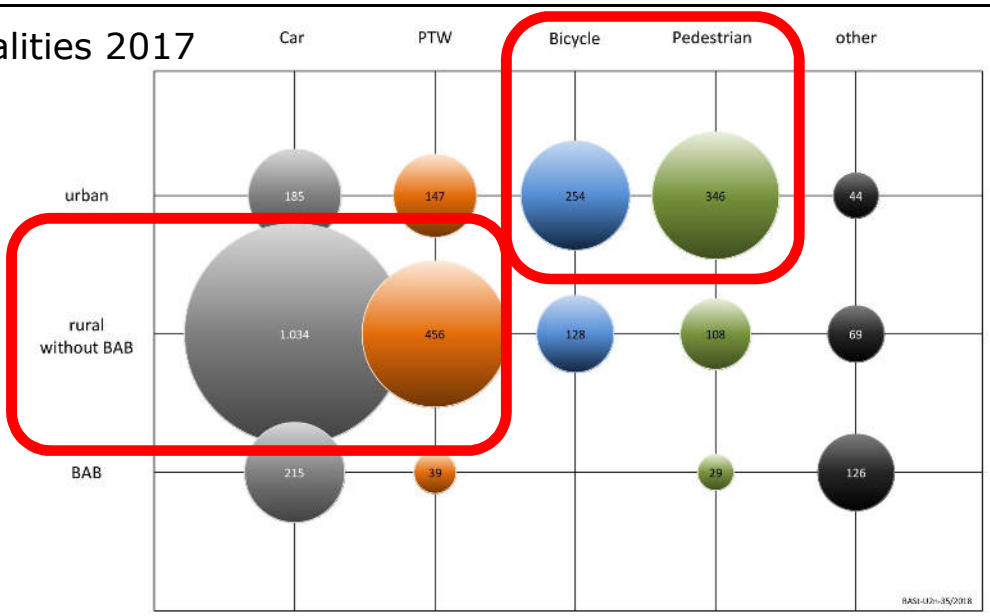
Andre Seeck

9. gmttb Jahrestagung
20 Jahre Vision Zero – Utopie oder Realität?
11./12. April 2019

Bundesanstalt für Straßenwesen



Fatalities 2017

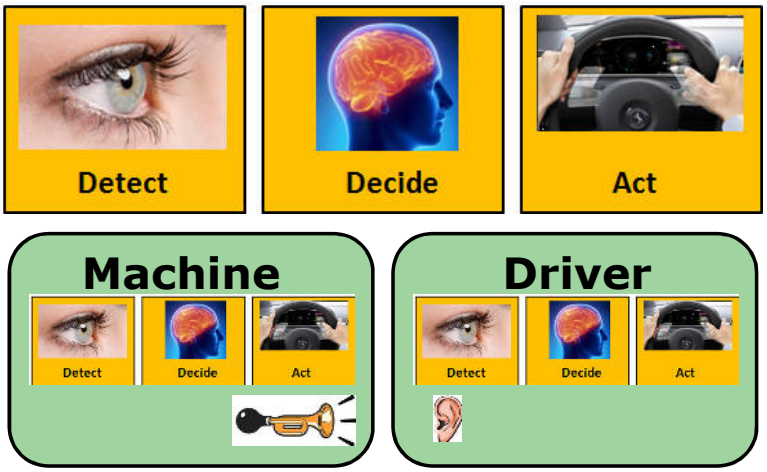


Was ist ein Fahrerassistenzsystem (FAS / ADAS)?

Principle of Operation A:
Informing and warning

Only indirect influence on vehicle guidance via the driver.

1. Status information
2. Warning (abstract hazard)
3. Warning (concrete hazard)

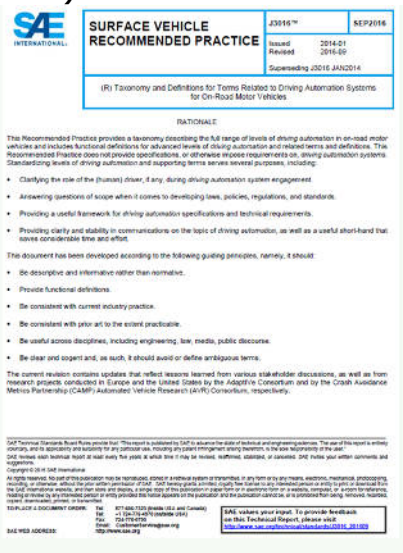


Was ist ein Fahrerassistenzsystem (FAS / ADAS)?

Principle of Operation A: Informing and warning	Principle of Operation B: Continuously automating
Only indirect influence on vehicle guidance via the driver. 1. Status information 2. Warning (abstract hazard) 3. Warning (concrete hazard)	Take direct influence on vehicle guidance (conscious activation by the driver – divided responsibilities in execution of the dynamic driving task). Always overrideable.

Was ist ein Fahrerassistenzsystem (FAS / ADAS)?

LEVEL	NAME	EXAMPLES	Dynamic driving task (DDT)[1]			ODD (Operational design domain)[3]
			Sustained lateral and longitudinal vehicle motion control	Object and event detection & response (OEDR)[4]	[DDT] fallback[2]	
Driver performs part or all of the dynamic driving task (DDT)						
0	No driving automation	warnings / active safety, only (if anything)	driver	driver	driver	unlimited (none)
1	Driver assistance	adaptive cruise control OR lane centering[5]	driver and system	driver	driver	limited
2	Partial driving automation	adaptive cruise control AND lane centering	system	driver	driver	limited
ADS[6] ("system") performs all of the dynamic driving task (DDT)						
3	Conditional driving automation	automated driving in freeway traffic	system	system	fallback-ready user[7]	limited
4	High driving automation	automated driving in geo-fenced locations	system	system	system	limited
5	Full driving automation	automated driving everywhere (taxi)	system	system	system	unlimited


SAE INTERNATIONAL

SURFACE VEHICLE RECOMMENDED PRACTICE

J3016™ SEP2016

Issued 2014-01
Revised 2016-09

Superseding J3016 JAN2014

(R) Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles

RATIONALE

This Recommended Practice provides a taxonomy describing the full range of levels of driving automation in on-road motor vehicles and includes functional definitions for advanced levels of driving automation and related terms and definitions. This Recommended Practice does not provide specifications, or otherwise impose requirements on, driving automation systems. Standardizing levels of driving automation and supporting terms serves several purposes, including:

- Clarifying the role of the (human) driver, if any, during driving automation system engagement
- Answering questions of scope when it comes to developing laws, policies, regulations, and standards
- Providing a useful framework for driving automation specifications and technical requirements
- Providing clarity and stability in communications on the topic of driving automation, as well as a useful short-hand that saves considerable time and effort

This document has been developed according to the following guiding principles, namely, it should:

- Be descriptive and informative rather than normative
- Provide functional definitions
- Be consistent with current industry practice
- Be consistent with prior art to the extent practicable
- Be useful across disciplines, including engineering, law, media, public discourse
- Be clear and cogent and, as such, it should avoid or define ambiguous terms

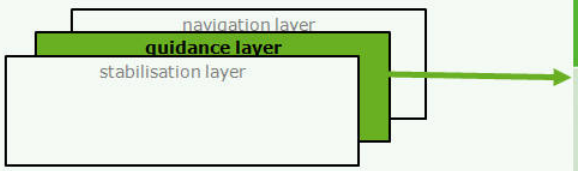
The current revision contains updates that reflect lessons learned from various stakeholder discussions, as well as from research projects conducted in Europe and the United States by the Adaptive Consortium and by the Crash Avoidance Metrics Partnership (CAMP) Automated Vehicle Research (AVR) Consortium, respectively.

SAE values your input. To provide feedback on this Technical Report, please visit

Was ist ein Fahrerassistenzsystem (FAS / ADAS)?

Principle of Operation A: Informing and warning	Principle of Operation B: Continuously automating	Principle of Operation C: temporarily intervening in accident-prone situations
Only indirect influence on vehicle guidance via the driver. 1. Status information 2. Warning (abstract hazard) 3. Warning (concrete hazard)	Take direct influence on vehicle guidance (conscious activation by the driver – divided responsibilities in execution of the dynamic driving task). Always overrideable.	Preventive machine intervention in case of negative situation prediction. Either: I. driver as controller does not react conform to expectation or is inaccessible II. in accident-prone situations drivers/ controllers cannot handle due to performance limitations

The full picture of the driving task:



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SAE-Standard J3016:

LEVEL	NAME	EXAMPLES	Dynamic driving task (DDT): Sustained lateral and longitudinal vehicle motion control	Dynamic driving task (DDT): Object and event detection & response (OEDR)	DDT fallback	ODD (Operational design domain)
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Level α - γ	I. Level definition: Abstract hazard (Principle of operation C)		II. Level definition: Concrete hazard (Principle of operation C)
Level α_1	Driver support via corrective intervention.	Level α_{II}	Driver initiated support by intensifying driver action. Realised by functional overlay.
Level β_1	Loss of the driver as “controller” (without full representation of the situation): Takeover of control by the function with the target of transition into minimal-risk-state (with respect to other traffic participants: Dependent on cooperation).	Level β_{II}	Driver-replacing intervention targeted at resolving the imminent danger by applying short intervention by function. Subsequent driver takeover required.
Level γ_1	Loss of the driver as “controller” (full representation of the situation): Takeover of control by the function to resolve the abstract danger. Transition into risk-minimal state or other appropriate control strategy (with respect to other traffic participants: Dependent on cooperation but no longer immediately reliant).	Level γ_{II}	Takeover of control targeted at resolving the concrete danger. Subsequently function-controlled driver takeover. Otherwise fluent transition to Level γ_1, if needed.

BASt´s refined definition of PO-C

…from theory to practice: IWI Categories in Euro NCAP

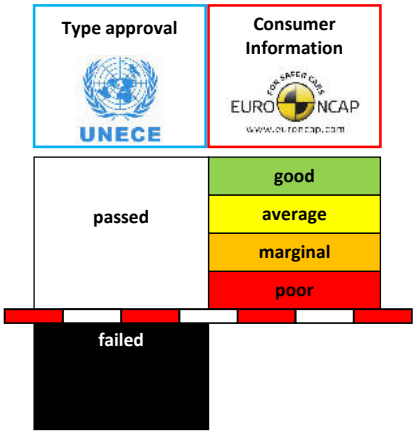
System	Function	Category A			Category B	Category C	
		Information (no threat)	Abstract threat	Concrete threat		Abstract threat	Concrete threat
AEB City	AEB function						x
AEB VRU	FCW function AEB function			x			x
AEB Inter-Urban	Distance warning FCW function AEB function		x	x			x
Lateral Support Systems	LDW function (Lane centring) LKA function Emergency LKA		x		x (L1)	x	x
Speed Assist Systems	SLIF MSA/ISA Warning MSA/ISA SLD	x	x			x	
Seatbelt Reminder			x				

Consumer Information

[Ineke Kamps]/[Moments]/Getty Images

Legislation / Type Approval

[MarcusRudolph.nl]/[Moments]/Getty Images



Passive Safety vs. Active Safety

Video

Occupant Protection

Video

Pedestrian Protection

Passive Safety vs. Active Safety Autonomous Emergency Braking (AEB)

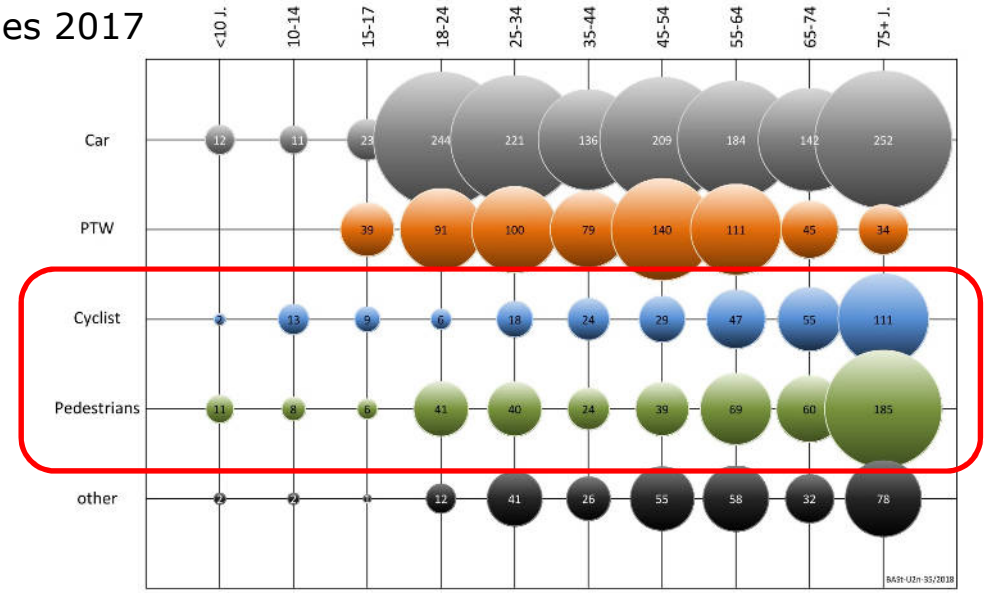
Video

Pedestrian

Video

Cyclist

Fatalities 2017



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Autonomous Emergency Braking (AEB)

Video

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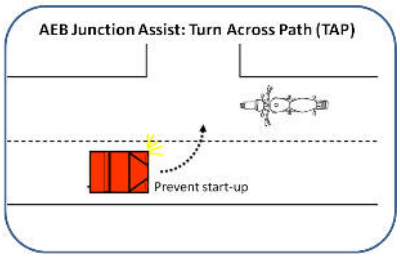
Effectiveness of Autonomous Emergency Braking (AEB)

- AEB Car-to-Car: -38% rear-end collisions — EURO NCAP 2014
- AEB Pedestrian: -15% of fatal injured pedestrians
  -38% of seriously injured pedestrians — EURO NCAP 2016
- AEB Cyclist: -54% of fatal injured cyclists
  -48% of injured cyclists — EURO NCAP 2018

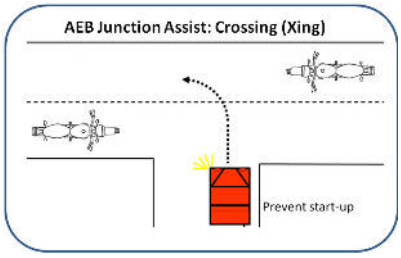
AEB Powered Two Wheeler

EURO NCAP FOR SAFER CARS
www.euroncap.com

2020



2022



Source:

Balancing the Requirements

Euro NCAP Market Coverage 2017

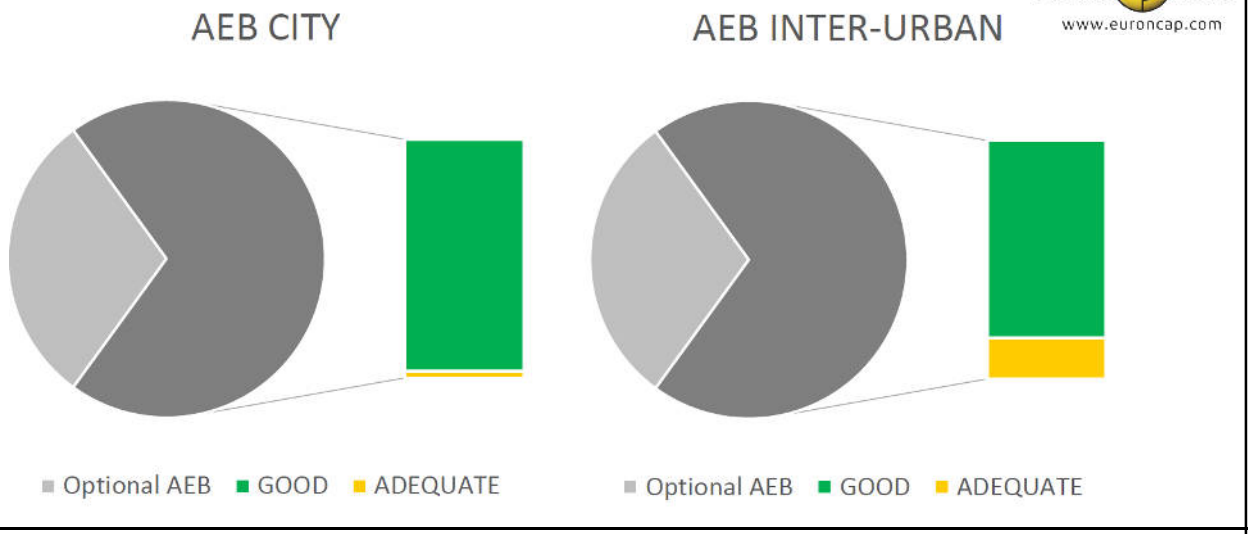
94% of new cars sold* in EU28 hold a valid Euro NCAP safety rating

3% SOLD ≤ ★★★☆☆

16% SOLD ★★★★☆

75% SOLD ★★★★★

AEB Fitment Rate and Performance 2017



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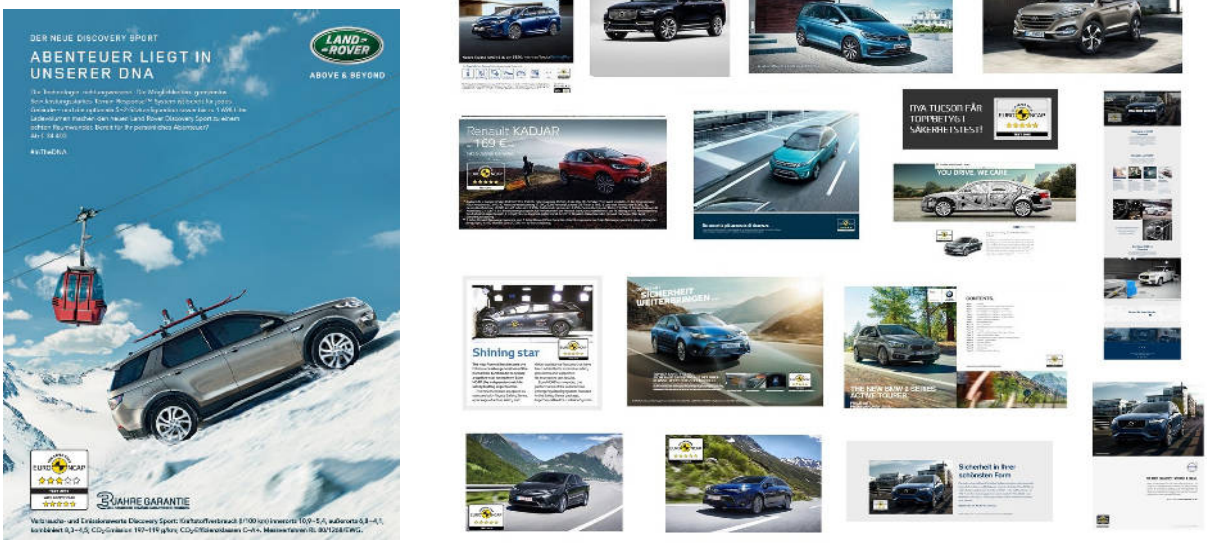
Euro NCAP Advertisement



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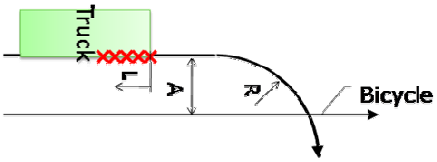
Autonomous Emergency Steering (AES) 2020

Video

Turning Assist for Trucks



- L – Impact location from front of truck
- A – Initial lateral separation of HGV and Bicycle
- R – Turning Radius of HGV

Turning Assist for Trucks

Bundesministerium für Verkehr und digitale Infrastruktur

Sachstand nationale Diskussion

Nachrüstung

- Juli 2018:
  Aktion Abbiegeassistenz
- Nachrüstung der schweren Nfz im Geschäftsbereich des BMVI
- Anreiz-Förderung
- Dafür: Anforderungen an Nachrüstsysteme
- Diese basieren auf GRSG-Dokument

TOP 3 Prioritäten der Fahrzeugtechnik auf dem Weg zur Vision Zero:

- Passive Sicherheit weiter verbessern (z.B. biofidelere Dummies und Kompatibilitätsbewertung)
- Sicherheit von ungeschützte Verkehrsteilnehmern durch Unfallvermeidung verbessern → Notbremsen (AEB) / Notausweichen (AES)
- Bewährte Sicherheitstechnologie in die Zulassungsvorschriften aufnehmen → General Safety Regulation (GSR)

Vielen Dank für Ihre Aufmerksamkeit!

Bundesanstalt für Straßenwesen

Direktor und Professor
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