

An orange abstract graphic consisting of multiple overlapping, curved lines that form a complex, organic shape, resembling a stylized flower or a network of connections. It is positioned on the left side of the top half of the slide.

FORSCHUNGSINITIATIVE
K O - F A S

BMWfunded Project Ko-PER Compendium and Digest

BMWf Förderprojekt Ko-PER
Leitfaden und Übersicht

Dr. Reiner Wertheimer
Management & Consulting

Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages

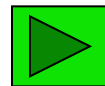
If cars could only talk to each other...

In Spring 2013 TED covers the idea of 'Cooperative Driving'

In 2007 and 2008 when I campaigned for a joint project “*Coop-PER*” and devised its basic ingredients in cooperation with very few key partners, I could hardly forebode that

as of March 2013, Jennifer Healey, an outstanding research scientist at Intel, would give the following talk @ TED promoting the very idea of cooperative driving...

http://www.ted.com/talks/jennifer_healey_if_cars_could_talk_accidents_might_be_avoidable.html



- Jennifer Healey is concerned with affective computing and develops mobile internet devices of the future.
- “TED is a nonprofit [initiative/organization] devoted to “Ideas Worth Spreading”. It started out in 1984 as a conference bringing together people from three worlds: **Technology, Entertainment, Design.**”

Basic Motivation of Ko-PER (Slide I)

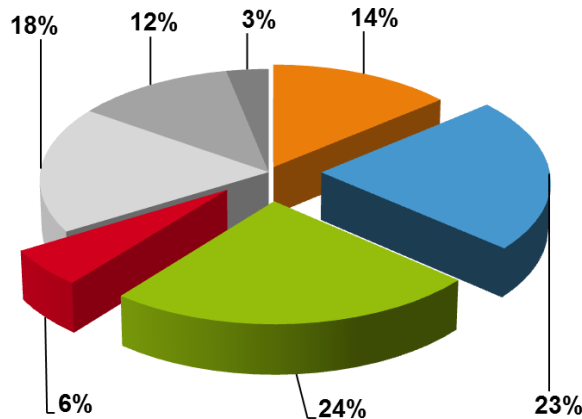
Increasing Complexity of Accident Scenarios

- Existing driver assistance and active safety systems (e.g. ECC/ESP, ACC and EBA), already significantly reduce the frequency of accident types in comparatively simple traffic scenarios (e.g. single vehicle driving accidents, rear-end collisions, etc.).
- Hence, the *relative incidence* of accidents in *complex* traffic situations increases continuously.
- Complex situations often require a virtually complete representation of the local driving environment and thus tend to overburden drivers as well as “self-sufficient” on-board vehicle perception systems.
- Because of occlusions and unexpected behavior of fellow road users, human drivers (and purely intra-vehicle perception systems as well) are often caught by surprise.
- Temporary inattentiveness is an added factor in case of humans.

Basic Motivation of Ko-PER (Slide II)

Major Accident Types (Germany, 2012)

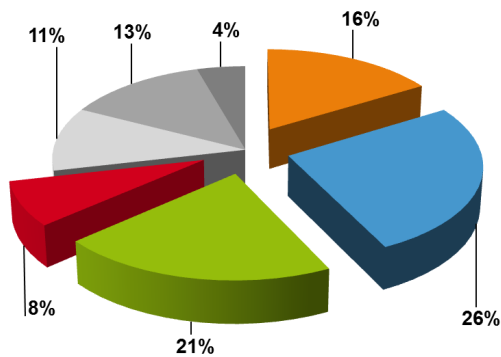
Accidents with personal injuries: total (100% = 206.696)



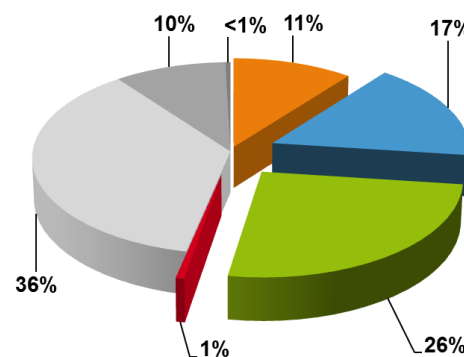
Type of accident

- Turning off the road (Abbiegeunfall)
- Turning into the road/crossing (Einbiegen/Kreuzen)
- Vehicles moving along in carriageway (Längsverkehr)
- Crossing the road (Überschreitenunfall)
- Driving accident (Fahrerunfall)
- Other accident (Sonstiger)
- Stationary vehicles (Ruhender Verkehr)

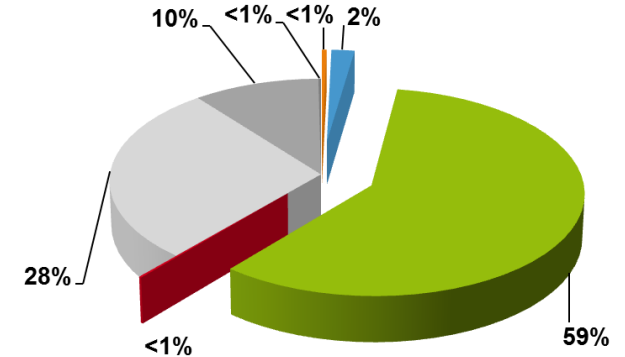
In town/village (68,9 %)



Rural roads w/o highways (25,1 %)



Highways (6,0 %)

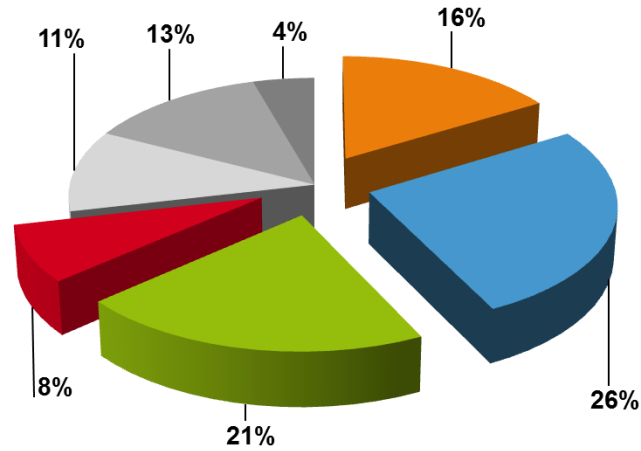


One Major Result of Ko-PER

Decisive Reduction of Safety-Critical Situations

Accidents with personal injuries in town/village (Germany, 2012)

Source: (German Federal Statistical Office)

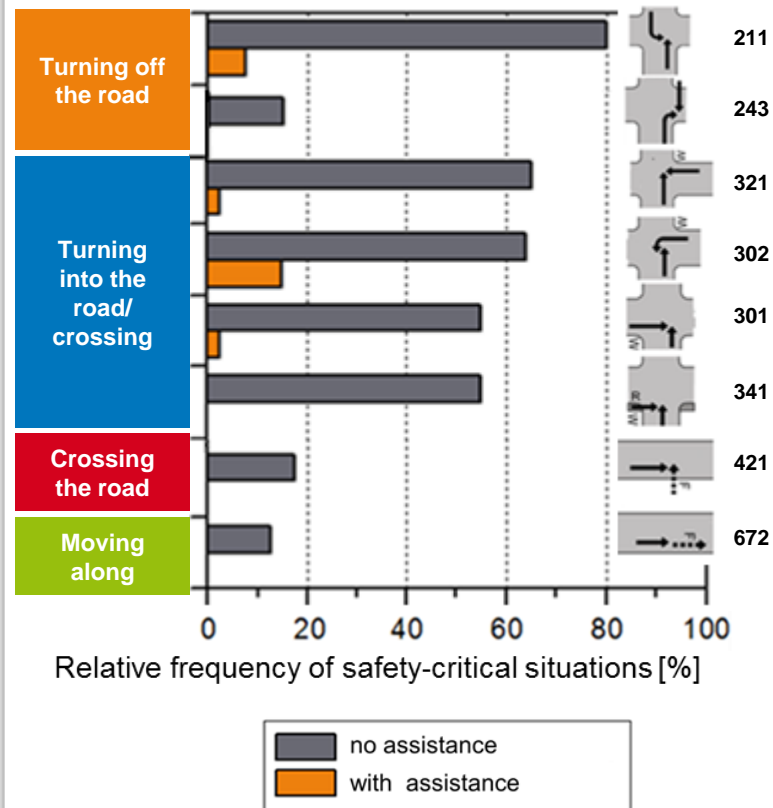


Type of accident

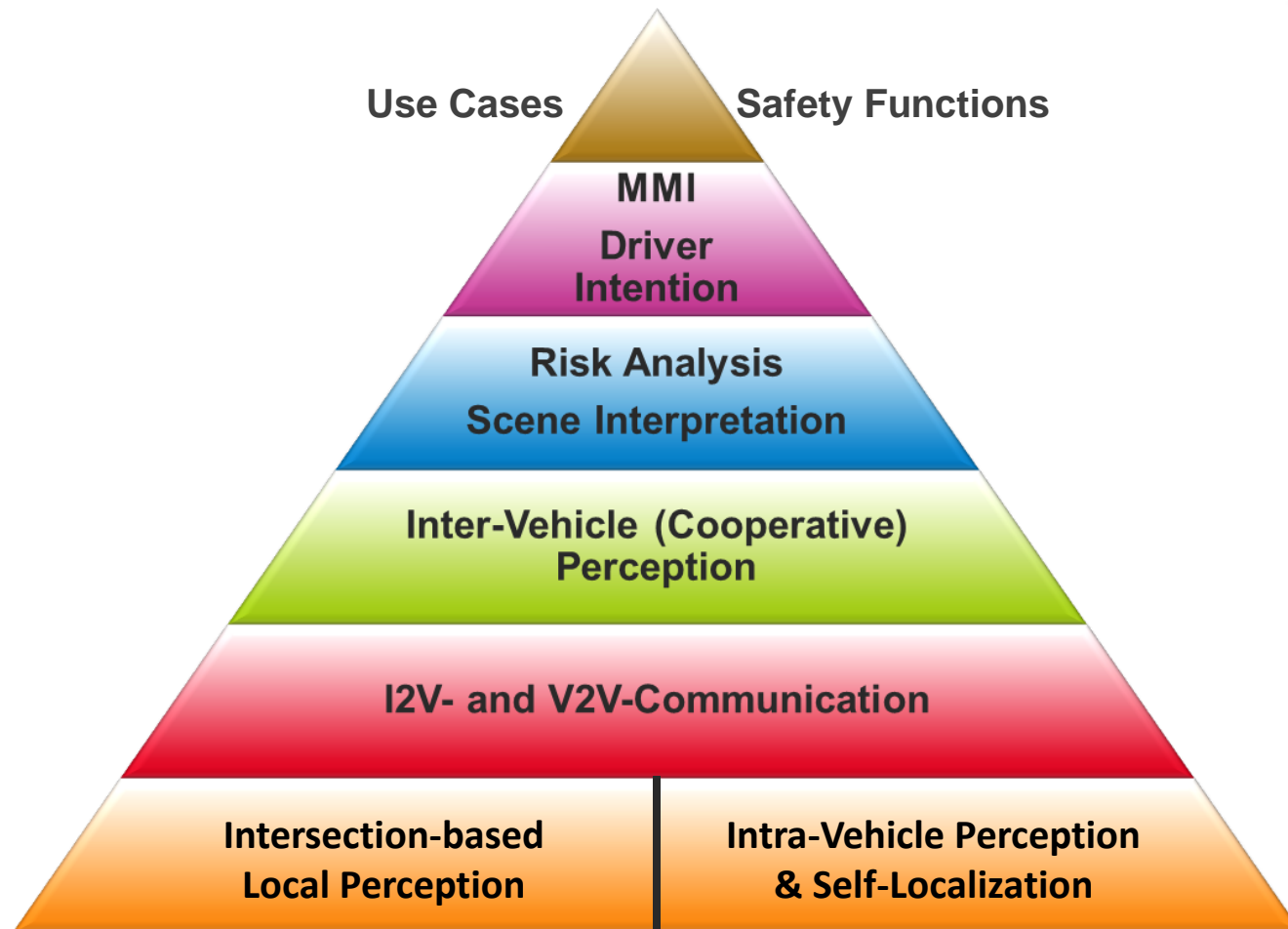
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Assessment of potential benefit

Result of extensive driving simulator studies (IZVW)



The Ko-PER “Pyramid” Layers of Information Processing

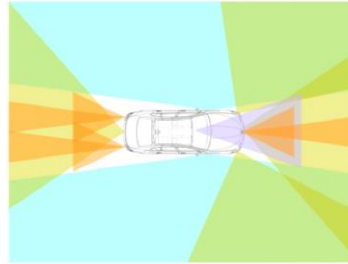


Ko-PER Building Blocks: From Sensor Data to Situation Awareness

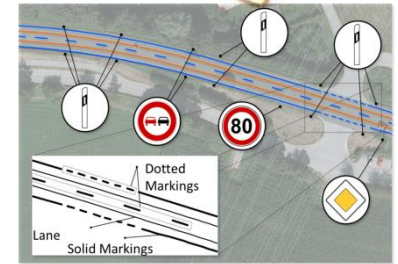
Perception Network Intersection



In-Vehicle Perception



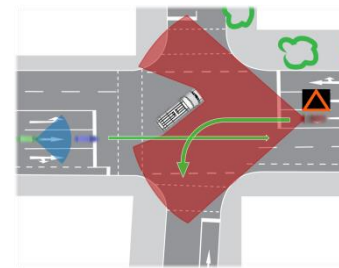
High Precision Self-Localization



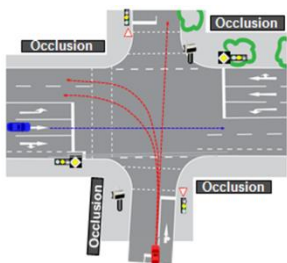
Wireless I2V and V2V Communication



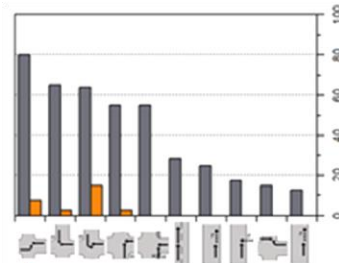
Inter-Vehicle Sensor Data Fusion / Cooperative Perception



Situation Analysis



HMI Composition / Effectiveness



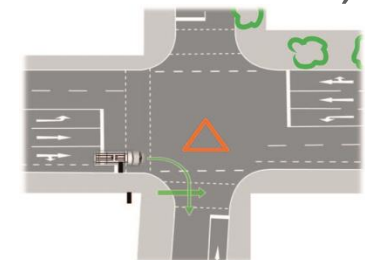
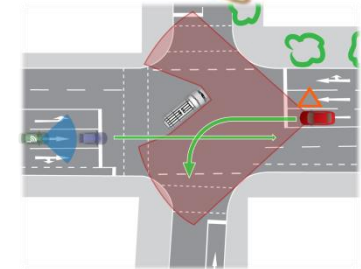
Preventive Safety Functions



Mixed-Team Life-Demos as of Today

Featuring Vehicle and VRU Safety in in Longitudinal and Intersection (IS) Traffic

- Team 1: Daimler, Delphi, driveU & MRM (IS)
 - V2X cooperative vehicle safety at intersections
 - 2 scenarios: left turn and crossing with occlusion
- Team 2: BMW (Ko-PER) & BMW (Ko-TAG) or MRM (IS)
 - V2V or I2V cooperative VRU safety in longitudinal and IS traffic
 - 3 scenarios: 1 VRU safety in longitudinal traffic
 - 2 VRU safety at intersections with & without Ko-TAG
- Live Demo Team 3: CSEI (car) & HSA (PED @ intersection)
 - I2V cooperative pedestrian safety at intersections
 - 1 scenario: right turn (car) with hidden pedestrian
 - Intersection recognizes pedestrian's intention



Acknowledgements



- Ko-PER is indebted to the Bundesministerium für Wirtschaft und Technologie (BMWi) for co-funding this project with about 6 mio. Euro.
- Ko-PER is highly grateful to the city of Aschaffenburg and in particular to her major, Klaus Herzog, for her/his quite non-bureaucratic response to Ko-PER's request to 'conquer' one of her busiest intersections.
- Ko-PER thanks the *University of Applied Sciences Aschaffenburg* for hosting the Ko-FAS final presentation.

Enjoy!



Now Enjoy
Live Demonstrations, Poster Sessions and
Lively Discussions

given by the three funded projects

Ko-TAG, Ko-KOMP and Ko-PER

affiliated in

Project Initiative Ko-FAS