INTEGRATED SAFETY

A Path to Achieve the Vision of Zero Accidents.

Georges Halsdorf
Advanced Engineering
ZF Friedrichshafen AG

OUR GOAL
VISION ZERO

AUTONOMOUS DRIVING CAN INCREASE ROAD SAFETY

SPIEGEL ONLINE

Crash von Uber-Fahrzeug

Überlasst den Robotern das Autofahren

Jeder Crash eines Roboterautos nährt die Angst vor dem automatisierten Fahren. Doch der jüngste Unfall eines Uber-Fahrzeugs zeigt gerade, dass wir noch viel stärker auf solche Technik setzen müssen.

Ein Kommentar von Stefan Schultz

Automobilwoche

DIE BRANCHEN- UND WIRTSCHAFTSZEITUNG

Autonomes Fahren:
Autofahrer erwarten mehr Sicherheit

Pittsburgh Post-Gazette
post-gazette.com

How self-driving cars will think ahead to keep you safe

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Pittsburgh cyclists prefer self-driving cars

March 21, 2017 10:29 AM

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Home › Business and Money › Driverless cars and their impact on traffic and safety

Business and Money | Life | World News

Driverless cars and their impact on traffic and safety

Self-driving cars are expected to transform road transportation to be safer and cheaper

FINANCIAL TIMES

ORK & CAREERS | LIFE & ARTS

The Future of Transport | + Add to myFT

Automated autos may be a game changer for health and safety

Queensland Government
Department of Transport and Main Roads

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Target zero - the role of autonomous vehicles in improving road safety

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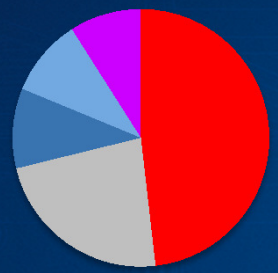
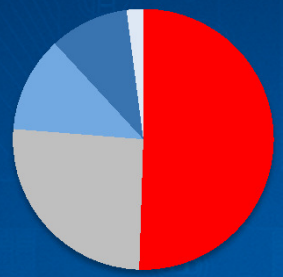
5 MOST FREQUENT FATALITIES 2015

FATALITIES PC USA*



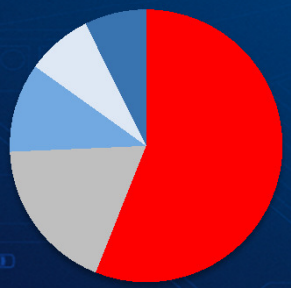
Top 5 = 93%, n_{total} = 17475

FATALITIES PC GERMANY**



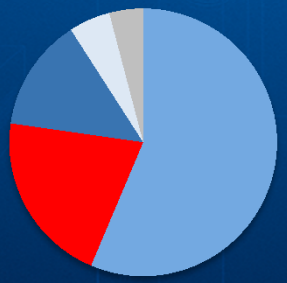
Top 5 = 100 %, n_{total} = 1980

FATALITIES CV USA*



Top 5 = 95 %, n_{total} = 5384

FATALITIES CV GERMANY**

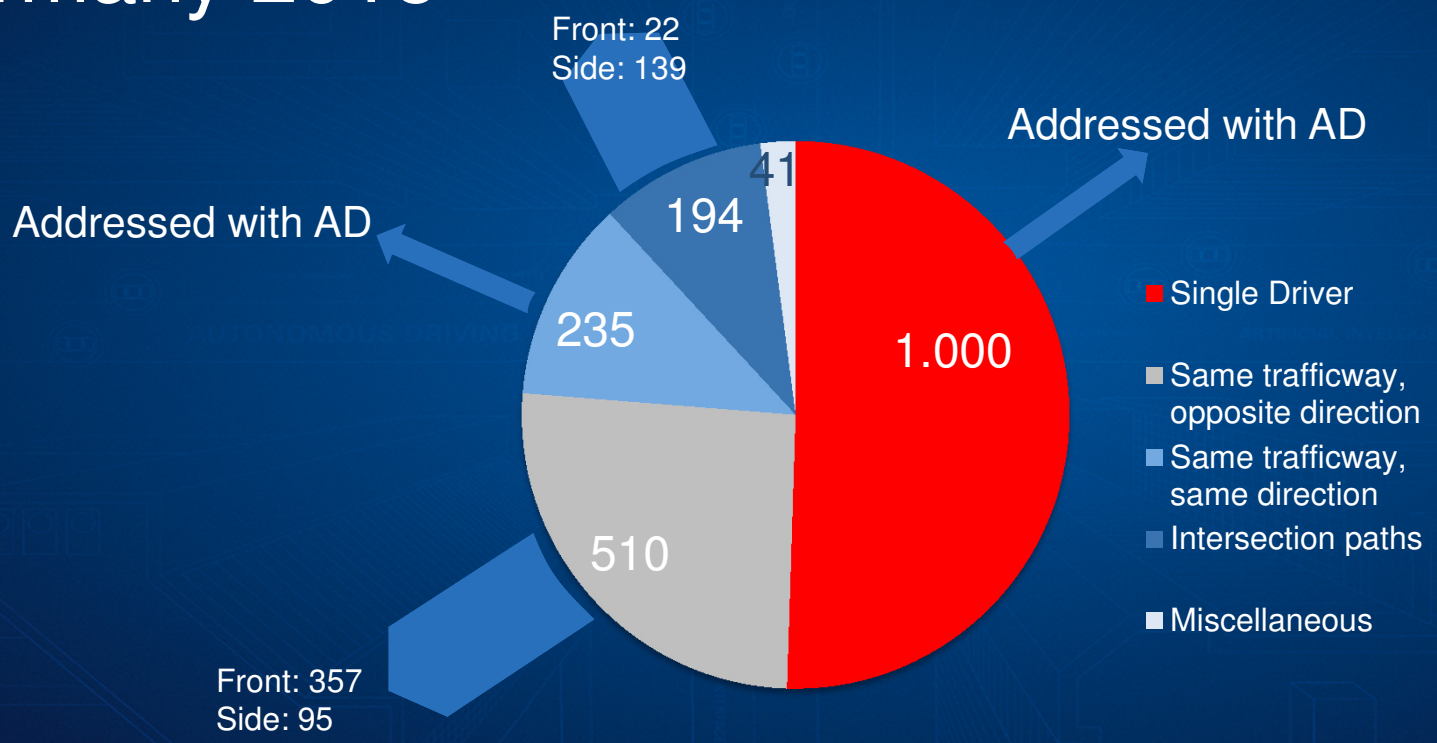


Top 5 = 100 %, n_{total} = 221

- Single Driver
- Same trafficway, opposite direction
- Same trafficway, same direction
- Intersection paths
- Change trafficway, vehicle turning
- Miscellaneous

Fatalities in ego-vehicle:
* FARS; total number: 28.322
** GIDAS weighted from Destatis; total number: 3.196

PASSENGER CAR FATALITIES Germany 2015**



Fatalities in ego-vehicle:
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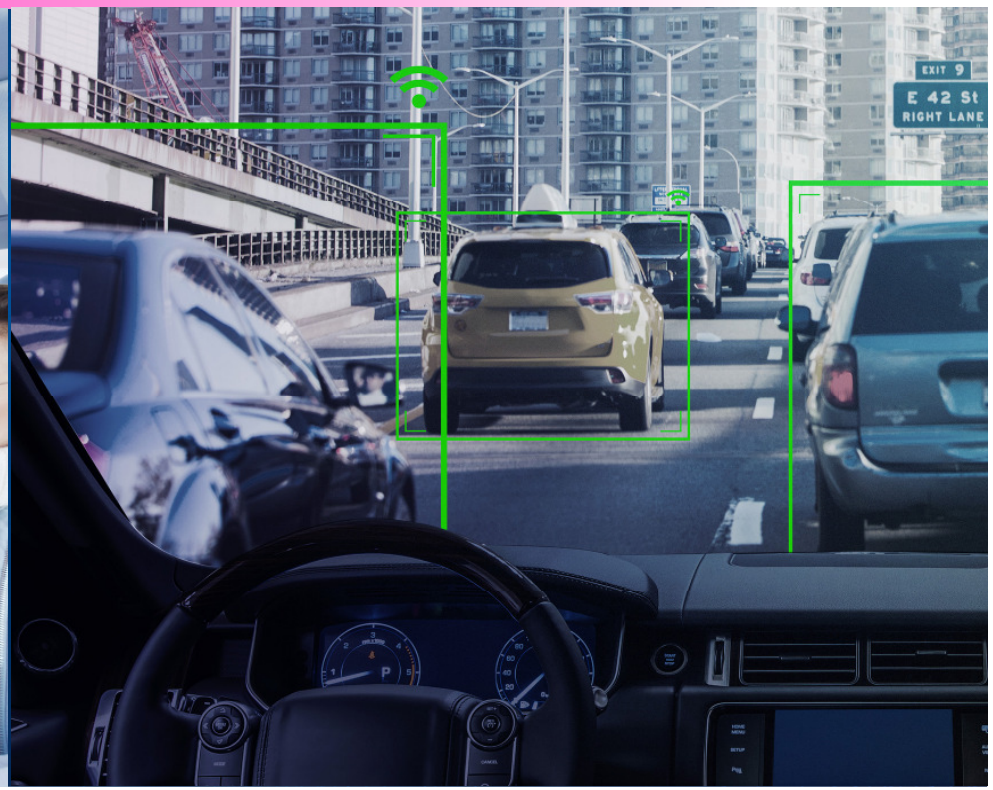
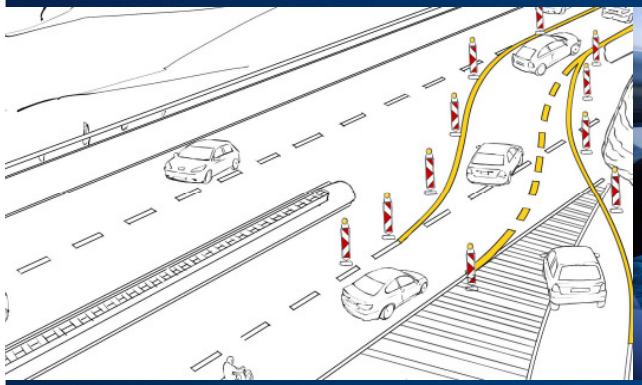
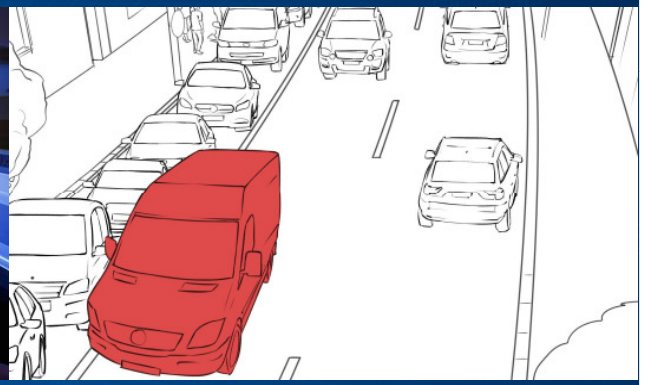
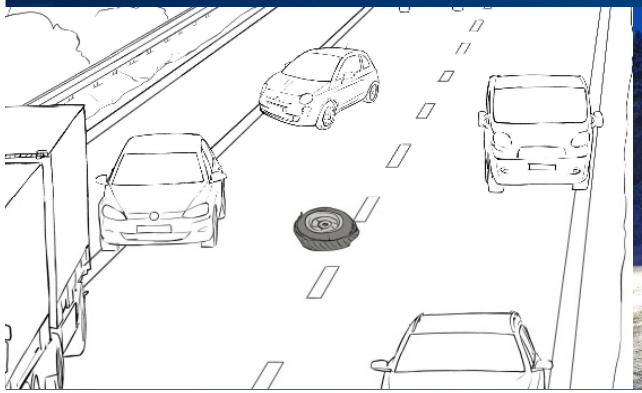
HOW TO APPROACH THAT?

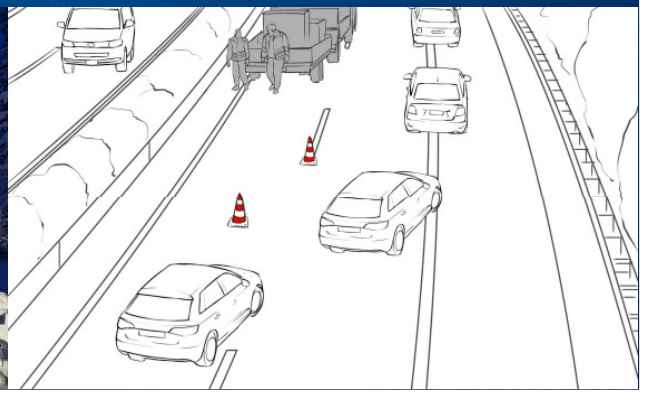
AUTONOMOUS MOBILITY



AUTONOMOUS DRIVING
SELECTED CHALLENGES

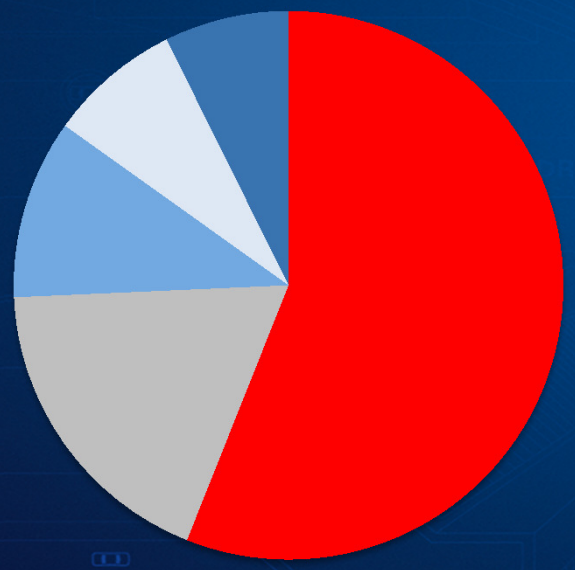




COMMERCIAL VEHICLES POTENTIAL FOR AD

FATALITIES CV USA 2015*



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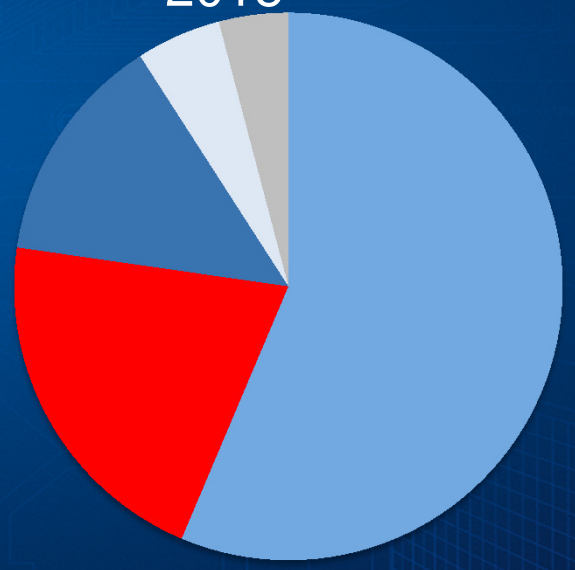
FATALITIES CV GERMANY 2015**



Fatalities in ego-vehicle:
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AUTOMATIC EMERGENCY BRAKING

EVASIVE MANEUVER ASSIST

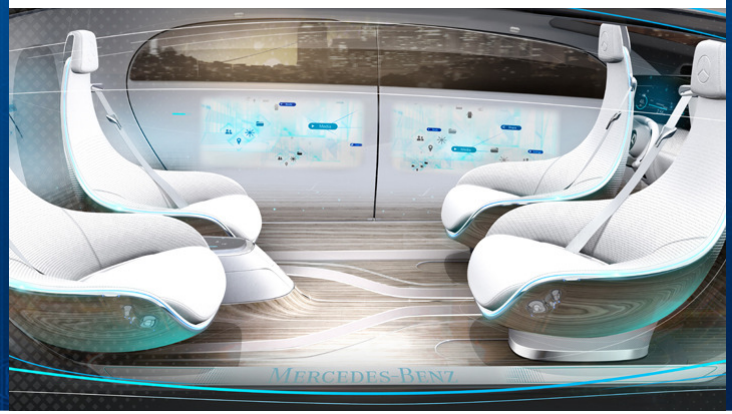
MAIN SAFETY TASKS

SINGLE DRIVER

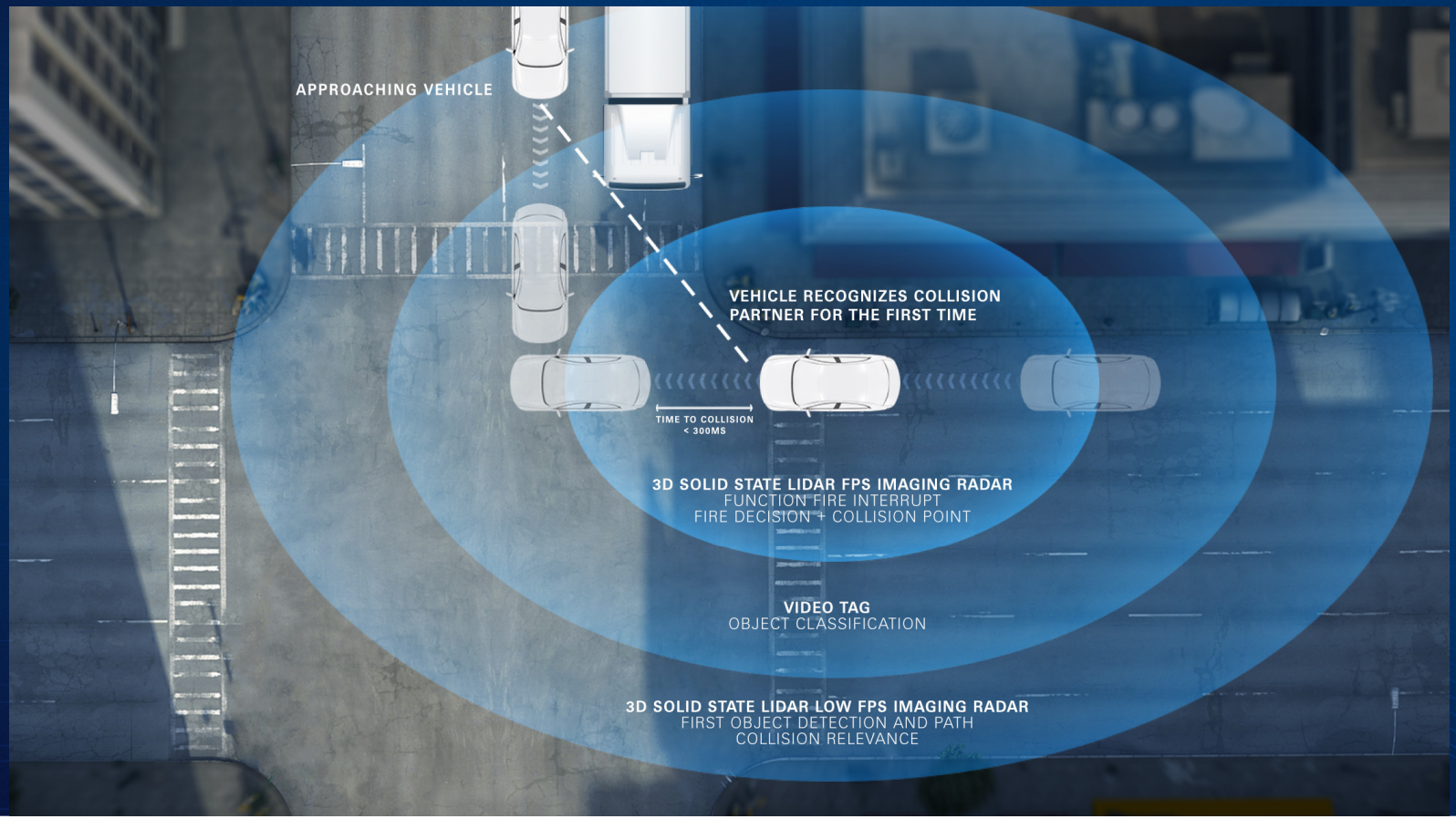
ONCOMING COLLISIONS

SIDE COLLISIONS

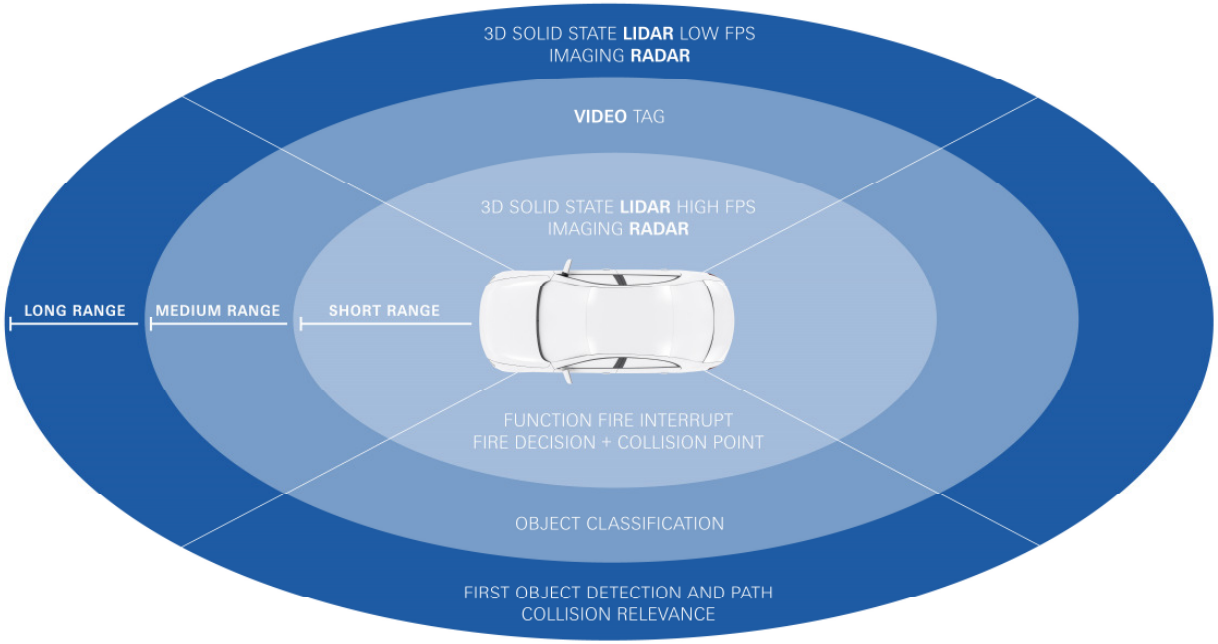
INTERIOR OF THE FUTURE



SCENARIO BASED SENSOR SET



STRATEGY SENSOR SYSTEMS



TECHNOLOGY ACCESS

ZUKUNFT VENTURES
A COMPANY OF ZF

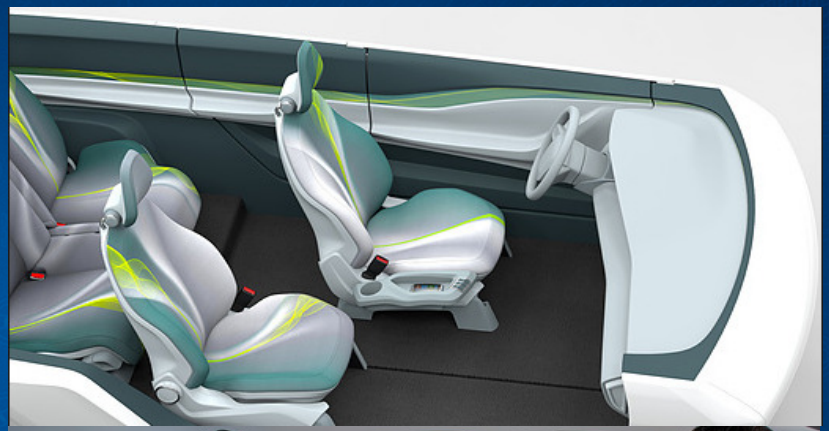
- accelerate **strategic change**
- fast access to **key technologies**
- Immediate link to key know-how and competencies
- **Flexible structures & agility** to adapt multi market requirements
- **Keep speed & entrepreneurship** within the JV

- **flexible capital structure**
- **significant shares, e.g. 40%**
- **market driven technology development**
- **multi market business development**
- **no dedicated exit strategy**

- **Keep entrepreneurship,**
  e.g. earn-out, sweet equity, …
- **no delegations in executive boards**
- **Business plan responsibilities in the companies / JVs**
- **create strategy than control strategy approach**

ECOSYSTEM ZERO ACCIDENTS

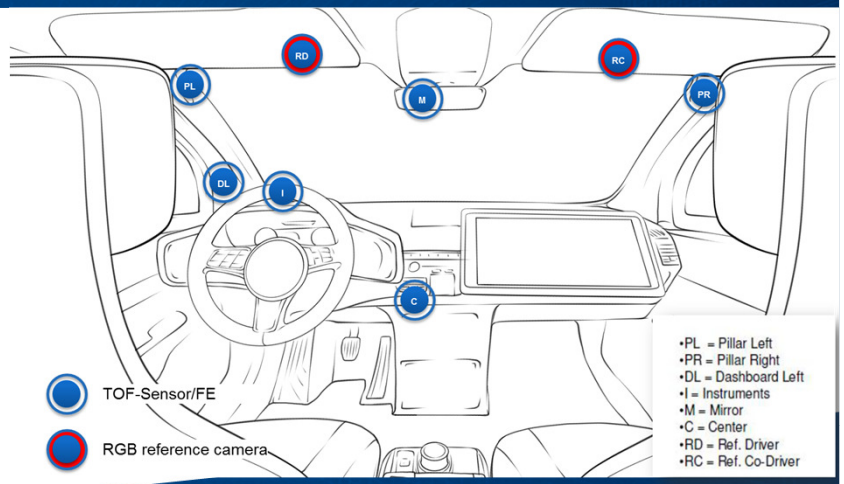
INTERIOR OF THE FUTURE



MAIN SAFETY TASKS
ADVANCED OCCUPANT SAFETY SYSTEMS

Interior / Function Scope

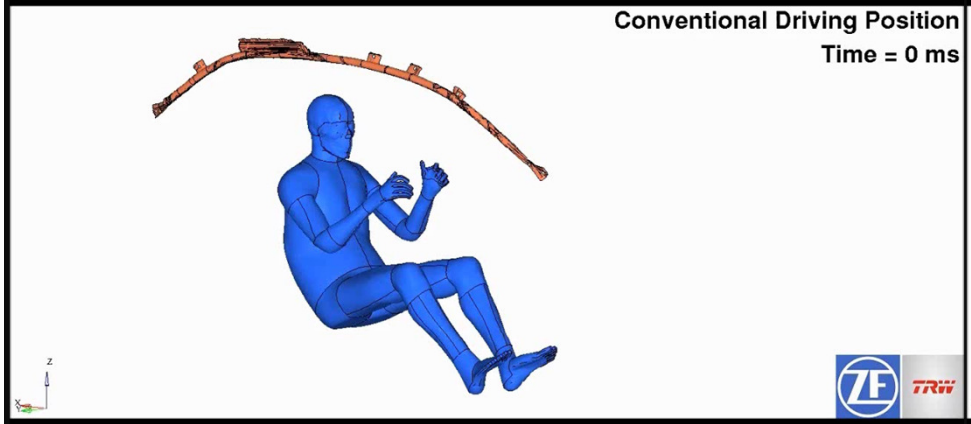
- Body detection / position (driver/pass)
- Head position + orientation (driver)
- Steering wheel position / Hands Off
- Body size estimation
- Seat belt detection
- Distraction
- Drowsiness

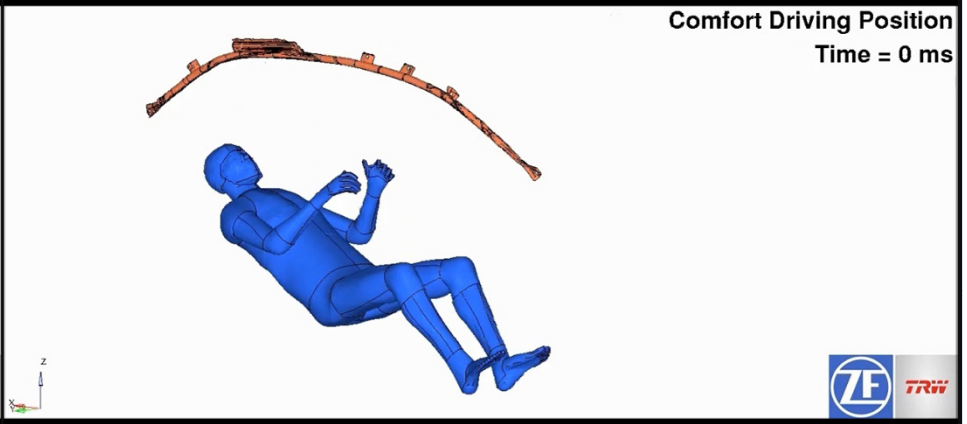


- Out-of-Position monitoring
- Other firing strategy needed
- Unbelted use-cases to be considered (US-specific)
- OSS for unspecified occupant movement in accidents or AEB cases (especially unbelted)
- Human modelling simulation to assess body kinematic

assisted driving
37
driver distraction
assist
assisted driving
Driver Distraction
1 s
Curve ahead!

IMPACT OF COMFORT POSITION ON OCCUPANT SAFETY

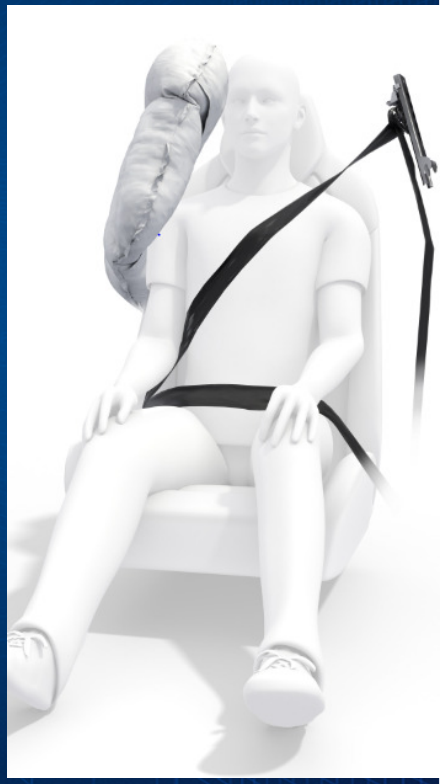




MAIN SAFETY TASKS
FAST OCCUPANT MONITORING

- Fast pre- and in-crash occupant position monitoring
- Sensor information independent from light conditions
- Fast adaptation of firing strategy necessary in different seating positions
- Validation of OSS in different AD use cases

AIRBAG SOLUTIONS



REFLEX PATH

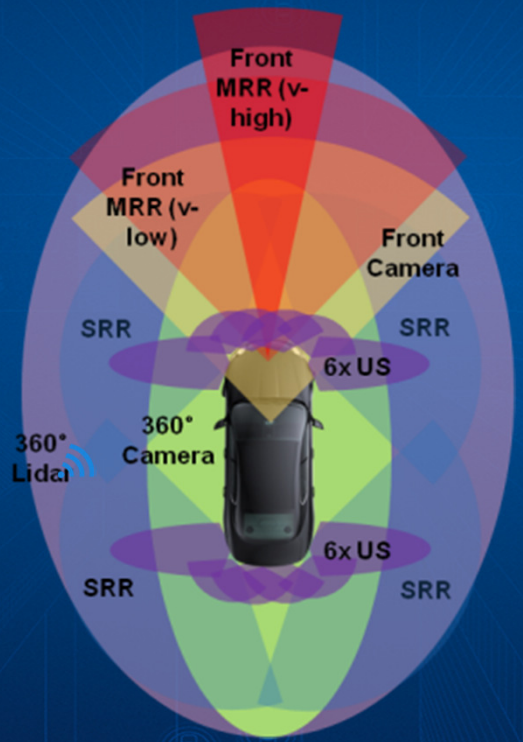
TODAY

TOMORROW

NCAP / EuroNCAP

ADAS / AEB Functions

Comfort Functions



Autonomous Driving

Interior of the future

New OSS Actuators

DEMAND FOR SYSTEM SUPPLIER

SUMMARY

- Autonomous Driving must cover today's crash scenarios
- ZF develops new integrated safety concepts for exterior and interior
- New set of sensors needs to be applied for critical scenarios
- Sensors need to be integrated with occupant safety systems
- We consequently develop all technology areas for safety and autonomous driving

Thank You!