SafetyCube

Integrating new measures and new technologies

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Present Status: System approach

Identification of risks & measures

- Risks & Measures can be Behaviour, Infrastructure or Vehicle related

Example of risk

Speed
- Speeding
- Inadequate speed

Behaviour measures
- Demerit point system
- Increase sanctions
- Speed awareness course
- Speed campaign
- Zero tolerance, reduction of tolerance
- Mobile speed enforcement

Infrastructure measures
- Change speed limits
- Speed cameras
- Section control
- Variable traffic signs
- Dynamic speed warning
- Speed humps

Vehicle measures
- Adaptiv cruise control
- Intelligent Speed Adaptation

Challenges for the future

New types of mobility: Alternative road users

- **Limits between road user types are fading** as new types of road users (Segway, electric unicycle, self-propelled kick scooter) appear

  - Road user considered as pedestrian (Franc `
  - No safety protection requirement
  - No speed limit for these types of « vehicle
  - No light requirement

Challenges for the future

New types of mobility: Alternative road users

- These new modes of transportation combine the risk factors of pedestrians but also those of cyclists / low speed PTW
- Need also to adapt the infrastructure for these types of "vehicles" to avoid the rise of new risks (ex: climb and descent of sidewalk …)
- Is a (e.g.) sedgway crash a road crash?

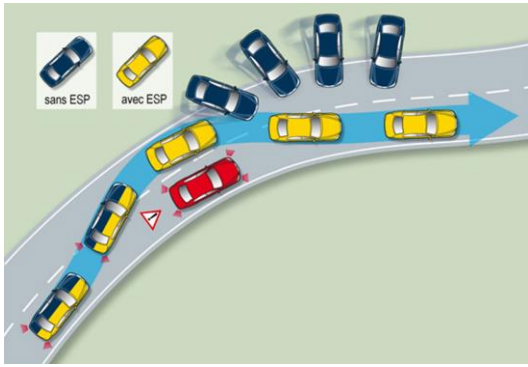
Challenges for the future

ADAS : cooperating vehicle countermeasures

- **ADAS' individual effects** are hard to assess as they cooperate
- … for the **better** …

Adaptive Cruise Control (ACC) is an efficient longitudinal control on vehicles travelling on (e.g.) highways in flowing traffic conditions. Only when ACC is augmented with other capabilities, such as Frontal Collision warning (FCW) or Advanced Emergency Braking (AEB) does it reach its full potential as a part of a road safety package.

ABS+ESP, Traffic Sign Recognition + ISA are other examples of efficient cooperation



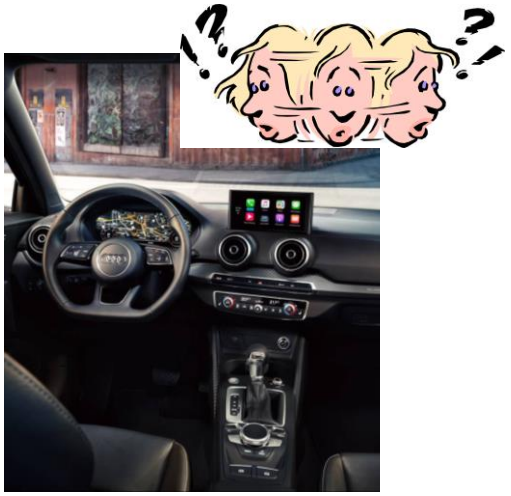
Challenges for the future

ADAS : cooperating vehicle countermeasures

… or the **worse** ….

Too many ADAS could be a risk!

- Distraction (« playing with the ADAS »)
- Distraction or loss of attention/concentration during driving
- HMI complex and distracting for some categories of users



Challenges for the future

V2X : Cooperative Systems

Vehicles will increasingly **interact** with infrastructure or vulnerable road users.

- *In the DSS, road users, infrastructure and vehicles were treated separately*
- *In the near future, they will combine into a **global road safety ecosystem** and cease to be individual entities:*
  - For traffic optimization, vehicles will interact with each other (V2V) or infrastructure (V2I)
  - Road accidents will be reported to all road users in real-time (V2Other)
  - All users of smartphones, connected watch or camera, GPS will be geo-localized (V2Road User)
  - Community communication (e.g. WAZ) will generalize (Connected Vehicle)

Challenges for the future

Autonomous Vehicle : behavior / vehicle interactions

These are **actual** AV crash scenarios:

An AV in autonomous mode was travelling on the right lane of an expressway when a vehicle travelling on the middle lane began **drifting to the right**. The **AV responded by nudging to the right** until the driver took over – but too late : as the AV could not avoid hitting the curb on the right upon which one of its tires deflated.

An AV in autonomous mode was **travelling northwards through an intersection** as another vehicle travelling westwards **rolled through a stop sign and struck the right rear** panel and right rear wheel of the AV. Prior to the collision, **the AV's autonomous pilot began applying the brakes** in response to the other vehicle's speed and trajectory. Just before the collision, the AV's driver took over manual control and **accelerated**.

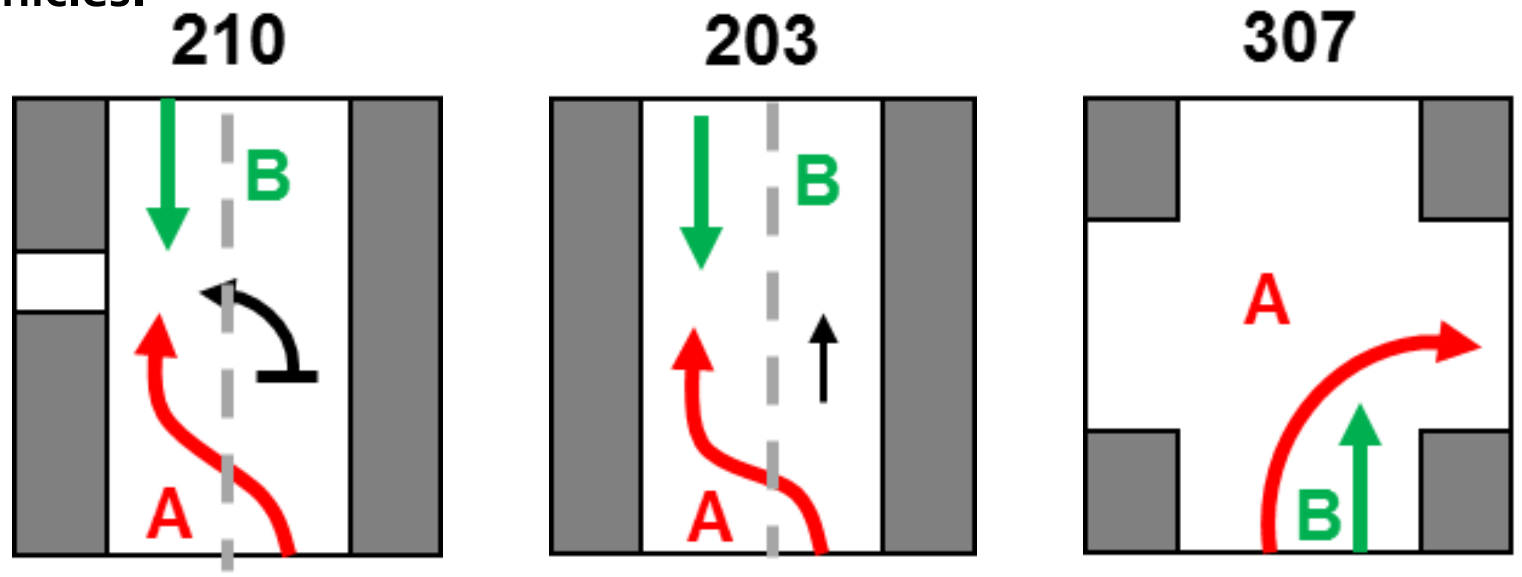
Challenges for the future

Assessing complex systems : scenarios

ADAS or AV efficiency and/or robustness can only be assessed by **massive numerical simulation techniques,** with regard to the variety of possible configurations.

To do this, the automotive industry worldwide uses **scenarios**, coming either from real accident data or expert opinions.

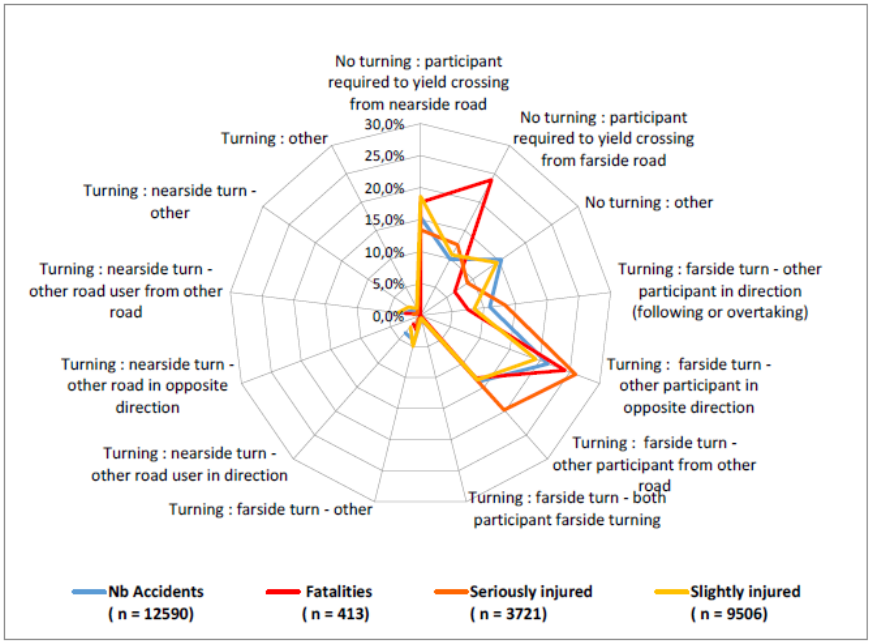
Scenarios are a combination of road user behavior, infrastructure and vehicles.



Challenges for the future

Assessing complex systems : scenarios

Scenario frequency can be assessed by analyzing in-depth accident data, thus allowing to assess the relevant stakes in cost-benefit terms.



Dealing with transversal scenarios will help make the DSS more helpful for more stakeholders.

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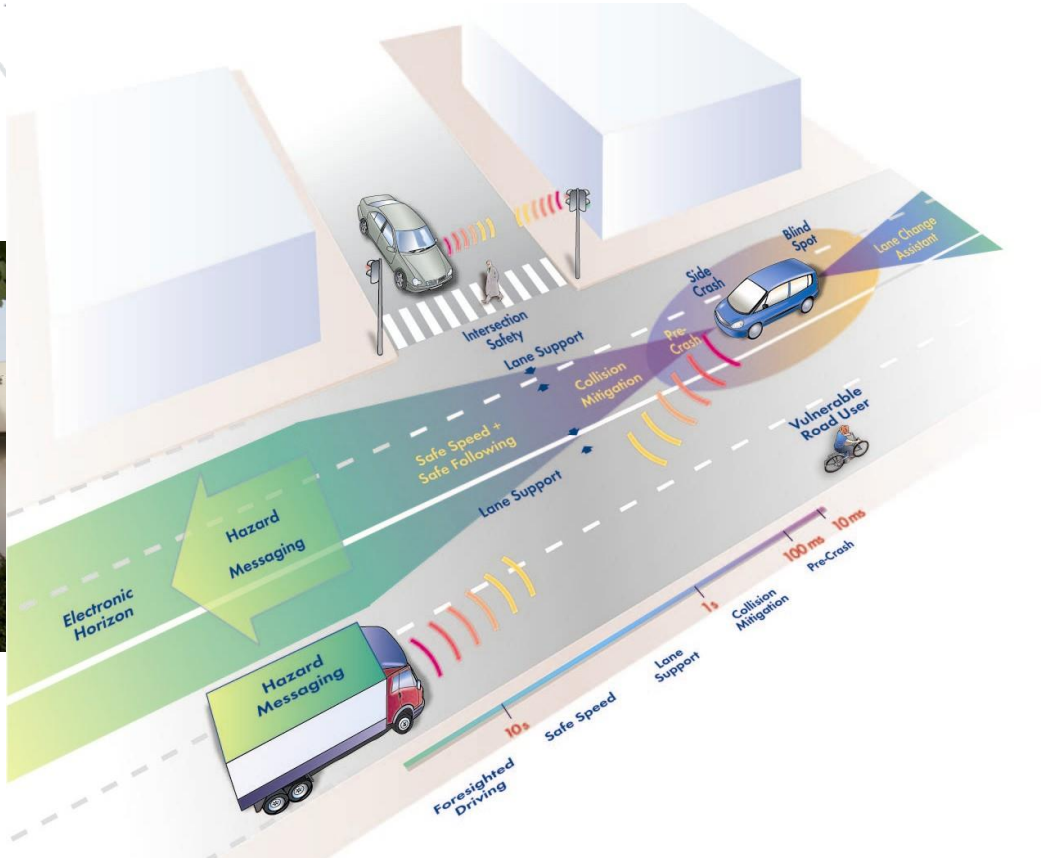

Many thanks for your attention

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