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Assessment of Technical Requirements for Automated Driving on Motorways

Research Questions and Methodology

The focus of this poster is to show suitable evaluation methods and data sources to examine automated driving systems of L3+ for their safety potential and availability. In this case a generic function of the motorway chauffeur will be used. The poster is based on a future publication of the AZT [Gwehenberger et al., 2020].

The Following Three Research Questions are Defined:

1. Which data can be used as a basis for a top-down evaluation of level 3 systems?
2. What are the advantages and disadvantages and what influence do different data sources have?
3. What is the safety potential of different system specifications of a motorway chauffeur?

In order to answer the first two research questions, different data bases will be considered in the following:

- Insurance Data on Motorways from Allianz Insurance-AG
  - 212 Accidents Third-Party-Liability material
  - 362 Accidents Third-Party-Liability injuries
  - 274 Collisions Motor own Damage
- VTTI SHRP2 Naturalistic Driving Study, just Motorways
  - 79 Accidents, 577 Near-crashes, 5367 Baseline trips
- German In-Depth Accident Study
  - Analysis of 3,052 accidents on motorways

In order to answer the third research questions, the Top-Down Approach will be used.

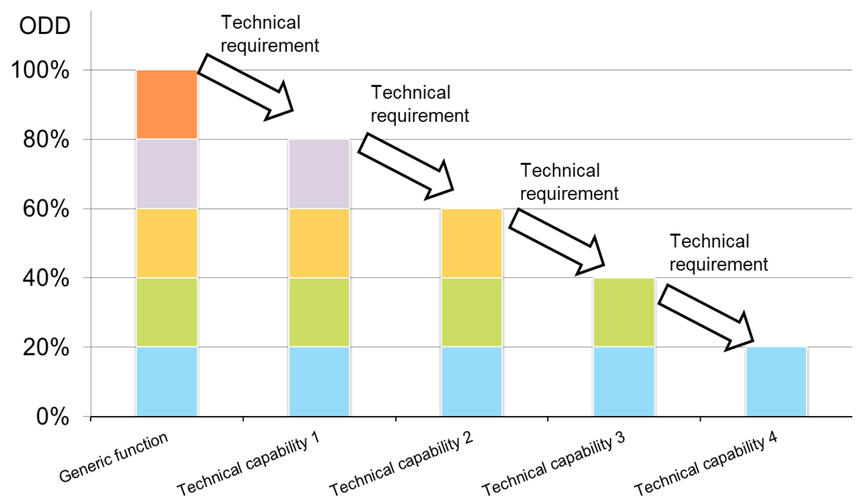

Fig. 1. Schematic Representation of the Top-Down Approach [Feig et al., 2019]

Based on the study by Feig et al. [Feig 2019], the technical requirements for a motorway chauffeur are examined with regard to the effects on availability and the resulting safety potential.

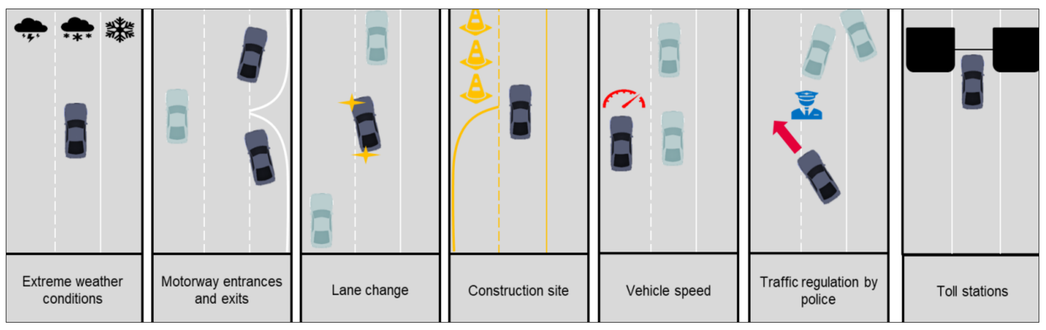

Fig. 2. Exemplary Requirements for a Motorway Chauffeur [Feig et al., 2019]

Results

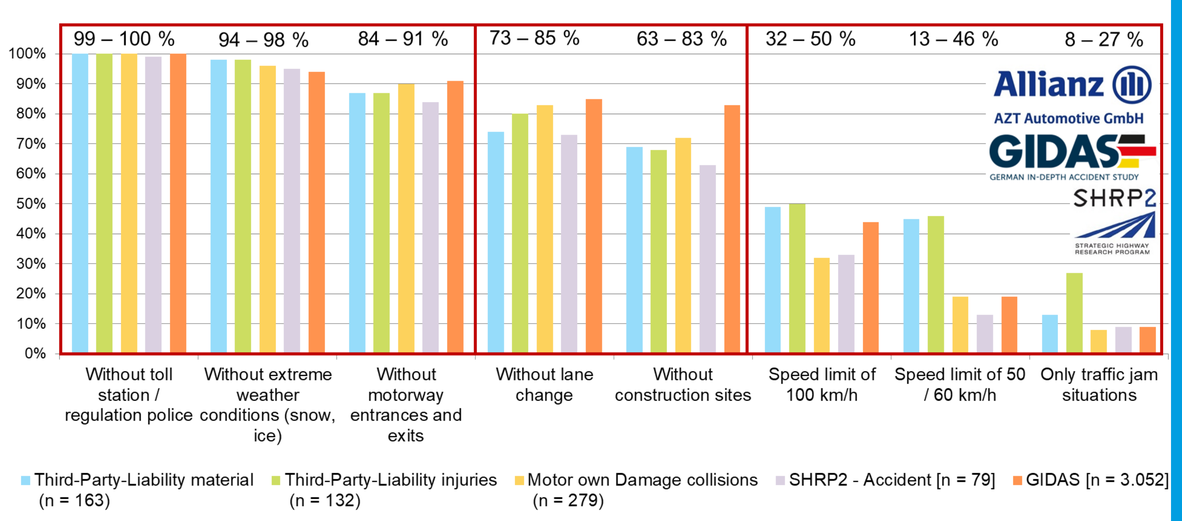

Fig. 3. Comparison of Results of Safety Potentials [Braxmeier 2019, Schatz et al,.19]

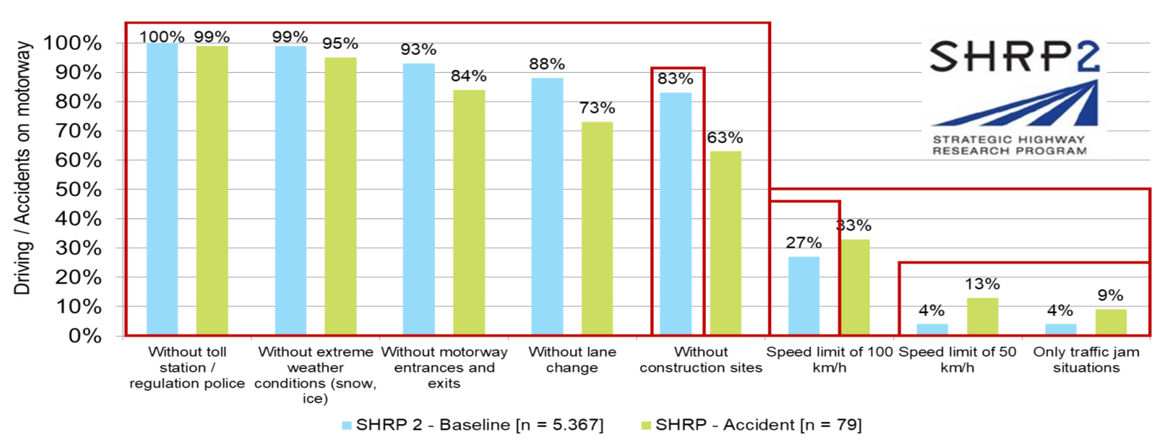

Fig. 4. SHRP2 - Availability and Safety potential of the System Specifications [Schatz et al., 2019]

Conclusion

"Automated driving must be safer than human driving ... “, What does this mean? Which data sources can be used to assess this?

- Result of the Analysis:
  - Different data sources show big differences
  - The decisive factor is what the benchmark of a system is:
    - Personal injury only
    - Personal injury and damage to property
- In Addition, the Respective Databases Show Different Influences:
  - Insured losses
  - Reporting behavior
  - Differences fully comprehensive / liability
  - Representativeness
- → Currently there is no "the All-Encompassing Database" for Evaluating Automated Driving Functions
- → Hence, the Respective Databases Show Clearly Following Demand:
  - Increasing the number of cases in databases
  - Increasing standardization of databases
  - Implementation of Naturalistic Driving Studies especially in Europe

References:

Braxmeier 2019 — Braxmeier, O., Analyse des Sicherheitspotentials eines Autobahn-Chauffeurs und Bedarfsanalyse für einen DSSA/Event-Data-Recorder [Bachelorthesis], Ingolstadt, not published, 2019

Feig et al., 2019 — Feig, P.; Schatz, J.; Labenski, V.; Leonhardt, T., Assessment of Technical Requirements for Level 3 and Beyond Automated Driving Systems Based on Naturalistic Driving and Accident Data Analysis, Washington D.C., National Highway Traffic Safety Administration, 2019

Gwehenberger et al., 2019 — Gwehenberger, J.; Braxmeier, O.; Borrack, M.; Assessment of Technical Requirements for Automated Driving – A Comparison to Human Driving, not published, UNECE, 2020

Schatz et al., 2019 — Schatz, J.; Feig, P.; Leonhardt, T.; Gwehenberger, J.; Braxmeier, O., Assessment of Technical Requirements for Automated Driving – A Comparison to Human Driving [PowerPoint], München, Technische Universität München, 2019

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