REQUIREMENTS AND CONDITIONS – Booth No.10

IDENTIFICATION OF CHALLENGING SCENARIOS FOR HIGHLY AUTOMATED DRIVING

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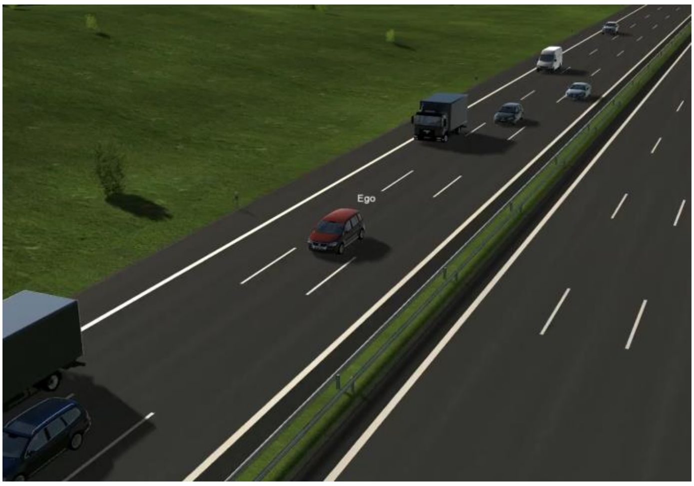
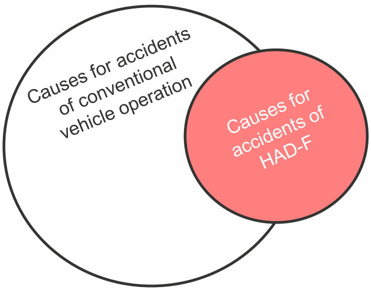
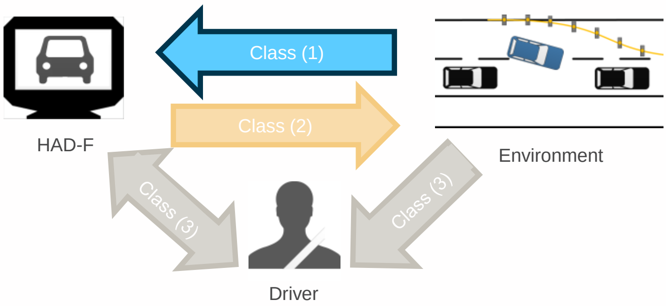
Highly Automated Driving Functions (HAD-F) will be able to avoid accidents.

- Nowadays, accidents are mainly caused by human factors.
- Accidents databases give insights to the causation and chronicles of accidents.
- However, causes for accidents may be different for Highly Automated Driving Functions.
- These causes have to be identified early and systematically.



In this scenario the lane markings are missing (e.g. due to a cleared construction side). While human drivers are able to cope relatively easy with this situation, a HAD-F may not.





(1) Impacts of the environment on the automation

- Misguided perception of the environment
- Misguided interpretation of the situation
- Misguided prediction of trajectories of other traffic participants

(2) Impacts of the automation on other traffic participants

- Misinterpretation of the HAD-F behaviour
- Reaction of automation cannot be anticipated
- Social Acceptance

(3) Interaction with the human driver

- Mode confusion
- Loss of confidence
- Misuse of function

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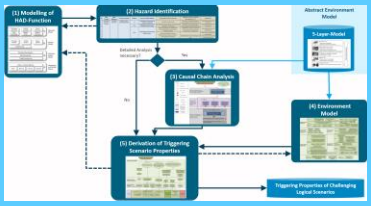
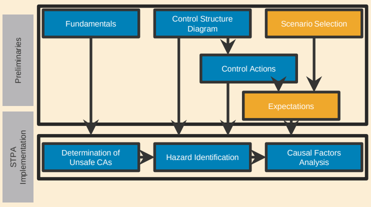
(1) Impacts of the environment on the automation

- Systematic approach based on established HARA methods (HAZOP,FTA) [1]
- Modified for the application to HAD-F
- Based on functional description of the system
- Designed to be applicable in early development stages
- Combined bottom-up, top-down approach



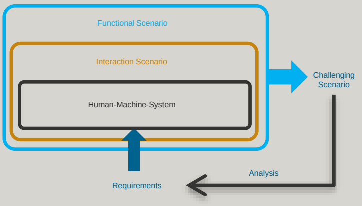
(2) Impacts of the automation on other traffic participants

- STPA based method
- Expectations always related to the expectation of a human driver regarding behavior of the HAD-F
- Control actions (CA) are actions performed by the HAD-F
- If actual behavior of the HAD-F deviates from expected behavior, risks may arise

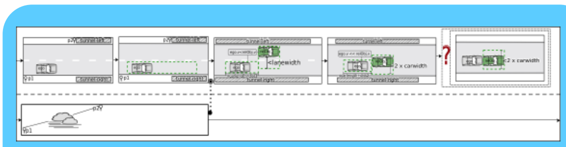


(3) Interaction with the human driver

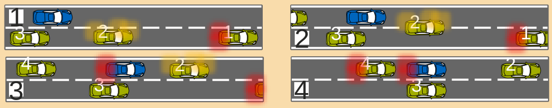
- Definition of possible Interaction Scenarios
- Derivation of possible challenges arising in these Interaction Scenarios
- Derivation of requirements on the HMI concept



Output:
Challenging scenarios and requirements for the development of safe HAD-F



A challenging scenario specified as Traffic Sequence Chart [3]

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JSON Format

PEGASUS Database [2]

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References

➡ [1] Büker, M., Kramer, B., Böde, E., Vander Maelen, S., & Fränzle, M. (2019). Identifikation von Automationsrisiken hochautomatisierter Fahrfunktionen in PEGASUS. In *AAET Automatisiertes und vernetztes Fahren* (pp. 315-329). ITS mobility e.V., Braunschweig.

➡ [2] Pütz, A., Zlocki, A., & Eckstein, L. (2017). Absicherung hochautomatisierter Fahrfunktionen mithilfe einer Datenbank relevanter Szenarien. In *Workshop Fahrassistenzsysteme und automatisiertes Fahren* (pp. 161-168).

➡ [3] Damm, W., Möhlmann, E., Peikenkamp, T., & Rakow, A. (2018). A formal semantics for traffic sequence charts. In *Principles of Modeling* (pp. 182-205). Springer, Cham.

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