CONNECTED AND COOPERATIVE

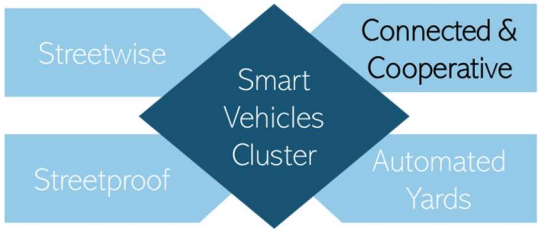
COMMUNICATING AND COOPERATIVE VEHICLES AND ROADS

TNO innovation for life

At the **Integrated Vehicle Safety Department of TNO Mobility and Built Environment** we work on reducing the number of fatalities and severely injured in road traffic. We develop technology to accelerate deployment of Connected and Cooperative Automated Mobility (CCAM) systems and offer tooling and innovative methodologies for safety monitoring and assessment. We support governments and industry with implementation, deployment and scaling-up by maximizing operational and functional safety in real world. To do this we develop knowledge in three areas:

- Automation in (semi-) closed environments
- Safety assessment of automated driving
- CCAM in its digital environment

in 4 product-market combinations:



Market Challenges

Connectivity between vehicles, road infrastructure and cloud services is foreseen to lead to safer and more efficient automated mobility. To discover what the *requirements for digital infrastructure availability* (e.g. coverage, quality-of-service, robustness, security) and *performance of connectivity and cooperation enablers* (e.g. quality of data, data rates, latency) are, a large CCAM ecosystem of parties needs to collaborate. Only through collaboration alignment of technology and protocols can be achieved.

TNO focus and developments

TNO has large experience in cooperative driving required technologies and architectures, the alignment of these technologies with different stakeholders, e.g. platooning, and safety engineering. Recently we added to our research programme the in-vehicle use of digital (road) infrastructure data, the in-vehicle creation and use of environment- and situation context awareness, and the in-vehicle use of AI.

We develop methods for detection and mitigation of incorrect infrastructure-to-vehicle information to increase the resilience and cyber security. We research quality and trust indicators for shared data. We look at the challenge of using shared object data, fusing external measurements with ego measurements, for *collaborative perception*. We research what vehicle applications require from data, pulled from map services. We develop cooperative tactical control strategies, (prediction-based) shared world models, and context modelling methods to use with motion planning. Finally, we develop AI for system health management, predictive maintenance, and intention prediction of other road users and methods to verify trustworthiness of AI.

Realizing connected AI-enabled context-aware systems will lead to more human-like behaviour of autonomous vehicles, increasing overall traffic safety and helping other traffic participants to understand, predict and accept the actions of the autonomous vehicle.
We look for partnerships and clients to bring new knowledge into functional demonstration, to understand the needs of future infrastructure and to accelerate the deployment of Connected and Cooperative Automated Driving.

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