



RESEARCH NEEDS FOR MULTI-BRAND TRUCK PLATOONING

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TNO innovation
for life



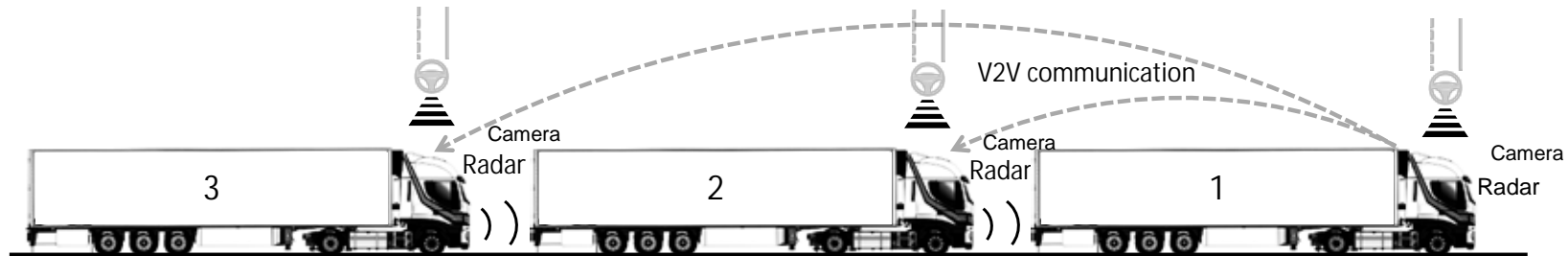
BASIC REQUIREMENTS FOR TRUCK PLATOONING

› Longitudinal

- › Scalable w.r.t. platoon length → disturbance attenuation
- › Safety: collision avoidance

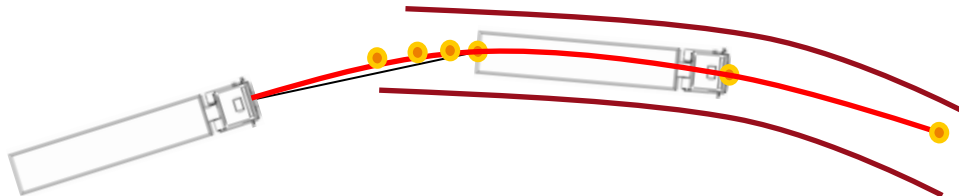
› Lateral

- › Scalable w.r.t. platoon length → disturbance attenuation
- › Safety: lane keeping



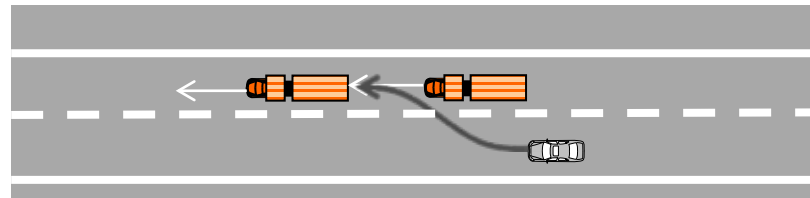
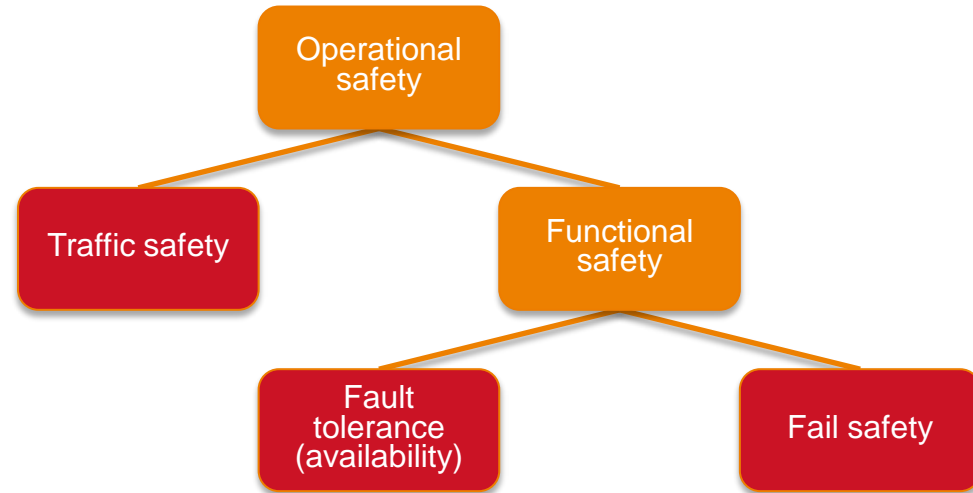
LATERAL STRING STABILITY

- › String-unstable vehicle-following behavior (“wagging tail”)
 - › Cutting corners (low-frequent)
 - › Amplification of small lateral maneuvers (high-frequent)
- › Lateral string stability much more complicated than longitudinal
 - › No degree of freedom such as time gap
 - › Lateral vehicle dynamics are complex
- › Necessary requirements for string stability
 - › Low latency of lateral sensors (≤ 40 ms)
 - › Sufficiently high information update rate (≥ 10 Hz)



SAFETY

- › How to deal with the unexpected?
- › Cut-in of unequipped vehicles
 - › Dynamic inter-vehicle distance
- › Unexpected heavy breaking
 - › Collision Avoidance functionality



ECOTWIN



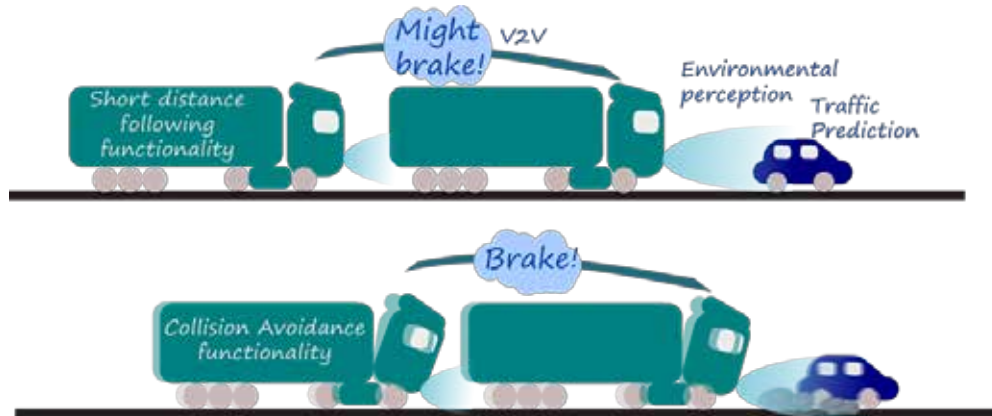
Decrease following distance
Increase robustness and safety



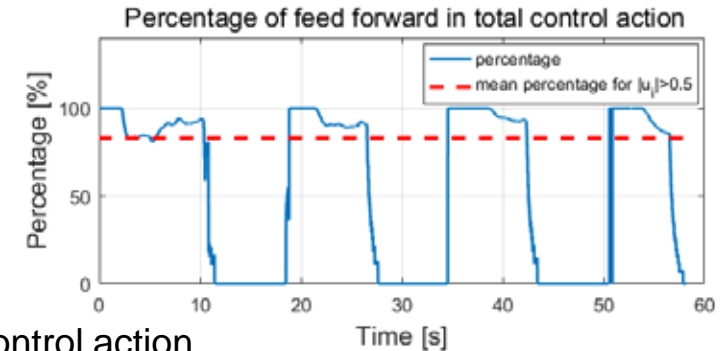
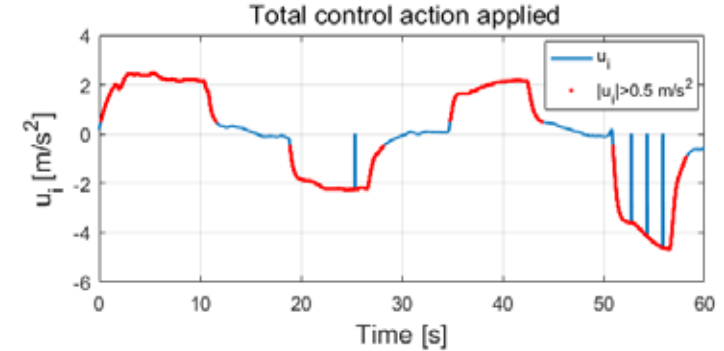


ROADART

- › Improve robustness of wireless communication on hardware, software in **platooning application**.

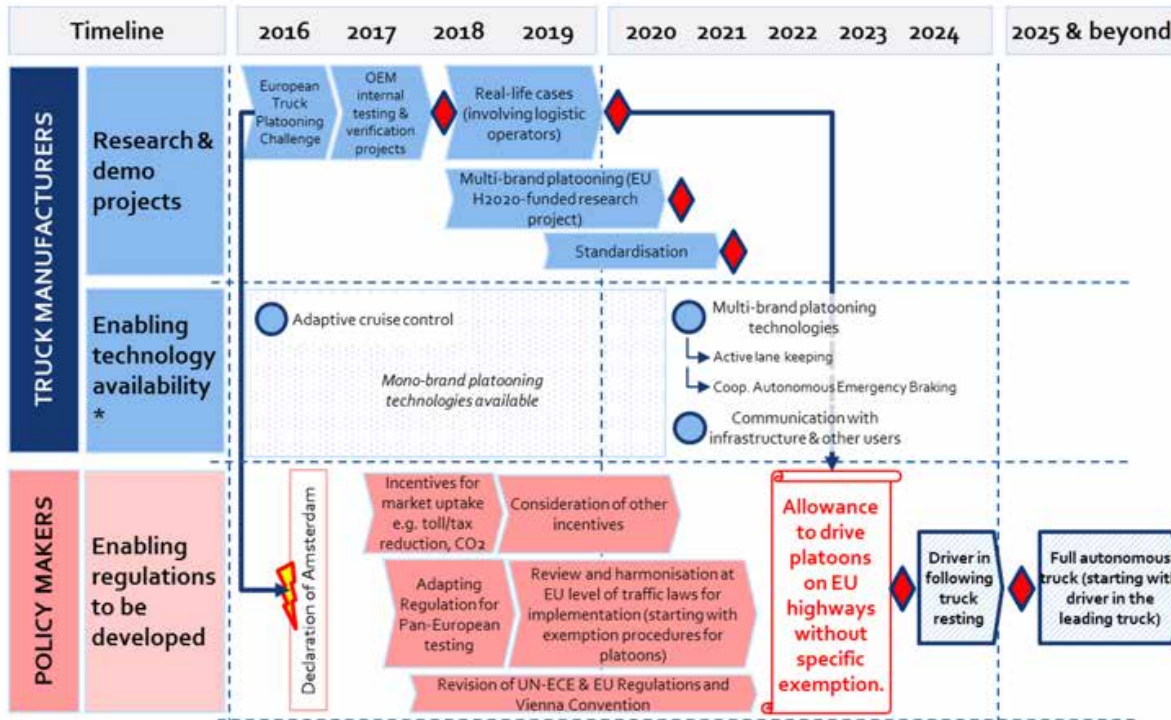


- › Feed-forward (V2V) determines 80% of the total (significant) control action



MULTI-BRAND PLATOONING

- ▶ Truck safe efficient
- ▶ Significant better acceptance platooning
- ▶ This higher strategic function



PROPOSAL ART-03

With representatives from all stakeholders (OEMs, suppliers and research) we propose to:

1. Pave the way for the adoption of multi-brand truck platooning in Europe to improve fuel economy, traffic safety and throughput.
2. Demonstrate driving up to six differently branded trucks in a platoon under real world traffic conditions across national borders.

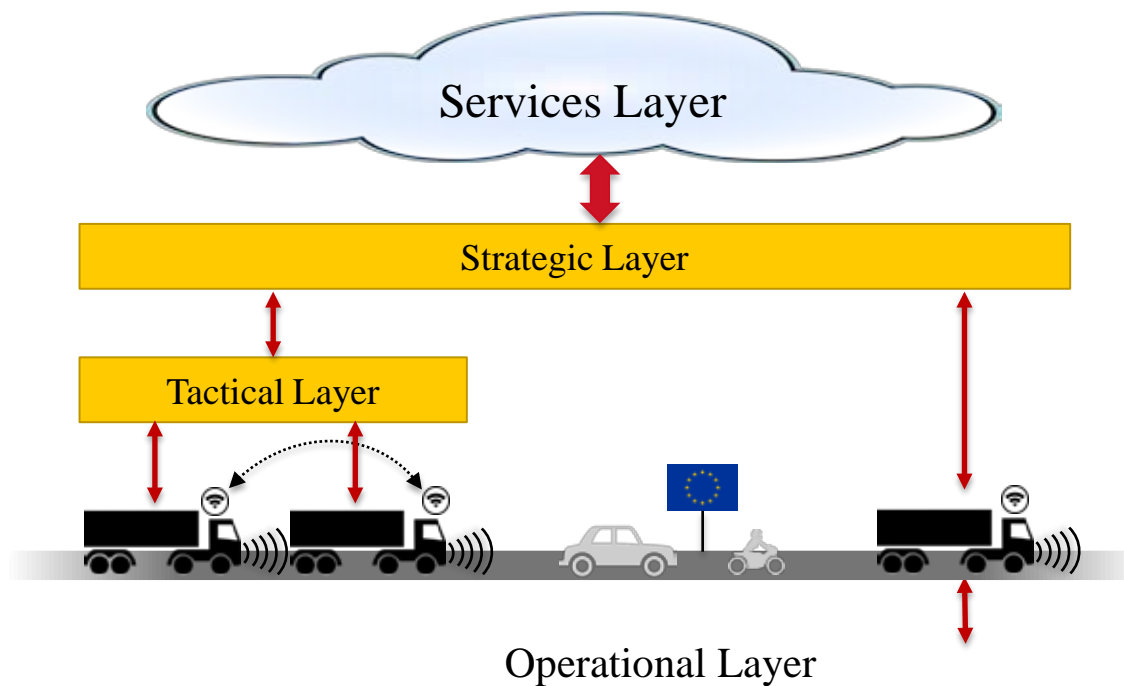


OBJECTIVES

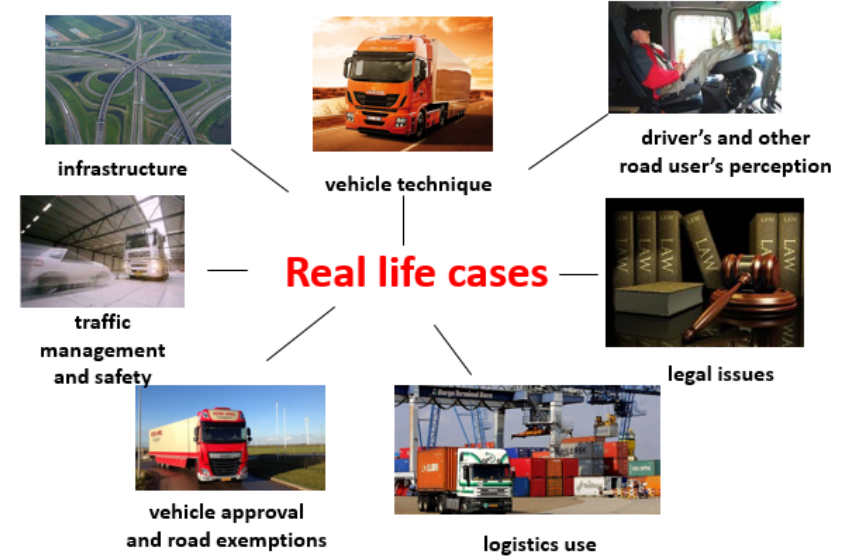
- › Inter-operable platooning
Compatible to ensure correct and safe operation
Generic solution
- › Safe platooning
Key aspect to ensure acceptance of platooning
Fail-safe & fault-tolerant
- › Real-life platooning
Both on closed testing grounds and real life
- › Embedded platooning
Seamless integration into the logistic value chain



CONCEPT OF HIERARCHICAL PLATOONING



NL REAL-LIFE CASE



TNO vision beyond
life-cases?

- › Large-scale deployment
 - › 2017-2019 multiple platoons based on public road exemption
 - › Aim: >200 platoons by 2020+
 - › Financing program under development



THANK YOU FOR YOUR
ATTENTION!

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