HEADSTART – Final event: Use cases

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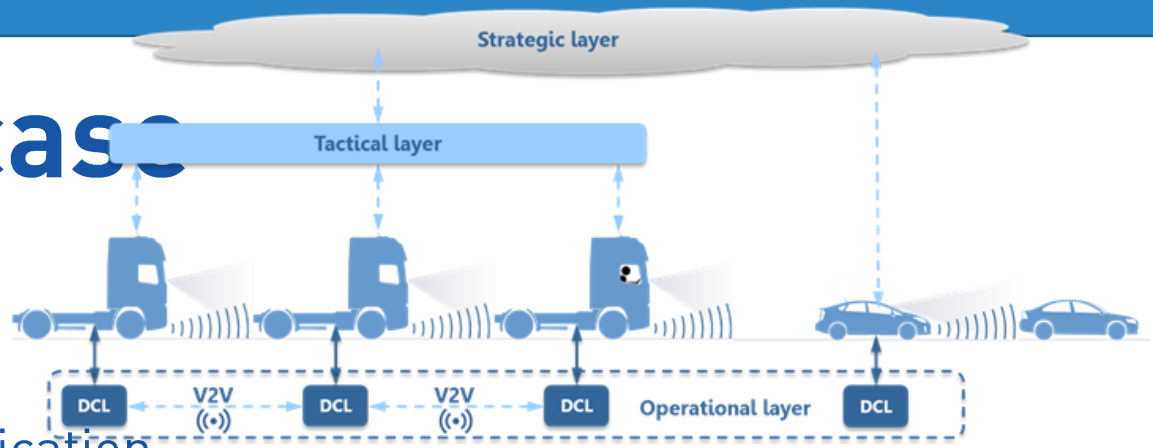
HEADSTART Use cases

Use cases:

- Truck Platooning
- Highway Pilot & Traffic Jam Chauffeur

How suitable is the HEADSTART methodology for the three use cases?

Truck Platooning use case



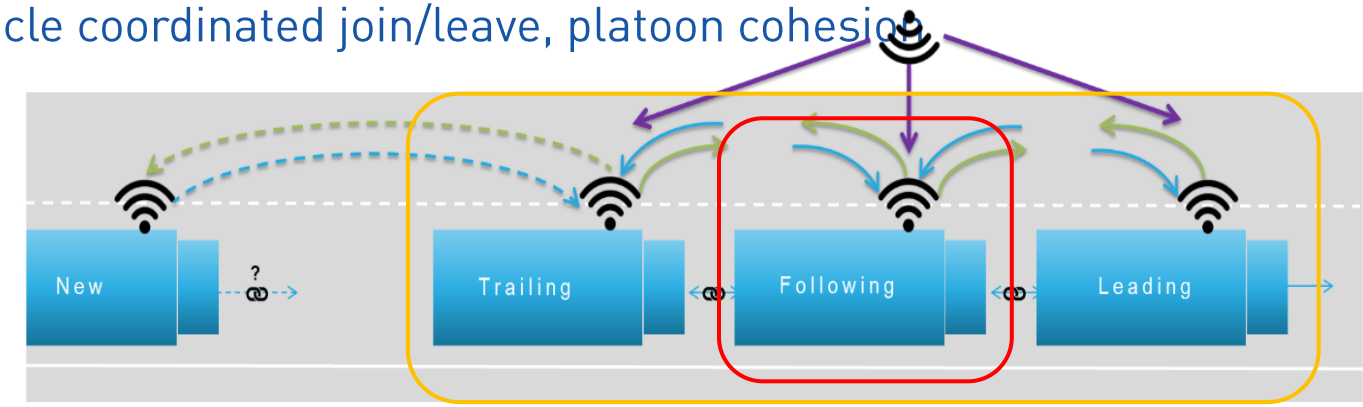
Good use case for HEADSTART methodology

CAD application:

✓ Real cooperative interactions using V2X communication
- V2V communication: sharing operational, tactical and strategical data
- I2V/V2I communication: digital infrastructure support

✓ V2X communication enabling Automated Driving functions:
- Vehicle level: ADAS functions for longitudinal & lateral control, LK, etc.
- Platoon level: platoon manoeuvring, vehicle coordinated join/leave, platoon cohesion

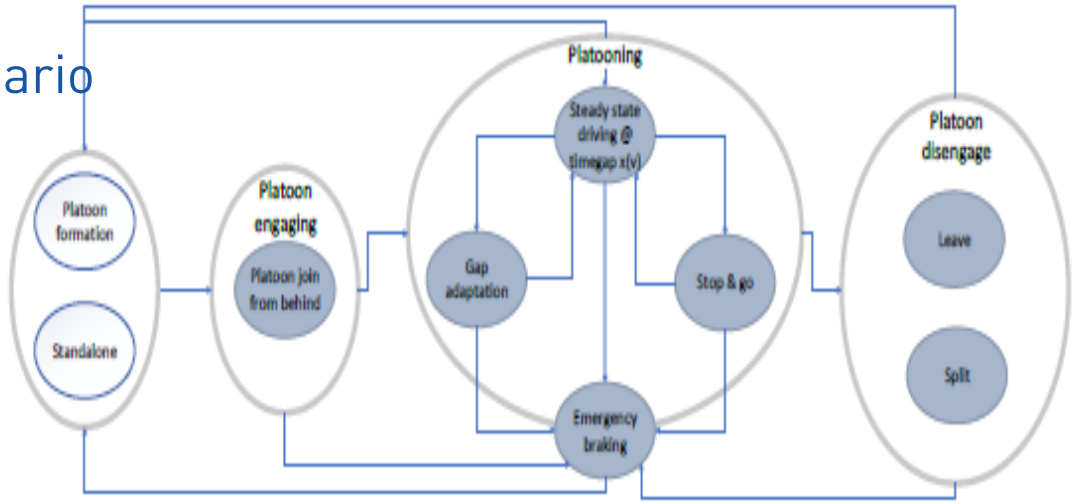
✓ Complex application:
- Vehicle level: system-of-systems
- Platoon level: system-of-vehicles
- Mono-brand, multi-brand (ENSEMBLE)



Truck Platooning use case

Good methodology for Platooning use case: scenario-based assessment helps to handle complexity

- ✓ Platoon manoeuvring and interactions -> suitable scenarios
- ✓ Very practical approach to match high-level platooning manoeuvres:
  - Platoon Engage, Platooning, Platoon Disengage
- ✓ By default V2X communications is a part of the scenario
  - Main enabler for Platooning
  - V2X communication is (can be) safety-critical
  - Introduce V2X failure modes/triggering conditions
- ✓ Usability of scenarios
  - Generic "truck platooning" scenarios
  - Reusable across testing methods



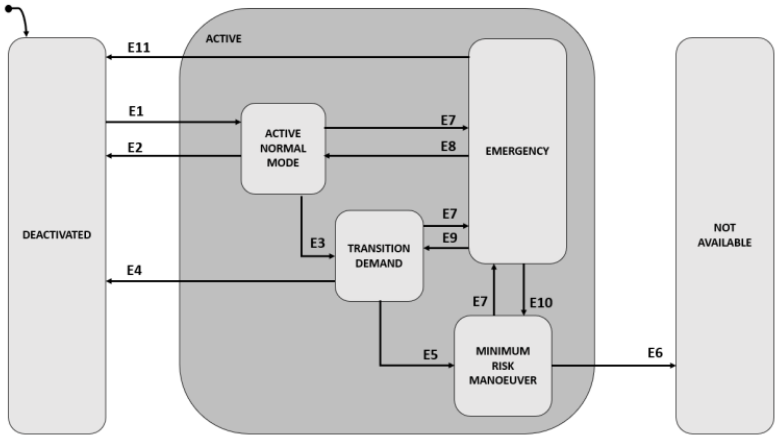
Wrap-up for Truck Platooning use case

- ✓ TRL of the Platooning use case influences the "application" of the HEADSTART method:
  - Currently no scenario database available
  - Expert knowledge used for scenario selection and allocation
  - ENSEMBLE multi-brand platooning (*linked project*):
    - (Pre-)standards for V2X platooning messages and protocol, ongoing
    - No standards for testing, ongoing research
    - Solution-specific implementations and testing
  - Currently no Platooning on public roads
    - Proving grounds
    - Exemption based

- ✓ Platooning is a good use case for:
  - Scenario-based assessment
  - Relevant for the *Key Enabling Technologies*: Communication (V2X), Positioning (GNSS) and Cyber-security

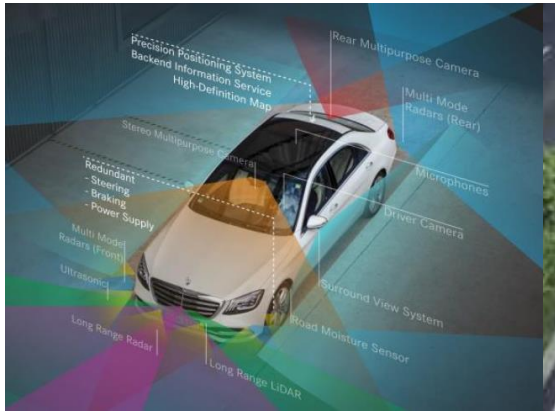
Traffic Jam Chauffeur / Highway Pilot

Both good use cases for HEADSTART methodology



✓ CAD application:

- High accuracy perception system at low speeds
  - Need to properly detect *traffic jam* situations
  - It needs to add sensors in rear part of the vehicle for blind spots
  - Highway Pilot is comparable -> but with "Highway" as ODD
- Positioning systems enabling HD maps to be used *as a sensor* for:
  - Speed Limit computation
  - TJC activation conditions
  - Curve anticipations, detection of highway exits
- V2X Communications for identifying road warnin
  - Construction zones, rescued vehicles, etc.
- New regulations for assessment
  - ALKS Regulation



Traffic Jam Chauffeur / Highway Pilot

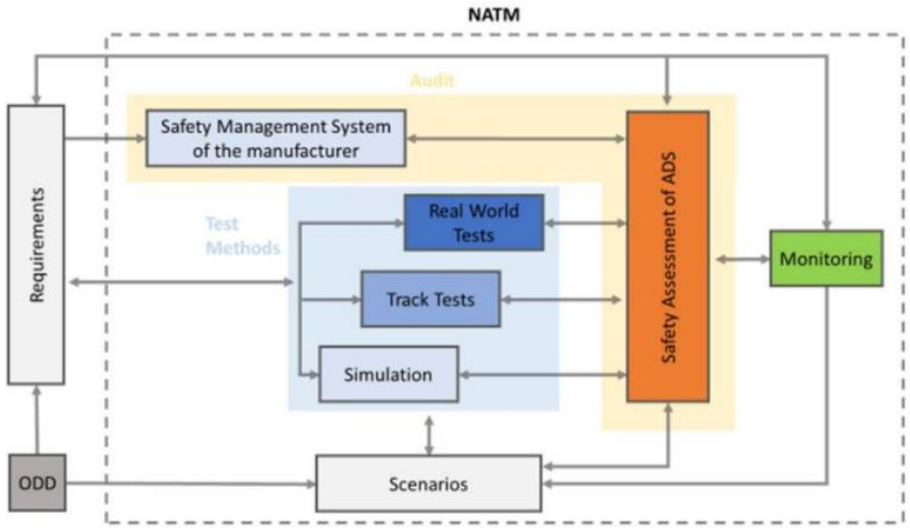
Good methodology for both use cases

✓ Scenario-based assessment helps to handle such complex use cases

- Scenario databases
  - Good scenario coverage for this ODD (TJC/HP)
  - ALKS regulation is also defining scenario catalogue

- By default positioning is part of the scenario
  - Lane detection is also relying on HD maps
  - Assessment of positioning performance in specific scenar

  is necessary to ensure proper accuracy.



- Usability of scenarios
  - Not a huge number of logical scenarios -> but a large number of parameters variations.
  - Virtual Testing is crucial to execute the large number of test cases.
  - Vehicle-in-the-loop is crucial for validation of *corner cases* in proving grounds.
  - Scenarios can be easily reproduced at proving grounds.

Wrap-up for TJC / HP use cases

- ✓ HEADSTART method applied to both use cases:
  - Currently scenario databases are available
  - Expert knowledge used for scenario selection and allocation
  - L3 Traffic jam chauffeur:
    - Evolution from L2 has a huge impact in terms of sensors and scenarios to consider;
    - High performance positioning system allows redundancy for lane detection;
    - If the ODD also considers lane change, the number scenarios increases.
  - L3 Highway Pilot:
    - Needs to considers huge range of parameter space because of higher velocities respect to TJC;
    - Communications enables the system to recognise road warnings on time;
    - It's important to asses the proper recognition of speed limits.
  - Currently many OEMs willing to homologate their L3 TJC/HP systems
- ✓ Both are good use cases:
  - For scenario-based assessment
  - For user groups: *Homologation (ALKS Regulation)*
  - Relevant for the Key Enabling Technologies: Positioning (GNSS) and Communication (V2X)

Thank you!

Any questions?

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