The HEADSTART use cases

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Event rules and process

- ✓ Webinar is being recorded
- ✓ Slides and recording **will be shared** and published on HEADSTART website
- ✓ Questions can be raised via www.slido.com with event code: *#HEADSTART*

  The questions are gathered and where possible raised by the webinar moderator at fixed time slots during the webinar to the presenters.
- ✓ Do not wait until the end of the presentation! If you have questions, just send them to us!

- ✓ Please, avoid using the GoToMeeting chat as your question may not arrive to us

HEADSTART: WP1 use case overview (October 2019)

Requirements for testing *HEADSTART KETs*

Requirements for *testing methods*

Availability of usage *Scenarios database* ➔

Collaboration partners for this use case ➔

Relevance to *key user groups*

	Truck Platooning	Highway Pilot	Traffic Jam Chauffeur	Valet Parking	Urban Automated Shuttle
How suitable is the use case to meet the requirements on testability of positioning in HEADSTART	3,8	3,6	2,6	4,3	4,5
How suitable is the use case to meet the requirements on testability of communication in HEADSTART	4,8	3,4	1,9	3,5	3,5
How suitable is the use case to meet the requirements of testability of cyber-security in HEADSTART	4,5	3,1	2,4	3,7	3,7
How suitable is the use case to meet the requirements regarding physical testing in HEADSTART	4,3	4,3	3,5	4,3	2,9
How suitable is the use case to meet the requirements regarding proving-ground testing in HEADSTART	4,1	3,6	3,1	3,8	2,6
How suitable is the use case to meet the requirements regarding field operational tests in HEADSTART	4,0	4,1	3,4	3,8	3,1
How suitable is the use case to meet the requirements regarding model-based testing in HEADSTART	3,9	3,6	3,6	3,9	3,6
How suitable is the use case to meet the requirements regarding definition and availability of scenarios in HEADSTART	3,3	3,8	3,5	3,0	2,6
How suitable is the use case to meet the requirements regarding requirements on collaboration partners in HEADSTART	4,0	3,7	2,9	3,3	2,6
How suitable is the use case to meet the requirements regarding relevance to OEMs andTier1s in HEADSTART.	3,0	4,8	4,5	3,5	3,3
How suitable is the use case to meet the requirements regarding relevance to type-approval authorities in HEADSTART	3,3	4,1	3,9	2,8	2,9
How suitable is the use case to meet the requirements regarding relevance to consumer testing in HEADSTART	1,7	3,9	3,6	2,4	1,7
Total Average Score	3,7	3,8	3,2	3,5	3,1

HEADSTART: selected use cases (April 2020)

Truck platooning

Highway pilot

Traffic jam chauffeur

HEADSTART use case: Truck platooning

✓ HEADSTART use case Truck platooning refers to:

two or more cooperative trucks driving together in a line,

maintaining a close distance enabled by vehicle-to-vehicle (V2V) communication

✓ Relevance of HEADSTART KETs:

- Communication V2X
- Positioning (GNSS)
- Cybersecurity

✓ Main safety and security assessment stakeholders:

- OEMs & TIERs
- Type approval authorities
- ~~Consumer organisations (like Euro NCAP)~~

HEADSTART use case: Truck platooning

✓ To limit scope:

Automation level closest to real-life deployment as basis for discussion:

This automation level is similar to ENSEMBLE level A.

- the first truck in the platoon is driven manually by a human driver

  possibly supported by advanced driver assistance systems (ADAS), like Adaptive Cruise Control (ACC) or Autonomous Emergency Braking (AEB).
- the following truck(s) have fully automated longitudinal control

  whereas a (safety) driver in each of these trucks is responsible to keep the following truck in its lane.

Used as basis for discussion, but with outlook to higher levels of automation.

HEADSTART use case: Traffic jam chauffeur

✓HEADSTART use case Traffic jam chauffeur refers to:

conditional driving automation (SAE L3) in traffic jam conditions, on highways and other structurally separated roads, with a speed range of 0 to 60 km/h.

✓Relevance of HEADSTART KETs:

- Positioning (GNSS)
- Communication V2X
- Cybersecurity

✓Main safety and security assessment stakeholders:

- Type approval authorities
- Consumer organisations (like Euro NCAP)
- OEMs & TIERs

HEADSTART use case: Traffic jam chauffeur

✓To limit scope:

Conditional Driving automation as basis for discussion:

- Traffic jam chauffeur is capable of keeping the vehicle in the current lane and maintaining a safe distance to the vehicle in front of the ego vehicle.
- The driver must deliberately activate the system but does not have to monitor the system constantly. The driver can at all times override or switch off the system.
- In case of a takeover request to the driver from the system, the driver has sufficient time reserve to orientate himself and take over the driving task (typically 10 seconds).
- In case the driver does not take over, the system will go to a reduced risk condition, i.e. bring the vehicle to a safe stop.

Used as basis for discussion, but with outlook to higher levels of automation.

✓Strong link with UN Regulation on Automated Lane Keeping Systems

HEADSTART use case: Highway pilot

✓ HEADSTART use case Highway pilot refers to:

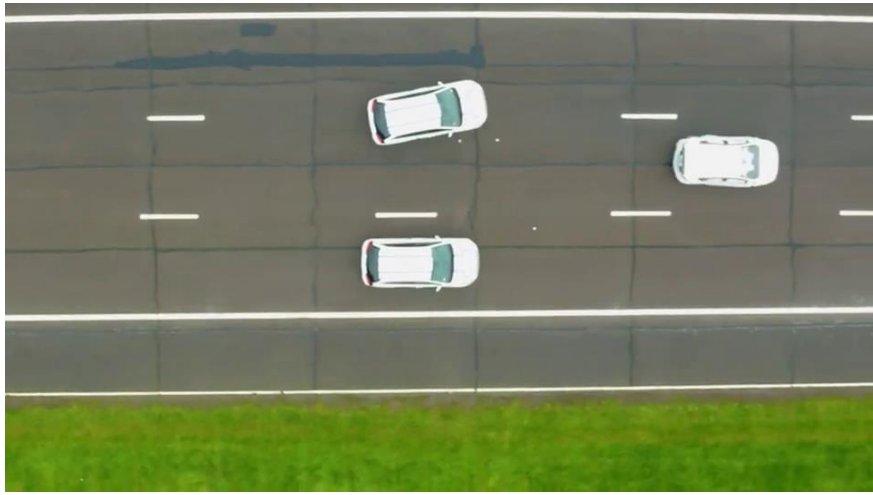
conditional driving automation (SAE L3) or highly automated driving (SAE L4) on highways between entry and exit. The speed range is between 30 and 130 km/h.

✓ Relevance of HEADSTART KETs:

- Communication V2X
- Positioning (GNSS)
- Cybersecurity

✓ Main safety and security assessment stakeholders:

- OEMs & TIERs
- Type approval authorities
- Consumer organisations (like Euro NCAP)



HEADSTART use case: Highway pilot

- ✓ To limit scope:

  Conditional Driving automation/Operational Design Domain (ODD) as basis for discussion:

  - Important elements of conditional driving automation for traffic jam chauffeur also apply for the highway pilot

  - What is the exact ODD for a highway pilot?
    - Environmental conditions:
      - What is the threshold for visibility conditions?
    - Static scenery
      - Include e.g. intersections, traffic lights? (e.g. for USA, Canada)
      - With or without toll gates?
    - Dynamic scenery
      - Include Pedestrians?

Role of the HEADSTART use cases

- ✓ For the different use cases HEADSTART will ***closely cooperate with 'linked projects'*** that will enable us to demonstrate the HEADSTART methodology.

  'Linked projects' include:

  - ENSEMBLE
  - MuCCA
  - CAVRide by IDIADA
  - Automated Drive Demonstrator by Virtual Vehicle

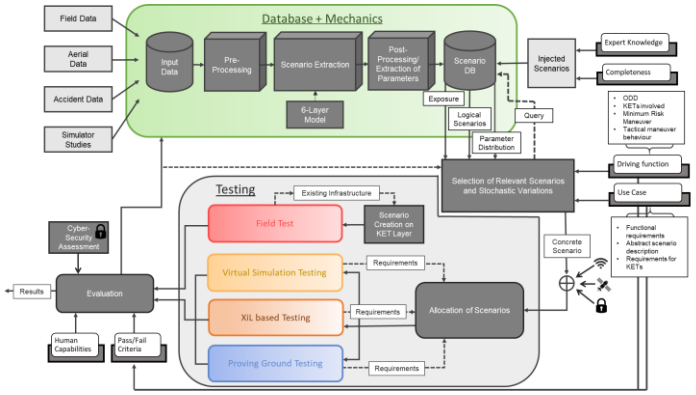
- ✓ Focus to:

demonstrate HEADSTART methodology

not to demonstrate vehicle/function performance.

Role of the HEADSTART use cases

- ✓ Important aspects to be covered in the demonstration of the HEADSTART methodology
  - *Scenario based approach*
    - Scenario database, selection & allocation
  - *Testing methods*
    - Field testing, Virtual testing, XiL-based testing & Proving ground testing
  - *HEADSTART KETs*
    - Communication V2X, Positioning (GNSS) & Cybersecurity
  - *Key user groups*
    - OEMs & TIERs, Type approval authorities & Consumer organisations (like Euro NCAP)



- ✓ Current 'linked projects' are not able to cover all aspects, but all 'linked projects' together will be able to demonstrate the feasibility of ***Scenario based approach, Testing methods*** and ***HEADSTART KETs*** and relevance of HEADSTART methodology for the different ***Key user groups***

Linked Project: ENSEMBLE

ENSEMBLE

DB

Query

ODD

Driving Function based on Truck platooning

Positioning, Communication (V2X) & Cybersecurity

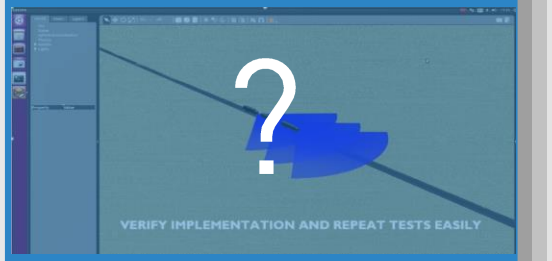
Integrate necessary aspects into test cases cases

Test Cases

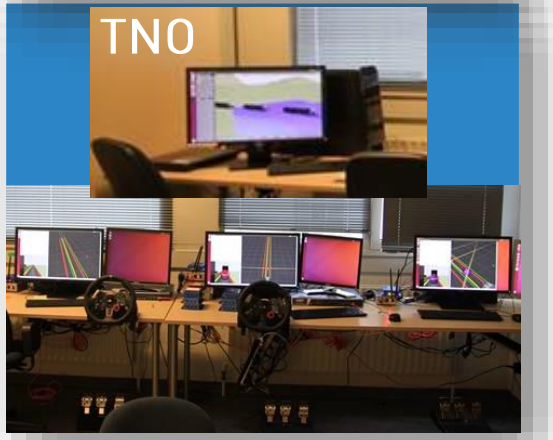
Field testing

Field tests

Virtual testing



XiL-based testing



HiL set-up

Proving ground testing

Test track test sessions

Linked Project: Automated Drive Demonstrator

DB

Query

ODD

Driving Function based on Highway pilot and Traffic jam chauffeur

Positioning & Communication (V2X)

ASAM OpenDRIVE®

ASAM OpenSCENARIO®

Integrate necessary aspects into queries & test cases

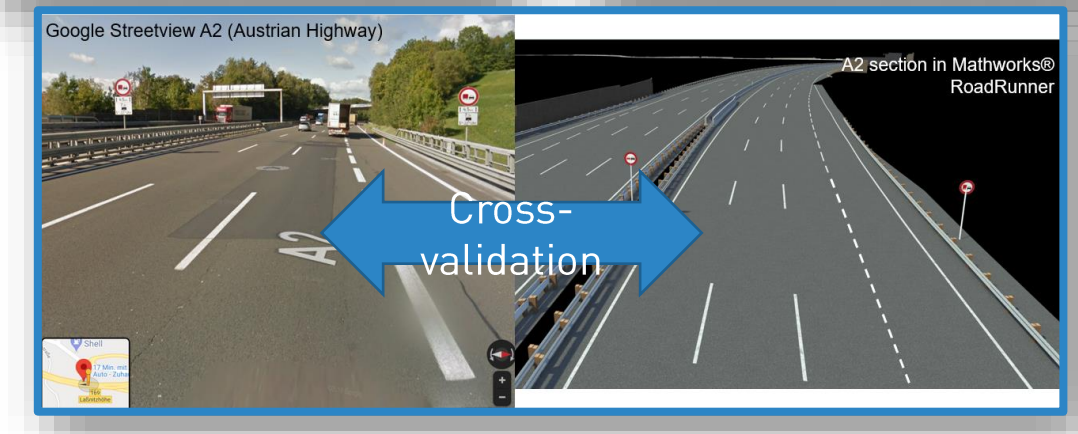
Test Cases

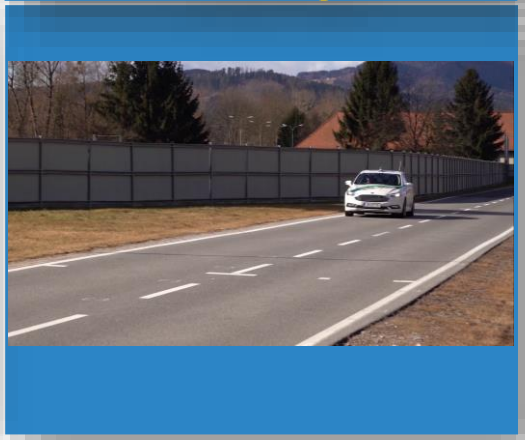
Field testing

Virtual testing

XiL-based testing

Proving ground testing





Field tests (permit available)

Virtual environments for usage in simulations

Driving simulator

Automated Driving Demonstrator

Linked Project: MuCCA & CAVRide

DB

Query

ODD

Driving Function based on Highway pilot and Traffic jam chauffeur

Positioning, Communication (V2X) & Cybersecurity

ASAM OpenDRIVE®

ASAM OpenSCENARIO®

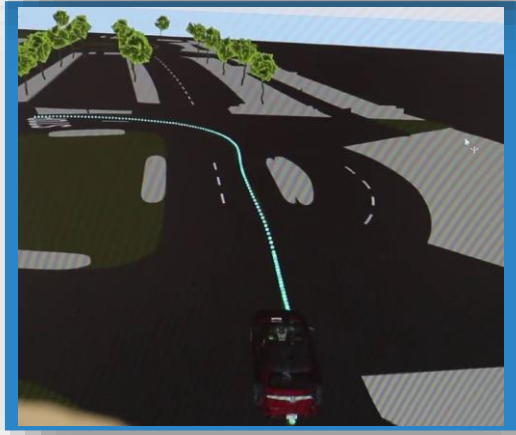
Integrate necessary aspects into queries & test cases

Test Cases

Field testing

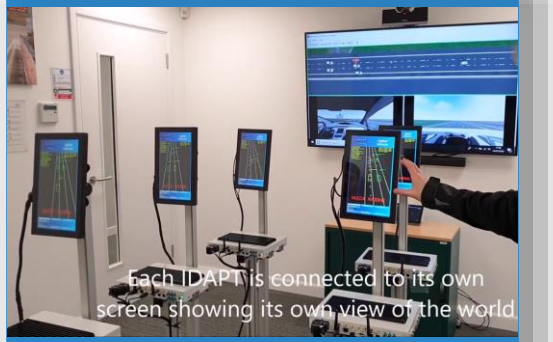
Field tests (permit available)

Virtual testing



Simulations

XiL-based testing



Vehicle-in-the-Loop testing

Proving ground testing

Test track testing

Thank you!

Any questions?

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