HEADSTART

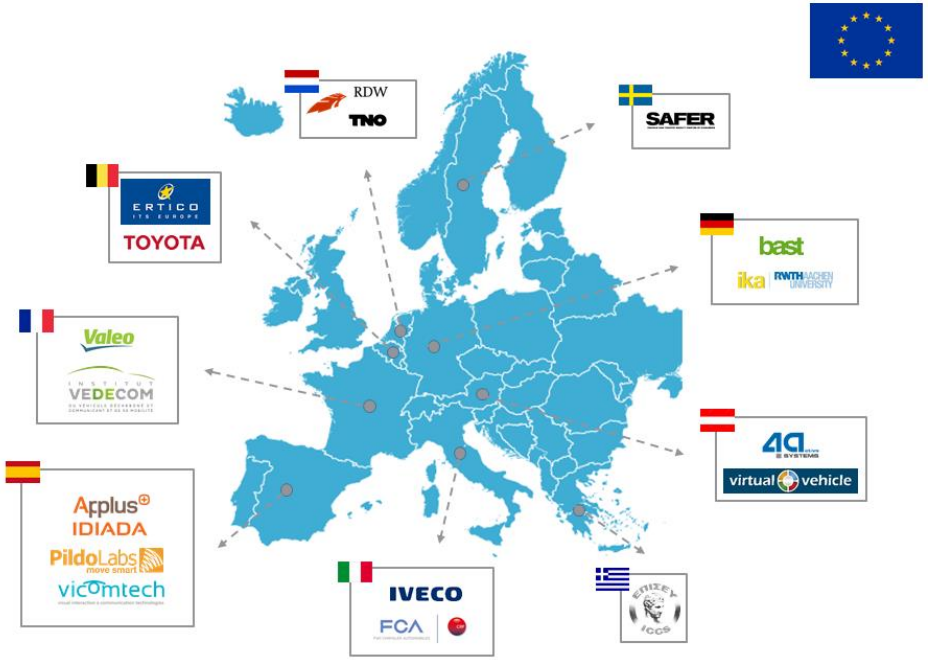
HARMONISED EUROPEAN SOLUTIONS FOR TESTING AUTOMATED ROAD TRANSPORT

Álvaro Arrúe – Applus IDIADA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824309.

HEADSTART project facts

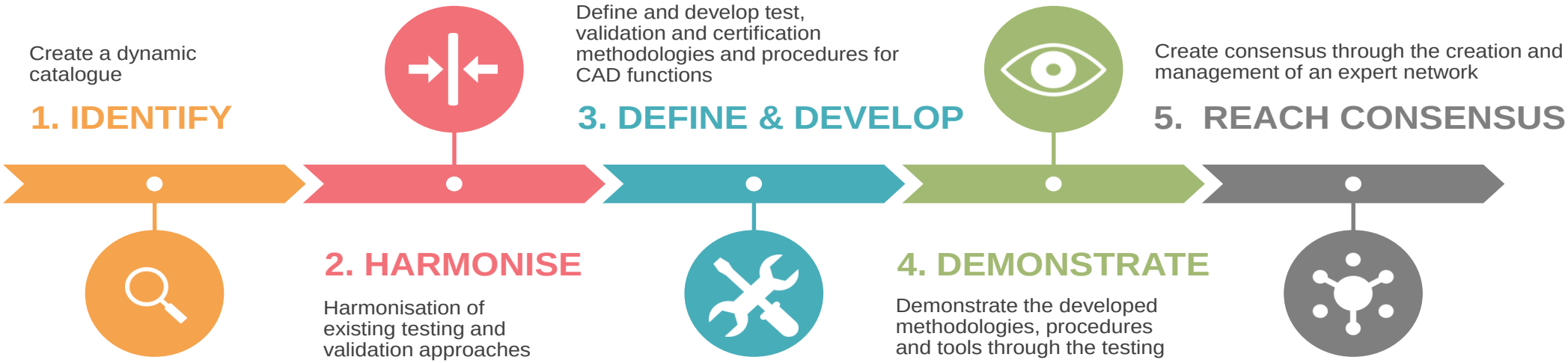
- ✓ **Call identifier:** ART-01-2018
- ✓ **Type:** RIA
- ✓ **Duration:** 01.2019 – 12.2021 (36 months
- ✓ **Budget:** 6M€
- ✓ **Consortium:** 17 partners
- ✓ **Coordinator:** Applus IDIADA, Mr. Álvaro Arrue, Project Manager
- ✓ **Dissemination Manager:** ICCS, Dr. Angelos Amditis, Research Director
- ✓ **Website:**https: www.headstart-project.eu
- ✓ **Social media:** / HEADSTART_EU
  / HEADSTART-PROJECT
  / HEADSTART project (Group)
  / @HeadstartEUproject



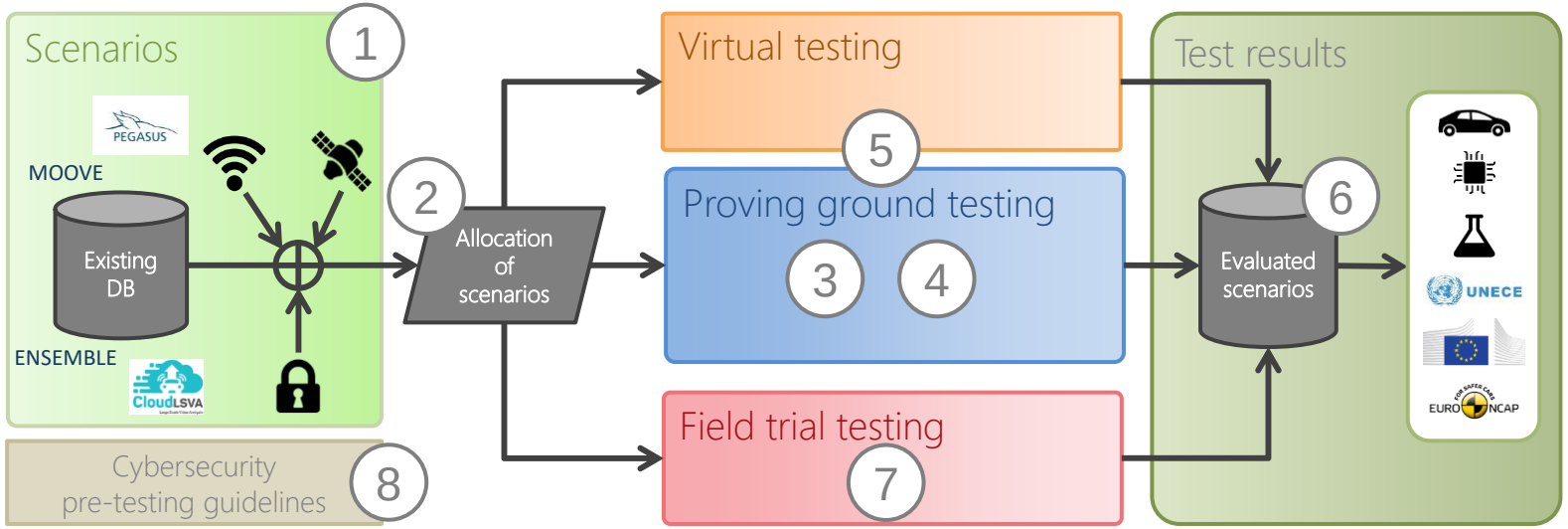
Project's Objectives

HEADSTART will define testing and validation procedures of CAD functions including:

- its key enabling technologies (i.e. communication, cyber-security, positioning)
- by cross-linking of all test instances such as simulation, proving ground and real world field tests
- to validate safety and security performance according to the needs of key user groups (technology developers, consumer testing and type approval)



Project's Concept



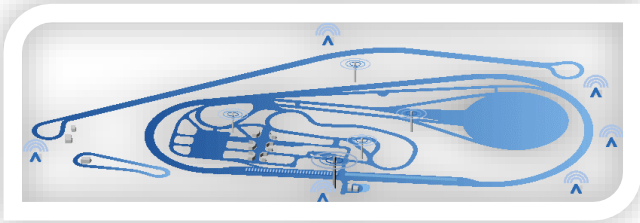
1. Integration of positioning, communications and cyber-security in CAD test scenarios
2. Comprehensive procedure for the allocation of test cases per testing platform
3. Selection criteria and specification for proving ground test scenarios taking into account criticality
4. Proving ground testing and evaluation
5. Correlation between simulation and proving ground results
6. Harmonised, open result compilation and sharing
7. Field trial test methodology description
8. Cyber-security principles and integration in the testing methodology

Test sites

IDIADA test site, Spain

LELYSTAD test site, the Netherlands

Aldenhoven test site, Germany



AstaZero test site, Sweden

A270 test site, the Netherlands

HEADSTART Partners

Cooperate with HEADSTART project

EXPERT GROUP PARTICIPATION

- Join as associated partner and our expert group
- Join the discussion group of your interest:
  - Cyber-security
  - Communications (V2X)
  - Positioning
  - Scenario selection
  - Consumer testing (NCAP)
  - Type approval
- Provide needs and requirements and evaluate project (intermediate) results

JOINT TESTING ACTION

- ✓ Joint cooperation between projects for testing validation and certification purposes
- ✓ Align your project with the harmonized methodology and tools developed within HEADSTART
- ✓ Become one of our use cases!

Please let us know about your interest and join our distribution list.
Website: www.headstart-project.eu
Contact: info@headstart-project.eu

Key Enabling Technologies:
Cyber-security, V2X communication and Positioning

Jacco van de Sluis, TNO

Michael Schmeja, Virtual Vehicle Graz

Andrea Steccanella, CRF

KETs cooperation:

EXPERT GROUP PARTICIPATION

- Join as associated partner and our expert group
- Join the discussion group of your interest:
  - **Cyber-security**
  - **Communications (V2X)**
  - **Positioning**
  - Scenario selection
  - Consumer testing (NCAP)
  - Type approval
- Provide needs and requirements and evaluate project (intermediate) results

Three **K**ey **E**nabling **T**echnologies

Work together on:

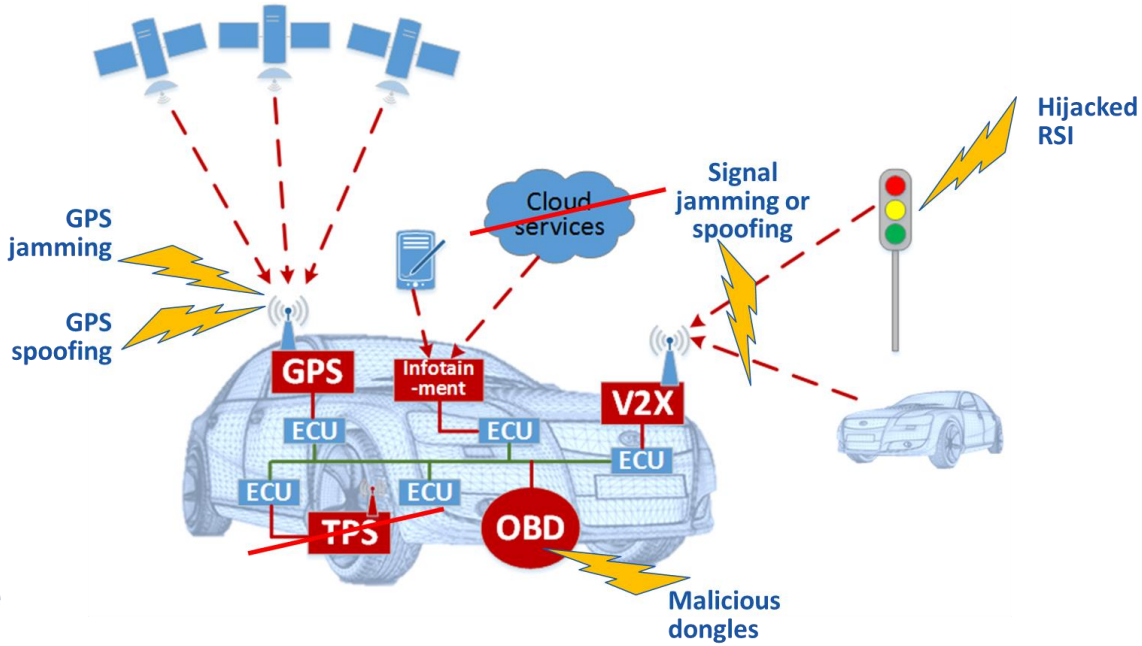
✓Joint cooperation between projects for testing validation and certification purposes

✓Align your project with the harmonized methodology and tools developed within HEADSTART

✓Become one of our use cases!

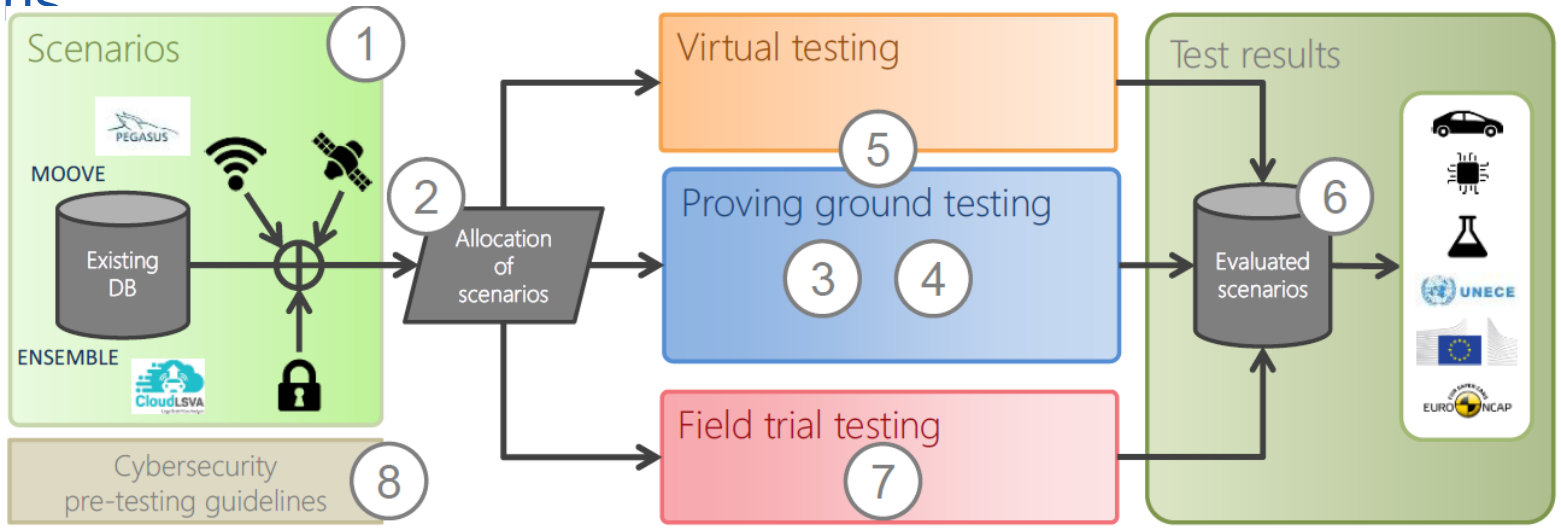
Motivation for the KETs

- ✓ HEADSTART will enhance current testing methods dealing with cyber-security, V2X communications and positioning. And it will integrate them in a holistic methodology that considers them together with automated driving functions.
- ✓ Digitalisation of the automotive industry is the main enabler for technologies such as communications or positioning, key for Connected Automated Driving (CAD) functions but at the same time pose a great challenge in terms of cyber-security.
- ✓ HEADSTART will deliver *new testing procedures and tools for assessment of connected and automated vehicles*.
- ✓ These tools will be implemented in the overall methodology and will enable the integration in virtual and physical testing.



HEADSTART overall approach

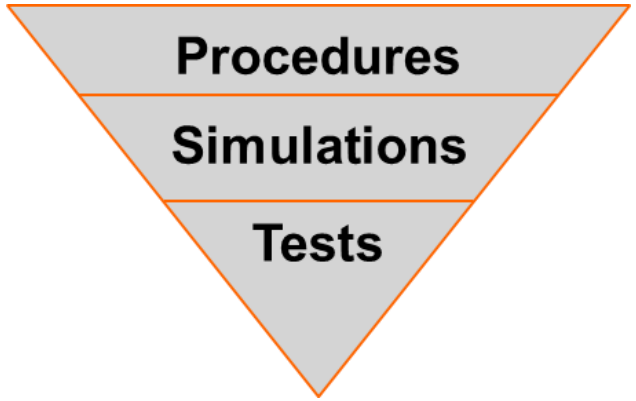
- ✓ Starting from a database of CAD scenarios
- ✓ Include the environmental conditions into the communication channel and perception layers of the device under test:
  - GNSS: introduce range errors due to environment conditions (urban canyons, interference levels).
  - Cyber threats on CAD functions
  - *Unreliable* communication



Goals for *cyber-security*

- ✓In HEADSTART existing cyber-security methods will be analysed and elaborated.
- ✓HEADSTART will target existing testing methods, tools, and approaches within the automotive industry, and transfer valuable cyber-security assessment methods and best practices from other domains (especially from the ICT industry) and adapt it to the needs of the automotive domain with particular focus on CAD.
- ✓HEADSTART will analyse the impact of cyber-security on the KETs communication and positioning and define suitable test methods to assess cyber-security aspects / threats / vulnerabilities of automated driving functions.
- ✓The resulting cyber-security testing/assessment methods will be integrated in an overall tooling architecture as well as tested/demonstrated within HEADSTART use cases for CAD.

Cyber-security approach



- ✓Following functional safety approach
  - 1) Well defined development process (e.g., ISO 26262 for safety)
    - -- Risk/vulnerability assessment covering a wide range
  - 2) Simulations (on component level) targeting several scenarios and test cases
  - 3) Physical/real tests: a set of specific tests carried out on vehicle level
    - -- For safety: “Handful well-defined tests → vehicle safe”
    - -- Same approach for cyber-security (?)
- ✓Lessons learned and knowledge transfer
  - Adapt procedures successfully used in other domains; learn from best practices from ICT
  - Analyse security known flaws
- ✓Cyber-security testing in HEADSTART
  - At least one Use Case allowing to apply developed cyber-security assessment procedures/tests

Goals for *V2X Communication*

- ✓In HEADSTART available V2X communication technologies will be analysed and elaborated.
- ✓Relevant use cases for V2X communication for CAD will be identified. For example based on examples from other projects.
- ✓Transfer V2X testing and assessments methods, tools and approaches and adapt it to the specific needs of the CAD functions.
- ✓Integrated approach in HEADSTART for analyzing the impact of V2X communication in relation with cyber security & positioning requirements in CAD functions.

V2X communication approach

- ✓Creation of Expert Network:
  - Consultation with stakeholders from the industry, research and standardization bodies to identify strengths and weaknesses of current V2X communication systems and their performance.
  - Lessons learned and knowledge transfer: adapt procedures successfully used in other domains, other project.

- ✓Integration of V2X communication into CAD scenario tooling
  - Define operational settings and metrics for V2X communication

- ✓V2X testing in HEADSTART
  - Use case(s) allowing to apply developed V2X communication assessment tests

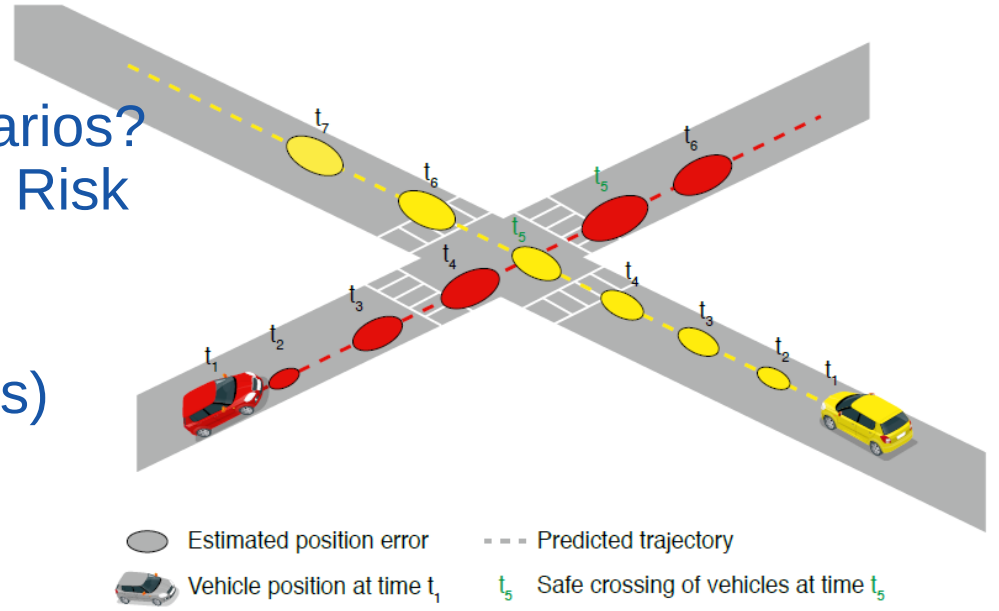
Goals for *Positioning*

- ✓ A unified testing methodology able to represent real environment conditions based on virtual scenarios for CAD functions

  - What happens to GNSS signals in critical scenarios? - ETSI TS 101 539-2 V2X Intersection Collision Risk Warning (ICRW)

  - How vehicle sensors (camera, radar, lidar, maps) can be included into the testing methodology to improve the positioning performance?

  - How to compare solutions relying on different positioning architectures?



Positioning approach

- ✓Creation of Expert Group network:
  - Consultation with stakeholders from the industry, research and standardization bodies to identify strengths and weaknesses of current Positioning system performances.
- ✓Identification Operational environments
  - Metrics of GNSS standards: ETSI GBLS, CEN EN 16803
- ✓Integration of GNSS simulator into CAD scenario tools
  - Evaluation of minimum performance of the systems keeping under control all the testing conditions
  - Record & Replay tests to monitor real life conditions.
- ✓Classification of Positioning module specifically designed for CAD functions

Mission of the Expert Groups

✓**The work of the different Working Groups on Cyber-security, V2X communications and Positioning will be driven by the following activities:**

- Consultation & interviews: Consultation to stakeholders from the industry, the research arena and standardization bodies to gather its positions regarding CAD testing and validation approaches, including type approval and conformance issues for higher levels of automation.

- Consensus building and harmonisation: between CAD stakeholders towards the creation of a coherent CAD testing and validation approaches, including type approval and conformance issues. Together with a roadmap for its implementation which will indicate how further testing and validation in the EU and internationally can be fostered among all the main stakeholders, with special focus on the testing of CAD technology.

- Expert awareness raising: HEADSTART believes that the best way to be convinced about the CAD technology is by testing existing products or prototypes.

Your opinion matters!
Take part in the HEADSTART online surveys!

Take part and identify the real stakeholder's needs! Help HEADSTART design the most appropriate strategy!

https://www.headstart-project.eu/2019/06/03/your-opinion-matters/

5 available surveys:

- Consumer Testing
- Safety Assessment & Safety-Case
- Testing
- Use Cases & Scenarios and
- Testing goals for KETs

Workshop on new approaches for ´Scenarios selection´ and ´Consumer Testing´

12 June 2019
8h45 – 12h00

Location: Seats2Meet (S2MV)

Address: Torenallee 24, Eindhoven, The Netherlands

(15 min walking from ESV location)

Chairman: Mr. Joaquim Huguet (Euro NCAP board of directors)

Expert groups involved:

- CONSUMER TESTING (chair: Applus+ IDIADA)
- Use case and scenarios (chair: Vedecom and IKA)

AGENDA:

8:45 – Welcome coffee & registration
9:00 – Welcome Message from the Conference Chair:
9:10 – Introduction to HEADSTART project and its Expert Network
- Objectives of the project & benefit of being an expert

9:20 – **Scenarios selection**
- State of the art on scenario definition and scenario sources
- State of the art and HEADSTART targeted use cases
- JARI: essence of Japanese approach for AD

Mr. Jacobo Antona – JARI

9:50 – **Consumer testing**
- State of the art on consumer testing and type approval
- Euro NCAP toward AD assessment: future trends

Mr. Richard Schram – Euro NCAP chairman of AD WG

10:20 – Coffee break
10:30 – Open discussion on the way forward for CAD validation and certification
11:50 – Next steps for HEADSTART and expert groups
12:00 – Workshop end

See you next week here in Eindhoven!

Stay connected with HEADSTART

- ✓Visit HEADSTART website

  www.headstart-project.eu

- ✓Follow our Social Media:

  - @HEADSTART_EU
  - HEADSTART-PROJECT
  - HEADSTART project (Group)
  - @HeadstartEUproject

- ✓Reach us via an e-mail:

  info@headstart-project.eu

- ✓Sign up to our newsletter:

  https://lists.iccs.gr/wws/subscribe/headstart-news

- ✓Get in touch with our partners

Please let us know about your interest and join our distribution list.
Website: www.headstart-project.eu
Contact: info@headstart-project.eu

Thank you!

Any questions?

KET: V2X communication

Jacco van de Sluis

TNO Automotive

Jacco.vandesluis@tno.nl

KET: Cyber-security

Michal Schmeja

Virtual Vehicle Graz

Michael.Schmeja@v2c2.at

KET: Positioning

Andrea Steccanella

CRF

andrea.steccanella@crf.it

Thank you!

Any questions?

Name of presenter

Job title affiliation

Contact details

(4 lines max)

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