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**Álvaro Arrúe Lobera** · 1st

Project Manager, Connected and automated driving at Applus IDIADA


**Nicolas Wagener** · 1st

Promotion bei Institut für Kraftfahrzeuge (ika) - RWTH Aachen University


**Andrea Steccanella** · 2nd

FCA | CRF Safety & Driver Assistance Systems engineer


**Stephane Dreher**

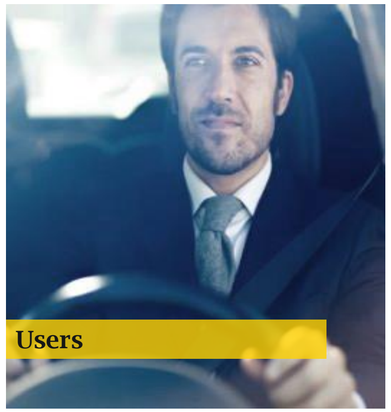
Senior Expert | Technical & Policy Advisor - Connected Automated Mobility, ITS, IoT, Digital Infrastructure, DLT

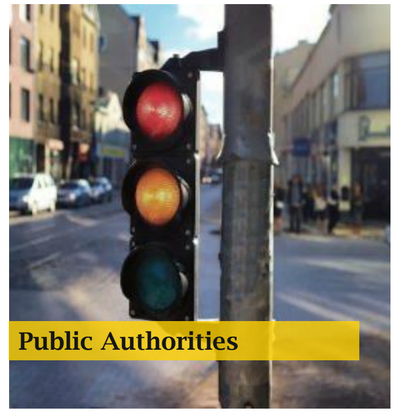
Bringing together
8 mobility sectors
to make **mobility cleaner, safer and more efficient.**









# ERTICO Partners

## MOBILE NETWORK OPERATORS

T · ·
ERICSSON
TIM

## PUBLIC AUTHORITIES

### NATIONAL

bmvit
Department for Transport
GDDKiA
Bundesministerium für Verkehr, Bau und Stadtentwicklung
MIT
Norwegian Public Roads Administration
IMT
وزارة النقل
TRANSPORT MINISTRY
TRAFICOM
WDR

### REGIONAL

Flanders State of the Art
Province Noord-Brabant
NORTH DENMARK REGION
The Ministry of Informatization and Communication of the Republic of Tatarstan

### CITY

Berlin
CITY OF COPENHAGEN
Glasgow
Hamburg
BORDEAUX MÉTROPOLE
Strasbourg.eu
THE CITY OF TAMPERE
TRANSPORT FOR LONDON
CONCELLO DE VIGO

## RESEARCH

AALBORG UNIVERSITY DENMARK
ARISTOTLE UNIVERSITY OF THESSALONIKI
CATAPULT
CERTH
CHALMERS
CTAG Centro Tecnológico de Automoción de Galicia
DTU Technical University of Denmark
ICCS
ICOOR
IFSTTAR
LINKS
ITS
list
MIRA
Newcastle University
OKAN ÜNİVERSİTESİ
PoliTecnico di Bari
TNO innovation for life
VEDECOM
vicomtech
VTT

## SERVICE PROVIDERS

AKKA
Allianz
Atos
BEMOBILE
DEKRA
dots.
here
IBM
Applus IDIADA
NeoGLS
PLUSERVICE.NET
PTV GROUP the mind of movement
SWECO
teamnet
Technolution
TOMTOM
VVA Economics & Policy

## SUPPLIERS

3M
AISIN AW
BRIDGESTONE
Continental
DENSO
DENSO TEN
FICOSA
HUAWEI
META SYSTEM
MITSUBISHI ELECTRIC Changes for the Better
NEC
NXP
Panasonic
QUALCOMM
Valeo

## TRAFFIC AND TRANSPORT INDUSTRY

ASFA
dynniq
kapsch
MICHELIN
SIEMENS
swarco
TXLOGISTIK

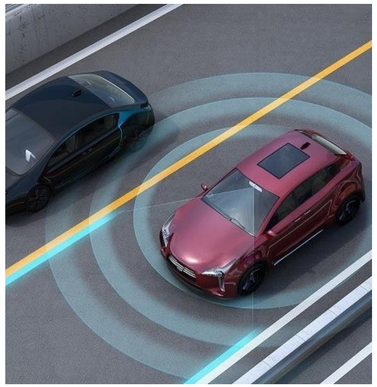
## USERS

Automobile Club d'Italia
FIA
RACC

## VEHICLE MANUFACTURERS

ACEA European Automobile Manufacturers Association
BMW
MINI
FCA
Ford
FORD OTOSAN
GROUPE RENAULT
HONDA
JAGUAR
LAND ROVER
TOYOTA
VOLVO
VOLVO
VOLKSWAGEN

# 4 focus areas of mobility

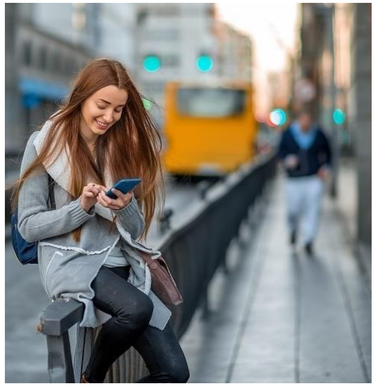


**CONNECTED AND AUTOMATED DRIVING**

Accelerating automation and connectivity for safer and smarter mobility

**CLEAN MOBILITY**

Reducing environmental impact



**URBAN MOBILITY**

Delivering seamless mobility for all

**TRANSPORT AND LOGISTICS**

Creating the digital infrastructure for freight transport and logistics operations

# ITS Innovation & Deployment

| | |
|---|---|
| 23 | EU Co-funded collaborative ITS research, pilot and deployment projects |
| 8 | Deployment oriented platforms for the European and global ITS market |

# Training and capacity building

## Filling the knowledge and experience gap for the deployment of ITS

- Training in smart and sustainable mobility – face to face & online
- Designed for Public Authorities in Europe & beyond
- On-demand & interactive courses for all levels

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Available Trainings

# HEADSTART

## HARMONISED EUROPEAN SOLUTIONS FOR TESTING AUTOMATED ROAD TRANSPORT

Álvaro Arrúe – Applus IDIADA

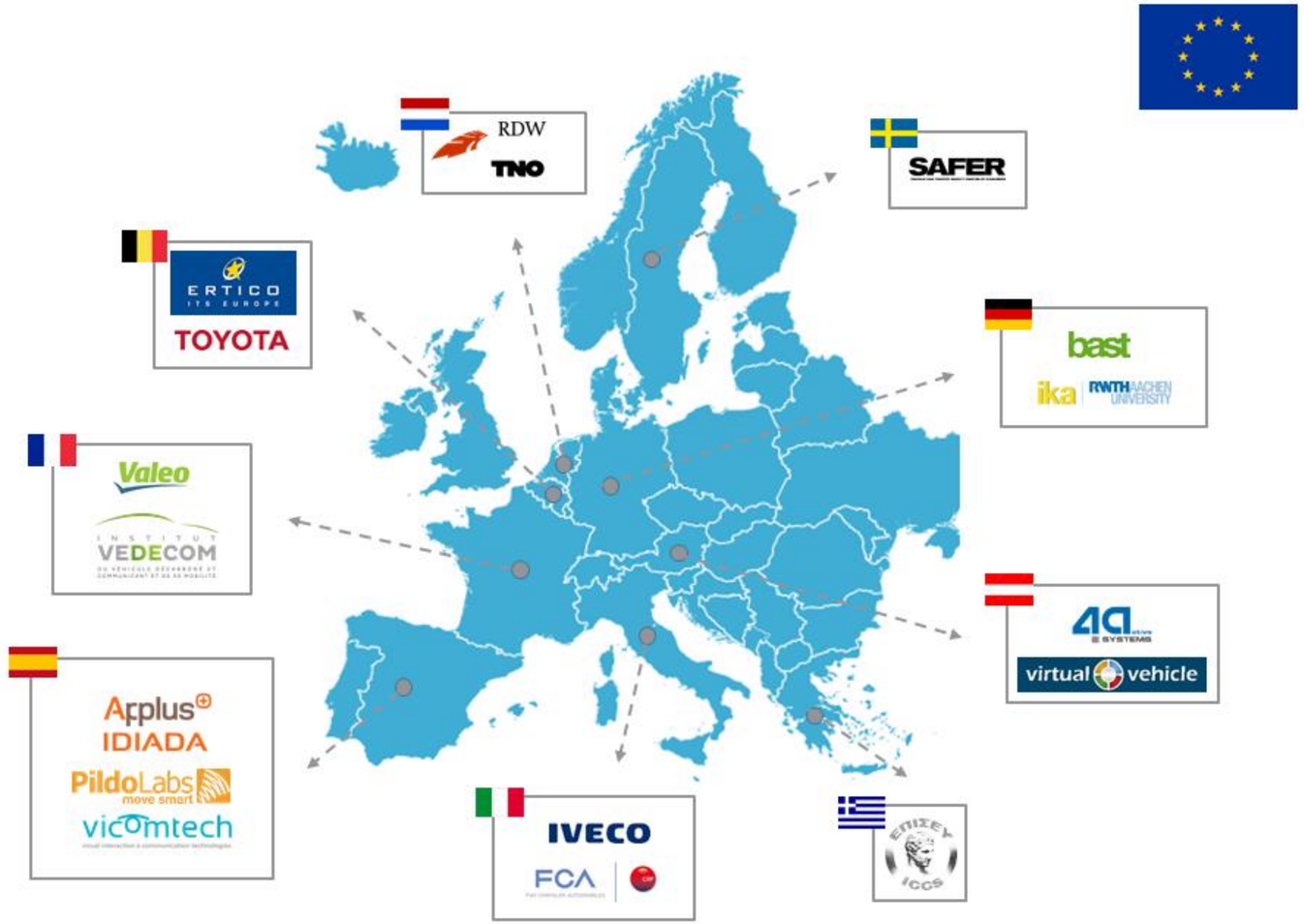
Project coordinator

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

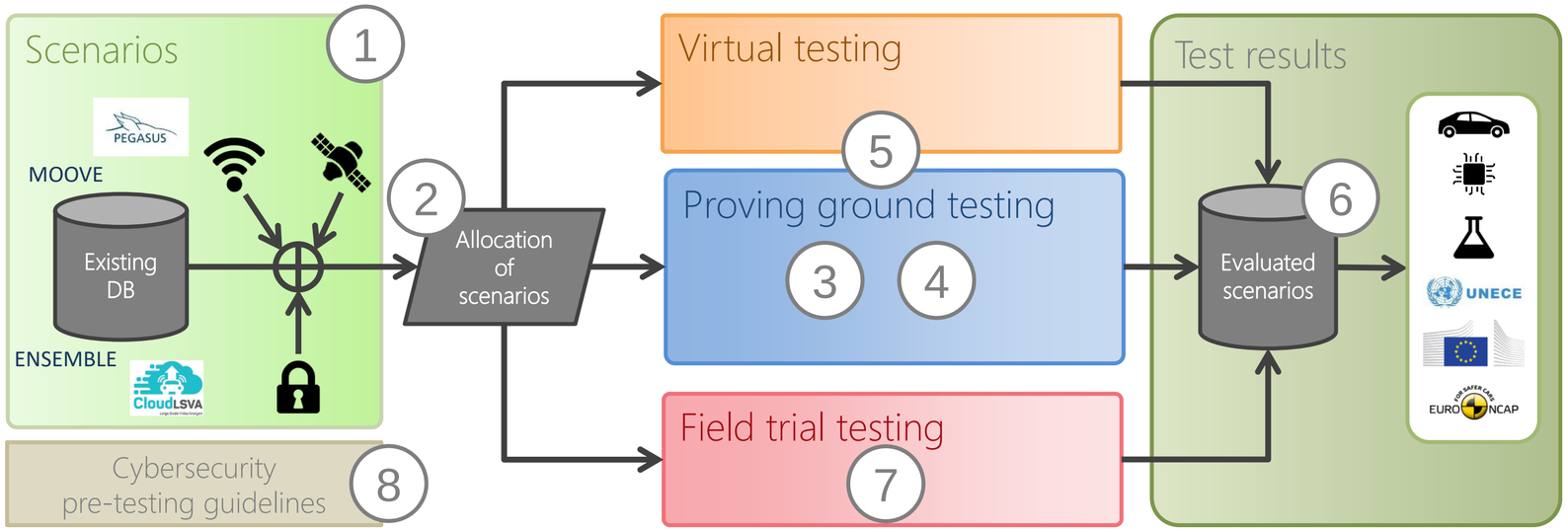
# HEADSTART project facts

- ✓ 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
  / @HeadstartEUproject

# HEADSTART Consortium



# Project's Concept

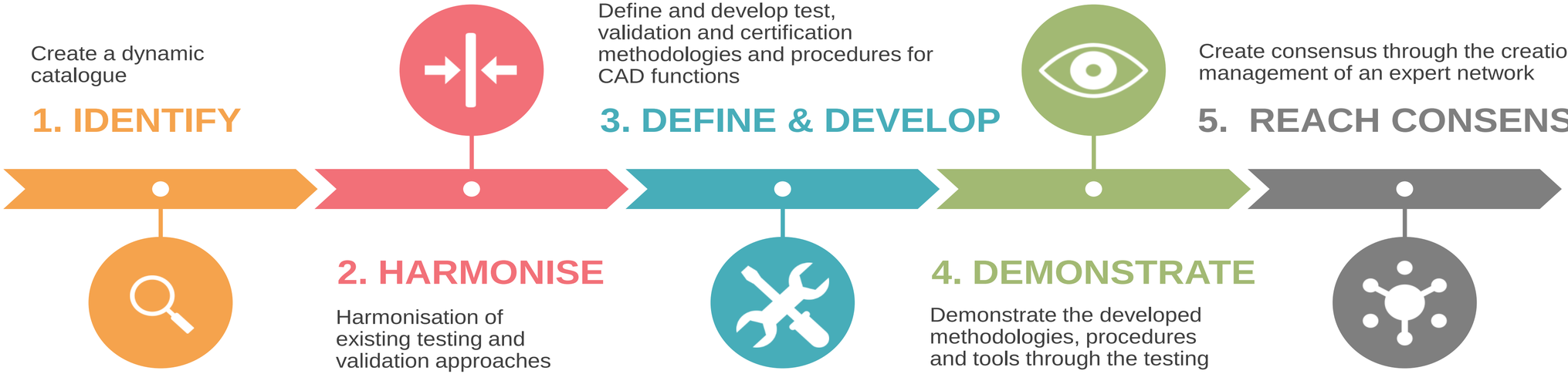



1. Integration of positioning, communications and cyber-security in CAD test scenarios
2. Comprehensive procedure for the allocation of test cases per testing platform
3. Selection criteria and specification for proving ground test scenarios taking into account criticality
4. Proving ground testing and 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

# 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)



# 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 both 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

# 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

# State of the Art: CAD Validation

Álvaro Arrúe, Applus IDIADA

# Use cases and requirements (Work Package 1)

January to September 2019

Create a dynamic catalogue

**1. IDENTIFY**

**2. HARMONISE**

Harmonisation of existing testing and validation approaches

Define and develop test, validation and certification methodologies and procedures for CAD functions

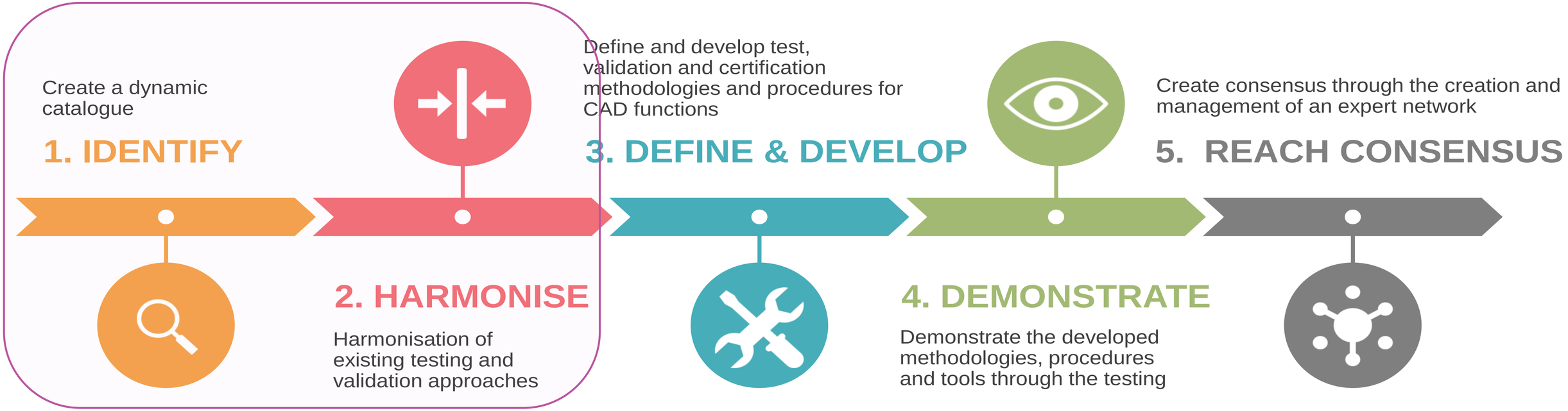
**3. DEFINE & DEVELOP**

**4. DEMONSTRATE**

Demonstrate the developed methodologies, procedures and tools through the testing

Create consensus through the creation and management of an expert network

**5. REACH CONSENSUS**



"State of innovation, stakeholder needs, requirements for Key Enabling Technologies and use case selection"

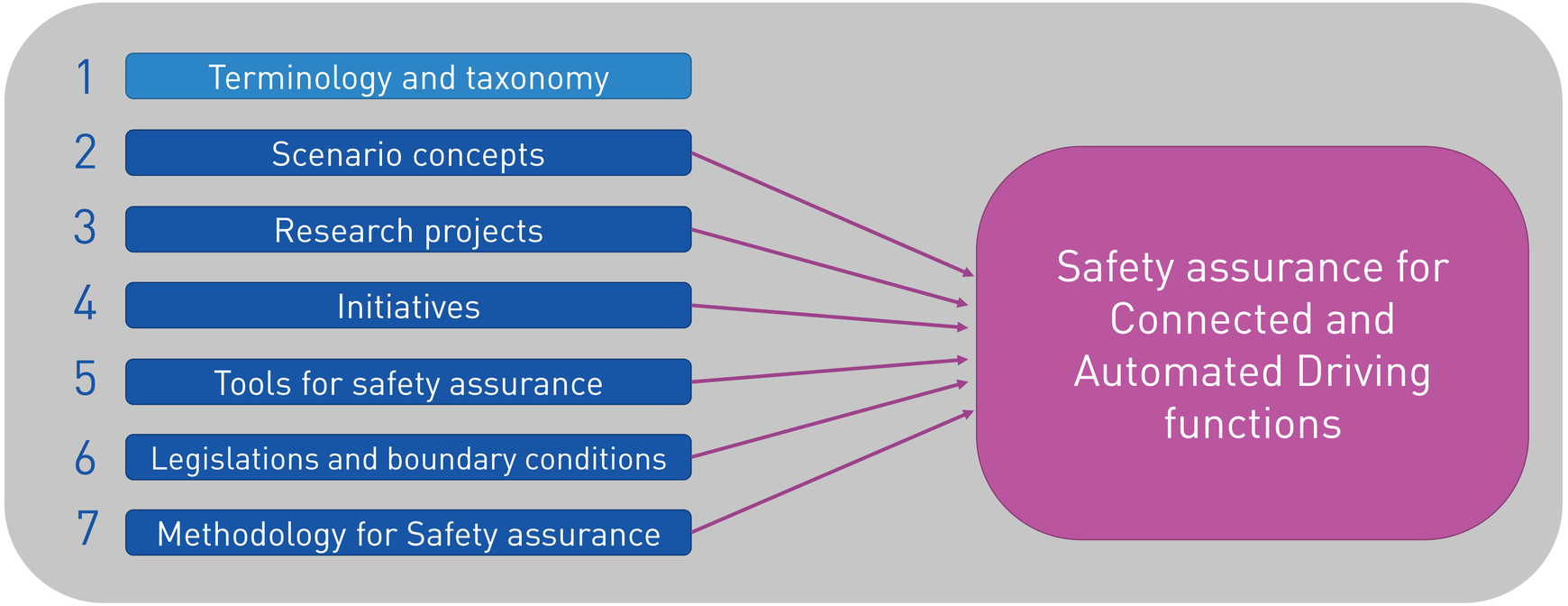
# Use cases and requirements (Work Package 1)

Objective : Develop a comprehensive technical analysis and gap analysis on testing and validation methodologies based on ongoing initiatives worldwide and future pilot tests across Europe.

1) Analyse the existing state of the art on validation and testing methodology for CAD
2) Identify the needs of stakeholders and target groups and prioritise the use cases arising.
3) Identify the functional and technical requirements for KETs (Cyber-security, Positioning, Connectivity).
4) Select the most relevant use cases and identify their functional requirements.

# I- State of innovation and gap analysis

- ✓ Topic led by ika INSTITUT FÜR KRAFTFAHRZEUGE RWTH AACHEN UNIVERSITY
- ✓ **Objective:** Provide a detailed analysis of the existing state of the art on validation and testing methodology for CAD and identify the main gaps based on the available results.
- ✓ 7 aspects of the state of innovation.



# 3- Research projects

AUTOPILOT

MOOVE

PEGASUS

L3Pilot Driving Automation

GALILEO FOR MOBILITY

Robust SENSE

INFRAMIX

ENABLE-S3

PRoPART
Precise and Robust Positioning for Automated Road Transports

ENSEMBLE

InDrive
Automotive EGNSS Receiver for High Integrity Applications on the Drive

ICT CART

AutoSec

TRUSTVEHICLE

SAFER TEC

street wise

Adapt!Ve
Automated Driving

VI-DAS

SECREDAS
Digital Privacy
Safety & Security

inLane
Lane Navigation Technology

CONCORDA

Scout

interACT
Designing cooperative interaction of automated vehicles with other road users in mixed traffic environments

CloudLSVA
Large Scale Video Analysis

PRYSTINE

ASTAZERO
Program (SAFER)

BRAVE

CARTRE
Coordination of Automated Road Transport Deployment for Europe

ESPLANADE

SAKURA
Safety Assurance KUdos for Reliable Autonomous Vehicles

gcdc
i-GAME
Grand Cooperative Driving Challenge

## Other projects:

- ✓HoliSec
- ✓MuCCA
- ✓PROSPECT
- ✓ESCAPE
- ✓Cooperative driving at traffic intersections
- ✓Grand Cooperative Driving Challenge
- ✓Coordination of CAVs over 5G
- ✓ADAS & me

# 4- Initiatives

- ✓ Objective : Identify CAD initiatives of interest for HEADSTART
- ✓ 22 relevant initiatives found
- ✓ Classification into several topics:

## Manufacturers associations

JAMA Japan Automobile Manufacturers Association, Inc.

ACEA European Automobile Manufacturers Association

PFA FILIÈRE AUTOMOBILE & MOBILITÉS

@OICA

## Public authorities

DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA

National Transport Commission

UNECE

## KETs

5GAA Automotive Association

CAR 2 CAR COMMUNICATION CONSORTIUM

## Consumer testing

EURO NCAP FOR SAFER CARS

## Other relevant initiatives

M city UNIVERSITY OF MICHIGAN

PROSPECTIVE EFFECTIVENESS ASSESSMENT FOR ROAD SAFETY PEARS

EATA European Automotive and Telecom Alliance

ECSEL JU

EGVI European Green Vehicles Initiative

Australia & New Zealand Driverless Vehicle Initiative

CETRAN

ERTRAC

EUROPEAN TRUCK PLATOONING

SIP 戦略的イノベーション創造プログラム

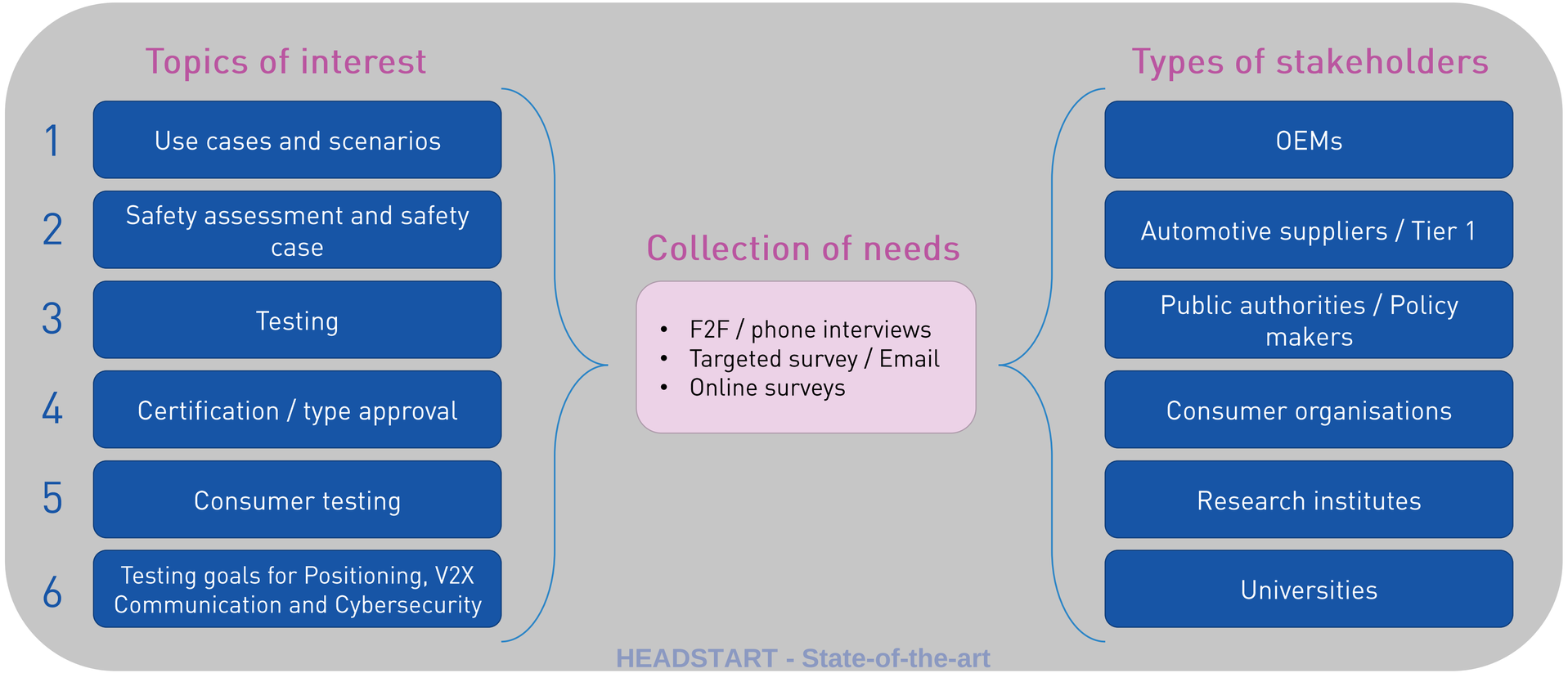
American Center for Mobility CONNECTED. AUTOMATED. VALIDATED.

Nouvelle France Industrielle (NFI)

# II- Identification of stakeholder needs

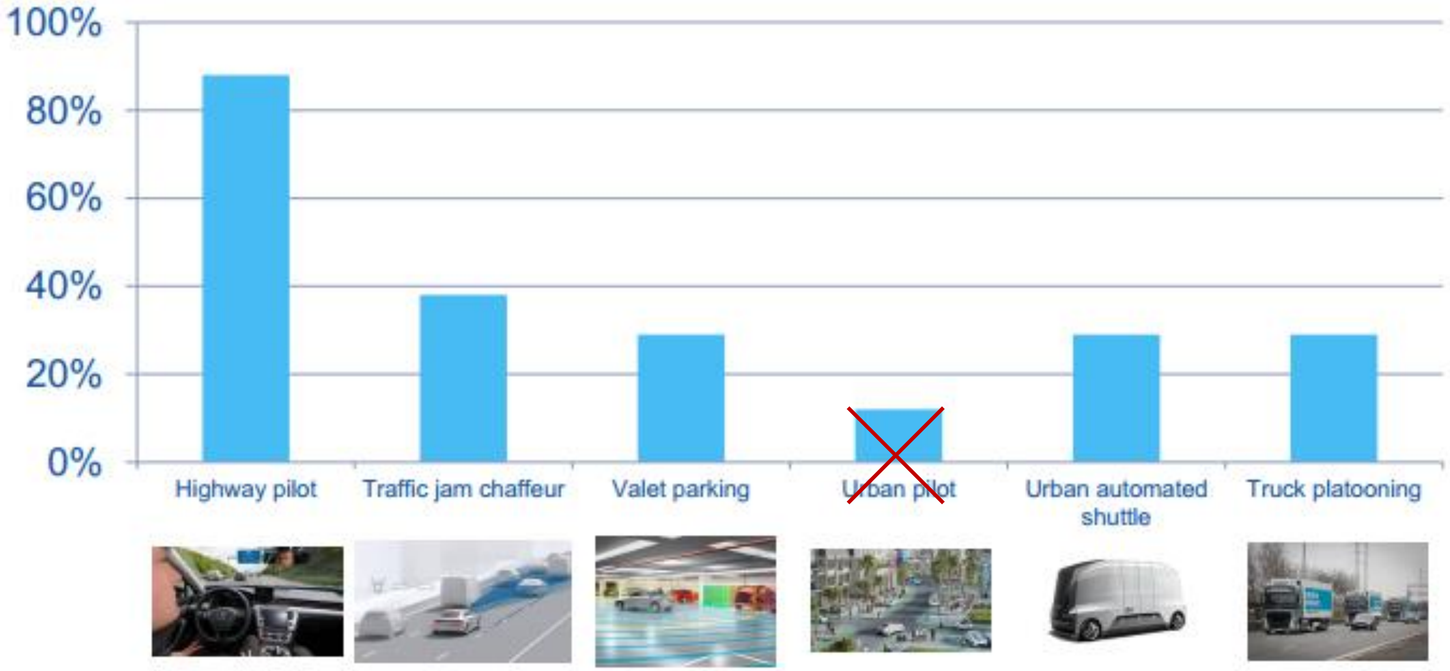
✓Topic led by INSTITUT VEDECOM

✓**Objective:** Identify the needs on methodologies and procedures (demonstrations, certifications), tools and standards from the viewpoint of different stakeholders and user groups.



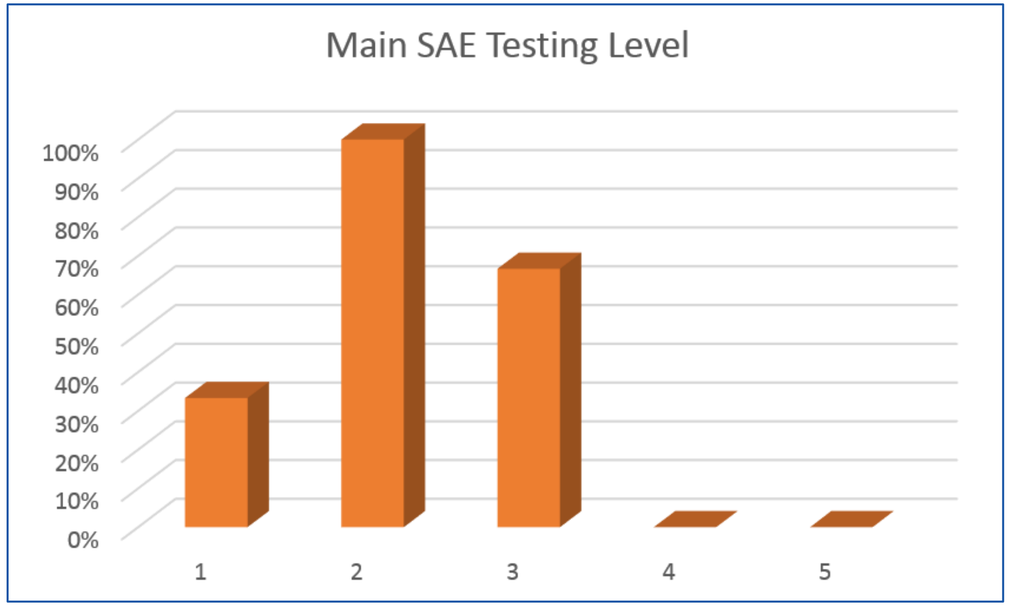
# Use cases and scenarios

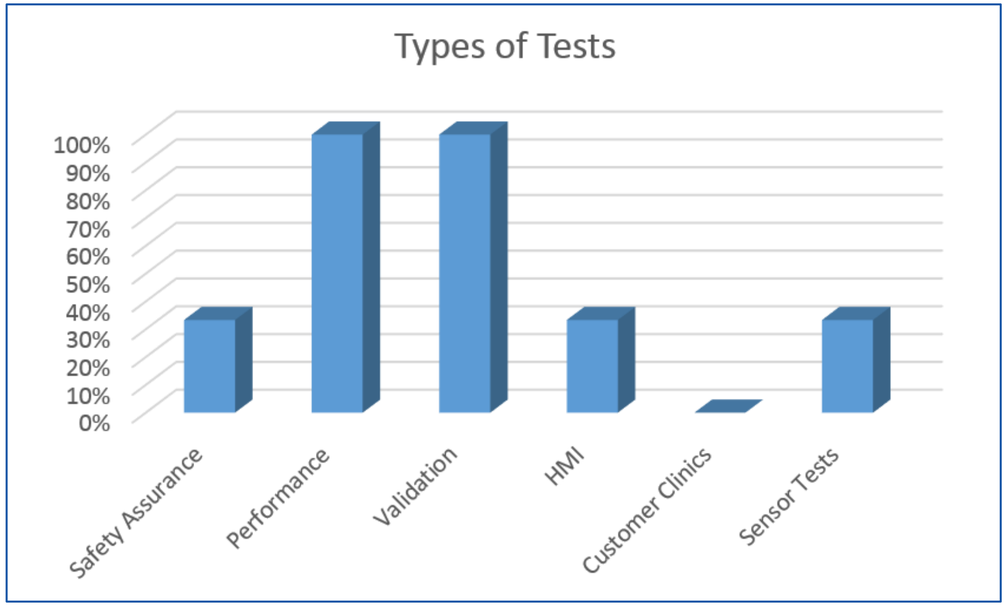
- ✓ Objective: Identify the priority use cases for stakeholders
- ✓ Survey results for use cases:
  - User groups needs on use cases have been presented at an expert workshop in Eindhoven in June 2019
  - The open discussions with the stakeholders confirmed that « urban pilot » is not a priority for them.



# Testing

- ✓ Objective: Identify the needs on testing CAD functions
  - Most of the testing is taking place on SAE levels 2 and 3 but will soon evolve to SAE level 3+
  - Testing organisations are focusing on performance and validation tests.




  - No fixed methodologies stated except from protocols like EuroNCAP
  - Need for a common methodology and protocol

# III- Requirement identification for KETs

- ✓ Topic led by SAFER VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS
- ✓ **Objective:** Identify and Compile technical and functional requirements for HEADSTART's Key Enabling Technologies (Positioning, V2X communication, Cyber-security) to achieve safe automated functions.

Analysis of stakeholder needs for KETs

KETs relevant projects from the state of the art analysis

SECREDAS Digital Privacy Safety & Security · SAFER TEC · ENSEMBLE · ICT4CART · (...)

interACT Designing cooperative interaction of automated vehicles with other road users in mixed traffic environments · ENABLE-S3 · PROPART Precise and Robust Positioning for Automated Road Transports

Positioning / V2X communication / Cybersecurity

1) Functional requirements at vehicle level
2) Technical constrains at vehicle component level
3) Safety requirements for road-users
4) Potential physical constrains on test tracks
5) How the technical requirements are expected to be partly verified by computer tools
6) Technical feasibility

# IV- Functional requirements and use case selection

- ✓ Topic led by SAFER VEHICLE AND TRAFFIC SAFETY CENTRE AT CHALMERS
- ✓ **Objectives:**

1. Compile the requirements for use cases and functionality to demonstrate safe CAD functions
2. Classify use cases, functional requirements and scenarios described in the previous tasks
3. Determine the most important use cases and for each of them, the appropriate CAD functions
   - Description of each preselected use case with representative scenarios,
   - Relevance ranking of the use cases based on a survey

# Use case ranking

| | | Truck Platooning | Highway Pilot | Traffic Jam Chauffeur | Valet Parking | Urban Automated Shuttle |
|---|---|---|---|---|---|---|
| Requirements for testing KETs | 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 |
| Requirements for testing | 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 |
| Availability of Scenarios ➔ | 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 |
| Collaboration partners for this use case ➔ | 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 |
| Relevance to key user groups | 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 |

# Challenges for CAD Validation

Nicolas Wagener, IKA

# Challenges for CAD Validation

| Safety assurance by test drives? |
| --- |
| ▪Sample calculations ranging **up to billions** of kilometers<br>➔ Not feasible |

# Challenges for CAD Validation

## Safety assurance by test drives?

- Sample calculations ranging **up to billions** of kilometers

➔ Not feasible

## Safety assurance by expert knowledge?

- **No evaluation methodology available** for automated driving (L3+)

➔ Not available

# Challenges for CAD Validation

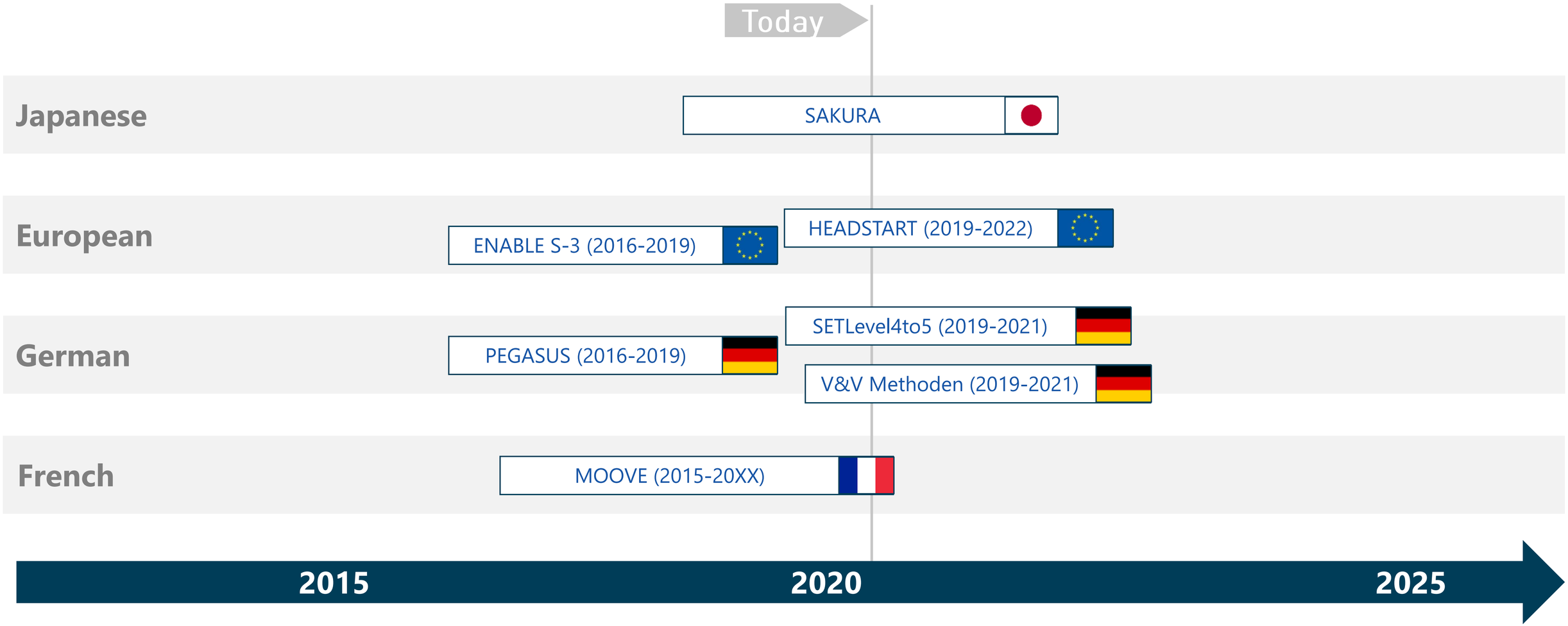
How to perform **safety assurance** of automated driving?

# Challenges for CAD Validation

How to perform **safety assurance** of automated driving?

- **Data-Driven Safety Assurance**
  - Deriving **relevant scenarios** from cumulative data collections
  - Utilizing **common databases** to analyze data
  - Testing of selected **relevant scenarios** only

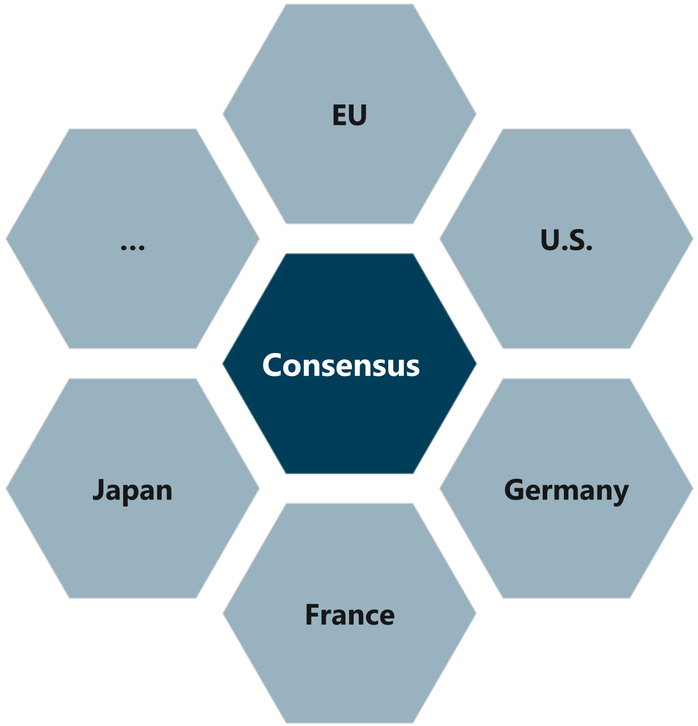
# Challenges for CAD Validation



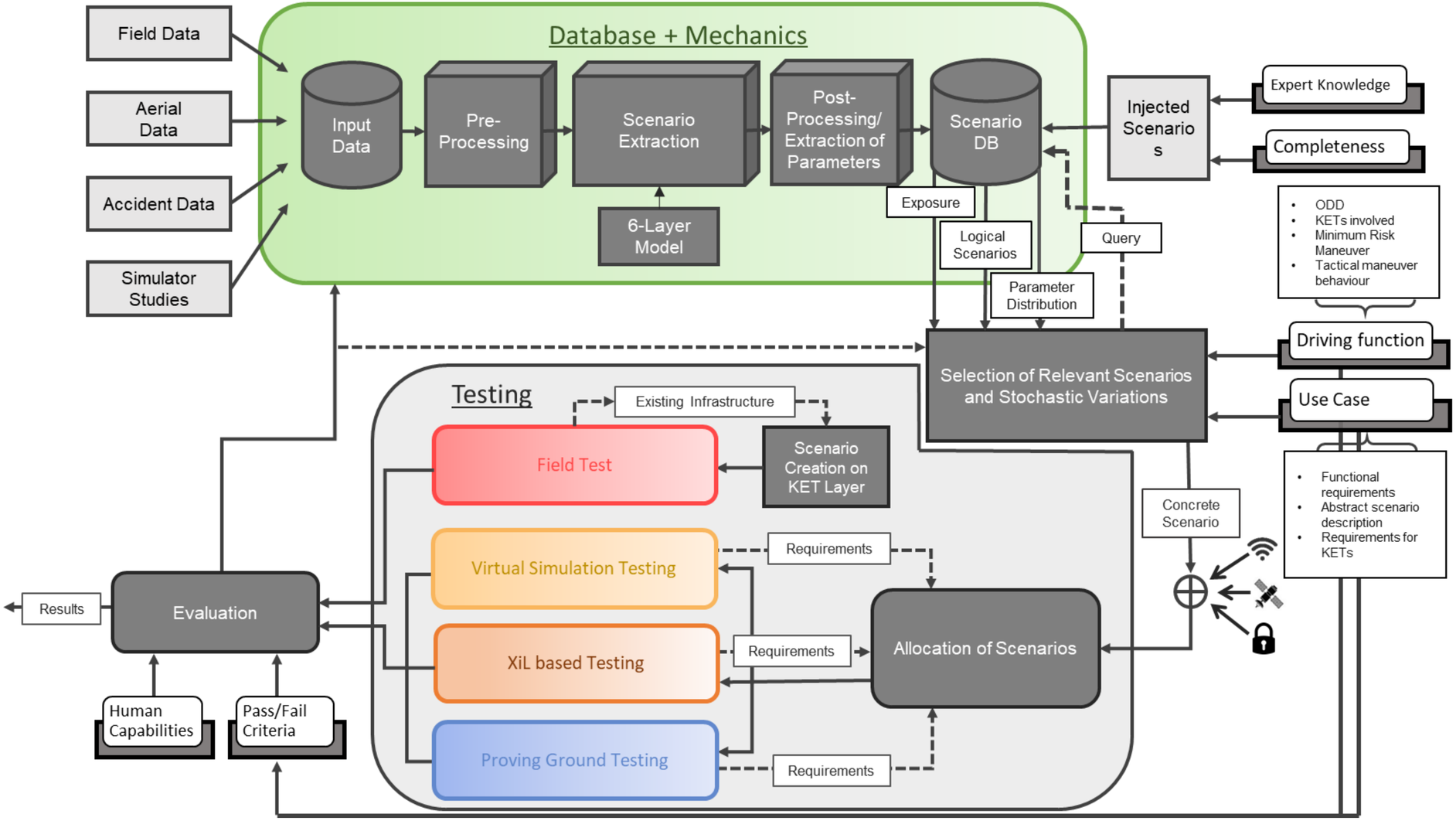
# Challenges for CAD Validation

- ✓ There are many national and international projects trying to tackle the challenges of CAD validation
- ✓ HEADSTART tries to analyse state-of-the-art methods and harmonize them
- ✓ Find a common methodology

➔ International cooperation



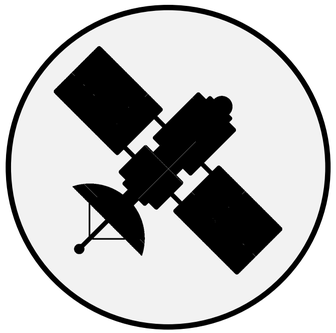
# HEADSTART's methodology in a nutshell



# What about "Key Enabling Technologies"?

Andrea Steccanella, CRF

# Key Enabling Technologies in HEADSTART



Positioning for AD functions

Operational Design Domain extension with absolute lane-level positioning

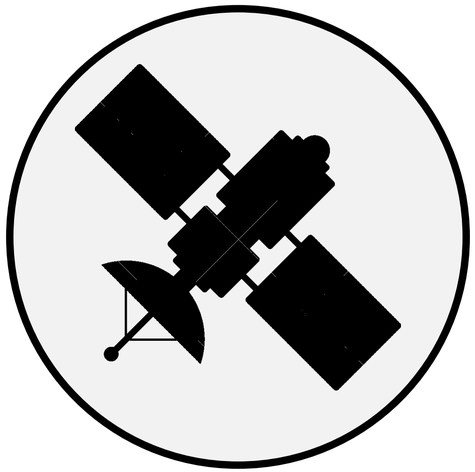
V2X Communication for AD functions

Additional information collected from external world beyond current sensors sensing

Cyber-security for AD functions

Identification of failures capable to compromise the safety functions

Enhance current Automated Driving functions with Connectivity



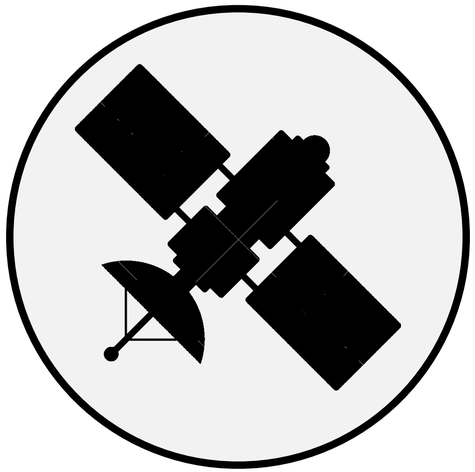
Positioning
Ego-Vehicle
Geo
Localization

V2X
Communication
Geo-localized data
from vehicles
& infrastructure

## Improve AD performances:

- Highway Pilot
- Truck platooning
- Traffic jam chauffeur
- Valet Parking
- Urban Automated shuttle

Enhance current Automated Driving functions with Connectivity



## Positioning
Ego-Vehicle
Geo
Localization

## V2X Communication
Geo-localized data
from vehicles
& infrastructure

## Improve AD performances:
- Highway Pilot
- Truck platooning
- Traffic jam chauffeur
- Valet Parking
- Urban Automated shuttle

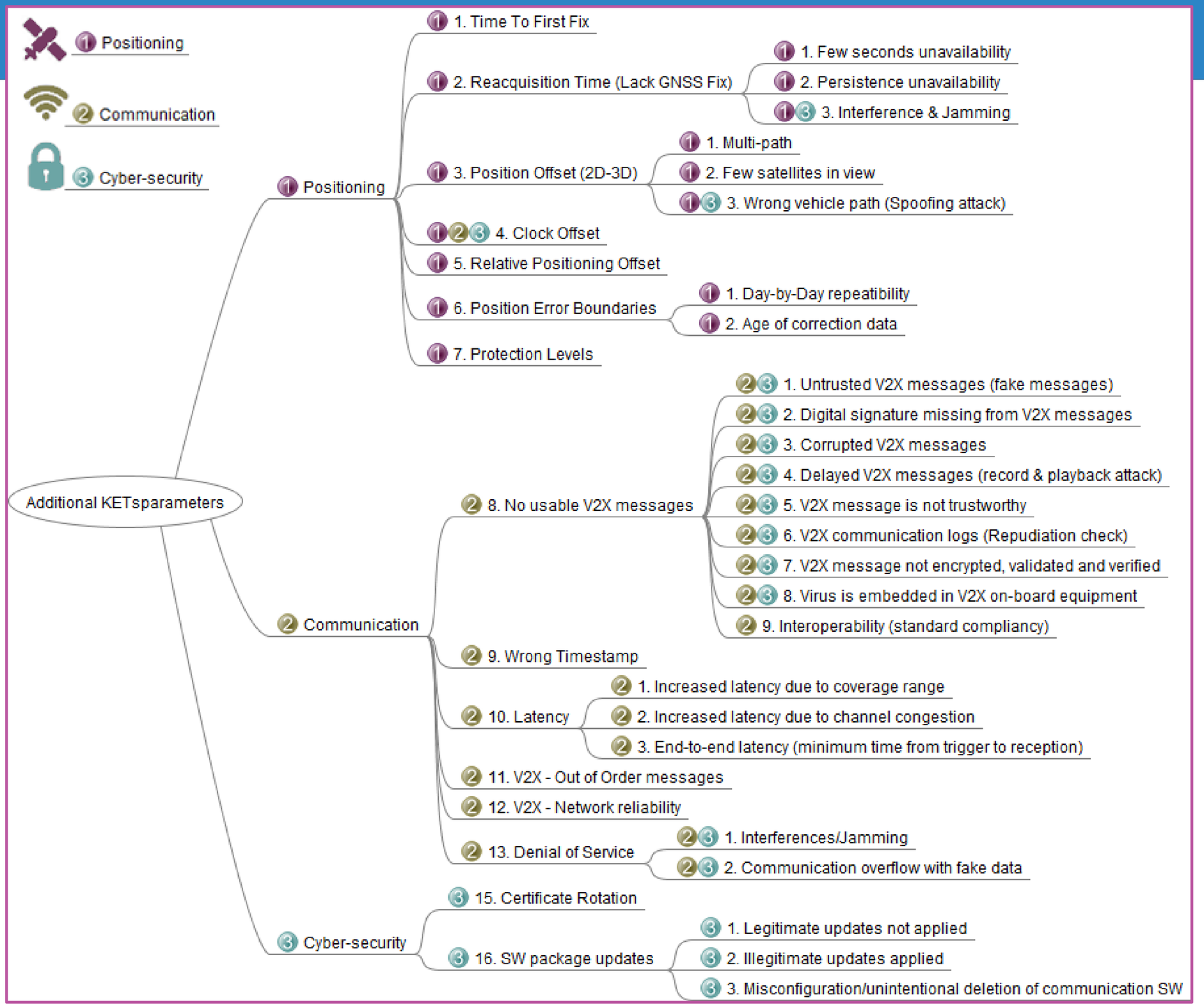
## BUT
they rely on data
outside the vehicle
design domain

## Cyber-security
Information trust
is crucial

# New information channels

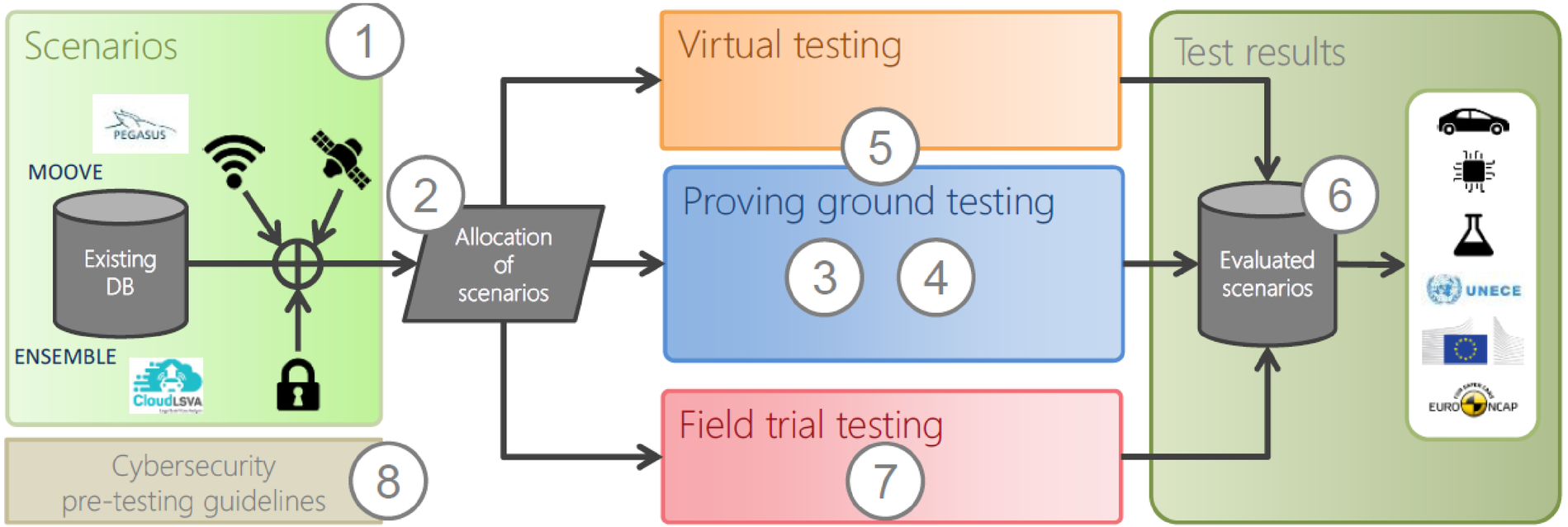
# new failure possibilities

- Additional parameters in the validation methodology
- Cross-dependences between KETs



# HEADSTART validation approach

- Starting from a database of AD databases;
- KETs parameters are modelled and injected into testing scenarios
  - Virtual testing,
  - Hardware/Software in the Loop,
  - Proving Ground,
  - Field trial testing.
- Overall evaluation of the Connected Automated Driving function.



# Identification of the KETs requirements

✓ Technical and functional requirements: Positioning, V2X communication, Cyber-security to achieve safe automated functions.

Analysis of stakeholder needs for KETs

KETs relevant projects from the state of the art analysis

(...)

Positioning / V2X communication / Cybersecurity

1) Functional requirements at vehicle level
2) Technical constrains at vehicle component level
3) Safety requirements for road-users
4) Potential physical constrains on test tracks
5) How the technical requirements are expected to be partly verified by computer tools
6) Technical feasibility

# Requirements for Positioning

1) **Functional requirements at vehicle level**
   - The system shall be able to provide positioning data at 10 Hz.
   - Detect and evaluate GNSS uncertainty.
   - …
2) **Technical constrains at vehicle component level**
   - The system shall be able to provide longitudinal and lateral positioning with 10 cm accuracy
   - ….
3) **Safety requirements for road-users**
   - The vehicle must be able to reach a safe state when positioning is degraded or lost
   - …
4) **Potential physical constrains on test tracks**
   - The outdoor test track must allow easy GNSS connection
   - A HD map of the test track area must be available.
   - How to test high-precision absolute navigation with confidence (not to measure GNSS with GNSS)
   - …
5) **How the technical requirements are expected to be partly verified by computer tools**
   - Proper simulation under various weather conditions
   - …
6) **Technical feasibility**
   - Availability of a real-life testing conditions,
   - Day-by-day repeatability
   - …

# Requirements for V2X communication

1) **Functional requirements at vehicle level**
   - Connected infrastructure, e.g., traffic lights, should be able to communicate through ITS-G5, 4G/LTE, 5G/LTE.
   - The system must support high connection density for congested traffic.
   - …
2) **Technical constrains at vehicle component level**
   - One Road Side Unit shall be able to communicate with up to 200 User Equipment (UE).
   - …
3) **Safety requirements for road-users**
   - A vehicle must be able to reach a safe state if it has a critical failure (engine failure or loss of V2X communication).
   - …
4) **Potential physical constrains on test tracks**
   - If V2X communication testing is carried out in open air, no other radio transmission must influence the testing.
   - If V2X communication testing is carried out in a shielded chamber, no other radio transmission must exist.
   - …
5) **How the technical requirements are expected to be partly verified by computer tools**
   - The tool should be able to define and re-use test sequences of V2X messages
   - …
6) **Technical feasibility**
   - V2X is still in being developed and devices meeting the requested requirements may not be available
   - To ensure safety when testing of non-deterministic algorithms (e.g. High speed Truck Platoon and AI).
   - …

# Requirements for cyber security

1) **Functional requirements at vehicle level**
   - V2X message reception shall be signed by a trusted third-party (message shall have valid and verified certificate and signature).
   - …
2) **Technical constrains at vehicle component level**
   - Measures should be applied for all components in the system (e.g. vehicles involving network and infrastructure) to ensure an end-to-end cybersecurity.
   - …
3) **Safety requirements for road-users**
   - N.A
4) **Potential physical constrains on test tracks**
   - Potential cyber-attacks shall be dually analysed; from the “Defenders” or “Blue Team” and the “Attackers” or “Red Team” point of view.
   - …
5) **How the technical requirements are expected to be partly verified by computer tools**
   - Performed cyber security testing (e.g. TARA analysis, Penetration testing, Fuzz testing)
   - …
6) **Technical feasibility**
   - The function has been developed following existing best practices for cybersecurity.
   - Sensitive to attack GNSS systems in non-shielded environment.
   - …

# Functional requirements and use case selection

Compile the requirements for use cases and functionality to demonstrate safe CAD functions

1. Classify use cases, functional requirements and scenarios described in the previous tasks
2. Determine the most important use cases and for each of them, the appropriate CAD functions
   - Description of each preselected use case with representative scenarios,
   - Relevance ranking of the use cases based on a survey

# Use case ranking

| | | Truck Platooning | Highway Pilot | Traffic Jam Chauffeur | Valet Parking | Urban Automated Shuttle |
|---|---|---|---|---|---|---|
| Requirement for KETs testing | 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 |
| Requirements for testing | 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 |
| Availability of Scenarios ➔ | 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 |
| Collaboration for the use case ➔ | 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 |
| Relevance to key user groups | 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 |

# Final selection of the Use-Cases


Truck Platooning

Highway pilot


Traffic-jam chauffeur

- Objective of the “HEADSTART week” webinars

THE ACADEMY by ERTICO PARTNERSHIP
Sharing knowledge


Álvaro Arrúe Lobera · 1st
Project Manager, Connected and automated driving at Applus IDIADA

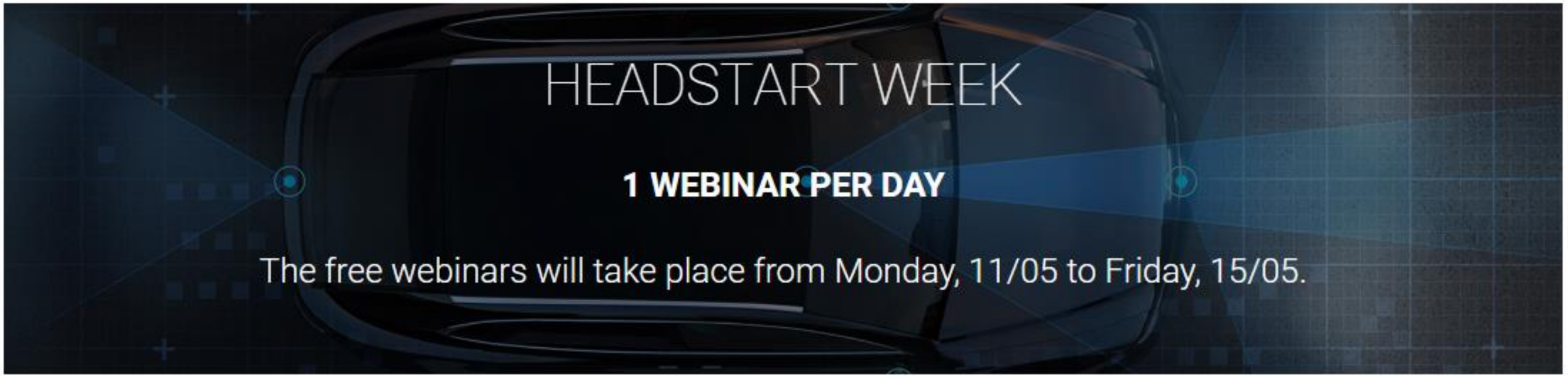
Nicolas Wagener · 1st
Promotion bei Institut für Kraftfahrzeuge (ika) - RWTH Aachen University

Andrea Steccanella · 2nd
FCA | CRF Safety & Driver Assistance Systems engineer

Stephane Dreher
Senior Expert | Technical & Policy Advisor - Connected Automated Mobility, ITS, IoT, Digital Infrastructure, DLT

✓And if you want to know more about HEADSTART….

# The HEADSTART week!




- ✓ HEADSTART project is organizing a week full of webinars, starting from Monday, 11/05 up to Friday, 15/05.
- ✓ These webinars will be interactive sessions engaging participants with questions and discussions.

# The HEADSTART week!

✓ All participants will have the opportunity to discuss and find out more about:

- HEADSTART methodology, which has harmonized different European initiatives and included Automated Driving key enabling technologies;
- HEADSTART selected use cases (Truck platooning and Traffic Jam Chauffeur);
- How the validation methodology will be applied;
- How to validate the AD driving function;
- How the KETs will be handled;
- Cybersecurity as a transversal topic which has a great impact in CAD functions validation

# The HEADSTART week!

✓4 Webinars: Different days for your convenience!

**Monday**


**Tuesday**


**Thursday**


**Friday**

# The HEADSTART week!

- ✓ Webinars are free and independent.
- ✓ This means that the participants are able to attend the webinars they prefer.
- ✓ As HEADSTART, our recommendation is to attend all webinars, so as to have a full overview of the project.
- ✓ To register and find out more information about each webinar, please visit our webpage

**www.headstart-project.eu/headstart-week/**

# Stay connected with HEADSTART

✓Visit HEADSTART website

www.headstart-project.eu

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**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

# Thank you!

*Any questions?*

**Álvaro Arrúe**

Project Manager, Connected and automated driving

Alvaro.arrue@idiada.com