# CARTRE - Coordination of Automated Road Transport Deployment for Europe

**Workshop on Automation Pilots on Public Roads**
**European Commission**
**Brussels, Ertico, Avenue Louise 326, 1050 Brussels**

**18/05/2017**
**(09:30-16:30)**

**Summary of the meeting**

## Overview of the Agenda

08.45    *Registration and welcome coffee*

09.00    *Welcome and introduction*

10.00    *Overview and workshop framework*
         Analysis of EU and national level activities
         Introduction of framework embryo and discussion

11:30    *Presentations of CAD activities in regions, cities, local areas*

12:30    Lunch

13:30    *Presentations of CAD activities in regions, cities, local areas*

14:30    *Useful exchanges and collaborations for your activities*
         Which? At what stage? Why? How?
         European collaboration? International collaboration?
         What can catalyse your progress? EU? What's in it for you?

15:45    Conclusions and next steps

16:00    End of the Workshop

## Participants

| Name | Surname | Company |
|------|---------|---------|
| Tom | Alkim | RWS |
| Álvaro | Arrúe | Applus IDIADA |
| Lennart | Asbach | German Aerospace Centre |
| Bob | Banks | Vodafone Group |
| Yvonne | Barnard | University of Leeds |
| Diego | Bernardez | CTAG |
| Davide | Brizzolara | ERTICO - ITS Europe |
| Ebru | Dogan | VEDECOM |
| Maxime | Flament | ERTICO - ITS Europe |
| Michael | Frey | Karlsruhe Institute of Technology (KIT) |

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|---|---|---|
| Graham | Hanson | UK Dept for Transport |
| Karel | Hofman | FOD Mobiliteit en Vervoer |
| Zoltán | Horváth | Ministry of Transport Czech Republic |
| Satu | Innamaa | VTT |
| EHRLICH | Jacques | IFSTTAR |
| Reijo | Jalko | Finnish transport safety agency |
| Ilkka | Kotilainen | Finnish Transport Agency |
| Maurice | Kwakkernaat | TNO |
| Johannes | Liebermann | AustriaTech |
| Julie | Maes | Belgian Road Safety Institute |
| Prasant | Narula | Delphi Deutschland GmbH |
| Lynn | Regenberg | Continental |
| Ludger | Rogge | European Commission, DG RTD |
| Francisco | Sanchez | CTAG |
| Jean | Schiltz | Ministère de l´Économie Luxembourg |
| Ingrid | Skogsmo | European Commission |
| Arjan | Van Vliet | RDW |
| Helene | Verbrugghe | Lysios |
| Andi | Winterboer | Robert Bosch GmbH |
| Hamid Reza | Zarghampour | Trafikverket |
| Beatriz | Zuniga | Spanish Department of Traffic |
| Georgios | Sarros | INEA |
| Bipin | Radia | INEA |

## Introduction

This Workshop follows up from the earlier workshop organised in Dec 2016 where different countries (AT, BE, DE, EL, ES, FI, FR, NL, SE, UK) gave presentations of current plans for large-scale public road pilots in (see report on the CARTRE website: http://connectedautomateddriving.eu/event/large-scale-automation-pilots-on-public-roads-in-europe/)

The motivation emerges from the GEAR2030 recommendation: "There is a need to exchange on lessons learnt during testing: To take the full benefit of testing over Europe, the group recommends encouraging the exchange on main common lessons learnt from testing. The form of such exchanges needs to be further discussed."

In this second Workshop local initiatives and projects will present their approaches: Drive Sweden/Drive Me, UK CITE, Test Area Baden Württemberg, Lower Saxony, Netherlands, Vigo. Furthermore two EU-projects with large scale testing will present: L3Pilot, Autopilot.

The objective is to facilitate learning and collaboration, and to investigate how to compare initiatives across Europe. During the preparation, the use of classification tools was considered and a framework based on spider web diagrams is proposed to the audience as a classification model for on-going activities (see paragraph below).

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# Welcome session

Ingrid Skogsmo, European Commission, opens the workshop and presents the activities on automated driving supported by the European Commission. A finding from the 1st Workshop was that MS have several plans and that test beds are being built, but that actual testing in large scale is sparse. (see presentation: 1a_Autom Pilot Wshp 18 May 2017_final).

Maxime Flament, ERTICO-ITS Europe, presents the main activities of the EU-funded CARTRE project (EC funded coordination and support action for development and deployment of ART) (see presentation: 1b_CARTRE overall presentation with themes).

Workshop participants furthermore point out that two projects CODEX and SIMEC have been going on for a while and their activities should be taken into account. C-ITS Day 1 applications are not complex enough for the needs of Automated Driving, anyway they should not be overlooked.

# Overview and Workshop framework

### Analysis of EU and national level activities

(See presentation: 1c_0verview CAD pilots and roadmaps). An overview of CAD pilots and roadmaps is provided by Tom Alkim, Rijkswaterstaat.

Lot of activities, start-ups etc. are running in this field. There are increasingly more connections between them.

There is high number of roadmaps in this area. The following up-coming challenges are highlighted: real-life / large-scale tests, testing in operational conditions and in mixed traffic, and shift from demo to deployment. A question is raised whether it is the goal to have 100% fully automated vehicles in traffic or we shall end up being in mixed traffic. Tom Alkim elaborates on the fact that humans are superior in many things, CAD is not the goal but only a mean to achieve safer, more sustainable, seamless and more affordable mobility. Ingrid Skogsmo highlights the importance of impact assessment.

The following numbers are mentioned: 42 pilots in EU (15 finished, 10 ongoing, 17 planned); policy initiatives (18, to enable AD); pods/people movers (17), truck platoons, highway pilots, test sites (7 each), urban driving (4, mostly passenger cars).

The following themes for cooperation are identified in current initiatives: knowledge domains (legal, technical, human behavior, impact, deployment), CARTRE themes (11 topics), High-Level Meeting conclusions (willingness to share vehicle data, need for cross-border testing, impact on road operators and traffic management, cyber security, managed test environments, etc.), etc.

Following Tom's presentation the workshop participants discussed: How can we cooperate? Similar or complementary pilots should be considered, by creating comprehensive overview, align pilots across various themes, and exchange lessons. CARTRE can facilitate on that point.

Overview of activities exists on Knowledge Agenda website (http://www.wetenschapsagenda.nl/?lang=en) and they are also available on the CARTRE website (see VRA Wiki http://vra-net.eu/wiki/ ).

### Introduction of framework embryo

The classification model is presented to the audience. It should help to understand what is being done around Europe on CAD. Rather than being a ranking in-between projects it should be seen as a way to illustrate in which areas a project has activities and actions, and to what extent. It is based on three general categories: Technical (Fig. 1); Non-Technical (Fig.2); Impact Assessment (Fig.3).

For each of the categories, a list of items/class was proposed. These classes constitute the axis of a spider chart – one for each category. For instance, considering the category "Personal mobility", it may be the main objective of a certain project (=high point on the scale), whereas another project doesn't look into this at all (scale = 0), and a third project can provide some input to questions about personal mobility through data it is collecting for another purpose (possibly scale 1). The proposal is tried out by applying it on the projects present at the workshop. Feedback is that the classification in this form is welcomed, and there are comments and additions. Below are some conclusions for the improvement of the classification tool:

For Non-technical:
- Liability, assurance, regulations and standards were rated slightly lower, perhaps because these topics are addressed at wider level in Europe or UN rather than by regional pilots,
- Sharing concepts was missing as a class and added,
- Regulation needs to be clarified between testing authorisation and wider work on regulations.

For Technical:
- EV was the classification least addressed;
- Sensor should be replaced by "environmental sensing"
- HMI should read "HMI &HF"
- Cloud should read "cloud computing"
- Connectivity should read "Network connectivity"

For Assessment:
- Safety, efficiency and comfort are the most addressed classifications
- Personal mobility should be replaced by "modal shift"
- Labour Market should be replaced by "job creation/losses"
- Vehicle operation cost should be replaced by "financial viability of service" but could be merged with business model

A general learning is that there are different types of activities overarching the classifications, a set of characteristics that we could call metadata for example:
- Type of project: Testbed, pilot, deployment
- Environment addressed: urban, highway, rural
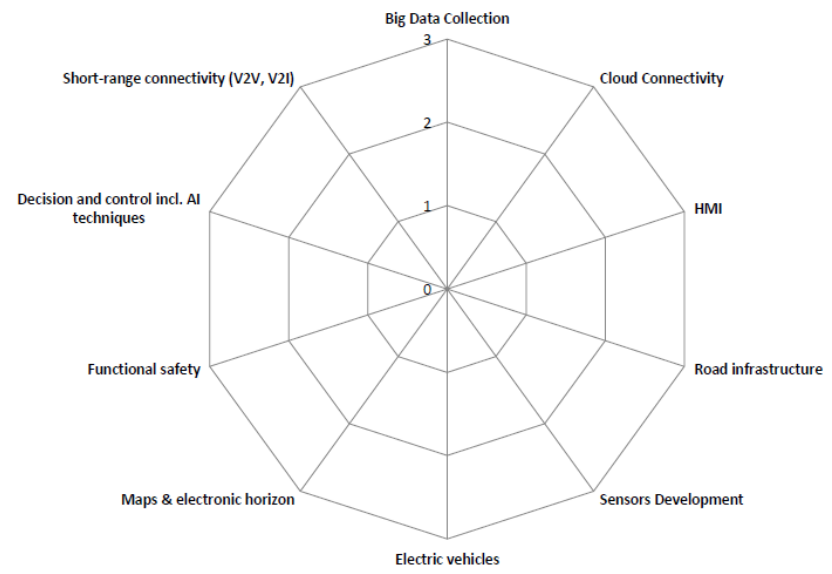- Infrastructure addressed: communication network, road network, vehicle

It was understood that the type of project was important to identify early enough: it is indeed very different to setup a testbed to facilitate the future test than do the testing themselves.

(Fig. 1)


(Fig.2)


(Fig 3)

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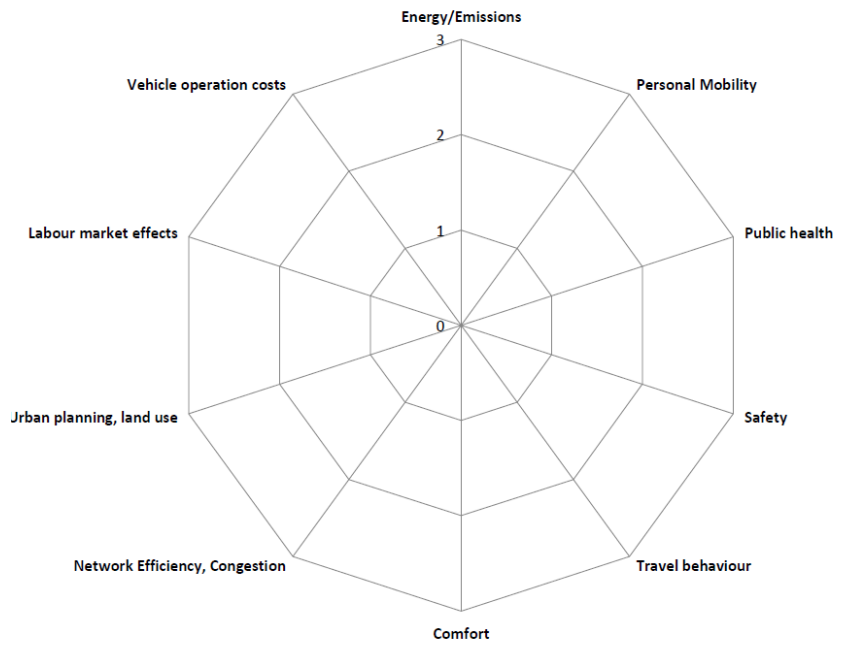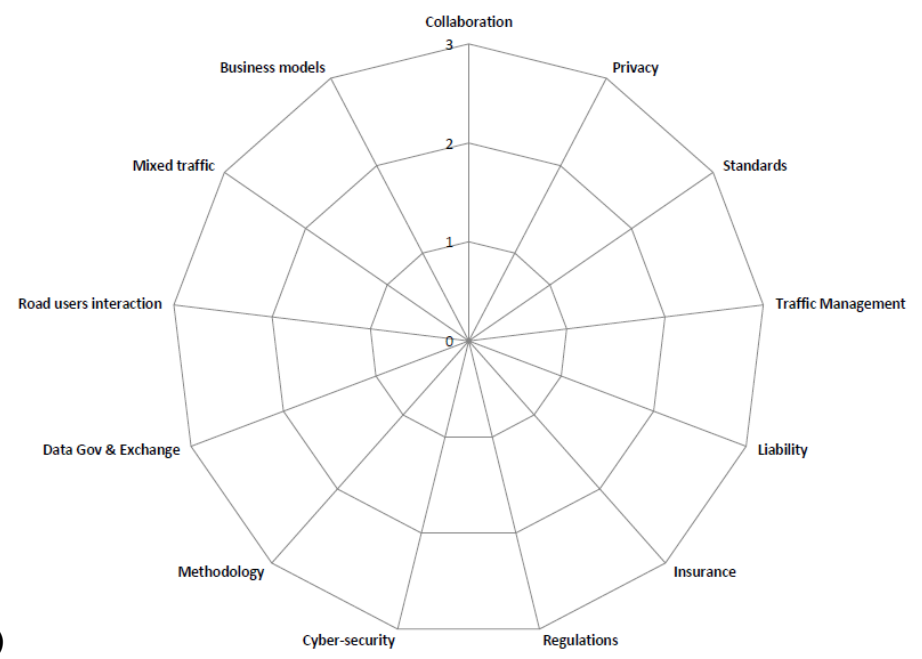
# Presentations of CAD pilots

### Drive Sweden/Drive Me
Drive Sweden is a large cooperation initiative in Sweden with lot of partners (see presentations: 2a_Drive Sweden 18 May 2017 Part 1 and 2a_Drive Sweden 18 May 2017 Part 1). Drive Me is one of several projects associated with Drive Sweden.
Main numbers for Drive Me: 100 'normal' families equipped with Volvo XC90 in Gothenburg, started in 2013, pilot begins in 2017, later also in London and China. In Gothenburg, the test route is 50 km, with max 70-80 km/h, no traffic lights, no pedestrians or bicycle traffic or at-level intersections.
Drive Sweden is active also on other activities: MaaS projects, projects on self-driving electric and shared vehicles, Sweden4Platooning (multi-brand platooning). New pilot projects will be formed in the coming years.

### UK CITE (Connected intelligent transport environment)
Bob Banks, Vodafone, presents the UK Cite project (see presentation: 3_UK CITE Workshop on Large Test Trials - May 18th 2017). The main points highlighted are the following: mixed road types, speeds up to 70 mph, DSRC 802.11p & LTE V & Wifi services on the move; road network efficiency and modelling, multipath broadcasting using multiple communication methods, whole journey experience - interlink between urban and strategic road network; Siemens back-office, Jaguar vehicle systems, virtual road sign messaging and mobility app, HMI testing, simulation and testing, business models.
Edge computing will be tested in cellular based communication to speed up the connection. Organizers believe that in longer term it is an interesting solution. An illustration of high-level system architecture is provided
Field tests will be held on motorways, expressways, a-roads and in urban environments. The field operational tests will include more than 100 vehicles, 1-3 fully-kitted vehicles, 2-20 vehicles per month for 5 months with mobile application. The testing activities will run from end Q2 2017 and the project will finish Q4 2018.

### Test Area for AD Baden-Württemberg, Germany
This is an initiative of state government (see presentation: 4_20170518_TAF-BW_16-9_en). The fields of action are the following: technology (vehicles & infrastructure), business models and mobility concepts, legal aspects, validation, social acceptance. A roadmap for the test area is presented. A position paper was released in 2015 and the project started in Oct. 2016.
Main goals are: to set up testing areas, to have strong regional integration and scientific support, to simplify access to key technologies for companies incl. SMEs, to connect with car and ICT industry, to have well-established and competent operating company of PT systems, to transfer concepts to other regions. 2.5M€ have been provided by the state for investing into infrastructure, over a total budget of 7M€. Additional information on the website: www.taf-bw.de

### Digital Test Areas, Braunschweig, Germany
Lennart Asbach, DLR (see presentation: 5_DLR_Ertico_170515_04). The main aim of the test area is to focus on urban environment and future mobility scenarios including R&D platform for vehicle and mobility applications and services in real traffic situations. ITS G5 modules as test track in the city. In the Test Area Lower Saxony Volkswagen a key-partner. High precision maps, virtual traffic lights, sensors and communication modules are main topics of interest. This is mostly about C-ITS, day 1 applications, ITS G5 and 4G/5G. Later the tests will focus also on automated driving. The whole test section of the road will be covered by stereo cameras and currently instrumentation on the road is under construction.

### Automation pilots on public roads in the Netherlands
Maurice Kwakkernaat, TNO, introduces the activities in the Netherlands (see presentation: 6_18052017 CAD activities on public roads in The Netherlands TNO). UDRIVE naturalistic driving

study is discussed: data will be made available to non-partners. Lot of different sensors, incl. 7 cameras to monitor driver behavior were used in this project (www.udrive.eu).

Pre-automated driving projects are active to collect data on scenarios in real traffic. 3 vehicles are involved with experienced drivers in real life scenarios which provide valuable insight in addition to the controlled environment test.

Enable-S3 valet parking pilot is discussed: the goal is to establish stable architecture for valet parking. Scenario development was difficult due to frequency of odd behavior at parking lots.

Autopilot/Brainport pilot is illustrated: 4 main hubs for car sharing and IoT including car sharing service, automated valet parking. Actual vehicles will come later in the project. Also research questions related to motion sickness are tackled in the project.

### SISCOGA 4CAD Test-bed

This test bed is located in Vigo, urban and interurban roads and test track with ITS G5 and LTE (see presentation: 7_CTAG presentation 18 May 2017). It is a test bed and living lab for CAD functions. North-west TMC is also involved. This test bed is connected with Portuguese Corridor and it was built for C-ITS. Public awareness of Automated Driving increased in Spain with the field tests / demos. Autopilot will have a test site in Vigo city center.

### L3Pilot

A short presentation of the pilot is provided by Satu Innamaa (see presentation: 8_L3Pilot_Brussels_170518).

The overall objective is to test and study the viability of automated driving as a safe and efficient means of transportation explore and promote new service concepts to provide inclusive mobility.

L3 Pilot will lay the foundation for the design of future, user-accepted, L3 and L4 systems, to ensure their commercial success by assessing user reactions, experiences and preferences of the AD systems' functionalities.

### AUTOPILOT

Francois Fischer, ERTICO-ITS Europe, presents the activity of AutoPilot (see presentation: 9_AUTOPILOT overview - 2017 02 15). This project is about merging automotive and IoT technologies to move forward AD towards a new dimension. The target is to enhance the driving environment perception with IoT enabled sensors. The focus will be on the communication layer to connect different parts of system (sensors, infra/vehicle, app server, data center). 5 test sites will be involved (Brainport = Helmond/Eindhoven, NL, Tampere, FI, Versailles, FR, Vigo, SP, etc.) and business models will be a key-research topic.

## Summary of activities utilizing the framework embryo

The spider charts are filled out by the representative of each project and based on this exercise they give feedback on the proposed framework. Some examples are discussed in detail.

Typically activities scored high for safety, network efficiency and mobility (>2), while there is little attention paid to urban planning and public health. In non-technical aspects, all scored on average about 2, only liability and insurance scored less. In technical aspects, all scored about 2 but electric vehicles less than 1.

It is noted that timing of things is missing from the overview, so is the definition of the system being tested.

Some suggestions are being made for a possible continuation of this type of workshop. The cooperation could go on in this kind of workshops but with a more detailed target. A clear topic and the involvement of specialists in that topic could be fruitful. It could be relevant to organize technical meetings, involving audience who has to solve the same problems (e.g. technical or operational issues such as minimal standards for testing).

It is also very important to consider international cooperation and also to involve new stakeholders (the risk is to focus always on the same projects).

The following points are identified as next steps:
- Refine the meta data
- Refine the classifications and finalise the definitions
- translate the classification and the meta data into a questionnaire
- Test questionnaire with known activities like Drive Me or Autopilot
- Organise more webinars to learn from; in more specific areas
- Use the wiki as a repository: restructure the CARTRE Wiki with a semantic structure
- See if the current projects in the wiki can be classified using the new classification tool
- Populate the wiki with new projects (CARTRE)
- Organise special sessions at congresses (ITS, AVS, etc…) inviting the major activities to present: L3Pilot, AUTOPILOT, etc…