

# EU EIP – Facilitating automated driving – SA4.2

status and approach

*FEHRL meeting – March 3 2020*

# Introduction

**EU ITS Platform (EU EIP) - H2020 project - <https://eip.its-platform.eu/>**

- the place where:
- National Ministries, Road Authorities, Road Operators and partners from the private and public sectors of almost all EU Member States and neighboring countries -
- cooperate in order to foster, accelerate and optimize current and future ITS deployments in Europe in a harmonized way.

## **Work package 4.2 - Facilitating automated driving**

Including:

- Impact of higher level (SAE 3-5) of automated driving to road authorities/operators' Physical and digital infrastructure;
- The socio-economic benefits and costs of automated driving from the road operator viewpoint;
- road map and action plan for especially road operators to facilitate automated driving on the TEN road network

# Introduction

## 4.2 Position in the CAD community & relation to other initiatives:

- Ongoing exchange with work in CEDR MANTRA, L3pilot, Inframix, etc.
- Compared to CEDR: more focus on tactical and operational topics
- CCAM scope and work very much linked with our goals

# Physical & Digital Infrastructure

- Open workshops Utrecht, Athens, Torino
- Report published: Identification of requirements towards network operators (Dec 2016)
- Awareness raising – being part of ongoing discussion on Physical & Digital Infrastructure side of CCAM
- Input to CCAM infrastructure elements table



# Attributes of physical infrastructure

## Physical infrastructure attributes

Attribute	Sub-attributes	Comment
Road	Road type	Basic road types such as motorway, highway, street, private road indicate separation of carriageways, intersection arrangements, types of road users etc.
	Special road sections	Additional requirements for critical road sections such as tunnels, bridges, toll plazas etc.
	Separation of automated vehicles	Dedicated lanes or areas; permanent or temporary such as night time only
	Pavement of road	Ease of detection of the roadway
Speed range	Speed limit or recommendation	The speeds in which the automated driving system has been designed to function. Either static or dynamic speed limits/recommendations. Dynamic ones relate to

## Physical infrastructure attributes

Attribute	Sub-attributes	Comment
Shoulder or kerb	Wide shoulder	
	Lay-bys or parking areas Passenger pick-up/drop-off areas	
Road markings	Existence of lane markings	
	Visibility, machine-readability	
	Markings indicating use by automated vehicles	
Traffic signs	Visibility, machine-readability	Visibility to vehicle sensors
	Signs indicating use by automated vehicles	Indicating of right to use or prohibition of use by highly automated vehicles
Road furniture	Landmarks	Static physical landmarks possible equipped by sensor reflectors or radio beacons or similar to support accurate positioning
	Gantries for road signs	indicating of right to use or prohibition of use by highly automated vehicles
	Gates and barriers	Access to dedicated lanes, roads or areas
	Road lighting Game fences	Support to automated vehicle's vision system Prevents elks, deer, etc. from entering road
Infrastructure maintenance	Winter maintenance (snow removal, de-icing)	Visibility of road markings and traffic signs in adverse weather conditions
	Road maintenance incl. road marking painting, clearing of vegetation	Quality and visibility of road markings and traffic signs
	Inspections of infrastructure	Inspections according to standardised test/inspection protocols for both physical and digital infrastructure

# Attributes of digital infrastructure

Digital infrastructure attributes		
Attribute	Sub-attributes	Comment
Communication	Short-range V2I	Communication at hot spots and road sections
	Medium and long-range V2I	Communications over road networks and corridors
	Medium and long-range V2I with low latency and wide bandwidth	Communications facilitating remote supervision of vehicles
Satellite positioning	Land stations	Improving accuracy of positioning in challenging areas
	Positioning support in tunnels	GPS repeaters or other solutions to provide accurate positioning also in tunnels
HD map	Maps of road environment including landmarks for cameras, radar and ultrasound sensors	Accurate positioning of the vehicle in the transport system, road and lane

Digital infrastructure attributes		
Attribute	Sub-attributes	Comment
Information system (digital layer of the HD map)	Maps of road landmarks for sensors	
	Maps of road landmarks for sensors	
	Real-time event disturbances	
Digital twin of road network	Digital twin of transport network & its environment	Provides the transport system information to the HD map
	Real time digital twin of the network managed including traffic flows	Enables simulation, modelling and testing of different traffic management measures in order to select optimal measure for vehicle flows incl. connected and automated vehicles
Traffic management	Geofencing in	
	Availability of	
	Road works management	Standardised markings and processes to maintain ODD
	Incident management	Standardised markings and processes to maintain ODD
Fleet supervision	ODD management	Management of factors affecting the ODDs of vehicles using the roads
	Traffic management centre and processes	Adaptation of the centres and processes to consider special requirements from automated vehicles and mixed fleets
	Dynamic traffic control	Variable Message Signs with standardised display technologies
	Fleet monitoring and supervision centres	Remote monitoring and supervision of fleets, likely necessary for shuttles, <u>robotaxis</u> , roadwork trailers, maintenance vehicles

# Cost and benefits

- Desk research, open workshop 2019
- Report being finalised: ‘Summary of impacts, benefits and costs of highly automated driving’
- Description of:
  - impacts on Mobility, traffic safety, capacity and traffic flow, parking, public transport, environment, physical infra, digital infra, planning, active travel, cyber security
  - Benefits for road operators
  - Costs for road operators
  - Impacts per automation use case

# Cost and benefits

Draft general conclusions (based on existing studies):

- Big impacts envisioned
- Expected effects often more argumentative than based on studies
- No specific road authority focus
- Uncertainty = current reality
- Scenario thinking – determine preferences
- Business model to be developed – where do cost and benefits land?

# Road map

## Under development

- Reflection on EU-EIP roadmap position within other ongoing initiatives
- Way forward on physical & digital infrastructure from road operators perspective
- Way forward on cost & benefits from road operators perspective
- Update process for road map

# Road map

## Next steps:

- Discussions with road authorities - getting input – per participating member state and CEDR level
- Other stakeholders mainly through CCAM platform
- Final draft right after summer
- **September 29/30 final road authorities/operators workshop**
- November 2020: finalisation of road map

# Questions?

# Comments?

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