



# ARCADE Coordination & Support Action Physical & Digital Infrastructure for CAD

Dr Stephane Dreher, ERTICO – ITS Europe

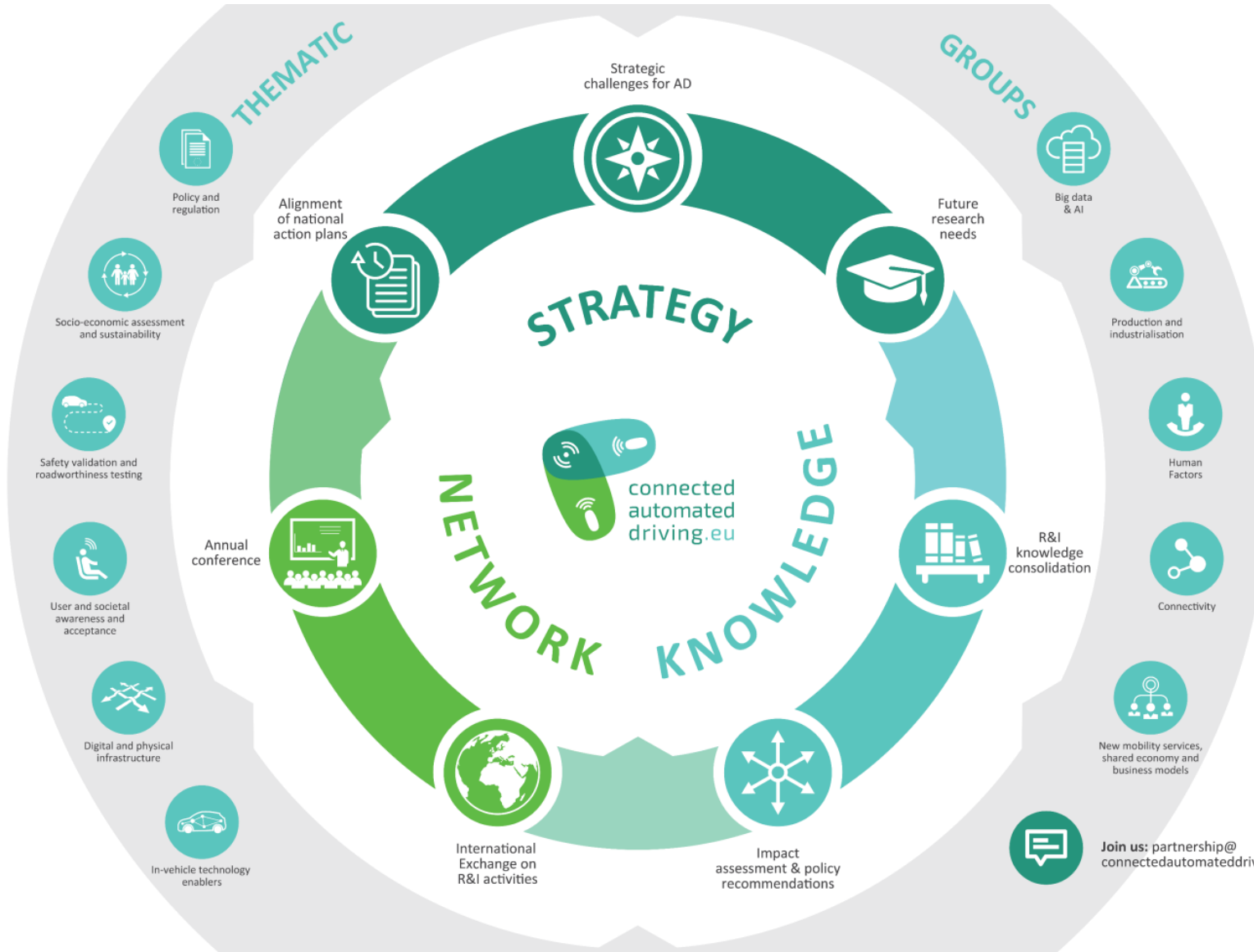
1<sup>st</sup> INFRAMIX Stakeholder Workshop  
14 May 2019, Barcelona

ARCADE is funded by  
the European Union Horizon 2020  
Work Programme



# Coordination of Automated Road Transport For Europe

Objective: Support faster deployment of connected and automated driving across Europe



European Commission funded  
Coordination & Support Actions

## **VRA**

- July 2013 – Dec 2016

## **CARTRE**

- Oct 2016 – Sep 2018

- 36 consortium partners

- 51 associated partners

## **ARCADE**

- Oct 2018 – Sep 2021

- 23 partners from 11 States

- 30 associated partners

- 2000 subscribers

# Thematic Areas

## Technology



In-Vehicle  
Enablers



Connectivity

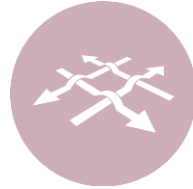


Human  
Factors



Deployment

## System & Services



Physical &  
Digital  
Infrastructure



Big Data, AI  
and  
applications



New Mobility  
Services,  
shared economy



Freight &  
Logistics

## Society & Users



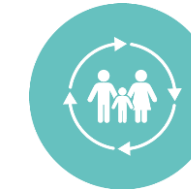
Safety Validation  
Roadworthiness  
testing



Policy and  
regulatory needs



User awareness,  
societal  
acceptance and  
ethics



Socio-  
economic  
assessment



- Visions
- Challenge
- SoA
- Gaps
- Positions

**ARCADE**

- Scenarios
- Key Challenges
- Key Enablers
- Roadmap



# Key conclusions from CARTRE Thematic papers

- **Physical and Digital Infrastructure:**

- Research and/or large scale FOTs are needed to specify and evaluate the physical (road and roadside) infrastructure adaptations needed for higher level automation.
- FOTs Living Labs for Automated Driving Systems provide the necessary infrastructure (including connectivity) and user communities to foster harmonization and interoperability and support cross-border functionality.
- The ODD in which an AV drives will be interrupted more frequently than desirable. The duration of continuous ODD should be such that an AV can drive continuously for a long stretch of time.

- **Connectivity:**

- The identification and standardisation of the connectivity requirements and performance is necessary for different use cases and automation levels. It is essential to continue data-driven assessment in real driving conditions for all types of use-cases.



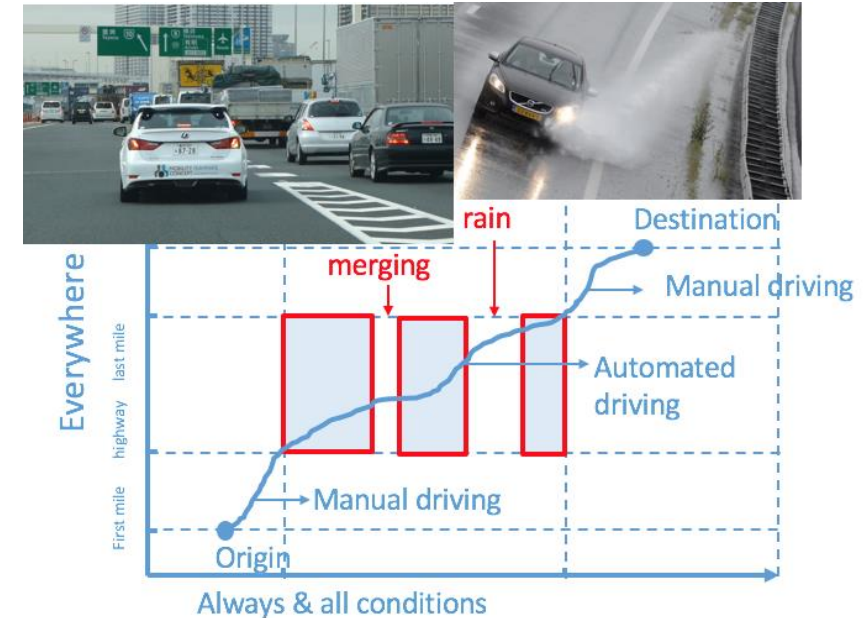


# ODD Framework

- ODD affected by combination of factors such as the technology in a vehicle, traffic conditions, road conditions, weather conditions, etc.
- No stakeholder can affect or control all specific conditions and thus cannot guarantee that a L4 vehicle can always drive in L4 mode, but only inside the ODD.

Shared goals amongst stakeholders could be

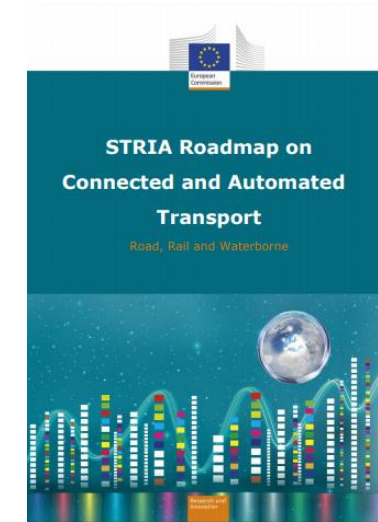
- to increase the ODD in order to allow as much automated driving as possible thus maximizing the potential benefits.
- to optimize the ODD, to make it as uninterrupted, stable and predictable as possible.
- Make sure that the process of switching control between the automation and the driver (ToC) will be adequate as automated vehicles with various capabilities (L2/L3/L4) will operate both in automated and manual mode,
- Define and assess the acceptable behaviour of the vehicle inside its ODD



# Contribution to Roadmaps and Action Plans

## Strategic Transport Research & Innovation Agenda (STRIA) on CAT

- To develop a EU strategy for PDI development for CAD, a close cooperation of OEMs, traffic managers, road operators and users is required (European Forum on CAD)
- Requirements of the PDI ecosystem should be determined in a structural dialogue
  - Define ISAD levels
  - Assess real-world performances for different use cases in a living lab.
  - Study the provision and use of traffic-relevant information



Physical & Digital Infrastructure in STRIA	
Priority	#2 among 23 R&I initiatives
Timing	short and mid-term actions, R&I and multiple
Responsibility	Implementation: MS, Funding: MS, EC

# SCENARIOS

## 2030

- Full HD Map coverage & connectivity
- Local Dynamic Map
- Agreed specification for the ODD
- Collective perception, automated tactical information by infrastructure (shared information, tactical advices)
- A virtual representation of most traffic signs is available
- Smart road elements available
- “Metaoperators”

## 2050

- All traffic signs & road markings are virtual
- Automatic self organization for maneuvers is established
- Vehicle tactical/operational control by local management (e.g. automatic intersection)

# CHALLENGES

- Role of operators in the ecosystem
- Knowledge and resources of the operator
- Map production model” including B2B cases and quality assurance of the HD-Maps
- Lack of data availability for ODD
- Upgrading existing roads (new process)
- Updates, quality and reliability (requires legislation and enforcement?)
- Achieve common specifications and regulations
- Balance between operation, reliability and the amount of available information





# Thank you!

## Get involved

 [partnership@connectedautomateddriving.eu](mailto:partnership@connectedautomateddriving.eu)

<https://connectedautomateddriving.eu/associated-partnership/>

ARCADE is funded by  
the European Union Horizon 2020  
Work Programme

