

Project MANTRA and beyond

ODD requirements and other consequences of automated vehicles to physical & digital infrastructure

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MANTRA responds to the questions posed as CEDR Automation Call 2017 Topic A:

HOW WILL AUTOMATION CHANGE THE CORE BUSINESS OF NRAs

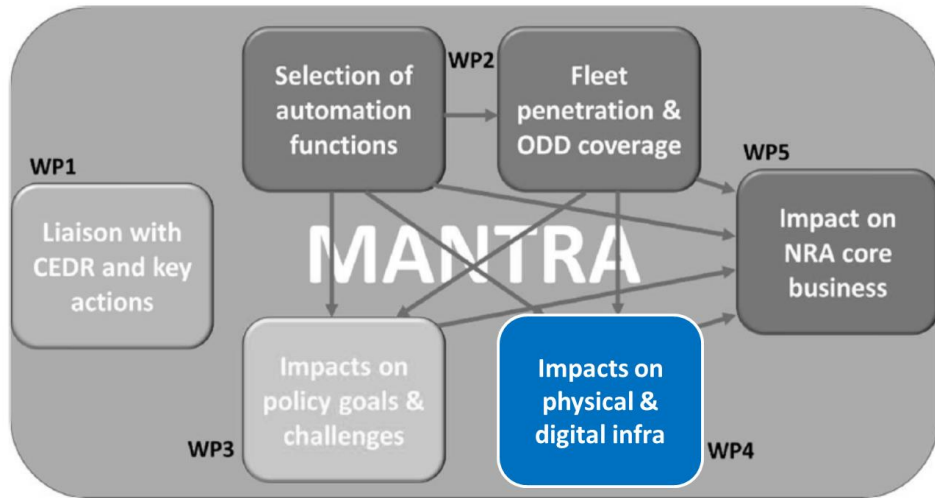


The following questions will be answered:

? What are the influences of automation on the core business of NRAs in relation to road safety, traffic efficiency, the environment, customer service, maintenance and construction processes?

? How will the current core business on operations & services, planning & building and ICT change in the future?

Funded by CEDR Call Automation 2017, Duration 2018-2020



1 Highway autopilot including highway convoy (L4)

Highly Automated Driving up to 130 km/h on motorways from entrance to exit, on all lanes, including overtaking and lane change.

2 Highly automated (freight) vehicles on open roads with platooning (L4)

Automated freight transport carriers on public high level roads, platooning as an option.

3 Commercial vehicles as taxi services (L4)

Highly Automated Driving up to limitation speed, in urban and suburban areas. The system can be activated by the driver on defined road segments, in all traffic conditions.

4 Driverless maintenance and road works vehicles on highways (L4)

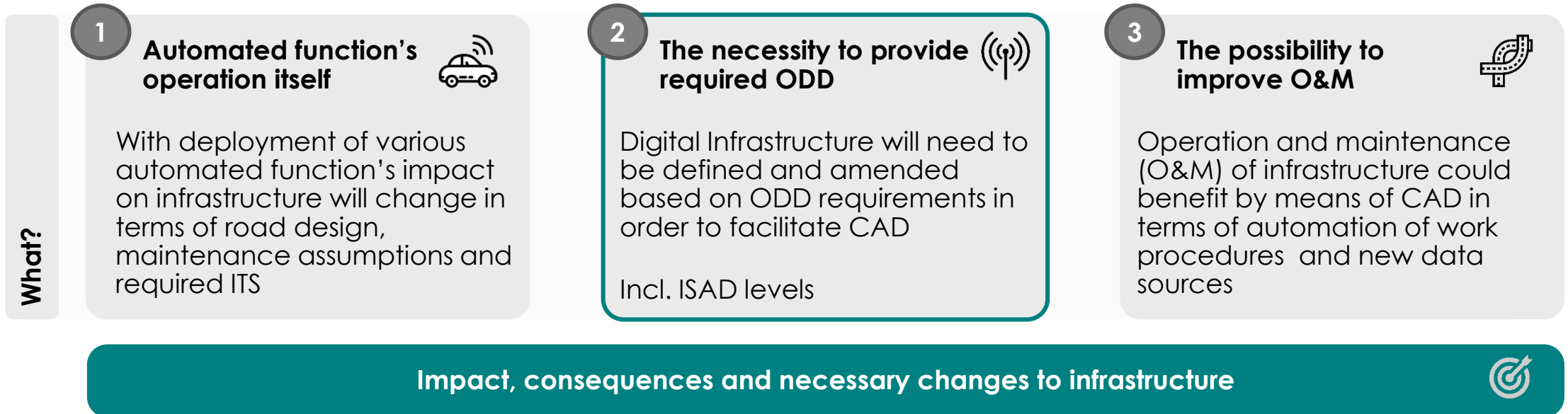
4a Safety trailer
Following trailer (L5) protecting moving work zones

4b Winter maintenance (L4)
Highly automated winter maintenance truck

Selected use cases
(mainly based on ERTRAC classification)

The impact and the resulting consequences and necessary changes to infrastructure will have various sources.

Impact, consequences and necessary changes to infrastructure due to...



Road operator related ODD attributes

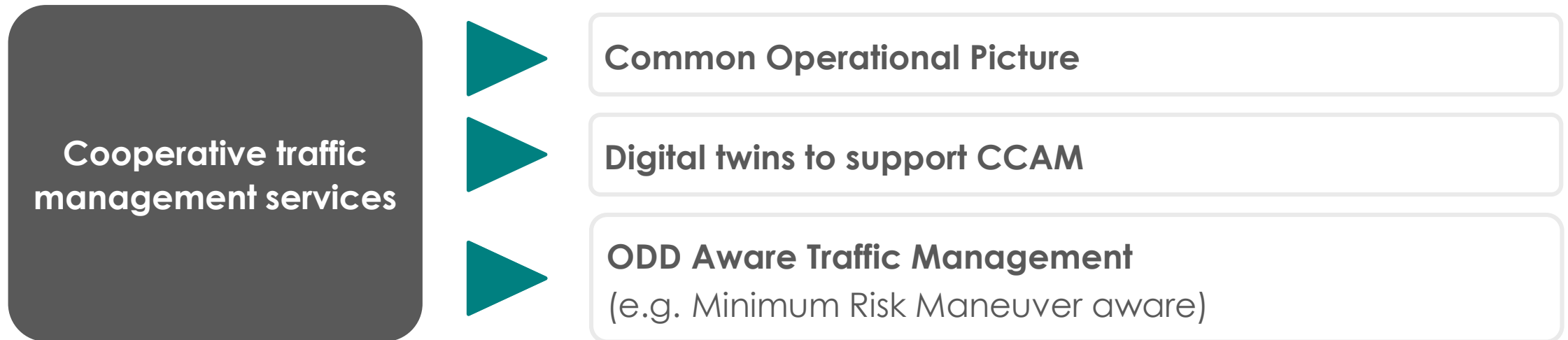
ODD attribute	Physical / Digital infrastructure	Static / Dynamic
Road	Physical	Static
Speed range	Physical	Static
Shoulder or kerb	Physical	Static
Road markings	Physical	Static
Traffic signs	Physical	Static
Road equipment	Physical	Static
Traffic	-	Dynamic
Time incl. light conditions	-	Dynamic
Weather conditions	-	Dynamic

ODD attribute	Physical / Digital infrastructure	Static / Dynamic
HD map	Digital	Static/Dynamic
Satellite positioning	Digital	Static
Communication	Digital	Static
Information system	Digital	Static
Traffic management	Digital	Dynamic
Infrastructure maintenance*	Physical/Digital	Dynamic
Fleet supervision*	Digital	Dynamic
Digital twin of road network*	Digital	Dynamic

* In order to deal with the dynamic non-infrastructure attributes of the ODD MANTRA has identified these three elements that should likely be added to the road operator relevant list of ODD attributes

ODD relevant collection of impacts for road operators

- ODD requirements for each of the attributes and each use case today
- ODD evolution for each attribute until 2020, 2030 and 2040
- ODD effects on different road types
- Responsibilities for establishing, operating and maintaining ODD
- Cost of establishing ODD



Impact on infrastructure in relation to NRAs core business fields

Common agreement of NRAs

“ main impact expected and planned for digital infrastructure

dependencies on physical infrastructure need to be limited
because of time and cost impact

”

Yes, we CCAM!
...together

Feel free to reach out: sandra@consu.one