Standardisation supporting Automated Driving

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2020-11-17, Budapest

ISO/IEC JTC1 AG6
Autonomous vehicles technology landscape

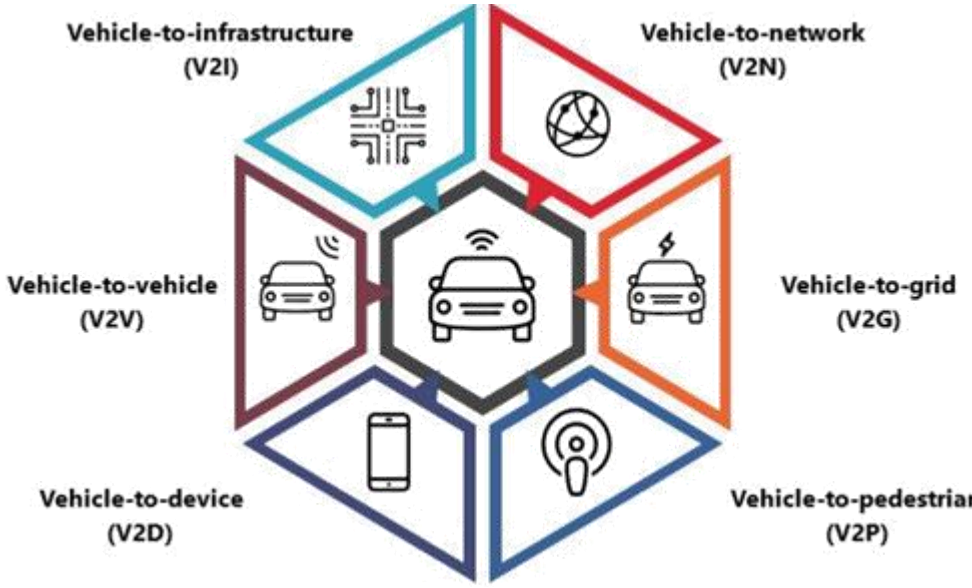
ISO/IEC JTC1 **AG6 Autonomous and Data Rich Vehicles**

- Assess the current state of Vehicular Data standardization activities
- Establish relations and coordinate Vehicular Data standards development and harmonization
- Engage with standards setting organizations that are involved in vehicular data in the area of Autonomous Vehicle standardization

AG6 ran a gap analysis on available standards and activities

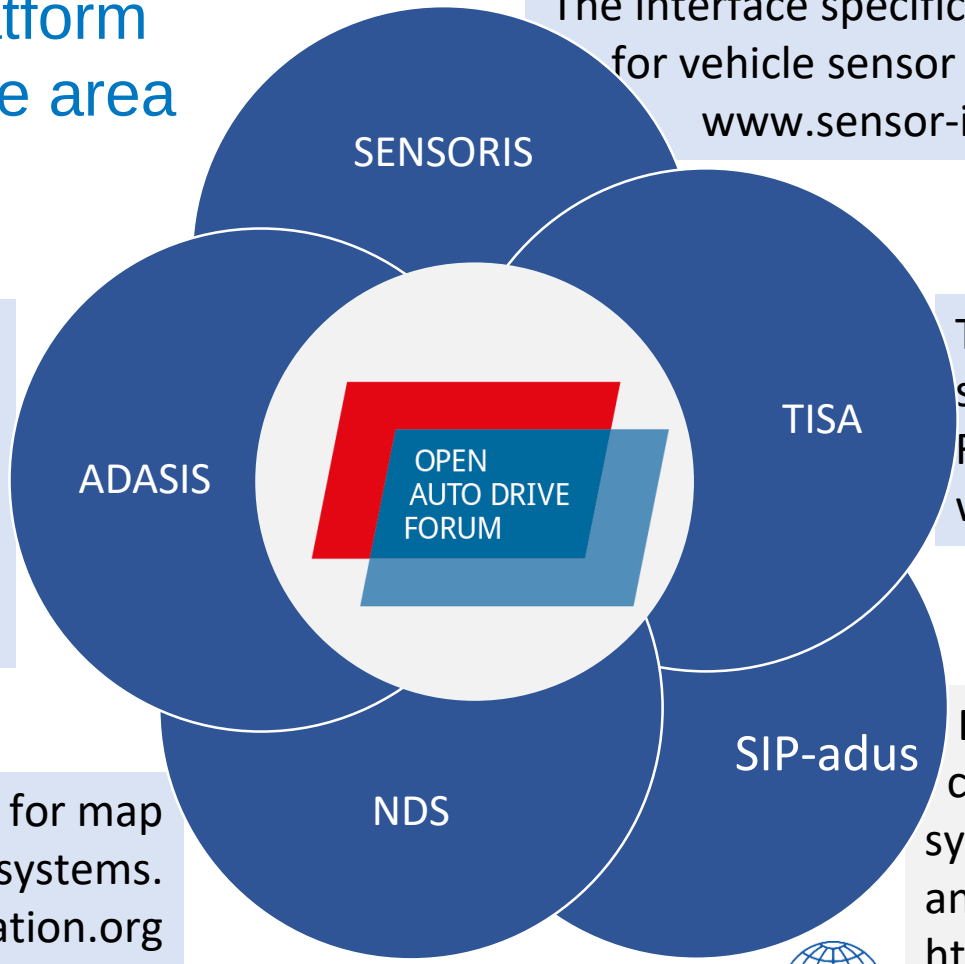
ISO/IEC JTC1 AG6 – gap analysis' key findings

- **Fully automated vehicles** are already found in limited environments such as **rail systems**, **farming** and **mining**.
- Automated and autonomous vehicles may be connected to other systems or may be self-contained.
- Standardization activities are currently done in silos and are rather road vehicle centric
- Standardisation is needed where data is exhanged between vehicles and infrastructure for interoperability or regulatory related certification reasons.
- Currently, there are around **400 standards on connected road vehicles**. An inventory of some of the work can be found at http://htg7.org
- The terminology used to characterise automated and autonomous vehicle has not be fully standardised yet. Eg. the confusion about the definition of 'automated' and 'autonomy'.



Open AutoDrive Forum (OADF)

Cross-domain discussion platform driving standardizations in the area of automated driving



SENSORIS

The interface specification for vehicle sensor data.
www.sensor-is.org

ADASIS

The data exchange interface to support Advanced Driver Assistance Systems (ADAS) applications.
www.adasis.org

TISA

Traffic and travel information services and products based on RDS-TMC and TPEG™.
www.tisa.org

SIP-adus
Innovation of Automated Driving for Universal Services

Develops ITS as cross-ministerial collaboration, working on AD system implementation in Japan and next-gen urban transport.
http://en.sip-adus.go.jp

TN-ITS
Map Update Exchange

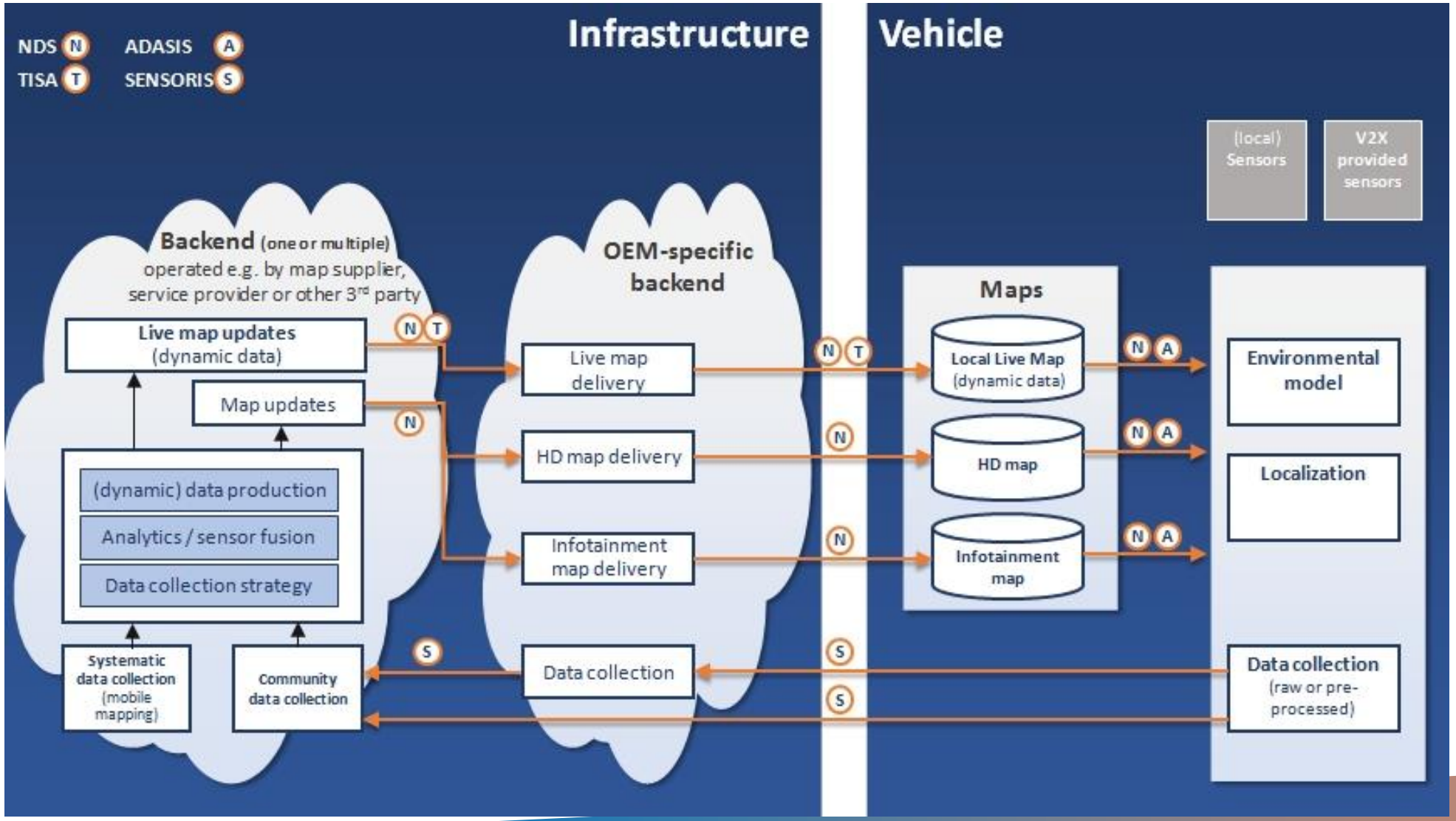
Navigation Data Standard

The worldwide standard for map data in automotive eco-systems.
www.nds-association.org

ASAM
OpenDRIVE
managing the road ahead
OpenCRG
OpenSCENARIO
bringing content to the road

ISO

A map-centric ecosystem supporting AD – the beginning



ADASIS

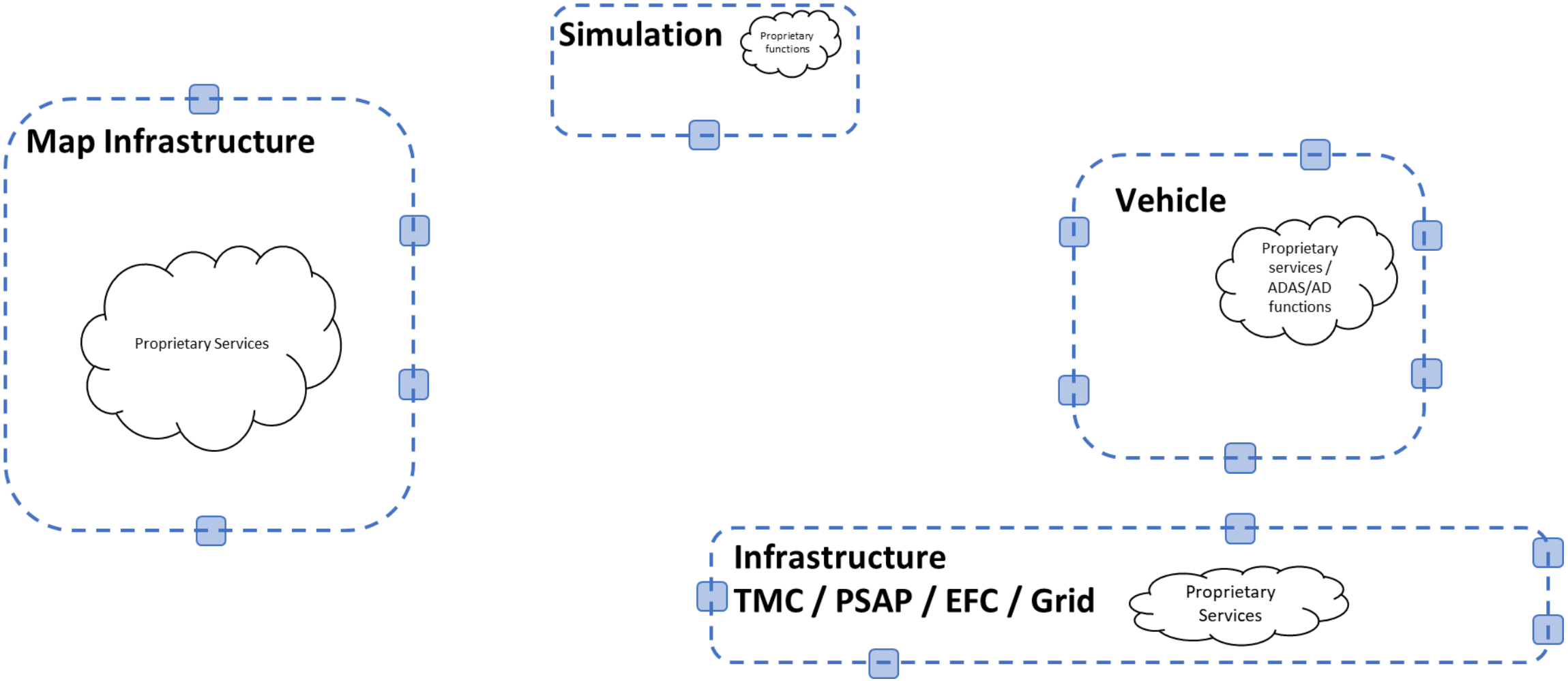
Navigation Data Standard

SENSORIS

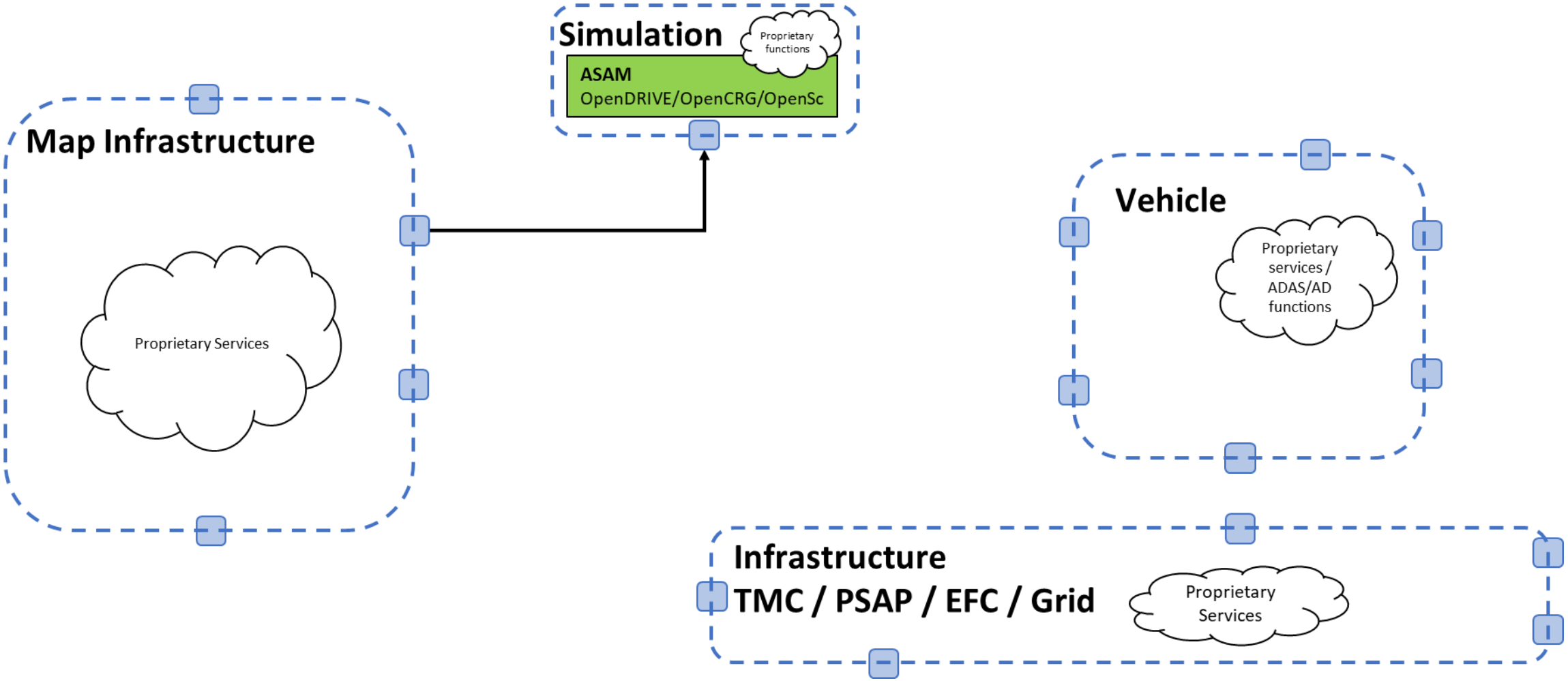
TISA
Traveller Information Services Association

Source: OADF @ Copenhagen, ITS World Congress

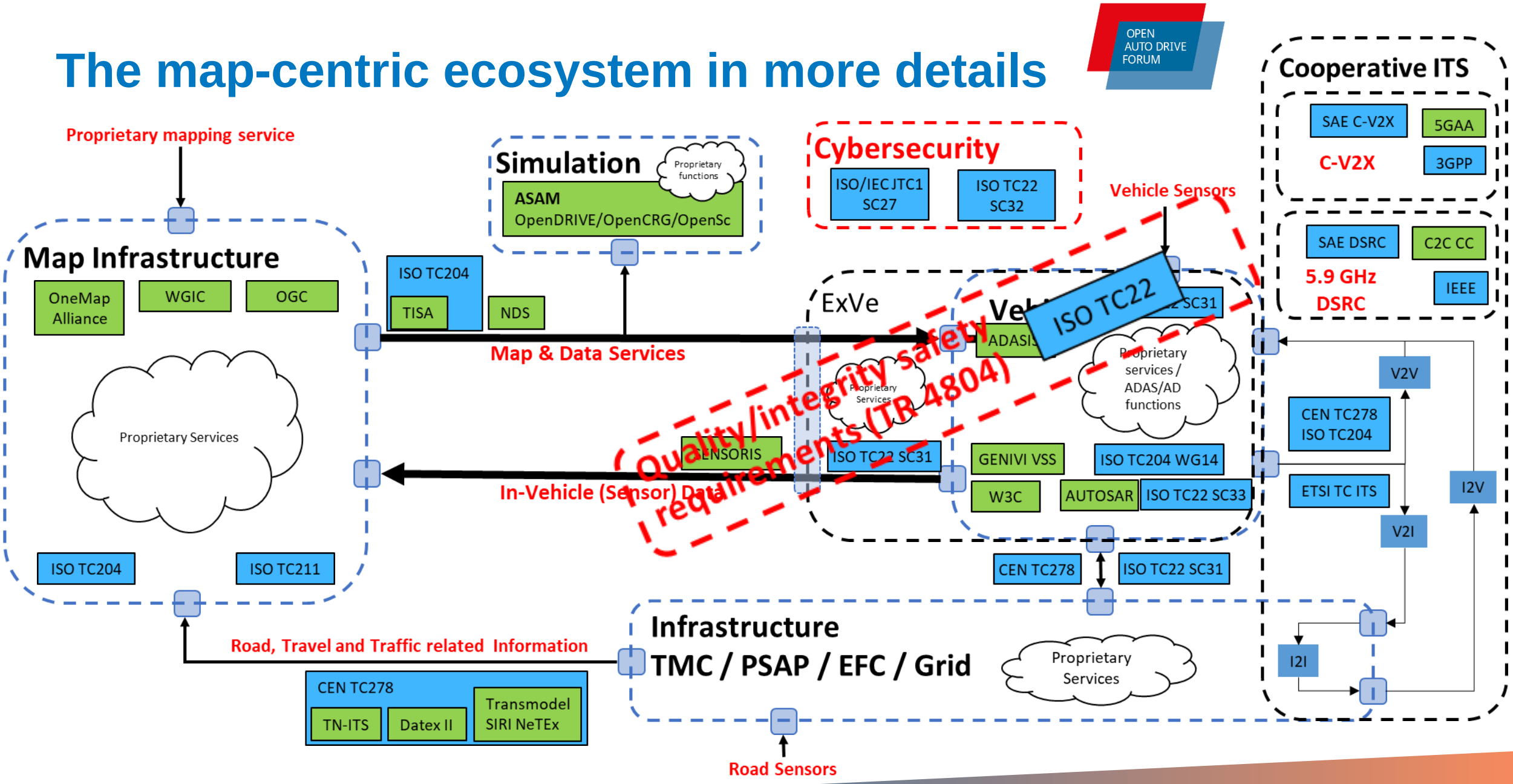
The map-centric ecosystem in more details



The map-centric ecosystem in more details



The map-centric ecosystem in more details



Standardisation environment

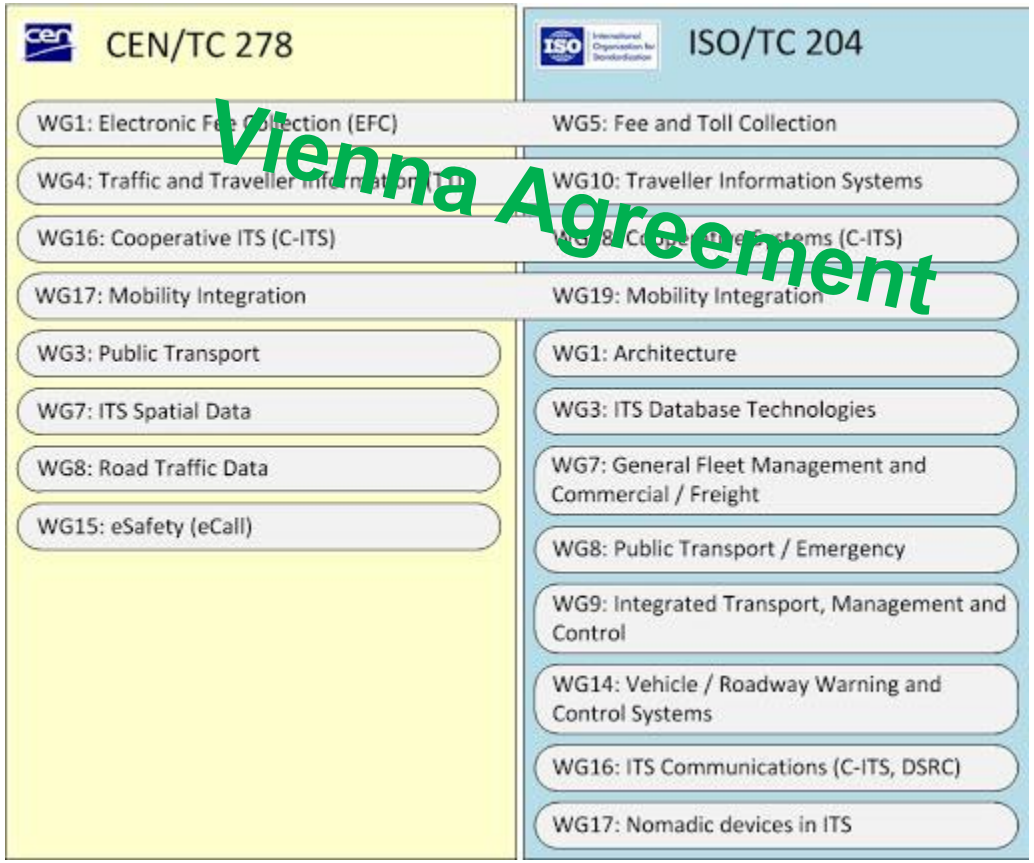
- example of ITS at CEN & ISO

Joint (European-international) approach was adopted in the standardisation of Intelligent Transport Systems (ITS) enabled by the Vienna Agreement in order to…

- …avoid duplication of work
- …avoid the creation of technology islands (which in fact exist unfortunately)
- …ensure the access for global stakeholders to regional initiatives
- …bring in expertise on missing competences
- …facilitate collaboration and leverage common goals
- …use internal and external liaisons' outreach is more efficient

Liaison organisations: ETSI TC ITS, ISO TC22 SC31 and ADCG, ISO TC211, ISO TC268, ISO/IEC JTC1 SC42, SAE ORAD, TISA, IETF, RTCM

Liaison organisations are extending even further the above mentioned points.



Infrastructure classification Supporting Automated Driving

The other side

ISAD levels (Carreras et al. 2018)

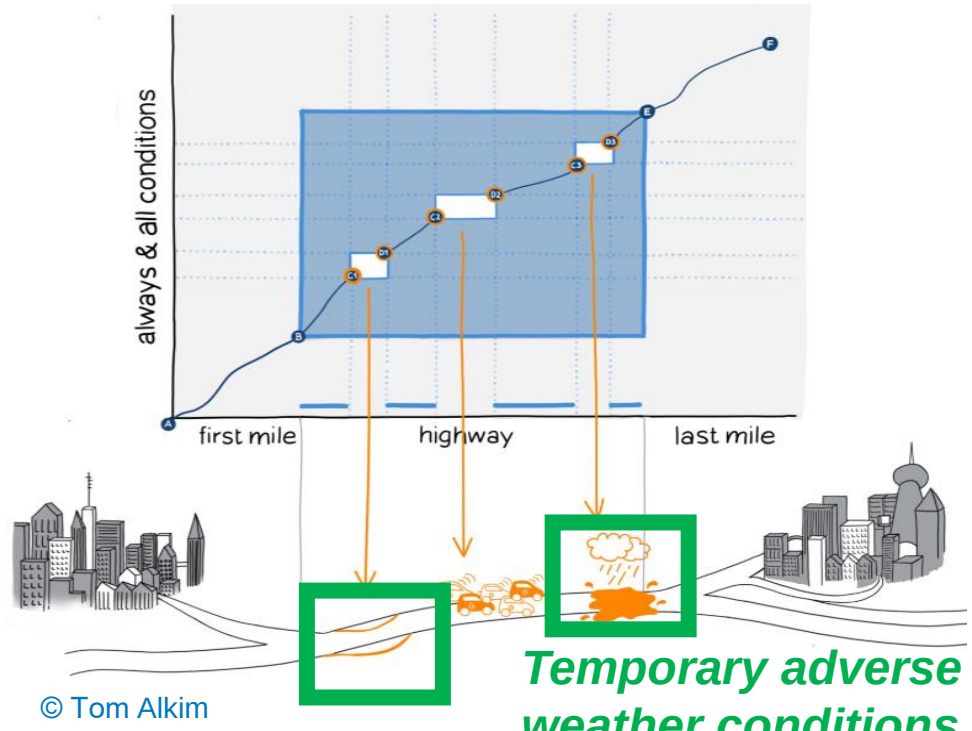
	ISAD	Name	Infrastructure side	AV side	Digtial information provided to AVs: Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				
	D	Static digital information / map support	Digital map data (inlcuding static road signs) complemented by physical reference points	Traffic lights, short term road works and VMS have to be recognized by AVs on their own				
Digital Infrastructure	C	Dynamic digital information	All static and dynamic information can be provided to the AVs in digital form	AVs perceive infrastructure support data				
	B	Cooperative perception	Infrastructure is capable of percieving microscopic traffic situations	AVs perceive infrastructure support data in real time (C-ITS Day 1)				
	A	Cooperative driving	Infrastructure is capable of percieving vehicle trajectories and guide single AVs (or AV groups)	AVs are guided by the infrastructure in order to optimize traffic flow (C-ITS Day 2+)				

- Based on the ISAD Level of information and services different on-board vehicle decisions can be supported
- CAVs will have to be able to drive on E-level, but the additional possibilities provided by A-level sections enable a much higher customer satisfaction as well as support road safety and capacity management related goals

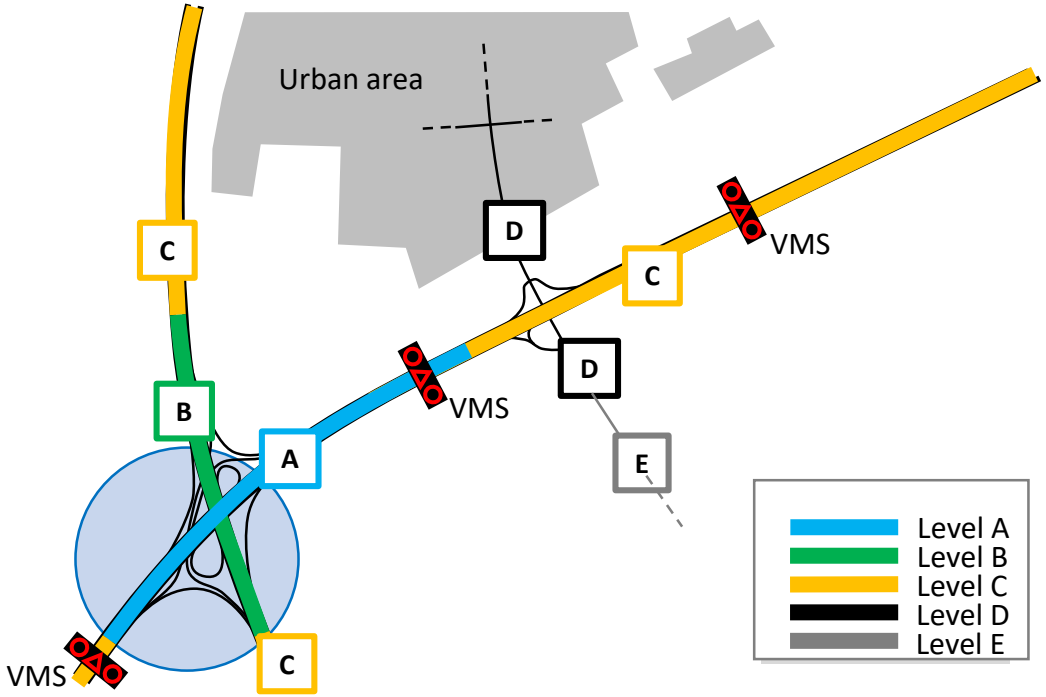
Source: Jacqueline Erhart (ASFINAG) – CCAM Single Platform

How to handle temporary/local missing ODD?

Definition of ODD gaps



Required ISAD functional



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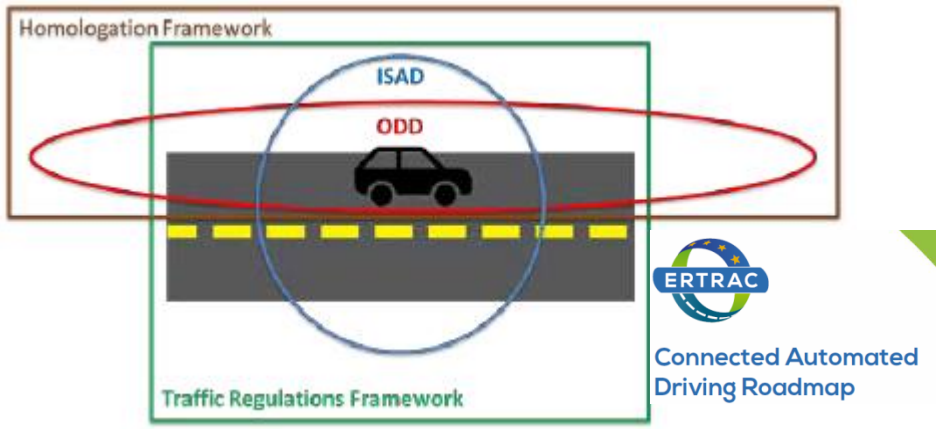
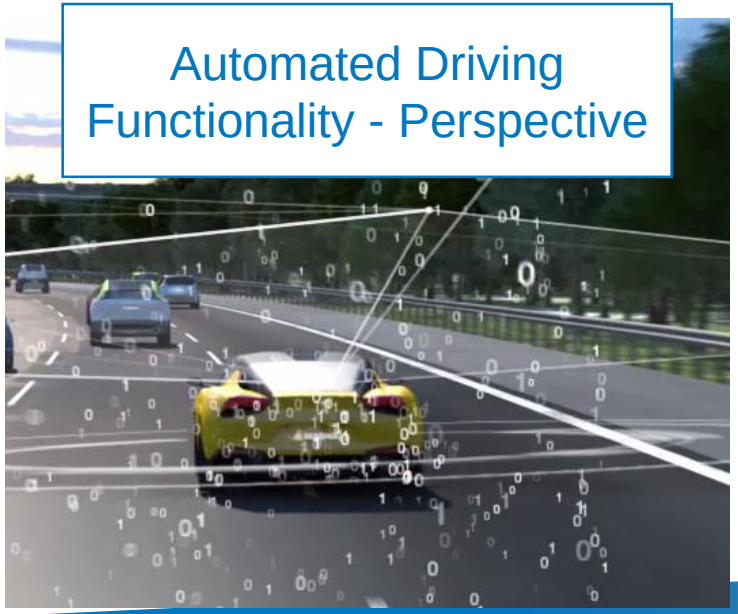
The Ecosystem approach



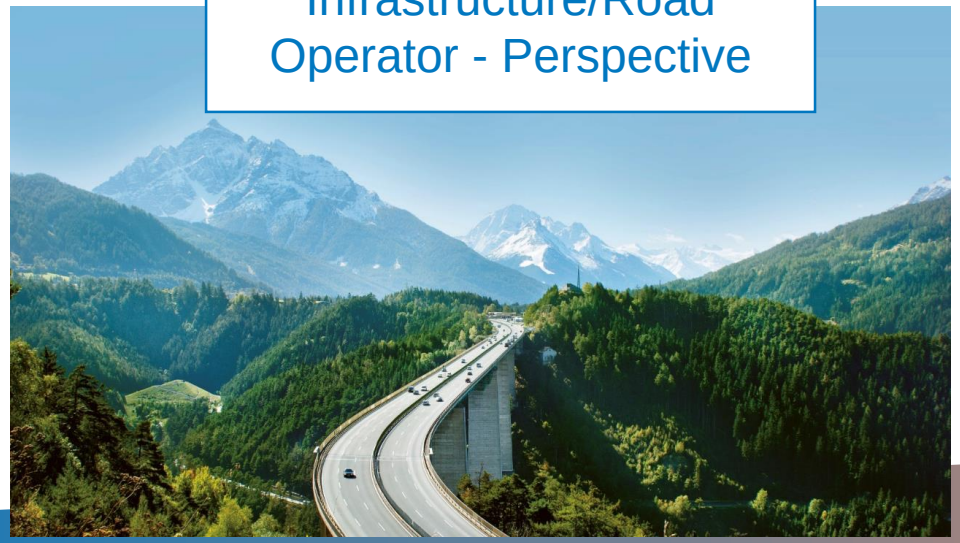
ERTRAC

Connected Automated Driving Roadmap

Automated Driving Functionality - Perspective



Infrastructure/Road Operator - Perspective



Regulation/Homologation - Perspective

Source: Jacqueline Erhart (ASFINAG) – CCAM Single Platform

Conclusions

- Connected and Automated Vehicles need joint standardisation efforts
- Interoperability of services is a must in an ubiquitous networking environment
- Standardisation is still fragmented and driven by different interests (Car industry, Infrastructure Operators, Network Operators, Policy-makers)
- Standardisation and harmonization efforts need to be invested on the road infrastructure side to support automated driving (such effort exists in CEN/TC226 Road equipment)
- Cooperative ITS is one of the enabler technology of Automated Driving, but only one of the list
- Map technologies, Sensor Technologies, Artificial Intelligence, Big Data, Internet of Things are on the list of the enablers
- Standardisation is resource and time consuming activity – we need technology experts and their delegating organisations
- Standardisation is below the horizon of the Hungarian stakeholders – we need to shake the boat!

Thank you!

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