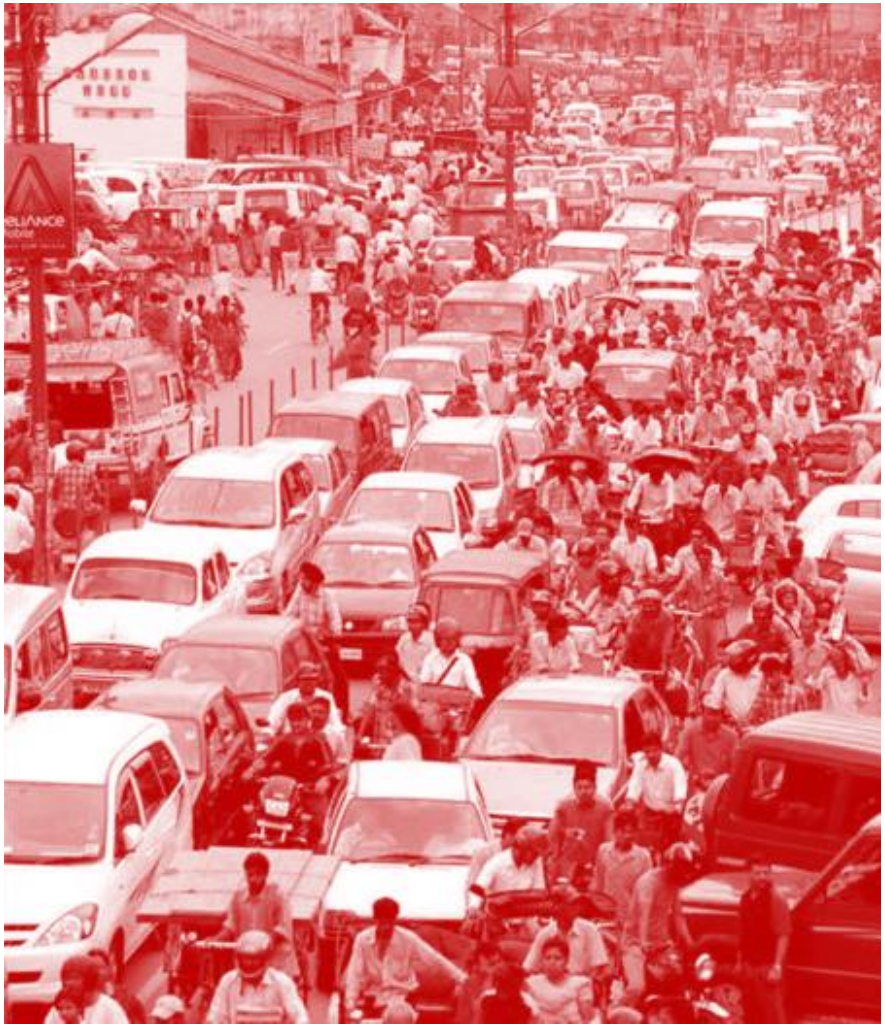
Europe’s practical perspectives on DTI

AVS19 – Breakout # AV Data

Martin Russ, AustriaTech



austriatech

1_The Role and Need of Digital Transport Infra

New Tools

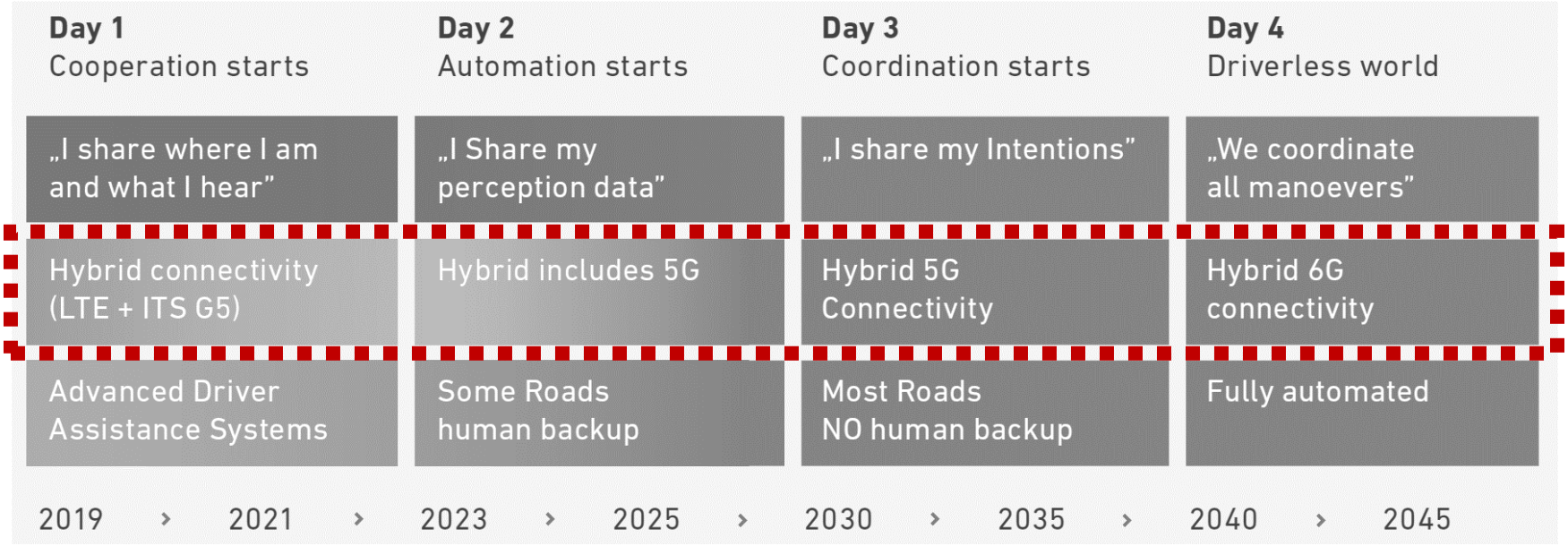
New Demand

New Responsabilities

New Functions

New: what about the old stuff to leave behind?

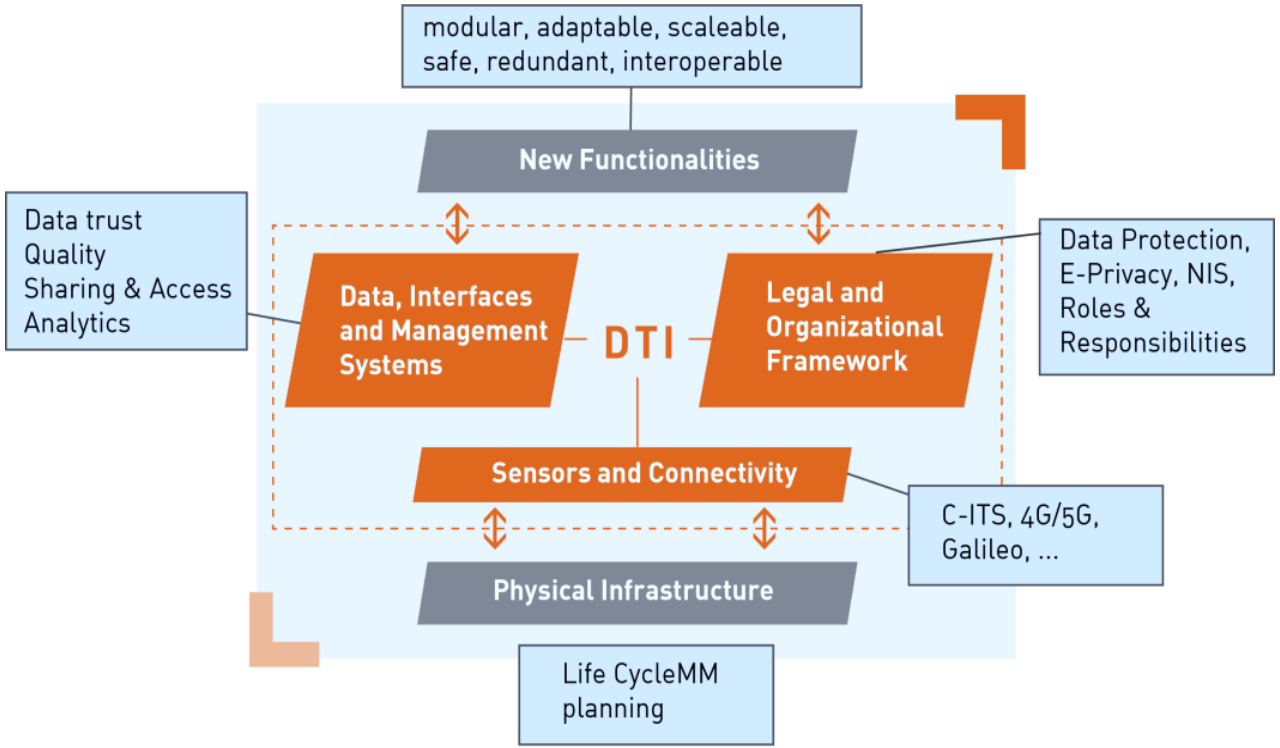
A European Mobility Vision…



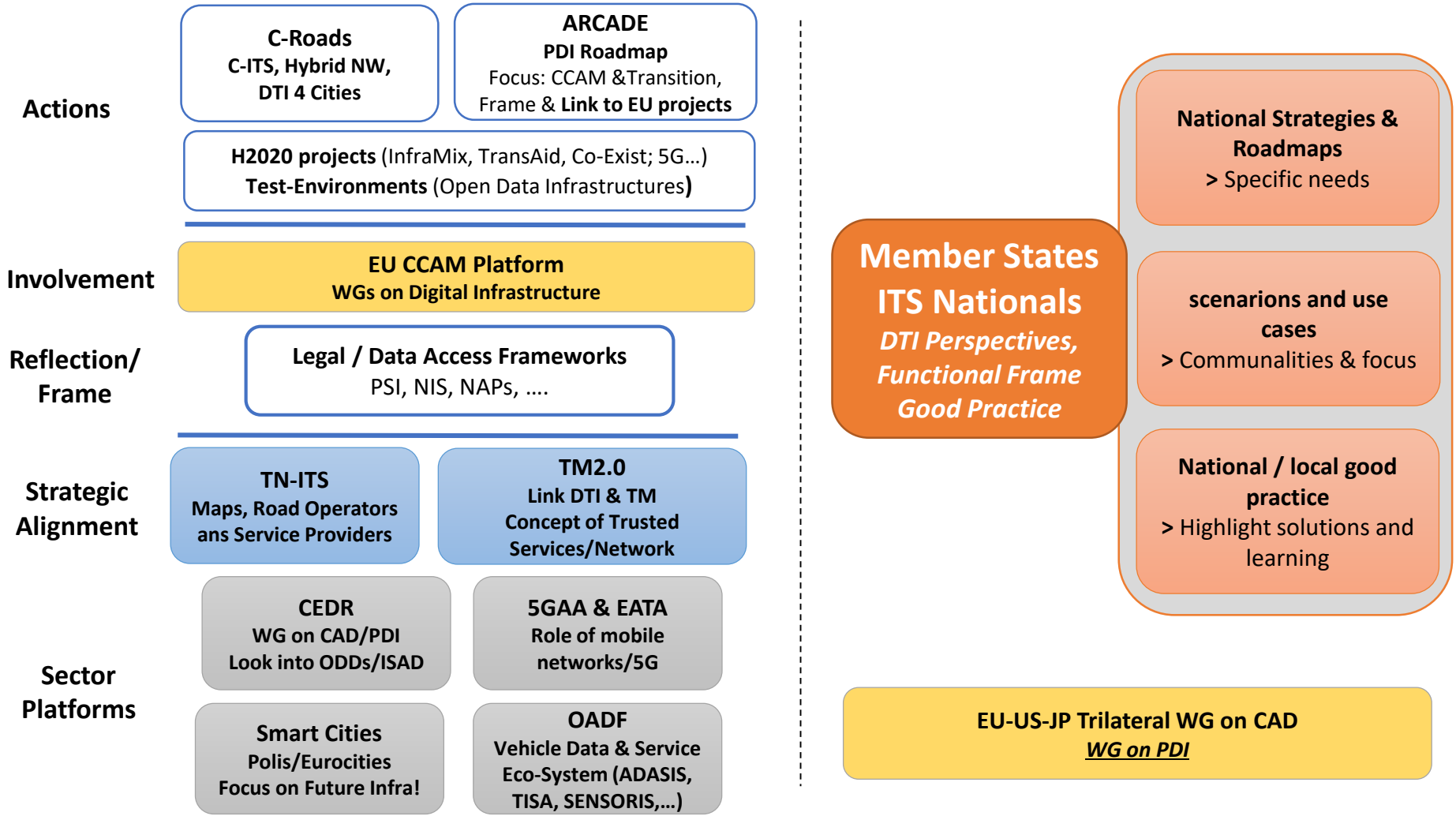
DTI > Connectivity

Source: European Comission

DTI – ITS Nationals Approach



A digital transport infrastructure (**DTI**) is a transportation **data ecosystem governed/enabled** by a set of **institutional policies and technical standards**


Actions
C-Roads
C-ITS, Hybrid NW,
DTI 4 Cities
ARCADE
PDI Roadmap
Focus: CCAM &Transition,
Frame & Link to EU projects
H2020 projects (InfraMix, TransAid, Co-Exist; 5G…)
Test-Environments (Open Data Infrastructures)
Involvement
EU CCAM Platform
WGs on Digital Infrastructure
Reflection/
Frame
Legal / Data Access Frameworks
PSI, NIS, NAPs, ….
Strategic
Alignment
TN-ITS
Maps, Road Operators
ans Service Providers
TM2.0
Link DTI & TM
Concept of Trusted
Services/Network
Sector
Platforms
CEDR
WG on CAD/PDI
Look into ODDs/ISAD
5GAA & EATA
Role of mobile
networks/5G
Smart Cities
Polis/Eurocities
Focus on Future Infra!
OADF
Vehicle Data & Service
Eco-System (ADASIS,
TISA, SENSORIS,…)
Member States
ITS Nationals
DTI Perspectives,
Functional Frame
Good Practice
National Strategies &
Roadmaps
> Specific needs
scenarions and use
cases
> Communalities & focus
National / local good
practice
> Highlight solutions and
learning
EU-US-JP Trilateral WG on CAD
WG on PDI

2_Beyond SAE LEVELS

Towards Safe and Sustainable Mobility

4th High Level Meeting on Automated & Connected Mobility (Vienna 28/29 Nov 2018)

Common Questions

how **to learn from trials**

how to **enable capacity building**

how to **manage from a policy's perspective** and

how to enter an **active dialogue** with the industry

In Focus (1) – „Digital Infrastructure & Connectivity“

What?	How?
Common standards for operating CCAV	Definition of ODDs
Identification of infrastructure needs and classification of ODDs	Digital Repository of Roads
Ensure standardisation and interoperability for automated systems	Roadmap for Physical & digital Infrastructure

- *V2X Communication (ITS-G5 & Hybrid*
- *Update C-ITS Services with CCAD specific requirements (CAM, IVI, …)*
- *ODDs (Operational Design Domains) and ISAD (Infra Support Levels) are key*
- *„Adressed layers“ still unclear (SAE, functions, or „behavioural competences“ ?)*

In Focus (2) – Data & Reporting

What?	How?
Harmonised testing and comparable reports	Standards to be set Single European Platform
Open access to test data (for research and development purposes)	Obligations for testing companies & projects
Standards/obligations for safety reports (Failures, Disengagements)	UN-ECE, common methods and database

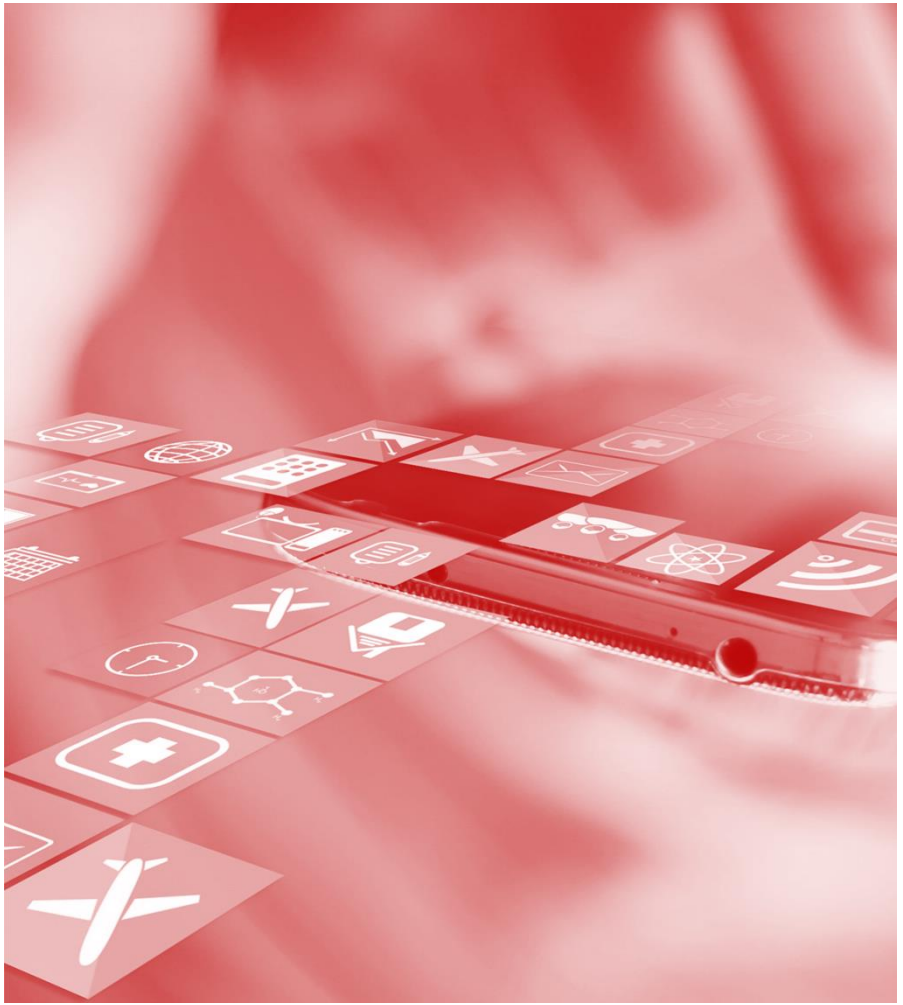
- *Comparability of Methods, Tests and Data –key for knowledge exchange*
- *Build upon existing references (e.g. FESTA Handbook)*
- *Data ≠ Data (Develop, Test, Validate, Operate)*
- *European approach for implementing, operating, recording, analysing, and comparing tests*

3_What, Who, Why?

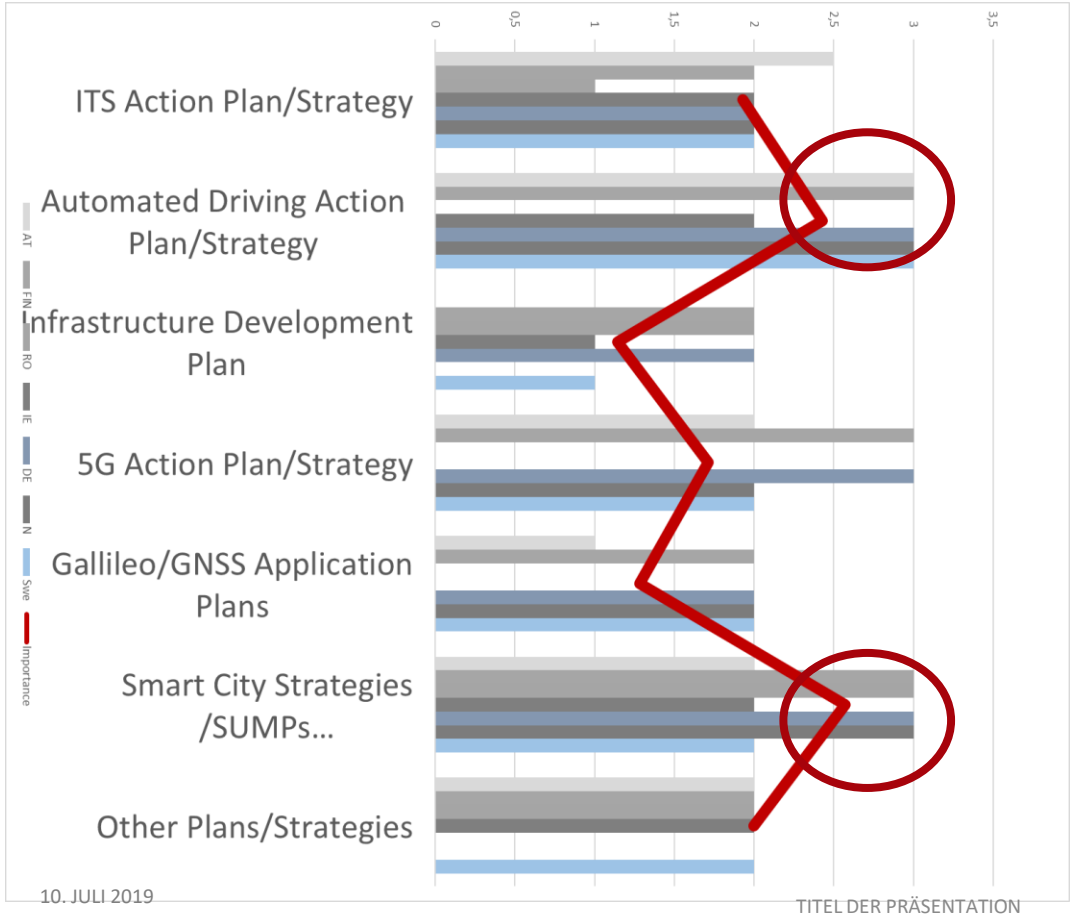
Driving Forces

Main Actors

(Un-)specific Goals



Strategies on DTI (AUT, GER, NOR, SWE, IRL, ROM, FIN)



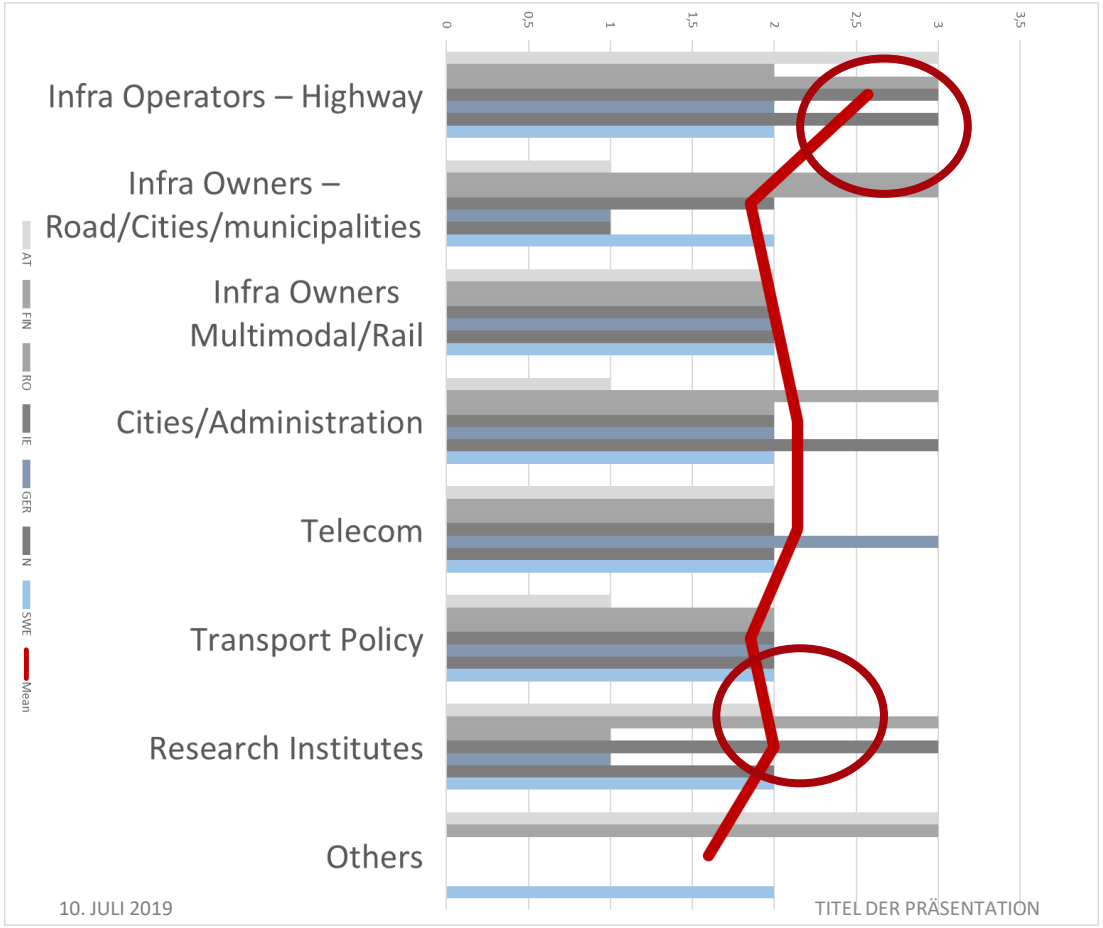
ITS Action Plans/Strategies still vague

Infra for CCAM as a Driver

Telco‘s Role & Cooperation still vague

Cities to drive „Infra Integration“

Main Actors in DTI (AUT, GER, NOR, SWE, IRL, ROM, FIN)



Highway Operators in Lead

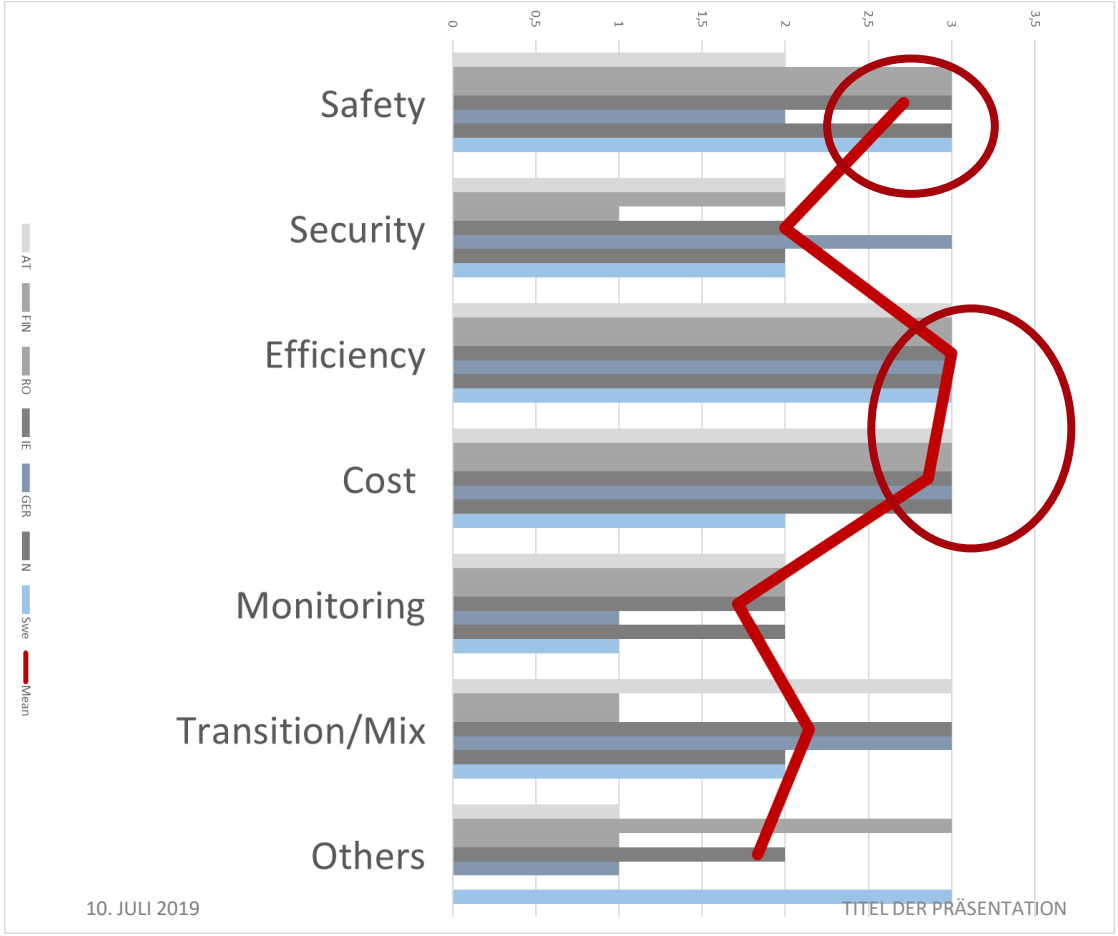
Cities fear higher costs

No clear policies

Formulate RDI Demands

We tend to forget other industries

Goals /KPIs for DTI (AUT, GER, NOR, SWE, IRL, ROM, FIN)



Safety driven ….

Security not in the forefront

Infra enhancement –
Lower Costs (P&D),
Business Models to be tackled

Mix instead of mess

Environment….Monitoring

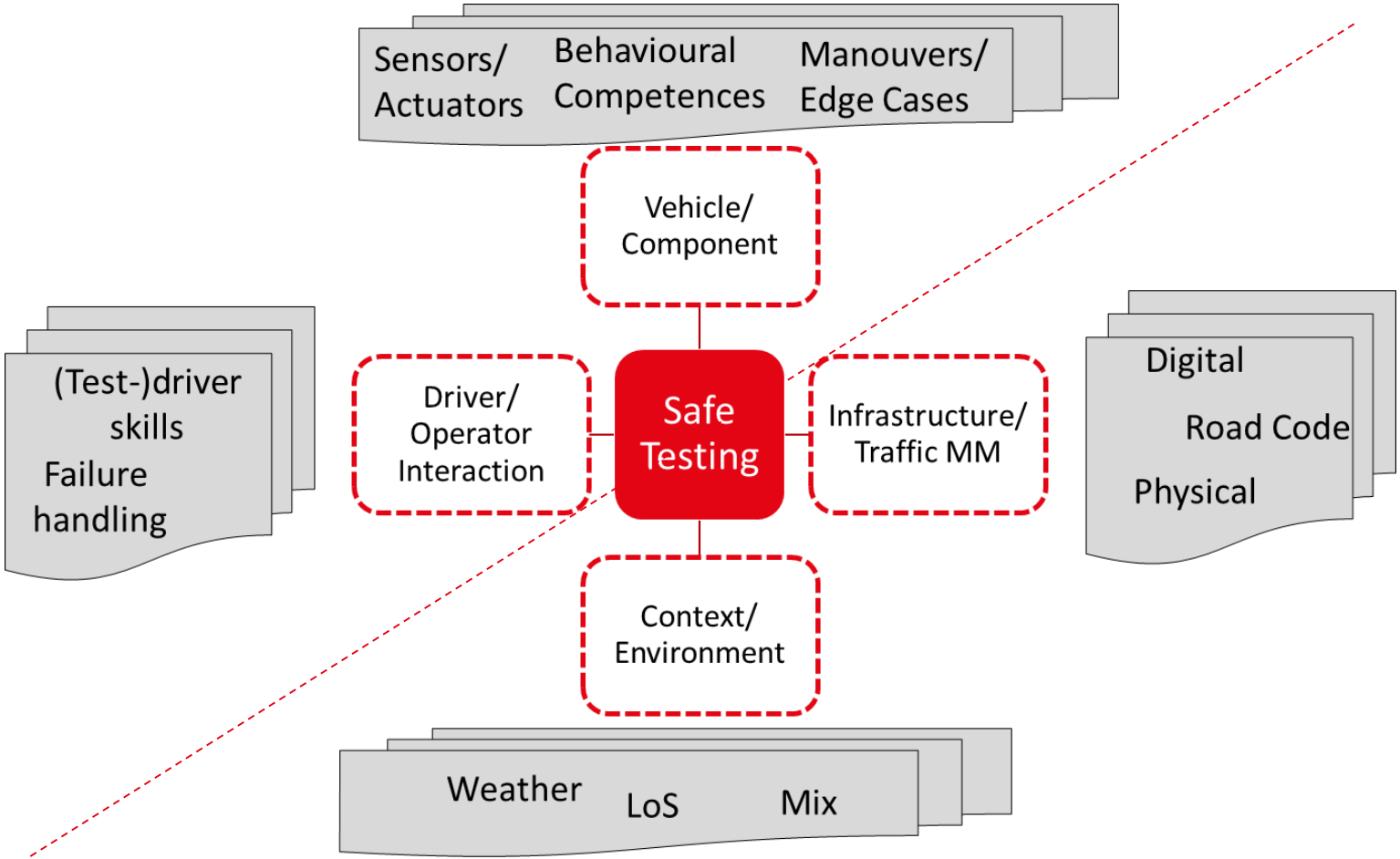
4_ Test-Infra, Simulations & Safe Testing,

A Digital Common Ground (Truth)

Tools for assessing Role of new Infra

Scenario Development Loop

Criteria Catalogue & Maturity Levels



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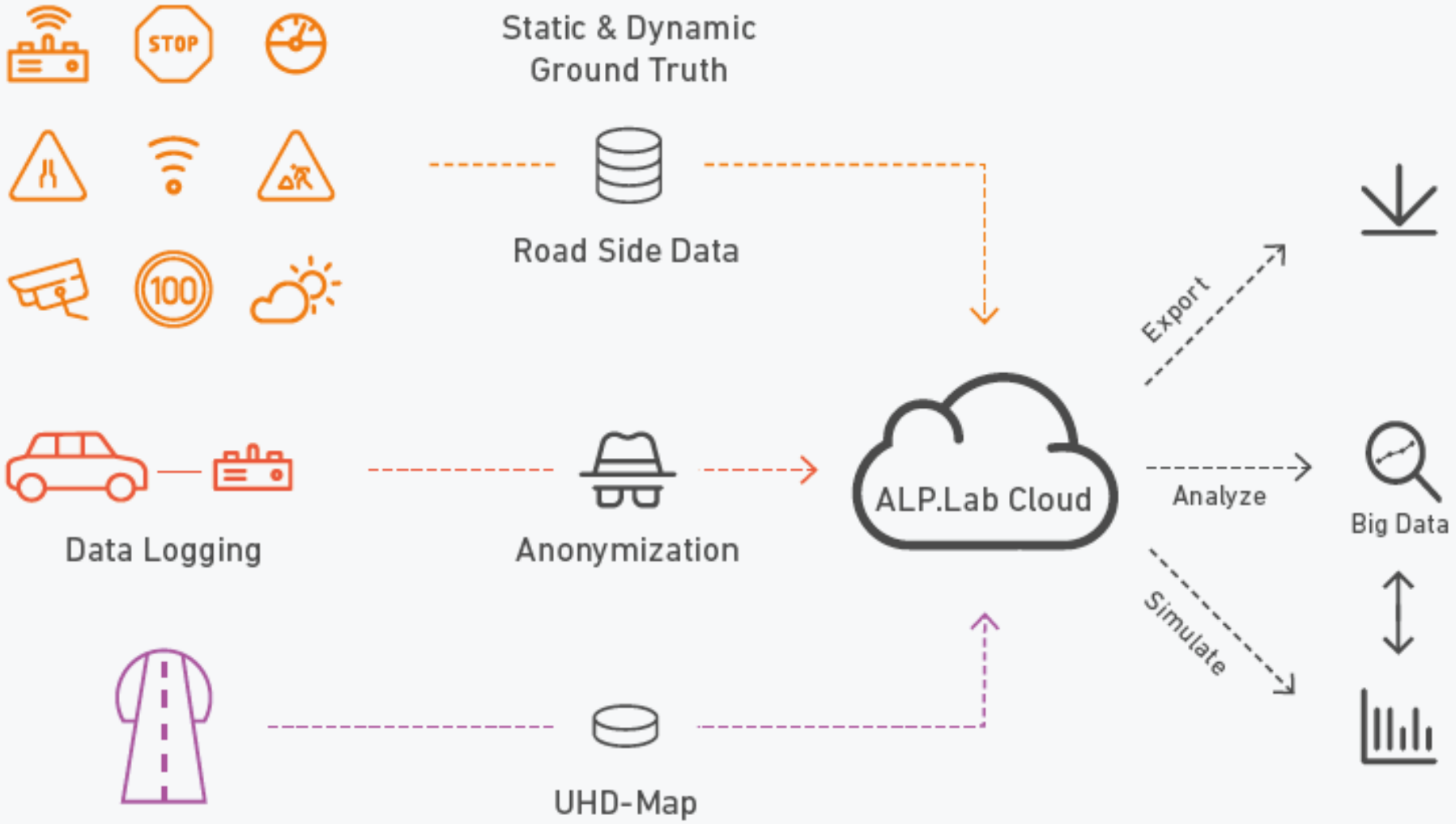
Austrian Light Vehicle Proving Region for Automated Driving

Our Shareholders

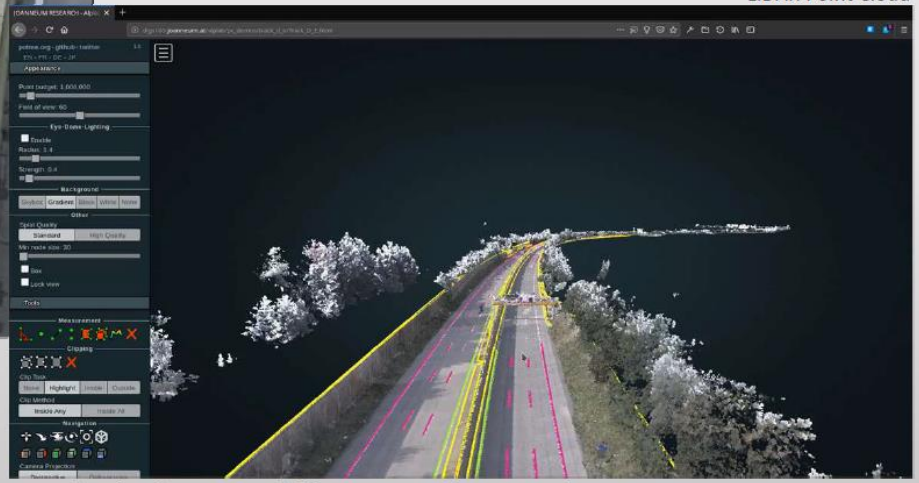
AVL · MAGNA · virtual vehicle · TU Graz · JOANNEUM RESEARCH

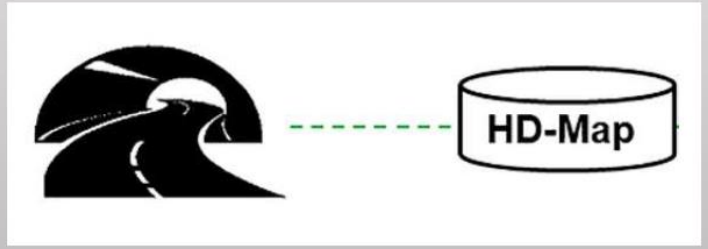

STOP
100
Static & Dynamic
Ground Truth
Road Side Data
Data Logging
Anonymization
ALP.Lab Cloud
Export
Analyze
Simulate
Big Data
UHD-Map

Mobile Mapping - UHD

400km A2/A9 als LiDAR Point Cloud, Road2SIM und GeoJSON ✓

LiDAR Point Cloud





Tool Chain - Mobile Mapping and UHD-Map as a Service. From Data to Simulation:
in cooperation with JOANNEUM RESEARCH and Graz University of Technology

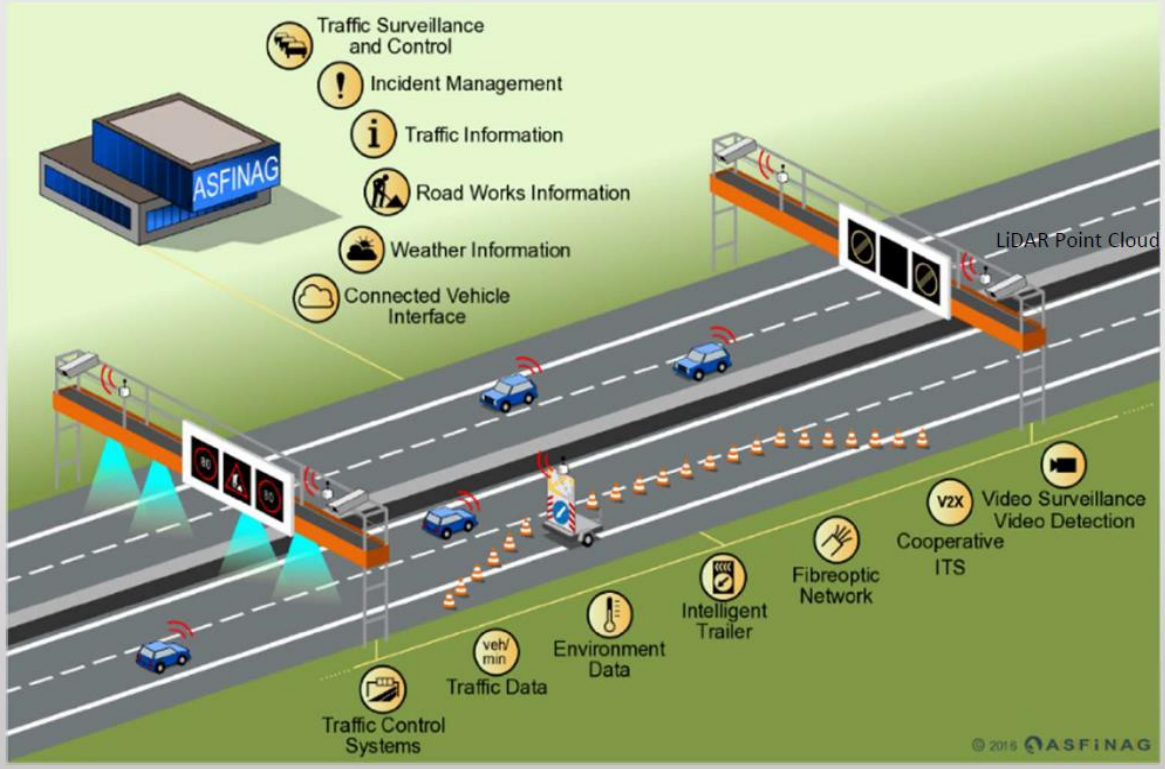
ALP.Lab

ALP.Lab Cloud Supported Data Fusion

ASFINAG

360° Radar

C-ITs G5 Road Side Unit



Road Side, Physical and Digital infrastructure on Highway A2/A9
in cooperation with ASFINAG, Magna, AVL, VIRTUAL VEHICLE: e.g. Cameras, Radar sensors, Traffic signs (Datex II), Weather Data, C-ITS G5 service, …

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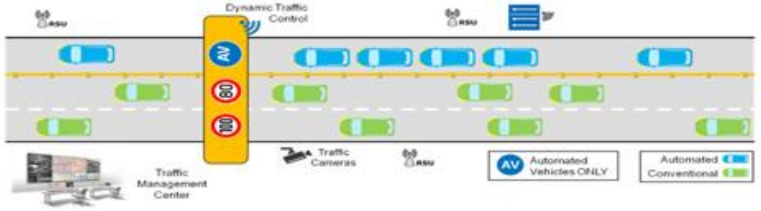
INFRAMIX - Road Infrastructure ready for mixed vehicle traffic flows

How the infrastructure can support automated and non-automated vehicles

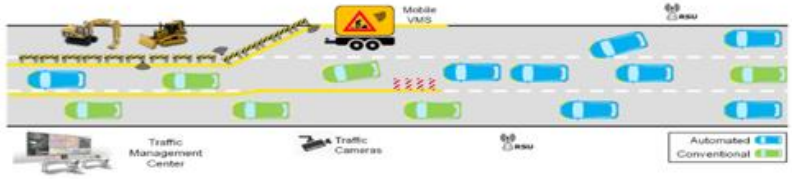
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723016.

INFRAMIX – Hybrid Infra & Testing Scenarios

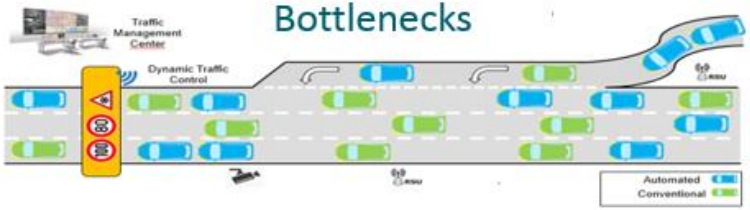
Dynamic lane assignment to automated driving



Roadworks zone



Bottlenecks



- Status quo of test sites and simulation tools as a starting point
- Definition of requirements (functional, feasibility, non-functional)

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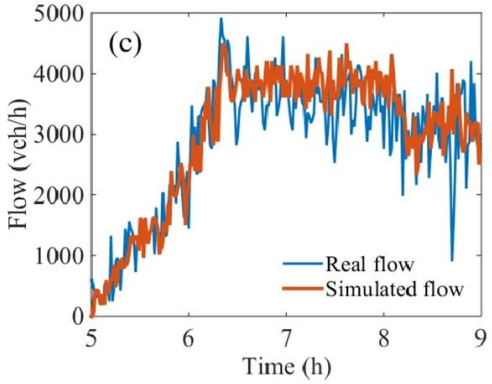
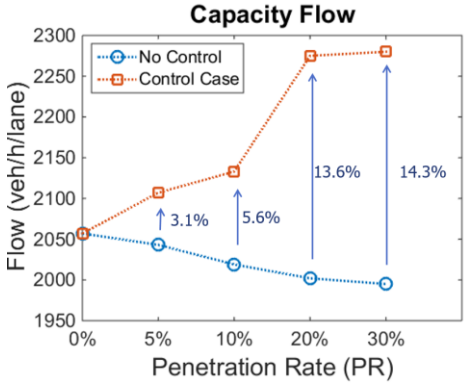
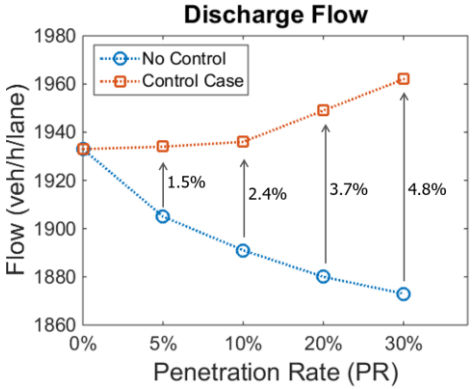
Traffic estimation & control

Design and implement novel **traffic estimation, monitoring and control strategies** dynamically adapted to

- the **different penetration levels of automated vehicles**,
- the **infrastructure equipment**
- and the **overall traffic status**.







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InfraMix Outcomes

Evaluation Tools

- **Development of co-simulation framework**
- **Real world implementation**
- **Combination of real world and simulation (=Hybrid testing)**

Recommendations

- **Infrastructure classification scheme**
- **Safety performance criteria**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723016.

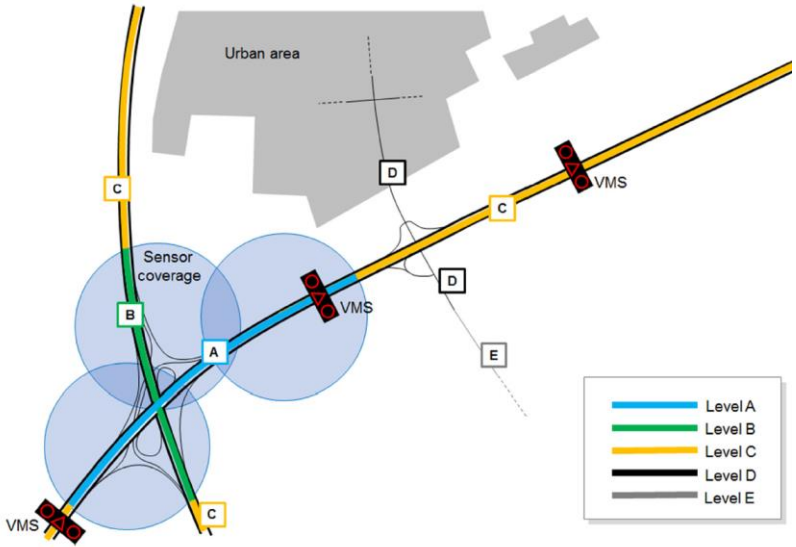
5_a common way forward → ISAD

From Data towards collaboration

Strategic allignment of „policy-manoevers“

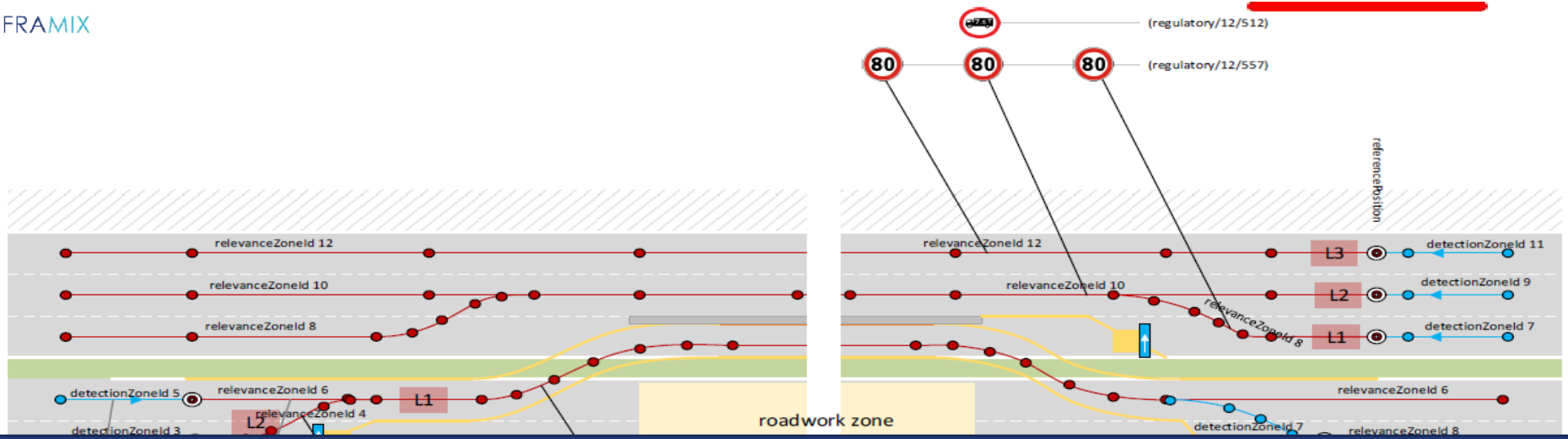
Infrastructure Support levels for Automated Driving (ISAD)

	Level	Name	Digital information provided to AVs: Digital map with static road signs	VMS, warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Digital infrastructure	A	Cooperative driving	X	X	X	X
	B	Cooperative perception	X	X	X	
	C	Dynamic digital information	X	X		
Conventional infrastructure	D	Static digital information / Map support	X			
	E	Conventional infrastructure / no AV support				



See also: ITS World Congress 2018 paper by Abertis Autopistas & ASFINAG, "Road infrastructure support levels for automated driving"

Usecase long term RW



Infrastructure support:

- Map w/o new layout – ISAD **D**
- - including (dynamic speed) limits – ISAD **C**
- Map support - map layers featuring new layout – ISAD **B**
- Lane change and gap advice dependent on traffic – ISAD **B**
- Guide single vehicles or vehicle groups through RW zone – ISAD **A**