CONNECTING CULTURES
ENABLING ECONOMIES
6th to 10th October 2019

DTI FOR CCAM – HOW TO GET READY?
THE INFRAMIX APPROACH

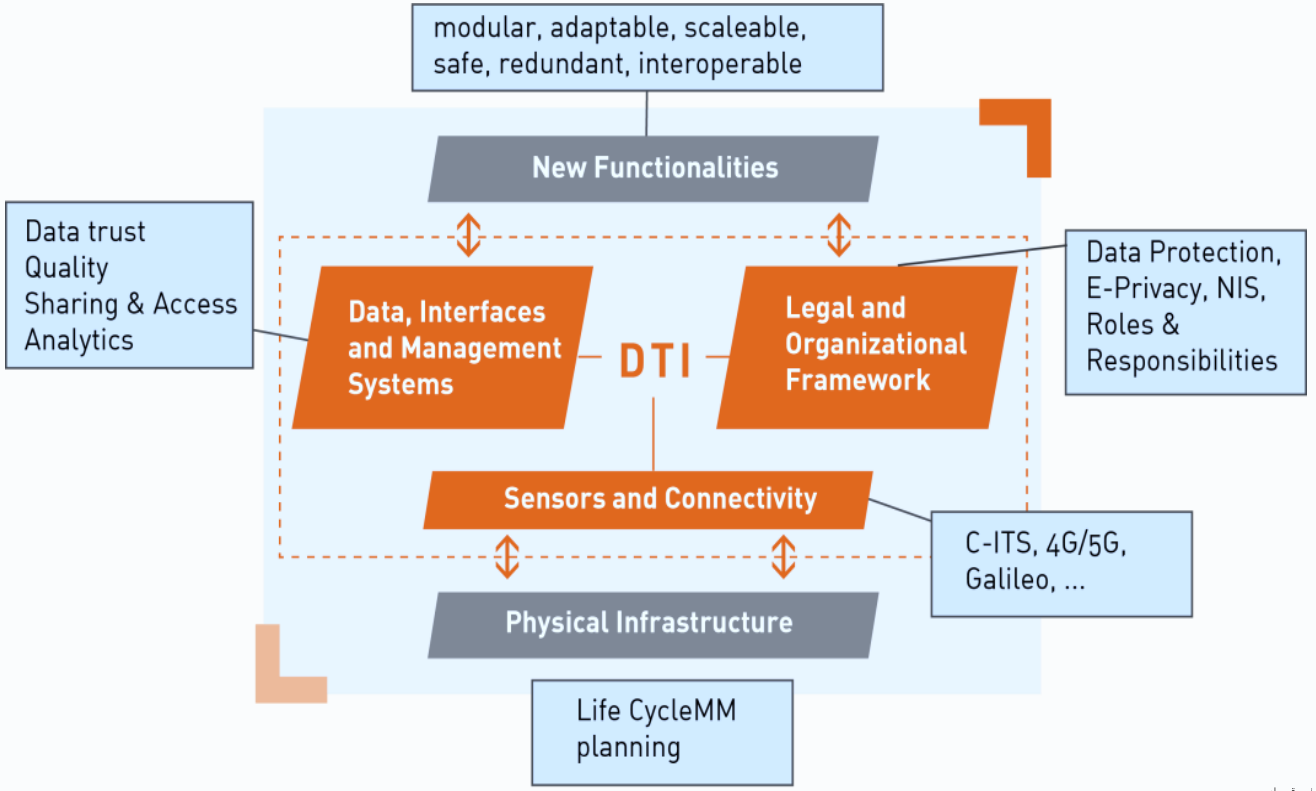
FORESIGHT SESSION 10 “CONNECTED & AUTONOMOUS MOBILITY: IS OUR ROAD NETWORK READY?”

MARTIN RUSS

MANAGING DIRECTOR

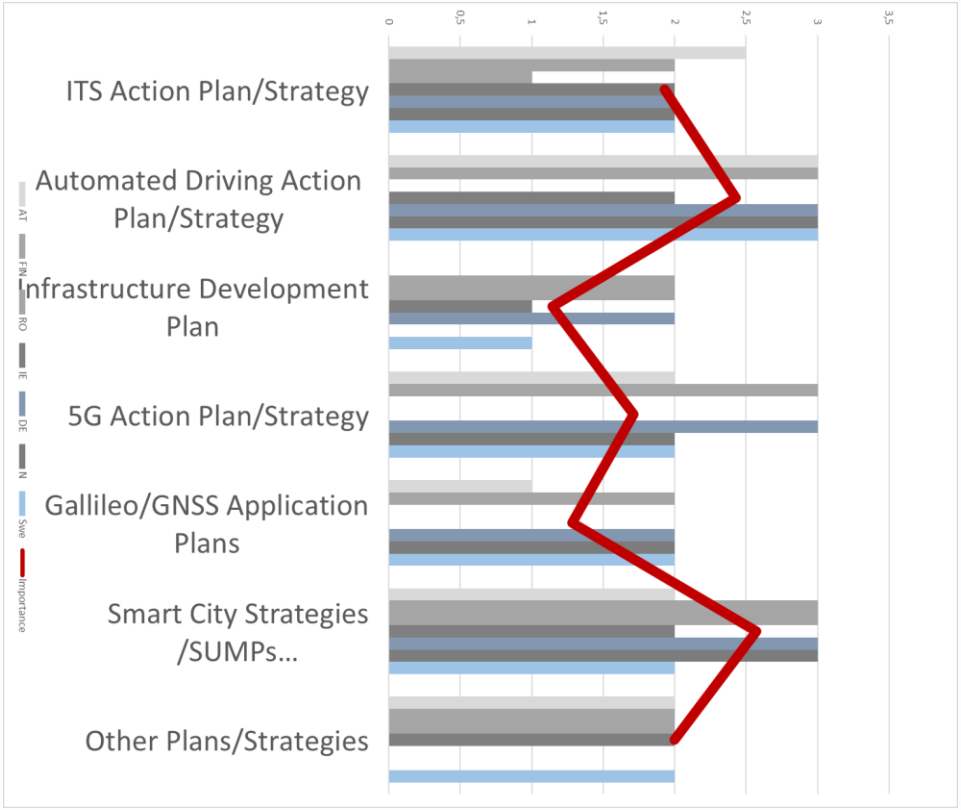
AUSTRIATECH

DTI – THE EUROPEAN ITS NATIONALS APPROACH



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

NATIONAL STRATEGIES ON DTI



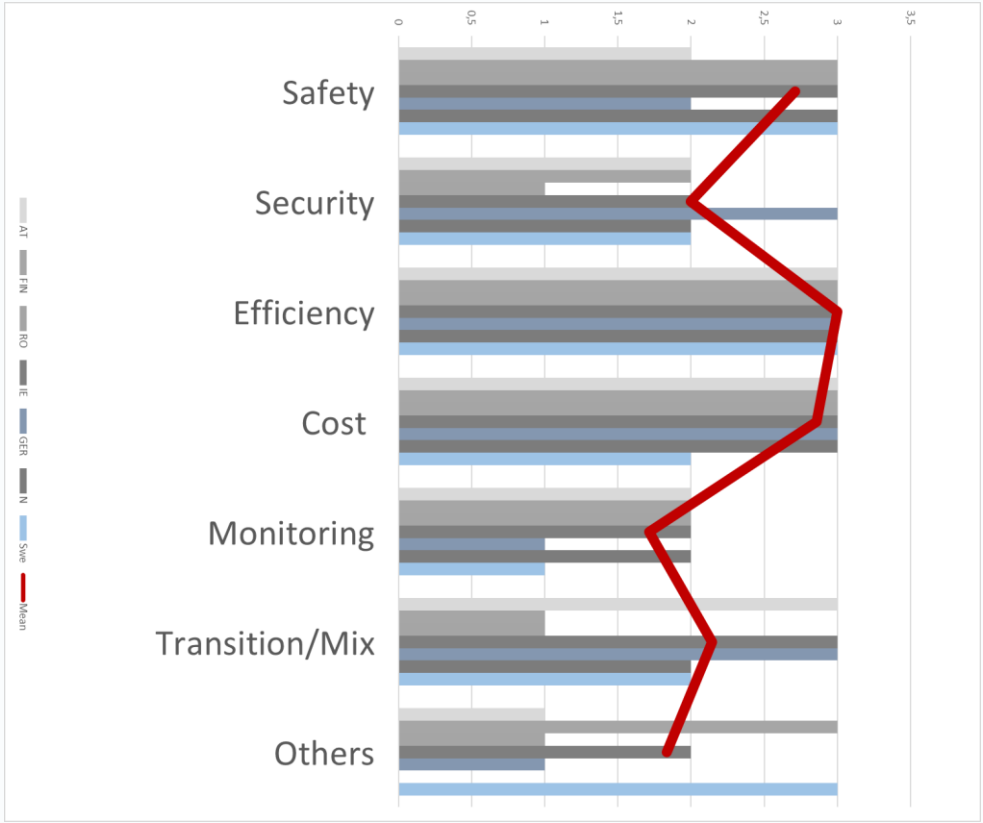
ITS Action Plans/Strategies still vague

Infra for CCAM as a Driver

Telco Role & Cooperation still unclear?

Cities drive „Infra Integration"

GOALS FOR DTI



Safety enhancer ….

Security is not at the forefront

Infra enhancement – Responsabilities, Costs, Business Models to be tackled

Mix instead of mess

Environment….

INFRAMIX

ROAD INFRASTRUCTURE READY FOR MIXED VEHICLE TRAFFIC FLOWS

How infrastructure can support automated and non-automated vehicles

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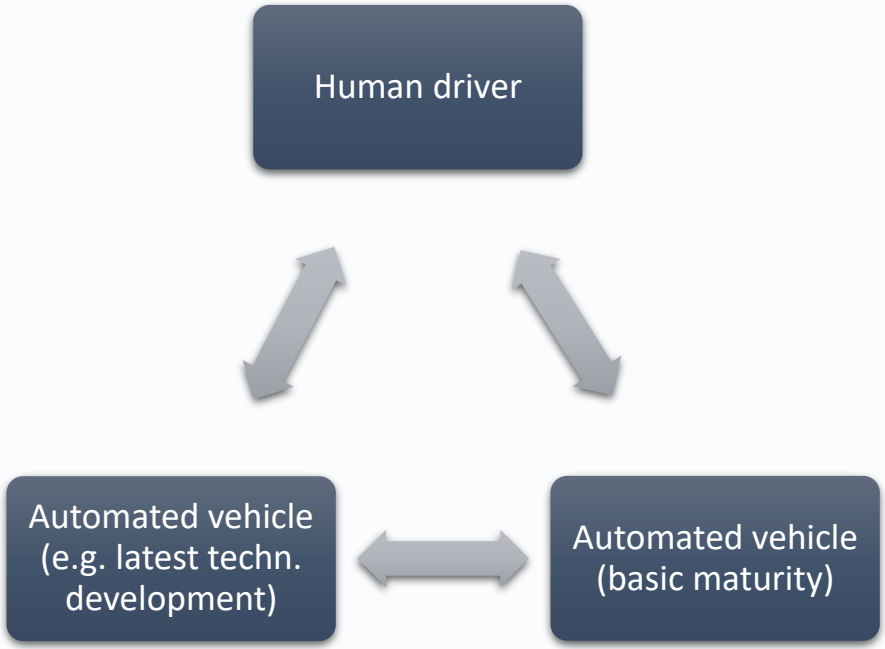
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723016.

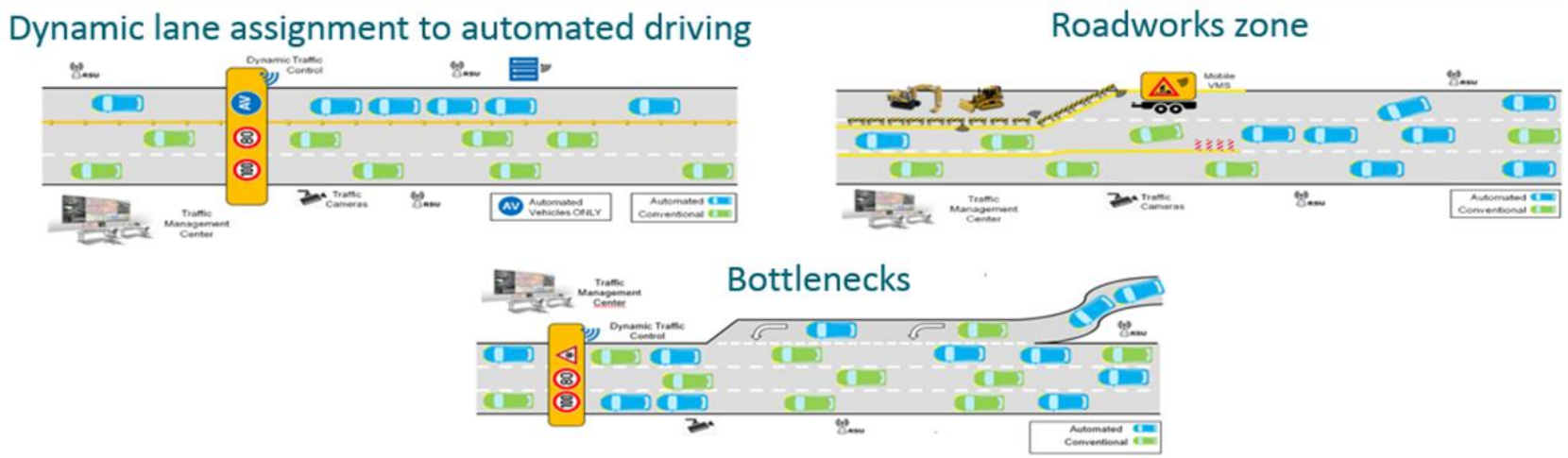
MIXED TRAFFIC → DECREASED EFFICIENCY AND SAFETY

- Human drivers and automated vehicles need to interact
- Automated vehicles will differ in functions and technical maturity
- Capabilities of specific automated vehicles are unknown to others
- Uncertainty about behaviour ofwill decrease the quality of interaction
- Efficiency and safety
  - depends on smooth interaction
  - will likely decrease in case of mixed traffic situations



INFRAMIX: SCENARIOS AND GOALS

IMPROVE EFFICIENCY AND SAFETY BY PHYSICAL AND DIGITAL INFRASTRUCTURE



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

THE INFRAMIX SUPPORT

Support of AVs **with specific information**

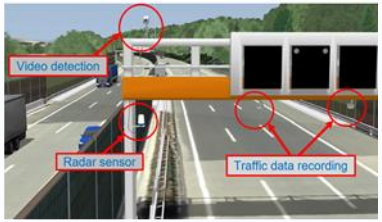
- e.g. weather conditions, incidents, ..
- Vehicles can adapt in advance to conditions

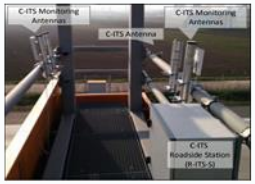
Direct **support for automated driving functions**

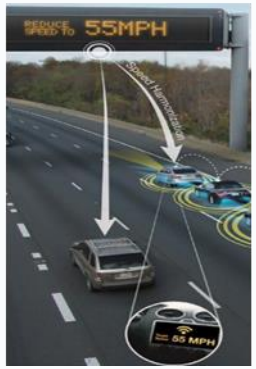
- Precise /HD maps
- C-ITS messages (mandatory)

Control strategies for mixed traffic situations

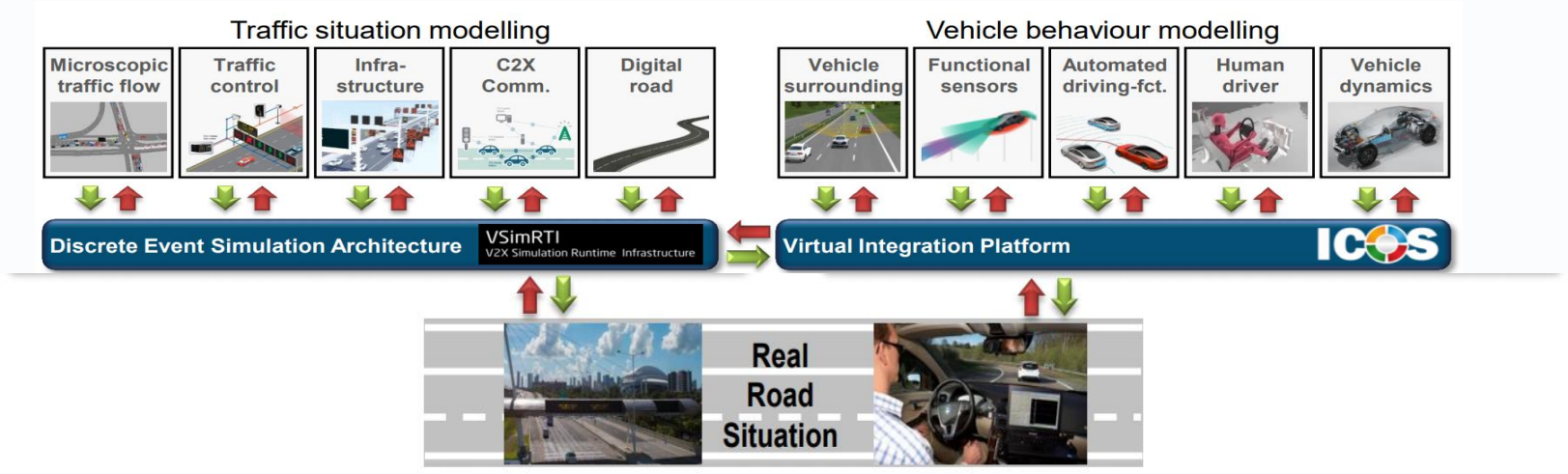
- On „micro level“ - at bottlenecks
- dedicated lanes for automated vehicles







EVALUATION OF EFFECTS ON EFFICIENCY AND SAFETY



- Coupling real vehicles on real roads with virtual traffic environment
- Detailed and realistic investigations of real driving behaviour and critical traffic situations in a complex but safe virtual environment
- Testing of actual and future concepts of CCAD

INFRAMIX ROADMAP & ACTONS

SET STEPS TOWARDS A FULLY AUTOMATED TRANSPORT SYSTEM

Guide towards incrementally upgrading of infrastructure

Addressed elements

- Traffic estimation and control algorithms for “mixed traffic”
- Simulation environments and hybrid testing for mixed traffic situations
- Extension of traffic messages (C-ITS Day 1.5 & 2)
- Novel signalling and visualisation elements
- New digital infrastructure elements
- Infrastructure classification scheme (for automation levels of vehicles)

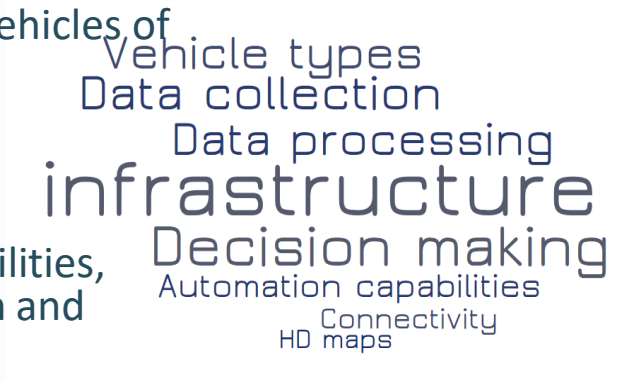
ROAD INFRASTRUCTURE CLASSIFICATION SCHEME

Objective:

- Highlight the connectivity and automation capabilities of the infrastructure and its ability to manage the circulation of vehicles of different levels of automation

Targets:

- Indicate the infrastructure connectivity, automation capabilities, capability to host vehicles of different levels of automation and connectivity
- Provide dynamic classification – under certain conditions (e.g. an incident, extreme weather conditions) the circulation of automated vehicles will be affected



ISAD

INFRA SUPPORT LEVELS FOR AD

	Level	Name	Description	Digital information provided to AVs			
				Digital map with static road signs	VMS, warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional infrastructure	E	Conventional infrastructure / no AV support	Conventional infrastructure without digital information. AVs need to recognise road geometry and road signs.				
	D	Static digital information / Map support	Digital map data is available with static road signs. Map data could be complemented by physical reference points (landmarks signs). Traffic lights, short term road works and VMS need to be recognized by AVs.	X			
Digital infrastructure	C	Dynamic digital information	All dynamic and static infrastructure information is available in digital form and can be provided to AVs.	X	X		
	B	Cooperative perception	Infrastructure is capable of perceiving microscopic traffic situations and providing this data to AVs in real-time.	X	X	X	
	A	Cooperative driving	Based on the real-time information on vehicle movements, the infrastructure is able to guide AVs (groups of vehicles or single vehicles) in order to optimize the overall traffic flow.	X	X	X	X

INFRAMIX IN A NUTSHELL

Solutions	• comprising new traffic management and control strategies, • new physical and digital road infrastructure elements (define, specify, develop, implement)
Evaluation Tools	• Co-simulation framework • Real world implementation • Combination of real world and simulation (=Hybrid testing)
Recommendations	• **Infrastructure classification scheme** • Safety performance criteria • Roadmap towards a fully automated transport system

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austriatech

Tel: +43 664 4630332

Email: martin.russ@austriatech.at

Website: www.austriatech.at

twitter.com/AustriaTech