4th High Level Meeting on Automated & Connected Mobility "Beyond SAE Levels: Towards Safe & Sustainable Mobility"

28-29 November 2018, Vienna

Results report

Beyond SAE Levels: Towards Safe & Sustainable Mobility

Results report

Vienna, 2019

Content

Welcome Statement

Director General Christian Weissenburger

When Member States agreed on the Declaration of Amsterdam in April 2016 one of our main objectives was to work towards a coherent European framework for the deployment of interoperable connected and automated driving. Also important for us was to adopt a "learning by experience" approach including cross-border cooperation. Lastly, we wanted to realise the potential of automated and connected mobility in terms of road safety, traffic flows or environmental impacts.

Since the first High Level Meeting in Amsterdam in February 2017, and over the following meetings in Frankfurt (September 2017) and Gothenburg (June 2018), we have picked up on various important aspects including work in the data and ethics task forces. When it comes to connected mobility many of us are cooperating in the C-ROADS project where roll-out of C-ITS services is now starting.

Sweden placed the issue of an integrated and decarbonised mobility system at the forefront of the strategic discussion of transport ministers in Gothenburg. The question of how to achieve clean and sustainable transport is of crucial importance. This is why Transport and Environment Ministers during their Informal Meeting in Graz at the end of October agreed on the Graz Declaration – Starting a new era: clean, safe and affordable mobility for Europe. In November 2018 Austria adopted a new Action Programme on Automated Mobility where we also emphasise that developments in automated and connected driving in no case should contradict our objectives on decarbonising our transport systems.

This is why we called the 4th High Level Dialogue on Connected & Automated Mobility in Vienna **"Beyond SAE LEVELS: Towards Safe and Sustainable Mobility".** We wanted to pick up on the Swedish focus on integrated mobility and ask ourselves how we can integrate new automated services into a future-proof and sustainable mobility eco-system. Our focus in Vienna was specifically on the

use case of integrated automated mobility services such as shuttles and pods. And we were very happy to have around 100 participants from Member States, the European Commission, and important stakeholders like ACEA, CLEPA, CEDR or FIA as well as new key stakeholders like UITP, POLIS or EUROCITIES. For the first time we also invited key European projects.

We are now happy to present the outcome of two days of very active work in Vienna in this Results Report. It shows our recommendations on common building blocks for the public sector priority use case of automated and shared mobility services thereby contributing to the necessary alignment we agreed to with the Declaration of Amsterdam.

Why automated and shared?

The High Level Dialogue on Automated & Connected Mobility was established with the Declaration of Amsterdam from April 2016. Its key objective was to focus on a learning-by-experience approach thereby realising the positive potentials of automated and connected driving as well as aligning national frameworks. Vienna's 4th High Level Meeting specifically focused on the use case with the biggest long-term potential for a sustainable transport system: automated and shared mobility services!

The Gothenburg Conclusions of 19 June 2018 clearly stated in its Preamble: *The development towards connected, cooperative and automated mobility has the **potential** to make the transport system significantly more efficient, safer and more secure and can help lower emissions. It can also be a **key enabler towards car-sharing and cooperative solutions**. Moving on to a wider implementation, regulation and political agendas will have to support a **sustainable development** in order to reap these potential benefits.*

In order to achieve the vision of an integrated, cooperative, connected, automated and decarbonised mobility system that significantly contributes to a sustainable society the 3rd High Level Meeting in Gothenburg concluded that the focus must be on:

- *The benefits for people, cities, regions and society at large including environmental benefits.*
- *Transport safety and security including data protection and cybersecurity.*
- *Technical leadership, jobs in the EU and sustainable business models.*
- *The usage of the opportunities associated with digital technologies.*
- *Close cooperation with cities, regions, road operators, public transport operators and other relevant stakeholders.*

Building blocks for the Gothenburg vision

Vienna's 4th High Level Meeting picked up on the Gothenburg vision of integrated mobility. The objective of this first expert event in the series of High Level Meetings was to work more intensely and more systematically on a specific use case. Our starting position was the following: As Member States or the public sector in general we need to focus not just on safe components and vehicles when it comes to automated mobility**. Our main focus is on the creation of a truly sustainable & "integrated" transport system.** With this in mind one of the most interesting use cases to look at from a public sector perspective is that of automated and shared mobility services which includes pods, shuttles or fleet solutions. These use cases are promising in terms of an impact on a system level – potentially allowing new mobility services in rural areas, supporting the transition from car-dependency to multimodal mobility and helping to lower the environmental impact of transport.

Participants of the HLM in Vienna worked in 4 Workshops to (1) identify common building blocks for integrated mobility, (2) set priorities on common "1st day elements" for future tests; (3) identify good practice legal frameworks for ongoing trials and (4) discuss new legal and institutional approaches needed in order to enable automated mobility services for the future.

In the course of a preliminary desk research and analysis, building blocks for connected and automated mobility have been identified and verified by various experts from the field (through bilateral talks and an online consultation) as well as due to insights from on-going test environments / activities. The idea was to provide a basis for discussing single aspects of cooperative, connected and automated mobility (CCAM) within moderated, small group workshop sessions.

The overall aim of the small group setting was to actively involve participants in addressing political needs and drawing attention to where common understanding and harmonised decision making for integrated CCAM is needed. In order to achieve this goal, participants focused on one specific use case (pods / shuttles as fleet solutions) and used the pre-defined building blocks for examining the topic systematically. For doing so, a landscape of building block was drafted. The building blocks are potentially describing, examining and framing CCAM practices by considering different aspects such as Traffic Safety, Legal and Institutional Frameworks or Digital Infrastructure and Connectivity (see Figure 1).
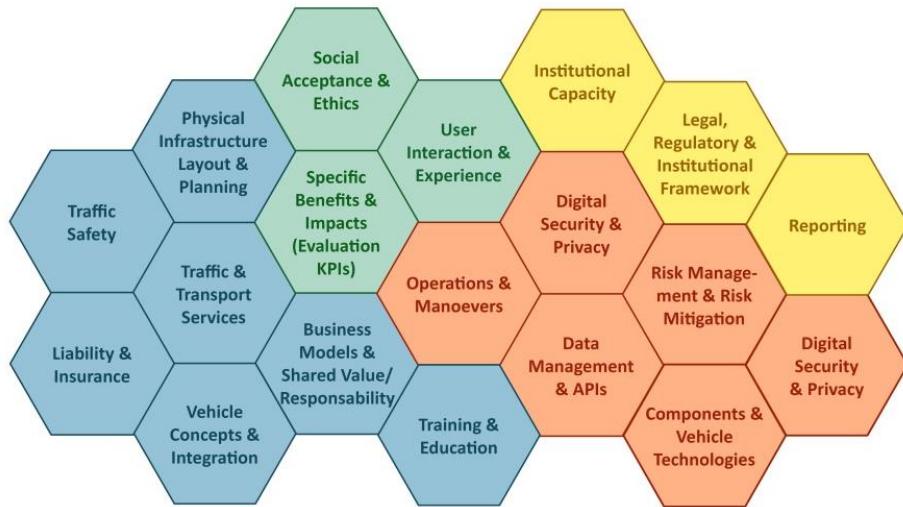
Figure 1: Building Blocks for CCAM

The workshops were designed as knowledge and experience exchange format, where participants were able to contribute insights from their national trials and project involvement. According survey results from the HLM preparation phase 80 % of participants are already working on pilot testing of CCAM, whereas the most crucial building blocks that are tackled at the moment are: Traffic Safety, Physical Infrastructure and Layout Planning, User Interaction, Experience and Acceptance as well as Legal and Regulatory Frameworks (see Figure 2). These survey results go hand in hand with the main HLM workshop results.
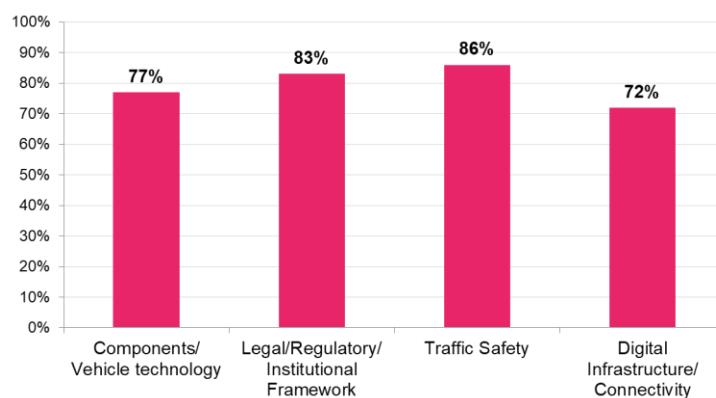

Figure 2: Pre-HLM Survey Results

Especially policy makers and the politics' perspective on integrated CCAM were addressed by finding answers to the question: What are the required next steps to create an appropriate framework for CCAM in an integrated mobility system?

At the moment, institutional settings are characterised by heterogeneity concerning the knowledge base and activities. However, well-established transnational cooperation and cooperative R&D projects are already contributing to achieving strong alignment towards harmonised CCAM development and deployment. Hence, the mixture of Member State representatives, projects and platforms was a necessary follow-up step after drafting the

Gothenburg vision for getting more into detail by examining building blocks on the basis of trials.

While learning from the experience of (EU-funded) research projects, insights brought by platforms, i.e. advocates of different industries, public authorities were keen to get an idea of:

- how learning from trials / pilots can be ensured and systematically steered,
- where to put further efforts in order to enable capacity building in the public sector,
- how to manage these technology-driven developments / deployments from a policy's perspective and
- where to enter an active dialogue with the industry

The identification of intersections between the public body and the industry are essential for finding a common ground for cooperation (in chronological, pre-defined working steps).

By differentiating between various building blocks and among them, numerous elements, a variety of relevant aspects for integrated CCAM development and deployment could be collected. Workshop results give valuable insights to where experience is already available, where to start harmonising and strengthening collaboration and hints on "blank spots", that indicate indeed the importance of certain building blocks but also the missing knowledge and competences (so far).

For enabling the integrated and safe deployment of CCAM, **Digital Infrastructure & Connectivity** was one of the most discussed topics during the workshop sessions. It covered vehicle-to-vehicle as well as vehicle-to-infrastructure (both together "V2X") communication, especially dealing with the currently highly relevant aspects of ITS-G5, cellular networks and hybrid communication. However, it was agreed that agreements towards common definitions (e.g. for hybrid networks) approaches and standard interfaces (for digital infrastructure) on European level are still missing and need to be defined, i.e. agreed upon. Flexibility and openness should be a prerequisite when establishing a harmonised solution. Not just during the HLM, but also within other transnational working groups (e.g. EU-JP-US WG, EU ITS networks) it has been agreed, that there is an urgent need for clarification when it comes to digital infrastructure issues. Prior to the deployment of V2X communication components (in vehicles or at the infrastructure), Member States are required to contribute to the provision of a digital repository of roads and the clarification (and definition of minimal acceptable standards) of Operational Design Domains (ODD). Other aspects are strategies for data management (and processing) as well as efforts in creating suitable frameworks for ensuring (cyber) security and handling privacy issues. Digital Infrastructure & Connectivity strongly correlates with other economic sectors such as the communications sector or developers of electronic components.

The public body, i.e. politics and operators / providers are required to define responsibilities (among actors, actions to be taken, and financing) and set frameworks in order to facilitate new operation and business models while at the same time mitigating financial investments for (physical) infrastructure. First efforts have been already achieved by introducing road infrastructure support levels for automated driving (for the highway network). The following Table 1 highlights activities to be taken up by Member States and being supported by advocacy platforms in order to achieve further efforts on European level.

Table 1: Highlighted activities: Digital Infrastructure & Connectivity

What?	How?	Who?	Supported by
Common standards for operating CCAV[1]	Definition of ODDs	CEN	Member States
Identification of infrastructure needs and classification of ODDs	Digital Repository of Roads	Road operators, Member States	CEDR, POLIS, EU Commission
Ensure standardisation, continuity and interoperability for automated systems	Roadmap for Infrastructure	Member States, EU Commission	CEDR, FEHRL, ERTRAC, EU Commission

Another important aspect for integrated CCAM is **Traffic Safety**. Of course, the topic of traffic safety should be a pre-requisite of a mobility system but is also strongly interrelated with the provision of V2X communication networks and the operability of connectivity, but also with user acceptance and user behaviour. Other important aspects are again ODDs (and safe system operations) as well as vehicle type approval (What are the vehicles? Which vehicle designs are needed?), considering active and passive safety. Especially during the upcoming years, i.e. the transition phase from conventional vehicles to CCAV rules for mixed traffic should be established and transnationally aligned. Therefore, operators and the public sector should be actively engaged in allocating responsibilities and establishing competences for various safety issues. First actions should cover at least the definition of requirements of a "safe system" (KPIs for enabling safety assessments), the implementation of trustworthy entities (e.g. for verifying ODD or vehicle types), setting up fall-back levels (for system weaknesses / breakdowns) and performance based safety regulations (e.g. due to rule adherence). Another crucial aspect is the issue of crashes and its documentation, either for test purposes or in real environments. It can be assumed that there will be new types of crashes and risk compensation (e.g. varying between vehicle types and ODDs to be used), also with effects on the traffic rules and punishment laws. Hence, Table 2 gives examples of activities for traffic safety improvements for the upcoming year in order to ensure safe and integrated transport systems with CCAV.

Table 2: Highlighted activities regarding Traffic Safety

What?	How?	Who?	Supported by
Deploying safe, new vehicle designs	New approaches for type approval	EU Commission	ACEA, CEN, CLEPA Member States
Having an idea of a "safe system"	Define KPIs, validating through test data analysis	Traffic Safety Boards	FERSI
Establishing trust in the system and its elements	Implementation of trustworthy entities	Member States	FERSI, UITP, Road operators

In order to measure safety and develop the transport system, tests of CCAM are indispensable. Under safe conditions and by complying with certain institutional and legal provisions tests of new technologies and functions should be enabled and documented / observed (esp. vehicles, transport users and the surrounding environment). In this matter, Data & Reporting represent another important building block for the current status of CCAM. With the new release of the FESTA Handbook (updated and maintained by FOT-Net and CARTRE) methodologies for field operational tests also addressing automated road transport are provided and may also be useful on national level for approaching a rather harmonised way of testing and reporting. Governmental institutions may get in contact with each other from time to time for experience sharing and knowledge exchange on success and failure factors of implemented frameworks. The need of having a harmonised approach for testing and reporting (incl. data collection) was strongly expressed during the HLM in Vienna, especially when it comes to comparable tests and open access test data (for research and development purposes). A differentiation between (a) data for developing the system (and measuring the quality of the transport system), (b) data for safety validation (and measuring benefits and impact), and (c) data for operational use was suggested. Nevertheless, a common European approach for implementing, operating, recording, analysing, and comparing tests is important on national and international level. Furthermore, data and reporting also forms the basis of trust and enables the modification of regulations (due to evidence based best practice examples). As already in discussion on EU Commission level, the Single European Platform for CCAM may represent an appropriate framework for documenting pilot tests / trials and data / experience sharing. Indeed, this activity should be strongly supported by Member States and actors providing practical experience.

Table 3: Highlighted activities regarding Data & Reporting

What?	How?	Who?	Supported by
Harmonised testing and comparable data reports	Single European Platform	EU Commission	Member States

The implementation of testing may cover all building blocks, even if only some of them are actually addressed in test environments or research projects. An appropriate instrument for testing technology aspects but also its integration in the real environment, i.e. the transport system and the interactions with vulnerable road users are Living Labs. It was a well-mentioned best practice example during the HLM and strongly interrelates with the framework of flexible and experimental legal frameworks (e.g. sandboxes) for testing integrated CCAM measures. Learnings and knowledge can be generated on different levels: conception, organisation, regulation and evaluation. An outlook to "legal moonshots", i.e. sandboxing is given in the subsequent chapter. Furthermore, **User Acceptance & User Interaction / Experience** can be observed from different perspectives

Yet, not all building blocks, i.e. thematic issues were covered during the two intense workshop days. Nevertheless, this report should provide some guidelines for where to continue discussions and set the focus during the upcoming High Level Meetings and ongoing activities. A very crucial but kind of neglected building block during current trials and projects are **Business Models**. Discussions on this building block were not characterised by previous experience or best practice examples, but rather by complaining about lacks of harmonisation and data/information. First steps for launching new business models should be a framework that ensures fair competition between service providers and the implementation of coherent service standards - most likely established by the public body. A crucial aspect in this case is the shared responsibility among actors and the coordination between the public and private sector. Subsequently business models that most probably be driven through public-private-partnerships and collaboration among providers will be put onto market. However, most likely business models are developed and established by the private sector. Here, policy makers are demanded to reflect onto this development and be aware of its important value creation perspective. At the moment, the transport market is not integrated and the involvement of public transport providers in CCAM deployments is lacking behind. Cooperation needs to be more successful and incentives should be provided. However, this process will also need a comprehensive dialogue tackling the question, what is the responsibility of a city / public transport provider and what exactly means "integrated"? Considering this, public events such as the citizen dialogue provide a suitable platform for also involving transport users and inhabitants of a city into the deployment of CCAM and hence, establishing a better (more profound) understanding and higher acceptance of the desired mobility services (shared, connected, automated, low-emission etc.) of the future.

But besides this also the **dialogue between the public body and the industry** is highly needed (and recommended). Thanks to the systematic approach through the building blocks, industry can be addressed accordingly. In this matter, the establishment and maintaining of a process (for keeping the dialogue between the public body and the industry) is the most

important aspect for now. Additionally projects and platforms should be constantly consulted advisory. Hence, this will also contribute to a more decisive framework for future business models, by achieving a joint framework of responsibilities and win-win situations with huge benefits.

Legal Moonshots

A specific aspect of the Vienna debate should be highlighted: how can we create an effective regulatory and institutional environment and also build legal sandboxes for future tests of new technologies and use cases? Indeed, in the survey conducted prior to the meeting 75% of respondents named the legal framework as the most important issue which needs to be addressed to create efficient and effective testing environments – similar to the approach that is provided by the Canadian government. Across the pond, policy makers intend to establish a stable framework covering stakeholder engagements, non-regulatory tools and guidance, regulations and standards as well as laws. During the third workshop at the HLM the participants were guided to turn their discussion on the legal and institutional frameworks. Discussions were not limited to certain standards or laws but also focused on institutional settings and guidance tools. The objective was to identify general frameworks that are necessary for trials on integrated automated and connected transport systems. Discussions were based on identified legal and institutional challenges (see Figure 3) and participants again contributed with their knowledge on ongoing practices in their country / project / trial.
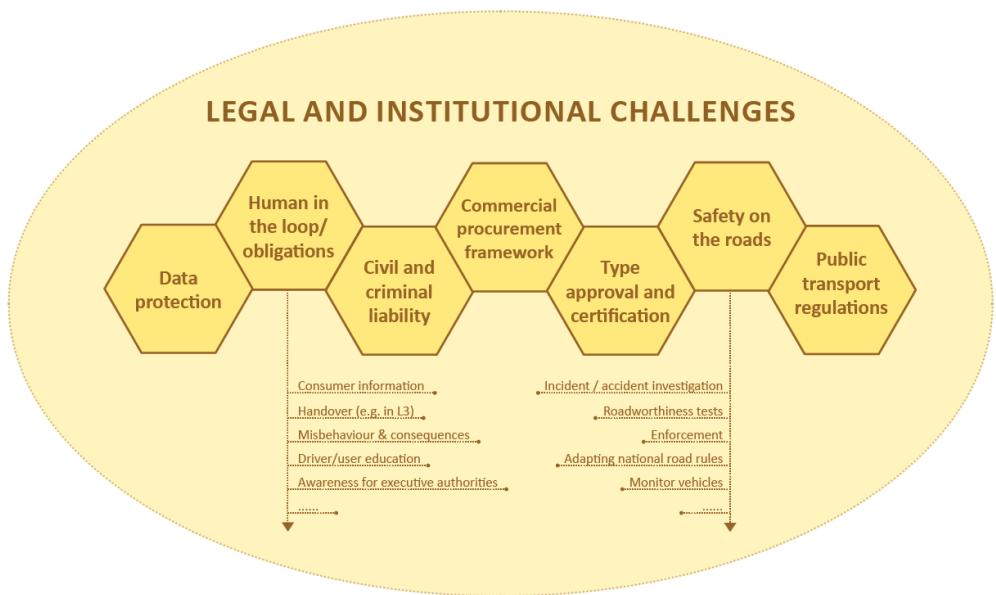
Figure 3: Legal and institutional challenges for CCAM

Similar to the building block workshops, insights on the most crucial aspects within the field of legal and institutional frameworks could be found during the HLM. Most of the ongoing trials and projects are focusing on safety on the roads. Other aspects such as data protection, human obligations ("human in the loop"), civil and criminal liability a well as type approval and certification contributed to lively discussions. What is definitely missing at the moment but supposed to be tackled within the projects AVENUE and ARCADE.

Currently, the debate on automated and connected mobility still revolves around the necessary incremental changes to legal provisions which are very challenging to align. It is clear that new technologies often do not comply with existing standards and rules. Everyone agrees that mobility innovation in Europe needs to be supported. It is now necessary to develop regulations that keep up with the increasingly fast pace of innovation whilst at the same time ensuring that (1) innovation is not happening in a lawless environment and (2) technologies are not supported for "technologies' sake" but for their potentially positive impact on a sustainable transport system. "Legal sandboxes" could provide an approach to try out new technologies and allow tests to deviate from a multitude of current provisions. Some Member States are already experimenting with such frameworks which made for an interesting final debate. Figure 4 briefly shows the results of the Sandboxing session at the HLM.
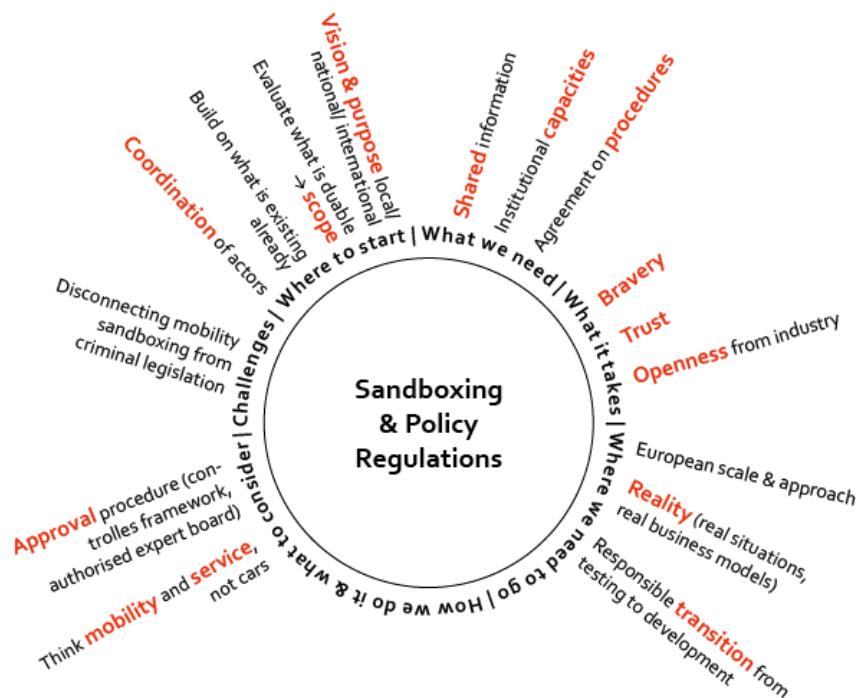

Figure 4: Sandboxing – Results from the HLM workshop

In the Netherlands, an Experimental Law was developed in 2018. From 2019, the law will come into force and in the future will allow the driving of (partially) automated vehicles without driver in the vehicle (but outside, via remote control), formulated a new definition for the term "driver" and enables new test options for highly automated and fully automated vehicles. In Sweden regulatory changes that are necessary to test and further develop automated vehicles on the roads are proposed. This covers the simplification of testing procedures, new rules for accountability, new definitions of automated vehicles, and data storage requirements. In June 2019, first regulatory changes will come into force.

Making tests possible and simultaneously verifying and calibrating legal regulations is one of the most addressed issues at the moment. Simple and harmonised rules that are also recognised by other EU countries are claimed. This also applies to national test regulations and their visibility and clarity to foreign testers / countries. Tools such as codes of practices, Q&A for testing and single contact points are assumed to be success factors for developing and deploying integrated CCAM solutions.

Conclusion & Follow-up activities

During the HLM we were able to broadly and systematically discuss integrated CCAM by using building blocks and moderated workshop sessions. Hence, when summarising the results of the 4th HLM in Vienna, we can provide an overview on valuable lessons learnt of our diverse and fruitful discussions, so directions for follow-up activities could be retrieved. The collected best practices and experiences among all participants enable new visions and approaches for the public sector and institutional capacity.

A common pathway for policy makers

Alongside the major building blocks and following the approach of "first things first", concrete and coordinated actions should be taken up by Member States, the European Commission, Platforms as well as funded research projects within the upcoming years. An important task is to define a common (and specific) pathway for policy makers and public authorities as well as responsibilities (e.g. EU, Member States, Cities) and time horizons (rather short-term, e.g. 2-5 years) for its implementation that need to be agreed upon.

Analogous to "Day 1 services" from the C-ITS approach, CCAM elements need to be elaborated and implemented in a reasonable chronological order. In a first step the definition of ODDs and the adaption of ISAD could be achieved, as well as the authorisation of new type approvals. Furthermore, the definition of new standards for cross-site testing (and its recognition) appears appropriate to be tackled within the upcoming years and lead, i.e. accompanied by the public sector.

Be specific on goals and how to measure impacts

Moreover, aims for providing new offers at the supply side and the definition of KPIs for measuring efforts and impacts are needed in order to find (potential) trade-offs and relations between safety, technological functionalities, efficiency, costs and societal change. It is not just about the technological readiness but also about social practices and approaches of how to integrate these aspects in our future developments and deployments of CCAM.

Effective operational frameworks to support sustainable business

A good starting point for addressing these aspects are on-going European projects where policy makers could take the chance of ensuring a policy dialogue and hence, learning. In terms of efficiency, frameworks for joint operations for services as well as the infrastructure perspective should be developed: How will infrastructure be used in the future? What are the operational models and responsibilities? Other than now, where the contradiction between conventional taxi services and platform-driven ride-hailing services lead to silo solutions in our mobility system, adequate frameworks for integrated services and air competitive conditions need to be created. Among this, public and private responsibilities alongside new emerging business models as well as societal effects and benefits of new models. From a public sector perspective it should be crucial to again differentiate between the trade-offs and the pay-offs.

A common knowledge base on building blocks

In order to move forward with this systematic approach gained through the Vienna HLM, further knowledge should be generated and provided by constantly enriching the building blocks and elements with existing approaches and experiences. Here, especially the Member States, but also the EU Commission as well as research projects are demanded for also sketching and visualising relations of major elements, weighting the elements in accordance with their impacts e.g. on specific use cases.

Effective frameworks for experiments

Regarding the proposed and discussed frameworks for experiments ("sandboxes"), a clear and common understanding of the actual intentions of this instrument is required. Experimental frameworks combine legal laboratories with physical / urban test environments and labs. It is crucial to know, that this instrument is not about "wildcards" for trials or project schemes being tested or deployed on public roads without having learning effects for the public sector. It is rather about complex and demanding use cases that legitimise exemptions and providing learning loops for both – the tested technology and its eco system as well as the legal and institutional framework. At the same time concepts for trustworthy entities which are responsible for running / using a "sandbox" need to be provided.

Aim for consistency and interoperability

Among all mentioned recommended actions and approaches, consistency and interoperability across Member States but also on national level are essential when following the "first things first" approach for working on elements such as physical infrastructure planning and asset management, operations, maintenance, traffic control, active DTI and data sharing. Considering this, multi-city deployments and corridor-connection as well as the

strengthening of functional and institutional capacity are dependent on common systematic approaches. With reference to the public private dialogue in the US, perspectives that should be considered for business cases, the allocation of responsibilities and measuring of benefits cover visioning of future systems, educational models, outreach strategies, planning and investment, design and safety, DTI and data as well as operations and maintenance. Still, learning from and with each other is essential, also beyond the joint meetings but throughout other on-going cooperation and platforms / projects.

Follow-up activities

That being said, organisations and platforms represented at the HLM in Vienna, such as UITP, ACEA, ERTRAC, FERSI, POLIS etc. as well as projects and coordination actions on EU level, such as ARCADE, AVENUE, Levitate etc. are demanded to take up activities and raise awareness and visibility among their stakeholders considering the different building block elements for CCAM. Together, we need to define processes for implementing certain building blocks in European projects (e.g. ARCADE) and find processes and responsibilities on how to provide quality assurance. Member states are asked to provide information on elements that are already available and could enrich the building blocks and practices.

The next HLM will take place in Lithuania in June 2019, followed by Spain in autumn the same year.

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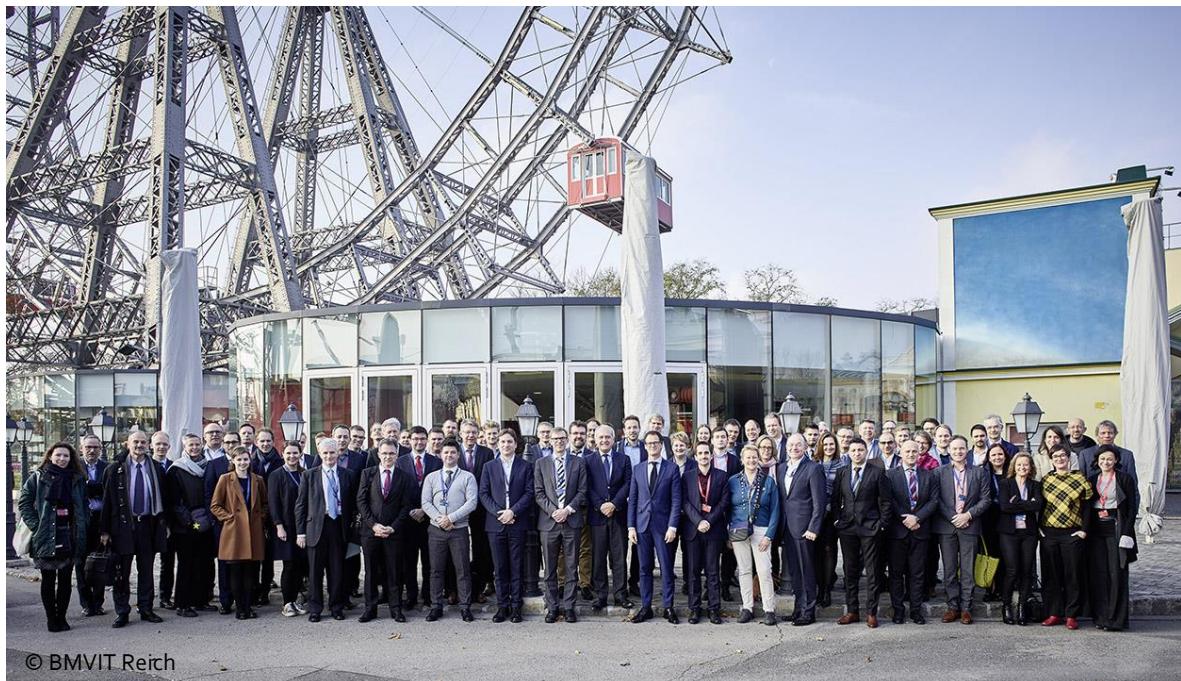
Thank you for taking CCAM to the next level: Safe, sustainable & integrated mobility!

List of Tables and Figures

Glossary

CCAM   Cooperative, connected and automated mobility

CCAV   Cooperative, connected and automated vehicles

C-ITS   Cooperative intelligent transport system

DTI   Digital transport infrastructure

HLM   High Level Meeting

ISAD   Infrastructure support levels for automated driving

ODD   Operational design Domain

ANNEX

(1) List of Building Blocks and Elements

(2) Legal and Institutional Challenges

(3) HLM Survey Results

BUSINESS MODELS & SHARED VALUE / RESPONSIBILITY	- Cross Sector / New Partnership - Involvement of Road Operator - Involvement of Police - Niche Market Development - Policy Principles - Pricing Aspects - Shared Mobility Perspective
COMPONENTS & VEHICLE TECHNOLOGIES	- AI - Cameras - Customer Interfaces - Charging - Lidar - Positioning - Propulsion - Radar - Sensor Fusion
DATA MANAGEMENT PLANS	- API - Back Office Services (Billing, Personalisation) - B2B (OEM, TNC, Insurance, Fleet) - B2G (Municipalities, Federal Govs.) - B2I / I2B (Road, Operators, TMC, …) Collect & Analyse Test Documentation - Data Sources Combination (FOT, Test, Accident) - Interoperability with Other Modes - Open Data & Training Data - Open Standards Data Categories - Test Data Platform - Vehicle Black Box
DIGITAL INFRASTRUCTURES & CONNECTIVITY	- 5G - Cloud Services - DTI Inventory Map DSRC (Dedicated Short Range Communication) - E-Horizon - HD Maps - ITS-G5 - LTE
DIGITAL SECURITY & PRIVACY	- Certificate Policy (CP) - Data Protection & Privacy - Safety & Security Concepts - Security Infrastructure (PKI,…) - Security Policy (SP)

INSTITUTIONAL CAPACITY	- Capacity Building with Institutions - Institutional Framing & Responsibility (One-Stop-Shop) - National Contact Point - Policy Intervention Tools / Steering - Stakeholder Management / Balancing Interests - Trustworthy Entity
LEGAL & REGULATORY & INSTITUTIONAL FRAMEWORK	- Commercial Law - Competition Law - Driving License Vehicle Type Approval - Operational Duties - Procurement Law - Spatial & Time Limits - Test Approval - Test-Pre-Conditions - Use Case Definition - Vehicle Registration
LIABILITY & INSURANCE	- Enforcement - Inspection - Public Transport License - Product Liability - Reliability
OPERATIONS & MANOEVERS	- Dynamic Routing - Mixed Traffic - Route Planning - Scalability - Scenario Definition, Evolution & Integration - Test Planning - Traffic Management Plans - Traffic Situation Analysis - Trial Guidelines
PHYSICAL INFRASTRUCTUE LAYOUT & PLANNING	- Curb Usage - Lane Markings - Link to Energy, Land Use, … - Network Planning - ODD (Operational Design Domains) - Reference Points - Road Design Standards - Stations & Stops - SUMP Integration - Test Site / Test Track (Topology/Topography)

ANNEX (1) List of Building Blocks and Elements

REPORTING	- Final Reports - Media - On Demand - Periodic Reports - Standardised Reporting - Who Reports to Whom? For What Purpose?
RISK MANAGEMENT & RISK MITIGATION	- Risk Assessment - Risk Mitigation Plan - Risk MM Strategy - Site Assessment - Specific Methods/Processes - Training - Weather, Climate, Environmental Conditions
SPECIFIC BENEFITS & IMPACTS (EVALUATION KPIs)	- Behavioural Aspects & Social Acceptance - Crash Reduction - Environmental Aspects - Evaluation Guidelines - Impact Assessment (Environmental/ Spatial/ Economic/ Mobility System ...) - Simulation - Target Oriented Monitoring Guidelines - Traffic Flow - User Acceptance
TRAFFIC SAFETY	- Active Safety - Disengagements - Passive Safety - Public Transport - Road Safety Audit - Traffic Safety KPIs - Vulnerable Road Users
TRAFFIC & TRANSPORT SERVICES	- Booking & Ticketing - C-ITS D1 - C-ITS D1.5 - Fleet Management - In-Vehicle Services - Incident MM - MaaS Integration - On-demand Service Provision - RTTI - Trip-Planning

USER INTERACTION & EXPERIENCE	- Customer Interfaces - Driver Training - Operator Training - Public Awareness & Social Interaction - Service Level Agreements - Trust - User Experience - User Groups Integration (Handicapped / Children …)
VEHICLE CONCEPTS & INTEGRATION	- Compensation Measures - Transport System (Other Modes) - Vehicle Capabilities - Vehicle Features - Vehicle Features / Limitations - Vehicle Types M1/M2

ANNEX (2) Legal and Institutional Challenges

DATA PROTECTION	- Data Ownership (Who, …)
	- Data Storage (Blackbox, …)
	- Ethical Standards (AI, Robots, …)
	- Security and Privacy
ADAPTING NATINAL ROAD RULES	- Defines Areas for AVs?
	- Interaction with Other Road Users (e.g. VRUs, …)
	- Parking, Road Profiles, …
	- Specific Legislation Addressing AVs?
	- Speed Limits, Distances, Priority Rulings, …
CRIMINAL LIABILITY	- Aggravated Offences
	- Awareness of Executive Authority
	- Methods for Owner Identification
	- New Driver Obligations?
	- New Forms of Mischief and Crime? (e.g. Mischief of Sensors, Hacking of Other Vehicles, …)
	- New Sanctions Needed?
	- Offences Regarding Driving (User vs. System)
	- Rules for Reporting Accidents
	- User Fit to Drive
CIVIL LIABILITY	- Clear Definition for Software
	- Data Retention (Blackbox)
	- Human Driver = System?
	- Insurance and Maintenance
	- New Forms of Consumer Rights / Protection
	- New Forms of Liability
	- Product Liability
HUMAN IN THE LOOP / OBLIGATIONS	- Awareness for Executive Authorities
	- Consumer Information
	- Driver/User Education
	- Fallback?
	- Handover (e.g. in L3)
	- Misbehaviour & Consequences
	- Secondary Activities and Conditional Automation
	- User/Driver Obligations (Inside/Outside the Vehicle)
TYPE APPROVAL & CERTIFICATION	- Components and System
	- National vs. International

	- Safety Assurance System
	    o Self-Certification
	    o Third-Party Testing
	    o Simulation and/or Road Verification

ANNEX (2) Legal and Institutional Challenges

SAFETY ON THE ROADS	- Different Standards for Existing Road Networks vs. Dedicated Roads (ODDs)?
	- Driver Education & Training
	- Enforcement
	- Incident / Accident Investigation
	- Interaction Between Vehicles and Road Users
	- Misbehaviour of Vehicles
	- Monitor Vehicles
	- Recalls
	- Roadworthiness Tests
	- Standards for Communication (e.g. C-ITS)?

ANNEX (3)

Automated Mobility Survey Results

for the High Level Meeting on

28-29 November 2018 in Vienna

Survey Participants

- 60 participants

- 35 returned surveys

- Type of organisation:
  - 60% Governance
  - 40% other type
    (e.g. association, research,…)

→ *HLM organisations and countries are well covered by the survey participants.*

Which of the following strategic measures are being taken in your country/ by your organisation on Cooperative, Connected and Automated Mobility (CCAM)?

Most often mentioned

Chart data:
- Pilot Testing: 80%
- Legal Framework: 70%
- Action Plan: 60%
- National Strategy: 60%

→ ca. $\frac{1}{3}$ use Standardised Methods for Testing

ca. 50% Specific on CAD

ca. 50% Combined with ITS/5G

e20
u18
·at
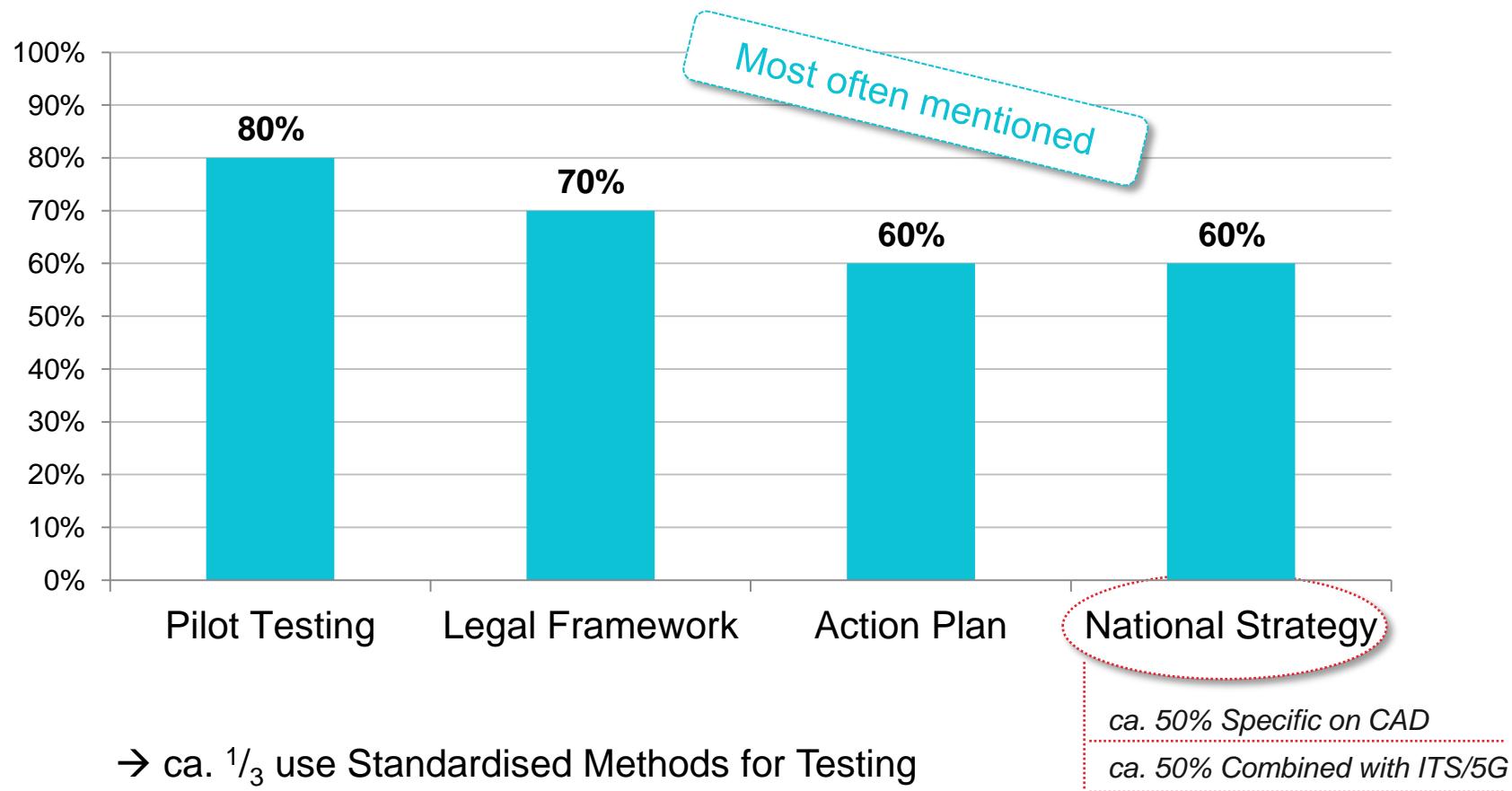
Selection of (non-)relevant aspects regarding pilot testing

Highly / very relevant	Somewhat / not relevant

**Highly / very relevant**

- Traffic safety

- Legal/ regulatory/ institutional framework

- Components/ vehicle technology

- Digital infrastructure/ connectivity/ security

Somewhat / not relevant

- Mobility behaviour/ Technology acceptance

- Data Management/ Application programming interface

- Operations/ Manoeuvres

- Sustainable Business Models

Which of the following areas have been mainly addressed in your pilot testing activities?

Vehicle & Infrastructure Technology: main activites 58%, some activites 25%, no activites 17%

Service Operation & Planning: main activites 28%, some activites 50%, no activites 22%

User Interaction & Mobility Behaviour: main activites 22%, some activites 50%, no activites 28%

Frequency in %

- main activites
- some activites
- no activites
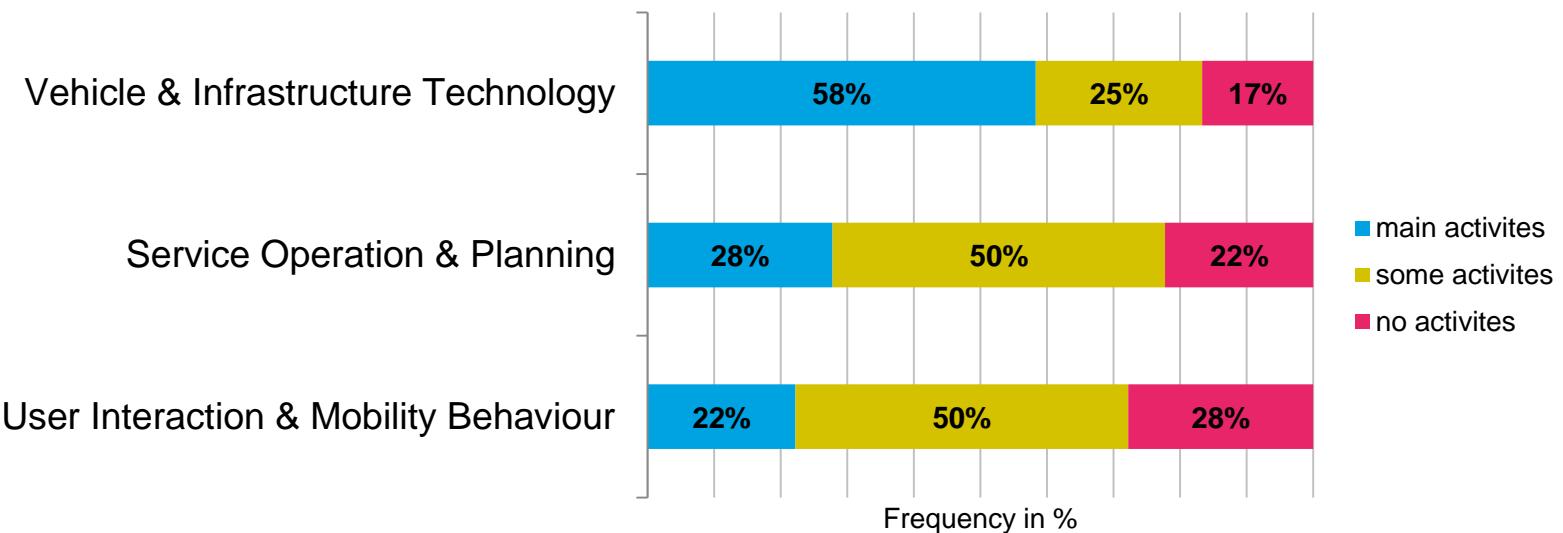
What are the most important issues which need to be addressed to create efficient and effective testing environments?

→ Important issues to be addressed:
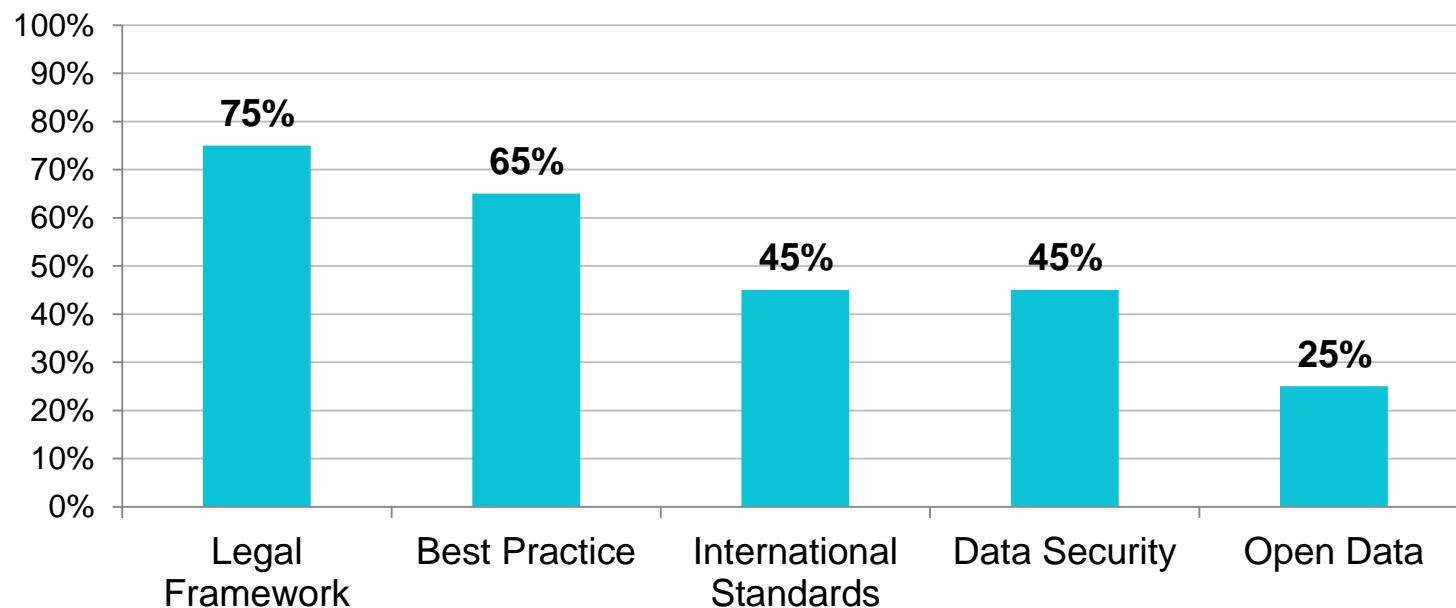
Plans to adopt the national legal framework
## … for testing or experiments

- Allowing tests without a driver

- Common rules for automated driving including liability chain

- EU Recommendation

- Mandatory administration decrease

- Swifter authorisations
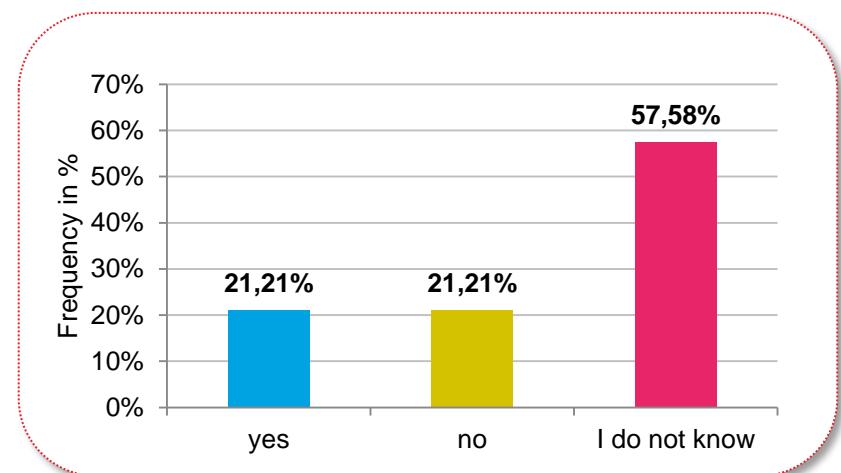
Plans to adopt the national legal framework
… for operations and deployment

- AI (artificial intelligence) legislation

- Punishment law, infrastructural, data, EDR etc.

- Development of 5G networks

- Legal framework to allow for open road, commercial introduction of automated vehicles

- New MFF* proposals

- Language used in road traffic act
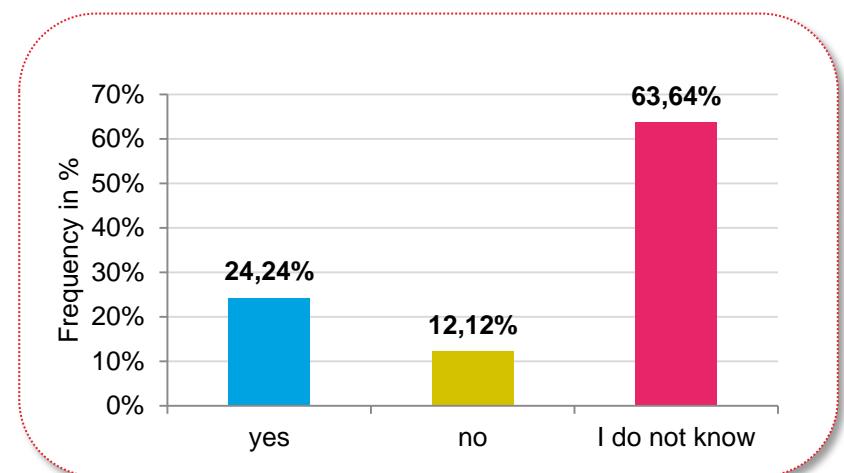
Multiannual Financial Framework – European Commission

What is your motivation contributing to the HLM?

Chart — Frequency in %:
- Knowledge Exchange (Testing Experiences): 84,85%
- Networking: 75,76%
- Consolidate Testing Activities on a European Level: 51,52%
- Define the European Perspective on Automated Mobility: 78,79%
- Other: 18,18%

Legend:
- Knowledge Exchange (Testing Experiences)
- Networking
- Consolidate Testing Activities on a European Level
- Define the European Perspective on Automated Mobility
- Other

Other
- Establishing a common understanding of CCAM
- Gathering input for national plan and initiatives on CCAM
- Active contribution towards European leadership on CCAM
- Highlighting the need to involve cities and regions in debates
- Sharing knowledge regarding the impact of legal framework

Thank you for participating!

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