



CEDR Call 2017 Automation: Final Conference
November 6th, 2020

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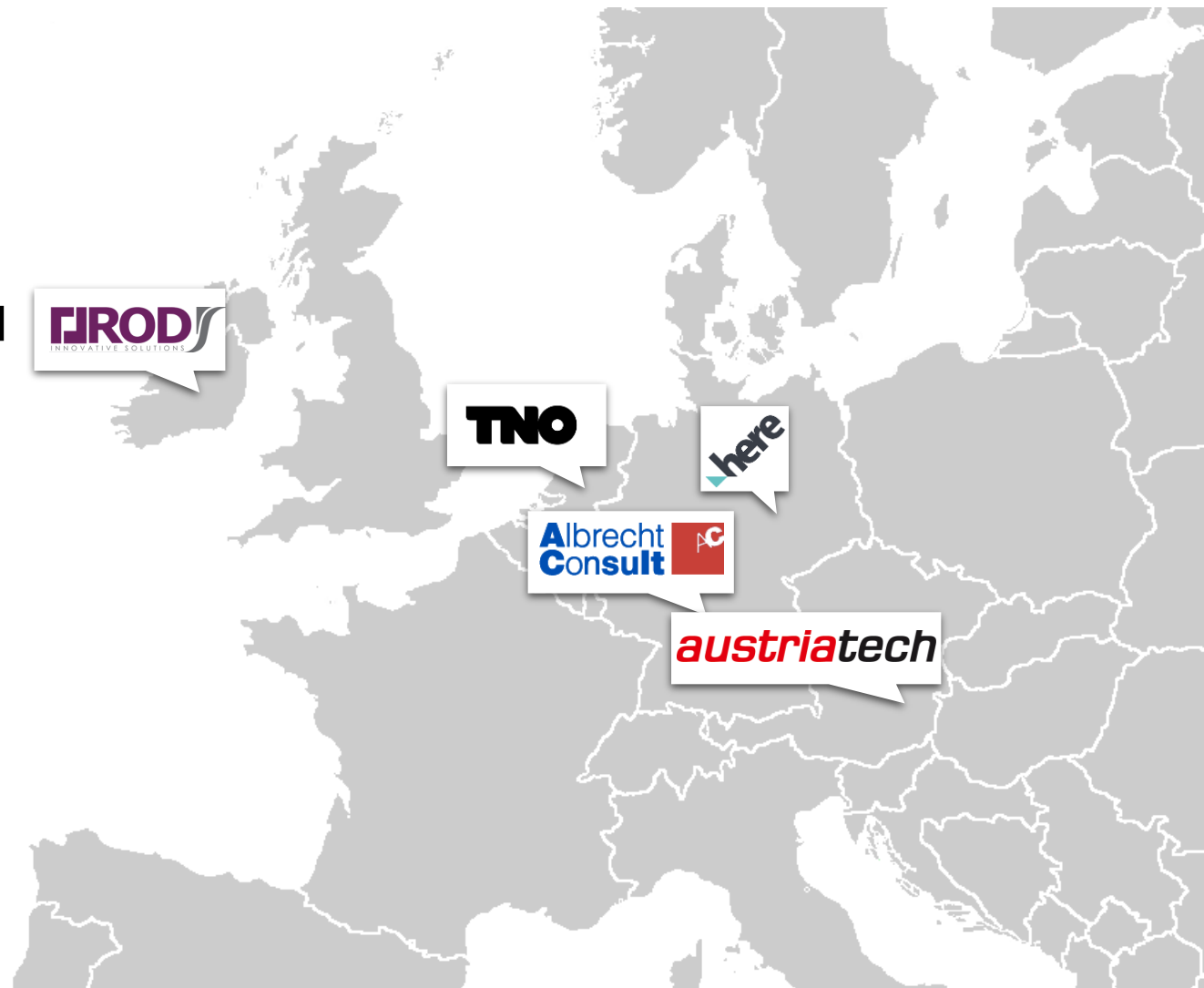
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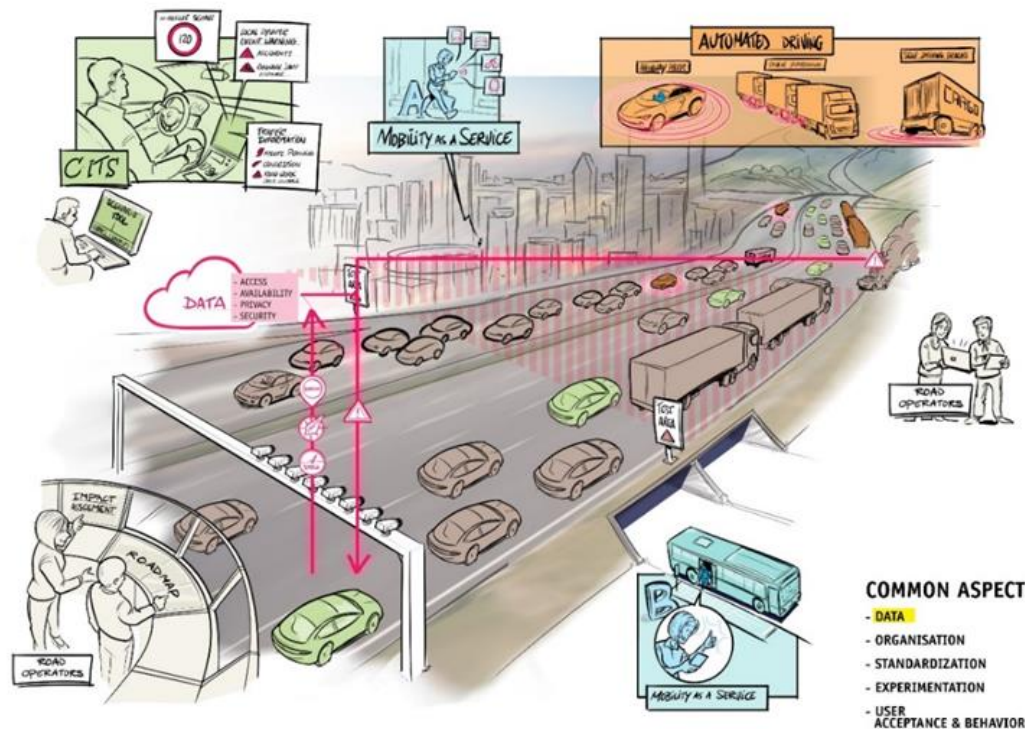
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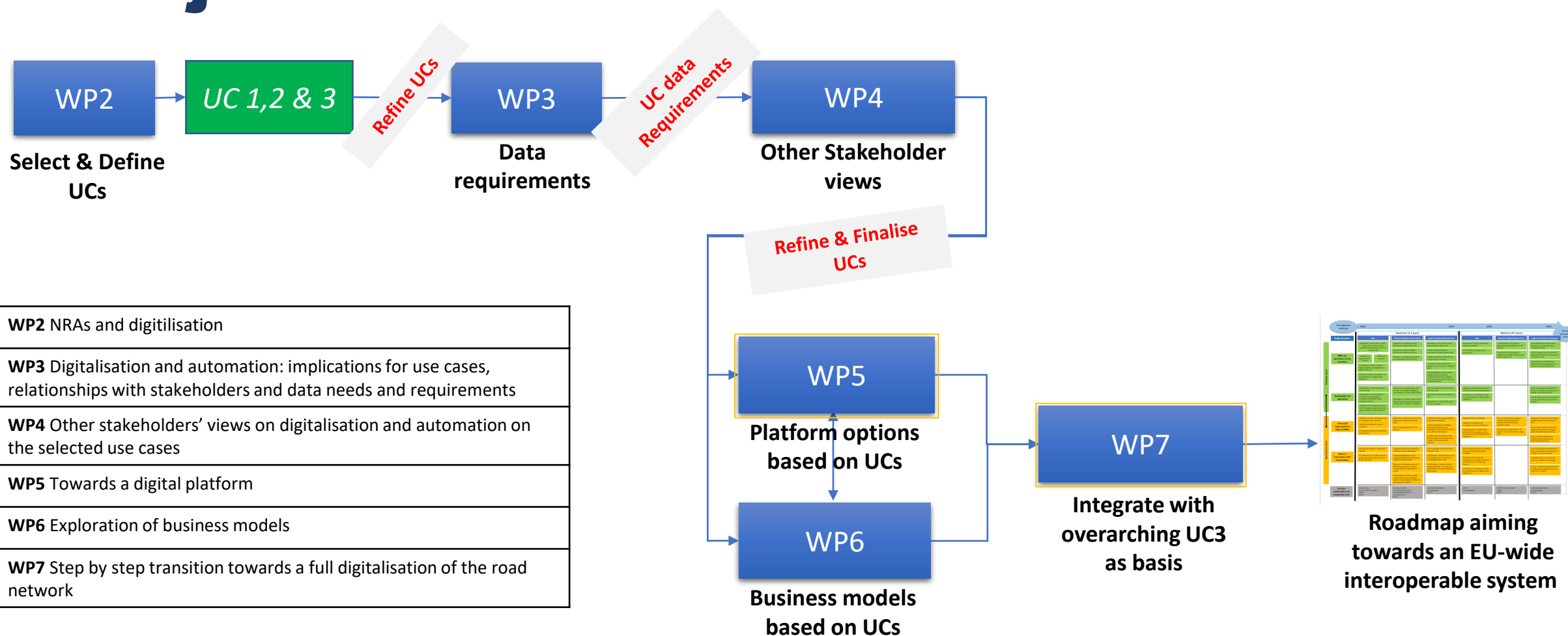


Objectives

Provide a concept for a technical data-exchange platform,
with corresponding business models for its exploitation,
in light of the step-by-step digitalisation of NRA road assets,
and current and future relationships with stakeholders.



Project Evolution



WP2 NRAs & Digitalisation: Findings (1/2)

Finding	Digitilisation	Automated Driving
Safety is critical in considering all actions	✓	✓
Different Countries at various levels of planning, development & Implementation	✓	✓
Roles & Responsibilities Unclear	✓	✓
Lack of Collaboration between actors and lack of understanding of each others needs/requirements	✓	✓
Lack of trust between actors	✓	✓
Lack of European Interoperability	✓	
Business Models difficult to define (insufficient facts, empirical proof etc.)	✓	✓
Significant change required in Operations	✓	
Investment uncertainties (How much to invest, what to invest in?)	✓	✓
Technology available but need to understand which ones to use	✓	

WP2 NRAs & Digitalisation: Findings (2/2)

Finding	Digitilisation	Automated Driving
Standards and Regulations (e.g. Legal) need further development	✓	✓
Upskilling/new skills required for workforce though requirements uncertain	✓	
Insufficient Regulations in respect of Automated Vehicles (e.g. what is their ODD?)		✓
OEM's unwillingness to share IP		✓
Liability/legal issues (who is responsible if incident – the driver, the vehicle, the data provider?)		✓
Lack of clear road map and timeframe		✓
Social/Public acceptability needs to be addressed		✓
A lot of research ongoing but more needed as not all possible use cases/scenarios tested.		✓
Uncertainties from mixed traffic conditions		✓

WP2 NRAs & Digitalisation: Recommendations

- **Roles and Responsibilities** of the various actors should be clarified
- **Collaboration** between NRA's and other relevant actors through the NRA's direct involvement in projects with these actors. Through collaboration 'trust' will be built between the actors, particularly in relation to data. Without this trust, realising the full benefits of Automated Driving may not be realised. In this regard a trusted Third party that evaluates data and quality in a neutral environment could be of benefit
- Eliminating the barriers and mitigating the risks is not the sole responsibility of the NRA's and as such an **Holistic Approach** is required with involvement of all actors, including but not limited to NRA's, Governments, third parties, road operators and other stakeholders
- **Testing** of various technologies and services is a significant prerequisite for the implementation of C-ITS and even more so for automated driving
- **Disparity** in levels of Digitilisation & Automated Driving across countries (planning, development, implementation/deployment) is evident. For a harmonised, interoperable approach all NRA's should develop action plans and have a strategy in place
- **Legislative frameworks** should be put in place to deal with regulatory, standards and legal issues

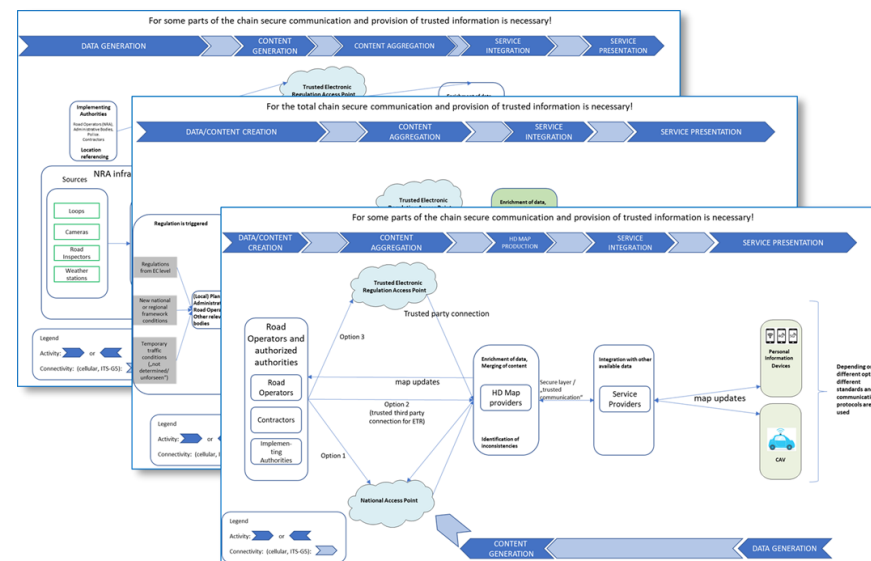
WP3 Digitalisation and Automation: Findings (1/2)

- 3 use cases and focus on data quality criteria and possible levels for Connected Automated Driving

Provision of HD Maps for Automated Mobility
DIRIZON-UC-1
 The provision of detailed mapping in a machine-readable format supports a connected positioning, of the environment. Hence, HD maps are needed for automated mobility.

Distribution of Digital Traffic Regulation
DIRIZON-UC-2
 Distribution of digital traffic regulation becomes more and more relevant for CAM (Connected and Automated Mobility) as well as for other areas such as smart cities.

Infrastructure Support Services for CAD
DIRIZON-UC-3
 Infrastructure support for Connected and Cooperative Automated Driving (ISAD) is digitized information, including representations of the physical environment, to support CAD functioning. Map data could be complemented by physical reference points (landmarks, signs, beacons). This use case provides digital and physical infrastructure support (including traffic management measures) of vehicles in a mixed environment, supporting CAVs by extending their ODD's and improving safety, traffic flow and environmental impacts.



WP3 Digitalisation and Automation: Findings (2/2)

Criterion	Definition
Geographical coverage	Road classification in the road network covered by the service
Refreshment rate	The rate at which the data are updated in the vehicle, regardless if there has been a change in the data provided or not
Availability	Percentage of the time that the service is available with fresh data. Expressed as a percentage of the time
Timeliness/ Latency	the total time between the detection of a change and the delivery to the user
Location accuracy	Accuracy to within a specific distance
Classification correctness	Correct identification of, e.g., a static road element, a vehicle type, event or condition, or a dynamic regulation
Event coverage	Percentage of the actually occurring events which are known to be correctly detected and published by type / class, time and location
Variance	for many or all of the criteria, a variance should be provided
Predictability	use of information in forming predictions (this criterion results from the experience of Service Providers with data provided for Green Light Optimal Speed Advisory (GLOSA)).

WP3 Digitalisation and Automation: Recommendations

- Learn from outcomes of the Proof-of-Concept of the Data Task Force and other pilots: determine additional standards for data exchange, agree on standards for access, and explore where the quality checks need to take place and by which actors.
- Use pilots to refine data needed, data quality standards, implementations and profiles: implementations should be correct, taking into account the coverage and range of communication.
- Engage with OEMs to achieve Operational Design Domain extension of connected and cooperative automated vehicles.
- Consider the use cases in a pan-European context.

WP4 Other Stakeholder's Views: Findings

- **Most important stakeholder groups could be reached** through a web-based questionnaire → 53 participants from 10 different countries
- Over 75% of participating organizations from **large enterprises** (>250 employees)
- **Validation of activities within the proposed process flow diagram** shows that the majority of respondents **agree with the proposed process** for all 3 core topics
- **Validation of relevant data** shows that most respondents **agree with the proposed data** that is needed within the core topics, however, there are **national differences** regarding availability in machine-readable format
- **Additional opportunities and challenges** expected e.g. latency issues (HD Maps)

WP4 Other Stakeholder Views - Recommendations

- **Lack of data availability in machine-readable format**
 - Taking national differences into account
 - Map providers suppose challenges and uncertainty in the meaning of open data and fees for data in different countries
- **Clarification of roles and responsibilities necessary**
 - Collaboration needed
 - Consideration of overlapping roles
 - Role of NAP unclear -> needs to be defined
- **Consensus on data sharing and exchange needed**
 - Clarification whether and which information is exchanged directly between the stakeholders or whether an exchange platform
 - Compliance with standards -> need for standardisation groups

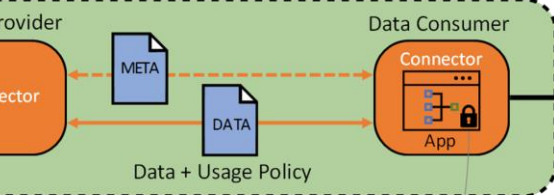
WP5 Towards a Digital Platform: Findings (1/2)

- The current landscape is heterogeneous in technology and preferences
- Increasing data exchange needs, data categories and the variety of stakeholders (beyond road operators, OEMs and service providers) require more than traditional data exchange concepts can provide.
- International Data Space (IDS) concept is a very innovative and industry proven concept and seems to be of high value
- IDS provides a distributed platform concept for secure and trusted data sharing maintaining data sovereignty
- It offers new possibilities to trustful access even sensitive mobility data sources (e.g. fleet data) in order to use them e.g. for traffic condition monitoring, traffic prediction models, future AI applications.

WP5 Towards a Digital Platform: Findings (2/2)

Blueprint for a distributed
European Mobility Dataspace?

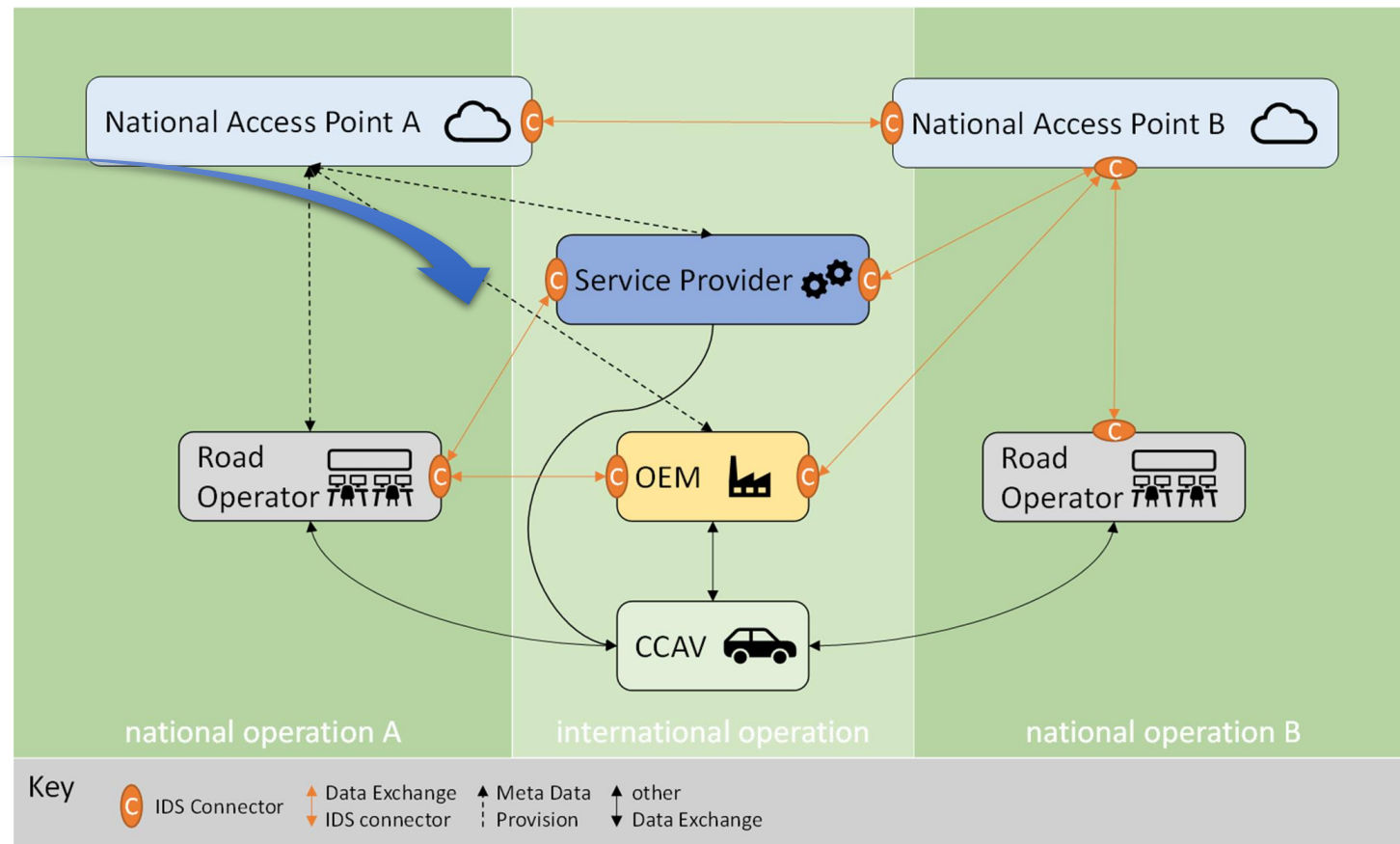
Secure „Data Space“



Data Sovereignty through defined Usage Policy

Option 1: Road Operator as Data Distributor

Option 2: NAP as Data Distributor



WP5 Towards a Digital Platform: Recommendations

- Evaluate the requirements and the feasibility of the IDS concept.
- Learn from national IDS pilots.
The German research project “Mobility Data Space” i.e. is investigating such possibilities by applying the IDS concept on the German NAP.
- Initiate i.e. an IDS-ified" version of the Data Task Force's PoC.

WP6 Exploration of Business Models: Findings (1/2)

- Current landscape is heterogeneous in technology and preferences
- For the full EU-scale UC3 implementation close collaboration with OEMs is needed for car data-and-control. For “CAD-fleet-as-a-Service” future scenario there must be mutual interest.
- Collaborative Networks are needed and their business model options integrate elements from governance and decentralized platform business models
- Implementations can be NRA-dominant (e.g. C-ROADS), market-dominant (e.g. YourNow) or hybrid (e.g. MobiDS).
- Each having pros and cons in criteria like Traffic, Convergence, Governance, Business, European Values and Innovation

<i>Full-scale EU scenarios are for study purposes</i>	NRA-Dominant (NDS)	Market-Dominant (MDS)	Hybrid (HS)
Traffic	Traffic Knowledge Authority	City-level servicing collaboration	Local to global by interoperability
Convergence	"Agree first"	"Big Markets First"	By design Enabling
Governance	NRA-centric	CEO at Joint Ventures Local coordination	Local public private collaboration
Business	Passive: agreed standards	OEM driven Big Tech driven	Local to global by interoperability
European Values	Not in contradiction Limited mandate at NRAs	If market demands	By design Enabling
Innovation	Pilot to standard Pre-competitive & R&D heavy	Customer centric Unknown traffic effect	Decentralized, yet replicable

WP6 Exploration of Business Models: Findings (2/2)

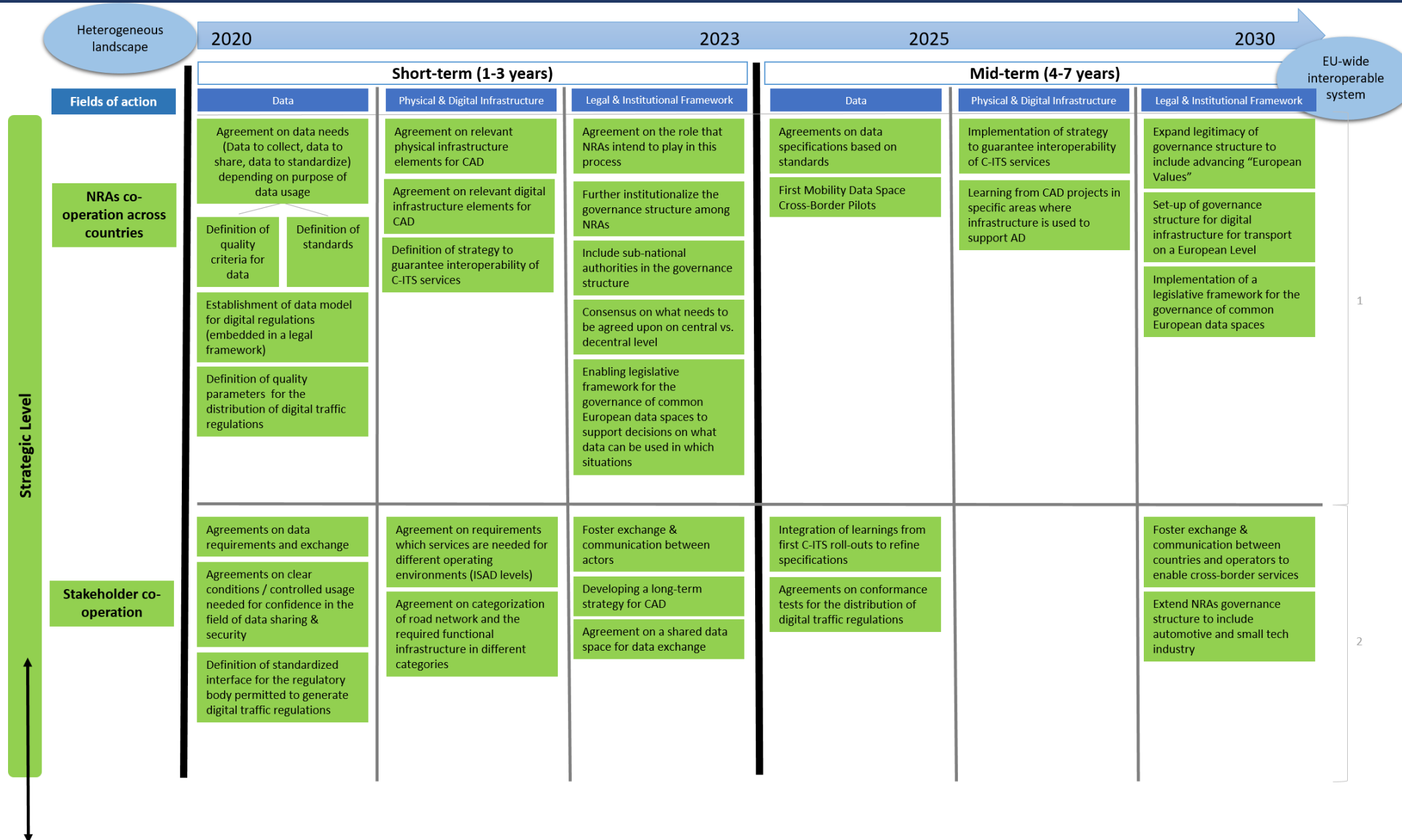
1. Governance structures like C-ROADS provide a EU-wide pilot-to-standard structure.
2. It provides an EU-wide NRA centric governance structure interfacing automotive industry.
3. And is authoritative on traffic and safety management.
4. In the market dominant scenario we observe services, platforms and public-private collaboration at city-level.
5. The hybrid option, MobiDS, provides a scalable / replicable concept (IDS).
6. Governance structures like C-ROADS seem limitedly legitimized for advancing “European Values”, e.g. data sovereignty.

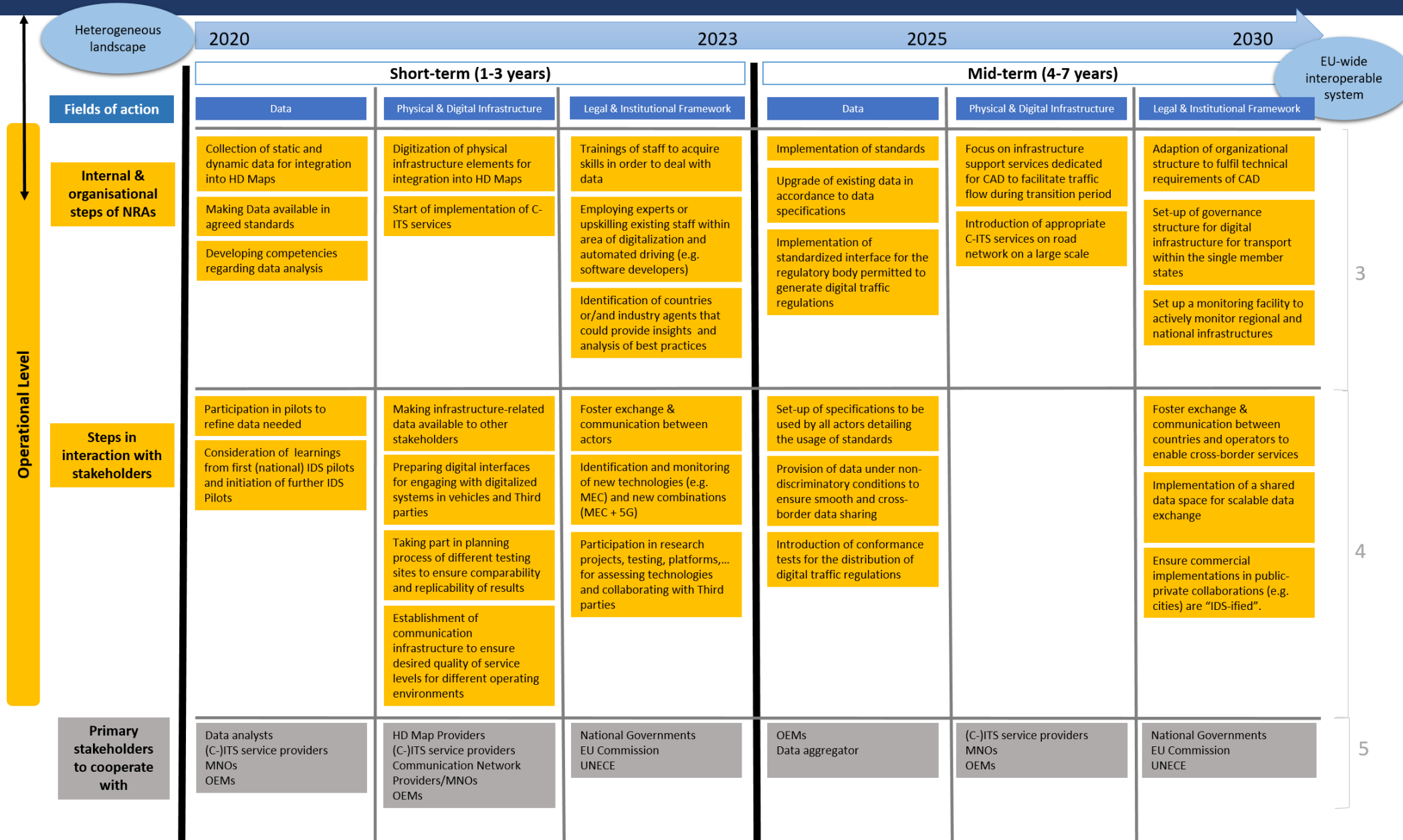
WP6 Exploration of Business Models: Recommendations

1. Further “institutionalize” the governance structure from e.g. C-Roads
2. Ensure pilots are “IDS-ified”, for replicability and sovereignty.
3. Include sub-national authorities in the governance structure.
4. Ensure commercial implementations in public-private collaborations (e.g. cities) are “IDS-ified”
5. Expand legitimacy of governance structure to include advancing “European Values”, e.g. data sovereignty.
6. Extend governance structure to include automotive and small tech.
7. Actively profile and monitor regional and national infrastructures and actively broker upscaling / replication of IDS-ified pilots and (commercial) best-practices.

WP7 Step by step transition: Findings

- **Step by step transition towards full digitalisation of the road network**
→ Sequence of steps NRAs need to undertake (**Roadmap**)
- Starting point: complex, heterogeneous landscape today
- Aiming towards an EU-wide interoperable System (**end goal**)
- Roadmap includes steps on **strategic & operational level**
- Focus on **short- and mid-term actions**
- **3 fields of action:**
 - Data
 - Physical and Digital Infrastructure
 - Legal and Institutional Framework





WP7 Step by step transition: Recommendations

Selection of key actions for NRAs (focus on internal & organisational steps)

1. Data

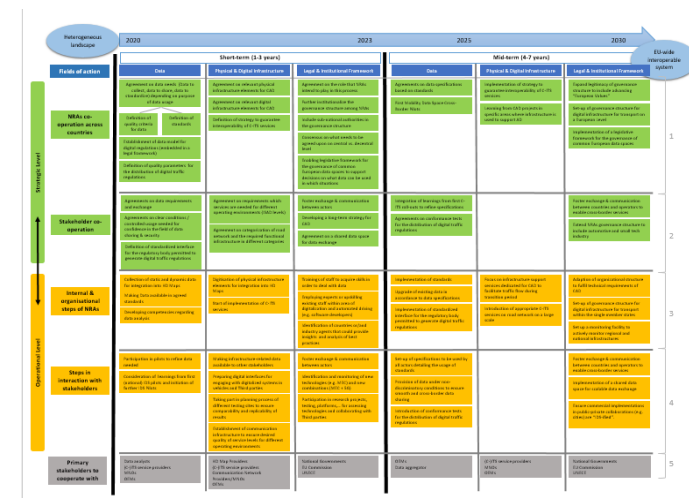
- Make data available (in machine-readable format and agreed standards)
- Build-up competences regarding data analysis

2. Physical & Digital Infrastructure

- Digitise relevant infrastructure elements
- Take part in the planning process of pilots and testing sites
- Categorise the road network and the required functional infrastructure

3. Legal / Institutional Framework

- Enforce communication and collaboration on all levels
- Agree on roles and responsibilities

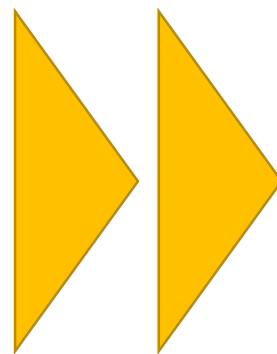


Poll Question

Select all of the following suggestions which you consider to have practical potential

- a distributed and interoperable infrastructure for data sharing and
- a decentral governance model that links national and subnational road authorities, automotive and digital service industry
- to establish a situation in which data can be shared
- to manage traffic flow and safety and services provided,
- whilst maintaining data sovereignty and European competitiveness

is high.



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COMMON ASPECTS

- DATA
- ORGANISATION
- STANDARDIZATION
- EXPERIMENTATION
- USER

TNO innovation
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