

DIRIZON

advanced options for authorities in light of automation and Digitalisation hoRIZON 2040

Mark Tucker

Roughan & O' Donovan/ Roughan & O' Donovan Innovative Solutions

ITS Ireland Annual Conference

The Johnstown Estate, Enfield

Co. Meath, Ireland

November 14th 2019

DIRIZON

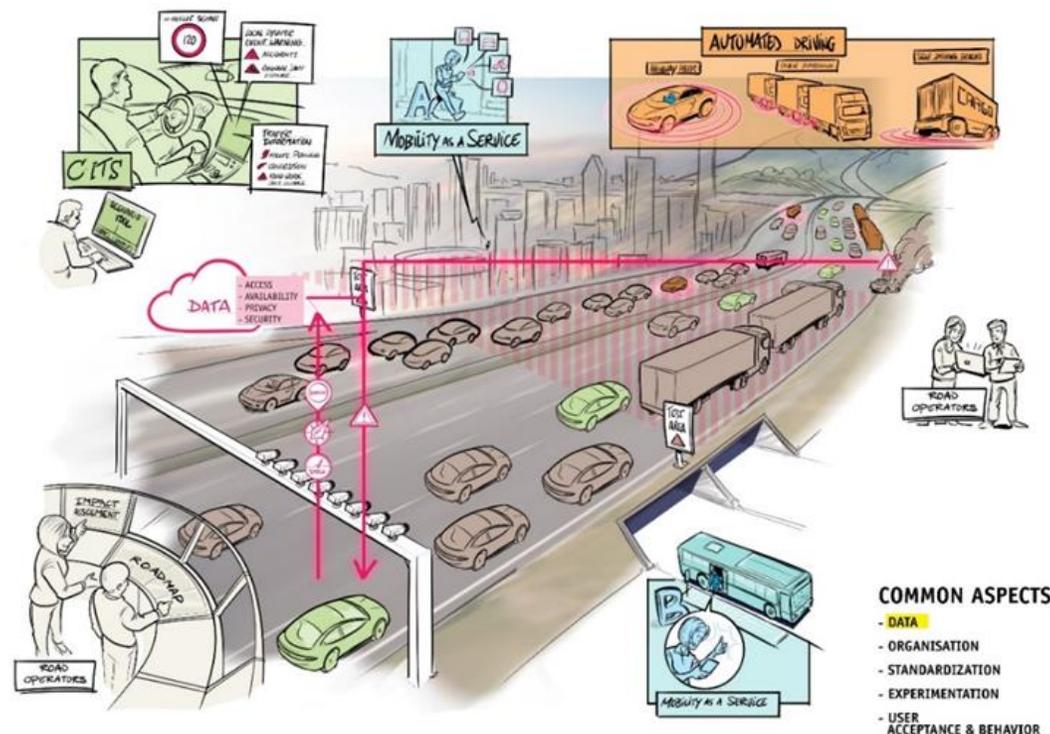
- Two-year research project commenced in September 2018
- Funded under the **CEDR 2017 Automation** call (www.cedr.eu/call-2017-automation/)
 - A. How will Automation change the core business of NRA's?
 - **B. What new options do NRAs have from Digitalisation and Automation?**
 - C. Practical learnings for NRAs from test sites
- **Funding Countries**
 - Austria, Finland, Germany, Ireland, Netherlands, Norway, Slovenia, Sweden & UK
- **Consortium**
 - TNO (Coordinators)
 - ROD-IS;
 - Albrecht Consult
 - AustriaTech
 - HERE (Associate Partner)

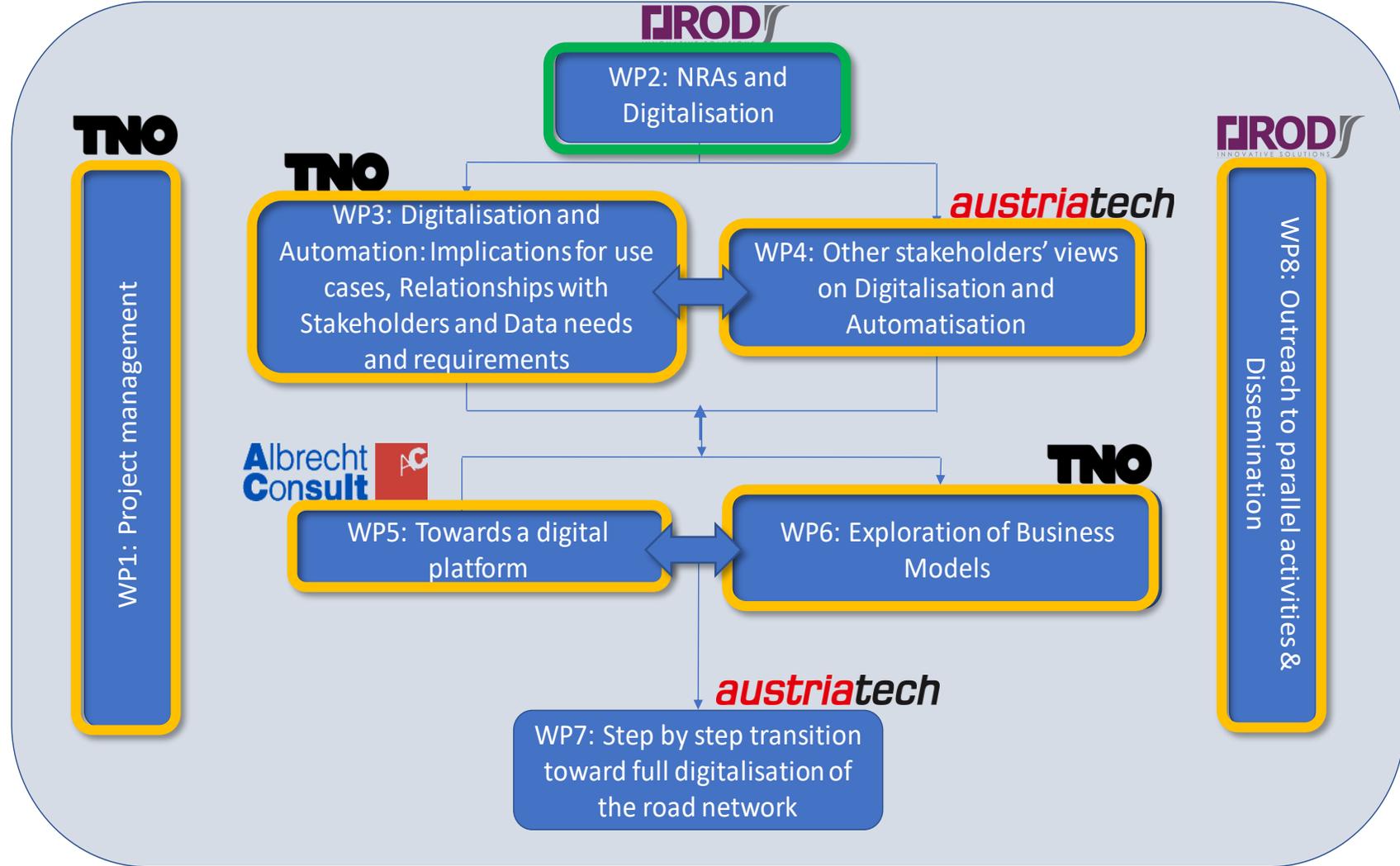


Objectives

In light of the step-by-step transition towards the full digitalization of NRA's road networks, for 3 no. Specific Use Cases;

- Provide a concept for a technical data-exchange platform, defining data issues & requirements
- Provide corresponding business model archetypes for the exploitation of the data-exchange platform,
- Identify the stakeholder field, how they perceive their roles and responsibilities and how these can involve
- Identify the NRA's current and future relationships with stakeholders





FINISHED

IN PROGRESS

Outputs

- A strategy for NRA's digitalisation of their assets, that includes relevant stakeholders, data needs and requirements;
- A practical roadmap (with a critical path) for step-by-step development and transition of road operation to digitisation (i.e. an implementation roadmap);
- A proposal for a set of business models for co-financing and operation of a suitable platform for data sharing between public and private sectors;
- A proposal for a suitable standard for a platform at the EU-level;
- Dissemination of findings at national and international levels.

WP2 – NRA’s and Digitilisation

- Identified;
 - NRA's current & future level of digitalisation and automated driving
 - Policies, impacts, barriers, risks etc. to achieve full Digitilisation of & Automated Driving on the road network
 - 3 no. specific Use Cases of relevance

- Methodology
 - Literature review
 - 10 interviews (*NRA’s* from Austria, Finland, Germany, Ireland, Netherlands, Slovenia, Sweden, UK; *Others*: Autostrada del Brennero, Czech Ministry of Transport)
 - Workshops with Connected Automated Driving (CAD) Working Group (Oslo and Tallinn)
 - <https://www.cedr.eu/download/D2.1-NRAs-and-Digitalisation.pdf>



WP2 – NRA's and Digitilisation

Key Findings

- **Collaboration** is a significant barrier which can only be improved through the NRA's direct involvement in projects with other relevant actors. Through collaboration 'trust' will be built between the actors, particularly in relation to data
- **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** 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)
- **Others** include;
Financial barriers/uncertainties; Roles and responsibilities unclear; legal/regulatory issues; public acceptability; Interoperability
Data issues (privacy, cybersecurity, sharing, quality, ownership etc.); Skills requirements

WP2 – NRA’s and Digitilisation

UC-1: Provision of HD Maps for Automated Mobility

DIRIZON USE CASE 1	
Use Case Name	Provision of HD Maps for Automated Mobility
Use case reference /id	DIRIZON-UC-1
Description	<p>The provision of detailed mapping in a machine-readable format supports a connected automated vehicle's (CAV) ability to understand its precise positioning, plan beyond sensor visibility, possess contextual awareness of the environment and local knowledge of the road rules.</p> <p>Hence, HD Maps can assist automated vehicles to optimize:</p> <ol style="list-style-type: none"> 1. Their precise positioning and control on the road surface; 2. Their accurate planning and control maneuvers beyond sensor capability. <p>HD maps can effectively extend (automated) vehicle's ODD in complex traffic situations.</p>

UC-2: Distribution of Digital Traffic Regulation

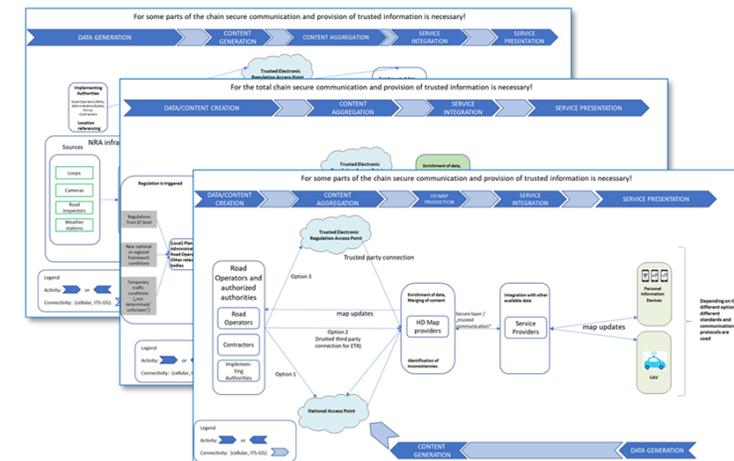
DIRIZON USE CASE 2	
Use Case Name	Distribution of Digital Traffic Regulation
Use case reference /id	DIRIZON-UC-2
Description	<p>Distribution of digital traffic regulation becomes more and more relevant for CAM (Connected and Automated Mobility as well as for other areas such as smart cities, and is currently being addressed in more detail within CEN/TC 278 WG17. It has been found that, currently legal responsibilities and authorisation schemes vary a lot between countries, states and cities. Rules are time-and-place referenced similar to a digital map. This means that for connected automated mobility (CAM) there will be a need to maintain and encode traffic regulations electronically to be machine readable, processed and correctly interpreted by a receiver (e.g. a connected automated vehicle).</p>

UC-3: Infrastructure Support Services for CAD

DIRIZON USE CASE 3	
Use Case Name	Infrastructure Support Services for CAD
Use case reference /id	DIRIZON-UC-3
Description	<p>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).</p> <p>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.</p>

WP3: Digitalisation & Automation

- Extends the use cases selected in WP2 by developing a future (i.e. target) view of generic, non-country specific process flow in each use case and;
- Identifies a first draft of the data requirements and data quality criteria in providing each use case and possible levels for Cooperative Automated Driving
- Data Quality Criteria are influenced by the Data Platform Architecture (WP5) and Business Models (WP6)
- The process flow describes how the service is provided and the roles and activities that are carried out.

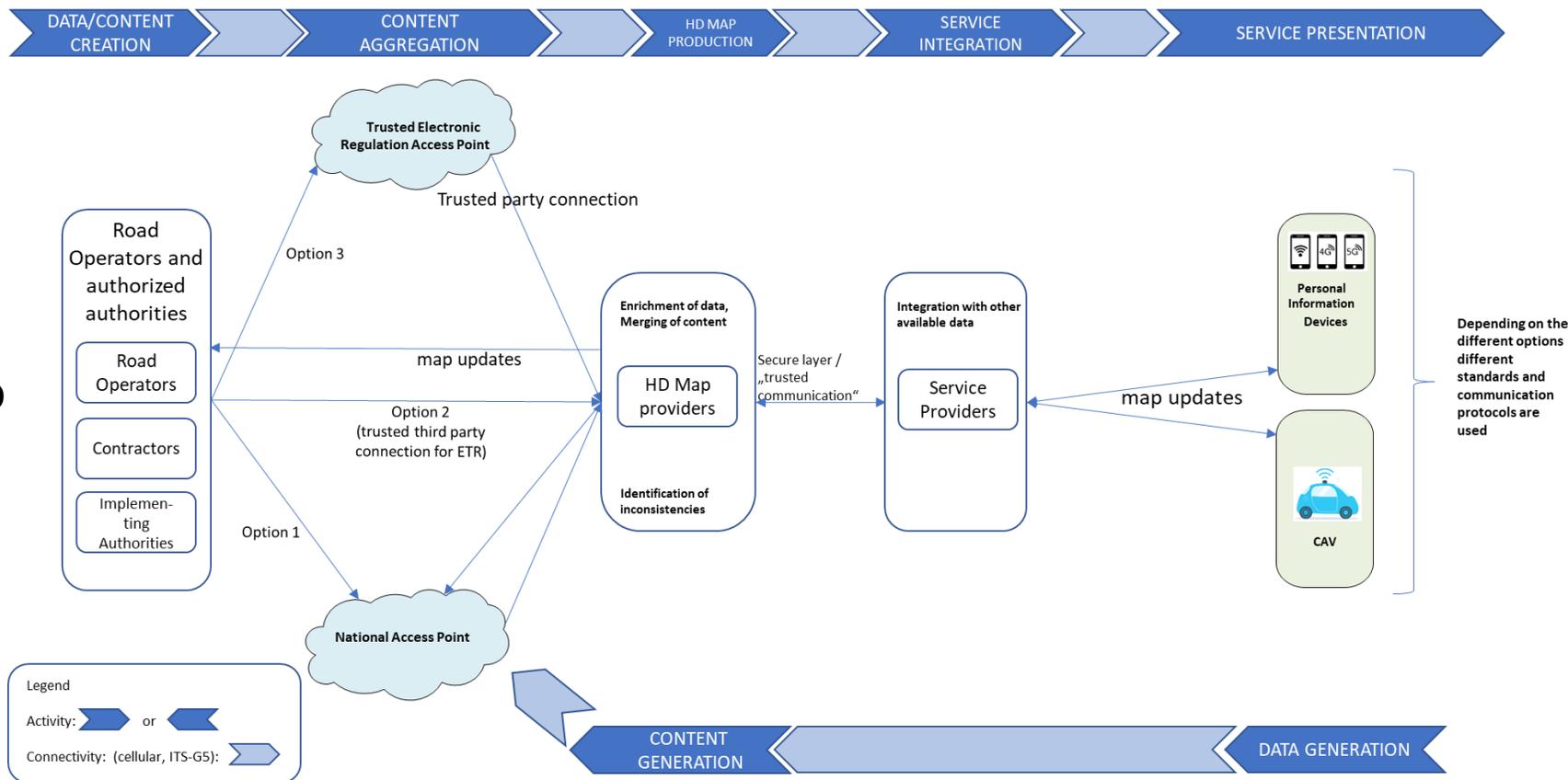


WP3: Digitalisation & Automation

For some parts of the chain secure communication and provision of trusted information is necessary!

CONCEPT

UC-1 Process Flow Diagram
Provision of HD Maps for Automated Mobility

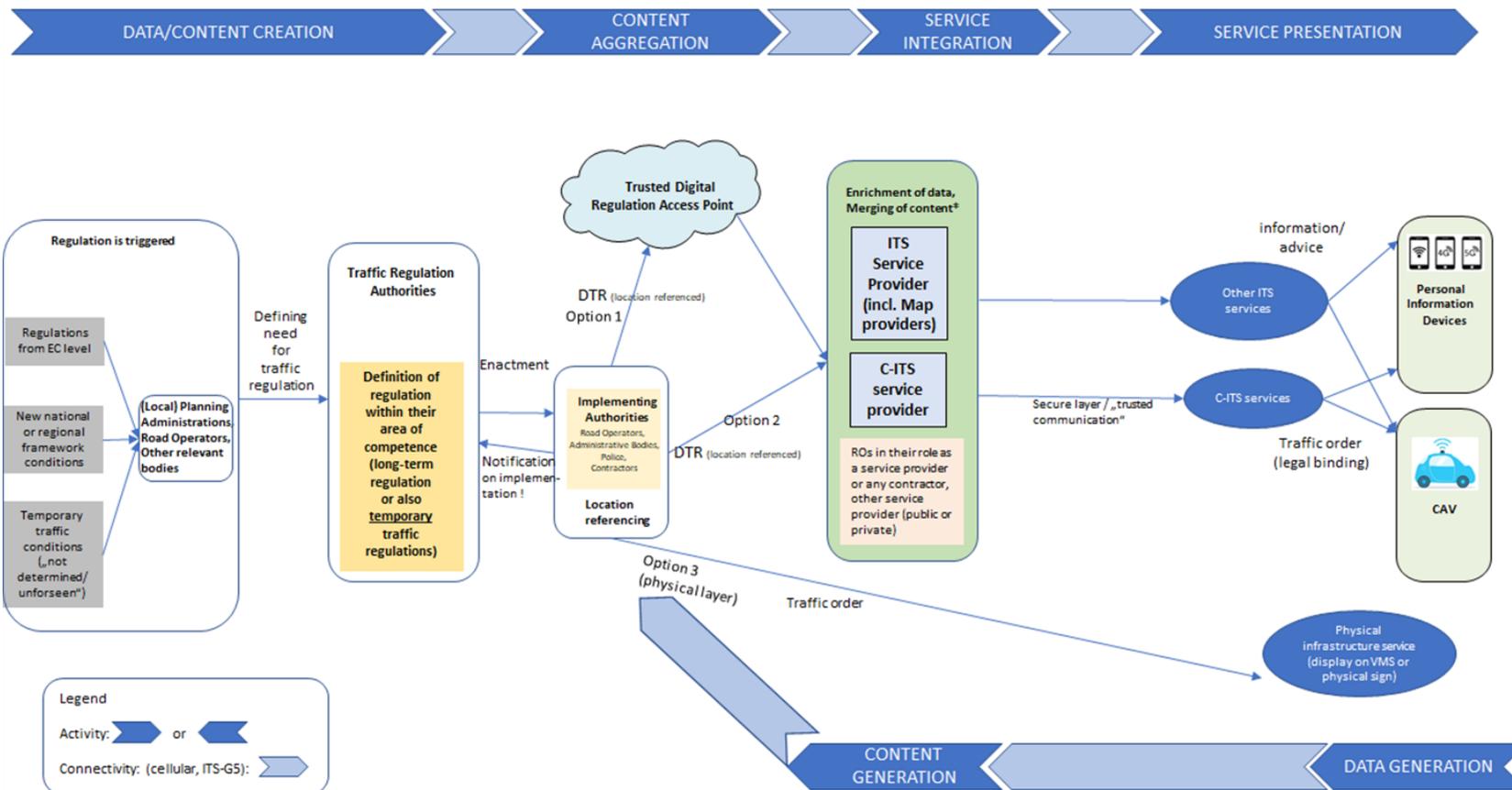


WP3: Digitalisation & Automation

For the total chain secure communication and provision of trusted information is necessary!

CONCEPT

UC-2 Process Flow Diagram Distribution of Digital Traffic Regulation

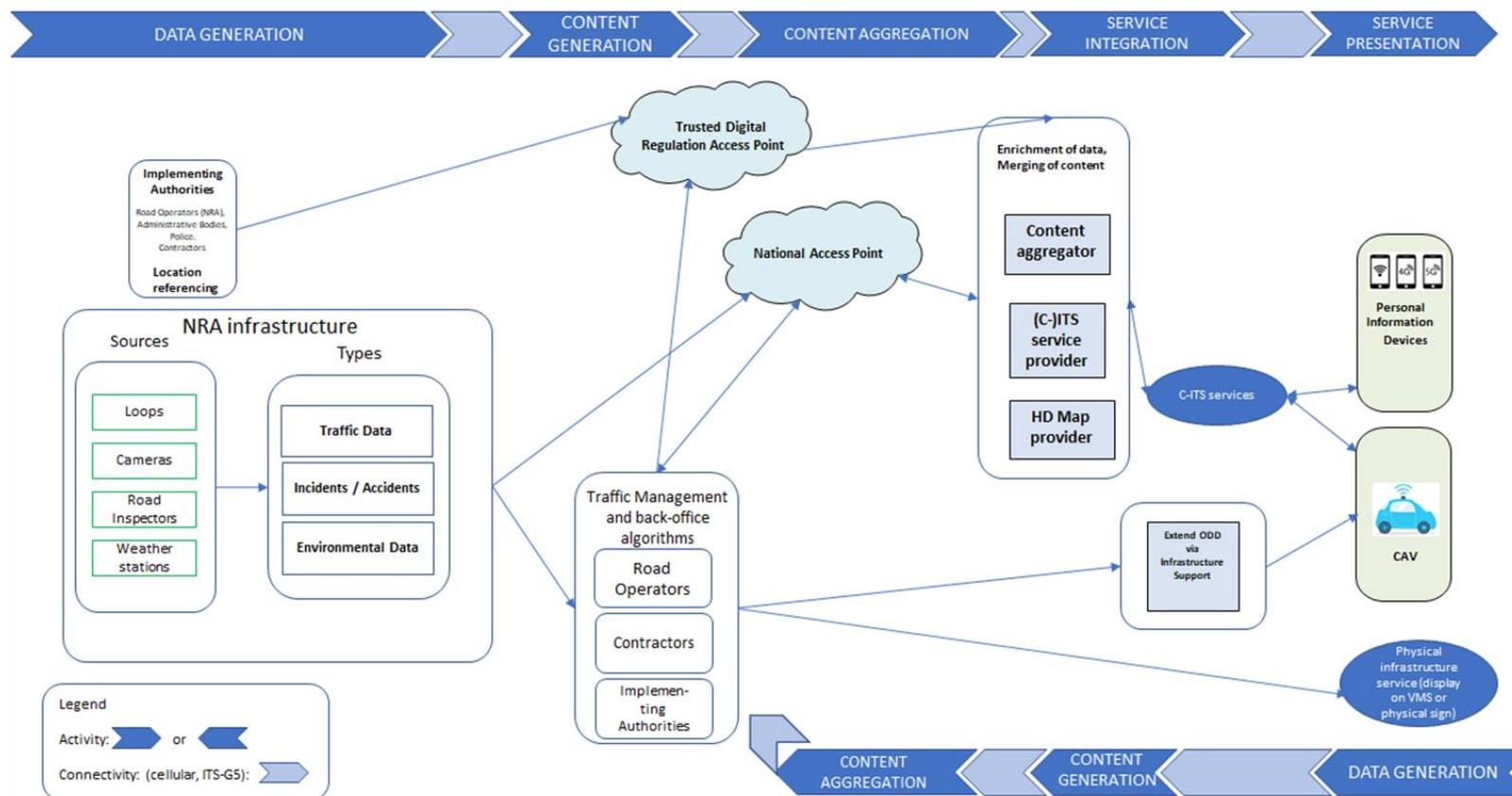


WP3: Digitalisation & Automation

CONCEPT

UC-3 Process Flow Diagram Infrastructure Support Services for CAD

For some parts of the chain secure communication and provision of trusted information is necessary!



WP3: Digitalisation & Automation

- **Data categories (data collected – not exhaustive)**

- *Static data*: digitized information about the road and traffic regulations
- *Traffic data*: traffic volume, speed, occupancy, and travel times per lane, plus vehicle types and the SAE levels
- *Events or conditions* which are primarily safety-related (SRTI)
- *Dynamic regulations*: include dynamic speed limits; road, lane and bridge closures; and road works

- **Data Quality Criteria**

- *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)).

WP4: Other Stakeholders Views

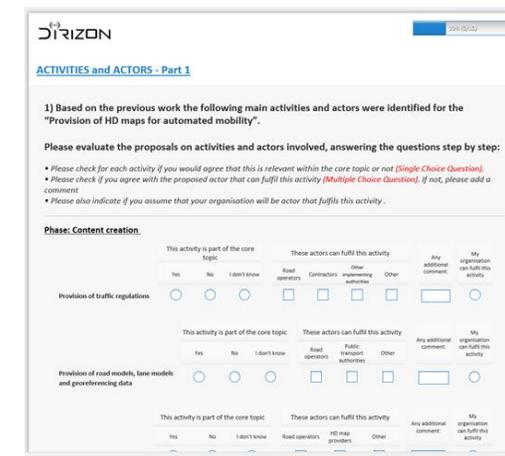
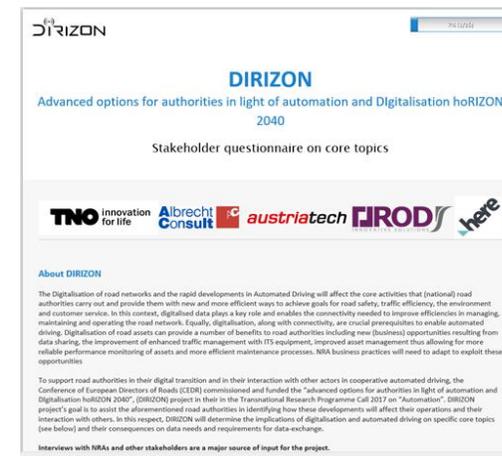
- **Collect views of *other* stakeholders (based on the 3 Use Cases) on:**

- Activities and actors
- Data needs
- Data exchange (incl. prerequisites)
- Roles and responsibilities
- Security, Data protection, Privacy
- Governance

- Elaboration of a web-based questionnaire, **now open: <https://lamapoll.de/DIRIZON>**

- Challenge the views of NRAs with the results of other stakeholder groups

- Summarize input, develop conclusions and provide input to further WPs



WP5: Towards a digital platform

- **Provide a technical data-exchange platform concept by focusing on connected stakeholders**
 - Any future Cooperative Connected and Automated Mobility (CCAM) scenario will generate a need for substantial improvements in data exchange between backends of road authorities, service providers & OEM backends (cloud-to-cloud services).
 - Appropriate services would pave the way for providing data services directly into vehicles, mobile devices or aftermarket devices used inside vehicles and, vice versa, providing sensor-data back to the connected backends.
- **Current focus on**
 - Current developments and transferable, decentralized platform concepts like the International Data Space.
 - Potential cooperation models between NRAs, service providers and OEMs like the proof of concept signed on the ITS Europe Congress or further developments regarding National Access Points.
 - Derivation of data exchange requirements and related data exchange concepts.

WP6: Exploration of Business Models

- **Identify which roles and business models drive the exploitation of the platform-to-be-designed.**
 - Digital services in any future CCAM scenario will be created and delivered by an ecosystem of international and national, governmental and commercial, small and large service providers using in-car, mobile or aftermarket devices.
 - The data-exchange platform and its governance must ensure that these service providers are optimally facilitated in the creation and proper functioning of these services is, e.g. by providing added value elements, e.g. by enriching services, toolkits, good governance and consistent access in all countries
 - From the perspective of the service providers, whose use determines the value of the data-exchange, a “google”-like platform for building their services on top of would be ideal. But how to realise that decentrally, with which governance and conditions?
- **Current focus on**
 - Current developments and transferable, decentralized platform concepts like the International Data Space.
 - Potential governance models between NRAs among themselves and , service providers and OEMs.
 - Development of working diagram to explore the scope of the platform. Is it central or decentral? Is it 'NRA only' or open for use by the whole ecosystem?

WP7: Step by step transition towards full digitalisation of the road network

- **Analysis of the outcomes of WP3 and WP4, take WP5 and WP6 elaborations into consideration with focus on the transition steps towards full digitalisation.**
 - Elaborating a sequence of actions/measures, ensuring a proper sequence from a technical, as well as process point of view
 - Identification of recurring patterns to identify areas for synergies or faster need of action
 - Elaborate recommendations for short-, medium- and long-term actions
 - Suggest an agile and flexible process to adopt uncertainty (also with respect to other actors)
 - Draw a consolidated picture

WP8: Outreach to Parallel Initiatives and Dissemination

- **Create awareness of the DIRIZON project**
 - Disseminate progress and results of DIRIZON to CEDR, NRAs and stakeholders throughout the project such that benefits can be exploited efficiently.
 - DIRIZON website <https://www.dirizon-cedr.com/>
 - Project info, deliverables, events, publications etc.
 - Conferences
 - ITS Ireland
 - TRA 2020; a special session with MANTRA (Topic A) and STAPLE (Topic C)



Thank You

Contacts

ROD/ROD-IS: Mark Tucker mark.tucker@rod.ie

TNO: Max Schreuder max.schreuder@tno.nl

Albrecht Consult: Christian Lüpkes christian.luepkes@albrechtconsult.com

AustriaTech: Radics Lena Lena.Radics@austriatech.at

HERE: Christian Kleine christian.kleine@here.com

Acknowledgement

Dirizon is funded through the CEDR Transnational Road Research Programme Call 2017 “Automation” with funding provided by the road administrations of Austria, Finland, Germany, Ireland, Netherlands, Norway, Slovenia, Sweden and United Kingdom (see call description here). The programme is being managed by FFG, Austria, on behalf of CEDR.