Digital Road Operator Information and Data Strategy

Deployment of road transport related digital models – shadows – twins

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1. Opening and Introductions

CEDR Call 2022 Data:
Maintaining and sharing the digital road infrastructure
https://www.cedr.eu/call-2022
https://droids.project.cedr.eu/

Digital Road Operator Information and Data Strategy (DROIDS)

TRAFICON	Traficon (Finland)
FEHRL	Forum of European National Highway Research Laboratories (FEHRL) (Belgium)
IFE Institutt for energiteknikk	Institute for energy technology (IFE) (Norway)
MAPtm	MAPtm (Netherlands)
Royal HaskoningDHV	Royal HaskoningDHV (RHDHV) (Netherlands)
WMG THE UNIVERSITY OF WARWICK	WMG department, University of Warwick (United Kingdom)

DROIDS project

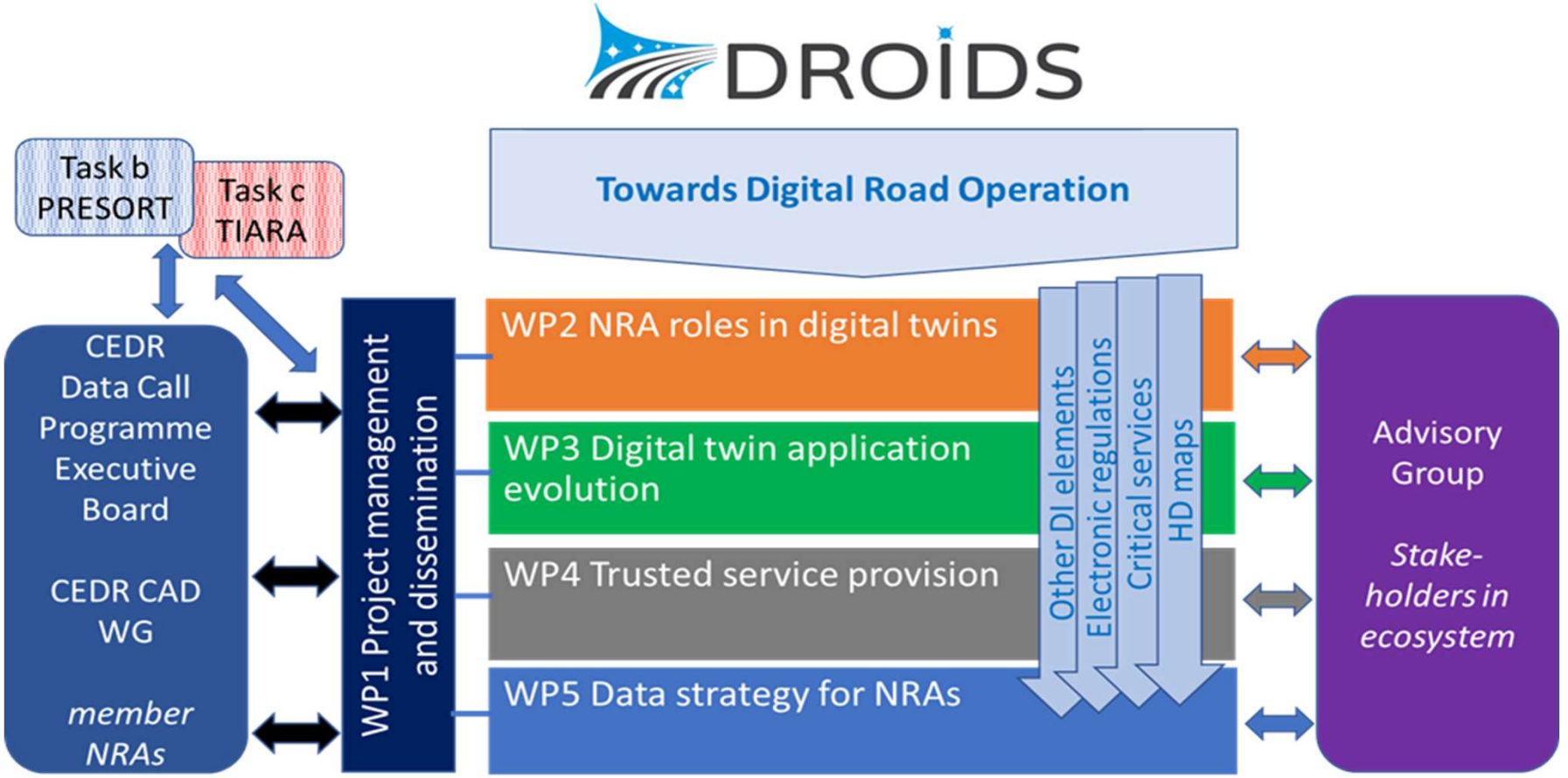
Expected end results

1. **Role of role operator in an ecosystem of digital twins for road infrastructure**: state-of-the-art, information maintained and shared with stakeholders throughout lifecycles, standards and specifications, data complexity, digital traffic rules and regulations, trust and security
2. **European data strategy** for the role of physical and digital road operator
3. **A master plan for implementation** of the strategy from 2025 and beyond
4. **Proof of concepts**: a possible flow of information from BIM to HD maps
5. **Proof of concepts**: provision of authoritative information needed for automated vehicles lane-level navigation

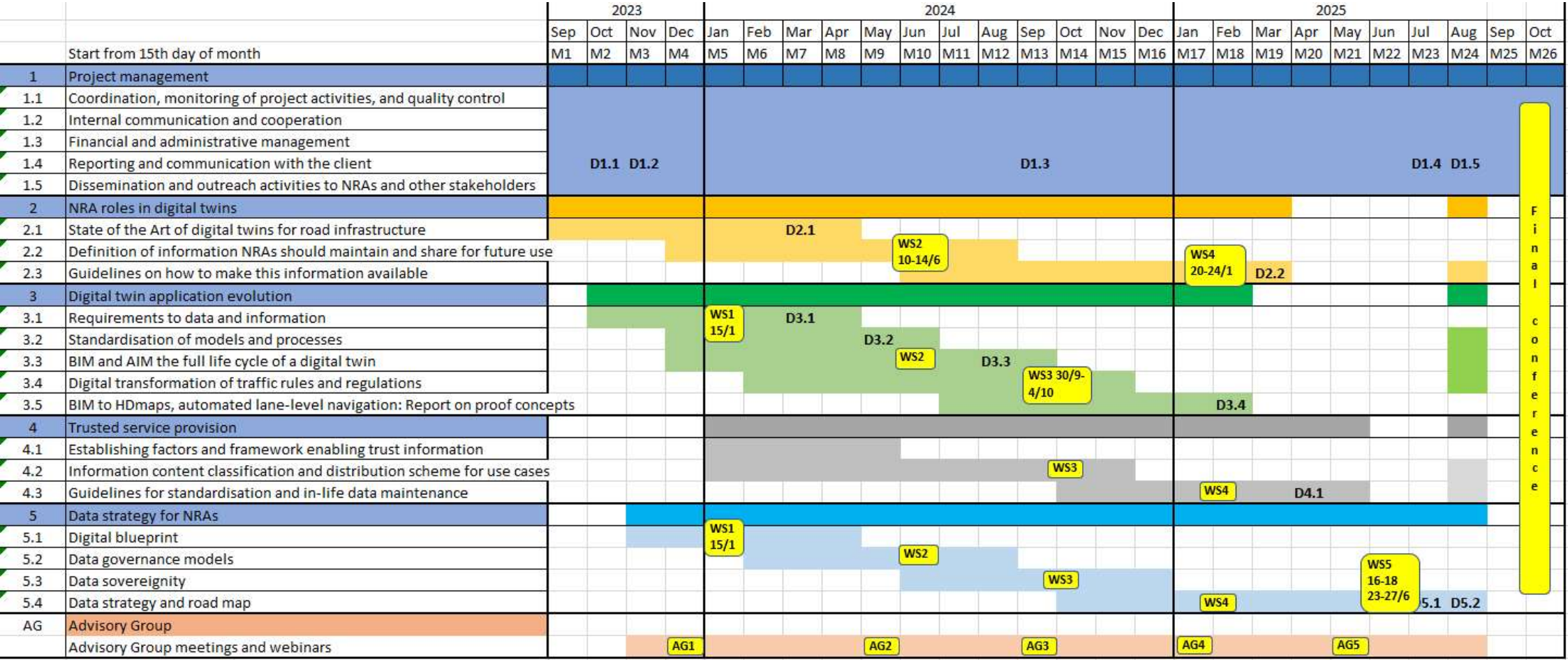
Main objectives and research questions

- **RQ1** what role should the NRAs take in the larger Ecosystem of digital twins for road infrastructures, and how should they fulfill this role?
- **RQ4** How much responsibility should NRAs take for establishing and maintaining base data sets supporting automated driving, such as High-Definition (HD) Maps, compared to the role of commercial Map Providers?
- **RQ5** What services and data are expected to be shared from NRAs?
- **RQ12** How can traffic rules and regulations be transformed into a digital and machine-readable representation that enables automated vehicles to understand and follow them on a European level?

DROIDS methodology and structured approach

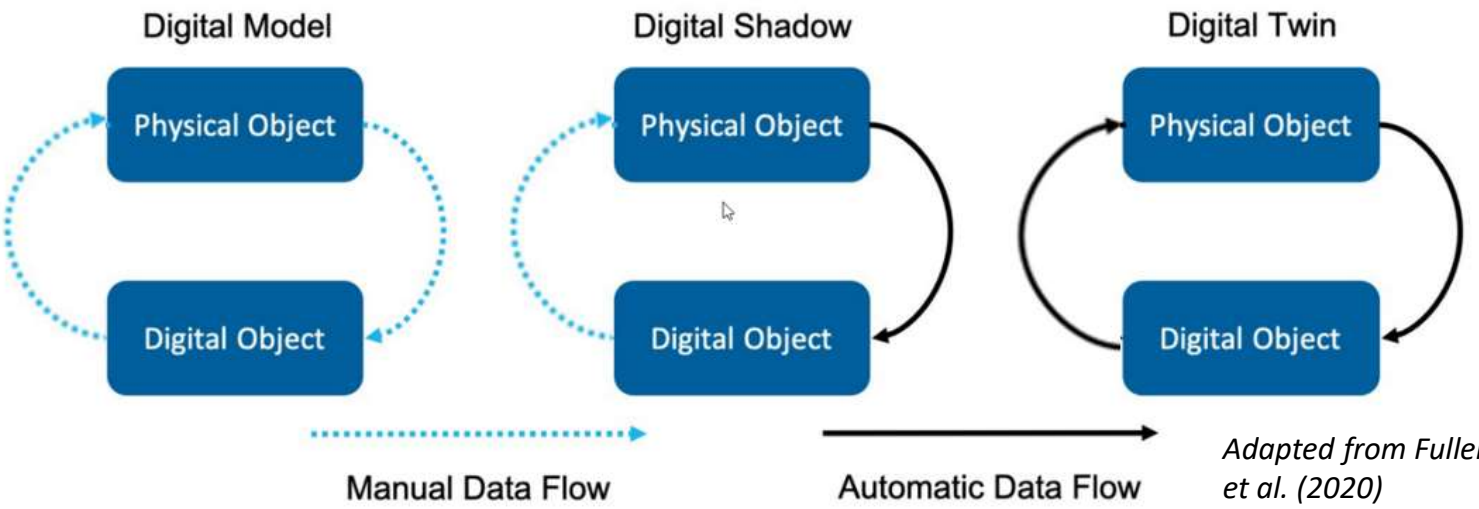


DROIDS GANTT chart



DROIDS

DROIDS taxonomy definition of Digital Twin



Adapted from Fuller et al. (2020)

"**Road transport Digital Twin** is a **virtual representation of the real-world physical road transport systems**. The road transport Digital Twin includes digital representation of elements such as road infrastructure, traffic with vehicles and pedestrians, road environment and land use. The road transport Digital Twin has a **bidirectional real-time data connection** between the physical and the digital representation. It can **support road operator decision making** with dynamic monitoring, analysis, and predictive modelling capabilities of the road transport systems that enable road operators for instance to enhance traffic flow, road safety and infrastructure asset management or to facilitate automated driving."

DROIDS (2024). State of the Art of digital twins for road infrastructure (D2.1). Digital twin state of the art – Technical aspects (D3.1)

Deployment of digital representations

	Estimated likelihood of use case deployment by 2030 by at least three Member States?		
Use case	**Unlikely**	**Likely**	**Very Likely**
Common operational picture for traffic management (network level use case)			
- Traffic jam conditions and end of queue	DT	DS	
- Surface condition monitoring	DT		DS
- Tunnel closure and management	DT	DS	
- Road works	DT	DS	DM (static RW data)
- Safety related incidents and incident management	DT and DS (all stakeholders)		DM
- Incident detection	DT		DS
- Event management	DT	DS (large events)	DM

Deployment of digital representations

	Estimated likelihood of use case deployment by 2030 by at least three Member States?		
Use case	**Unlikely**	**Likely**	**Very Likely**
Road maintenance	DT		DS
Winter maintenance	DT		DS
Asset management	DT	DS (high-risk assets)	DM
Road planning and building	DT (smart construction)	DS (smart construction)	DM

Deployment of digital representations

	Estimated likelihood of use case deployment by 2030 by at least three Member States?		
Use case	**Unlikely**	**Likely**	**Very Likely**
Electronic/Digital traffic rules/regulations			
- General traffic regulations	DT	DS (dynamic)	DM
- Speed limits		DT (dynamic)	DS
- Access Control / UVAR		DT (dynamic)	DS

Deployment of digital representations

	Estimated likelihood of use case deployment by 2030 by at least three Member States?		
Use case	**Unlikely**	**Likely**	**Very Likely**
Automated traffic enforcement		DS	DM
Signal control		DT (dynamic)	DS
Hard shoulder running		DT	DS
HD Map	DT		DS
Cooperative Connected and Automated Mobility (CCAM) – Distributed ODD attribute value awareness		DT	DS

Priority of digital representations by CEDR

1. Asset management
2. Electronic transport regulations – speed limits
3. Road works
4. Electronic transport regulations – access control/UVAR / Incident detection
5. CCAM Distibuted ODD Attribute Value Awareness / Electronic transport regulations – general traffic regulations
6. Road maintenance

Results available

- https://www.droids-project.eu/Resources/projectreports
- https://www.cedr.eu/call-2022

Project results:

- D2.1/D3.1 State of the Art of Digital Twins for Road Infrastructure - draft
- D3.2 Information maintenance and availability - draft
- D3.3 BIM representation for full life cycle of road infrastructure - draft

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Conférence Européenne des Directeurs des Routes
Conference of European Directors of Roads

CEDR Call 2022: Data
Maintaining and sharing the digital road infrastructure
Image by Anton Wijbenga (MAPtm)