



FROM INDIVID TO SCALE

ASSESSMENT AND PROJECTIONS TOWARD AUTOMATED
DRIVING ON MOTORWAYS

Benoît VUADELLE

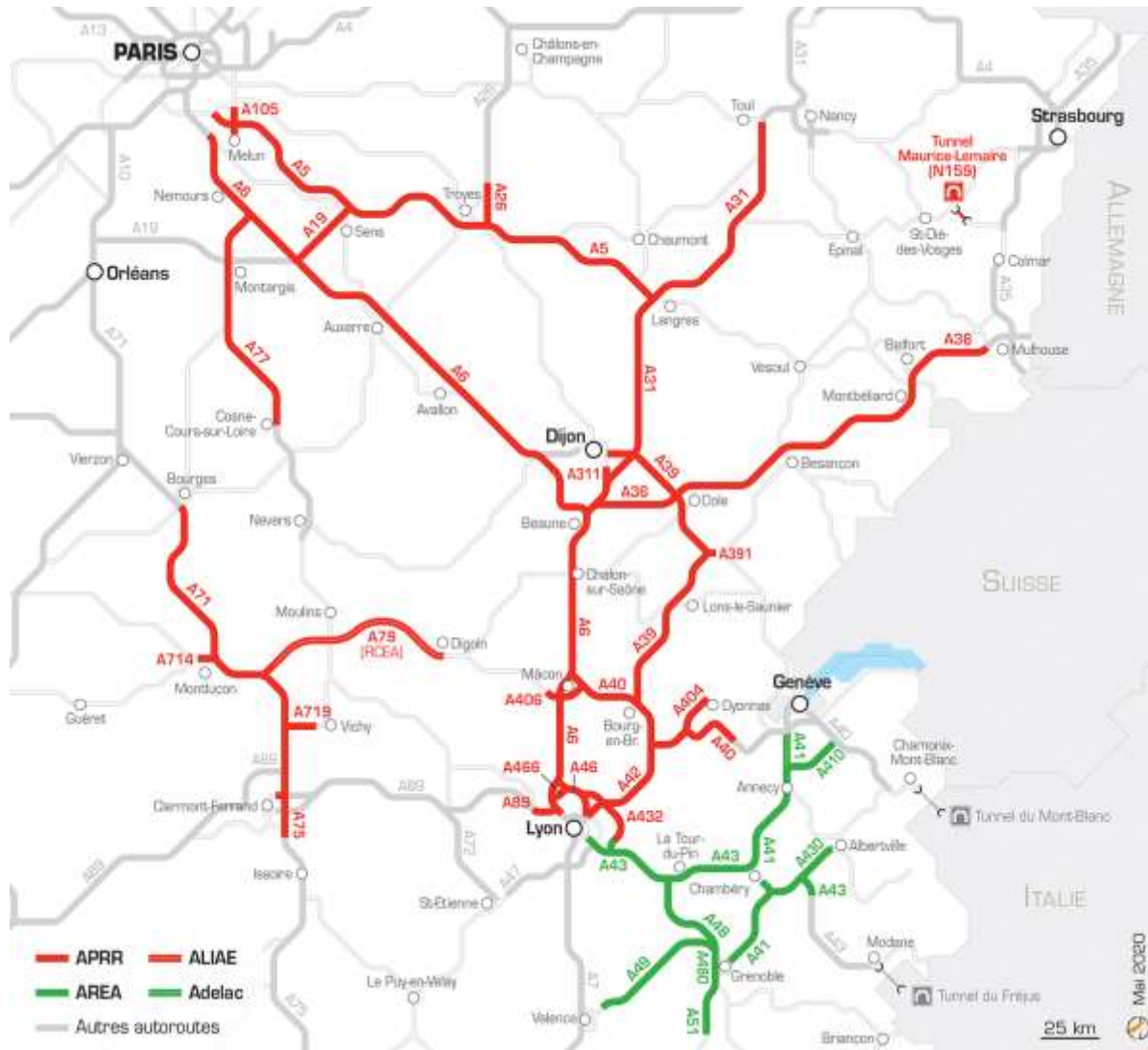
C-ITS & Connected Mobility Expert



Hosted by



APRR



2 323 km NETWORK

27% OF THE FRENCH CONCESSIONS NETWORK

2nd MOTORWAYS OPERATOR 

4th MOTORWAYS OPERATOR 

APRR involvement in the C-ITS field

2011- 2013 ITS-G5 DEVICES EXPERIMENTS



2016 - 2021 C-ITS ARCHITECTURE DEPLOYMENT- ITS G5 – I2V – CONNECTED VEHICLES



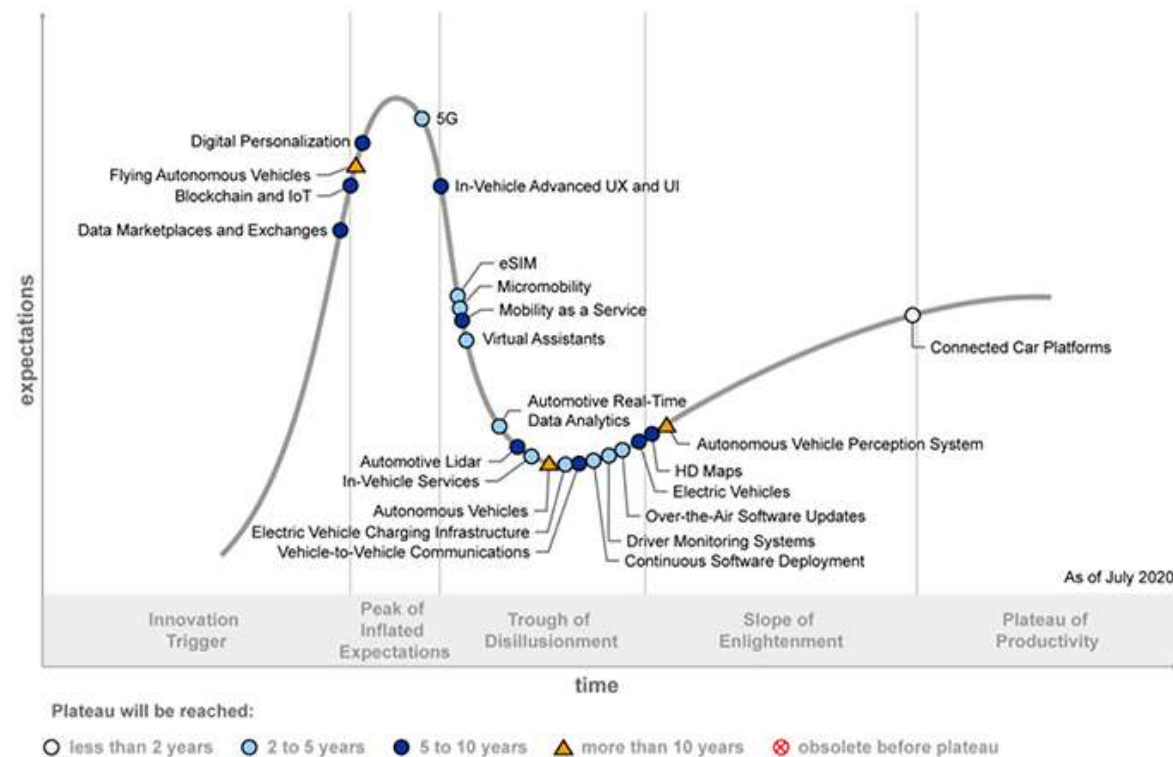
2019 - 2023 ENHANCED C-ITS ARCHITECTURE – ITS G5 – I2V – AUTONOMOUS VEHICLES



APRR involvement in the C-ITS field

- APRR's investors supportive of our engagement.
- High level automated driving to be coming by 2035 with 300 to 400 billions in revenue (Source: Mc Kinsey)
- APRR aims to be a key player in new mobilities on motorways

Hype Cycle for Connected Vehicles and Smart Mobility, 2020



Source: Gartner

APRR motivations for AD development

- Safety improvement for our customers and Road Workers
- Convenience improvement for customers
- Traffic management improvement by reducing congestion on the suburban and urban parts of our network
- As we build the first multimodal Hubs: new services with efficient modal shift for commuters in mind (Automated Valet Parking, Remote Driving...)

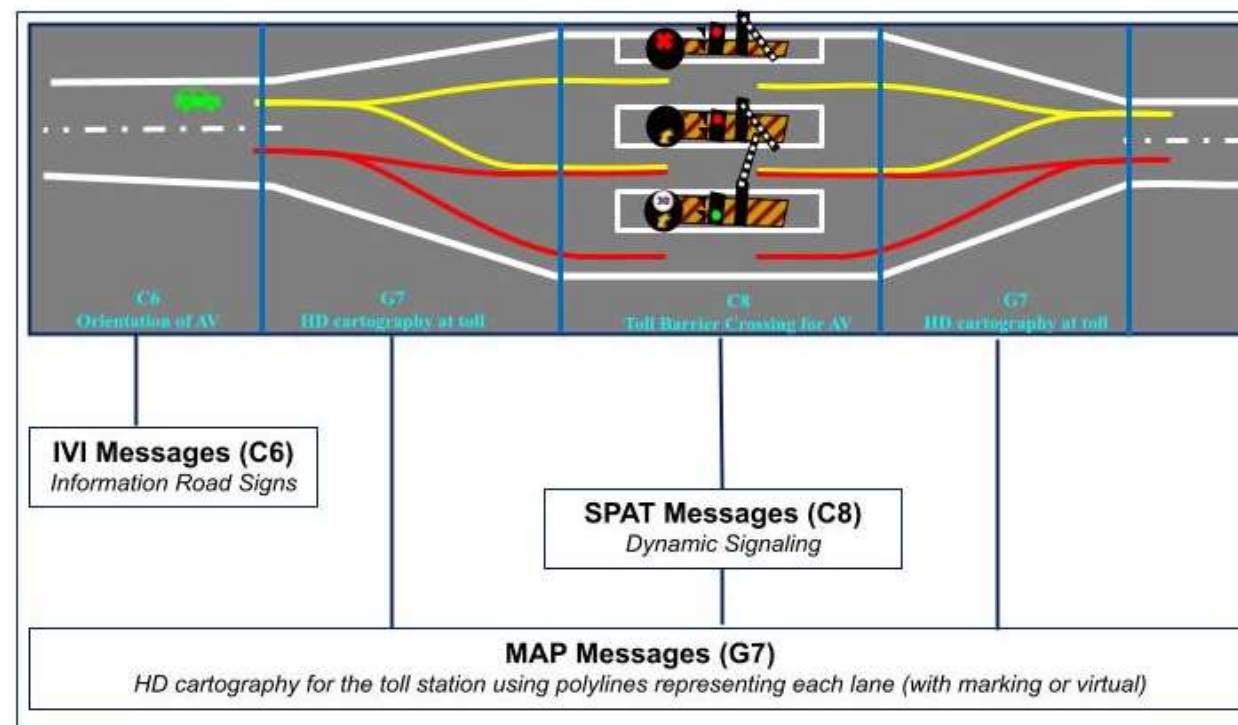


Automated Vehicle negotiating a Toll Barrier

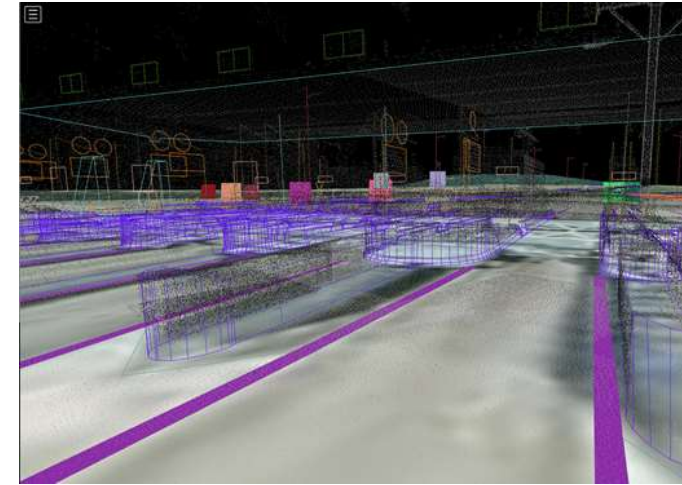
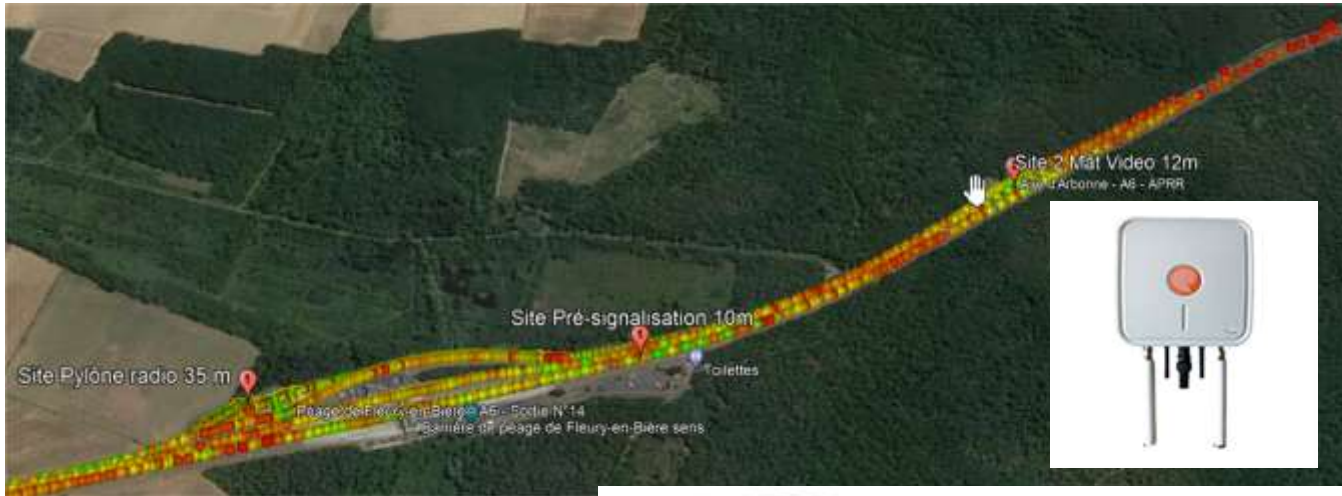
- AV's Operational Design Domain fragmentation:

I2V dialog as a solution

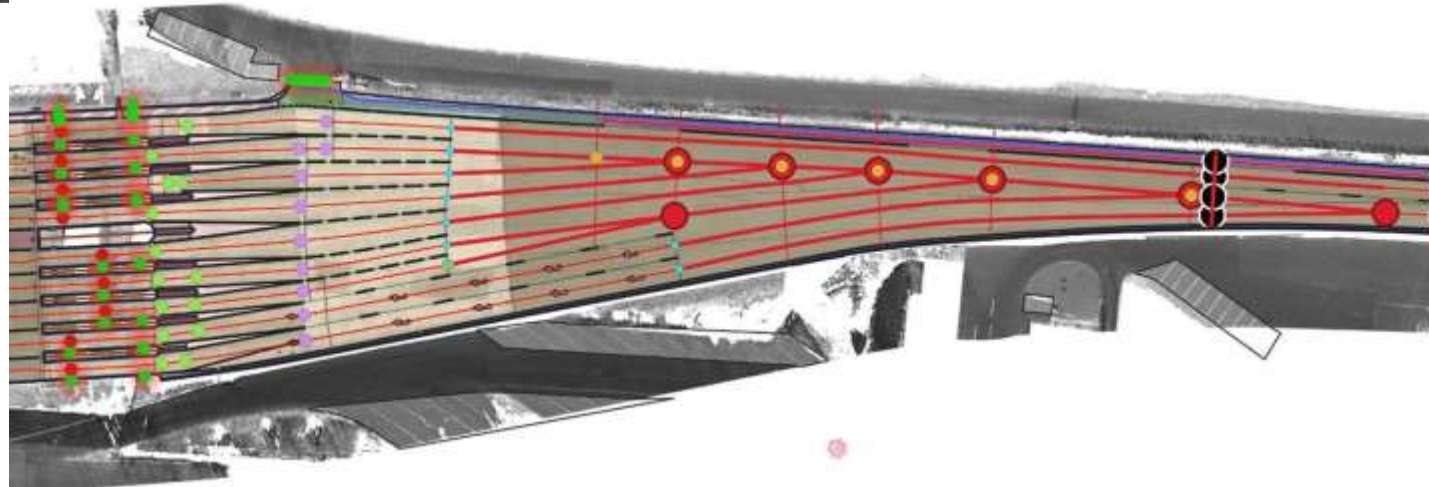
- Which Toll Lane ?
- No roadmarks on platform...
- Difficulties to see traffic light and barrier



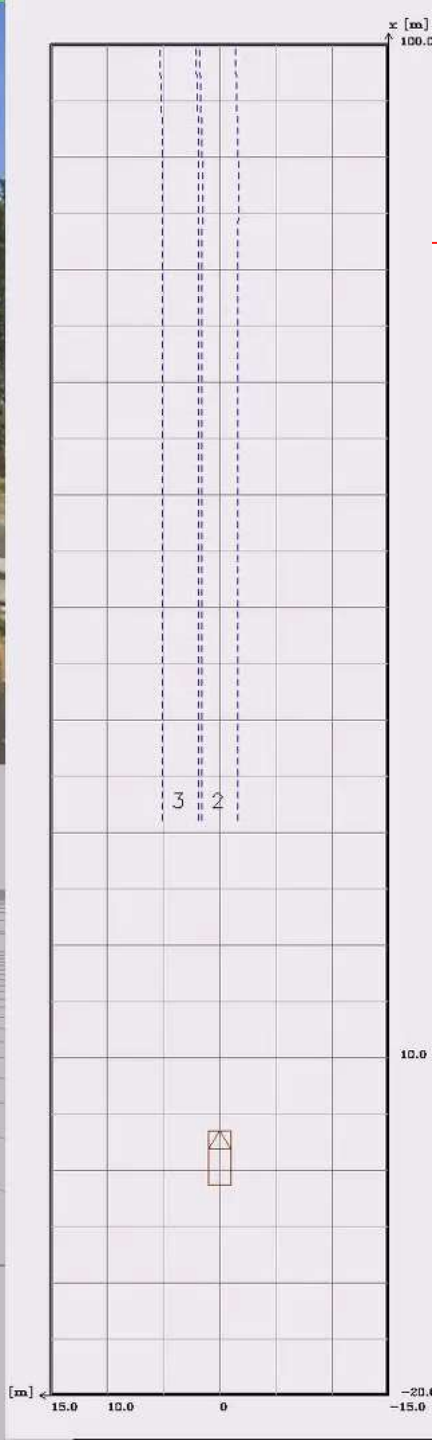
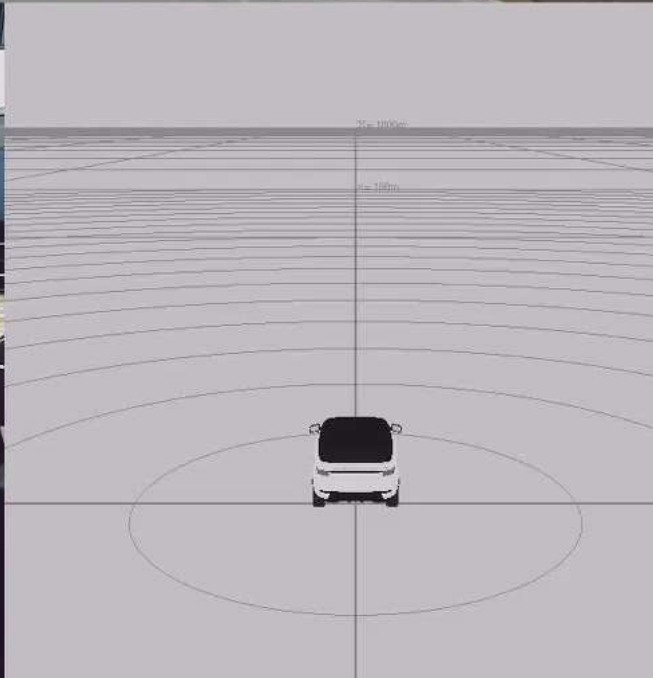
Automated Vehicle negotiating a Toll Barrier



- axes_ILOTS
- noeud_effet_panneaux
- Noeud_marquage
 - DISABLE WHITE LINE
 - ENABLE WHITE LINE
 - INGRESS LINE
- TAPER
- MERGE
- axes virtuels maquette
- VOIES
 - Limites_voies
 - Bord_chaussee
 - axe_voies
 - signalisation_horizontale

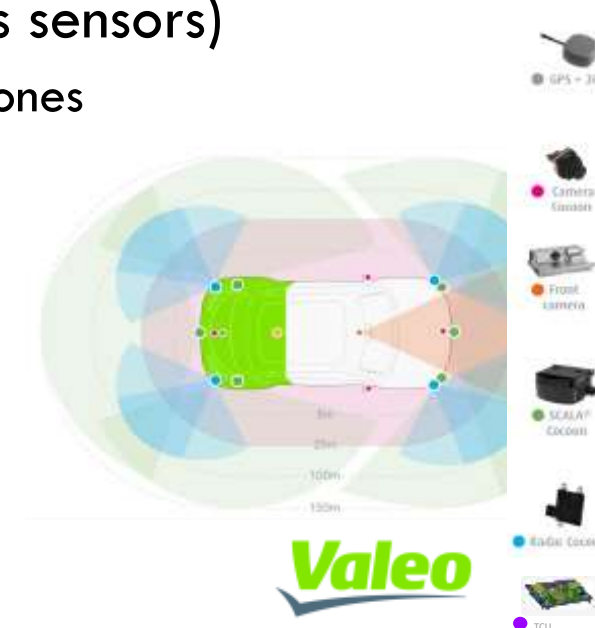


IGN



Automated Vehicle negotiating a Roadwork

- AV negotiating a roadwork
 - without any information about the configuration (only with Av's sensors)
 - ... can lead to last-minute safety maneuvers up to collision with traffic cones
 - with the minimum information about presence of a roadwork (localisation)
 - ... can lead to a more comfortable request of takeover by the driver
- With I2V dialog crossing is possible



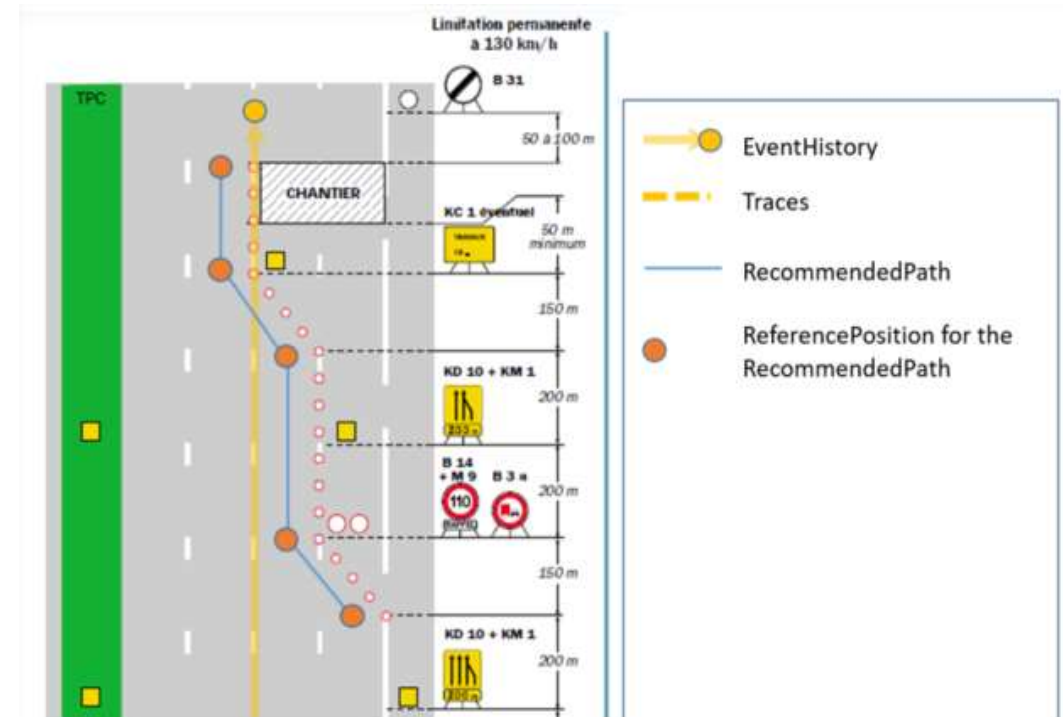
Automated Vehicle negotiating a Roadwork

- ETSI messages

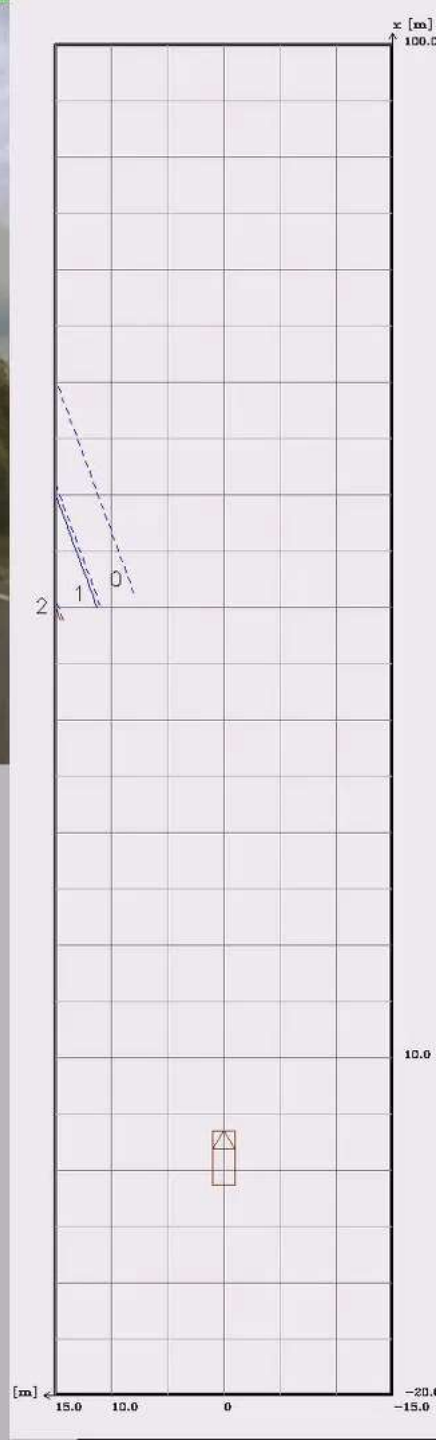
- Depending of the complexity of roadworks, several messages may be used

- DENM
- IVIM
- MAPEM..

- Illustration with DENM using the « recommended path »



AD ON



Next steps toward SCALE

- Completion on negotiating roadworks use case



- Tunnel Environment use cases (Fire, AV in distress...)

- AV's and I2V capabilities to enhance roadworkers and Intervention Vans safety



Key Enablers to continue to pave the way

- EU Funding for CCAM projects
- Basics Pre-requisites (Regulation, EU harmonization, Cyber security ...)
- Hands-on demonstrations for customers and motorway users



THANK YOU

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