



CAR 2 CAR
COMMUNICATION CONSORTIUM

C-ITS in Europe

Niels Peter Skov Andersen

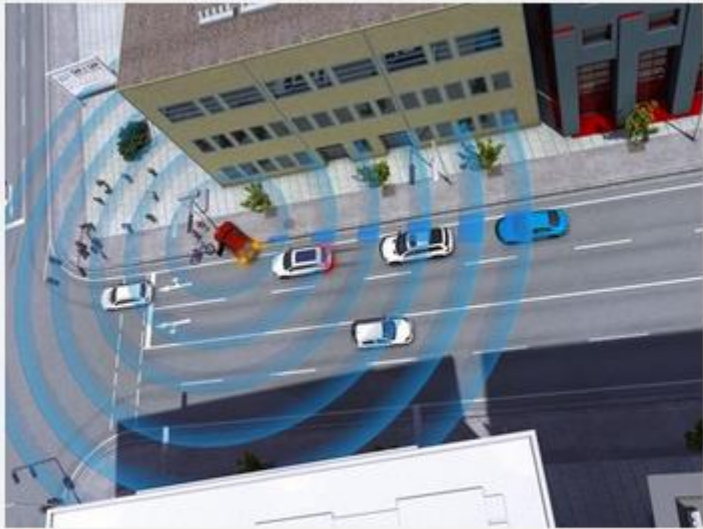
General Manager, CAR 2 CAR Communication Consortium

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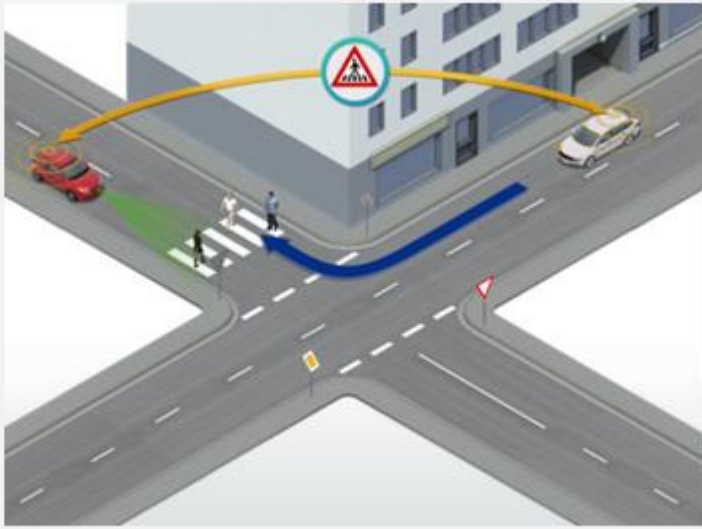
Why is C-ITS deployment a success in Europe

- Clear vision beyond initial services and deployment combined with frameworks for spectrum and other regulatory aspects that allows stakeholder to see the long term viability of investing in C-ITS as key part of CCAM.
- Use of well tested mature technology - ETSI ITS G5 (DSRC/IEEE 802.11p)
- Engaging with all stakeholder about the ideas of cooperative road traffic and road maps for C-ITS deployment.
- Focus on common security framework.
- Interoperability testing with deployment projects to ensure interoperability across borders, road operators and brands.
- Initial Day 1 deployment started in 2019 – the VW Golf 8 was the first vehicle there as standard was equipped with Car-to-X communication other models have followed. Road operators have followed too.

Phases of Cooperative driving



Awareness Driving



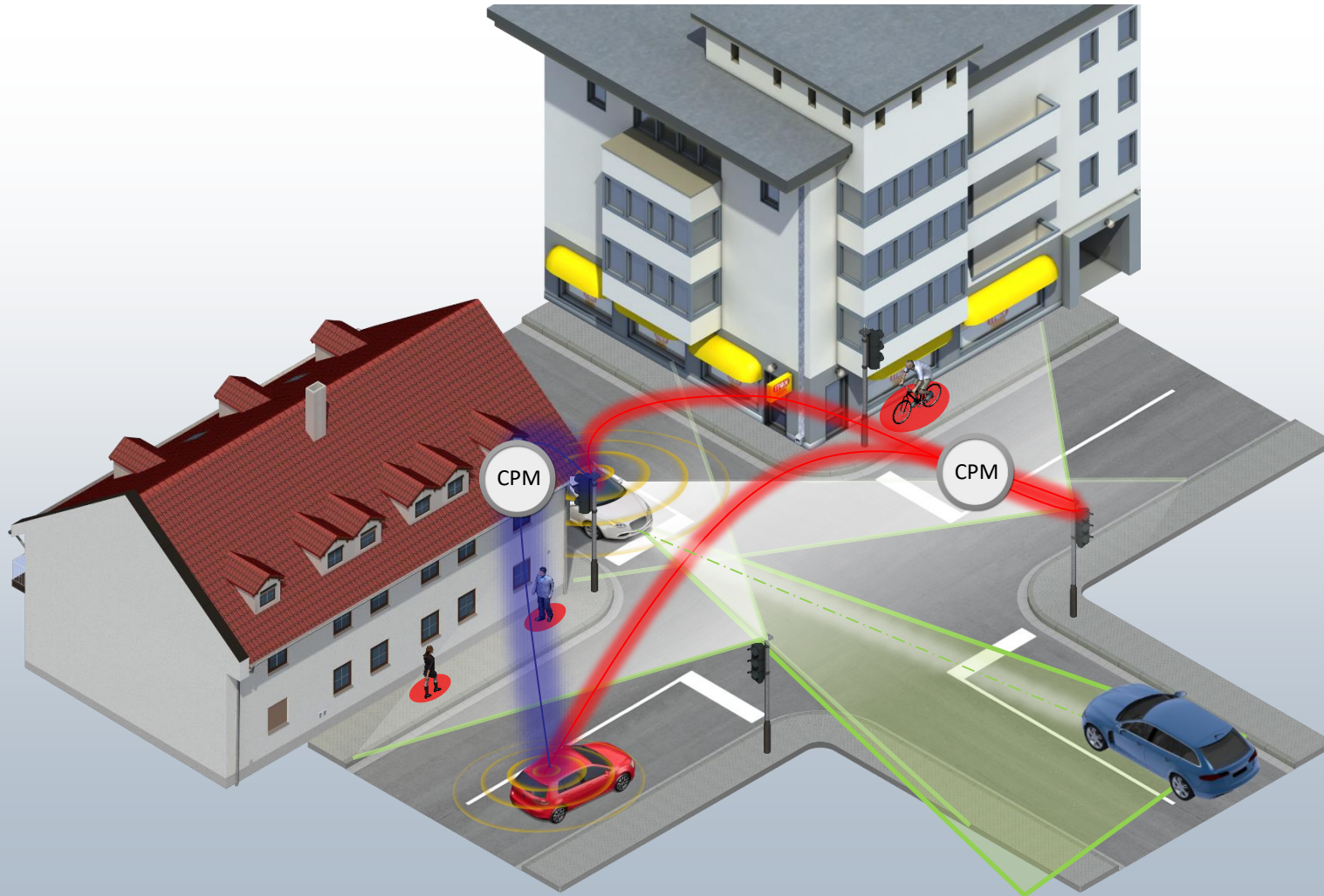
Sensing Driving



Cooperative Driving

Source: CAR 2 CAR Communication Consortium

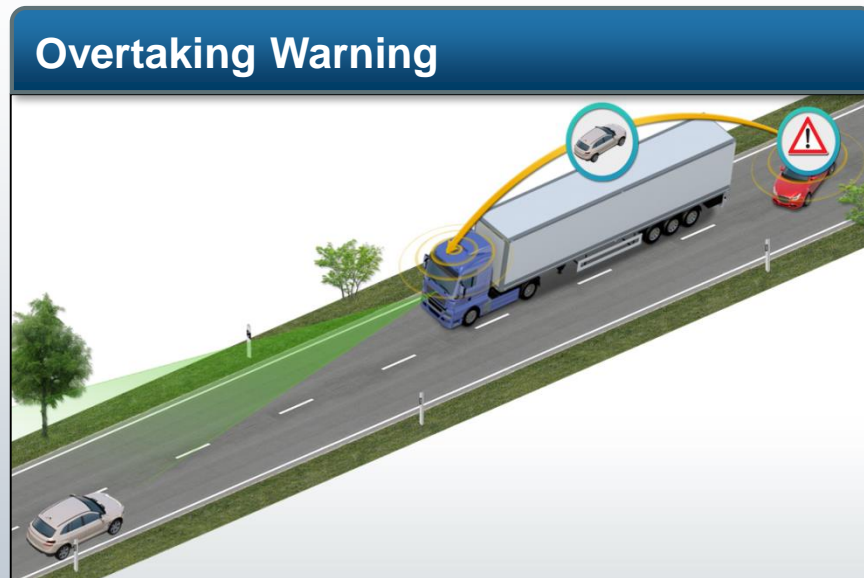
What is Collective Perception?



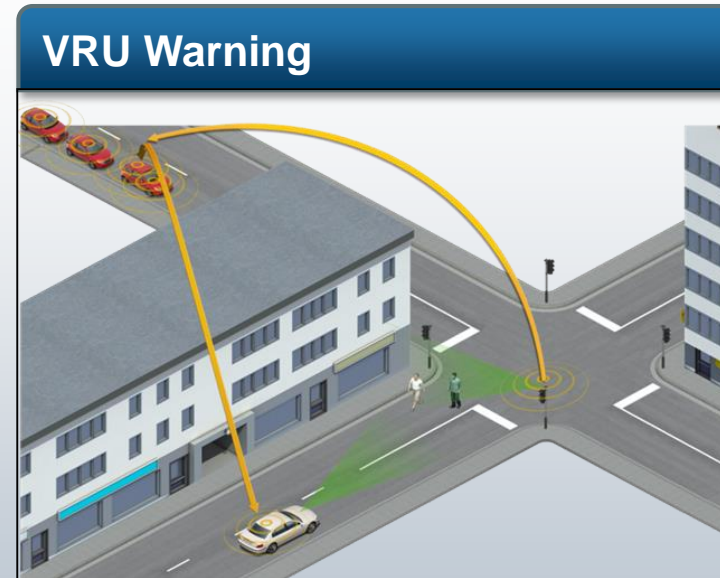
- Increase awareness by sharing information about locally detected objects
- Enables hidden line of sight applications by raising awareness also about non-connected road users (especially VRUs)
- Vehicle sensors and sensors mounted to infrastructure components can share information
- Collective Perception Service on ITS-S generates Collective Perception Message
- ETSI TR 103 562 approved by ETSI WG1, to be published by end of November 2019
- Standardization activities now focus on ETSI TS 103 324

Sensing Driving: Collective Perception

- Sharing abstract descriptions of objects detected by vehicle or infrastructure sensors
- Creates improved awareness even with low C-ITS penetration



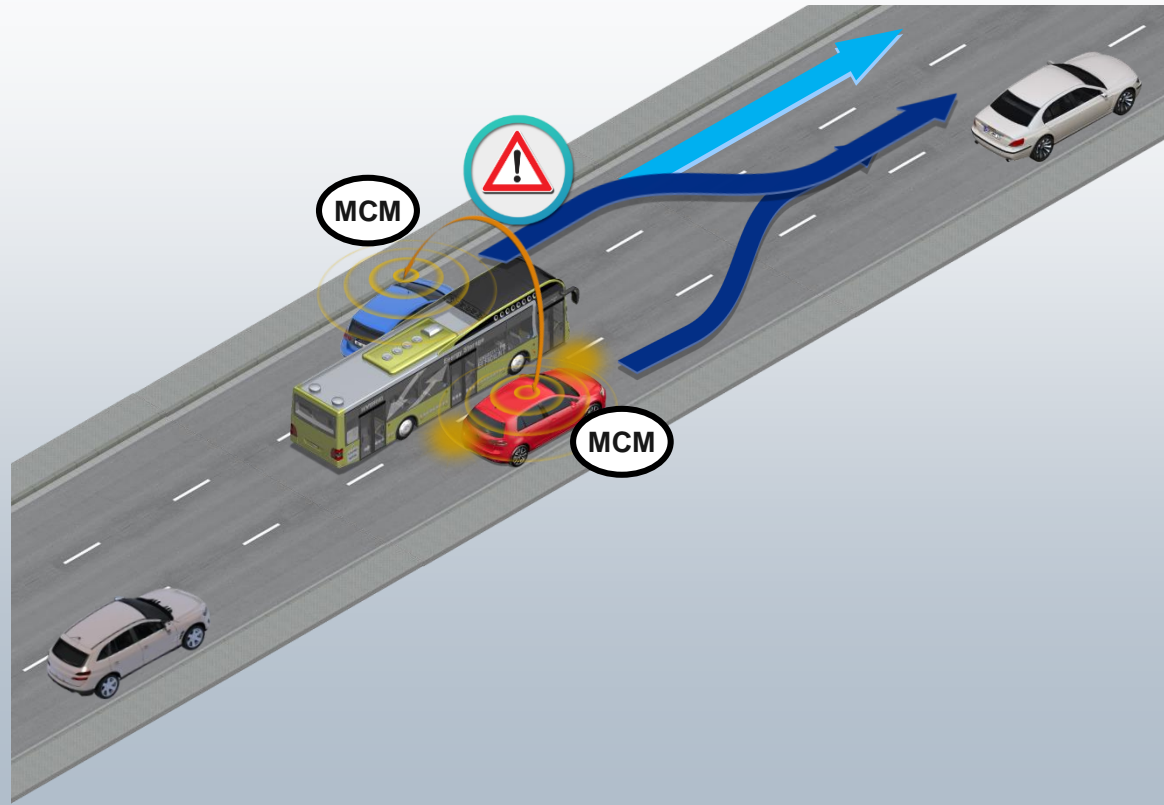
Overtaking car analyses the rx info and warn the driver if necessary



Turning car analyses the rx info and warns the driver if necessary

Cooperative driving: Maneuver Coordination

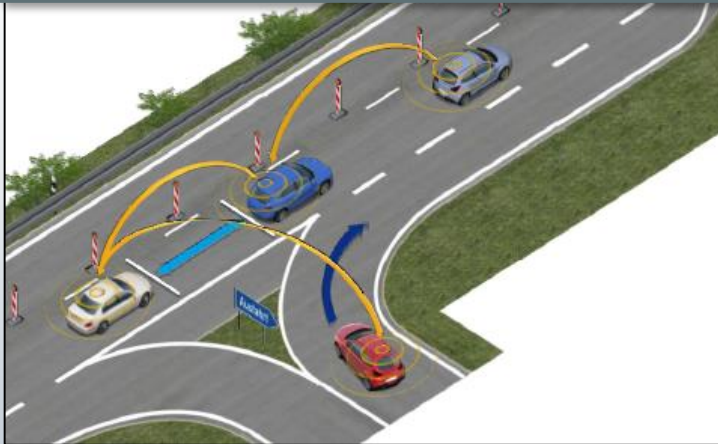
- Maneuver Coordination is an essential service towards automated driving, as it allows vehicles to coordinate their maneuvers and make safe maneuvers without slowing down the traffic. Thus it will be a key element to keep the existing traffic capacity when moving towards automation.



Cooperative driving: Coordination / Negotiation Sharing

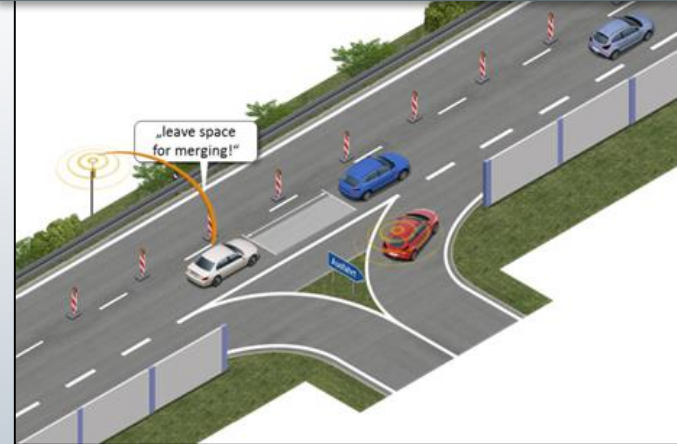
- Enabling V2V and I2V interaction for coordinated maneuver execution
- Examples (from German IMAGinE and EU H2020 TransAID projects)

Cooperative Merging on Highways



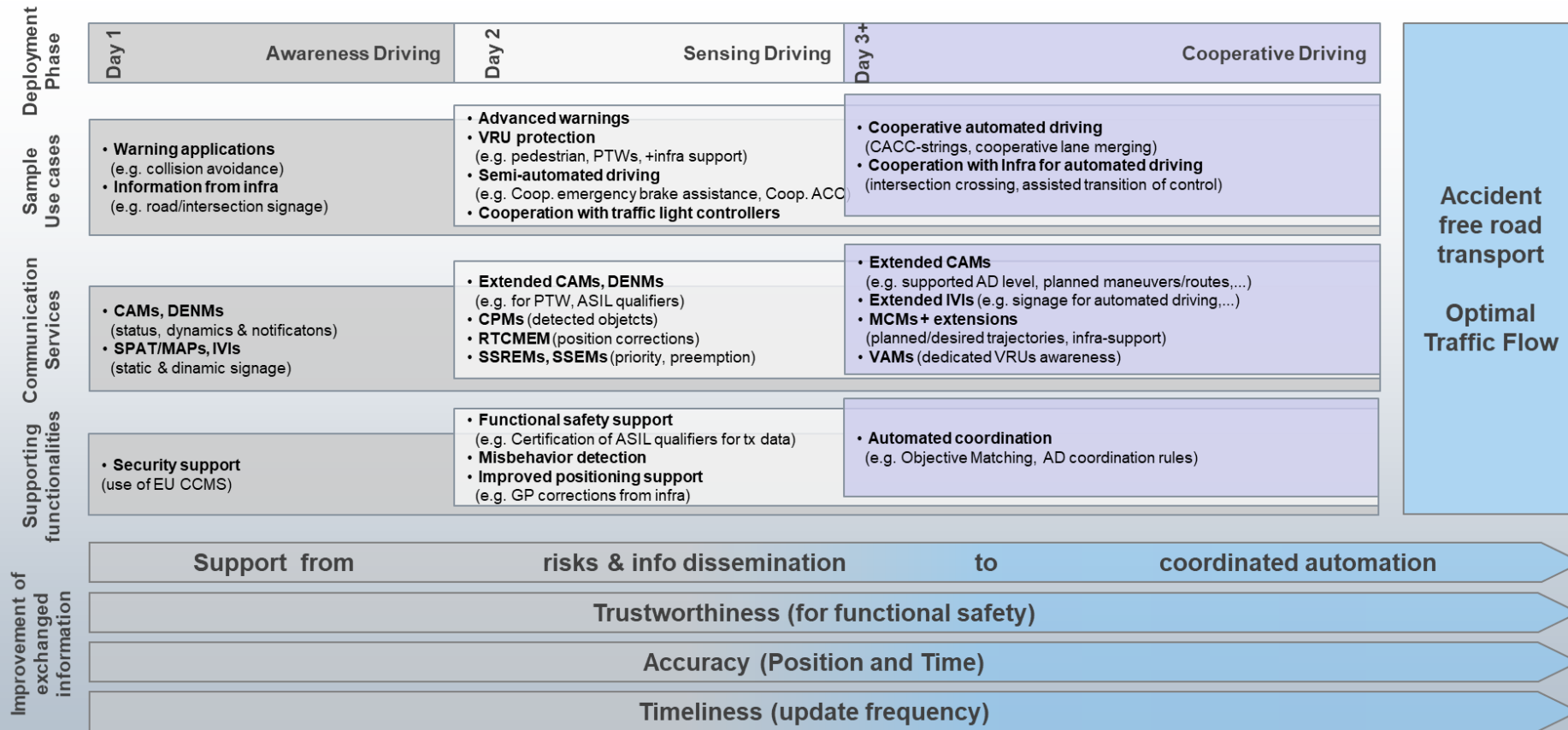
Based on notification of intended merging, interested vehicles exchange info to coordinate gap opening and merging maneuvers with increased time spans

I2V assisted- cooperative merging



Infra suggest info to coordinate right of way in a way to optimise the overall traffic flow

C2C-CC Roadmap



Contact:

Niels Peter Skov Andersen
npa@anemonetechnology.com

