COLLABORATIVE INNOVATION DAY
4th October 2022 | Virtual Event

5G- Blueprint
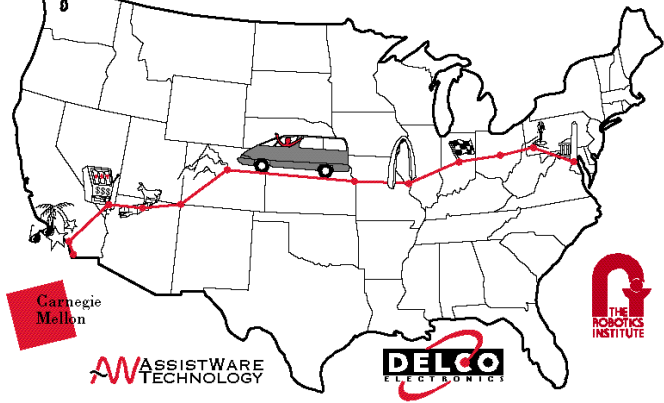
Rakshith Kusumakar

V-Tron

ORGANIZED BY:

5GLOGINNOV

alice | Alliance for Logistics Innovation through Collaboration in Europe

Co-funded by the European Union

5G-BLUEPRINT IN A NUTSHELL

NO HANDS ACROSS AMERICA

NAVLAB USA TOUR '95

Carnegie Mellon

THE ROBOTICS INSTITUTE

AssistWare Technology

DELCO ELECTRONICS

- Washington DC
- Pittsburgh PA
- Columbus OH
- Indianapolis IN
- Kokomo IN
- Saint Louis MO
- Kansas City KA
- Denver CO
- Four Corners
- Grand Canyon
- Las Vegas NV
- Los Angeles CA
- San Diego CA

Driven in autonomous mode:
98.2 % of the trajectory*

27 years of R&D later …

2% issue

Edge & corner cases

Teleoperation
- Human driver
- Safe, fast & reliable communication with 5G

5G-Blueprint approach

* https://www.cs.cmu.edu/~tjochem/nhaa/

OBJECTIVES

5G BLUEPRINT

TECHNOLOGICAL

- Design and implement a **5G network for CAM services**

- Develop and implement the **prototype of a TO system**

- Implement and deploy enabling functions **guaranteeing safety** and increasing value

- Validate the **end-to-end TO transport** solution supported by 5G in real-life cross-border scenarios

BUSINESS

- 5G TO transport **market analysis**

- **Commercial possibilities**

- Positions the **possible role** of TO transport based on 5G **in CAM**

- TO transport based on 5G connectivity **market adoption**

REGULATORY

- Identify regulatory issues

- Recommended actions

USE CASES

UC1: Automated barge control

Vlissingen

UC2: Automated docking

Vlissingen and Antwerp

5G

Teleoperated crane

UC4: Remote take over

NL – BE Cross border

UC3: CACC-based platooning

NL – BE Cross border

ENABLING FUNCTIONS

EF1	Enhanced awareness dashboard
EF2	Vulnerable Road User interaction
EF3	Timeslot reservation at intersections
EF4	Distributed perception
EF5	Active collision avoidance
EF6	Container ID recognition
EF7	ETA sharing
EF8	Scene analytics

TELEOPERATION COCKPIT

Concise messages on
- Speed advice
- Warnings
- Navigation and routing features

EF2 **EF3** **EF4** **EF5** **EF6** **EF7** **EF8**

5G PILOT SITES

NORTH SEA PORT ANTWERP ROTTERDAM TRANSPORT CORRIDOR
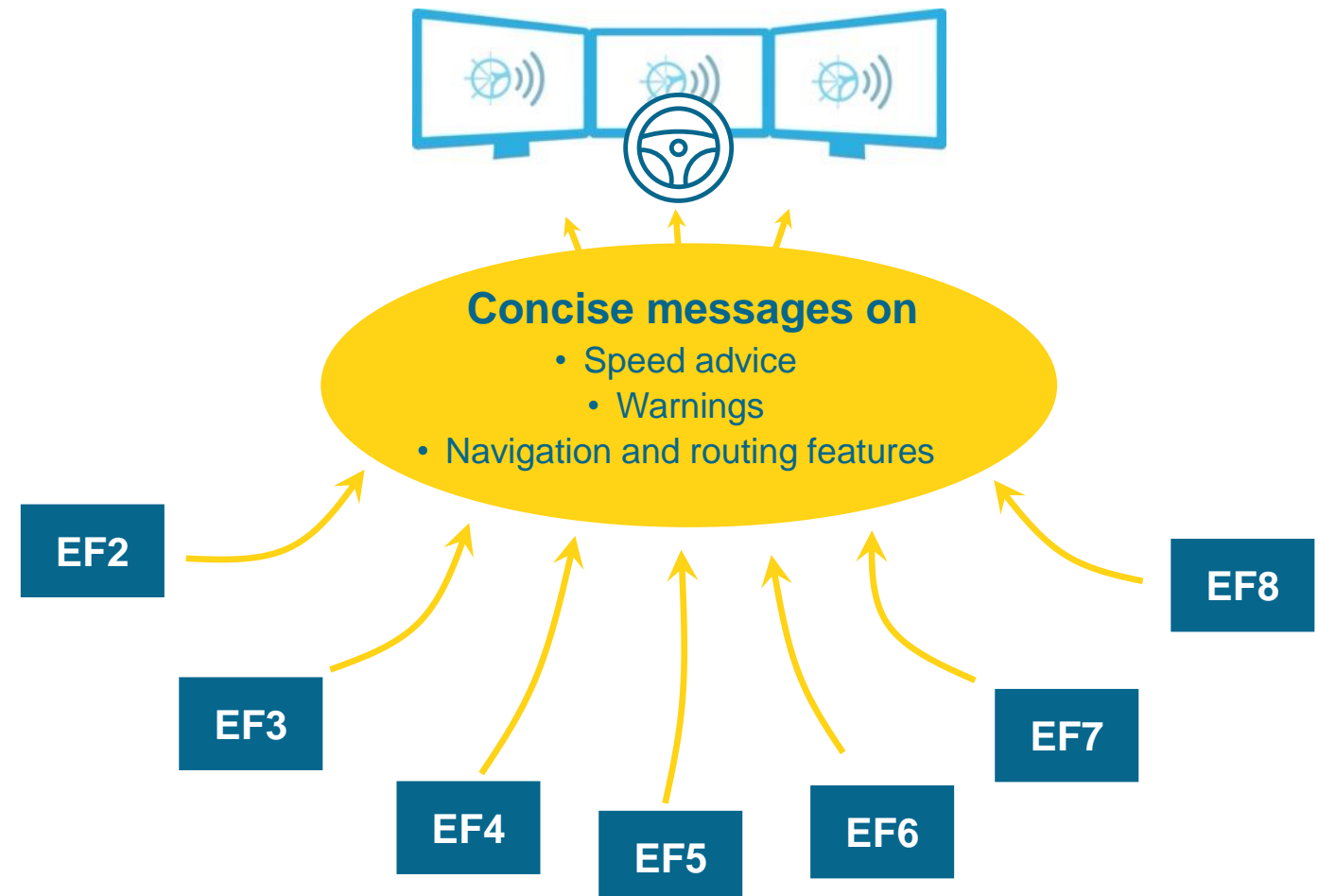
VLISSINGEN

- 5G enhancements for: direct-control teleoperation on roadways, docking, and platooning

- Enabling functions support:
    - Estimated Time of Arrival
    - Timeslot reservation at intersections
    - Container ID recognition
    - Active collision avoidance
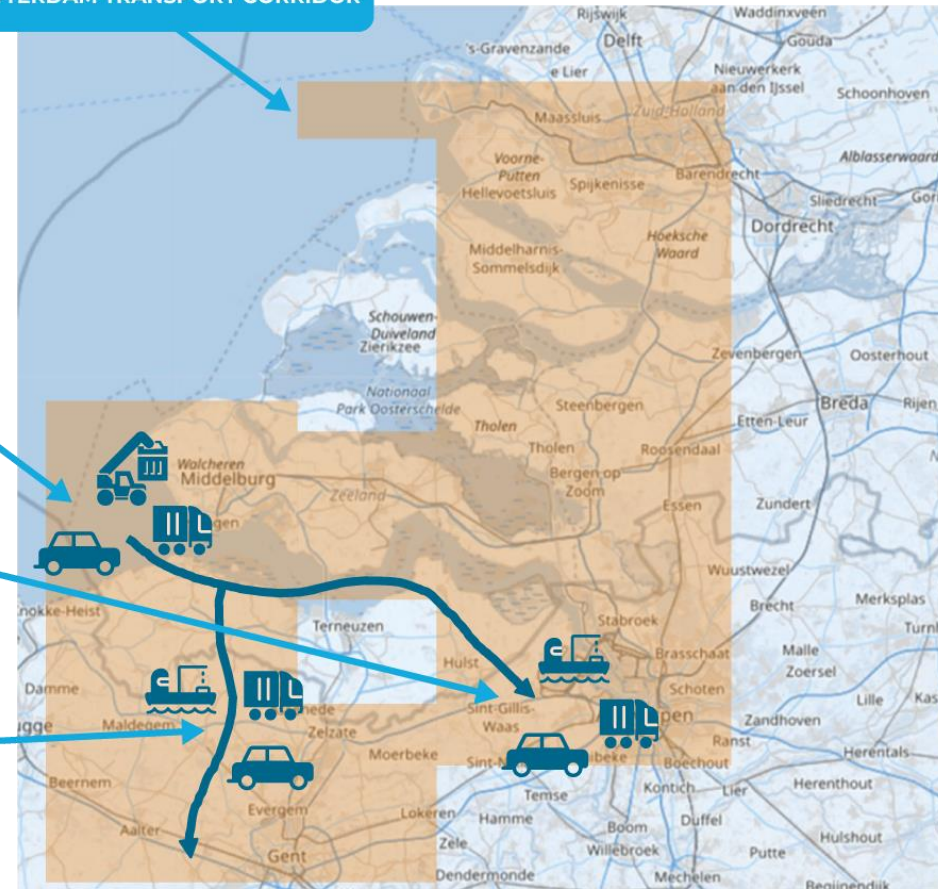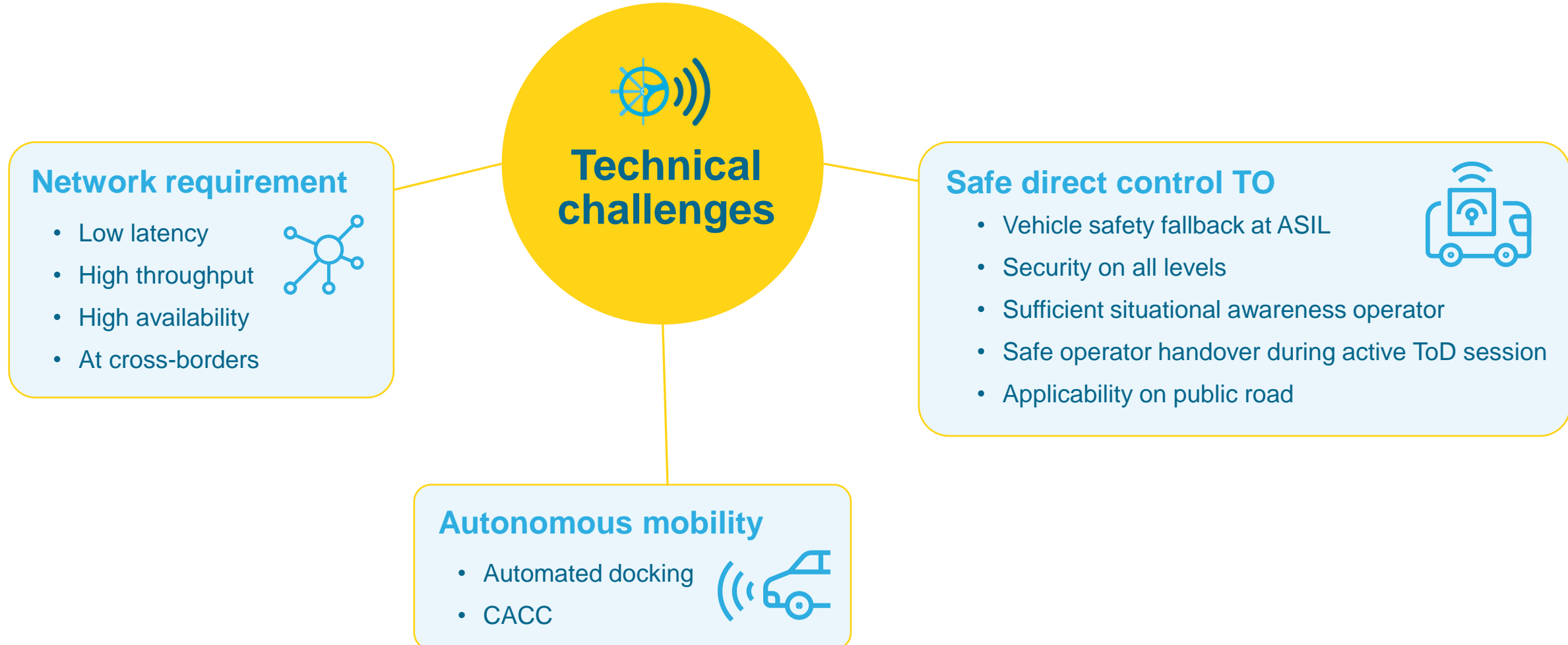   - Enhanced awareness dashboard

ANTWERP

- 5G enhancements for: direct-control teleoperation on roadways/waterways, and platooning

- Enabling functions support:
    - Estimated Time of Arrival
    - Distributed perception
    - Scene analytics
    - Active collision avoidance
    - Enhanced awareness dashboard

ZELZATE (cross-border site)

- Seamless roaming

- 5G enhancements for: direct-control teleoperation on roadways/waterways, and platooning

- Enabling functions support:
    - Estimated Time of Arrival
    - Vulnerable Road User interaction
    - Timeslot reservation at intersections
    - Active collision avoidance
    - Enhanced awareness dashboard

5G-BLUEPRINT CHALLENGES

5G BLUEPRINT

Technical challenges

Network requirement
- Low latency
- High throughput
- High availability
- At cross-borders
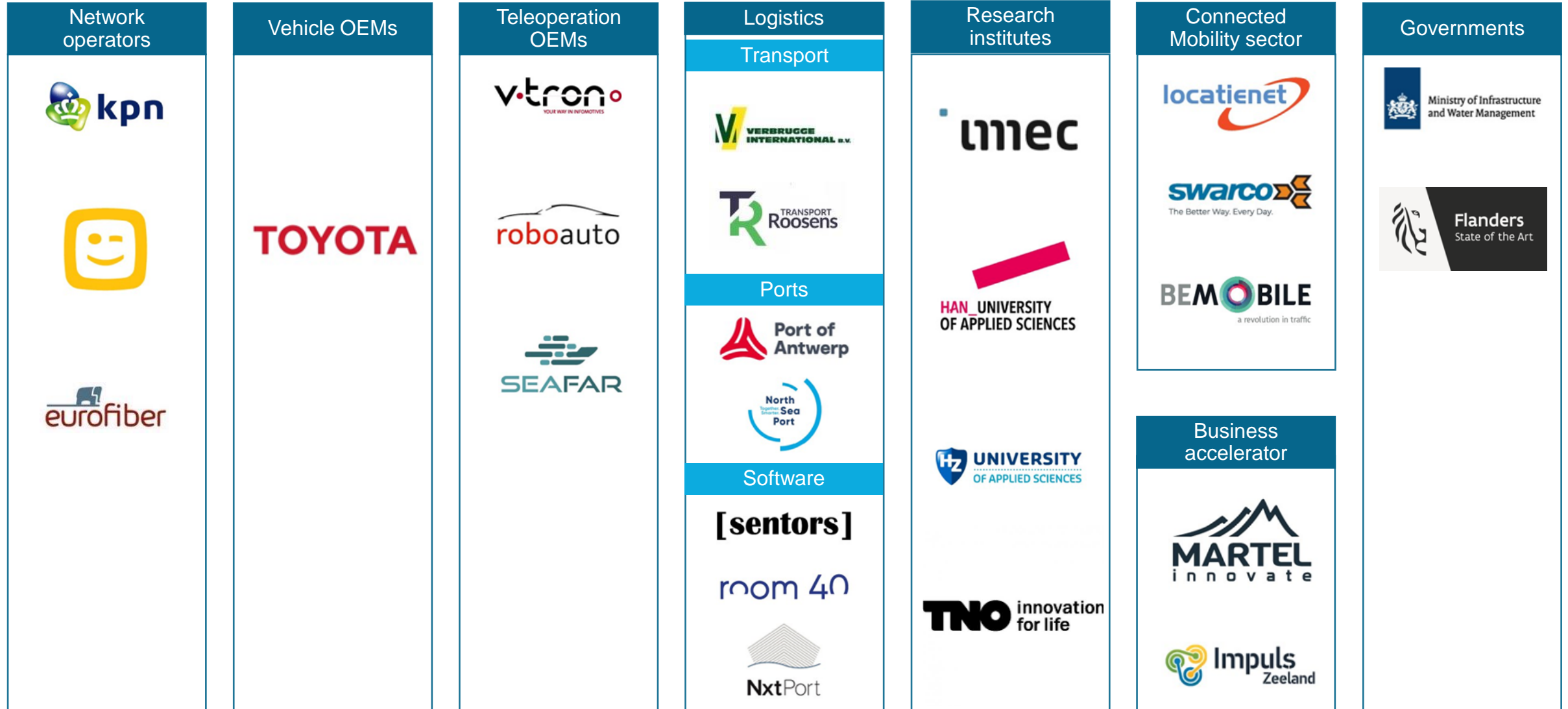
Safe direct control TO
- Vehicle safety fallback at ASIL
- Security on all levels
- Sufficient situational awareness operator
- Safe operator handover during active ToD session
- Applicability on public road

Autonomous mobility
- Automated docking
- CACC

CONSORTIUM AS A WHOLE

ADVISORY BOARD

FACTS & FIGURES

Project Acronym: 5G-Blueprint

Project Name: Next generation connectivity for enhanced, safe & efficient transport & logistics

Funded Under: H2020-ICT-2018-20

Topic: ICT-53-2020: 5G PPP *(5G for Connected and Automated Mobility)*

Call for proposal: H2020-ICT-2019-3

Starting Date: 01/09/2020

Duration: 36 Months

Total cost: EUR 13,9 M

EU contribution: EUR 10 M

Project Coordinator: Dr Wim Vandenberghe, *Ministerie van Infrastructuur en Waterstaat*

Technical Coordinator: Prof. Johann Márquez-Barja, *Interuniversitair Micro-Electronica Centrum*

5G BLUEPRINT

THANK YOU FOR YOUR ATTENTION

5GBlueprint.eu