The work-from-home train driver? Remotely driving a train on the Betuweroute

06/06/2023 – RailTech Belgium

OTW

Introduction OTIV

HQ
Ghent, Belgium (EU)

Founding
02/2020

Team
15

Legal entity
OTIV B.V.

Mission
OTIV aims to increase the safety and efficiency of rail by teaching rail vehicles to drive autonomously in complex environments

Customers, tests and pilots

Founders
Niels Van Damme (MSc. Automation Engineering, UGent): Co-founder and Tech lead
Sam De Smet (MSc. Business Engineering, UGent) : Co-founder and Business lead

Partners

Our beliefs

Billions are invested in long term mobility solutions …

EV
(Car & truck)

Hyperloop

Carbon neutral aircrafts

… to tackle problems that rail already solves

Low CO2 emissions

High capacity

Existing network and infrastructure

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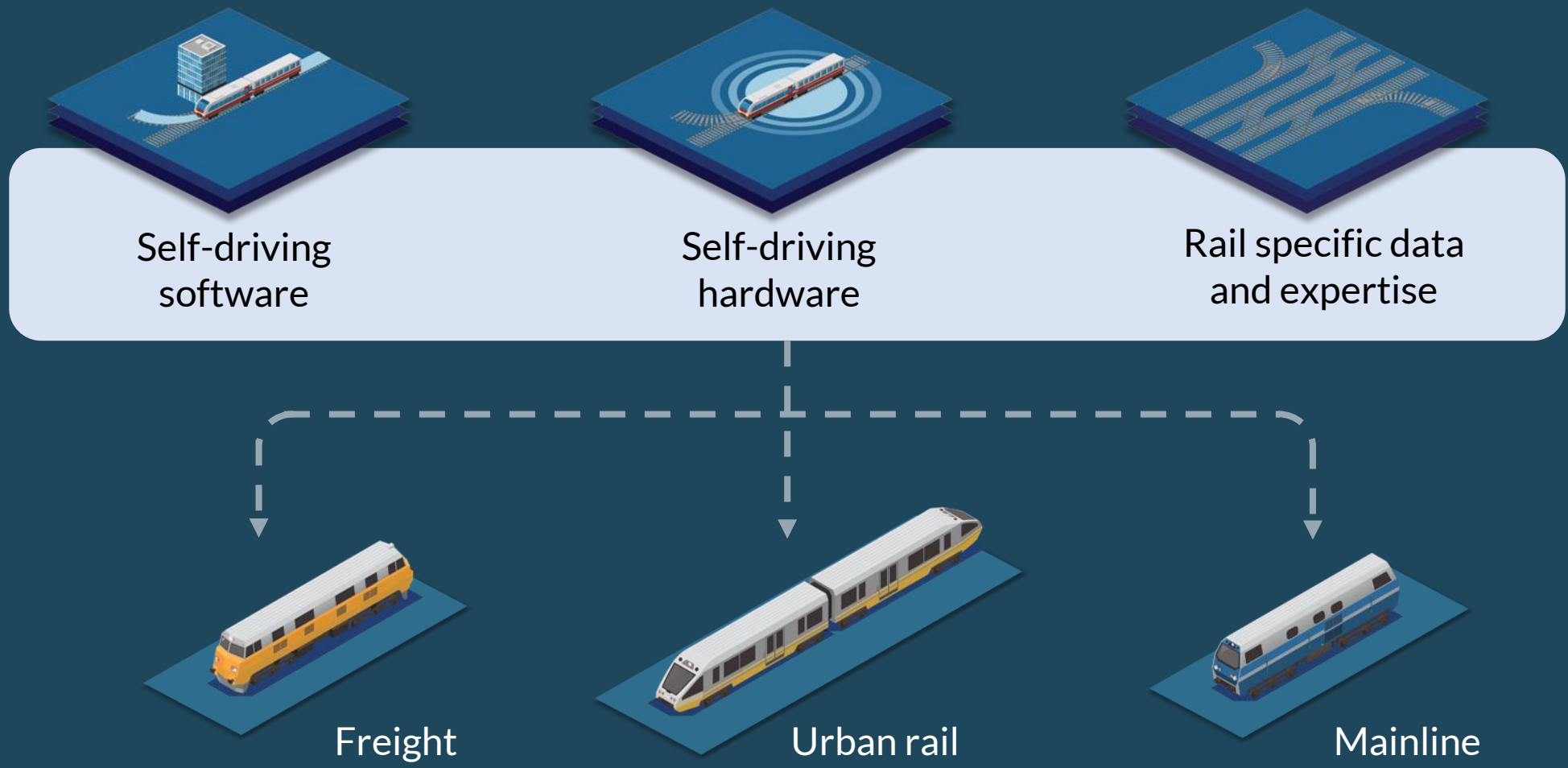
Developing the underlying tech for autonomy



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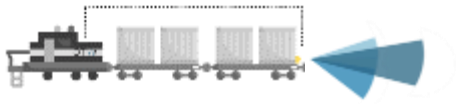
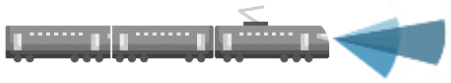
The road to autonomous goes over ADAS and R/C

OTIV.ONE



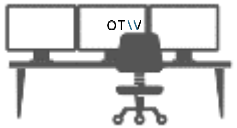
Assistance System for Industrial Shunting

OTIV.TWO



Advanced Driver Assistance System

OTIV.THREE



Remote Control Center

OTIV.FOUR

Perception for Full Self-Driving (GoA4)

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Why remote operation?

Degraded mode for GoA4

Back-up system for full autonomy

Improve driver efficiency

Increase the time spent actually driving

Increase asset utilization

Optimize fleet and network utilization

Benefits for freight, passenger, urban and industrial rail

OTIV.ONE: Enabling remote operation for shunting

Driver's main view

Object detection

Start/Stop

Assistance lines

Vision at night/day

200°+ wide angle view

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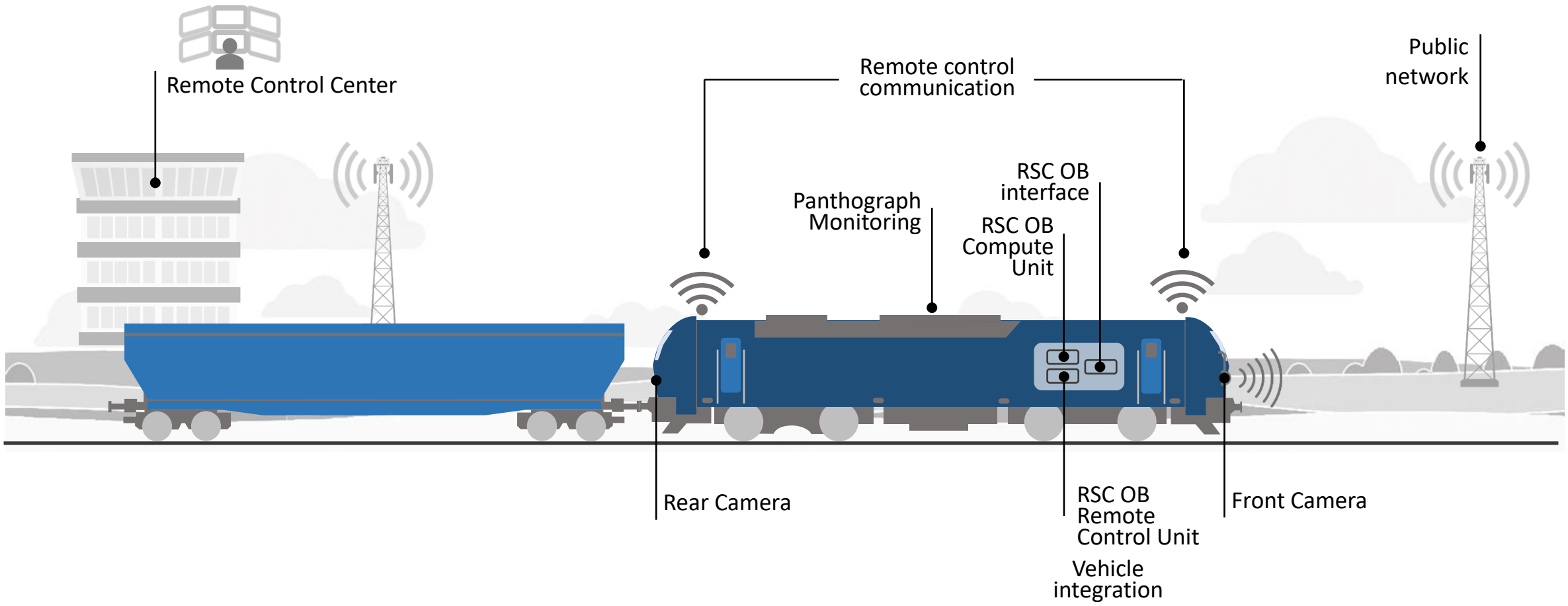
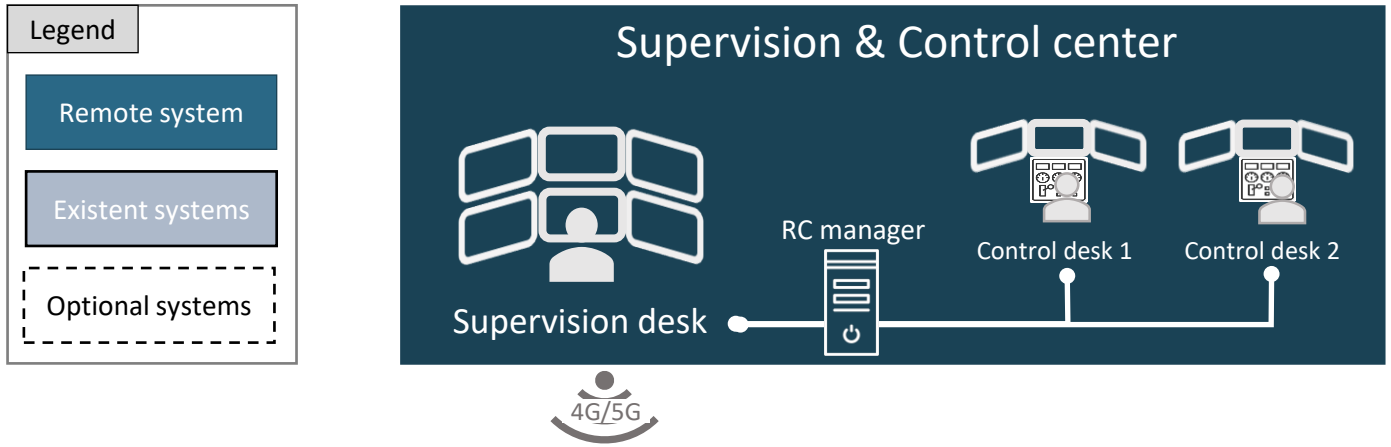
OTIV.THREE: Enabling remote operation for mainline



Remote Operation Center



- Supervision & Control center has a supervision desk and multiple control desks
- Onboard system directly connects to TCMS (ETCS and ATO if existant)
- Train control adapter receives and transmits commands between ATO/Control center and TCMS
- Non-intrusive system as the train can still be operated from the cabin

The project: ATO and R/C over Betuweroute in NL

- Essential rail freight route between German Ruhrgebiet and Port of Rotterdam
- Fenced area (acoustic barrier) without level crossings
- Protected by ETCS Level 2
- ATO GoA2 combined with R/C in operational trials in 2025
- Joint project of OTIV with partners Mobility42 (NL) and Rail Systems Engineering (CH)

REMOOT
MOBILITY42 OTIV RAIL SYSTEMS ENGINEERING

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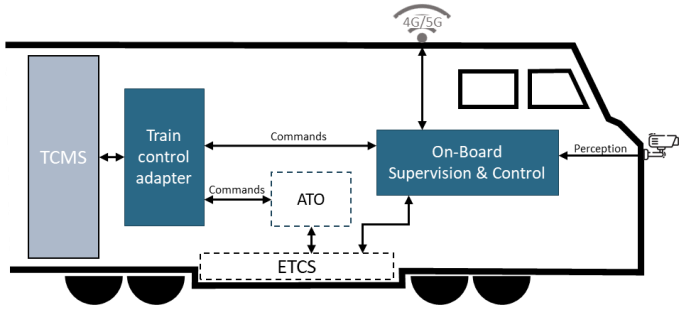
Challenges and criteria for success

Human factors

1-on-1 replication of the current driver cab, or development of a new driving experience?

Train integration

Integration of On-Board control unit into TCMS / ATO / ETCS systems to be standardized on European level



Derogation / homologation

Safety for operational trails (derogation) and future full operational use (homologation)

What's next? Combining R/C with perception to achieve GoA4

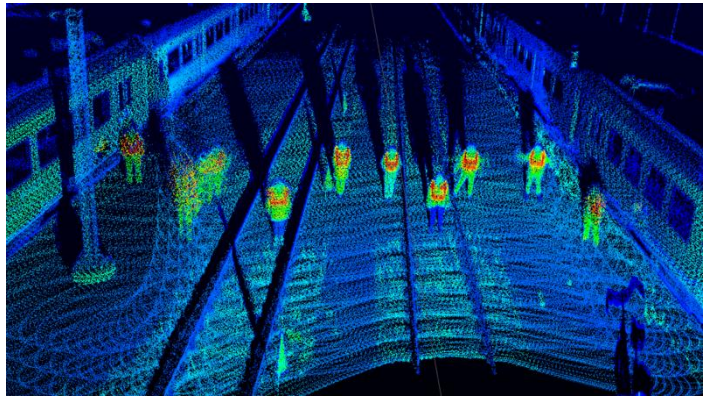
Object segmentation

Object detection

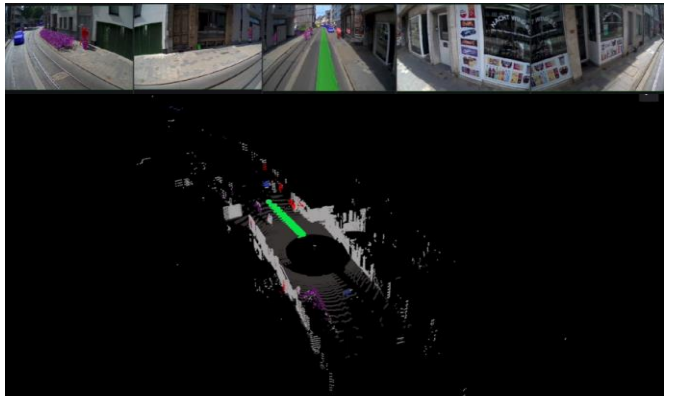
Signaling detection

Rail segmentation

Lidar 3D clustering



3D vector space



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What’s next?

Where is the Belgian lighthouse project on ATO?

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Thank you!

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