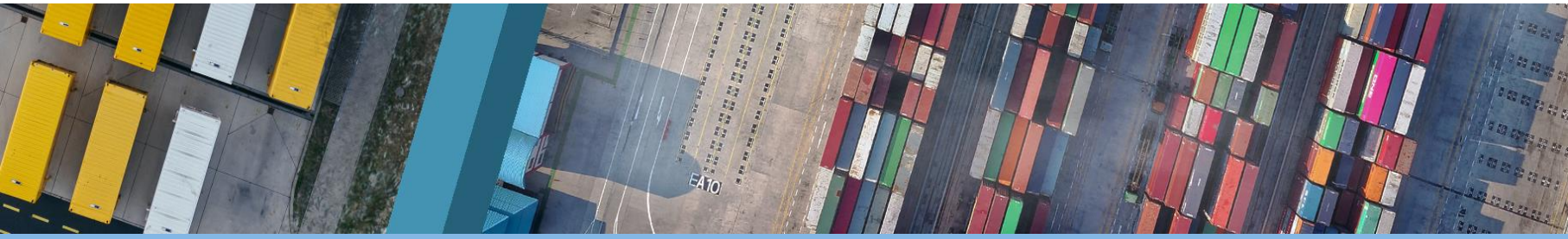
AWARD

Scaling autonomous logistics



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Presentation of the project

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AWARD overview

AWARD : All Weather Autonomous Real logistics operations and Demonstrations

Project Coordinator : EasyMile

Budget : € 26M

Partners : 29

H2020 framework

- **2018-2020** : Digitising and Transforming European Industry and Services: Automated Road Transport
- **DT-ART-05-2020** : Efficient and safe connected and automated heavy-duty vehicles in real logistics operations

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Four real-condition demonstrations

Harnessing the expertize of all consortium members

Development of the system

- Able to handle adverse environmental conditions
- Targeting compliance with ISO 26262 and taking into consideration SOTIF recommendations
- Integrating an embedded teleoperation system to address 24/7 availability and multiple sensor modalities:

FORESIGHT, Continental, ADASKY, NAVTECH RADAR, ottopia

- Optimized fleet management & supervision system for logistics use cases

APPLIED AUTONOMY

Integration into HDV and validation

Demonstrations

Port Trailer autonomous transfer operations — DFDS

Hub to hub autonomous logistics on public roads — ROTAX AIRCRAFT ENGINES, DB SCHENKER

Airport autonomous ground support equipment — AVINOR OSL

Autonomous loading and unloading operations — AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

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Airport

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About the vehicle

"EZTow" autonomous tow-tractor

- Manufacturer: TLD (Saint Lin, France)

- EZTow: airport and industrial towing tractor
- Vehicle speed: 15 km/h
- Towing capacity: 14 tons

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How we make sure it's safe

Tests and scenarios both at home and elsewhere

Simulation of airport environment:

- Vehicle running in autonomous mode under the rain tunnel
- Different kinds of obstacles: pedestrian and car dummies, suitcases, barriers
- Test in a straight line, on intersections

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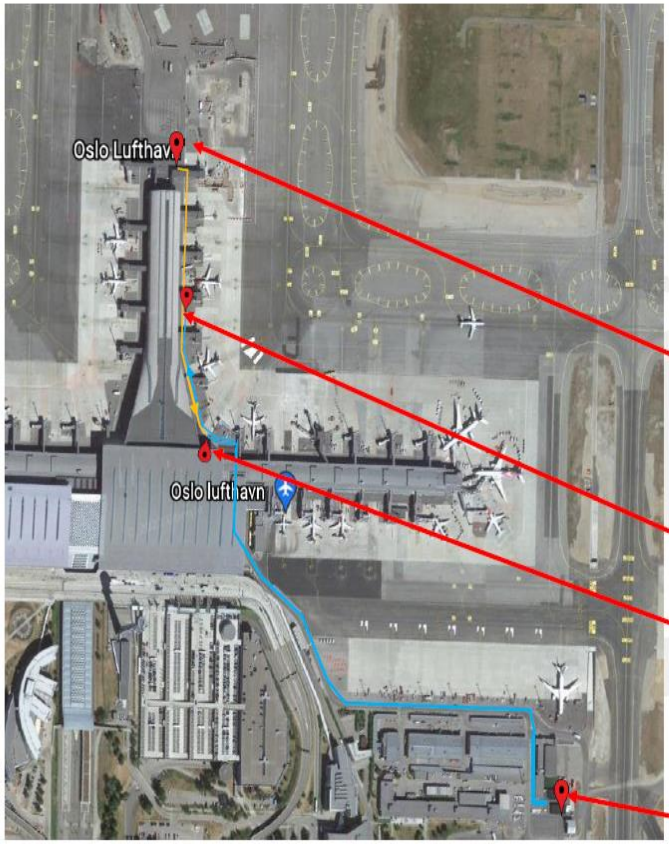
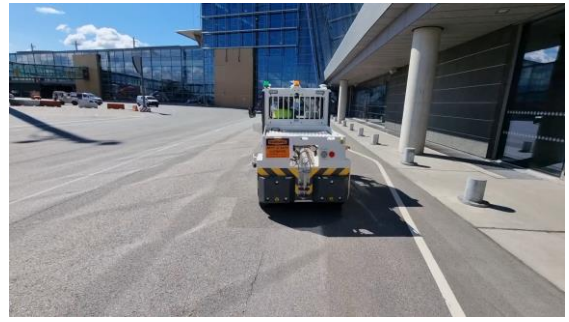
On the tarmac

Real-condition operations with AVINOR at Oslo Airport, Norway

Route Description

- Use Case:
  - TractEasy waiting mission point
  - Go manually to pick up empty dollies along P-North, then go to Start Auto Mission point
  - Bring them autonomously to containers storage
  - Go back autonomously to End Auto Mission point
  - Drive manually to TractEasy waiting Mission point





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Port

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About the vehicle

"EZTug" autonomous terminal tractor

- Manufacturer: TERBERG (Benshop, Netherlands)

- Vehicle speed in autonomous mode: 25 km/h

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How we make sure it's safe

Tests and scenarios both at home and elsewhere

Simulation of port logistics operations:

- Vehicle running in autonomous mode under the rain tunnel
- Different kind of obstacles: pedestrian and car dummies, barriers
- Test in a straight line, on intersections, on the roundabout

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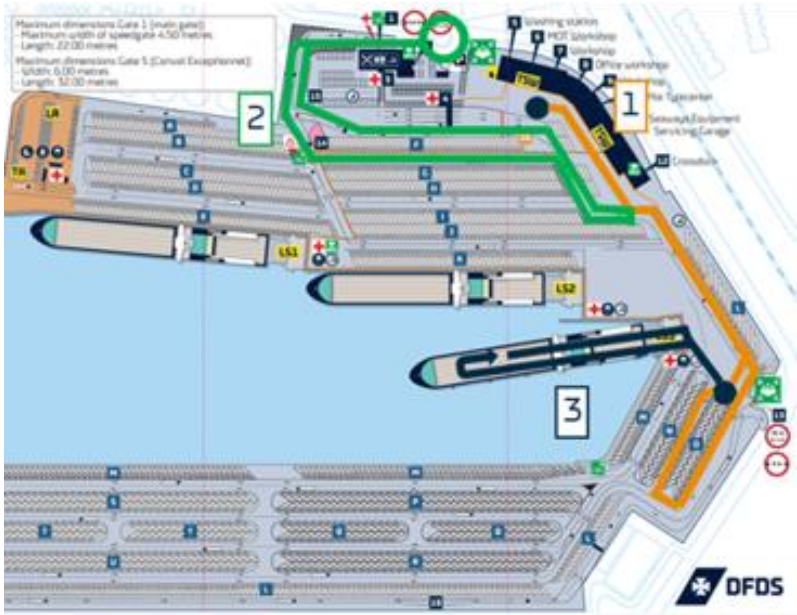
At the port

Real-condition scenarios with DFDS in Vlaardingen, The Netherlands)



Use case

- Phase 1 : Trailer move on site – prepared for loading onto the ship
- Phase 2 : Public road access and gate-process without trailer
- Phase 3 : Loading of a trailer onto a ship

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Forklift

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About the vehicle

Remotely-controlled forklift

- Palfinger Crayler
- Outdoor and off-road machine
- Usually used for loading and unloading at sites without logistics infrastructure

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On-site

Demonstration of autonomous truck loading

Use case

- Truck parks at arbitrary position
- Driver or freight management system (FMS) assigns an area to unload
- Crayler starts autonomous unloading
- Operator responsible for supervision

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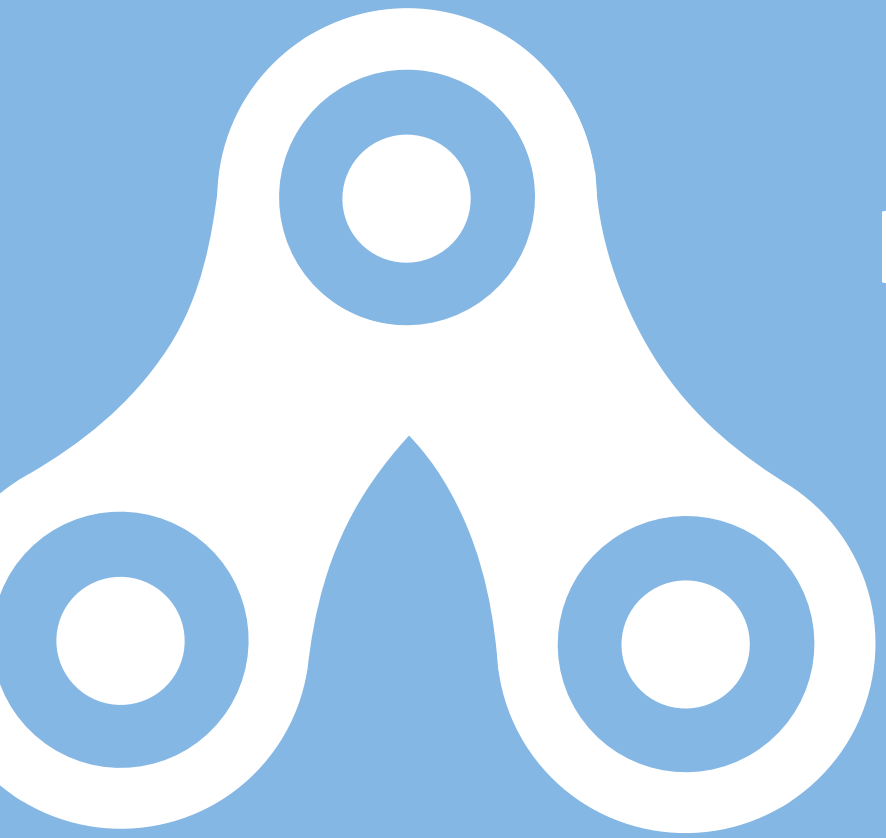

Hub-to-hub

About the vehicle

Autowiesel: Swap-body transporter

- Manufacturer: KAMAG (Ulm, Germany)

- Vehicle speed in autonomous mode: 20 km/h

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How we make sure it's safe

Tests and scenarios both at home and elsewhere

Simulation of hub to hub logistics operations:

- Vehicle running in autonomous mode under the rain tunnel
- Different kind of obstacles: pedestrian and car dummies, pallets, barriers
- Test in a straight line, on intersections, forward and backward

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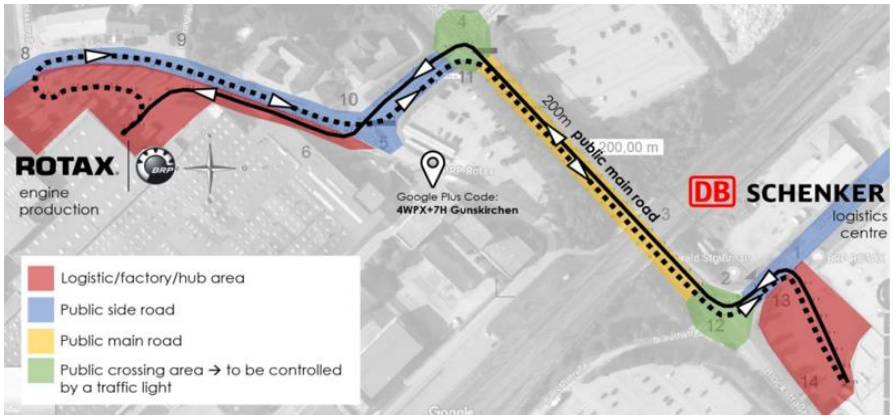
On the road

Hub-to-hub with ROTAX and DB SCHENKER in Gunskirchen, Austria



Use case

- Component pick-up at a logistic site
- Autonomous movement through mixed traffic with C-ITS
- Delivery at factory site
- Orchestration via Fleet Management System

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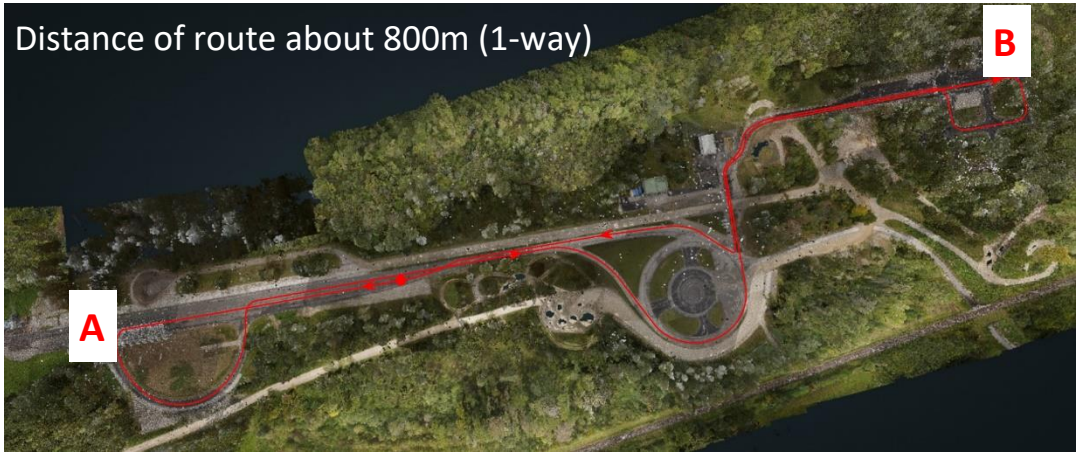
On the road

Hub-to-hub with teleoperation in controlled environment



Use case

- Autonomous operation with remote assisstance
- Intervention by teleoperator instead of on-board operator when needed

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Findings & Lessons Learned

Hub-to-hub logistics in Austria

- Operation on public roads
  - → Legal framework to allow operation
  - → Integration in prevalent traffic flow required
  - → Traffic lights safety critical for entering/leaving crossings
  - → Other road users sometimes ignored red lights after 30s in the evenings
- Overall good performance
  - → Especially driving at industrial sites and reversing
  - → High maturity of technology with space for improvements (e.g. harsh weather, mixed traffic, availability)
  - → Overall process to be considered in automation
  - → On average, humans operate the route with 16 km/h, automation with 6.4 km/h
- Teleoperation and V2X communication
  - → Teleoperation as enabler for realistic applications
  - → Importance of V2X communication
- Acceptance, interaction and HMIs
- ...

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Further steps

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Way forward …

Joint Events: Workshops and Webinars:

- Pan-European Workshop: Charting the Roadmap for Autonomous Vehicles in European- 11th Dec from 9am-12am CET

Invitation to ALICE Members:

- "Join us for exclusive onsite demonstrations in 2024."
- "Experience firsthand the latest advancements in logistics and autonomous vehicle technologies."

Policy Recommendations:

- Discussion on shaping future policies for AVs in Logistics.
- Collaborative efforts to influence and inform policy-making.

Fostering Research Through Public Funding:

- "Opportunities for further research in logistics and AV technology through public funded projects."
- "Encouraging innovation and practical solutions."

Leaving a Lasting Legacy:

- Creating a roadmap for future advancements and industry standards.“
- Collaboration with MODI Project
- Integrating ALICE CCAM (Cooperative, Connected, and Automated Mobility) Logistic Operations Activity field with the MODI project.

Public Reports and Knowledge Sharing:

- Access our findings and developments on the ALICE Knowledge Platform and Zenodo.
- Stay updated with our latest public reports and research outcomes.

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