



Autonomous container handling with ship cranes

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Navigating the Future of European Waters with Autonomous Innovation

7 November 2023, Rotterdam

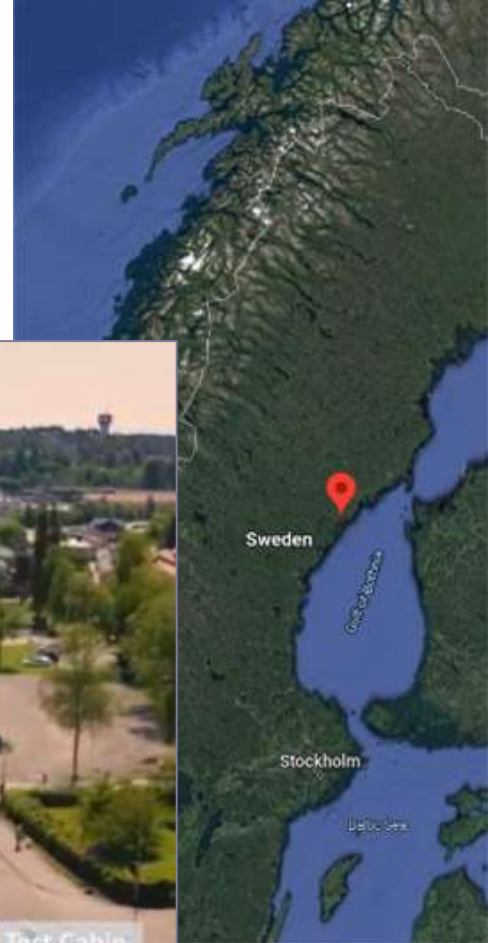


These projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements N° 815012, 859992, 861678.

What we had to conquer? What have we achieved?



- Robotic Crane **NEW**
- Automated Stowage planning for shortsea shipping **NEW**
- Digital Twin development environment





Main mechanical components

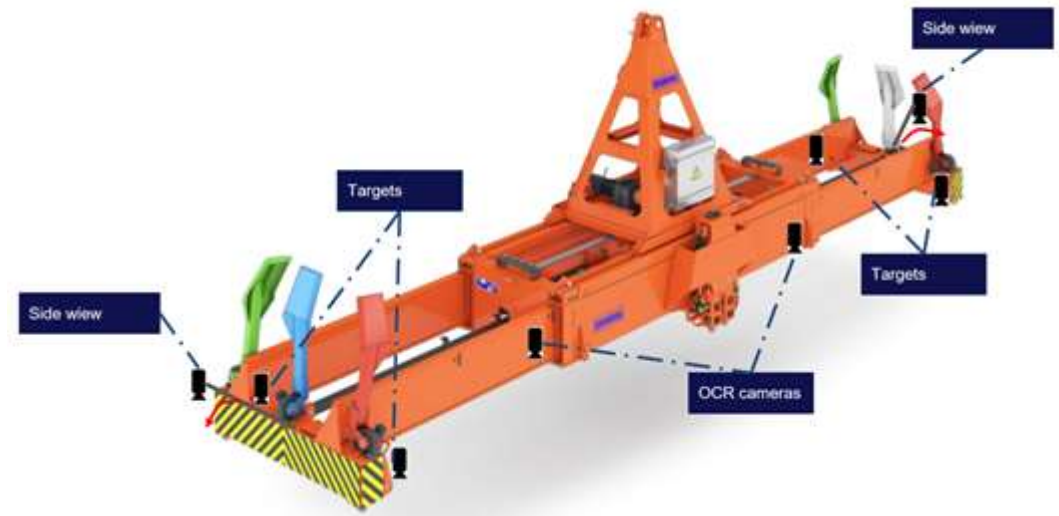


Electric crane GLE

- Swing defeater
- Antipendulation

Spreader

- Load sensors
- Tower control



New mechanical components



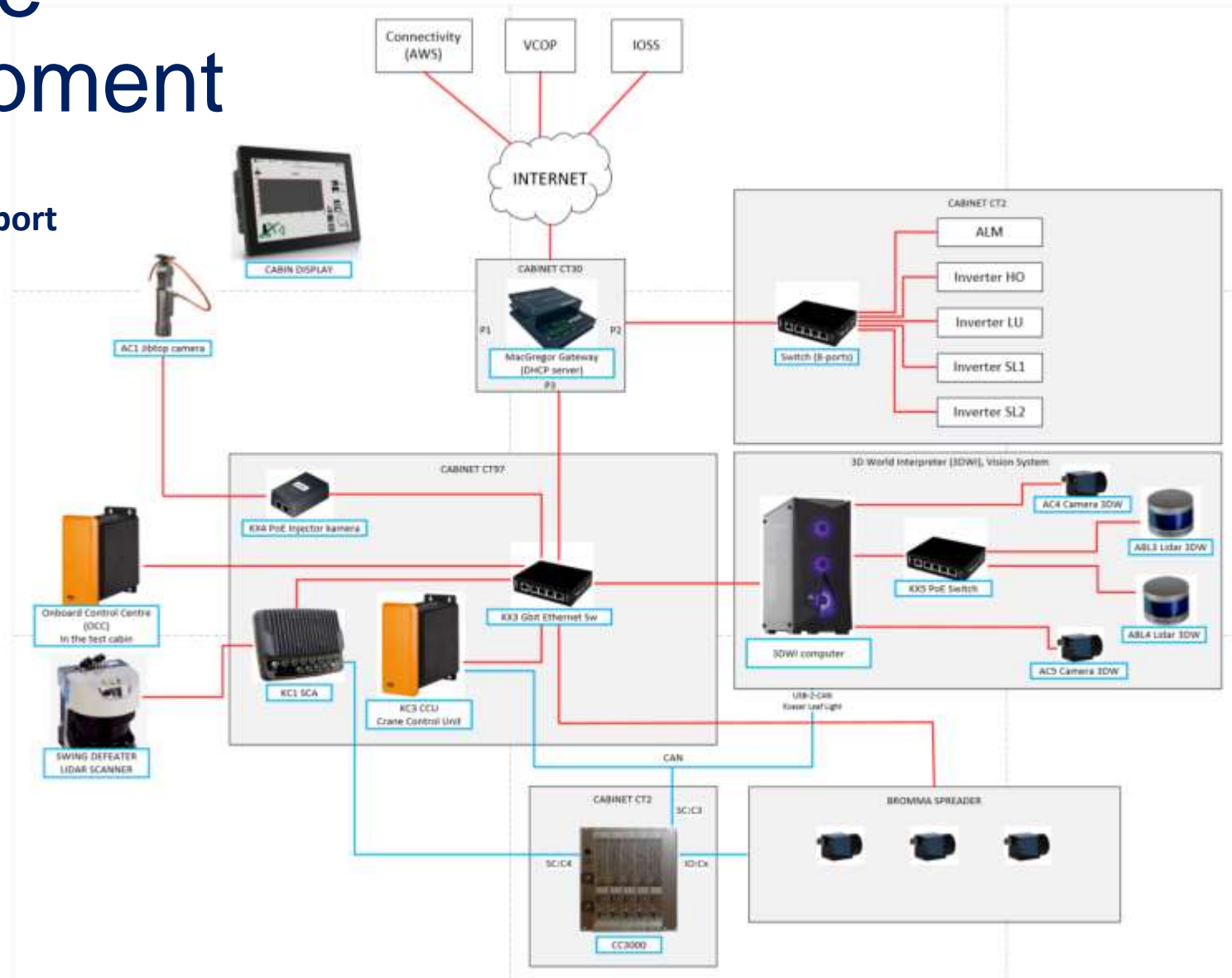
- Cable winch for IP-cameras **NEW**
- Jib top IP-camera **NEW**
- LIDAR used for pendulation damping
- Lidar and camera installation **NEW**
- CCU – Crane Control unit inside the crane house **NEW**
- Retractable camera arm **NEW**



Robotic crane

- SW development

- **IOSS NEW**
 - Intelligent Operator Support System
- **VCOP NEW**
 - (un)loading sequence
- **3DWI NEW**
 - Vision system
- **Spreader Control NEW**
 - Lock on Target
 - OCR Reading
- **Crane Control**
 - **OCC FEATURES ADDED**
 - **CCU NEW**
 - **CC3000 FEATURES ADDED**



Voyage and Container Optimization Platform (VCOP) **NEW**



MACGREGOR AEGIS VCOP - Cargo Booker

VCO HOME MY DRAFTS MY BOOKINGS NOTIFICATIONS

SEARCH CONTAINERS

Container ID or booking number
Enter ID or number

FILTER BY

Port of loading ▼

Port of discharge ▼

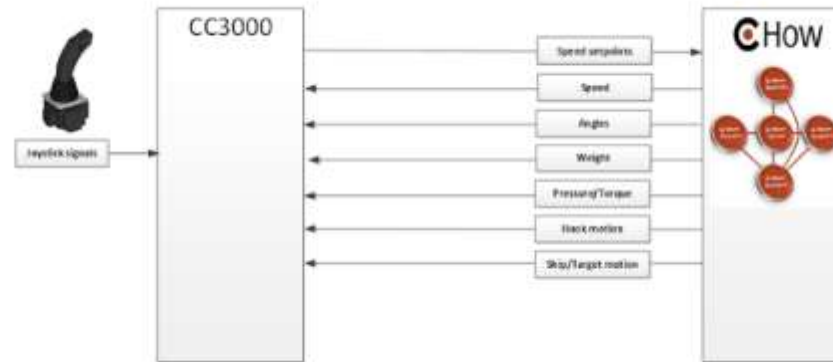
Containers (25)

Container	Booking Number
OBD222	TDF33
Container Type 22G0	Container Weight 28.5 MT
Cargo Origin Cargotec Ruskontie 13	Cargo Destination Sintef Captain Alley 11
Booked Vessel VCO Unity IMO1234567	Port of Loading Rauma FIRAU
Port of Discharge Larvik NOLAR	Transit to final destination
Booking accepted	N/A
Vessel ETA 7.11.2023 11:00:00	N/A

Container	Booking Number	
CID123312	BN3222	
Container Type 22G0	Container Weight 28.5 MT	Req. Temp -30°C



Digital twin development environment





Lessons learned & way forward



- Consortium member integration as early as possible
- Digital twin design environment
- Pre-project S-o-A components were fully utilized as planned

- Accuracy improvement (stacking of containers)
 - Optimal crane type
 - Vessel motion control
- Robust operation
 - Climate proofed sensors
- Autonomy vs. Semi-autonomy





Thank you

Rotterdam Ahoy
7 November 2023



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