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Connectivity needs for ports and autonomous ships

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Manager digital innovation

Energy and industry ports between three main ports

Ports and industrial sites adjacent to Unesco World Heritage Site

Eemshaven: energy & dataport

Connectivity needs for ports and autonomous ships

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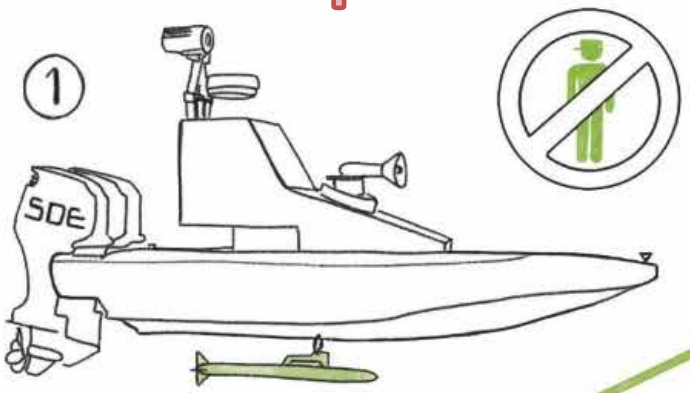
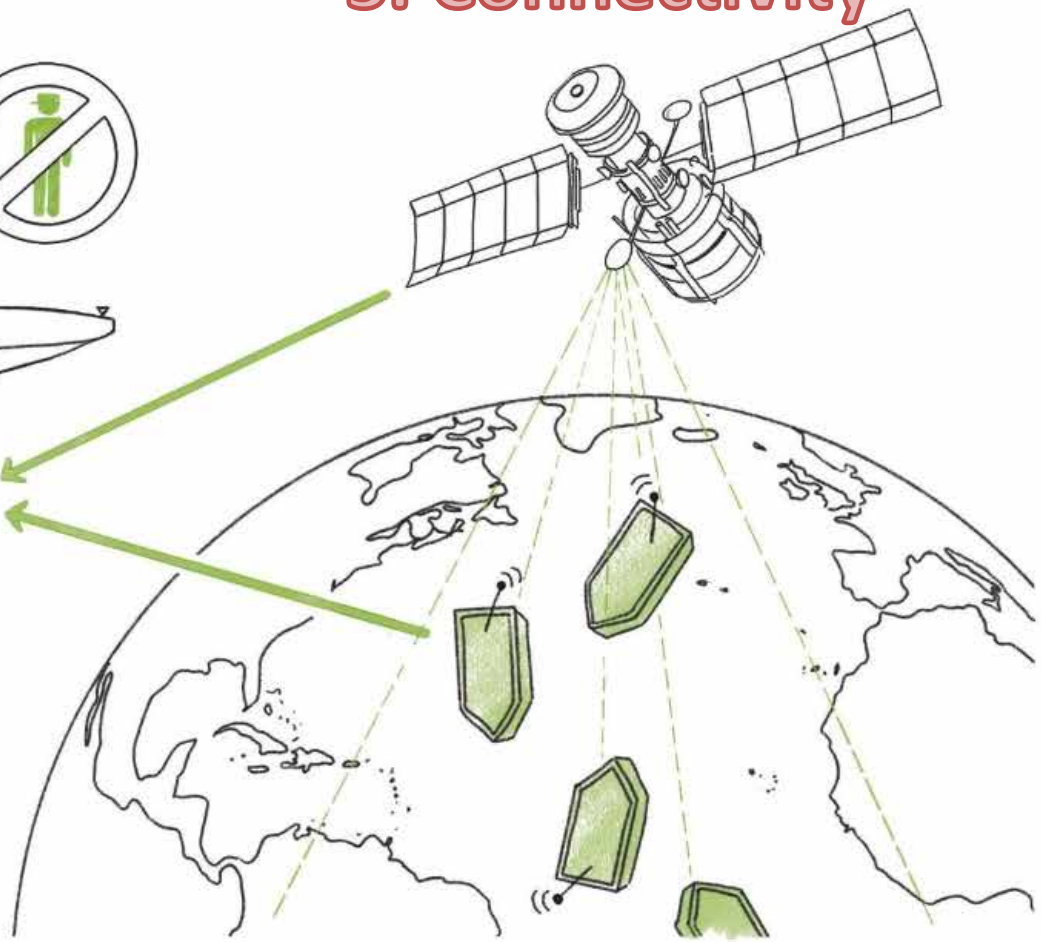
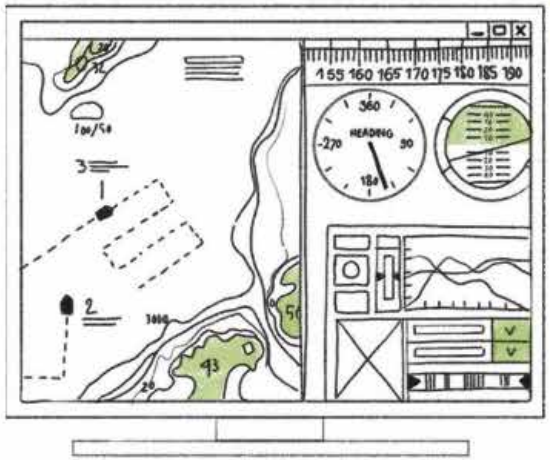
Elements of autonomous shipping

1. Autonomous ship



3. Connectivity





2. Control Center

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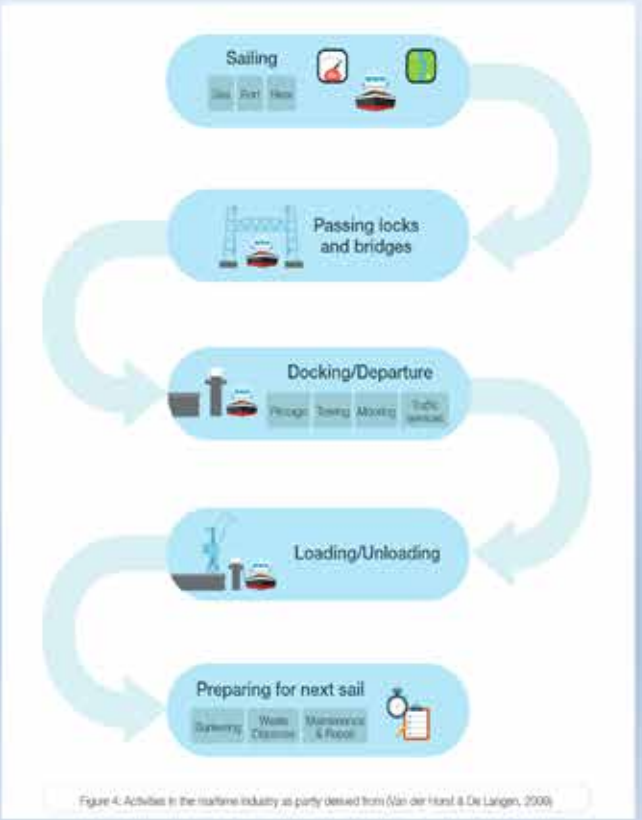
Autonomous shipping roadmap

5 15 Years to go According to



Increased sensors and decision support

Human assisted autonomy

Fully autonomous

5 15

5 15

5 15

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5 15

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Groningen Seaports preparations for autonomous shipping

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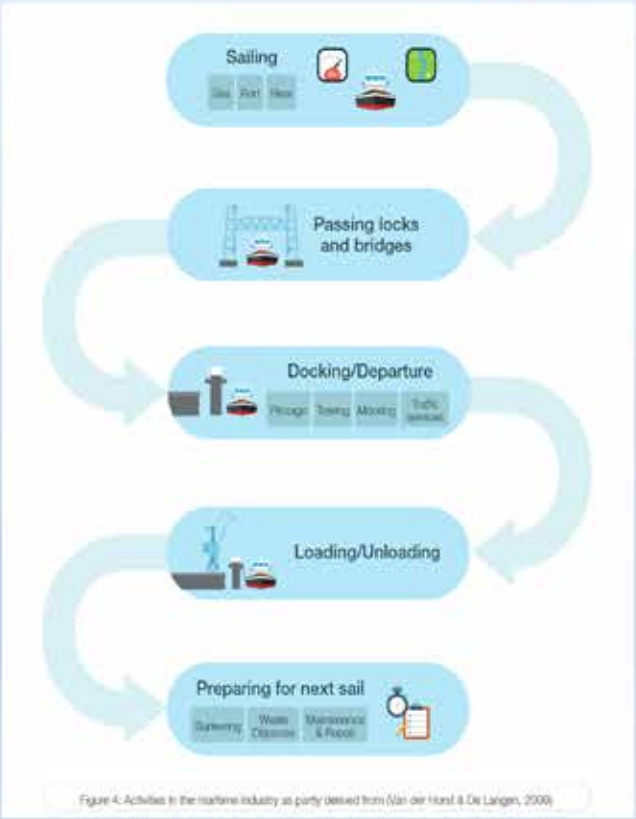
5 15 Years to go According to

Increased sensors and decision support

Human assisted autonomy

Fully autonomous



2015 Cameras and radar integrate

2019 5G pilots for connectivity

2019 Situational awareness pilot

2030 Fully digitized Port control center

2020 Port data analytics

2019 Pilots realtime sounding

Pilot port autonomous shipping

2025 Ready for first fully autonomous ship

2023 Data driven port management

2019 Pilots parking sensors

2021 Automated berth planning

2019 Pressure sensors on quays

2025 Automated billing

5 15

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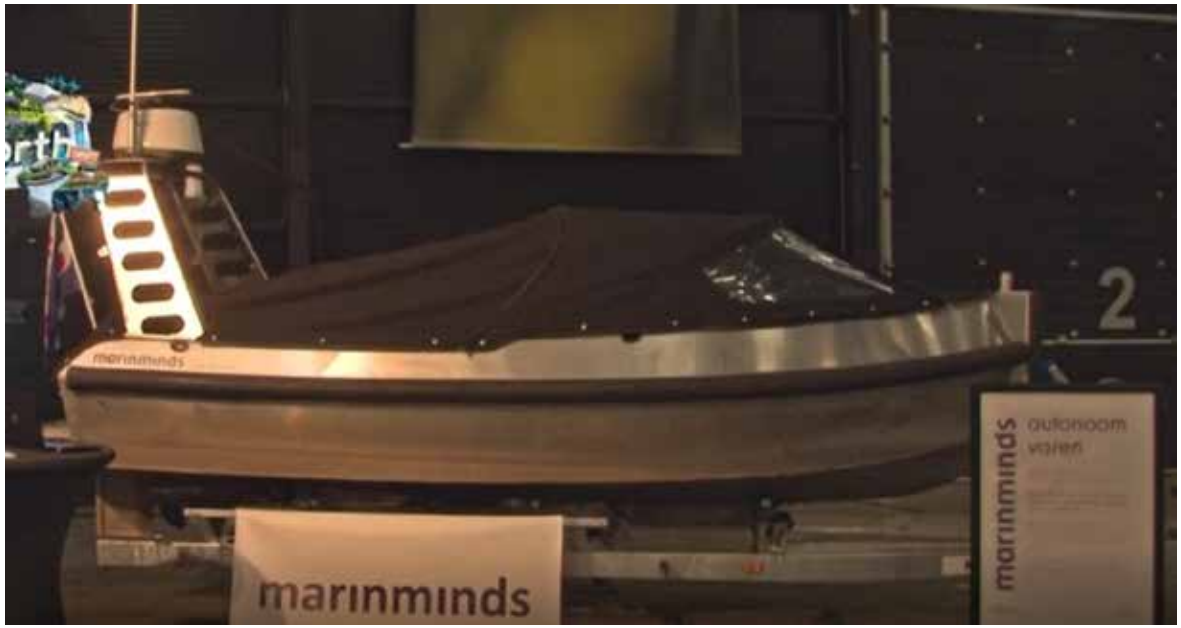
Pilot with 5G/4G and autonomous ship



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Transfer to Port Control Center

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Status of the first trials (May 2019)

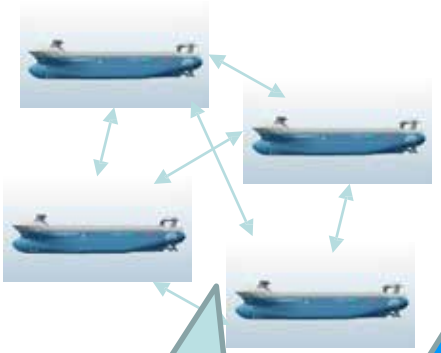
- 5G not yet present in the ports
- Inside port 4G sufficient to transfer situational awareness (of a ship with simple sensorsystems and camera's) to port control center
- Outside port 4G signal too weak
- Use as much AI on the ship itself to reduce connectivity needs
- Further testing with more sensors (for example sounding) in November 2019

Connectivity for autonomous shipping

1 Situational aware autonomous ship

Moderate bandwidth for monitoring the ship

2 Interacting autonomous ships



High bandwidth and low latency

3 Interacting autonomous ships entering a port

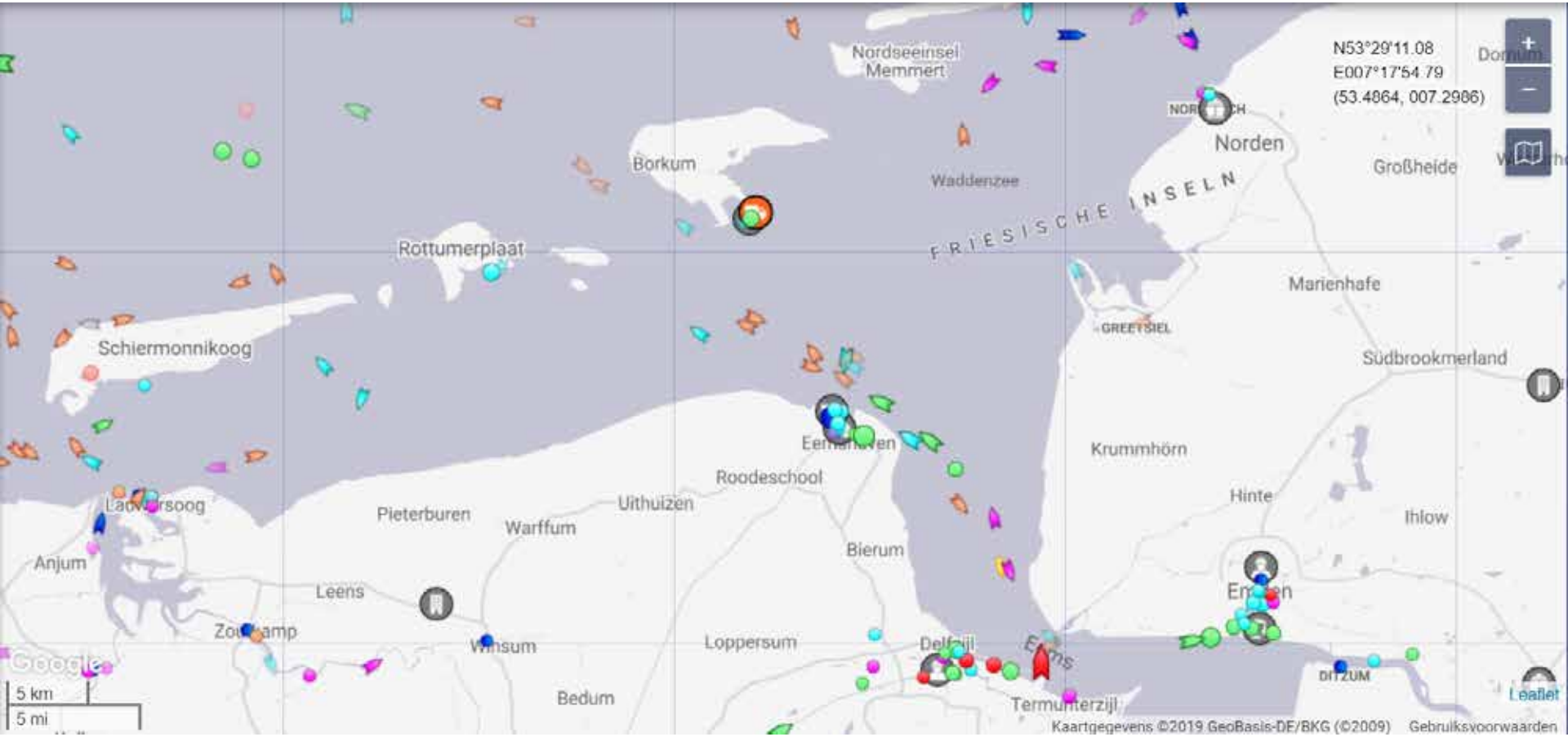
Higher bandwidth and lower latency

Shore Control centre !

Connectivity challenges

- No coverage of 5G/4G on full sea
- How much bandwidth can be delivered by satellite coverage?
- Can low latency be achieved, necessary to have safe control over the vessel, from a control station in the port?
- Is it possible to transport the situational awareness of the ship and the information about the performance of the ship and its equipment, to the control centre ?
- Is a swift shift of connectivity from 5G/4G to satellite and vice versa possible?
- What are the requirements in case of many ships that are in connection with the port/control room?
- Can adequate communication between vessels be established?

Approach to Eemshaven



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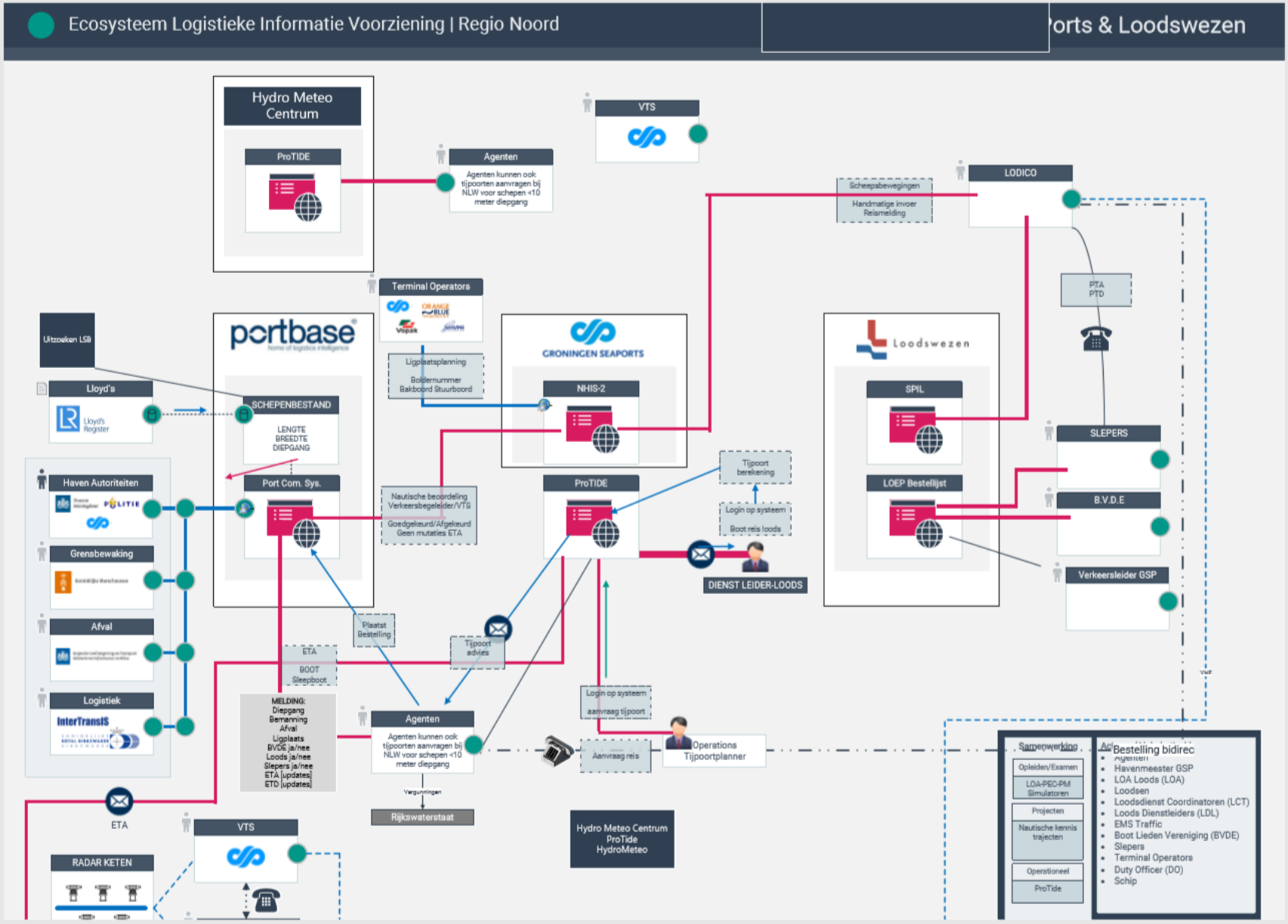
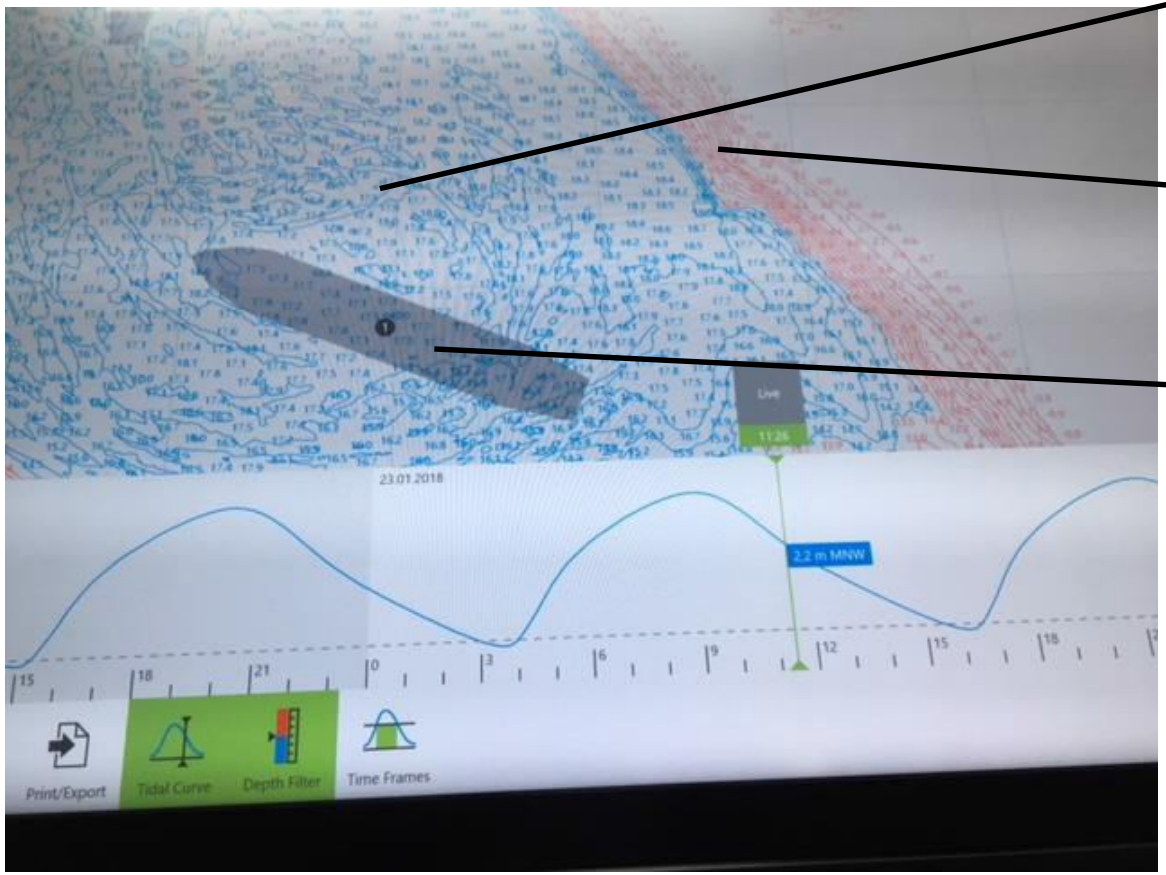
Ecosystem nautical information North of the Netherlands



Port control centre

Port of Hamburg control centre



Waterway: soundings, currents, tides, ……..

Depth filter: to shallow !!

Ship: depth, length, width, ETA, cargo, nautical characteristics…..

Port: quay planning, ETA, ETD, route, priority, activities

Pilot: quay planning, ETA, ETD, route, priority,…..

Meteo: wind strength, direction, temp, …..

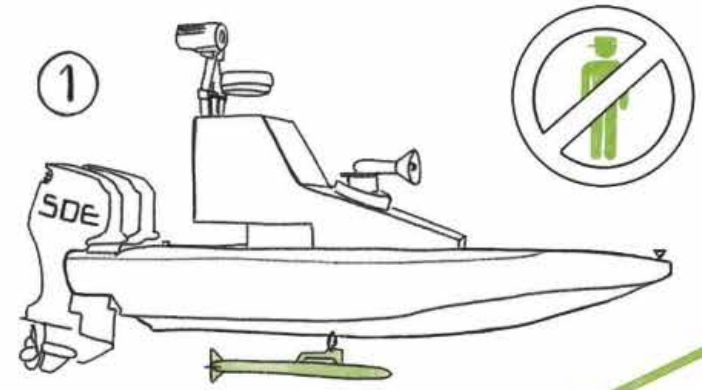
Some challenges Port Control center

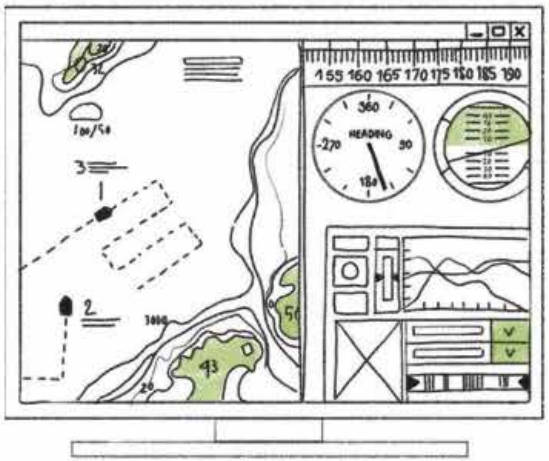
- Merge data in platform:
  - nautical data including actual depth, direction, current, wind strength, direction
  - Data about the ship: condition, nautical characteristic
  - Situational awareness
  - Port environment data
  - Logistical data
  - Communication data
- Need for protocols, communication standards
- Artifical intelligence
- Psychology of handling many different ships

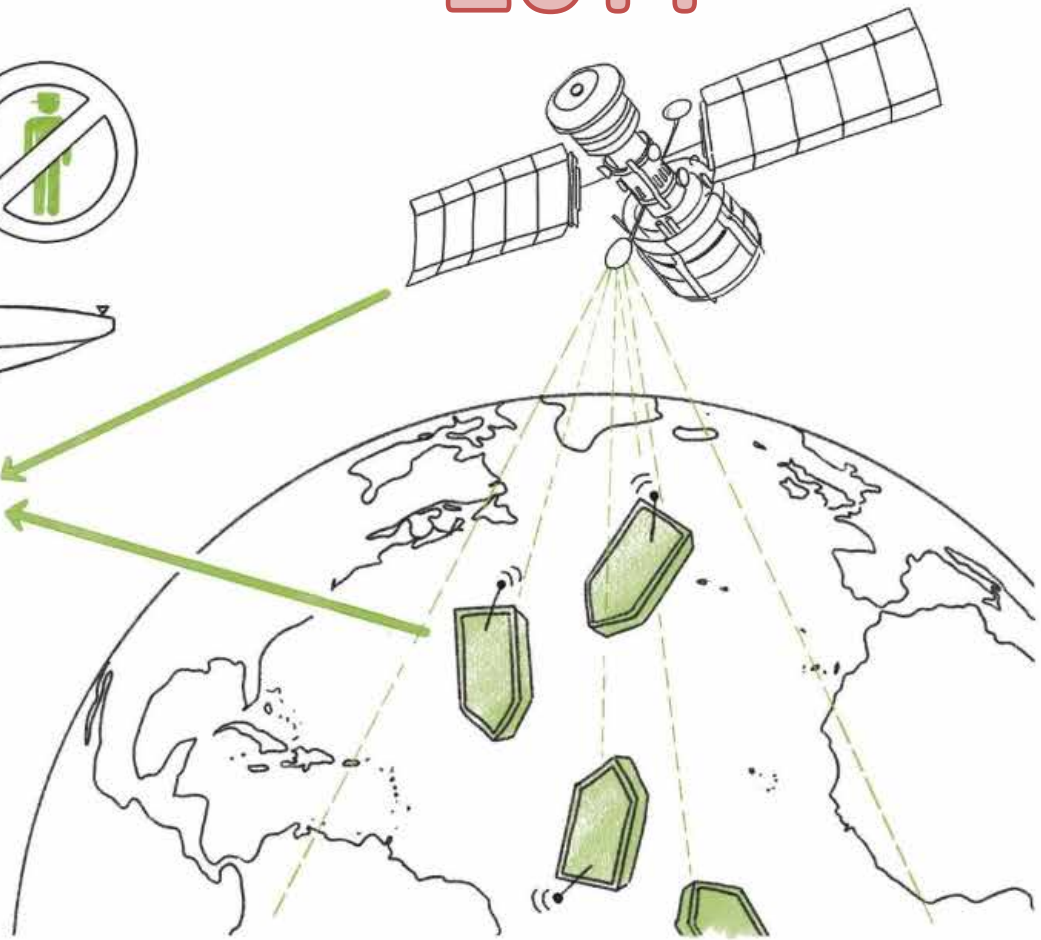
Summary

2019

20??







2025

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THANKS FOR YOUR ATTENTION

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