



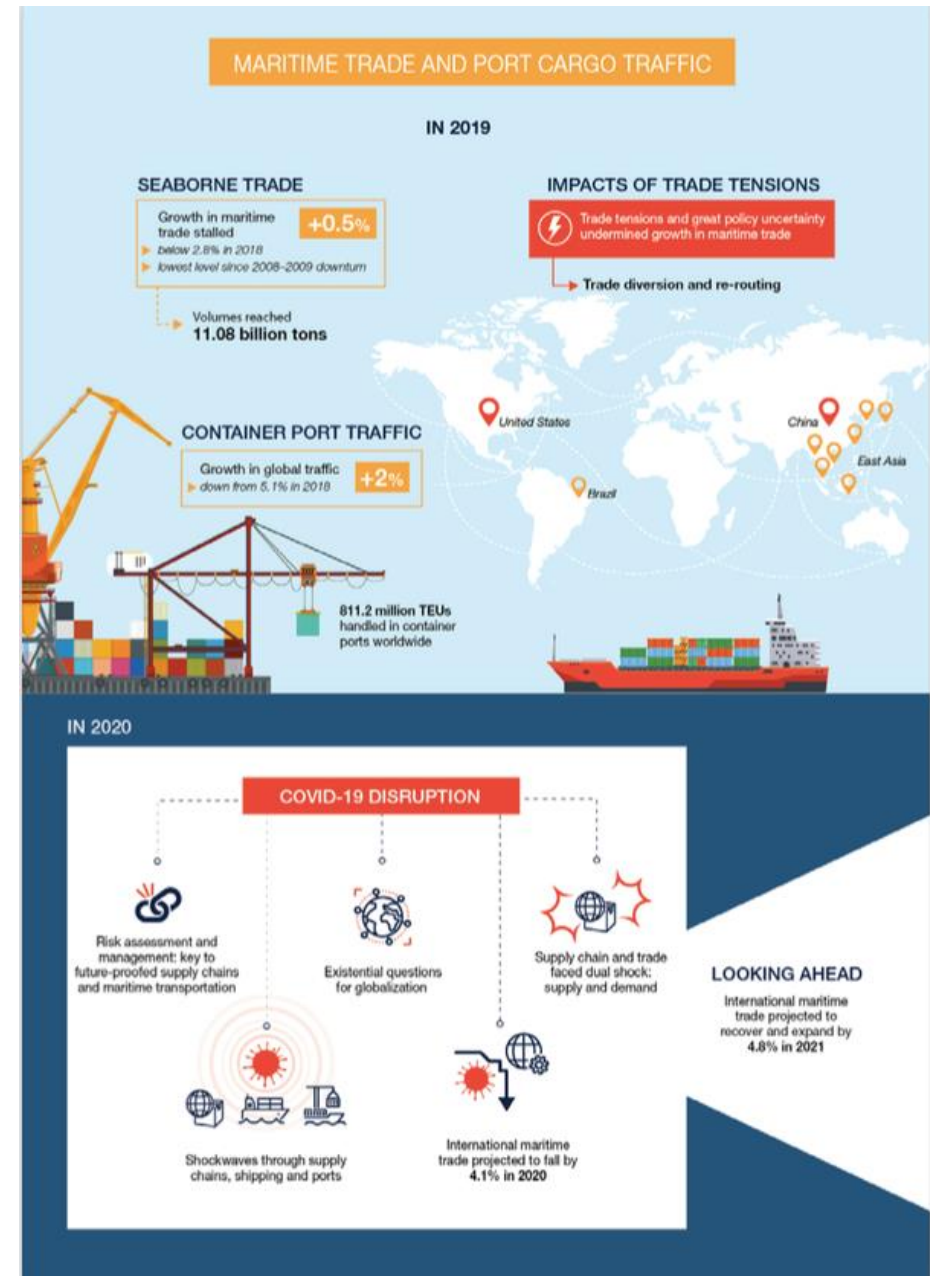
# Smart shipping: navigating to the future

Capt. Marc Nuytemans, FNI



# THE BLUE ECONOMY

# World Seaborne Trade in 2019



# Blue economy in Europe (2020 report)

Turnover of €750 billion in 2018

5 million people employed in 2018

- increase of 11,6% vs 2017
- mainly coastal tourism
- jobs in offshore wind energy sector increased nine-fold in < 10 years

Substantial financial support

- €1,4 billion from the European Fund for Strategic Investments
- €20 million in 2020 for starters from the BlueInvest Platform and the European Investment Fund (€22 mio in 2019)



# Ownership of the world fleet (2020)

## Top 25 Beneficial Ownership Countries



Source: UNCTAD secretariat calculations, based on data from Clarksons Research 2017

Only one country from Latin America (Brazil) in the top 35 and none from Africa

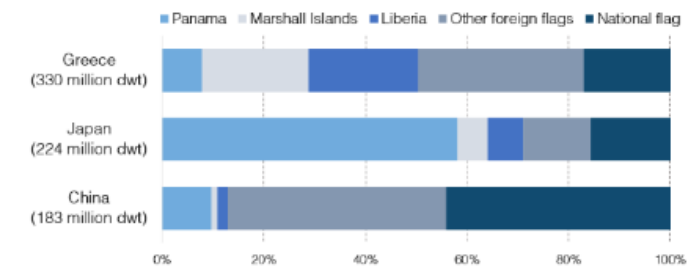
Measured in deadweight tons of carrying capacity, the beneficial owners of 40% of the world's merchant fleet are domiciled in Greece, Japan, or China, in 2019.

Meanwhile, 41% of the world's carrying capacity is registered in the top 3 registries: Panama, Marshall Islands, or Liberia.

So where are the ships of the top 3 owner countries registered?

### Percentage of carrying capacity by flag of registration

For the top 3 economies of beneficial owners



## Summary of the estimated global supply of seafarers 2005-2015

<b>RANK</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>
<b>Officers</b>	466,000	624,000	774,000
<b>Ratings</b>	721,000	747,000	873,500
<b>Total</b>	1,187,000	1,371,000	1,647,500

\*Note: The estimates for 2015 are not directly comparable to previous report due to changes in approaches to data collection and definitions used in the scope of the report. Source: Country Questionnaire, 2015, and Manpower Reports from 2005 and 2010.

The background image is a composite of several elements. In the foreground on the left, a person stands in a field of tall, golden-brown grass. To the right, a body of water reflects the sky. In the distance, a lighthouse is visible on a small island, and a vertical scale or ruler is superimposed over the scene. The overall color palette is muted, with greys, blues, and earthy tones.

## The Blue Cluster – Belgium (Flanders)



## Mission:

Blue Cluster is the preferred partner for businesses who want to develop innovative activities and valorise their expertise in the sustainable blue economy.

# What does Blue Cluster do?

We **reduce the risk of innovation** in five areas:

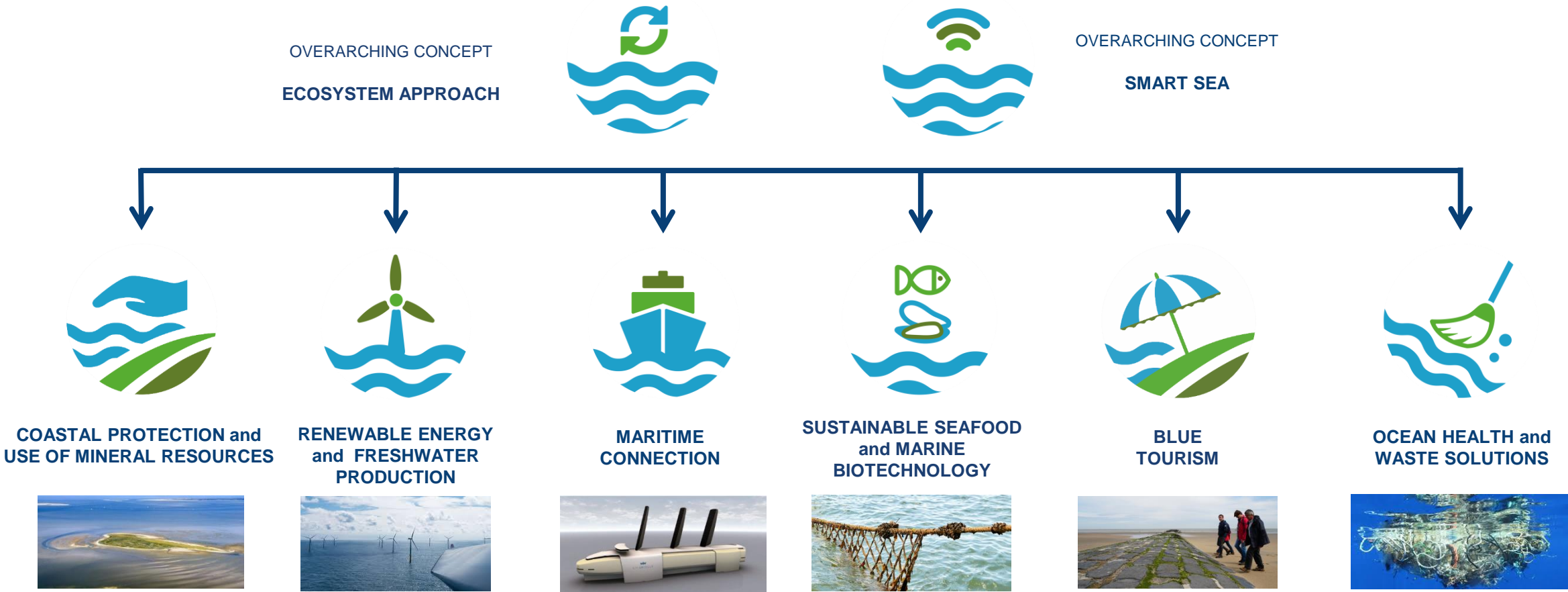
- Strategy (roadmaps)
- Finance (subsidies and external financing)
- Resources (partners)
- Commerce (market knowledge)
- Rules and regulations (policy & stakeholder management)



# In which areas are we active?

6 focus areas  
2 cross-sectional areas

A roadmap for each area



# We are Blue Cluster





# Navigating to the Future





### SSN (Shore Supported Navigation)

Purpose of the pilot is remote control of an estuary vessel sailing between Antwerp and Zeebruges with a reduced crew on board and a Master in a control center ashore. Using pilot testing and interaction with maritime stakeholders the project will determine which aspects of the control of the vessel can be automatized or equipped with alarms and which aspects have to be monitored differently and have to be executed.



### SSAVE

SSAVE (Shared Situational Awareness for Vessels) wants to improve interconnectivity and interoperability between assets in the maritime and inland waterway environment by allowing (in)direct communication between assets and providing inter-connectivity through distributed maritime digital twins (MDT).

*Duration: October 2019 – December 2021*

*Focus area: maritime connection*

*Partners: IMEC, DEME, dotOcean, Tresco Engineering, KU Leuven, Royal Military Academy*



# Semi-Autonomous Shipping





  
SEAFAR

**SEAFAR**

**Remote Shipmanagement & Crew reduced navigation**



## **SEAFAR** **Shore supported navigation**

By integrating new services and technologies, shipping companies and operators can continuously improve their operational efficiency:

- **Reducing operational costs (crew-reduction)**
- **Enhancing competitiveness**
- **Expansion of the navigation possibilities (expand hours of navigation)**

**Seafar offers the service to operate vessels from a Shore Control Center, to increase efficiency by reducing onboard crew.**



# Seafar Control System

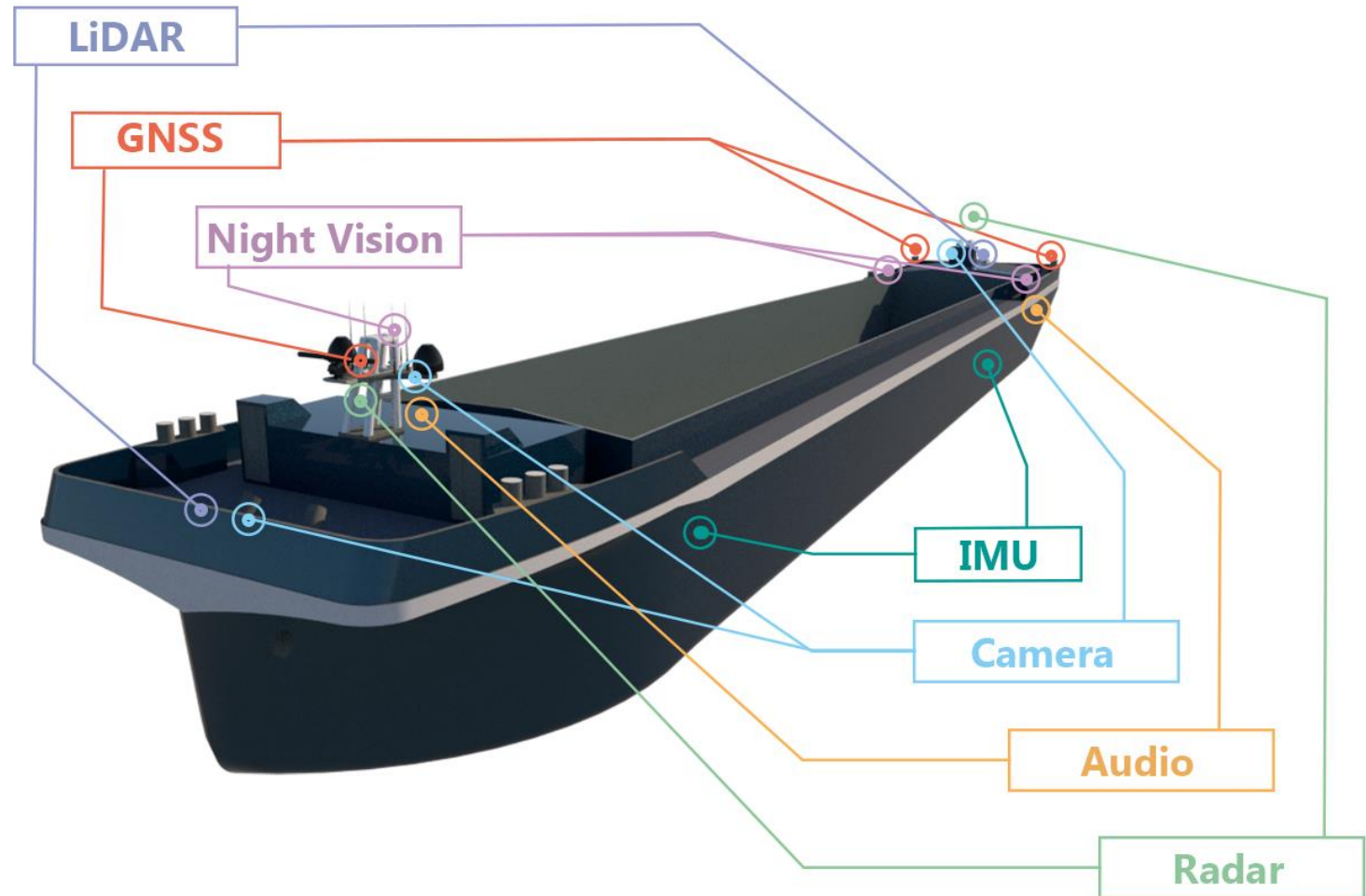
The Seafar Control System integrates with all onboard systems. The hardware and software are engineered by Seafar.

The system can be integrated on existing vessels or new built projects.

Control system

Communication System

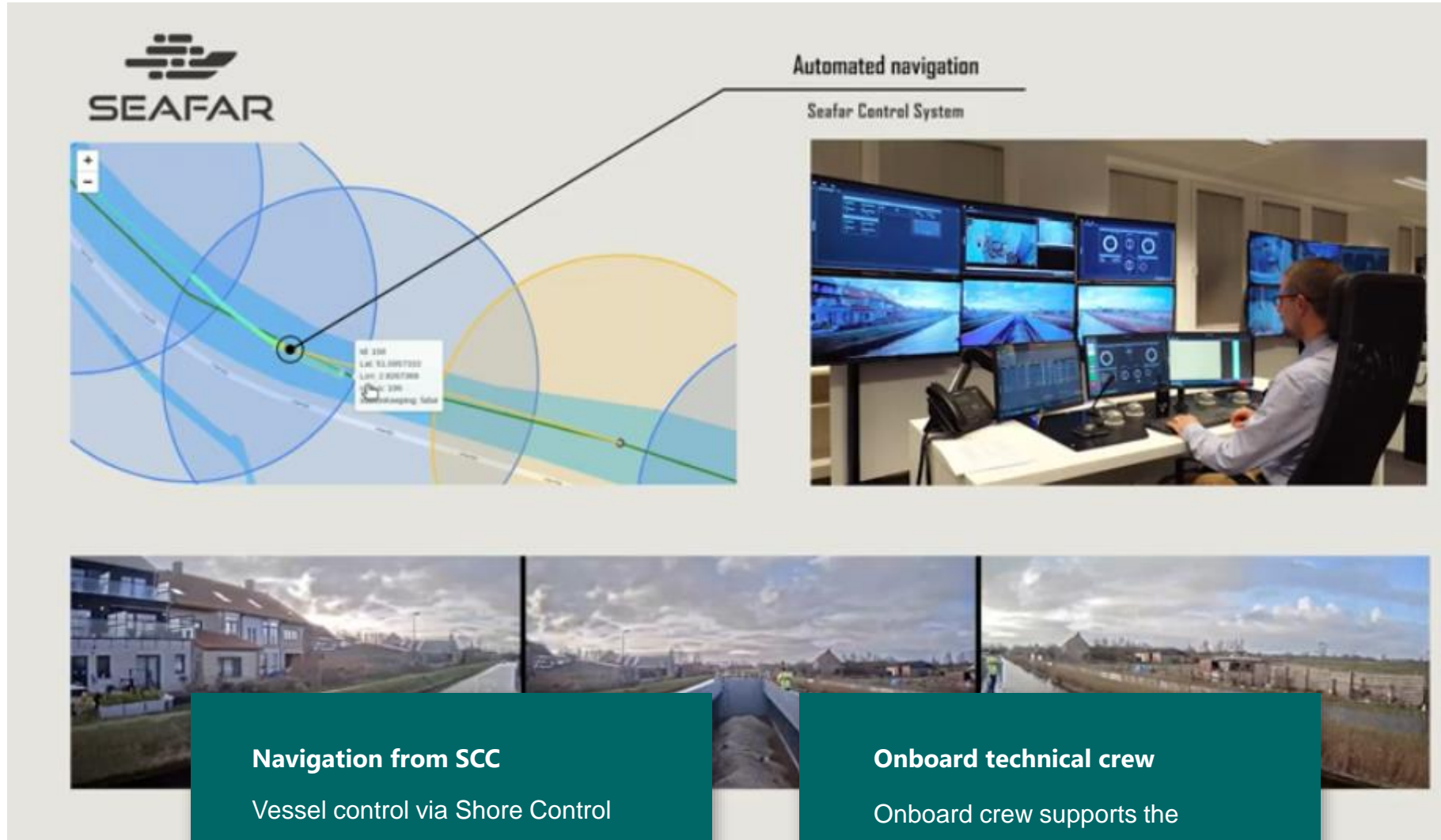
Sensor architecture



# Seafar Control Center

From the shore control center, the captain from Seafar navigates via direct control or automated control under supervision.

The captain has a range of tools and technologies for safe operations.



**Automated navigation**  
Seafar Control System

**Navigation from SCC**  
Vessel control via Shore Control Station, all onboard functions available remotely.

**Onboard technical crew**  
Onboard crew supports the remote captain for technical and safety purposes

Antwerp

Rotterdam

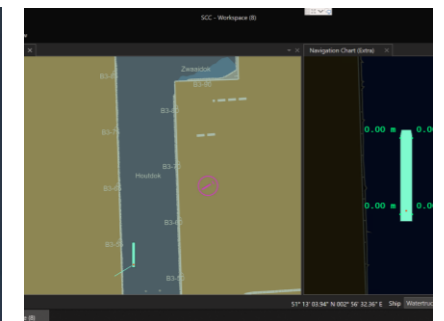
Charleroi

## Seafar

# Autonomy is the accelerator, not the goal

Combination of vessel autonomy (navigation) and remote piloting (support in manoeuvres) is the key for implementation of efficient smart shipping.

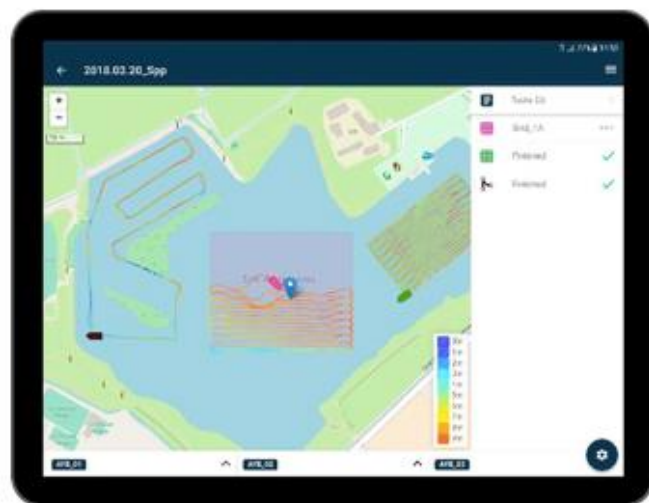
**RESULT:** onboard crew reduction and centralized vessel control





# Autonomous Shipping

# Autonomous Networked Systems



1. Autonomous control

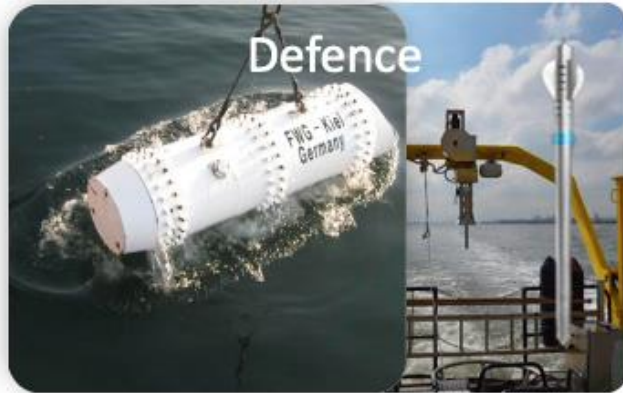


2. Navigation data services



.Ocean

# Markets



.Ocean

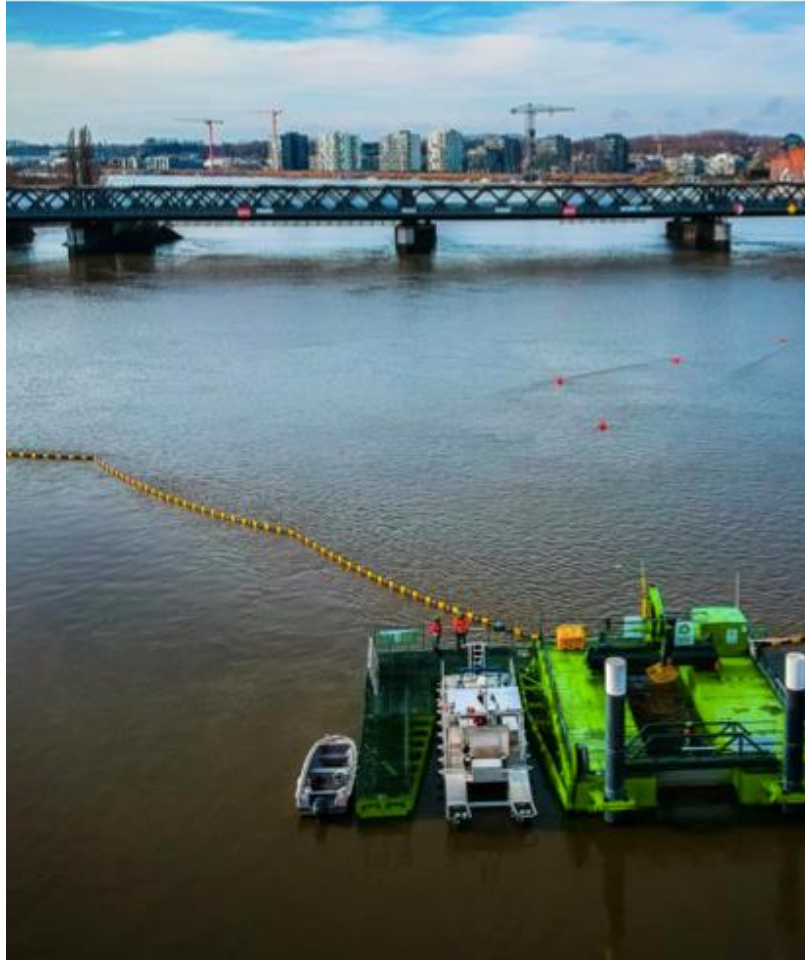


# Port Automation



.Ocean

# ver Automation





# Collision Avoidance



# MARSUR

ENABLING OPERATIONS WITH MULTIPLE HETEROGENEOUS  
UNMANNED MARITIME ASSETS

TRIPLE HELIX CONSORTIUM PARTNERS



.Ocean



# MARSUR

ENABLING OPERATIONS WITH MULTIPLE HETEROGENEOUS UNMANNED MARITIME ASSETS



 ANOMALY DETECTED BY RADAR NETWORK



 INSPECTING ANOMALY WITH AUTONOMOUS VESSEL

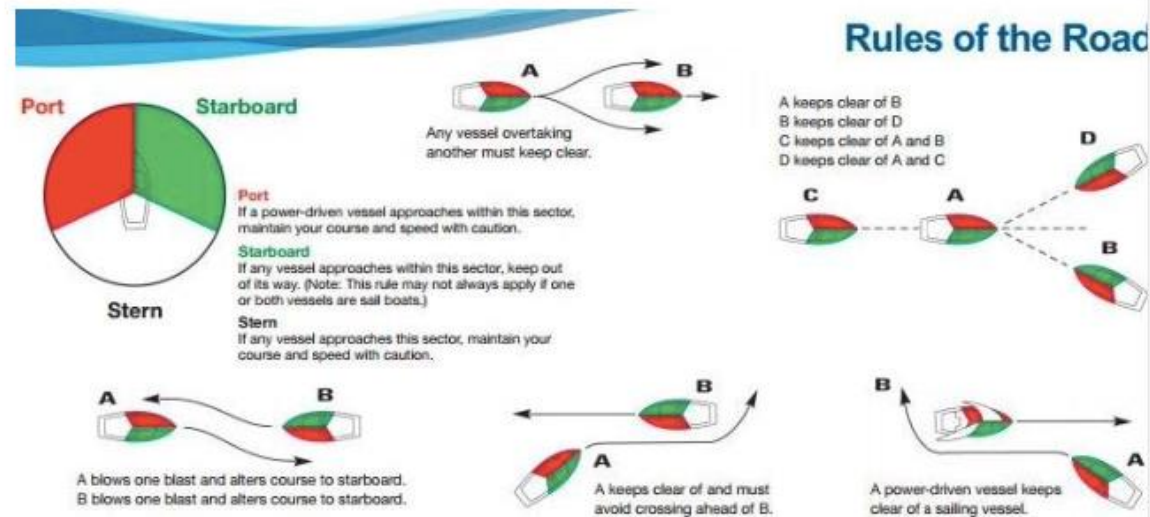
TRIPLE HELIX CONSORTIUM PARTNERS





# Autonomous Navigation Framework

- Object avoidance and collision avoidance rules
  - COLREGS
  - VHF communication
- Data sharing protocols
  - Unmanned to manned vessel
  - VTS to unmanned vessel



# Largest impediments for autonomous shipping

Lack of a regulatory  
framework

Cyber security/ piracy

Safety



# Greatest drivers for autonomous shipping

Lower OPEX

Crew work-life balance

Safety

Emmissions reductions

# Needs

Need for a common protocol for the exchange of data between autonomous ships AND between autonomous ships and non-autonomous ships



Need for mobile private networks (often 5G):

Independency  
of public  
infrastructure

Cost efficient

Data remain  
local and thus  
more secure

# A floating multinational environment

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Flag:



Owner:



Charterer:



Officers:



Crew:



Shipmanager:



Insurance:



P&I:



Cargo:



Class:





What will the  
future bring?





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BLUE  
CLUSTER