MARITIME

Autonomi, fjern-operasjon og konnektivitetsdrevne applikasjoner

SEMINAR Maritim Kommunikasjon

Steinar Låg

15 February 2017

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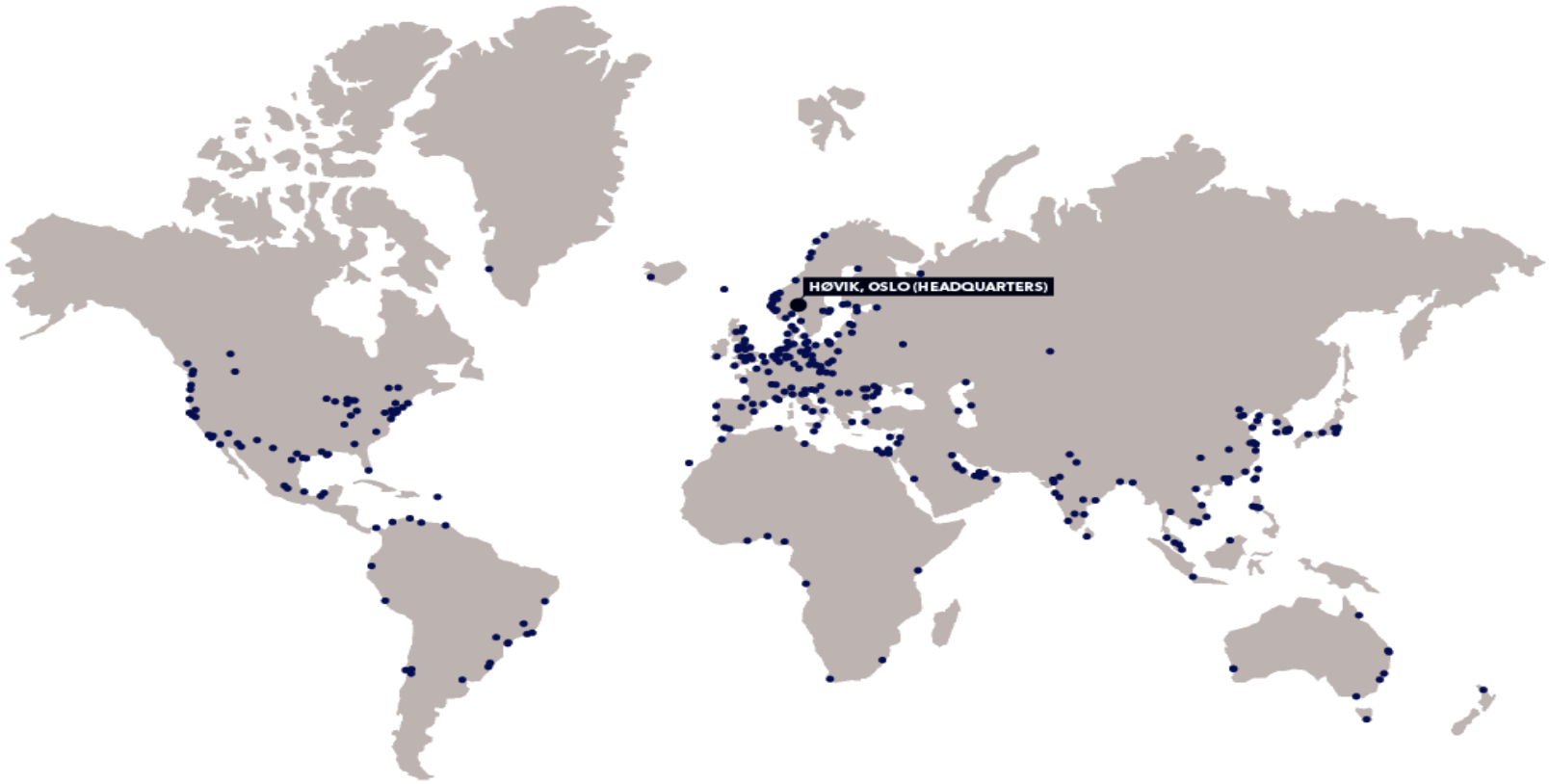
- New applications enabled by connectivity
- To new projects:
  - SIMAROS: **S**afe **IM**plementation of **A**utonomous and **R**emote **O**peration of **S**hips
  - ROMAS: **R**emote **O**perations of **M**achinery and **A**utomation **S**ystems
- How to assure safe implementations?

We are a global classification, certification, technical assurance and advisory company

- We classify, certify, verify and test against regulatory requirements, rules, standards and recommended practices
- We develop new rules, standards and recommended practices
- We qualify new technologies and operational concepts
- We give expert advice to enhance sustainable business performance

Global reach – local competence



CUSTOMERS
80,000+

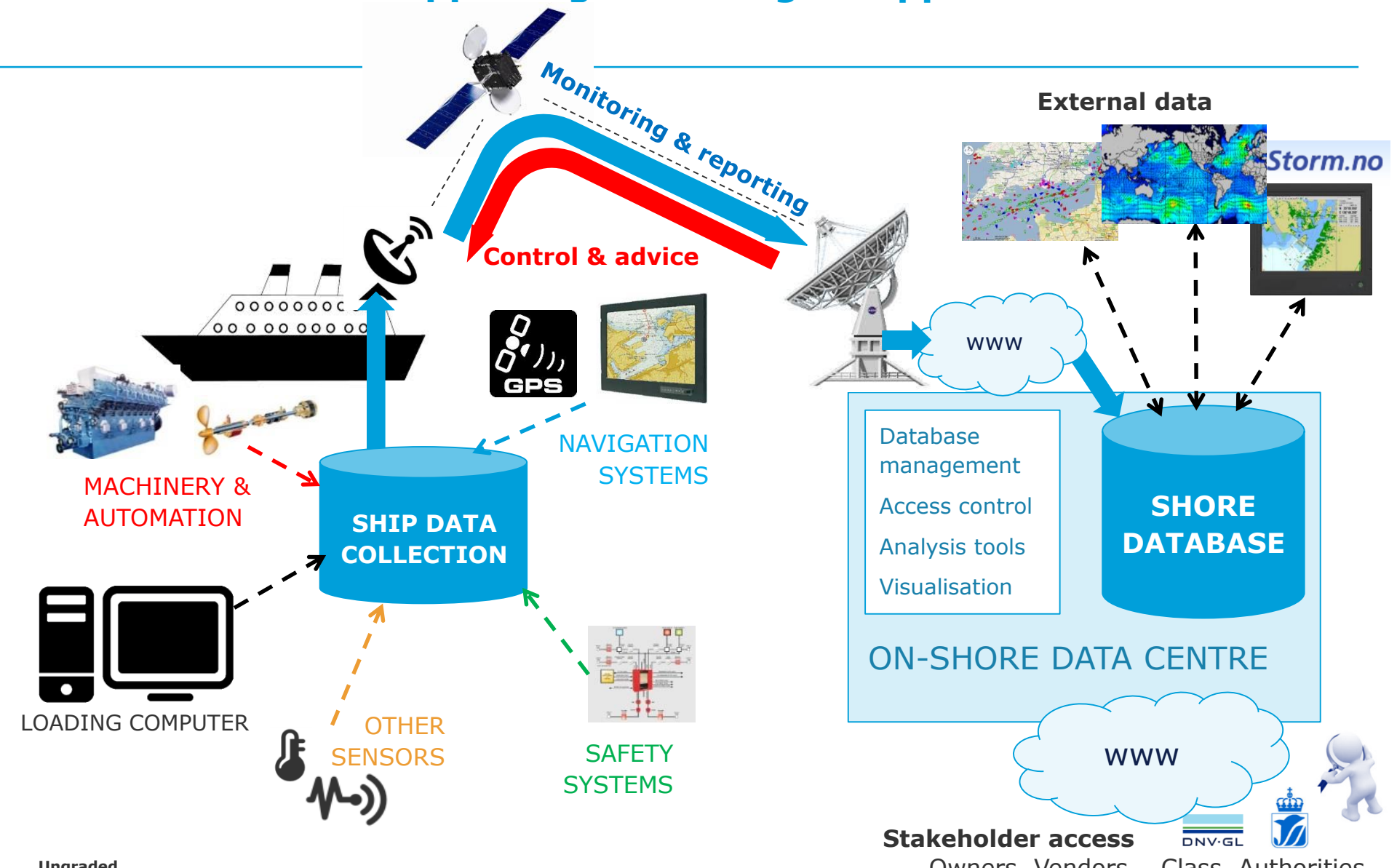
ESTABLISHED
1864

OFFICES WORLDWIDE
350

COUNTRIES
100+

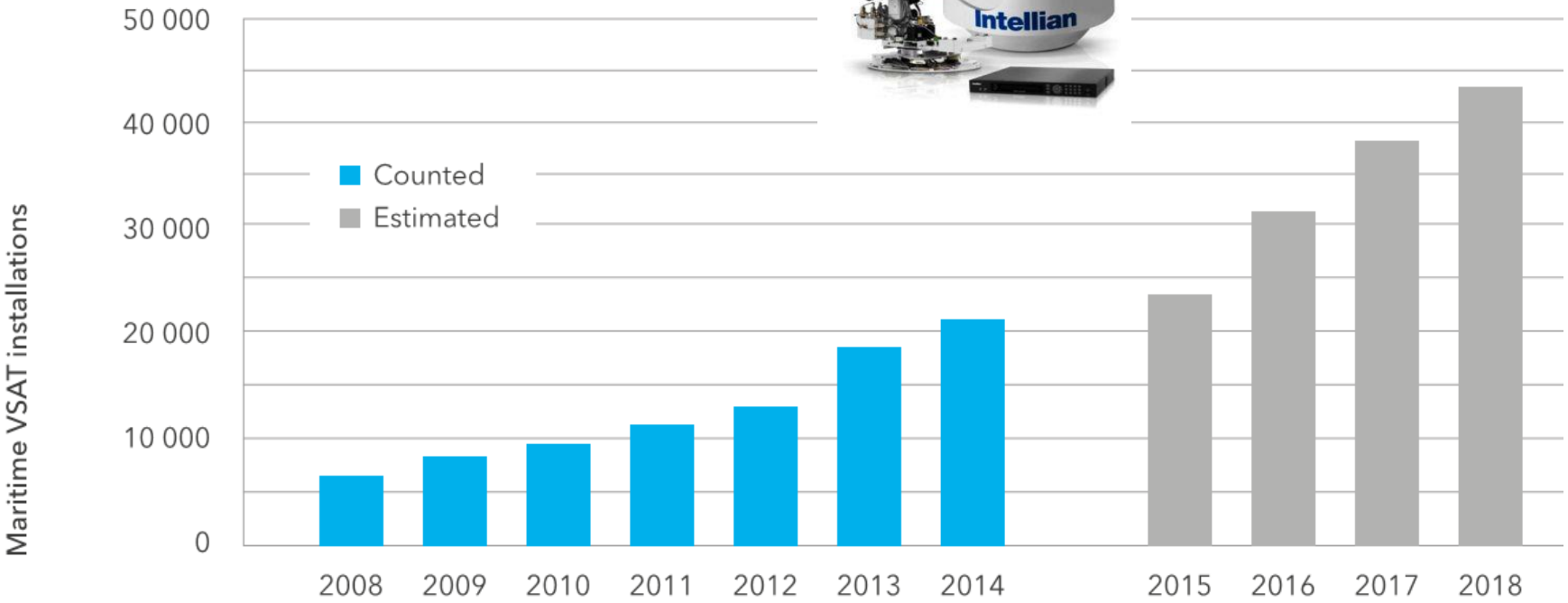
New applications
- enabled by connectivity

Infrastructure supporting future digital applications



Enabling trend: Connectivity

- Boom in maritime VSAT (Very Small Aperture Terminal) installations



Source: The COMSYS Maritime VSAT Report
4th Edition http://www.comsys.co.uk

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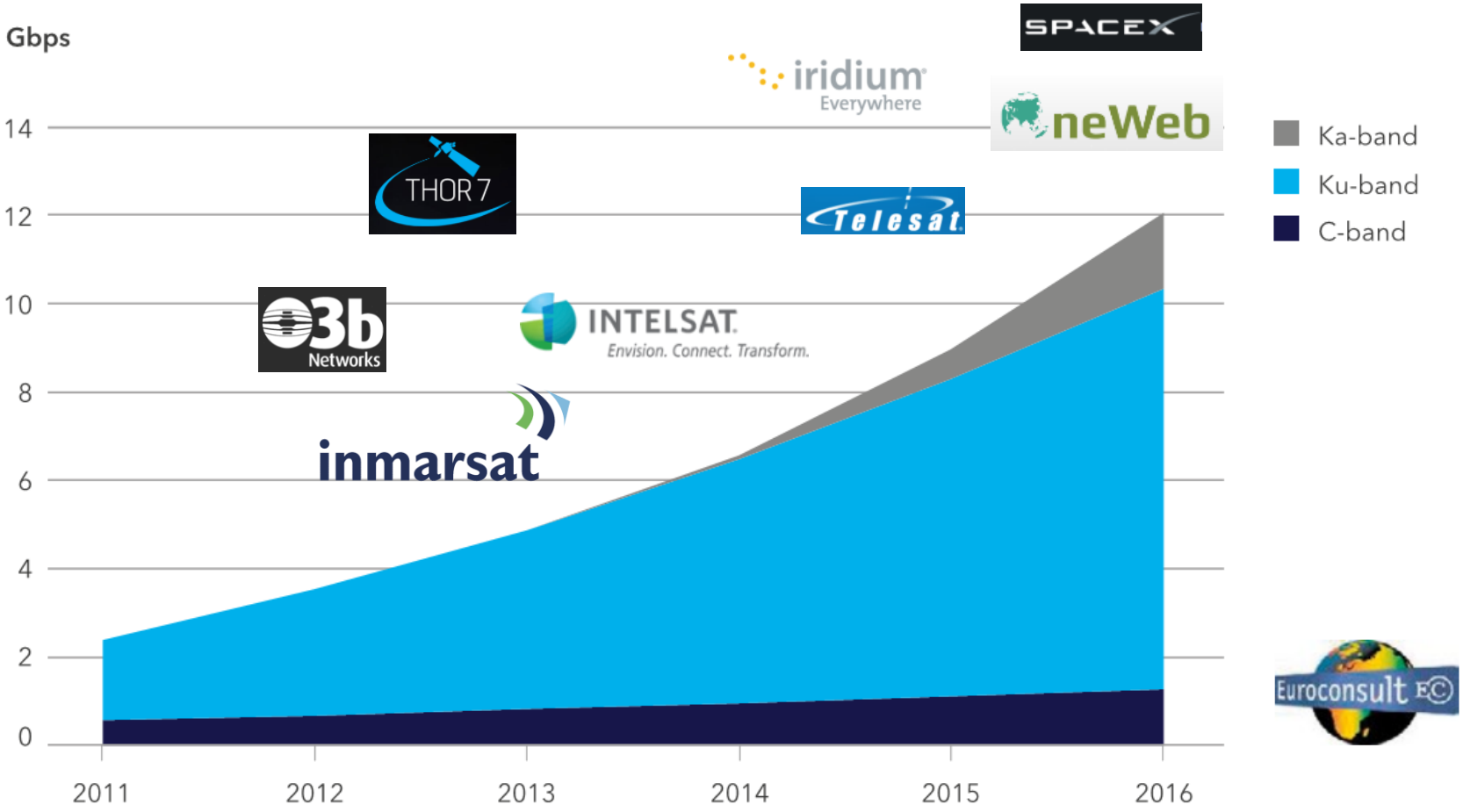
Enabling trend: Connectivity



Source: Euroconsult, Maritime Telecom Solutions by Satellite, 2014 edition

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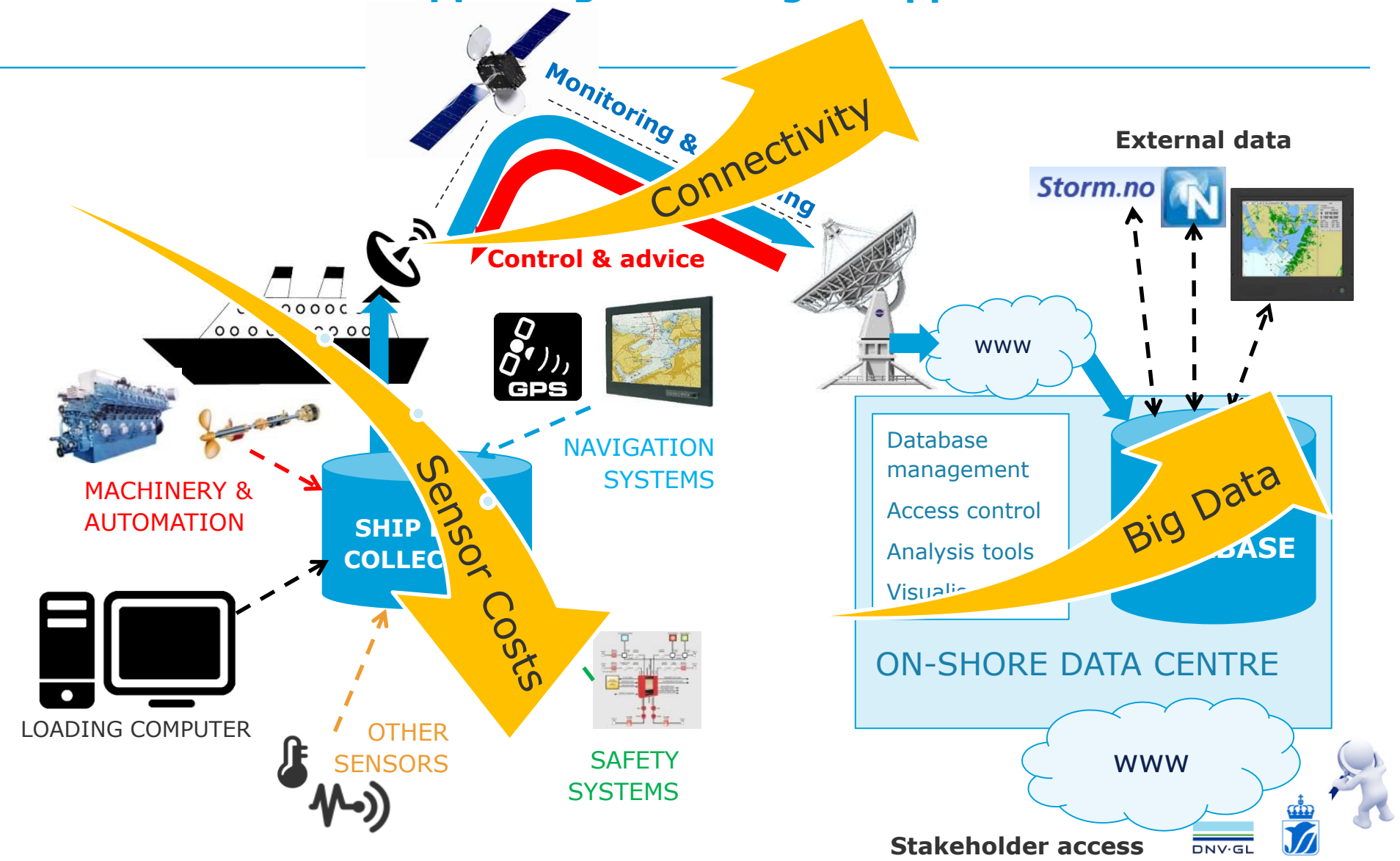
Infrastructure supporting future digital applications

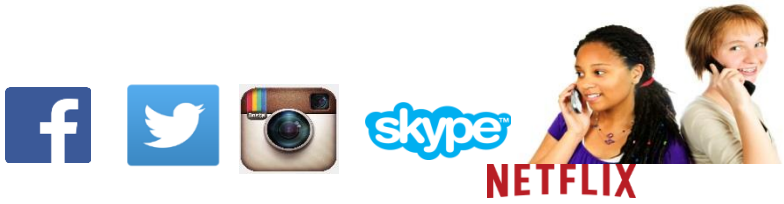


New applications enabled by connectivity

- Condition monitoring
- Autonomy & Remote control
- Environmental monitoring
- Safety applications
- Remote diagnostics & maintenance
- Energy efficiency optimisation
- VTS / e-Navigation
- Risk based classification & surveys
- Applications we haven't yet thought of

(although not «new»…)

- Welfare and entertainment



SIMAROS and ROMAS

The SIMAROS project

- **SIMAROS: Safe Implementation of Autonomous and Remote Operation of Ships**
  - NFR application granted Dec 2016
  - Research project 2017-2019
  - Total Budget: 18MNOK
  - Case: "Hrönn" offshore vessel
  - Contracted 2017, in operation 2018
  - Press release 01.11.2016

- **Partners:**

DNV·GL

KONGSBERG

FJELLSTRAND

MSubs Ltd
underwater vehicles & equipment

inmarsat

- **Reference partner:**

Sjøfartsdirektoratet
Norwegian Maritime Authority

Press Release

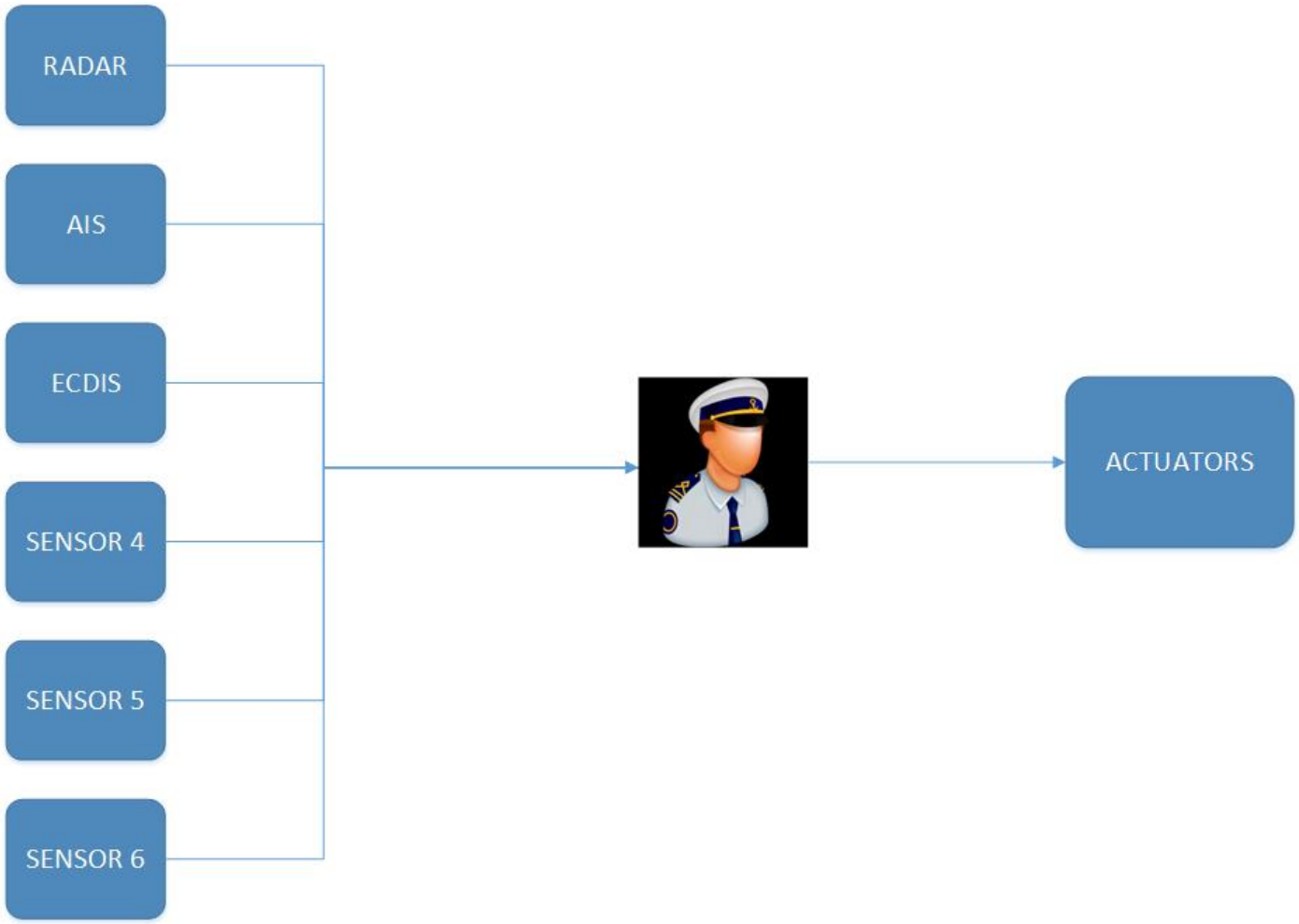
KONGSBERG

Automated Ships Ltd and KONGSBERG to build first unmanned and fully-automated vessel for offshore operations

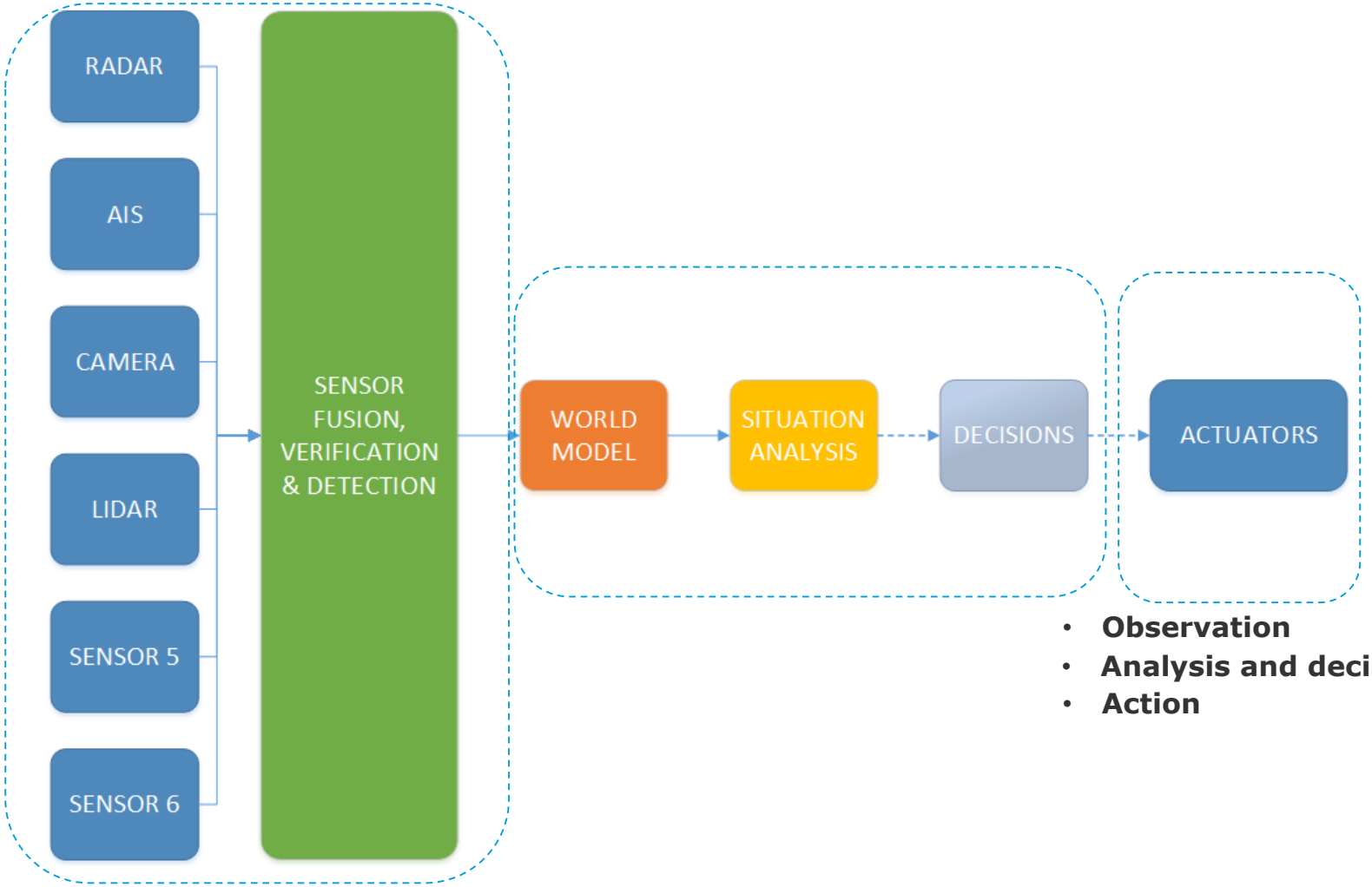
- *First full size unmanned ship to be built through UK and Norwegian co-operation*
- *Offshore vessel 'Hrönn', to be contracted January 2017 and in operation in 2018*

Artists impression of the 'Hrönn'

Human navigation



Autonomous navigation



- **Observation**
- **Analysis and decision**
- **Action**

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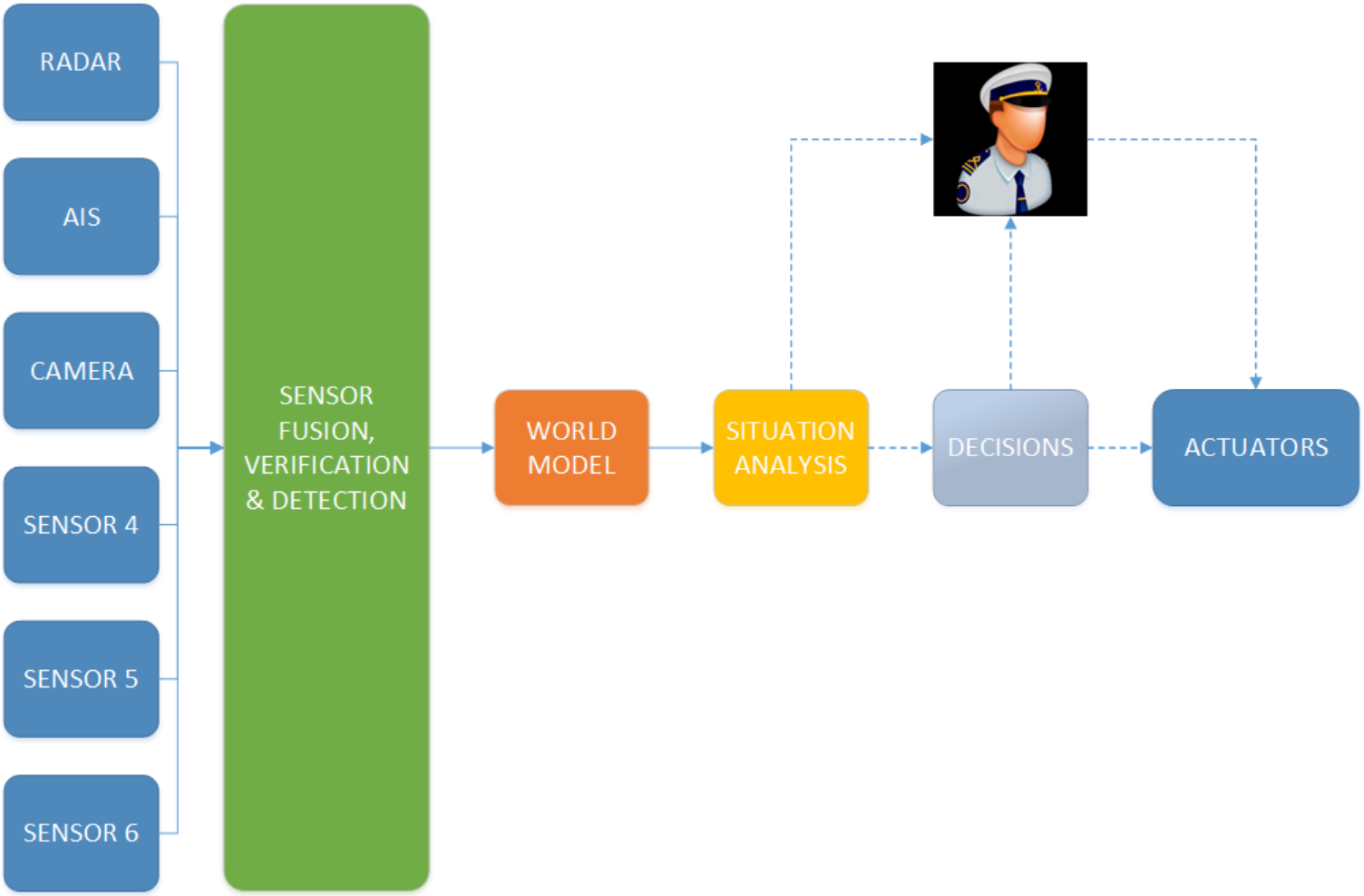
Combination of Autonomy & Remote Control: Human in the loop



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SIMAROS Work packages

- **Objective**: Develop technology supported by an assurance and regulatory framework that can enable safe realisation of a fully unmanned offshore vessel through autonomous and remote operation and demonstrate the full benefits of the concepts in a commercially viable setting.

The ROMAS project

- **ROMAS: Remote Operation of Machinery and Automation Systems**
  - NFR application granted Dec 2016
  - Research project 2017-2019
  - Total budget 9,5 MNOK

- **Partners:**

DNV·GL

Fjord1

HØGLUND Marine Automation AS

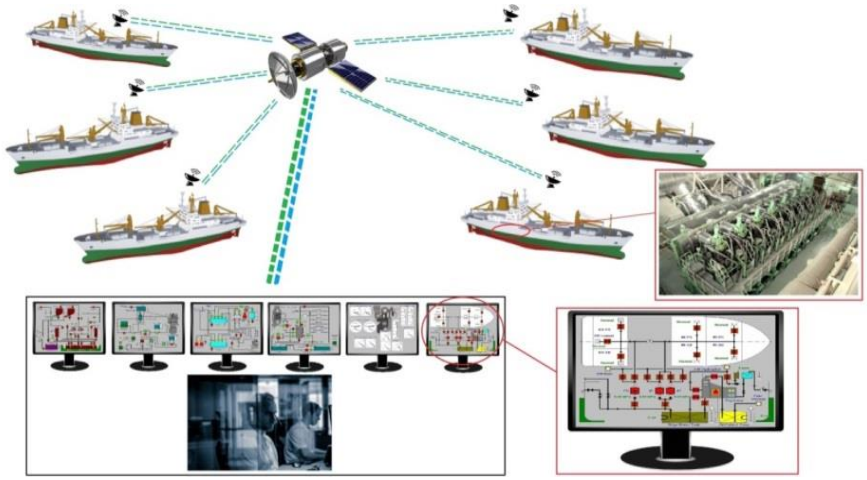
- **Reference partner:**

Sjøfartsdirektoratet
Norwegian Maritime Authority

Remote machinery operation: Background and motivation

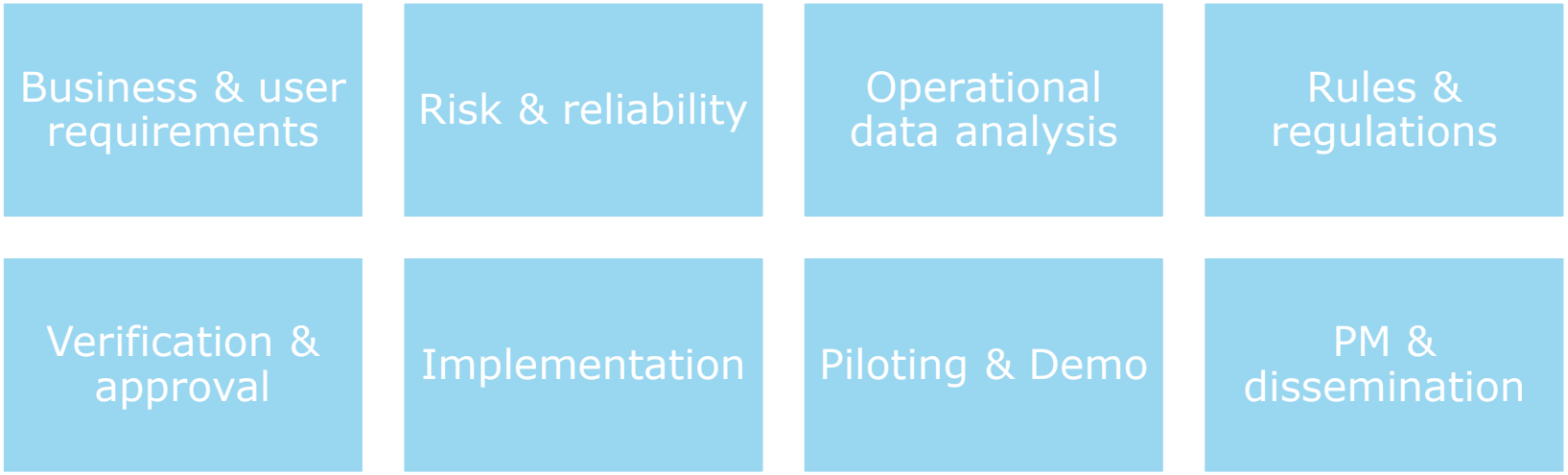
- Increasingly complex ships
- Shortage of machinery engineers to man ships
- Increased digitalisation & improved ship-shore connectivity
- Automation and remote operations is increasingly deployed in other industries

=> **IDEA: Move the Engine Control Room (ECR) from the ship to a shore-based Engine Control Centre (ECC)**



- Fleet wide control from an on-shore ECC
- Reduced need for engineers on-board
- Improved efficiency & safety
- Not as "revolutionary" as remote navigation

ROMAS Work packages



- **Objective**: To establish a framework of regulations, rules and verification methods for remote (shore-based) operations of ship machinery and automation systems, enabling improved operations and cost-efficiency without compromising safety of ship operations.

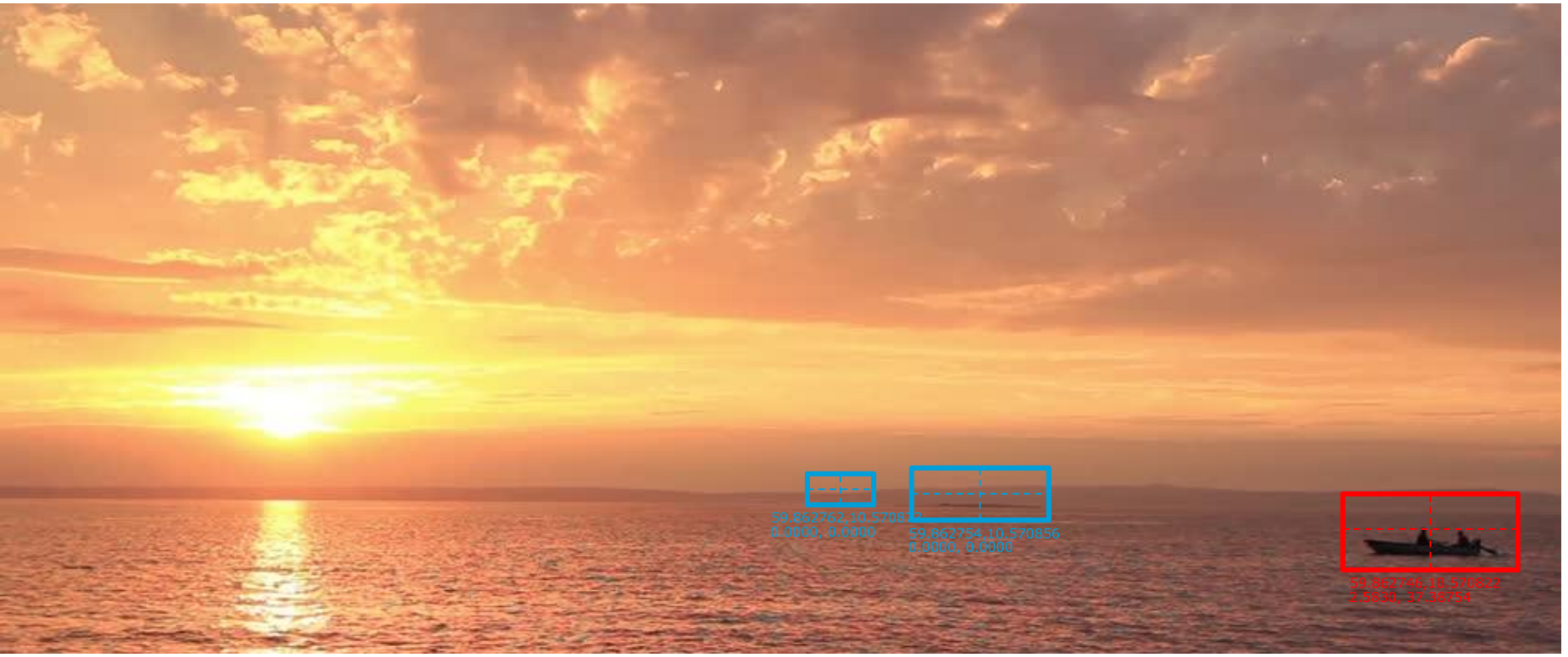
How to assure safe implementations?

Autonomy and remote operations: a different risk picture

- **Automation vs human operation**
  - Human error is eliminated (operation)
  - Fewer human lives at stake
  - No-one present to fix or take over control …
- **New risks**
  - Increased reliance on technology
  - Cyber threats, communication failures etc.
- **New unproven technology**
  - New and unknown sources of errors
  - Lack of standards and operational experience
- **Safe implementation depends on**
  - Robust and reliable technologies
  - Effective rules, requirements and verification methods

Areas where new requirements are needed.

- Sensor capabilities



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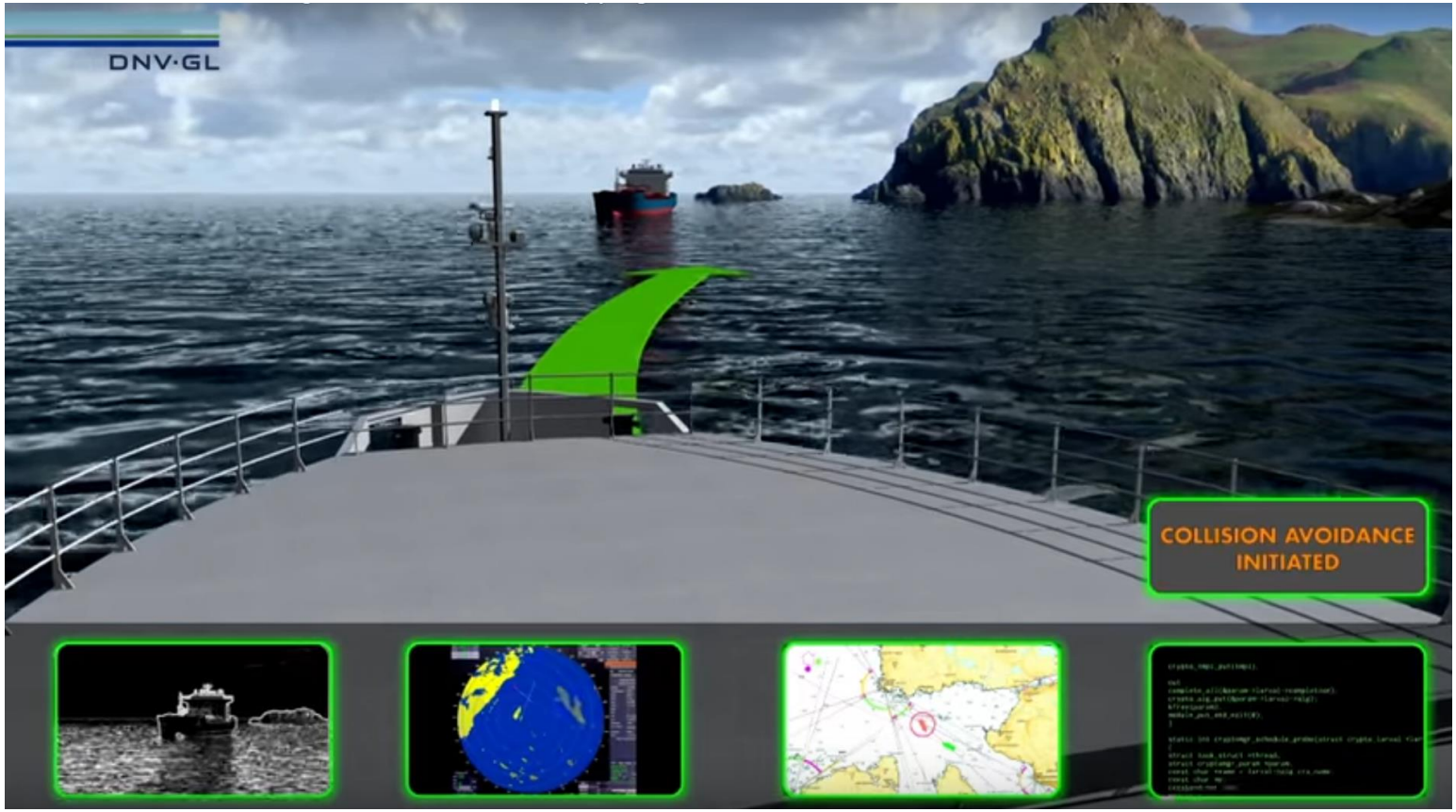
Areas where new requirements are needed…

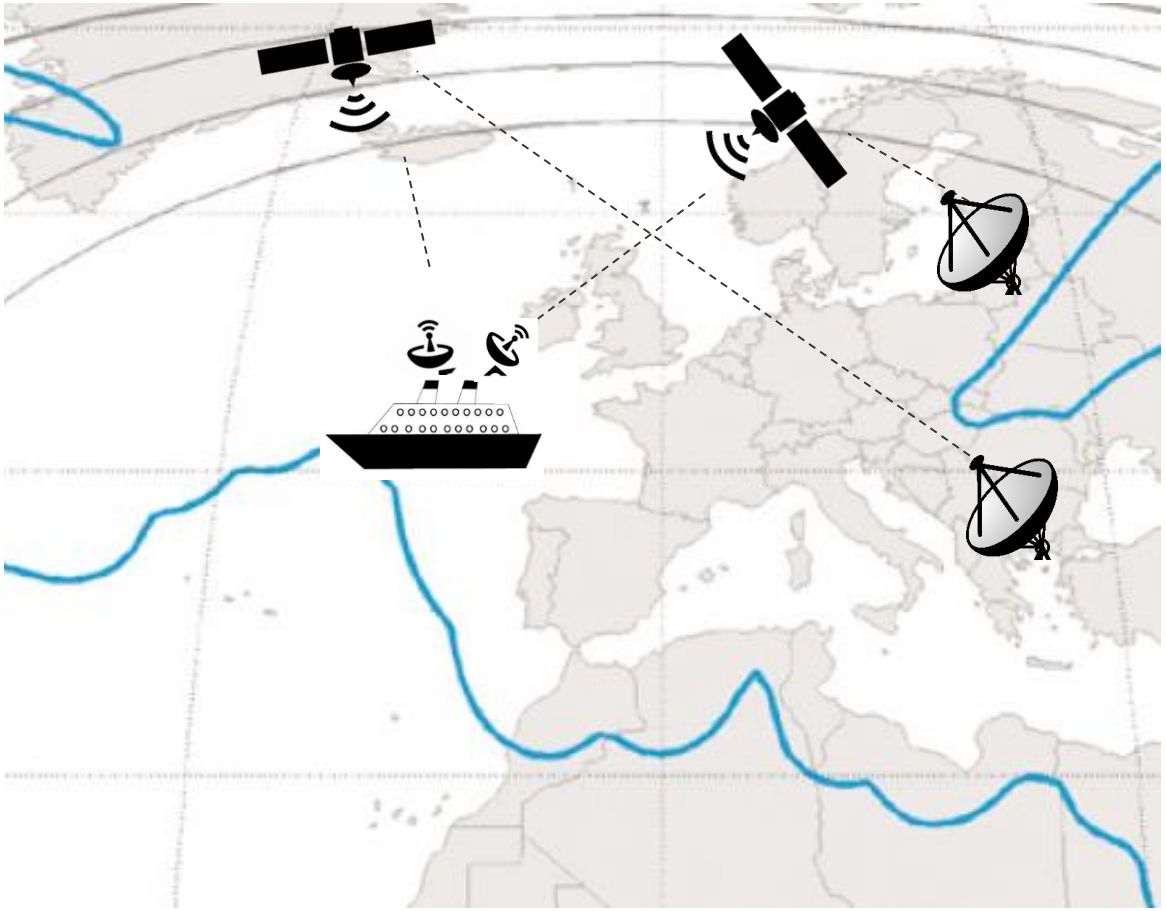
- Sensor capabilities
- Decision algorithms



From the ReVolt Movie - https://youtu.be/rhYaNHx5D00

Areas where new requirements are needed…

- Sensor capabilities
- Decision algorithms
- Ship-shore communication



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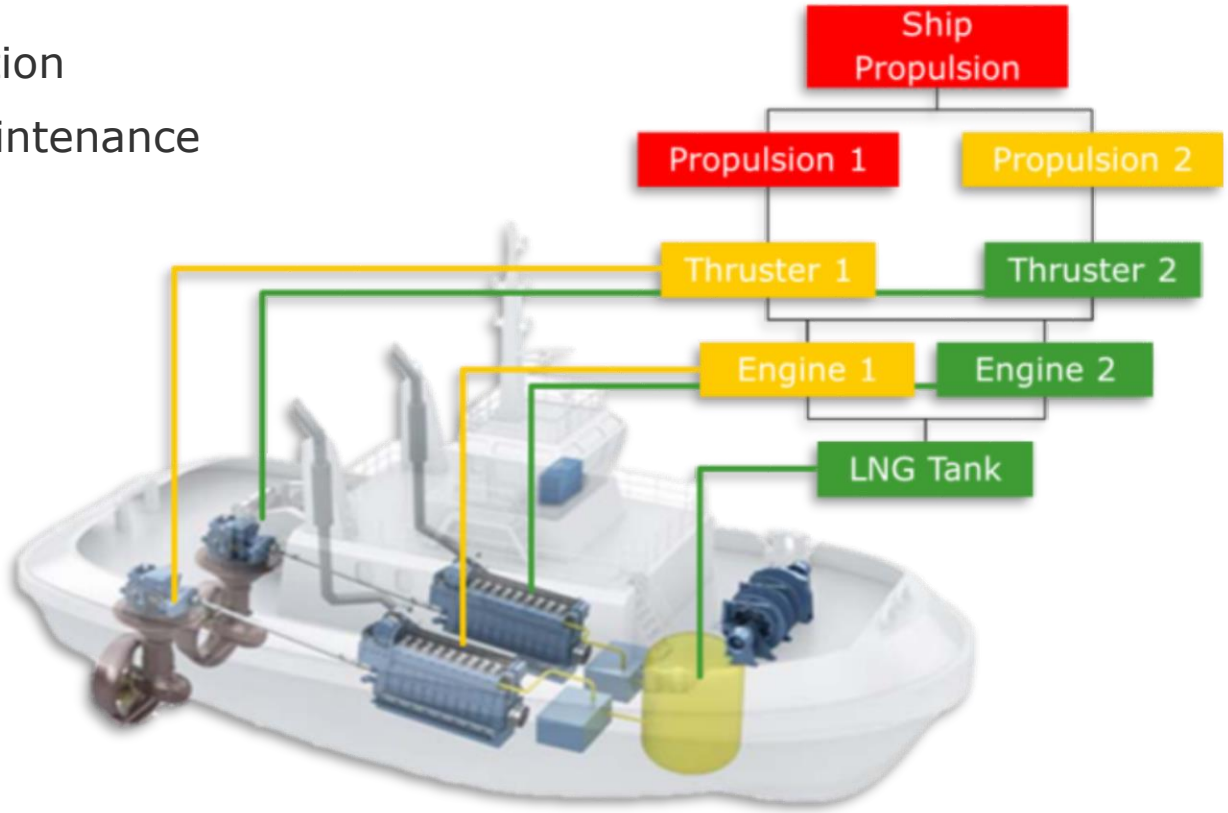
Areas where new requirements are needed…

- Sensor capabilities
- Decision algorithms
- Ship-shore communication
- Machinery design & maintenance



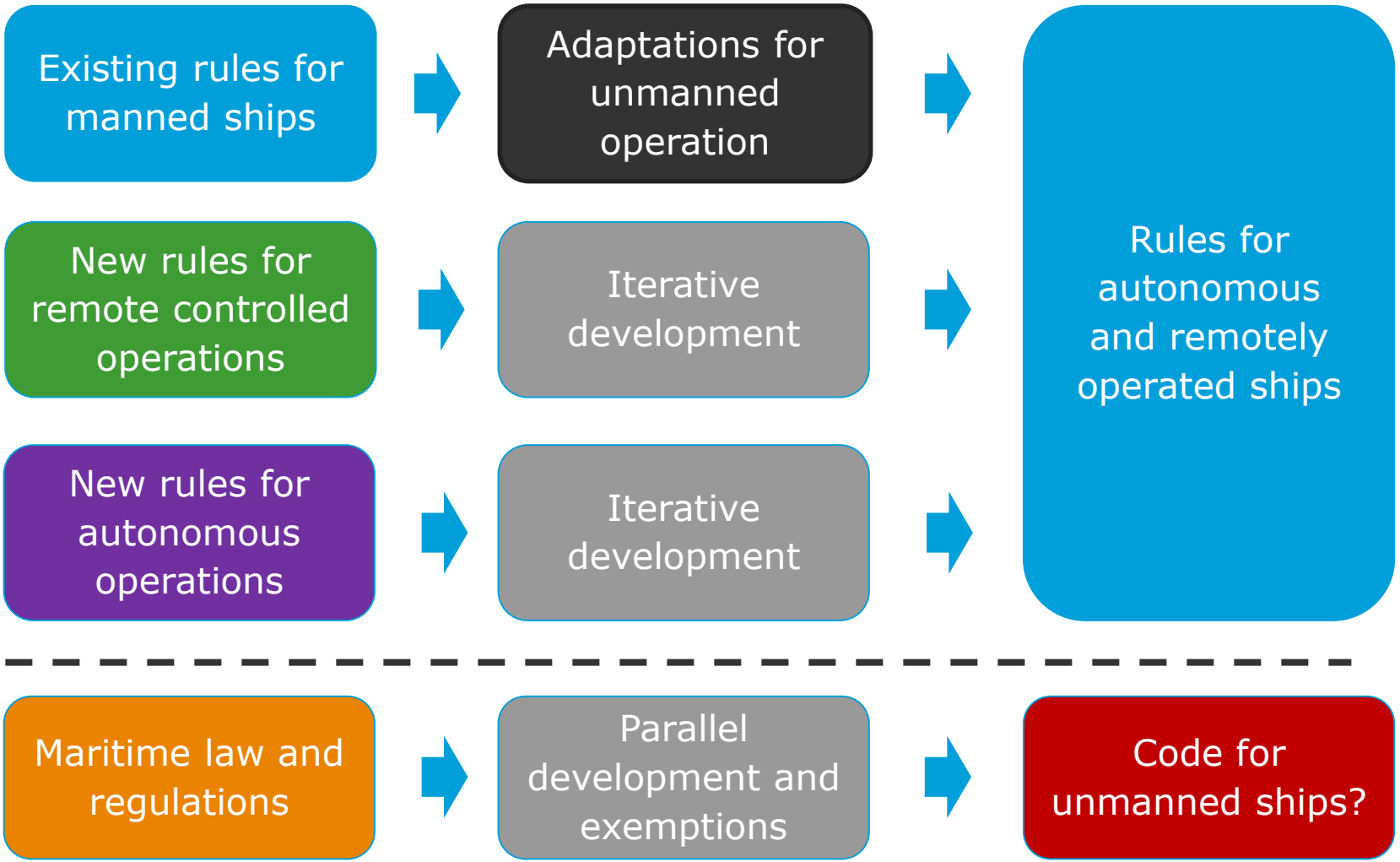
Areas where new requirements are needed…

- Sensor capabilities
- Decision algorithms
- Ship-shore communication
- Machinery design & maintenance
- On-shore control centre

Areas where new requirements are needed…

- Sensor capabilities
- Decision algorithms
- Ship-shore communication
- Machinery design & maintenance
- On-shore control centre
- Cyber security

Roadmap towards a class notation



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Thank you for the attention!

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SAFER, SMARTER, GREENER

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