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Challenges and opportunities in the e-Navigation Development. Actual projects.

John Erik Hagen, Regional Director

Oslo, September 2018

– Vi tar ansvar for sjøvegen

What is e-navigation?

- Efficient transfer of marine information and data between all users on board and ashore, such as:
  - Automated ship reporting provided from ships to shore-based authorities
  - Digital maritime services sent from different stakeholders ashore to ships.
- Integrated information presented on graphical displays on the bridge, such as:
  - Enable easier access and use of important navigational information
  - Provide navigators with user-friendly bridge design and standardized mode of systems.

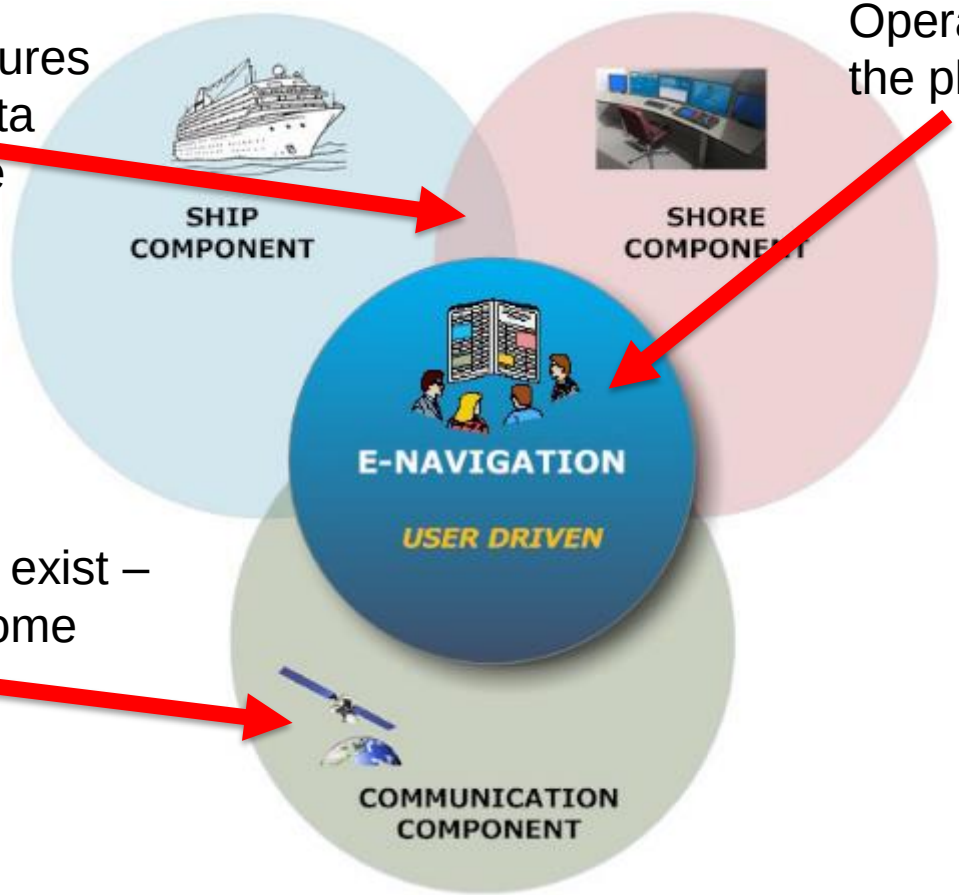
The purpose of e-navigation

- Prevent groundings and collisions by reducing human errors and strengthening safety and security for efficient marine traffic, thereby protecting the environment.
- Enhance services, systems and equipment that work for navigators and shore-based personnel, ensuring that their user needs continue to be met.
- Provides a structure that enable the maritime sector to continuously reap the benefits of digital advancements in today’s rapid technological development.
- The e-Navigation development is a necessary step towards a sustainable platform for enhanced connectivity and smart infrastructure.

Remaining challenges in all key components should be solved in the future. E-Navigation opens up for new opportunities.

Framework, procedures and harmonized data language – the glue

Operational description – the platform



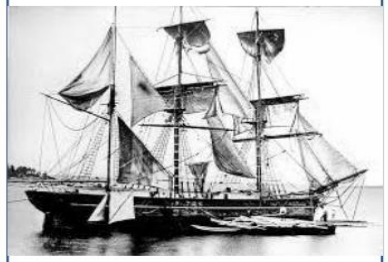
Several solutions exist – and new will become available

Test-beds in an holistic approach

Shipping @ digital inflection point

100 years ago

HUMAN



25 years ago

Machine assisted/ analog

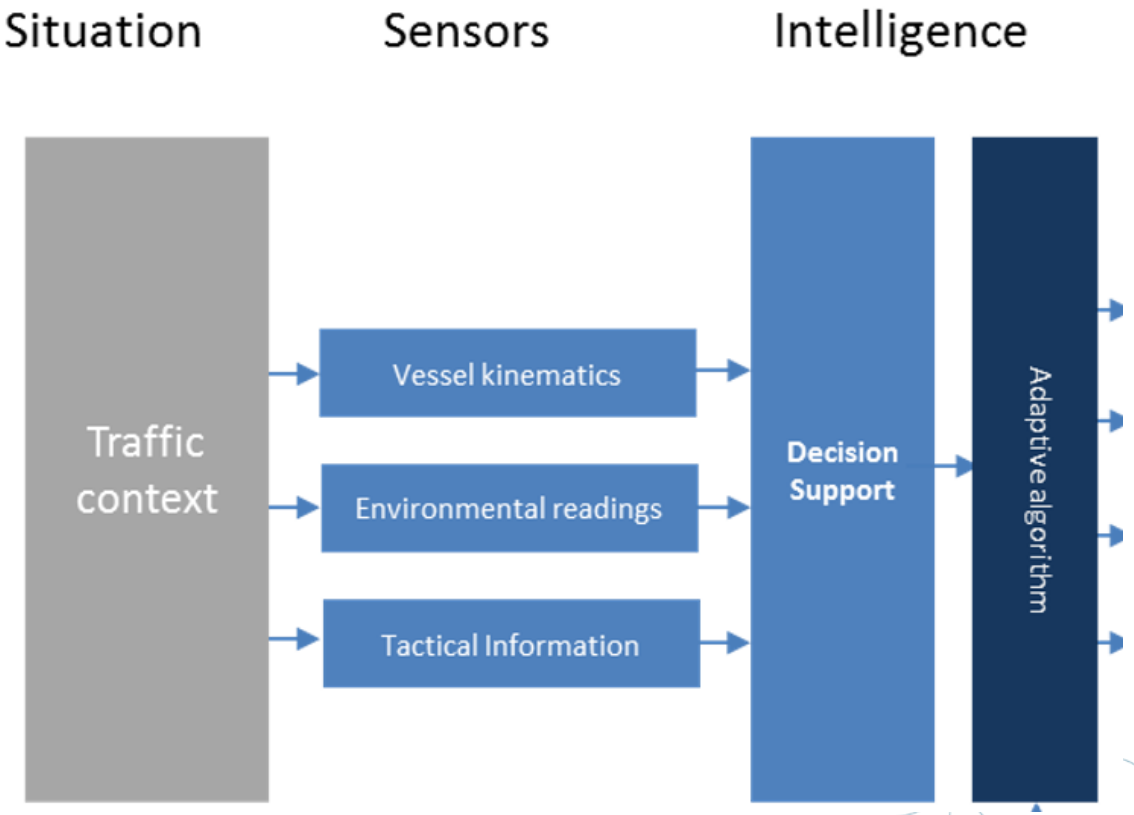
Today

Technology enabled & digital

Intelligent Systems and Data Analytics

The project shall prototype machine learning techniques to detect anomalies. Including, but not limited to:

- Ships deviating from planned/reported route
- Ships deviating from leads/fairways
- Ships entering restricted areas
- Ships moving erratically (performing frequent or large turns)
- Ships undertaking unexpected or abnormal rendezvous
- Ships seemingly drifting without engine power
- Ships loitering/mooring outside recognized mooring areas
- Ships failing normal AIS-reporting within area of expected coverage
- Ships providing conflicting or inconsistent AIS-information



SESAME Straits - objectives

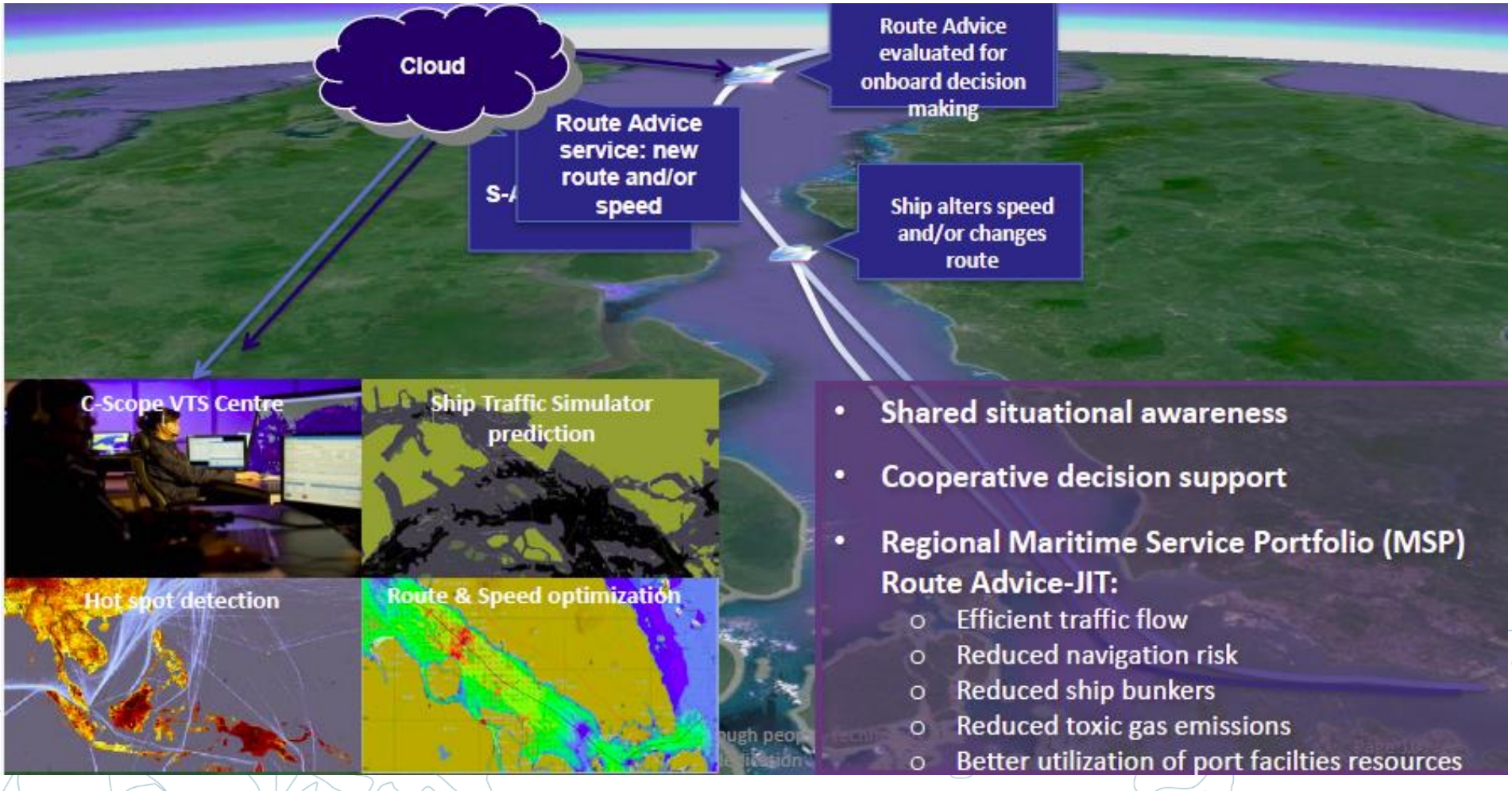
SESAME Straits e-Navigation Intelligent Ship Traffic Management

The primary objective is to **develop** and **validate** shared situational awareness and cooperative decision making between ship's bridge team and shore based Vessel Traffic Service (VTS) personnel.

Secondary objectives are:

- Just In Time arrival within a Regional Maritime Service Portfolio
- Use existing systems/equipment as far as possible

Operational Concept

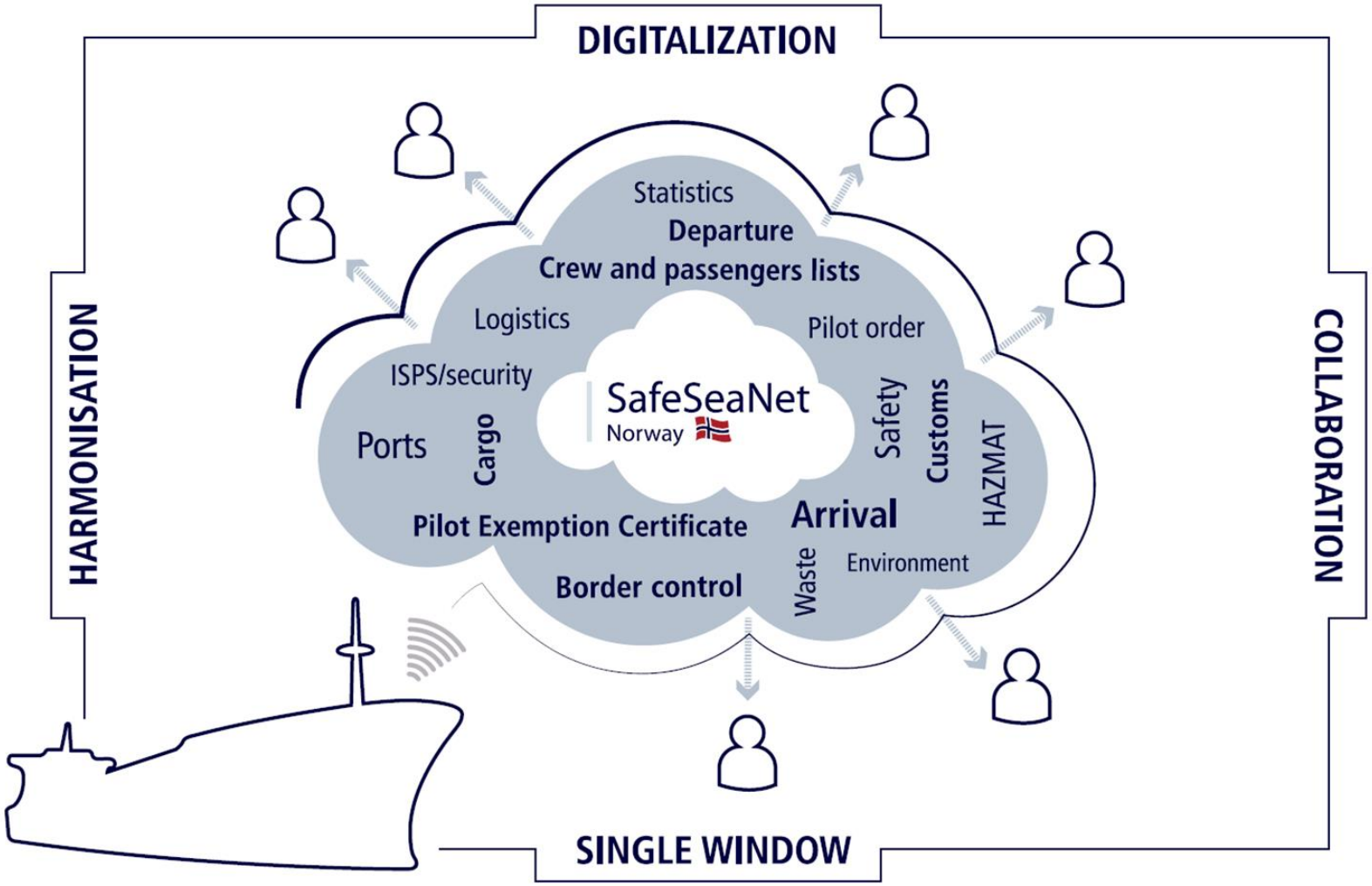


SESAME STRAITS – achievements

Functionality	On-board systems	Communication systems	On-shore systems
Route Exchange	Prototyped	Prototyped	Prototyped
Route Monitoring			Prototyped
Just-in-time			Prototyped
Live weather data	Operationalised		
Chart updates	Operationalised		
Nautical publications	Operationalised		
Hot spot detection	Prototyped	Prototyped	Prototyped
Enhanced alert service			Operationalised

SESAME Straits objectives were met, with e-navigation services test-bedded for the first time in real life environments

Smart and Innovative Infrastructure – the Norwegian Single Window Solution



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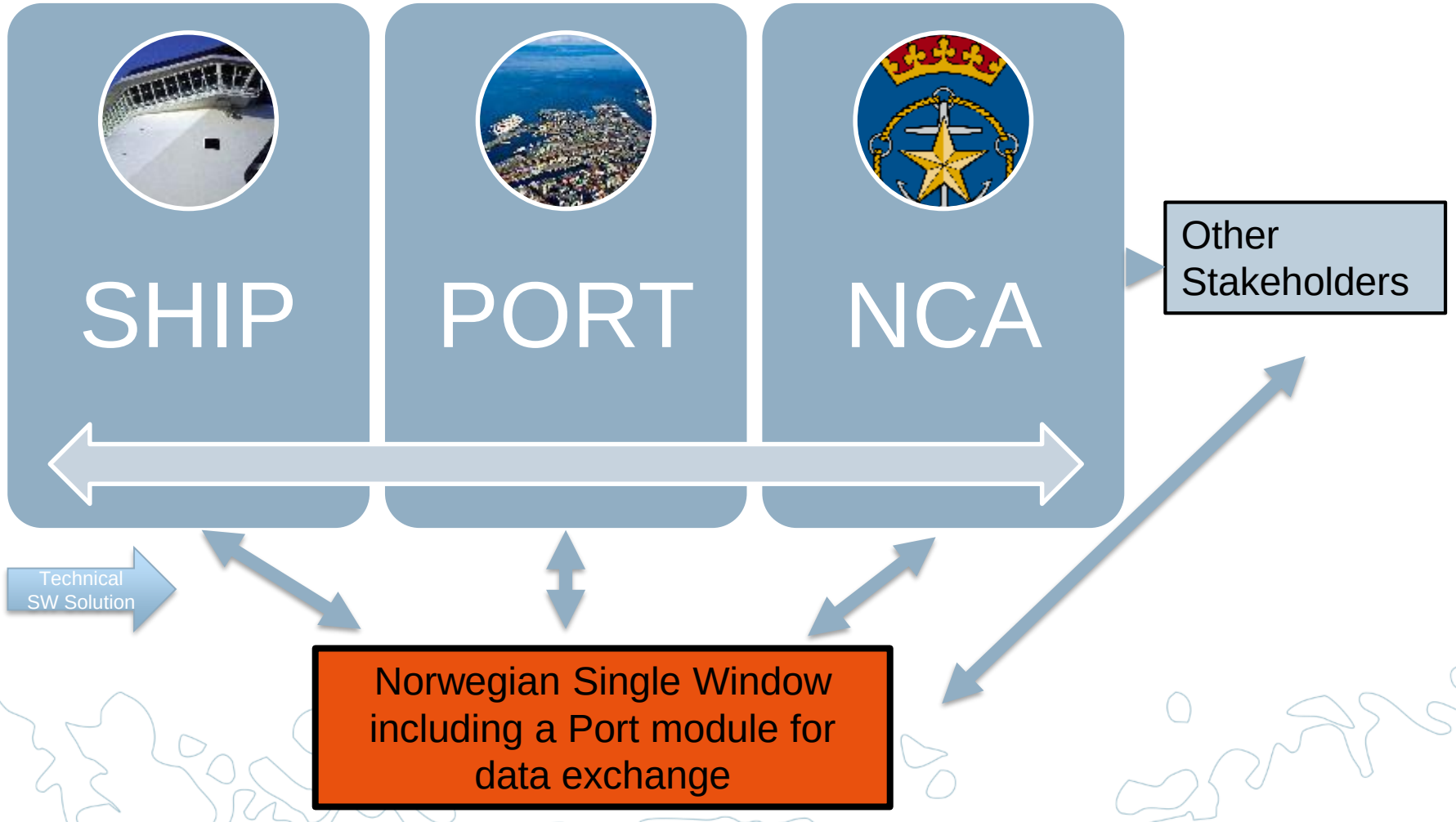
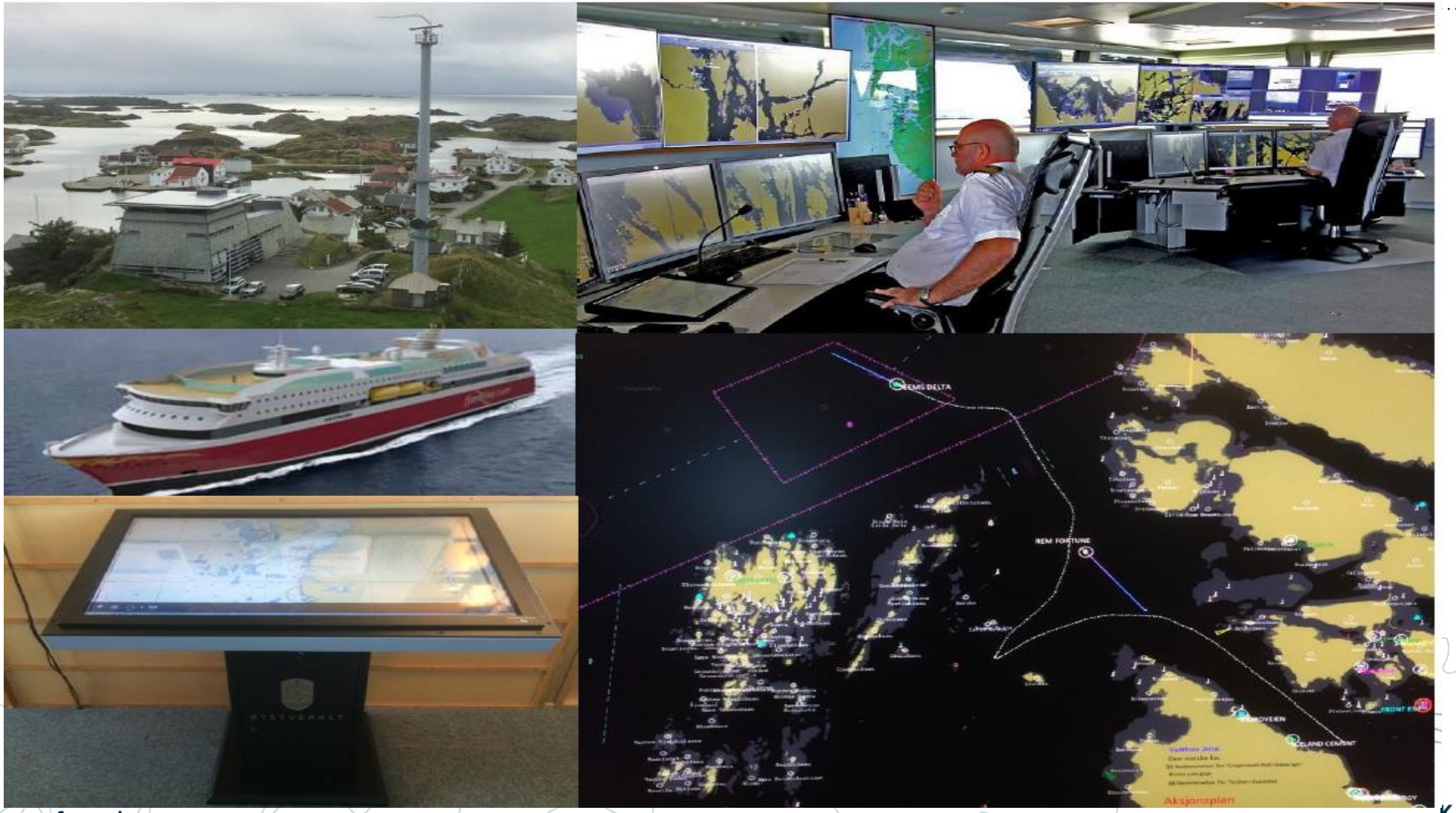
Local port service from testbed to real service in the Norwegian SW solution



E-navigation solution on ship reporting and maritime services

- IMO’s e-Navigation solution on automated and standardized ship reporting consists of two integrated parts.
- The first part is the automatic collection of data on board and its preparation in the correct format for transmission to a Single Window application ashore.
- The second part is the distribution of the ships’ information to the relevant shore parties via the Single Window solution, such as maritime authorities, customs, police, defense etc.
- These two parts are integrated by communications systems.
- The Norwegian SW approach includes IMO’s e-Navigation solutions on ship reporting and Maritime Services

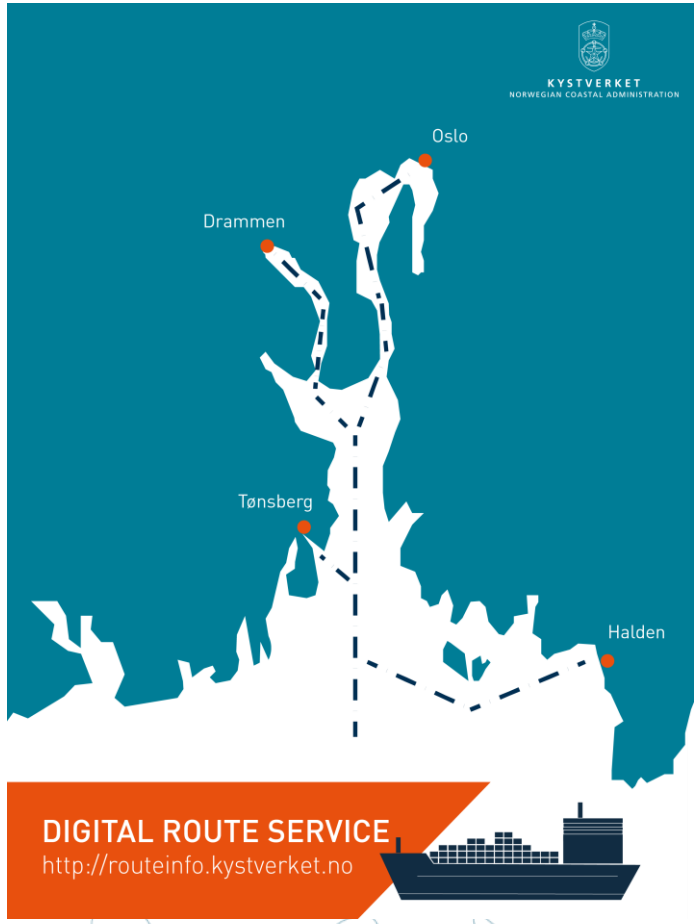
Safety and Security - e-Navigation test beds on port/VTS operatons such as route exchange and MSI



Goal based development in Norway – safety, efficiency and security

Functionality	On-board systems	Communication systems	On-shore systems
Automated Ship Reporting	Operationalise	Operationalise	Operationalise
Route Exchange	Operationalise	Operationalise	Operationalise
E-Navigation Services Route Monitoring Route Cross Check Pilot Route Route Optimisation	Operationalise	Operationalise	Operationalise
Just-in-time incl port services	Operationalise	Operationalise	Operationalise
Management of traffic organisation services			Operationalise
Human Centric Design	Operationalise		Operationalise

Digital voyage is already a reality, from 18th september 2018!



- Digital recommended sailing routes, to and from the port facilities
- Operational tool for planning and automatic information exchange during the voyage.
- Information exchange between web based GIS and graphical displays on board such as ECDIS.

GIS ⟷ ECDIS

Information technology

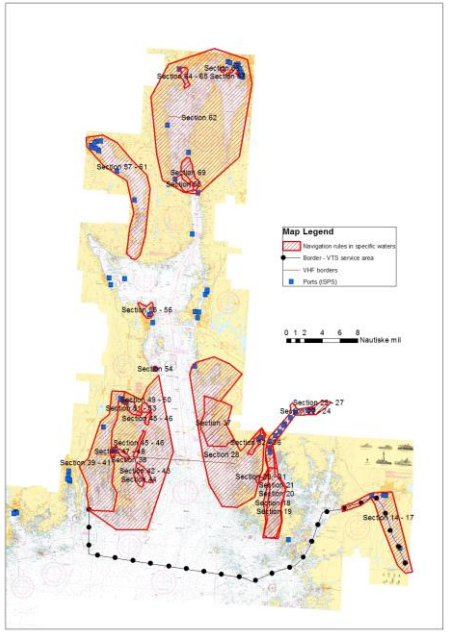
Information-management and tools in web-based Geographical Information Systems (GIS)

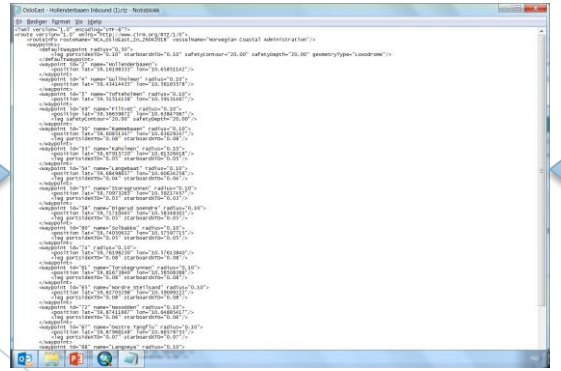
Operational technology

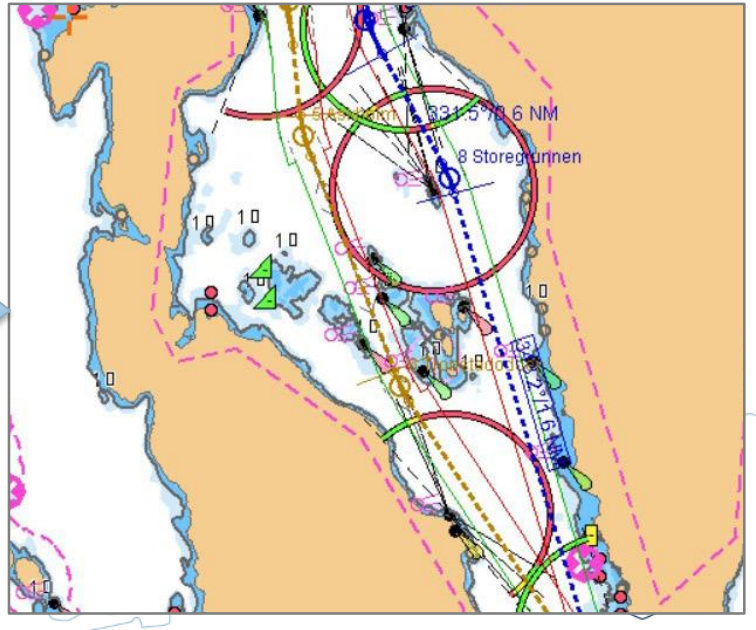
- Nautical information in Electronic Chart Display and Information System (ECDIS)

Route

(rtz and other international standards)







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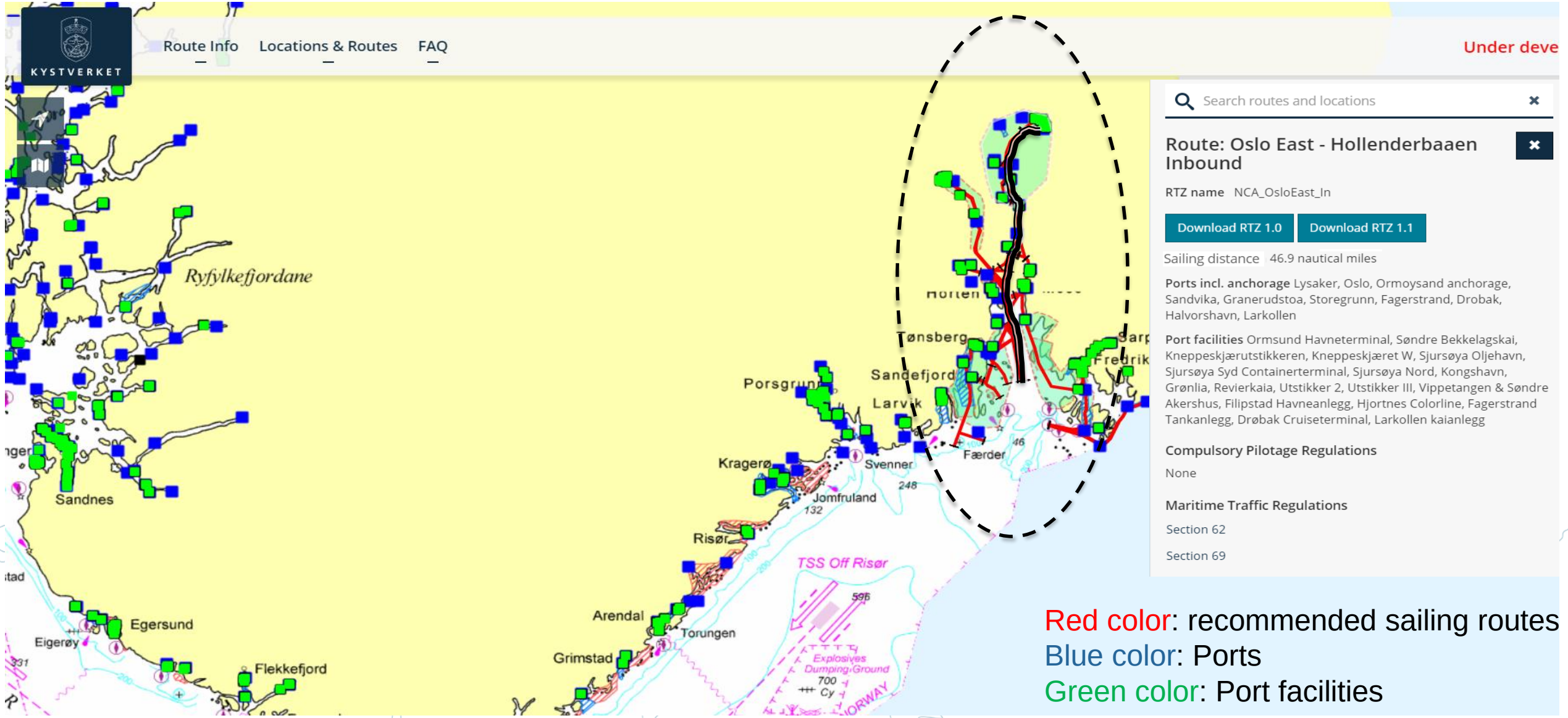
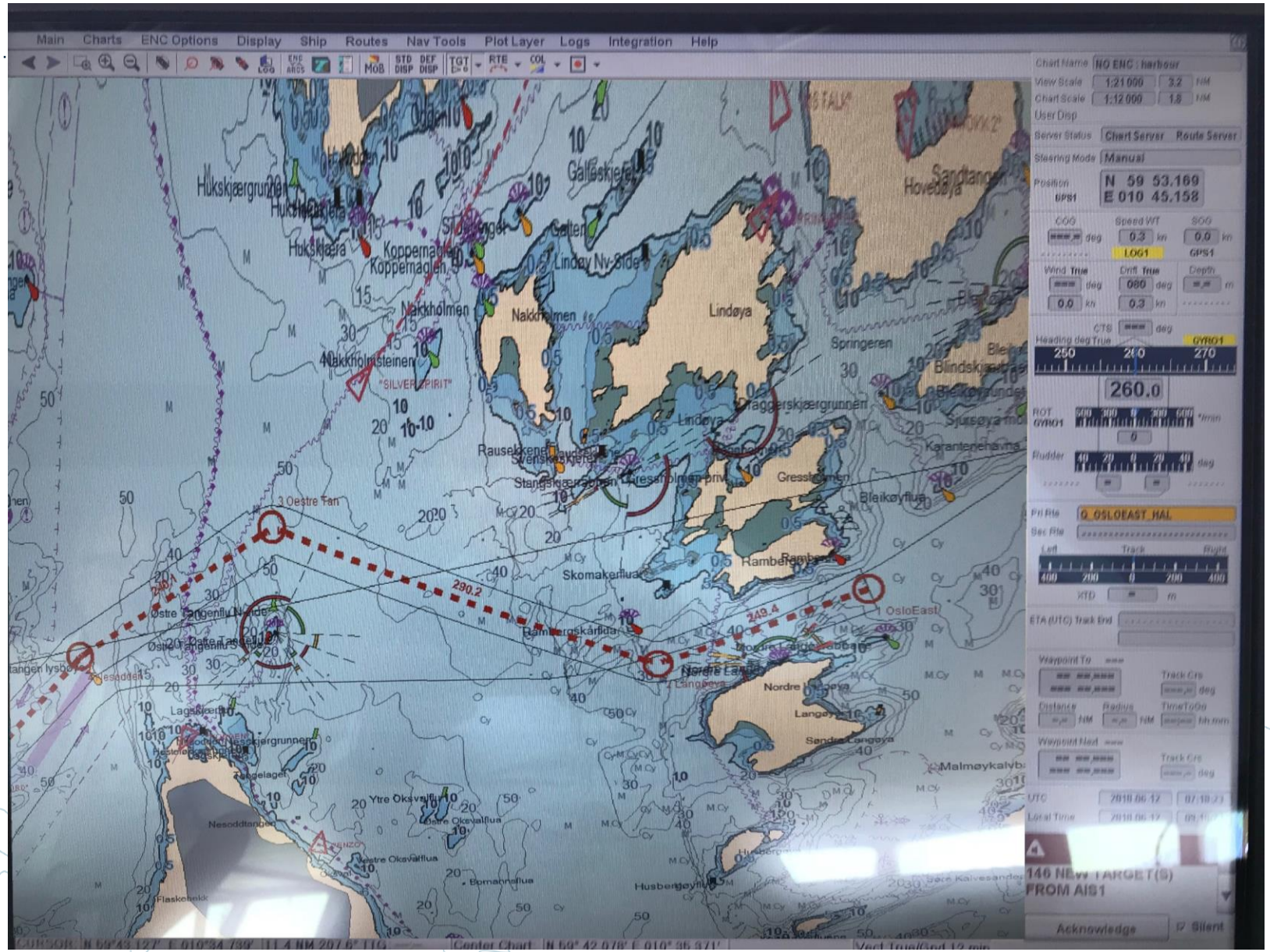
Ex: Sailing route to Oslo East is selected



Red color: recommended sailing routes
Blue color: Ports
Green color: Port facilities

The same sailing routes are integrated in ECDIS (exchanged from GIS to ECDIS)

NCA quality assured and, NCA recommended



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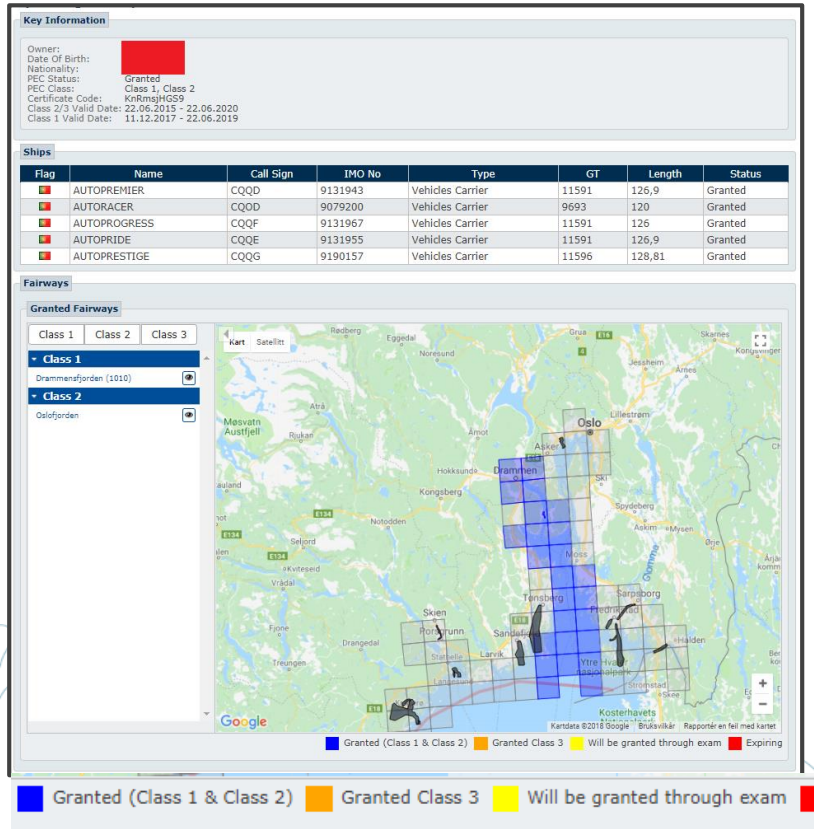
Next step: The area of the navigators Pilot Exemption Certificate (PEC) is shown on ECDIS/ENC

PEC



ECDIS

*For fairways/corridors in **BLACK** – Class 1 certificate needed*

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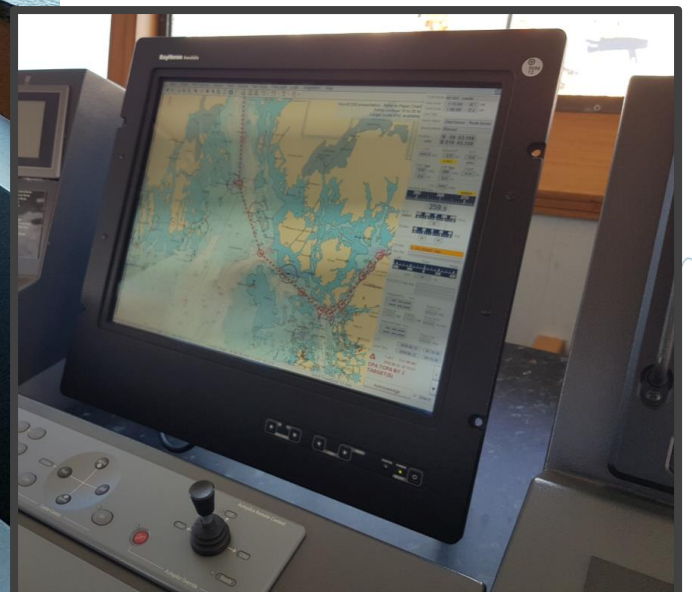
Implementation of The Digital Voyage

Quality check and assurance of usability for operationalization

The NCA-representative and the captain (to the right) on board



Autonomous Systems and Robotics – NCA's legal and VTS approach

E-Navigation transfers shipping from analog to digital solutions,
a necessary step towards automation and robotics.

Conclusions

- E-navigation presents solutions for modern shipping on board and ashore, which are proven to be cost-effective and risk reducing.
- In order to ensure that we continue to keep ships safe at sea, the successful adoption of new technologies will depend on:
  - an effective regulatory framework, technical standardization on a global scale, automation where possible, and cooperation between all maritime stakeholders.
- The rapid technological development and digitalization of the maritime world is a fact, and e-navigation is highlighted as an important IMO plan to lead shipping into a new digital era.

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Thank you for the attention!

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