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

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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

– Vi tar ansvar for sjøvegen
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

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

- Shared situational awareness
- Cooperative decision support
- Regional Maritime Service Portfolio (MSP)

Route Advice-JIT:
- Efficient traffic flow
- Reduced navigation risk
- Reduced ship bunkers
- Reduced toxic gas emissions
- Better utilization of port facilities resources
### SESAME STRAITS – achievements

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<th>Functionality</th>
<th>On-board systems</th>
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<th>On-shore systems</th>
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<td>Route Exchange</td>
<td>Prototyped</td>
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<td>Just-in-time</td>
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<td>Chart updates</td>
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<td>Nautical publications</td>
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<td>Hot spot detection</td>
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<td>Enhanced alert service</td>
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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
Local port service from testbed to real service in the Norwegian SW solution

- Norwegian Single Window including a Port module for data exchange
- Vi tar ansvar for sjøvegen

Other Stakeholders

SHIP
PORT
NCA

Technical 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 operations such as route exchange and MSI
Goal based development in Norway – safety, efficiency and security

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

ECDIS
Operational technology
• Nautical information in Electronic Chart Display and Information System (ECDIS)

Route
(rtz and other international standards)
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
Next step: The area of the navigators Pilot Exemption Certificate (PEC) is shown on ECDIS/ENC.

For fairways/corridors in **BLACK** – Class 1 certificate needed.
Implementation of The Digital Voyage

Quality check and assurance of usability for operationalization

The NCA-representative and the captain (to the right) on board
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.
Thank you for the attention!

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