

S-129 Under Keel Clearance Management Operational Test - Tjeldsundet

Topics

1. S-100 Demonstrator project information
2. S-129 Operational test report.
 - a) Test Phases
 - b) S-100 Products
 - c) Dataflow
 - d) S-100 Demonstrator application
 - e) Test Execution
 - f) Accomplishments
3. Paper for Consideration by S-129 PT

S-100 Demonstrator Project

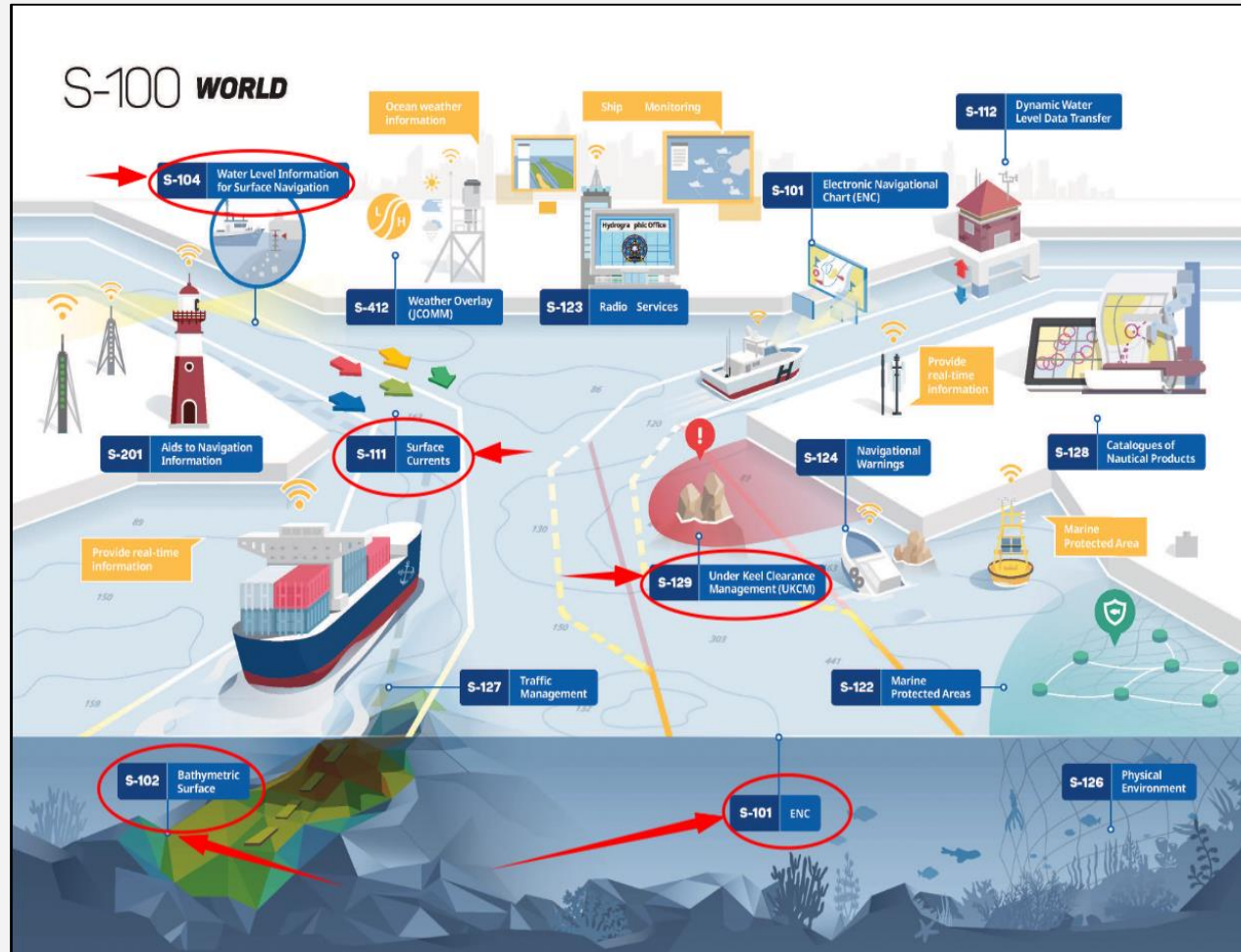
Scope:

To define how the new combined IHO S-100 standards can create considerable value for the maritime industry.

Ports, Navy and Coastal Administration

Period:

2019 - 2022

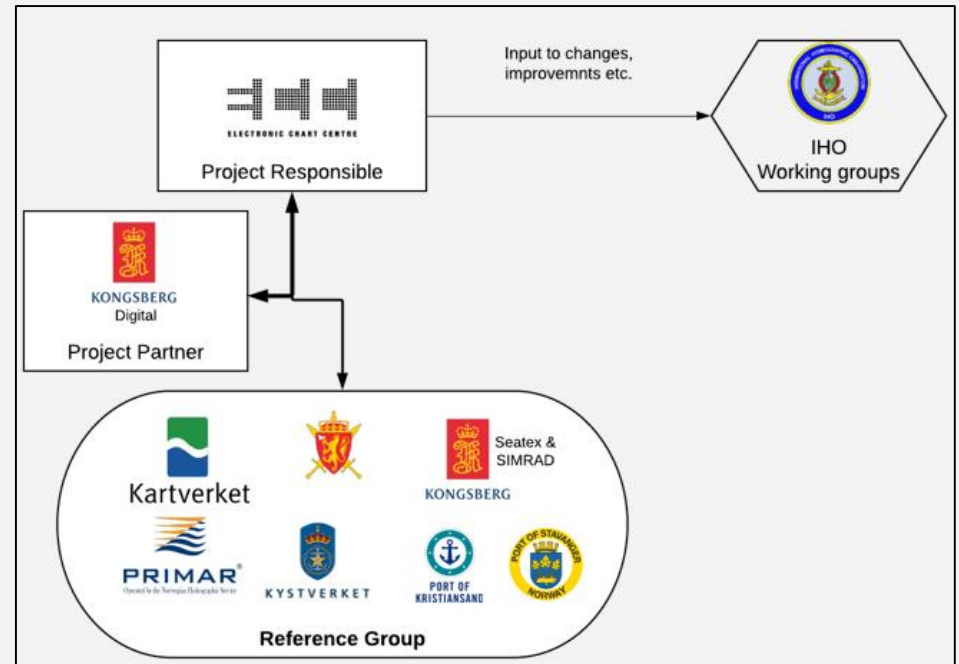


Outcome and Project Partners

Identify **providers**/source, availability and **quality of data** for S-100 products

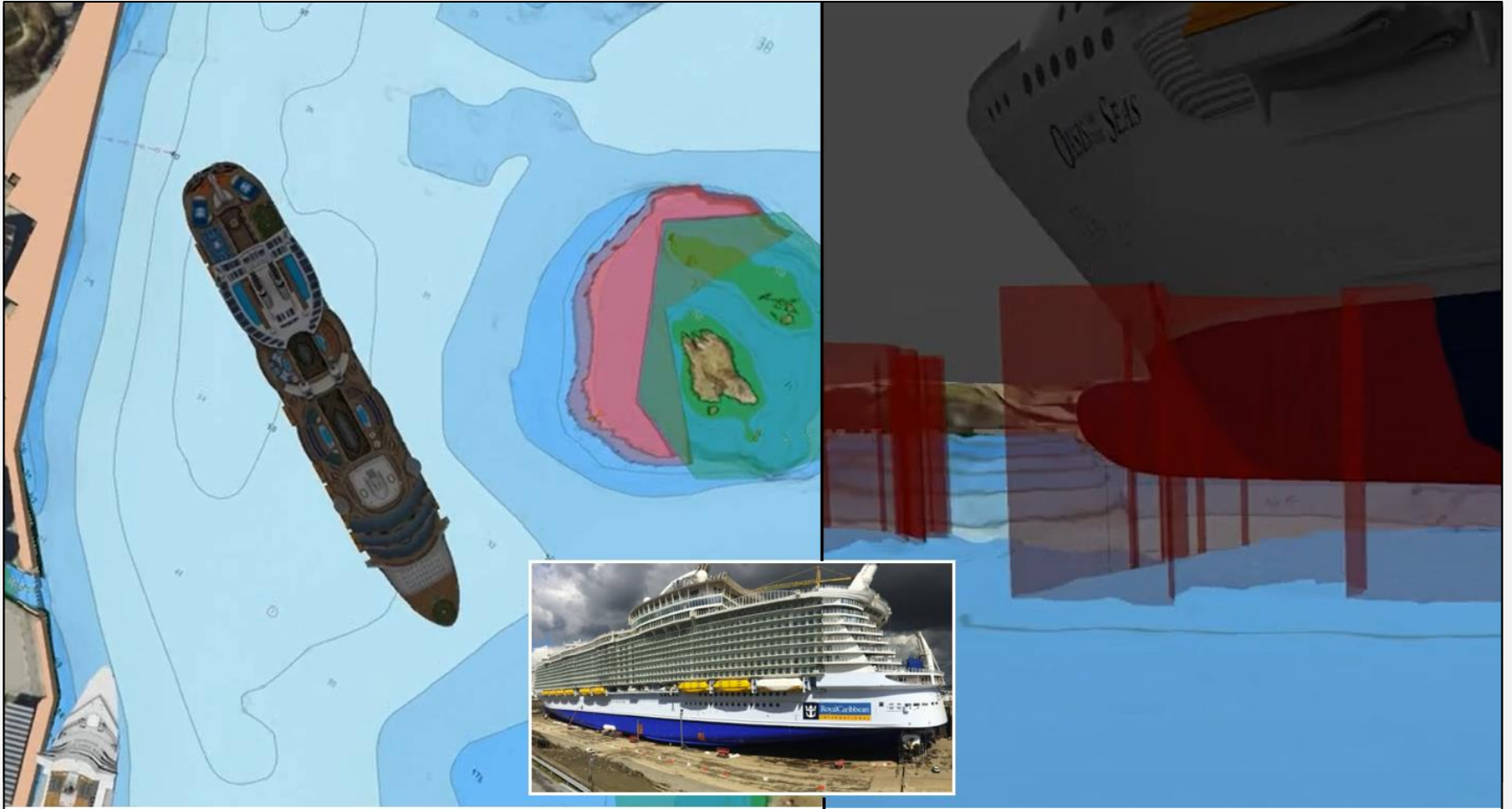
Identify the **need and value** of providing various S-100 products for the maritime industry and authorities

Add valuable **input to IHO** to assure that ratified S-100 products can be used by the industry



Establish **new and enhanced products and services** based on feedback from involved stakeholders

Operational tests



Test reports, videos and more: <https://s-100.no/>

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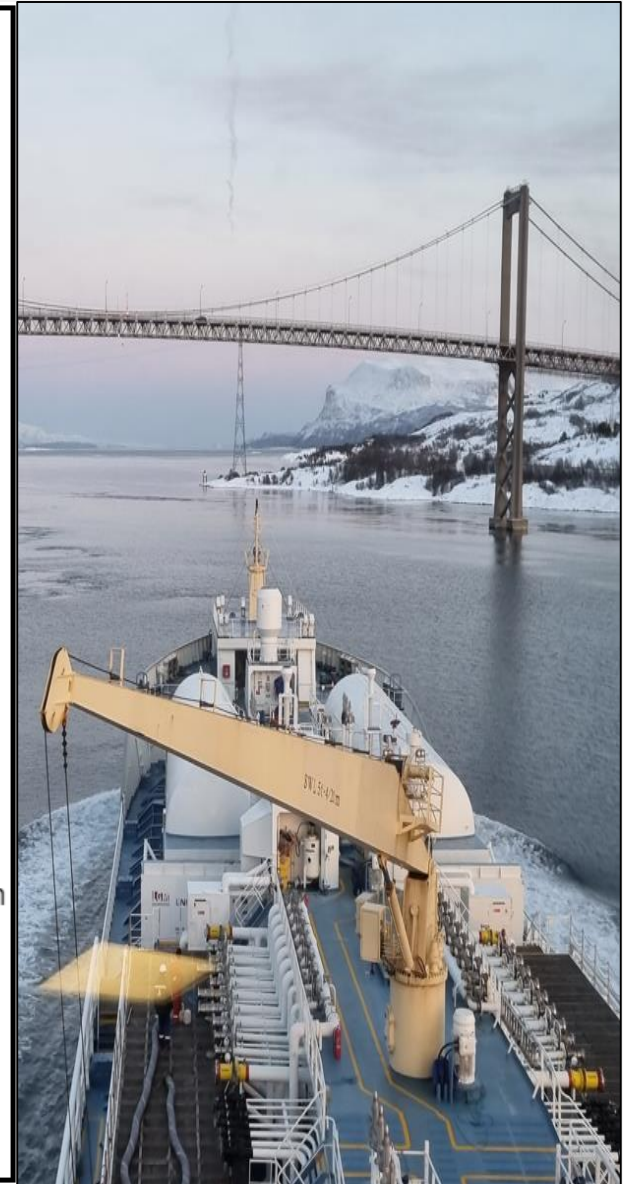
- Produce S-129.
- Produce S-1xx products.
- Use S-1xx products for S-129 generation.

- Integrate data in end user tool
- Use for voyage planning.
- Use for voyage execution.
- Commercial voyage.

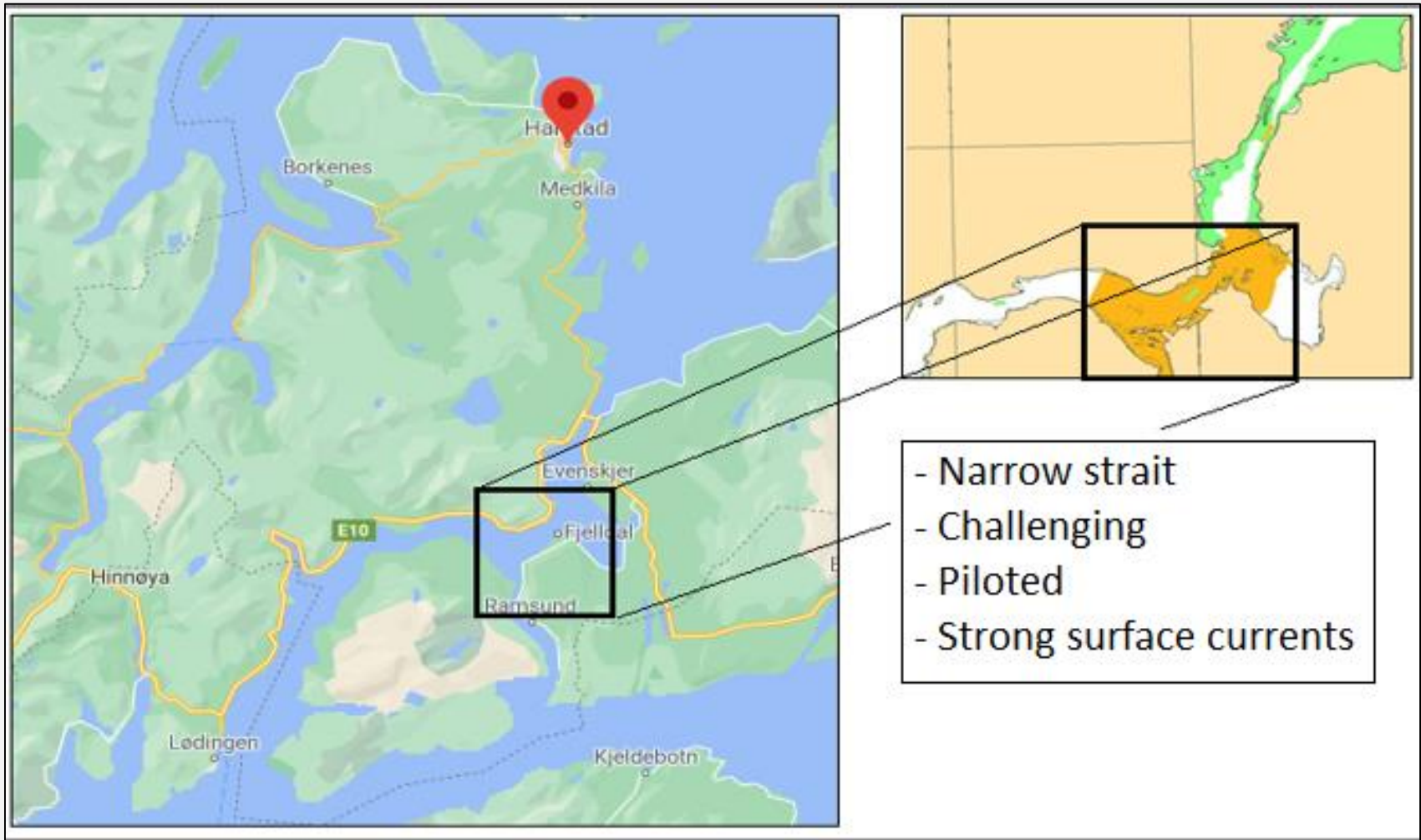
Participants

Participants:

- **OMC International:**
 - Chris Hens - General Manager Product Design & Development
- **Terntank:**
 - Claes Møller - Chief Executive Officer
- **Norwegian Coastal Administration:**
 - Odd Sveinung Hareide - Senior Adviser
 - Andor Dagfinn Antonsen - Pilot
 - Karl Helge Ness Haagensen - Pilot
 - John Morten Klingsheim - Senior Engineer
- **Norwegian Hydrographic Service:**
 - Hilde Sande Borck - Chief Engineer
 - Geir Gunnleiksrud - Senior Engineer
- **Kongsberg Digital:**
 - Thomas Hammer - Team Lead 3D Visualization at Kongsberg Digital
 - Trygve Aasen - Software Developer at Kongsberg Oil & Gas Technology
 - Terje Henriksen - Software Developer at Kongsberg Oil & Gas Technology
- **The Norwegian Meteorological Institute:**
 - Gjermund Haugen - Assistant Manager, The Weather Forecast in Northern Norway
- **ECC:**
 - Svein Skjæveland - Manager International Standardization
 - Sølvi Tunge - Key Account Manager
 - Kirsten Bøe - Managing Director
 - Kjetil Andersen - Sr. Systems Developer



Location Tjeldsundet



Vessel Tern Ocean

IMO no	9747986
Length Overall	147.00 m
Breadth (moulded)	22.00 m
Depth (moulded)	11.70 m
Draught (scantling)	9.00 m
Deadweight	14.827 t
Gross tonnage	11.374 t

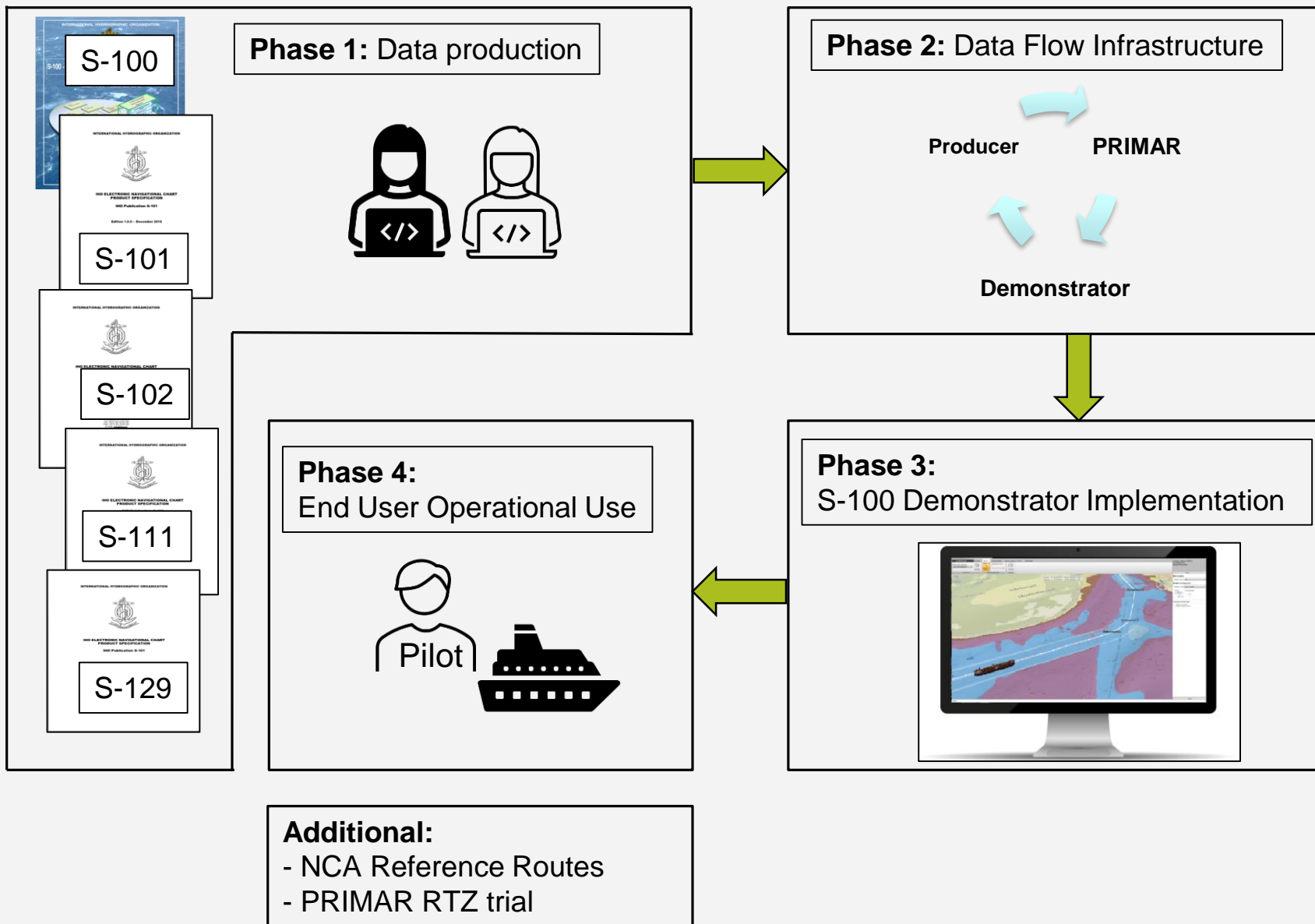


Terntank – Shipping, Chartering, Ship management
<https://terntank.com/>

S-100 data presented in end user application

The screenshot displays an electronic chart application interface. The top menu bar includes "In online mode", "Home", "Terrain", "Manage data", and "Vessel position sources". The left sidebar contains connection settings for a "Pilot plug" (Host: 10.33.3.4, Port: 8023, Username, Password) and "Vessel position sources" (Use own vessel NMEA messages, Use own vessel AIS messages, Adjust NMEA heading, Heading offset: 90 degrees). The central map area shows a vessel labeled "OWN VESSEL" moving through a channel with depth contours (10m, 14m, 18m, 24m, 30m) and a red shaded area. The right sidebar shows scenario information (Norway UTM33, EPSG:25833, 102N000TSUND02M) and settings for imagery, coloring mode, and grid/contour lines. A "Close" button is visible at the bottom right of the interface.

Test Phases



Phase 1 Products

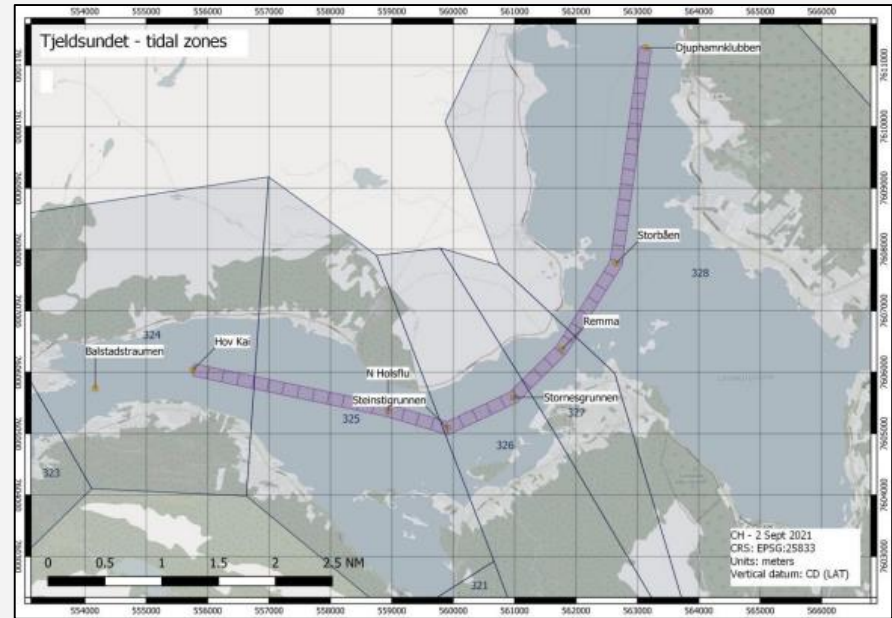
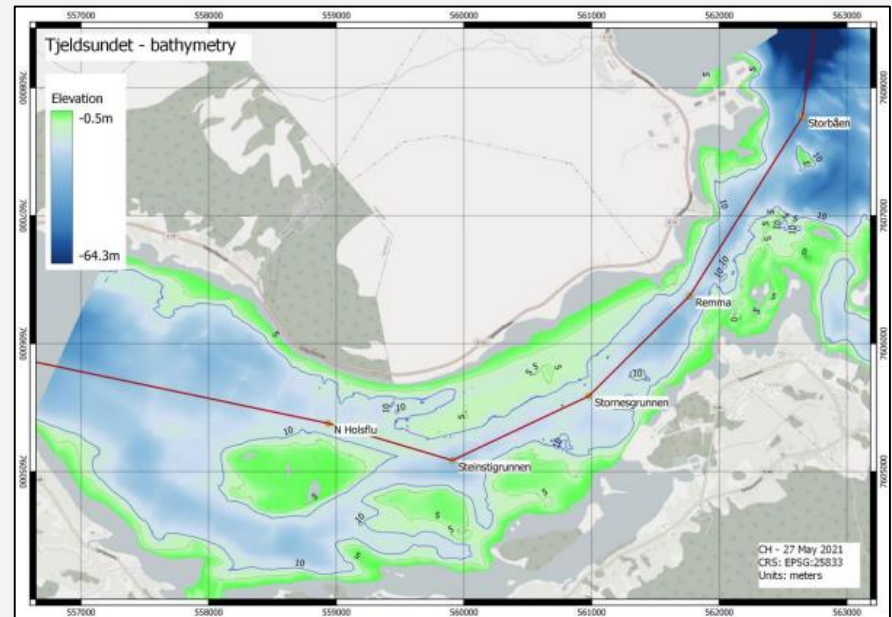
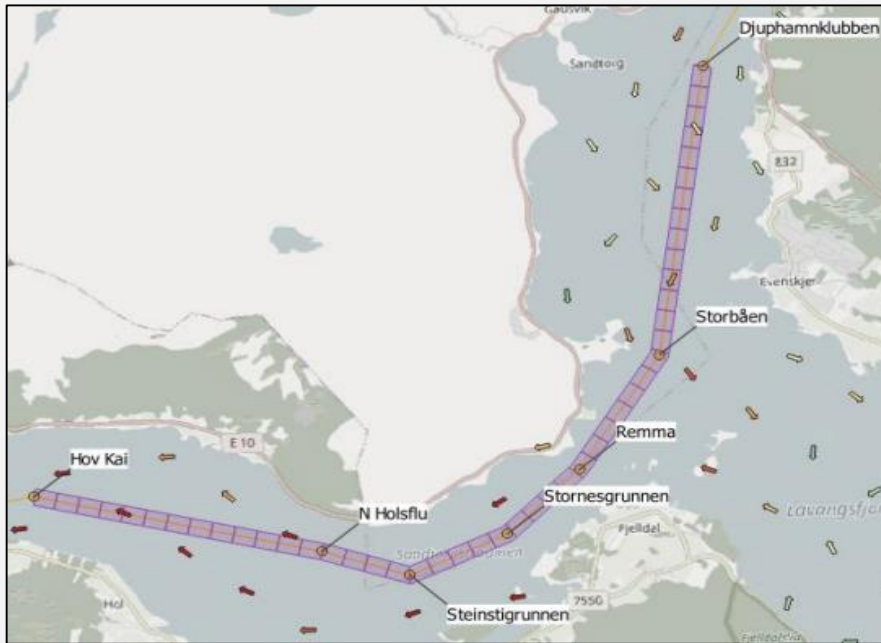
- ✓ S-57 Traditional ENC
- ✓ S-101 Future ENC
- ✓ S-102 High resolution bathymetry
- ⊖ S-104 Water level
- ✓ S-111 Surface current
- ✓ S-129 Under keel clearance
- ⊖ S-41x Weather
- ⊖ S-421 Routes

- Experience
- Challenges
- Standardization
- Production tools
- Automation
- Static vs Dynamic
- Validation

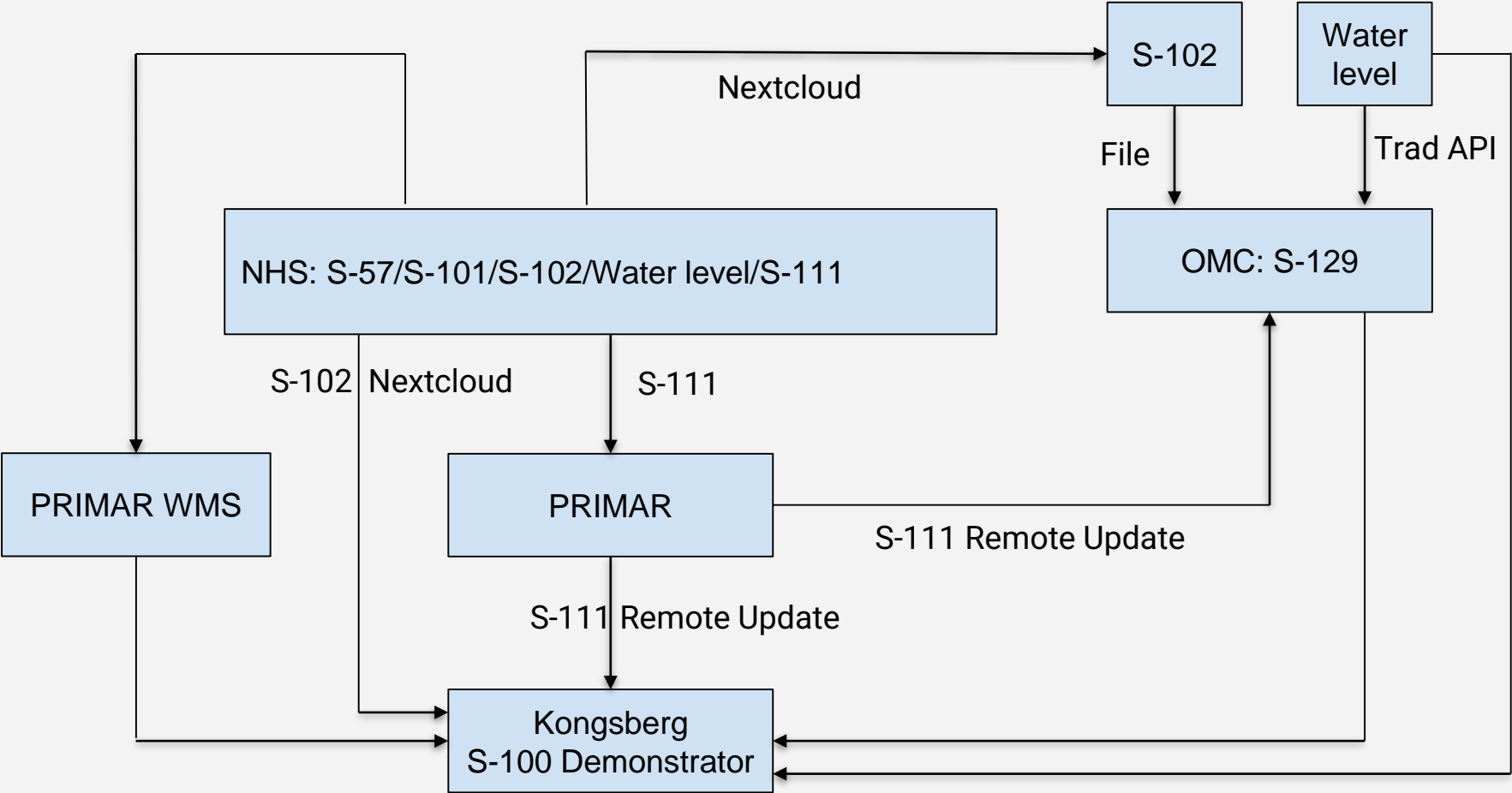


S-129 Production

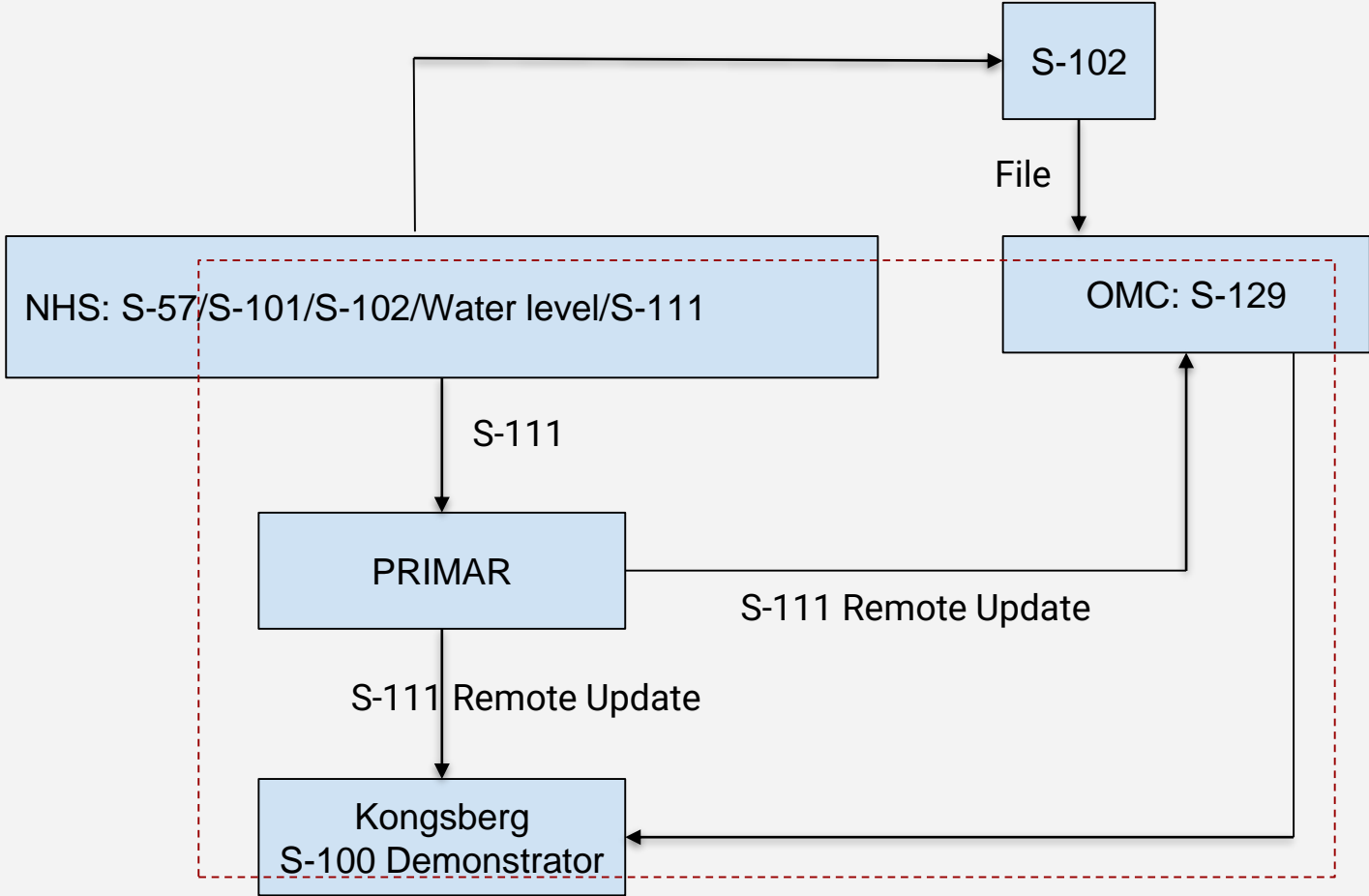
- OMC International (producer)
 - Bathymetry data (S-102)
 - Surface Current data (S-111)
 - Water Level data
 - Squat modelling
 - Draft modelling



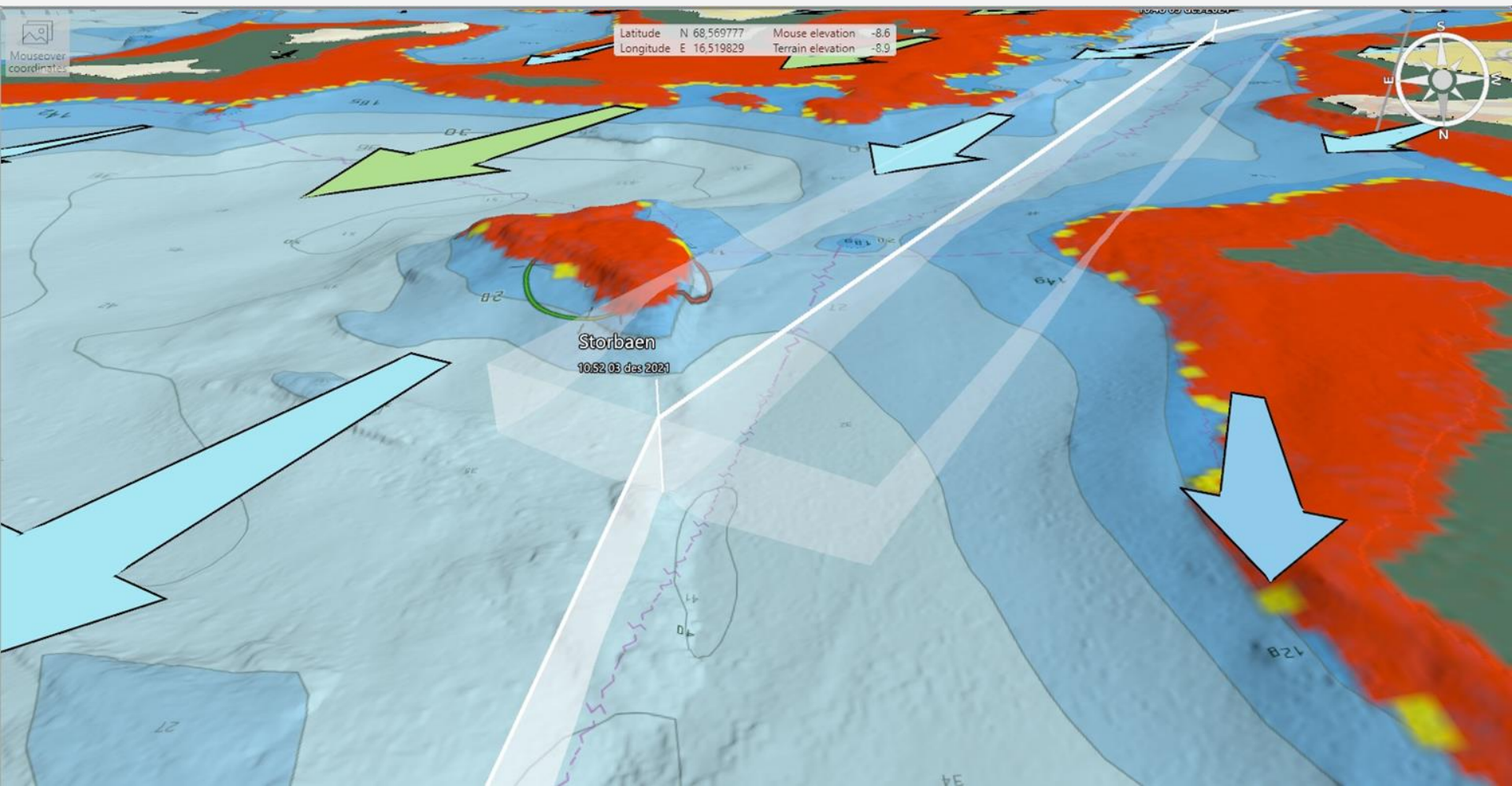
Phase 2 Dataflow



Phase 2 Dataflow



Phase 3 Demonstrator implementations



Phase 4 Test execution

- ✓ **Planning purpose**
- ✓ **Operational purpose**
- ✓ Single product usability
- ✓ Product combination
- ✓ S-129 live updates

- Experience
- Challenges
- Usability
- New ideas
- Situational awareness
- Safety of nav.



Phase 4 Test execution

The screenshot displays a maritime simulation software interface. The main view is a 3D perspective of a vessel labeled "Own vessel" on a blue sea, with a compass rose in the upper right. The interface is divided into several panels:

- Top Panel:** Includes "In online mode", "Home", "Terrain", "Manage data", "Vessel position sources", and a "Stop following vessel!" button.
- Left Panel:** "Pilot plug" section with "Disconnect" and "Connect" buttons, and "Position source" section with "Source configuration" and "Save" buttons.
- Top-Right Panel:** "Connection settings" with checkboxes for "Use own vessel NMEA messages", "Use own vessel AIS messages", and "Adjust NMEA heading". It also shows "Position types received" for "AIS NMEA", "Own vessel", and "Other vessels".
- Right Panel:** "Vessel manager" section with "Vessel list" and "Vessel properties".

Vessel list:

Name	MMSI
RouteVessel	--
Own vessel	--
KV FARM	25706920
ORIP SOLAR	25723080

Vessel properties:

- Name: Own vessel
- Position: N 68° 33.5152' E 16° 24.0336'
- Heading: 102.5
- Speed: 12.43
- Buttons: "Stop following"

Display properties:

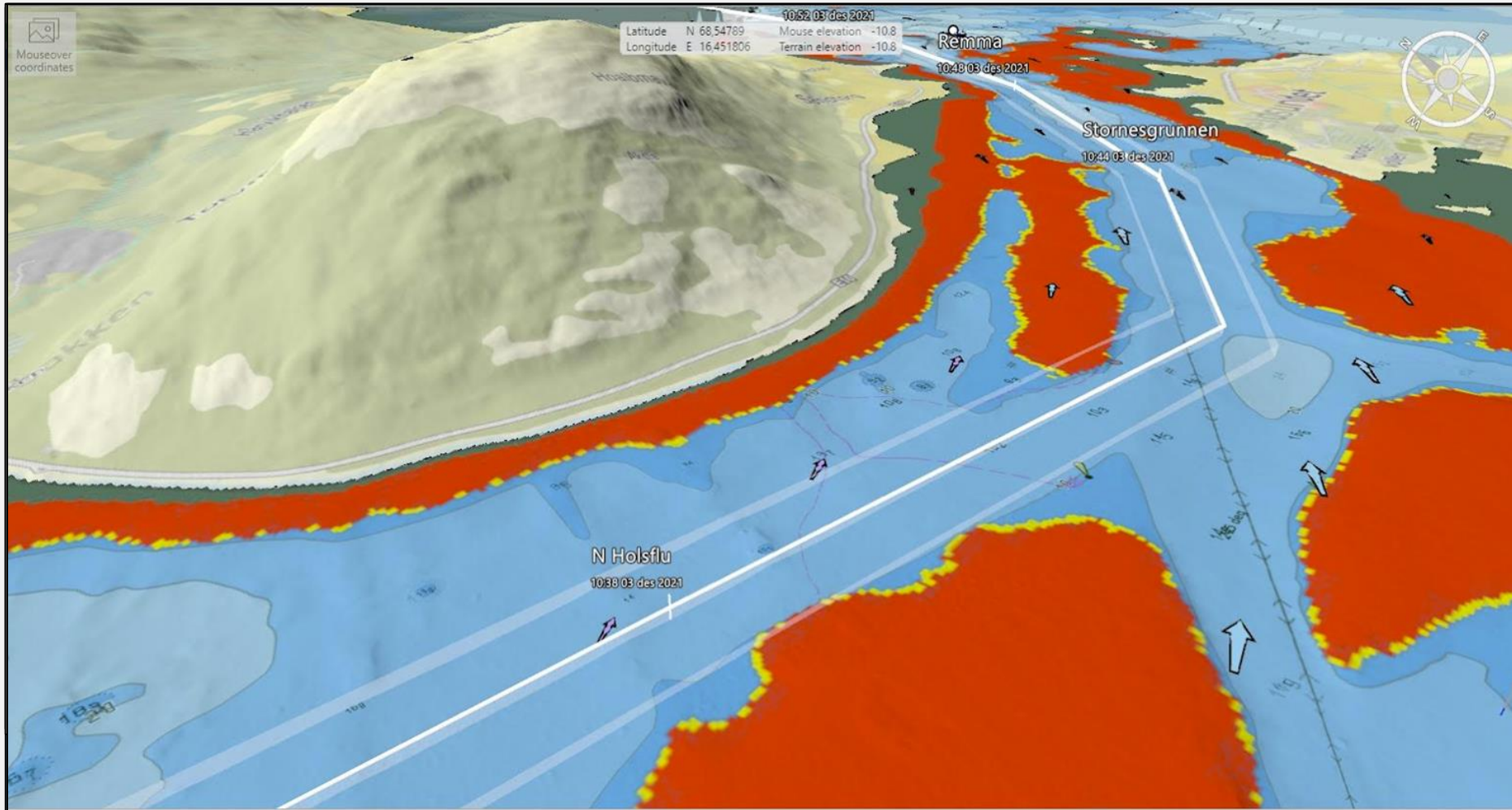
- Heading/COG
- Line and name
- Show model (Type: Tanker)
- Show box (Transparency: 100%)

Vessel dimensions and position reference:

- Dimensions: Bow: 73.5, Stern: 73.5, Port: 11, Starboard: 11, Depth: 10.00
- Buttons: "Use manual dimension values", "Close"

Phase 4 Test execution

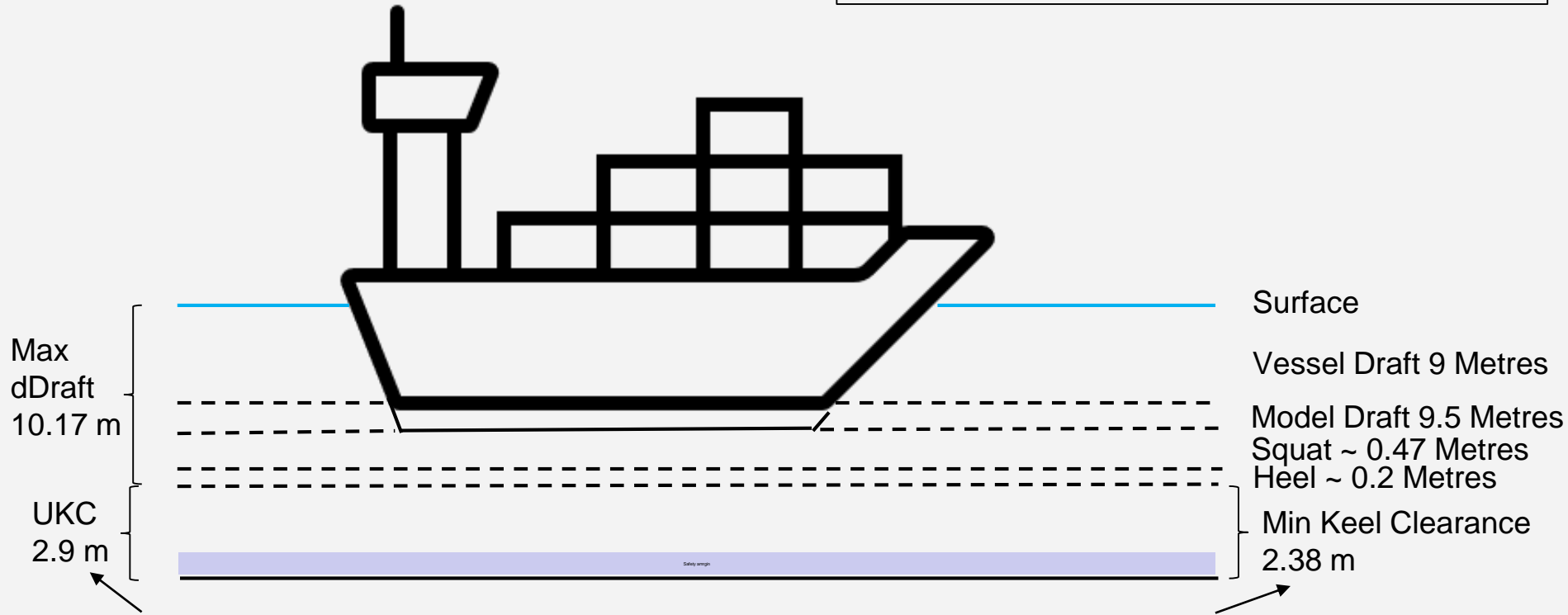
Water Level difference: 2.41 meter



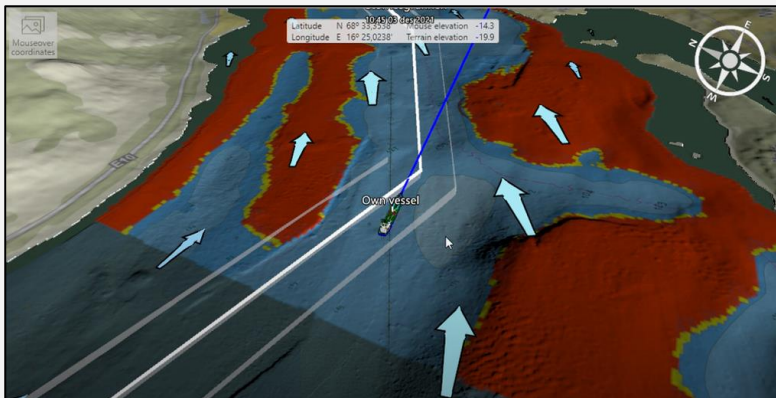
“After review, it turns out that ship must be postponed. This occurs when using the S-100 Demonstrator. New departure 0930”.

Phase 4 Test execution

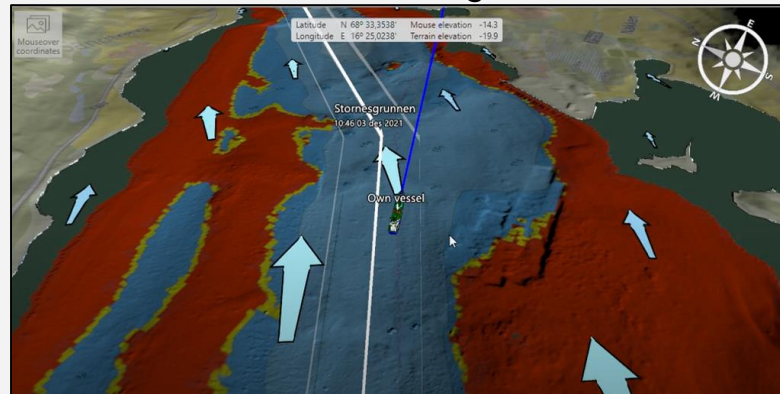
Water Level difference: 2.41 meter



Steinstigrunnen



Stornesgrunnen



Phase 4 Test execution – Voyage Planning

Planning purpose Conclusions S-129:

- Long time planning (pre-plan) not achieved.
- Dry-run, plan updating prior to voyage execution.
- Perception and understanding of available navigable space.
- Useful for safe passage considerations.
- **Most added value during planning process.**
- **Demonstrator and products available adds value to assist the Pilot in his area of responsibility.**
- **Time factor - displaying conditions ahead in time.**

Improvement suggestions:

- More flexibility.
- Demonstrator integration, ability to adjust parameters directly.
- Periodic product (3 hours before to 6 hours passed time of voyage).

“For planning purposes, the products available in the S-100 Demonstrator would be of good use when familiarizing with the circumstances and conditions in the area of planned voyage”.

“The S-100 demonstrator gives all the information I need in one place, so it gives added value to assist me in my area of responsibility”.

Phase 4 Test execution – Voyage Execution

Operational purpose Conclusions:

- Official navigation system: Onboard Transas system.
- Demonstrator as navigation support system: added value.
- Situational awareness - Instant access to S-100 data types.

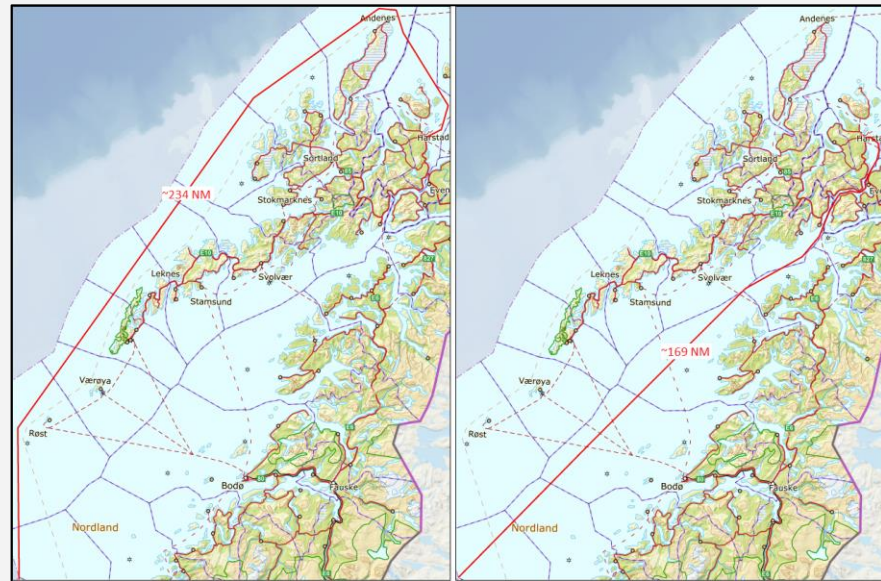
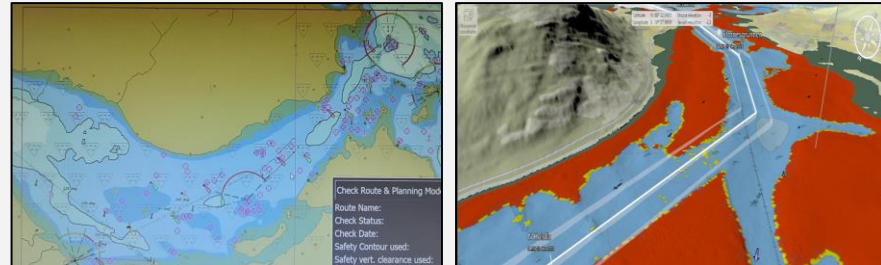
S-129:

- Online connectivity: 1 minute intervals were appropriate.
- Situational awareness.
 - Display of non navigable areas raises navigators awareness towards them.
 - Situational awareness for time ahead increased by the S-129 time factor.



Target accomplishments

- S-129 calculated using other S-100 products (S-102 and S-111).
- S-129 used in end user application expanding navigable available space.
- Reduced sailing distance (65 NM).
- Situational awareness improvement.
 - Added awareness to no-go areas.
 - Single interface availability.
 - Forward in time concept.
 - Improved preparation.
- Value for maritime industry.
 - Economical
 - Safety
 - Environmental
- Voyage planning and execution.



Information

S-100 Demonstrator:

- <https://s-100.no/>

S-129 Operational Test:

- <https://s-100.no/operational-test-s-129-under-keel-clearance-management-tested-in-tjeldsundet-norway/>
 - Summary
 - Full test report download.
 - OMC public report.

Article and video:

- <https://www.kystverket.no/en/news/pilot-tests-new-digital-tools/>
- https://www.youtube.com/watch?v=yVtc_0wFeso

Pilot tests new digital tools



Pilot Karl Helge Haagensen during pilotage when new digital tools were tested in Tjeldsundet. Photo: Svein Skjæveland, ECC.

The pilot service recently took part in a successful test of the digital product S-129. This new technical aid calculates where it is safe to sail at any given time, especially in shallow areas.

Published 12/15/2021 By Haugen, Lill, Therese Opsahl.

New digital tools will help make voyages even safer and more efficient in the future. Karl Helge Haagensen of the Norwegian Coastal Administration was recently the pilot on board M/T Tern Ocean through the narrow and shallow Tjeldsundet sound. Here the digital tool "S-100 Demonstrator", with live updates from S-129, was tested on a commercial voyage – the world's first such test.

The aim of S-129 is to ensure good clearance in areas where depths are marginal.

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Thank you!