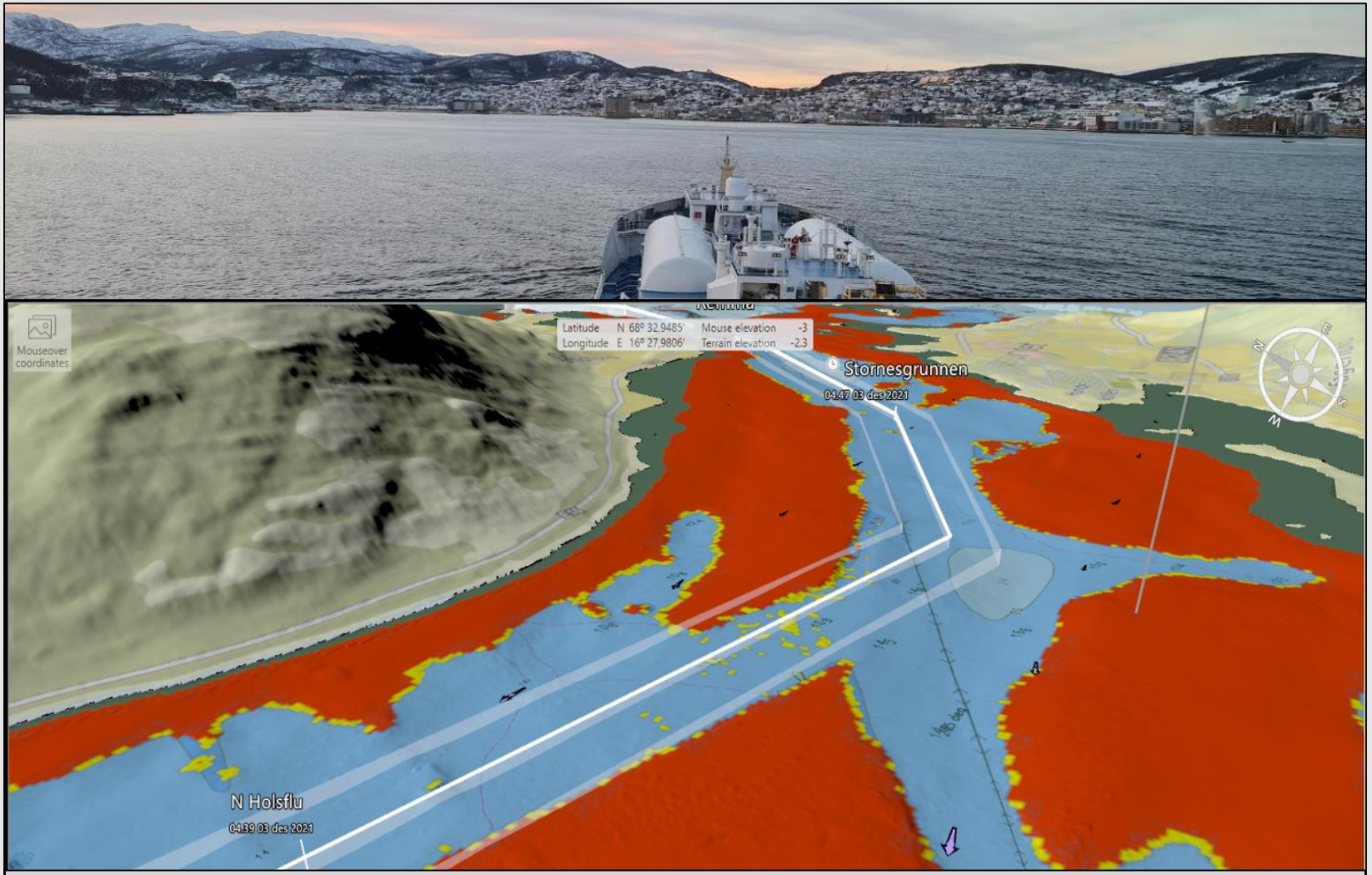


S-129 Under Keel Clearance Management Operational Test - Tjeldsundet

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

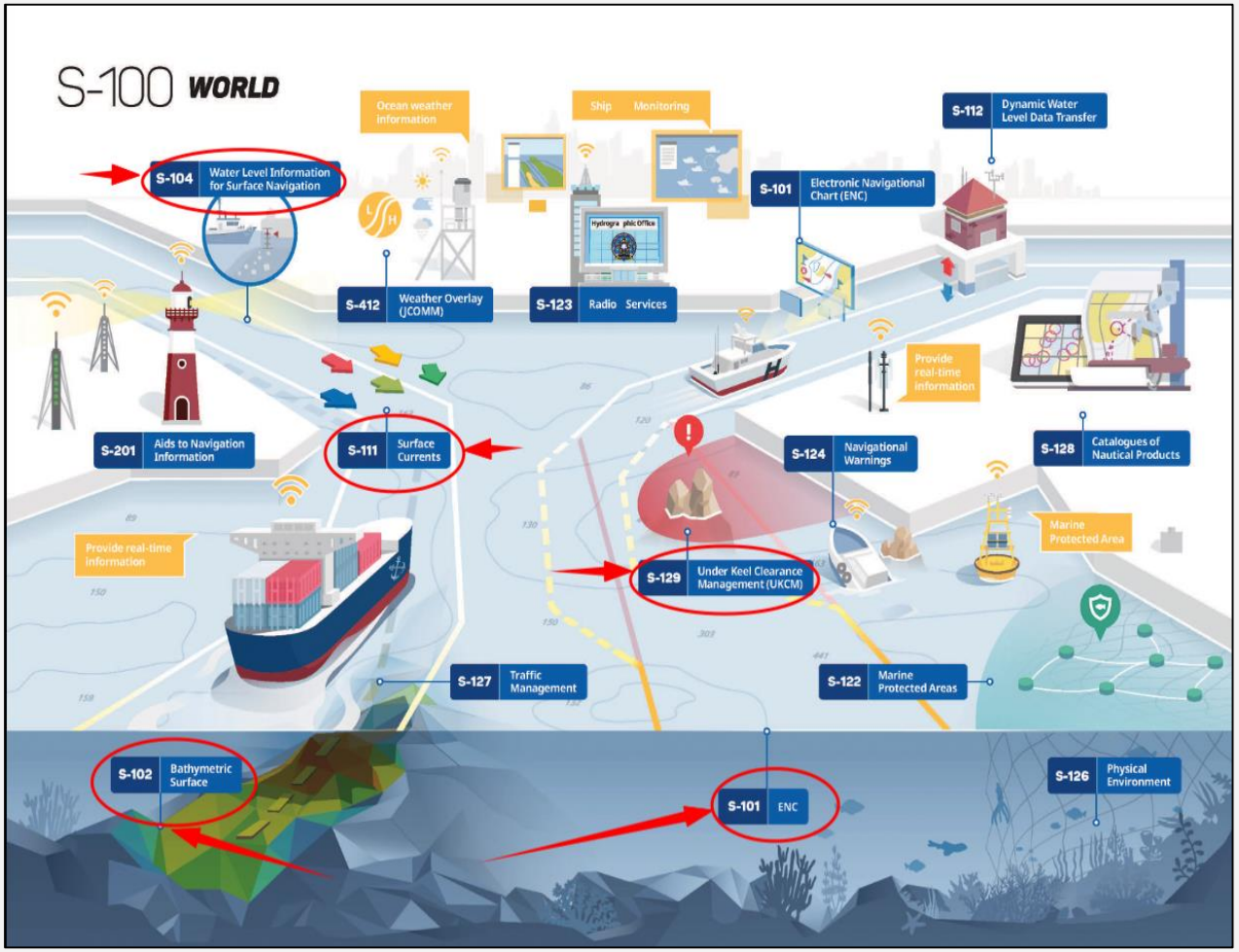
Scope:

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

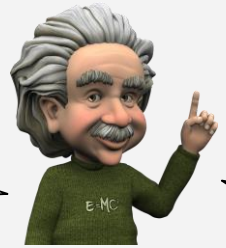


Outcome and Project Partners

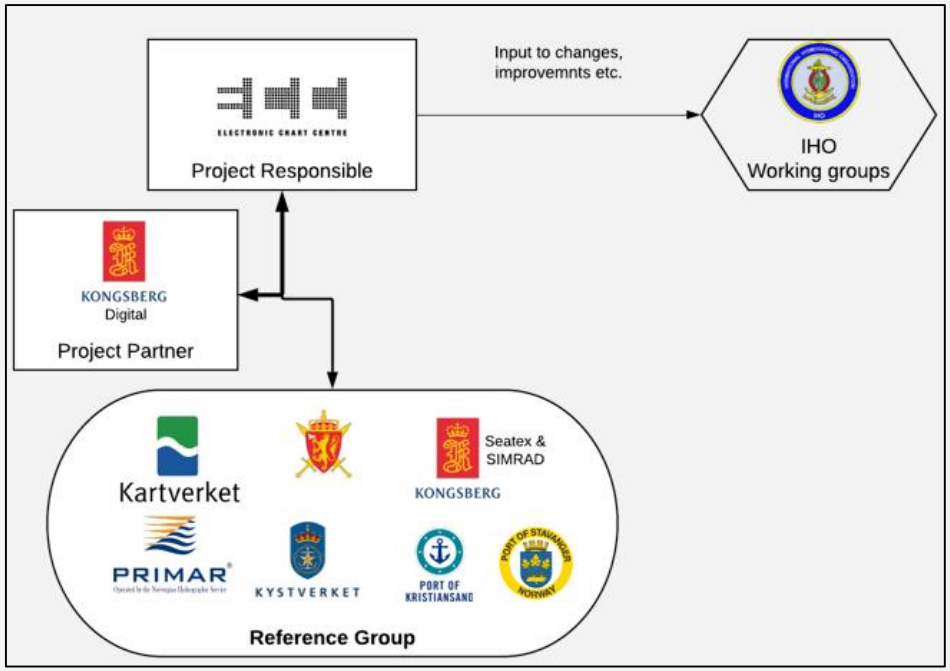
Identify **providers**/source, availability and **quality of data** for S-100 products

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

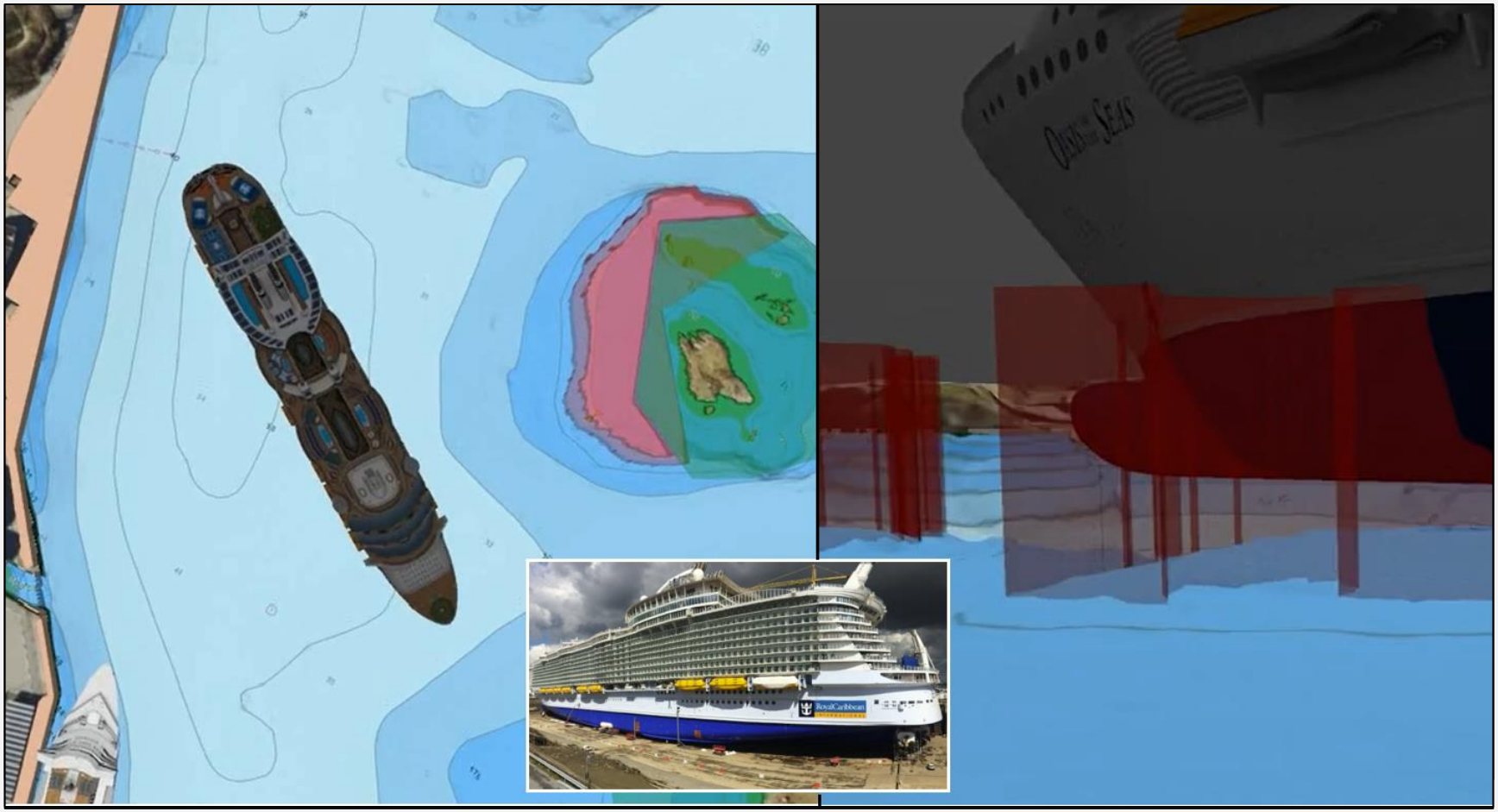
Add valuable **input to IHO** to assure that ratified S-100 products can be used by the industry



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



Operational tests



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

S-129 Under Keel Clearance Management
Operational Test - Tjeldsundet

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

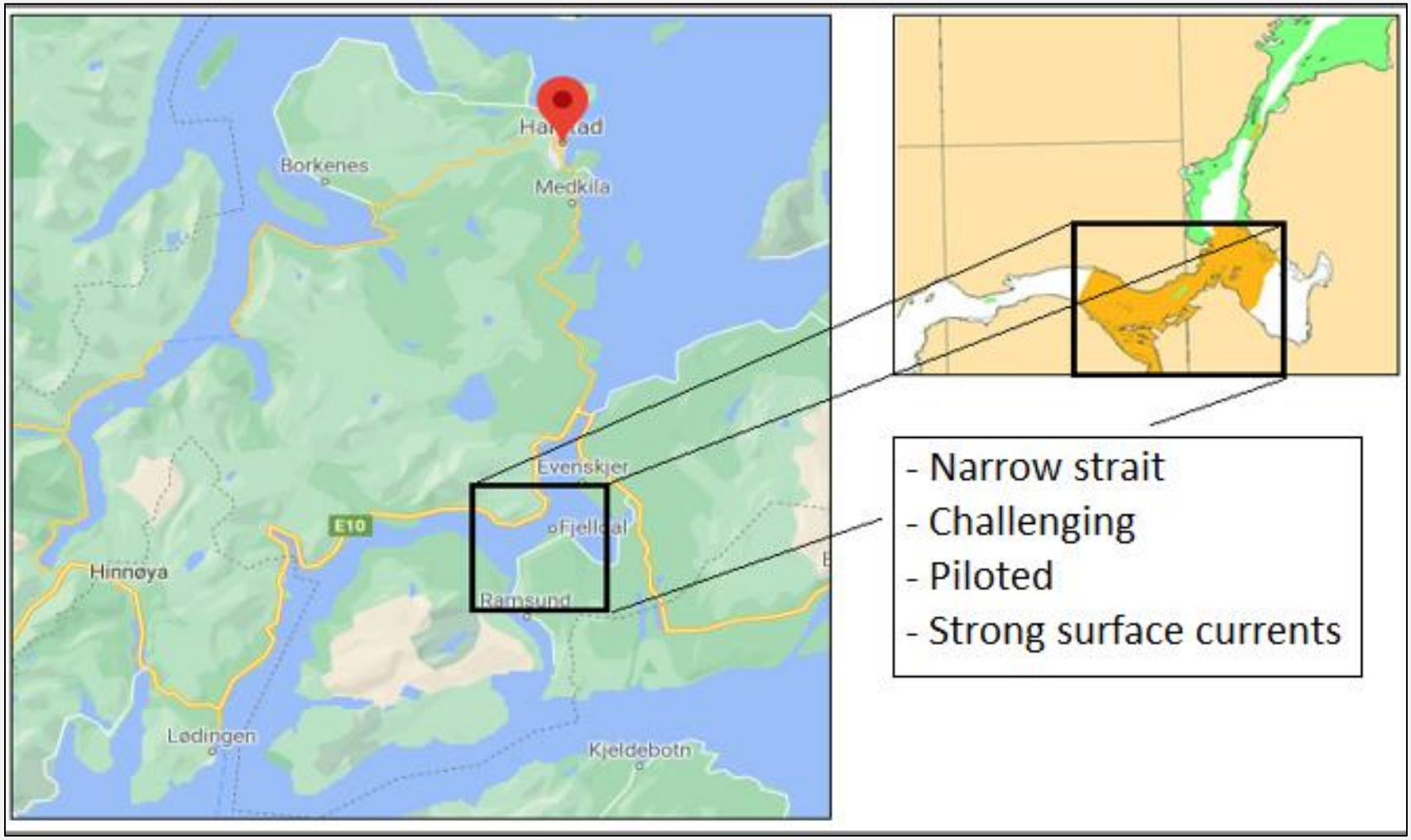
- Integrate data in end user tool
- Use for voyage planning.
- Use for voyage execution.
- Commercial voyage.

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

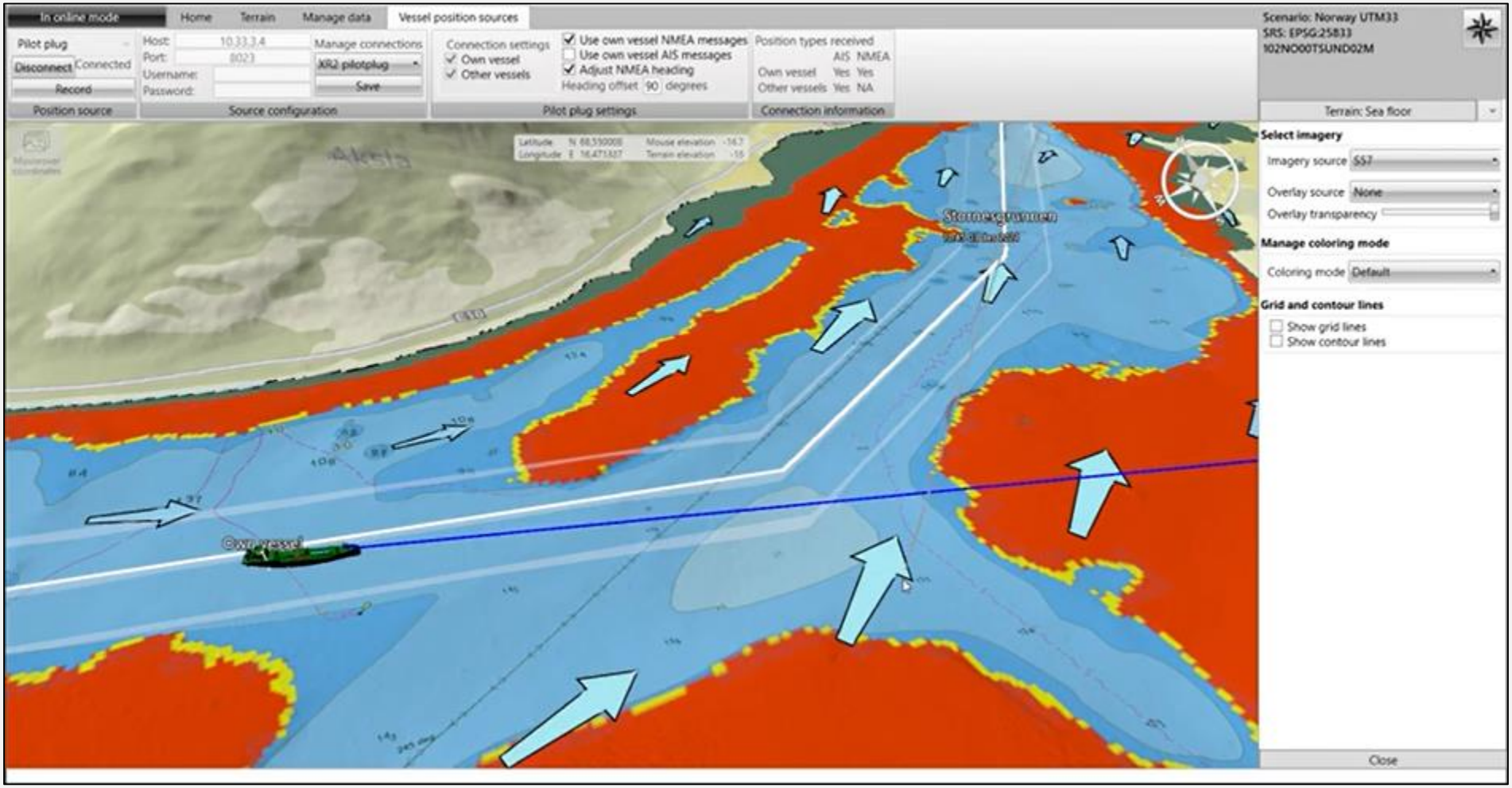


Vessel Tern Ocean

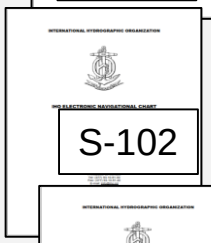
IMO no	9747986
Length Overall	147.00 m
Breadth (moulded)	22.00 m
Depth (moulded)	11.70 m
Draught (scantling)	9.00 m
Deadweight	14.827 t
Gross tonnage	11.374 t

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

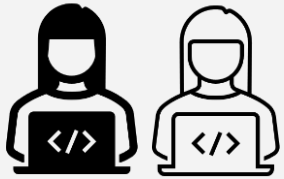
S-100 data presented in end user application



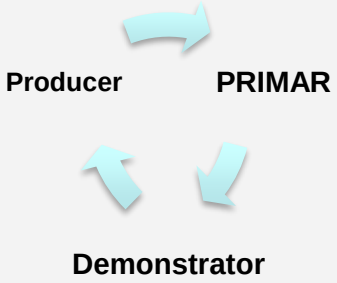
Test Phases



Phase 1: Data production

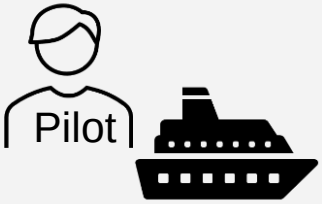


Phase 2: Data Flow Infrastructure



Phase 3:
S-100 Demonstrator Implementation

Phase 4:
End User Operational Use

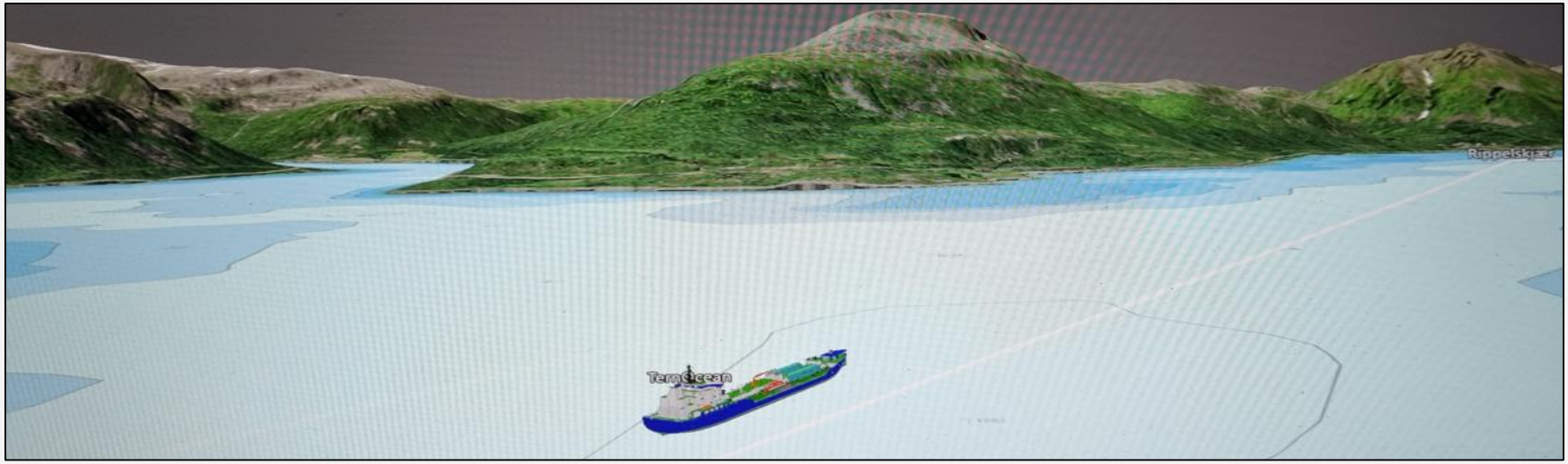


Additional:
- NCA Reference Routes
- PRIMAR RTZ trial

Phase 1 Products

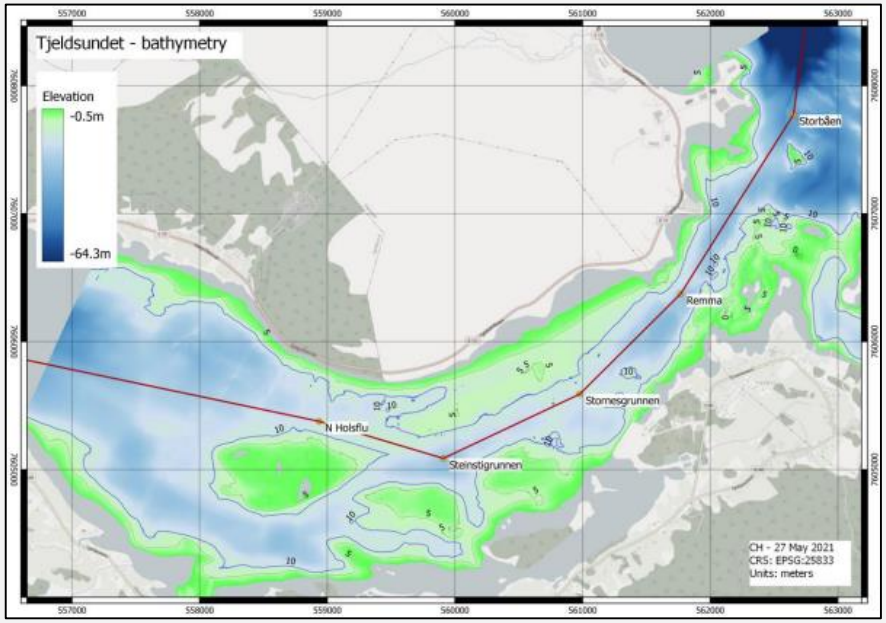
- ✓ S-57 Traditional ENC
- ✓ S-101 Future ENC
- ✓ S-102 High resolution bathymetry
- — S-104 Water level
- ✓ S-111 Surface current
- ✓ S-129 Under keel clearance
- — S-41x Weather
- — S-421 Routes

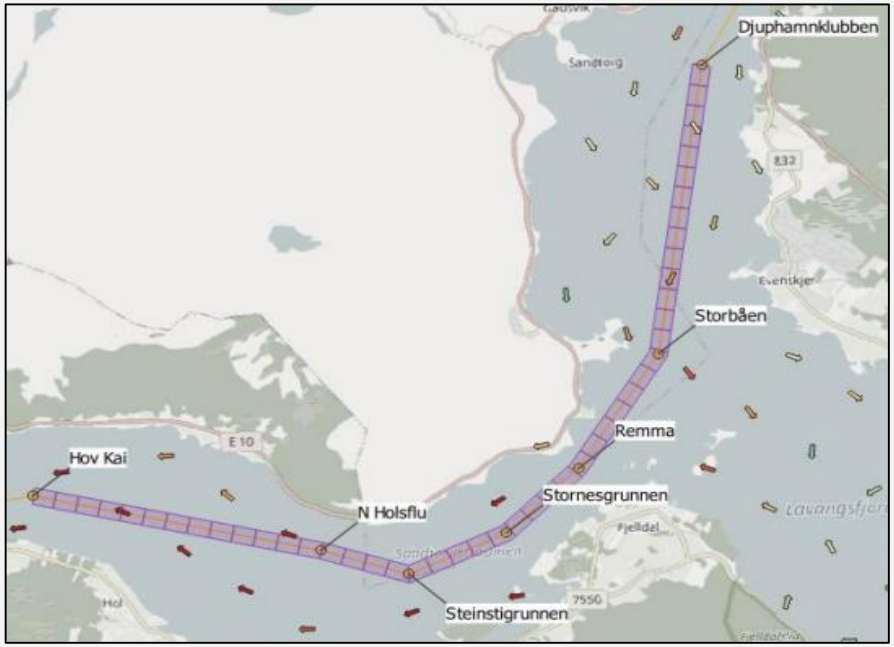
- Experience
- Challenges
- Standardization
- Production tools
- Automation
- Static vs Dynamic
- Validation

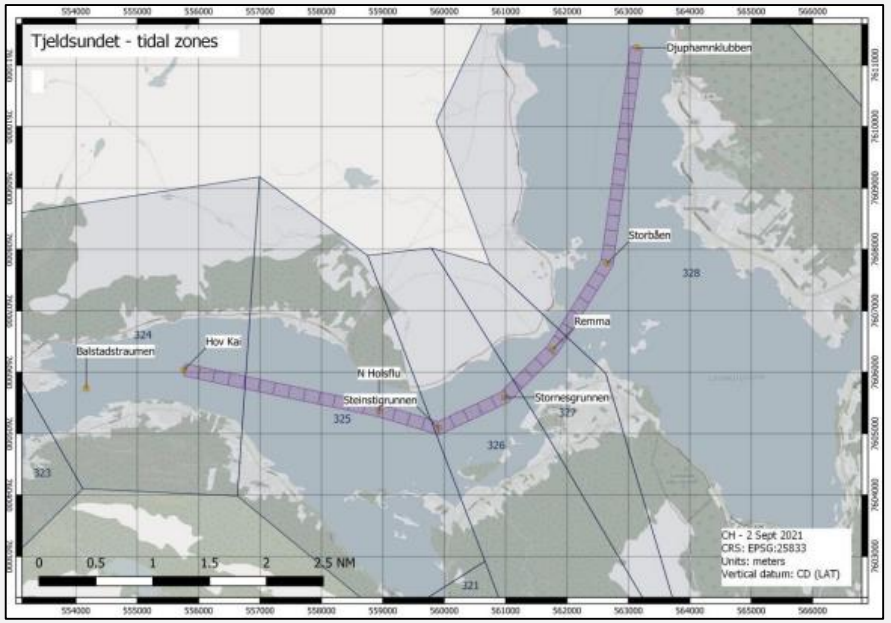


S-129 Production

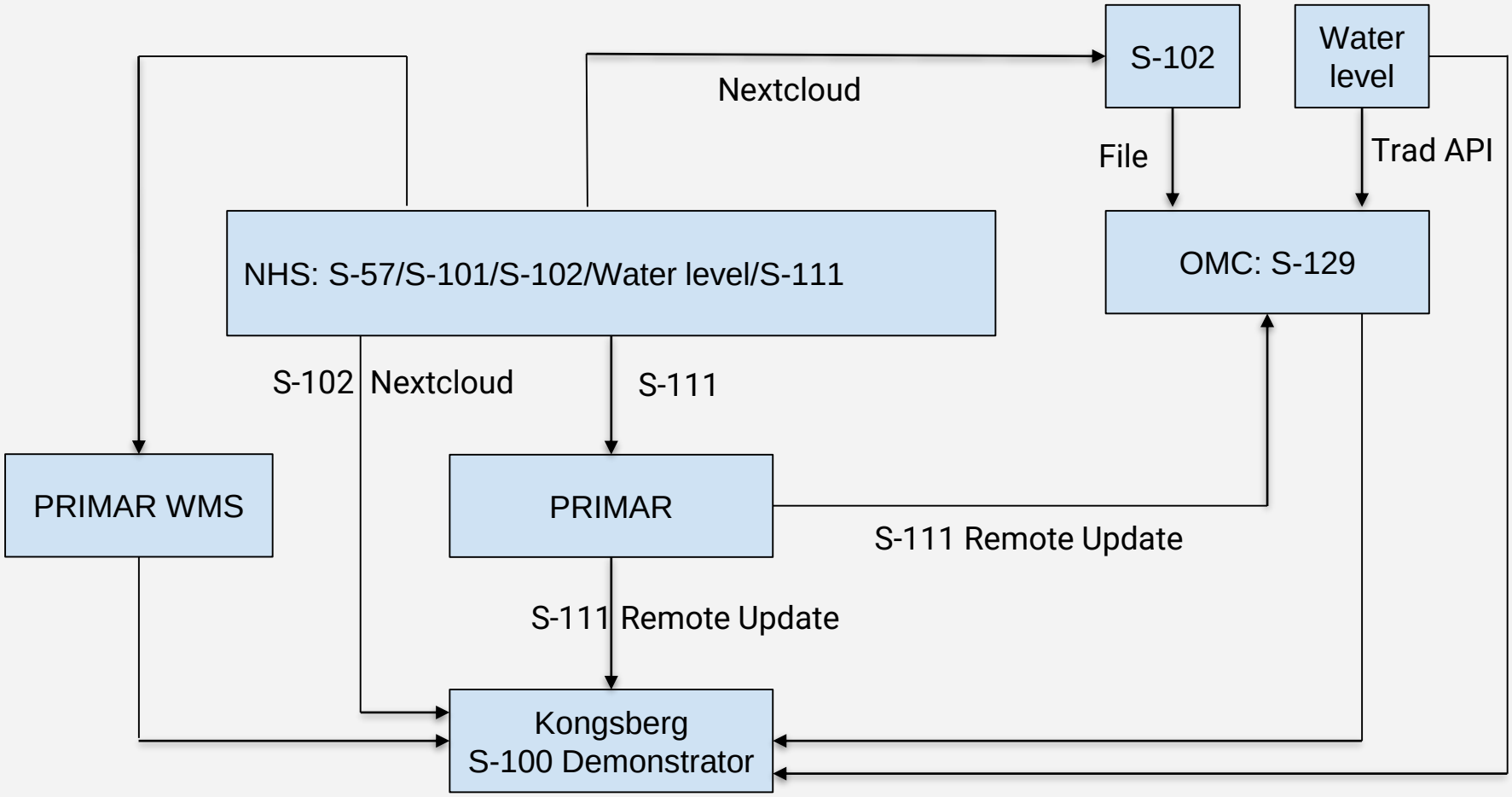
- OMC International (producer)
  - Bathymetry data (S-102)
  - Surface Current data (S-111)
  - Water Level data
  - Squat modelling
  - Draft modelling



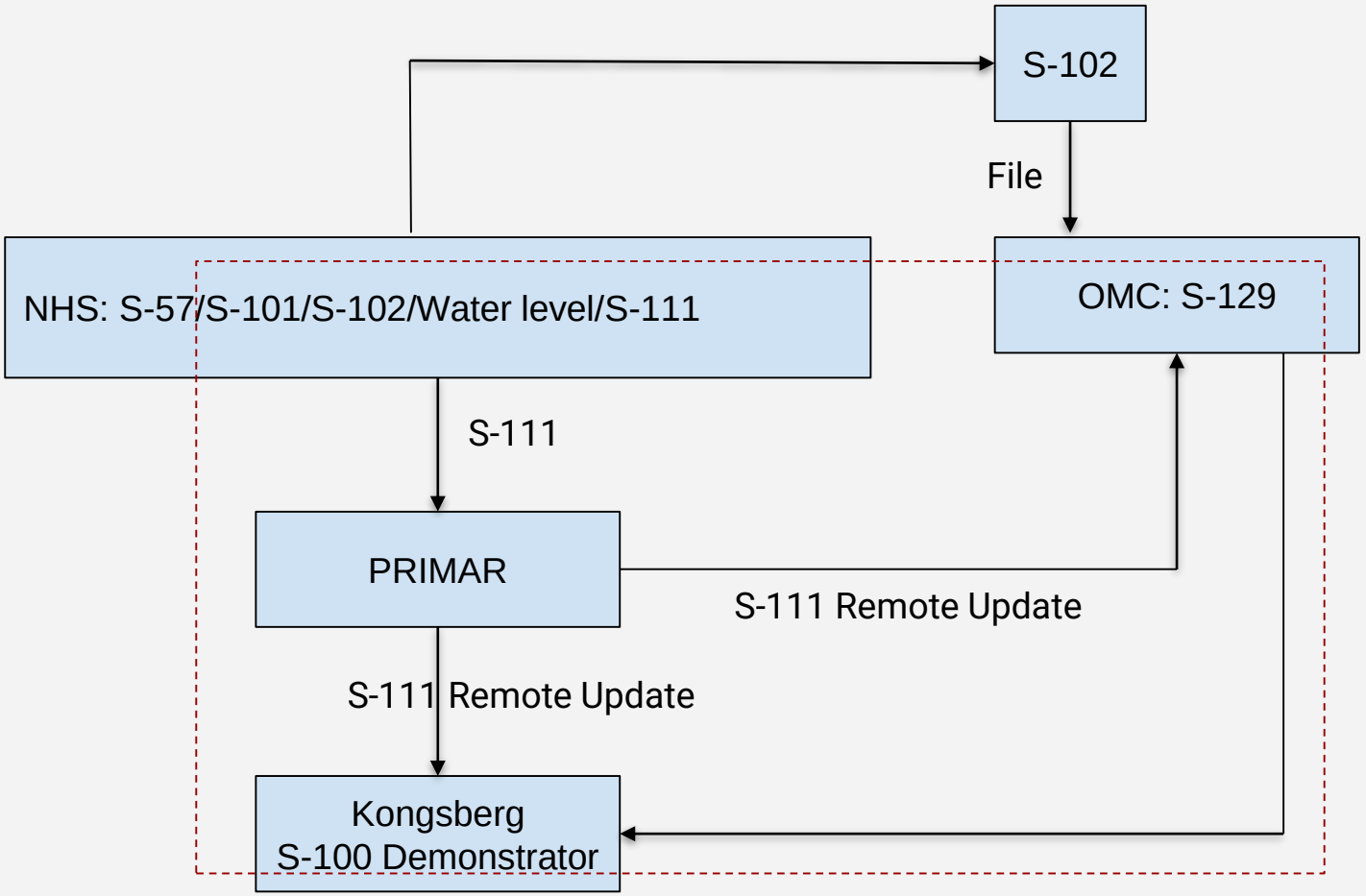




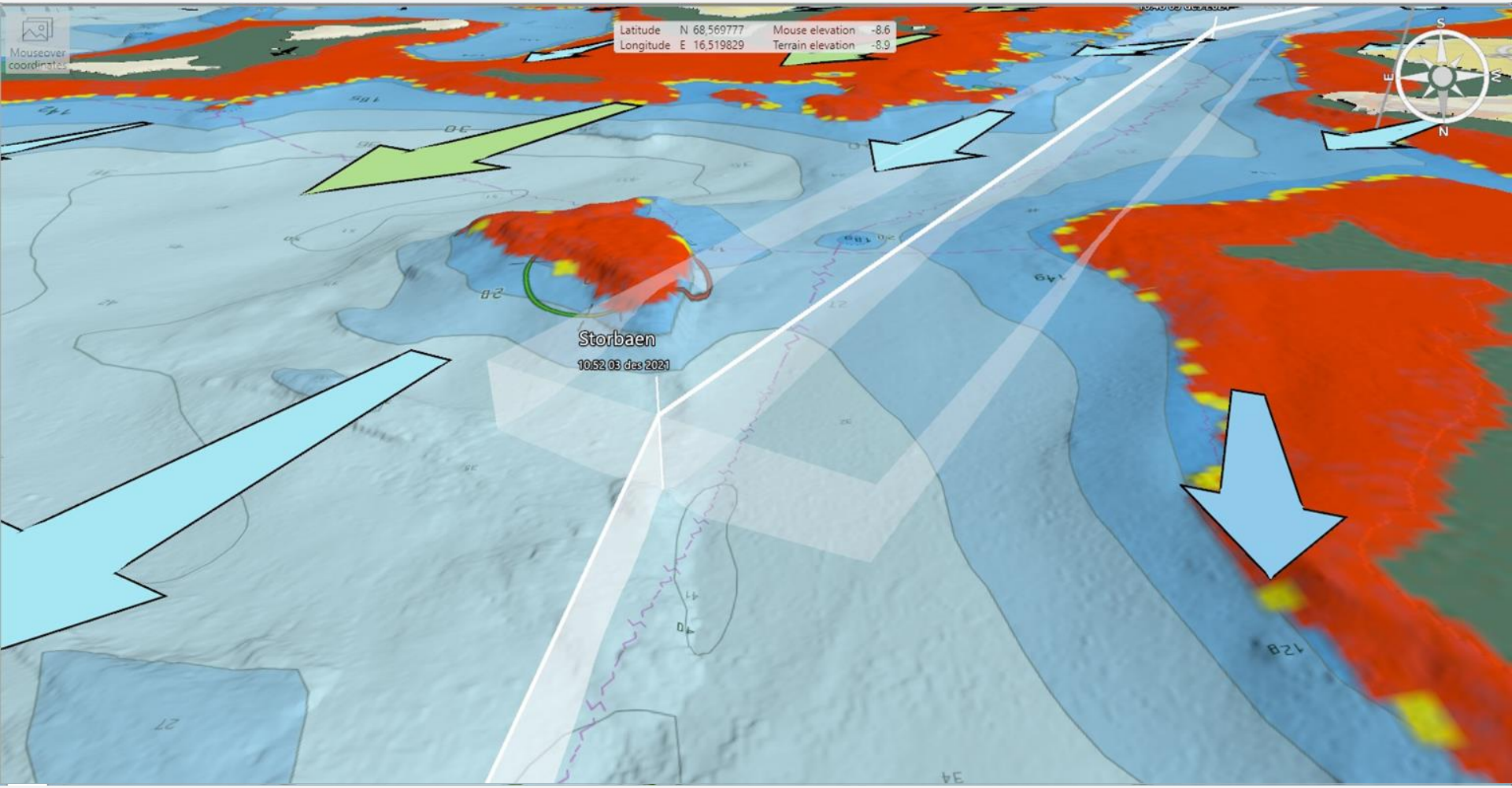
Phase 2 Dataflow



Phase 2 Dataflow



Phase 3 Demonstrator implementations

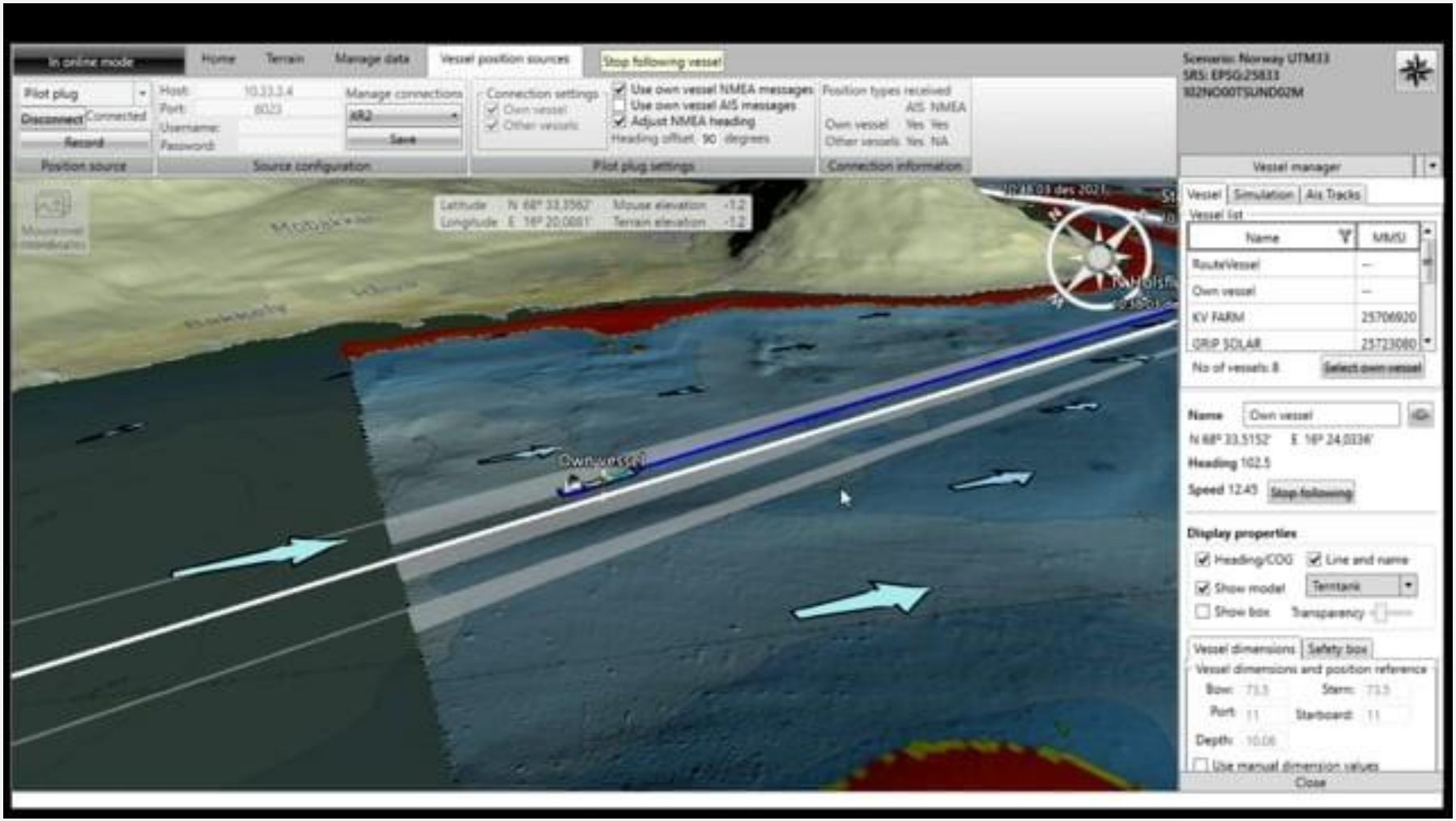


Phase 4 Test execution

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

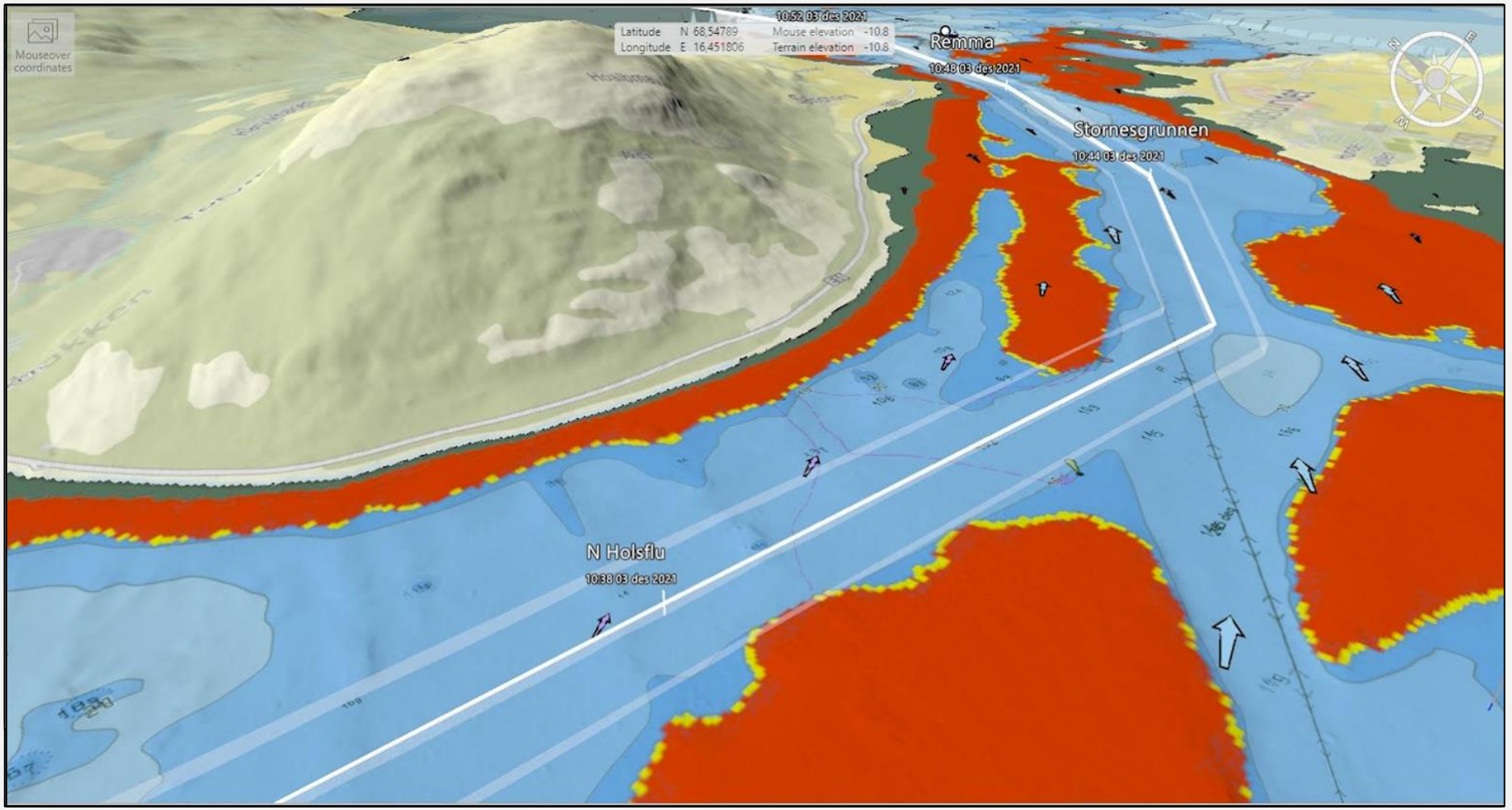
- Experience
- Challenges
- Usability
- New ideas
- Situational awareness
- Safety of nav.

Phase 4 Test execution



Phase 4 Test execution

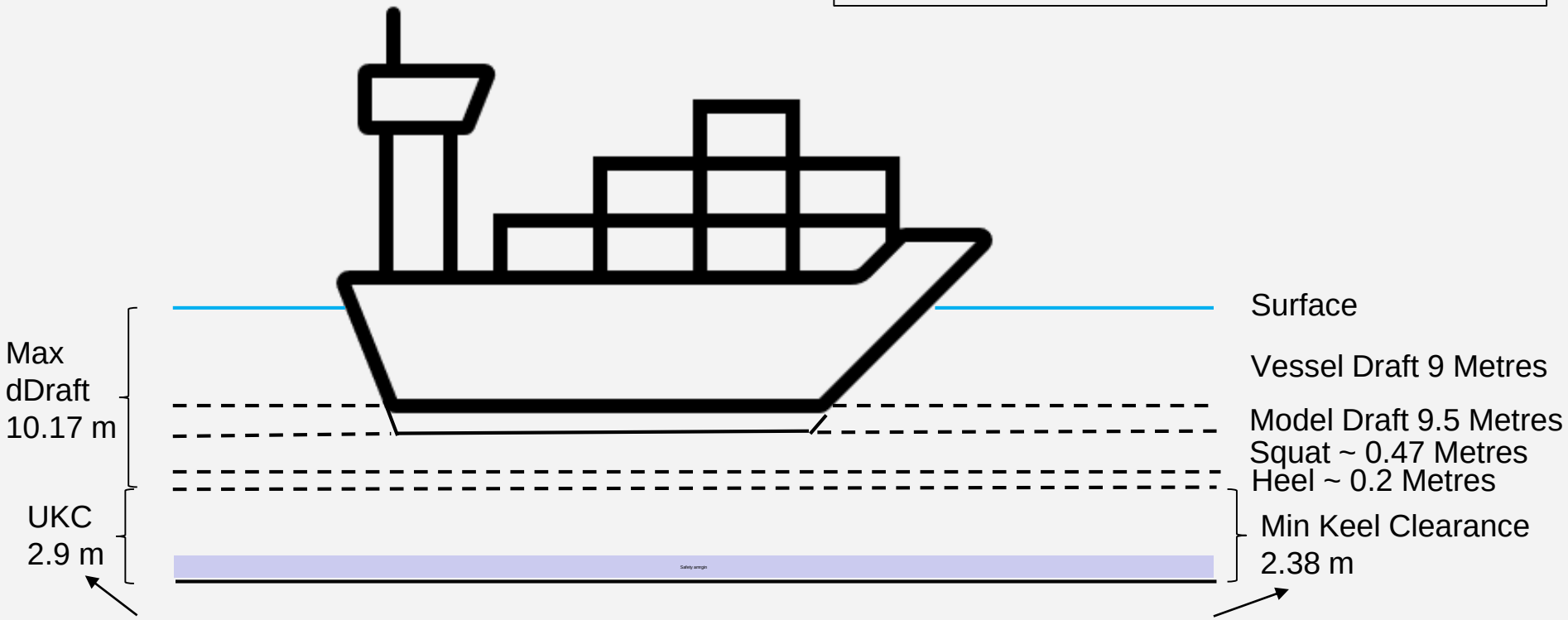
Water Level difference: 2.41 meter



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

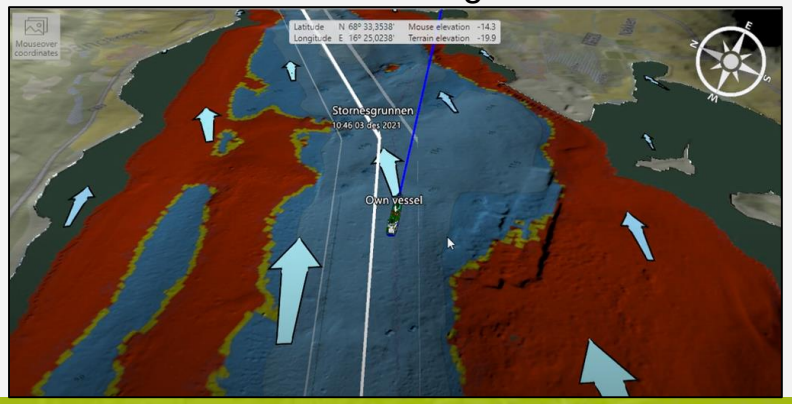
Phase 4 Test execution

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".

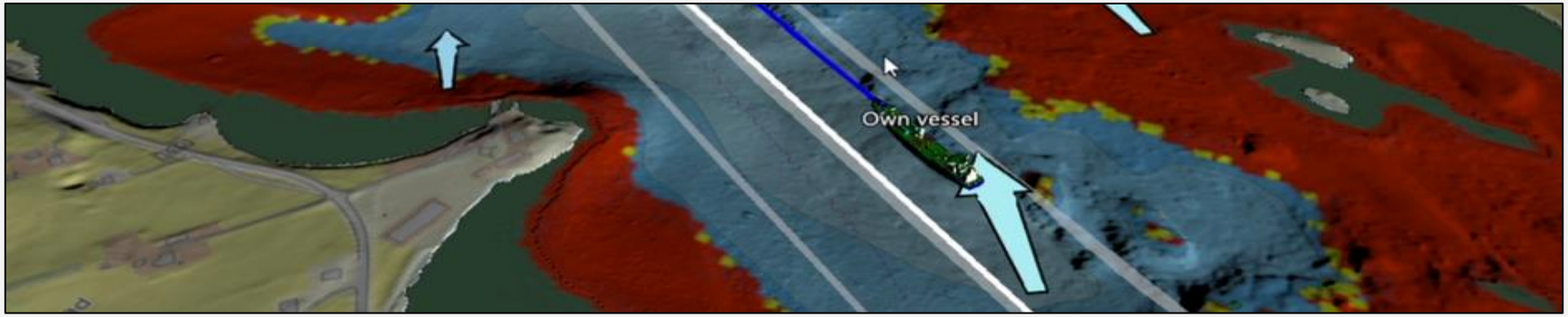
Phase 4 Test execution – Voyage Execution

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.

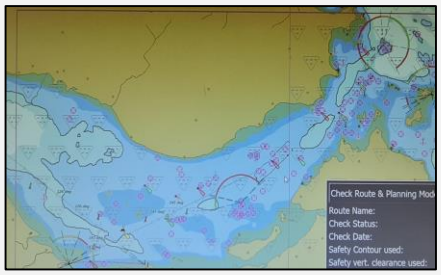
S-129:

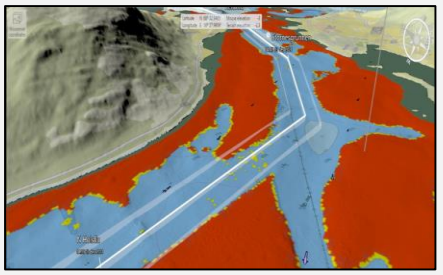
- Online connectivity: 1 minute intervals were appropriate.
- Situational awareness.
  - Display of non navigable areas raises navigators awareness towards them.
  - Situational awareness for time ahead increased by the S-129 time factor.

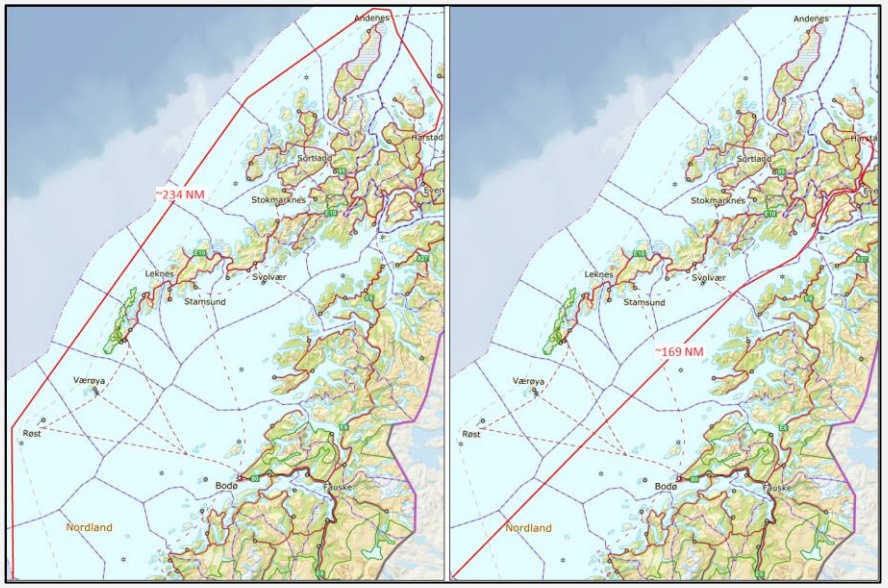


Target accomplishments

- 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:

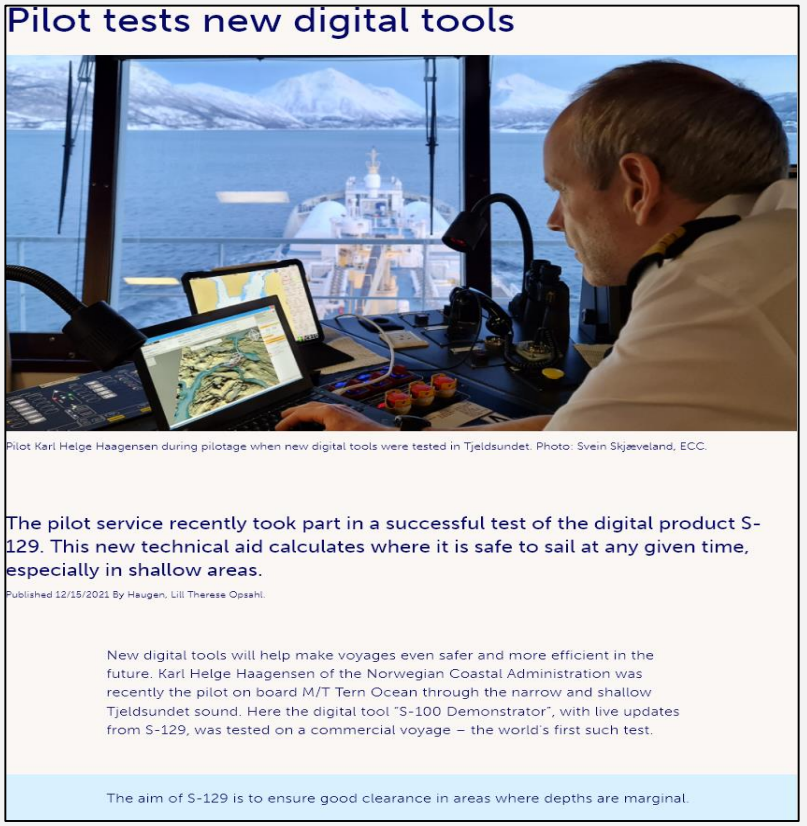
- https://s-100.no/

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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Phone: +47 92662697


Thank you!