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DIGITIZATION OF MARITIME NAVIGATION

The S-100 standard as a response to the challenges of e-navigation

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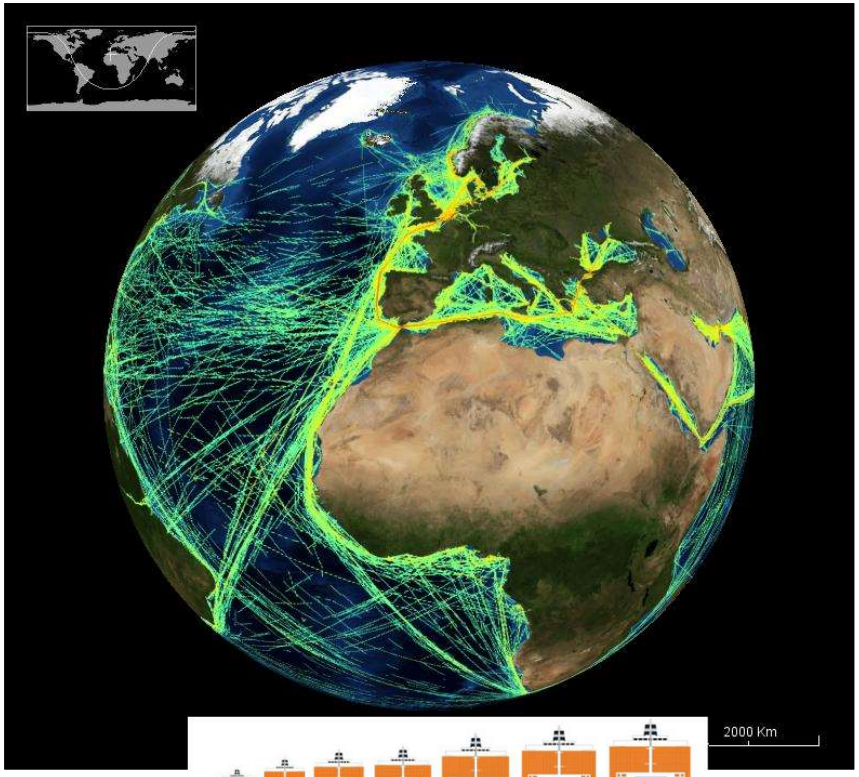
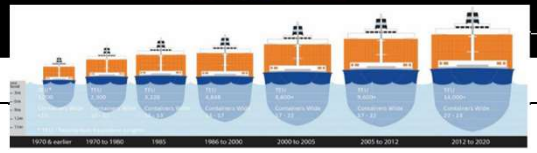
e-navigation : a major concept for IMO

Maritime traffic facing multiple challenges

SeaOwl teste le pilotage par lien satellitaire du « VN Rebel »





e-Navigation

IMO definition

E-navigation is defined as "the **harmonized collection, integration, exchange, presentation and analysis of marine information onboard and ashore** by electronic means to enhance berth to berth navigation and related services **for safety and security at sea and protection of the marine environment".**

https://smartnav.org/eng/html/Index_New/

e-Navigation to be derived as « Maritime Services »

Synergy between IHO international organization (IMO, IALA, WMO…) to:

- Promote harmonized sharing of digital information between ships and between shore and ships
- Increase safety and efficiency of navigation
- Protect the Environment

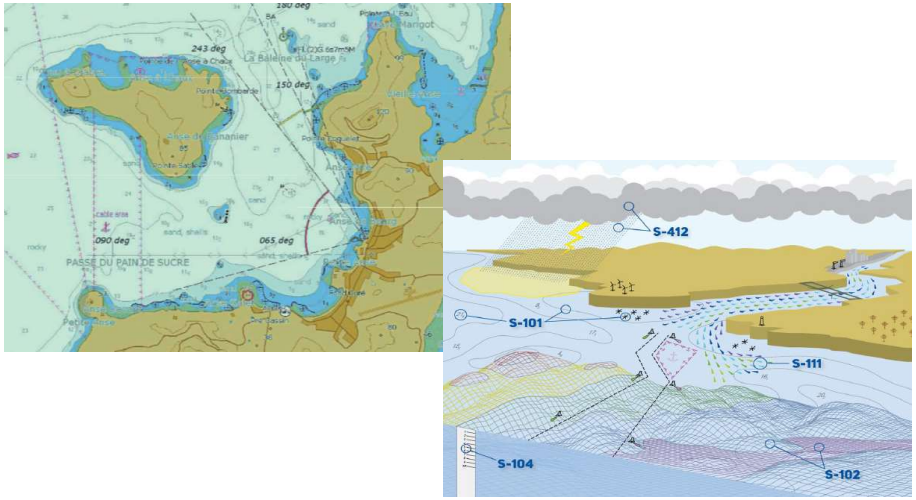
➔ **16 interoperable « Maritimes Services » will be based on the S-100 standard**

1- VTS Information	9- Telemedical assistance
2- Navigational assistance	10- Maritime assistance
3- Traffic organisation	**11- Nautical chart**
4- Port support	**12- Nautical publications**
5- Maritime safety information	13- Ice navigation
6- Pilotage	14- Meteorological information
7- Tug	**15- Real-time hydrographic & environmental information**
8- Vessel shore reporting	16- Search & rescue

What is S-100 ?

S-100 – The universal model for hydrographic data

A framework for the development of the next generation of **ENCs** and **digital products and services** for **safety of navigation** and beyond for the hydrographic, maritime and GIS communities.



Priority: products for the « route monitoring mode »

S-101 – ENC

S-102 – Bathymetric surface

S-104 – Tidal informations

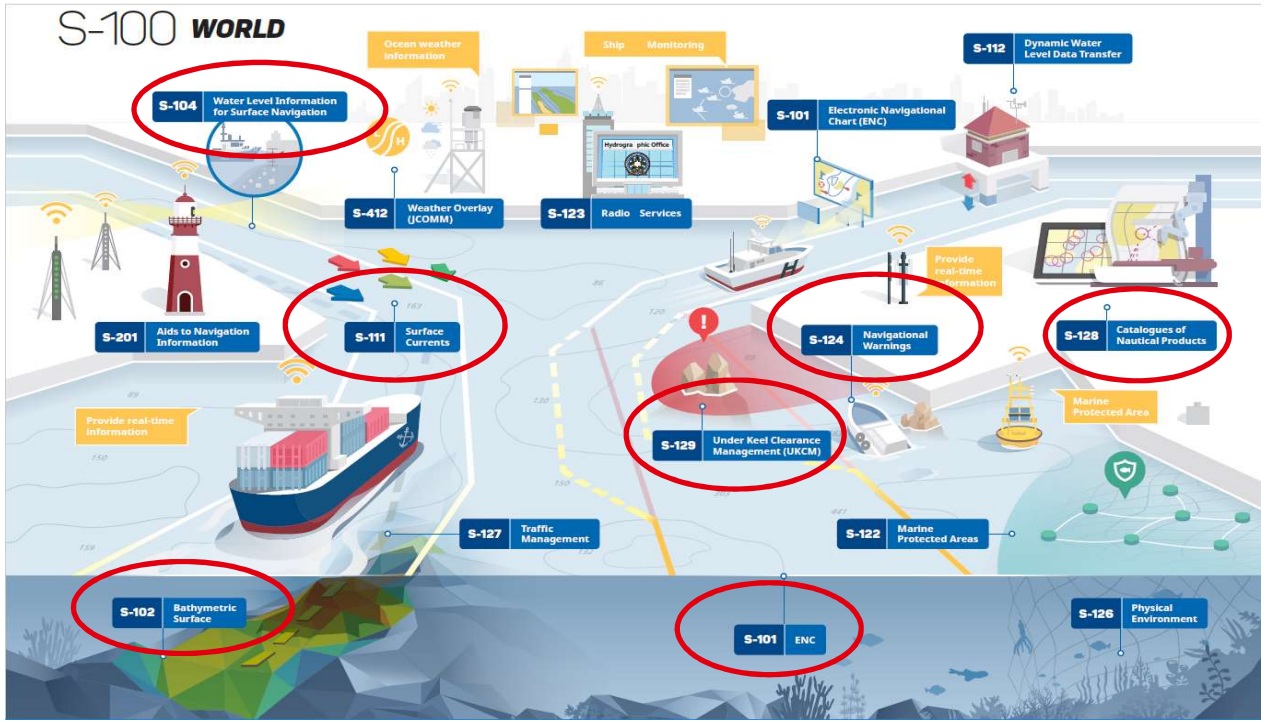
S-111 – Surface currents

S-124 – Navigational warnings

S-129 – Under keel clearance management

S-128 – Catalogue of nautical products

S-98 – Interoperability spec



Add-ons for the « route planning mode »

S-122 – Marine protected areas

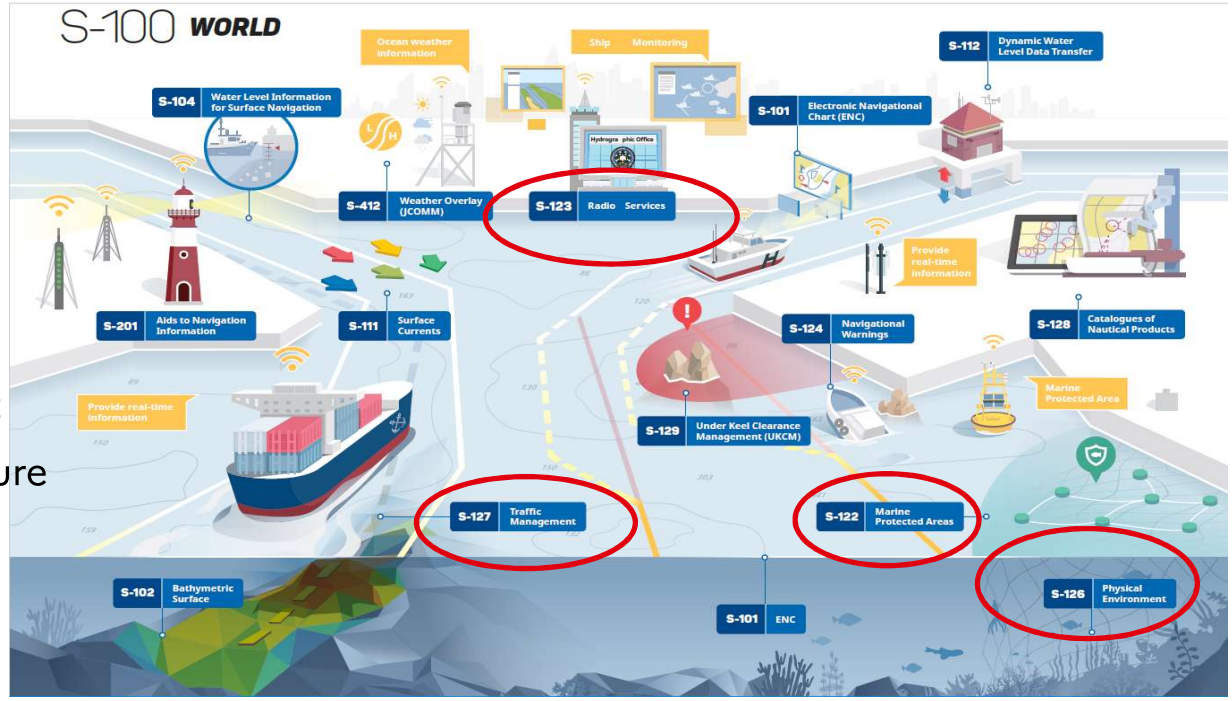
S-123 – Marine radio services

S-125 – Marine aids to navigation

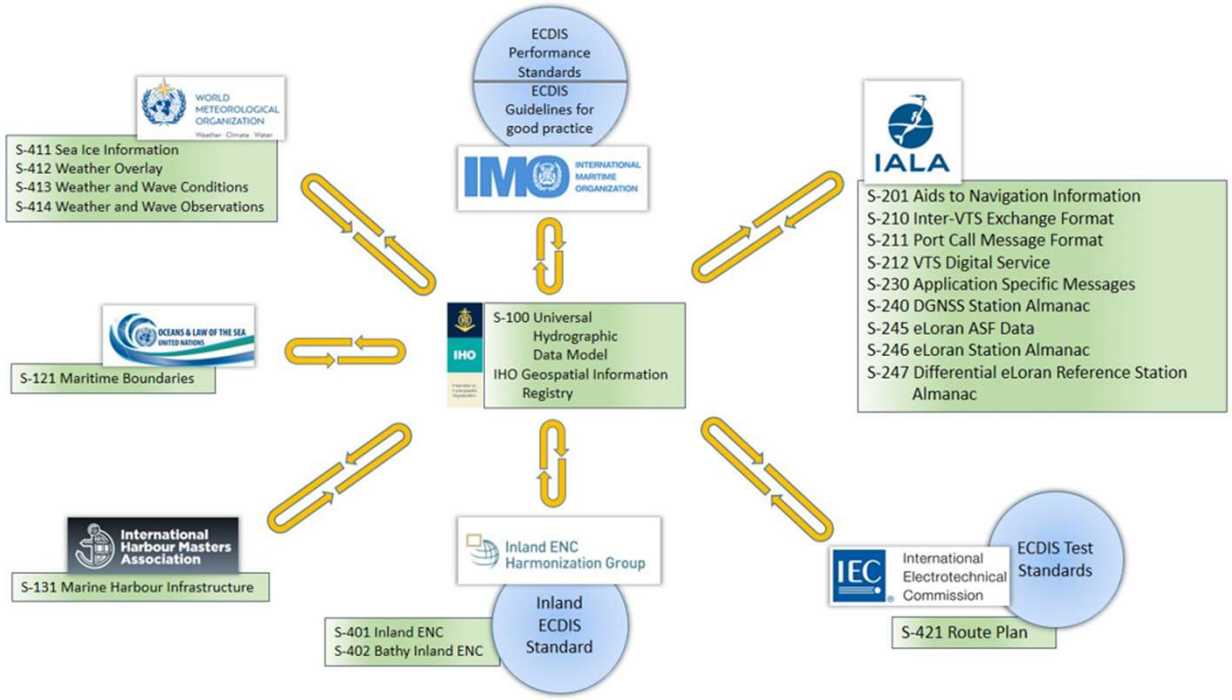
S-126 – Physical environment

S127 – Marine traffic management

S-131 – Marine harbour infrastructure



S-100 within a normative ecosystem to fulfill interoperability requirements

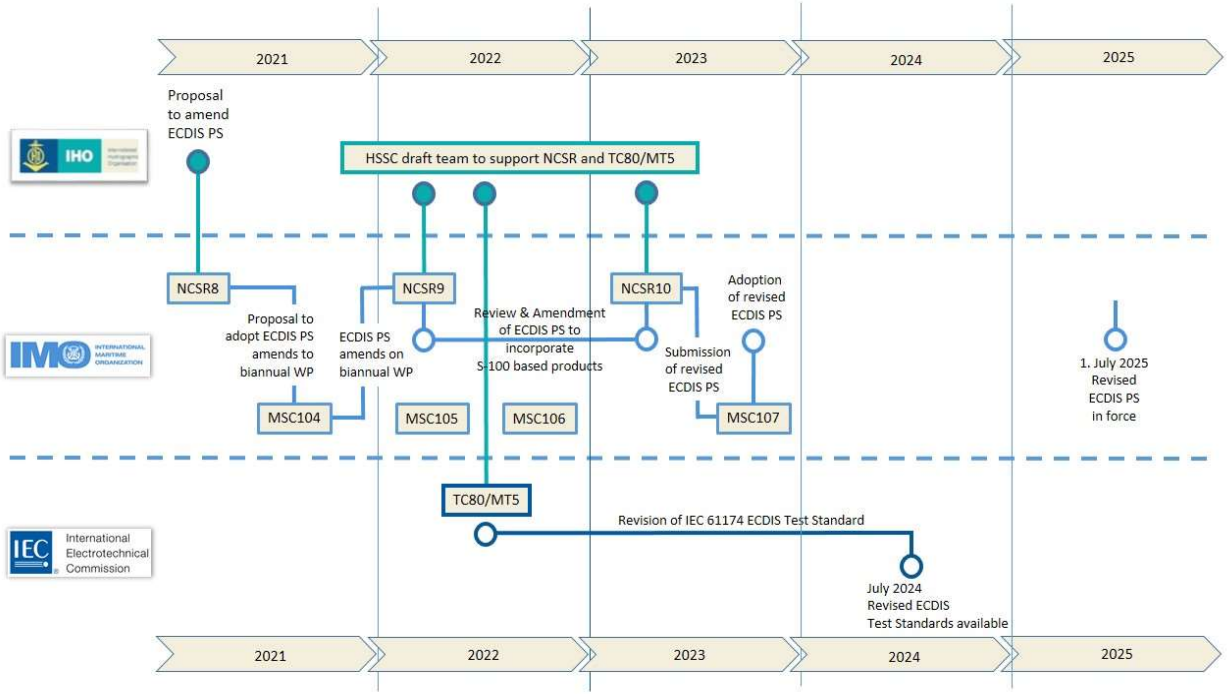


Source OHI – Roadmap for the S-100 Implementation Decade (https://iho.int/en/s-100-implementation-strategy)

An coordinated schedule for deployment of S-100 and compatible ECDIS

S-101, S-1xx products spec. for route monitoring and S-98 (interop.) to be approved by **mid-2024**

ECDIS S-100 compatible to become the standard by **mid-2025**



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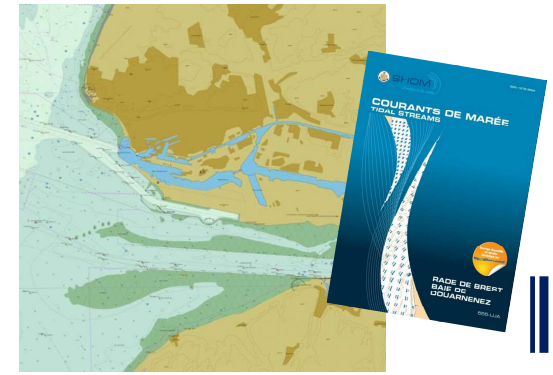
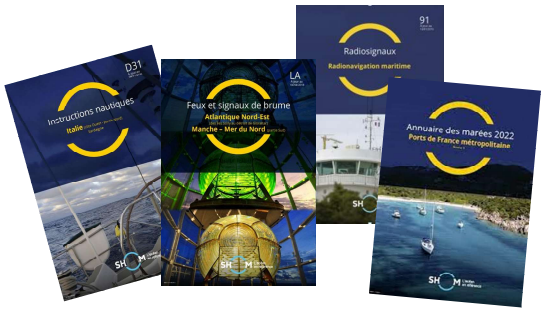
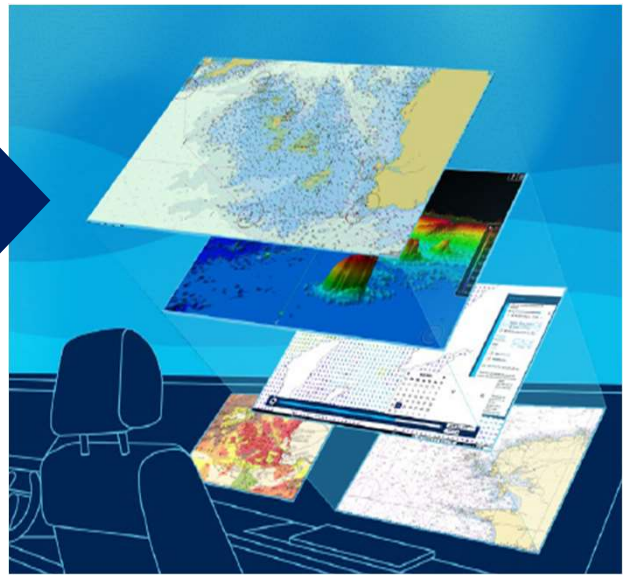
S-100 will transform the offer of HOs, impacting the navigation systems

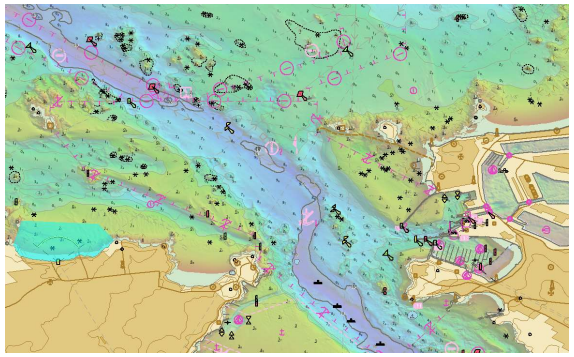


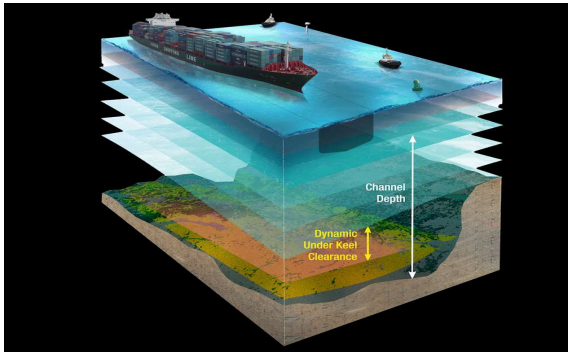




Contributions of S-100 products and services

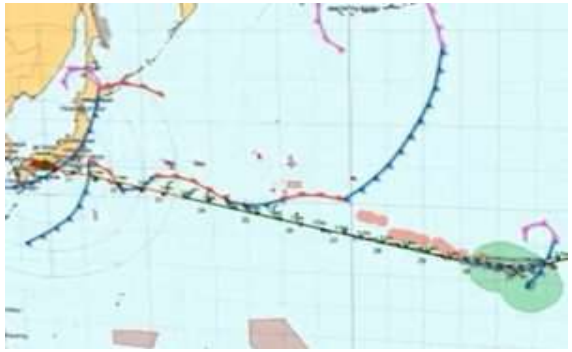
Safety of navigation





Loading optimization « Under keel clearance management »

Route optimization « Just in time »

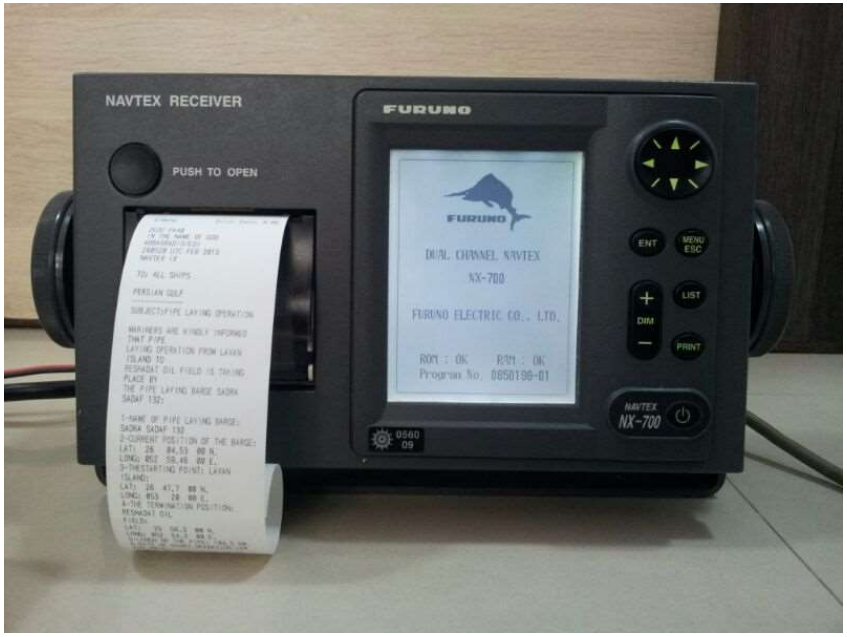


Autonomous navigation S-100 = « machine readable »

Examples of ongoing projects

Navigational warnings

Today : text information, radio transmission onboard…



AVIS URGENTS AUX NAVIGATEURS

Dernière mise à jour:
28 juin 2022 à 12:37:46

N° 2835/22

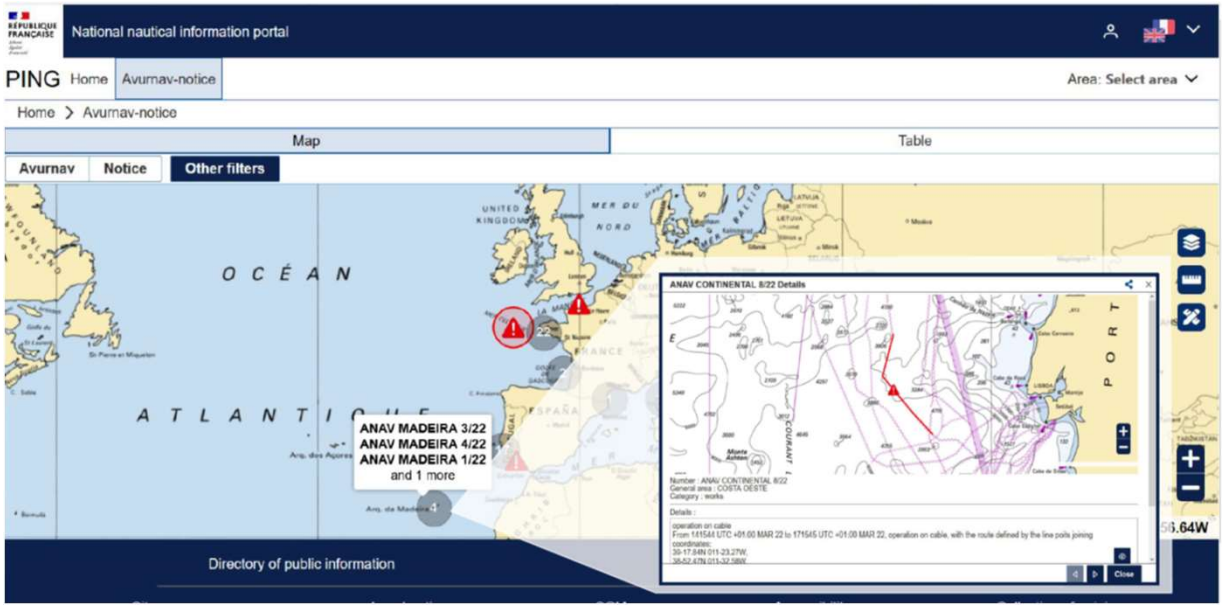
MARSEILLE - PORTEE DE FEU REDUITE

1. PORTEE DU FEU DE LA DIGUE DU LARGE DU PORT DE MARSEILLE SIGNALEE REDUITE.
POSITION: 43-20.869N 005-19.059E
NUMERO LIVRE DES FEUX: 30290 E.0634
2. ANNULER CE MESSAGE LE 131159UTC JUI 22

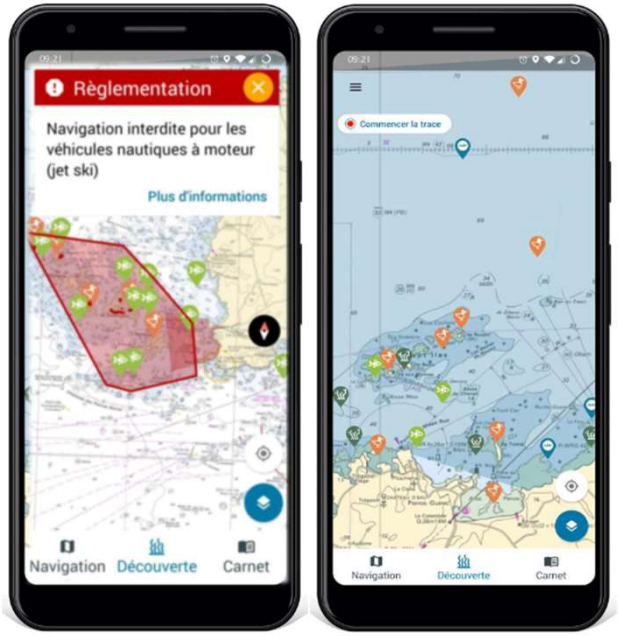
➔ **French project : national PING plateform – S-124**

Plateforme de l'Information Nautique Géographique - PING

collaborative production and broadcast of navigational warnings (S-124)



Web portal



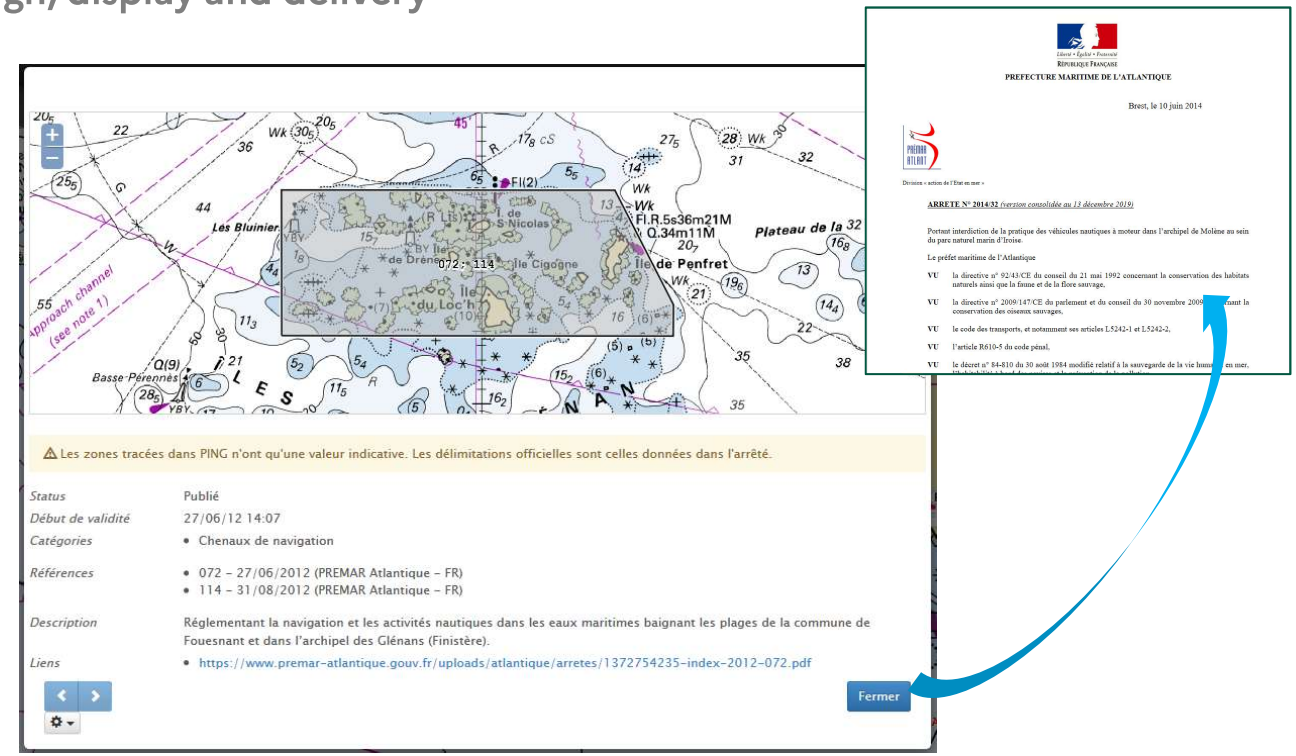
App available in 2023

Plateforme de l'Information Nautique Géographique - PING

Marine regulated areas design, display and delivery

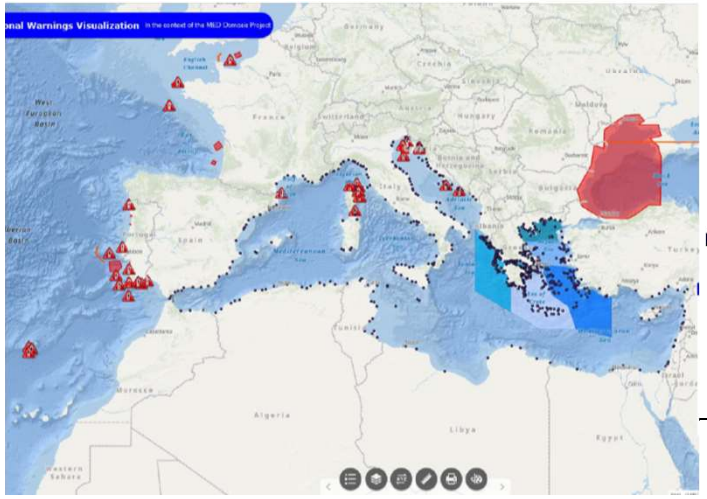
Design/management of **geolocalized regulations** by the local authorities

Broadcast as **new nautical information**



Interoperability

Navigational warnings from PING on the greek coastguards portal



« S-100 across the Channel » project

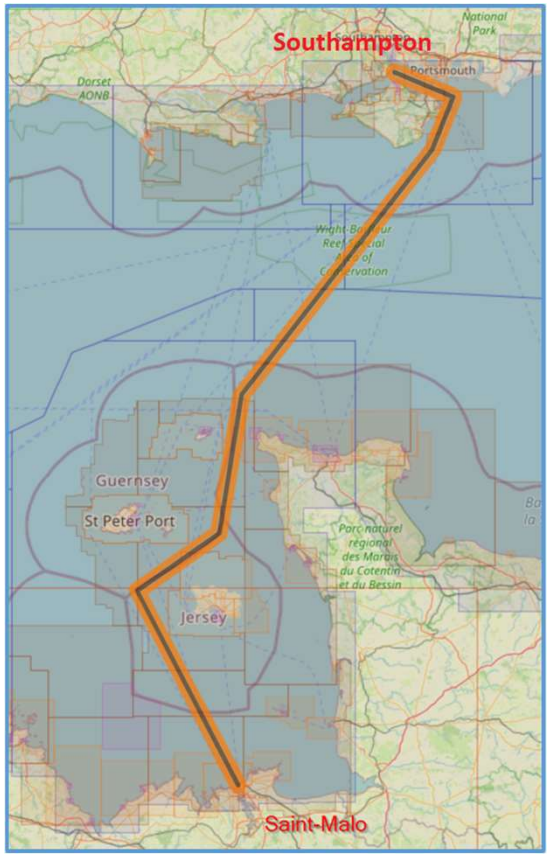
Collaboration and interoperability

Data production:

- S-101 (ENC),
- S-102 (HD Bathymetric surface),
- S-104 (tidal heights),
- S-111 (surface currents),
- S-124 (navigational warnings)

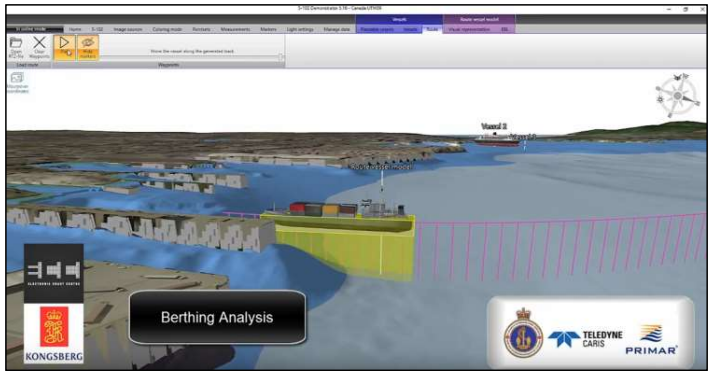
Distribution by RENCs, respecting cybersecurity standards

Sea trials with 4 ECDIS manufacturers in Q4-2023

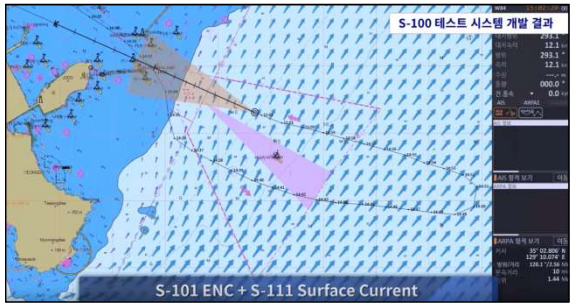


International projects

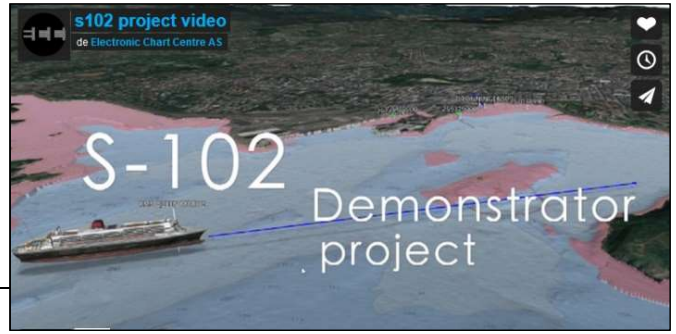
Canada: optimization of navigation thanks to S-100 products - https://www.dfo-mpo.gc.ca/videos/s-100-fra.html
Ou *https://www.youtube.com/watch?v=j0WlL8hG0BE*



South Korea: S-100 Sea Trial (KHOA)
https://www.youtube.com/watch?v=Z8FhC2OUdXU



Norway: High resolution bathymetry - The S-102 project : *https://s102.no/*



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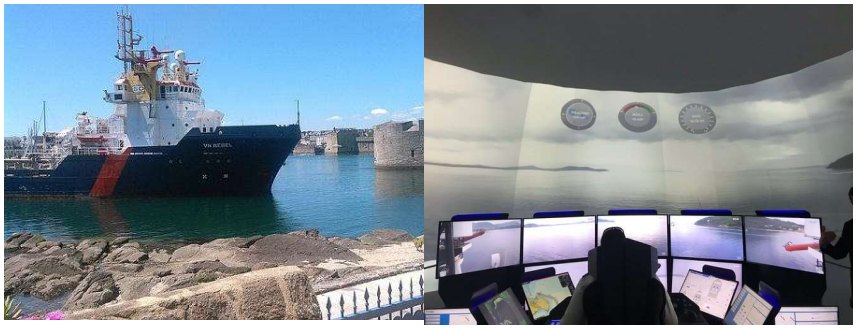
Autonomous navigation

Autonomous Shipping

Already a reality…



SeaOwl : 1st navigation license for a remotely operated ship in France

Sea Proven : Bioacoustic monitoring of cetaceans in the Mediterranean Sea

MV Yara Birkeland, first autonomous and 100% electric container ship

Trials of AUVs and USVs DriX (iXblue) by Shom

Autonomous Shipping

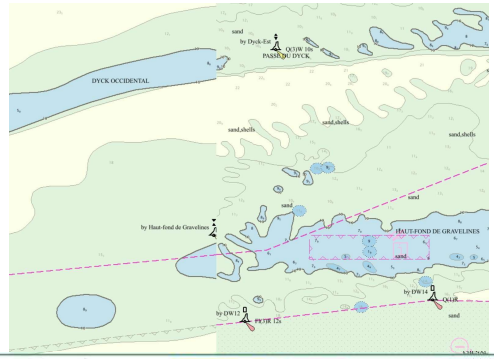
...but still a lot of problems and questions to address

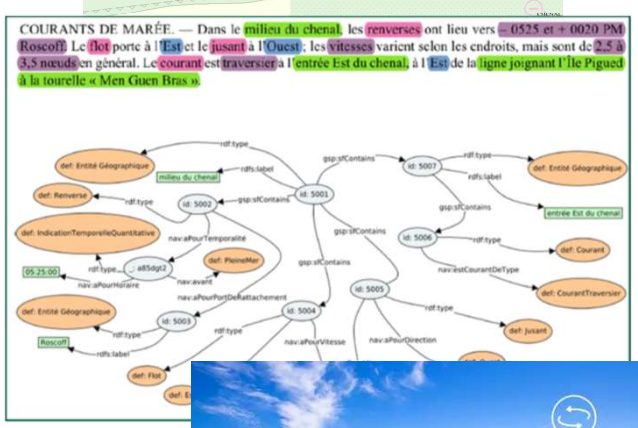
Challenges for HOs and new nautical products:

- How to make the nautical publications « **machine readable** » ?
  - ENC **reading** philosophy
  - Use of **textual nautical informations** (besides ENC)
  - What **uncertainty** is attached to each data?

- How to ensure the **safety of the ship** but also of the other vessels and **of the overall environment** ?
  - How to integrate **new information** and for which impact on the plannified route?
  - How to manage a GNSS **positionning** failure/loss?

- ...





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MERCI !