3rd IHO ASSEMBLY 2-5 MAY 2023 MONACO

Summary report on WP2

Hydrographic Services and Standards Committe (HSSC)

Magnus Wallhagen, HSSC Chair

IHO International Hydrographic Organization

Items to be reported

- HSSC Introduction
- Implementation of the IHO Strategic Plan
- S-100: Why, How and When?
  - Identified benefits with S-100
  - Fundamental differences with S-100
  - Plan of action
- Future of the paper chart
- Other highlights from the HSSC Work Plan
- Future challenges

HSSC, Introduction

HSSC, focuses on developing and maintaining global hydrographic standards to enhance navigational safety, efficiency and security enabling reduced environmental impact and protection of the marine environment.

S-100 WG
S-101PT
S-102PT
S-121PT
S-129PT
S1OOP PT

MASS PT
S-130 PT

TWCWG
Tides, Water Level and Currents

ENCWG
ENC Standards Maintenance

NIPWG
Nautical Information Provision

DQWG
Data Quality

NCWG
Nautical Cartography

ABLOS
Advisory Board of Law of the Sea

HSWG
Hydrographic Surveys

HDWG
Hydrographic Dictionary

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The implementation of the IHO Strategic Plan

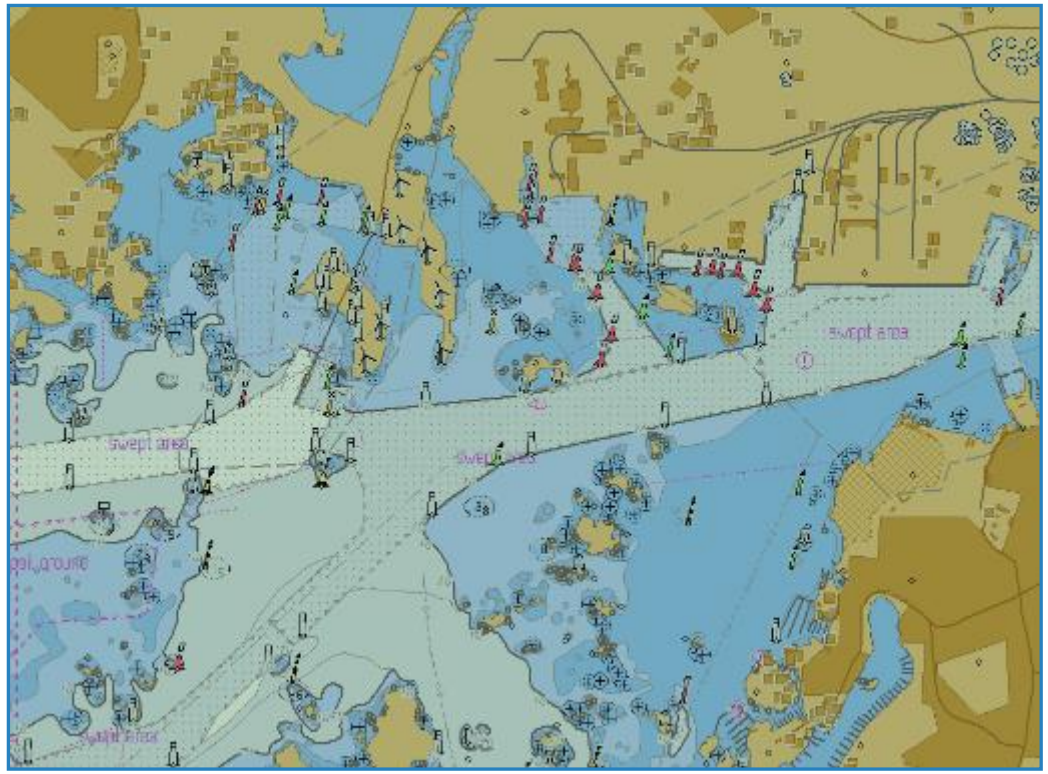
	Goal 1 : Evolving the hydrographic support for safety and efficiency of maritime navigation			*Goal 2 : Increasing the use of hydrographic data for the benefit of society*
	1.1 DELIVER STANDARDS FOR HYDROGRAPHIC DATA AND SPECIFICATIONS OF HYDROGRAPHIC PRODUCTS		1.2 DEVELOP STANDARDS & SPECIFICATIONS	2.2 PROMOTE NEW TOOLS AND METHODS
	1.1.1 Member States produce & deliver products based on S-100	1.1.2 Number of hydrographic data products and services based on S-100	1.2.1 Percentage of Hydrographic data product and services based on S-100	2.2.2 Number of new applications of the new version of Standards for Hydrographic Survey (S-44)
Target	2026 : 60% of MS distribute at least 1 product*	2026 : 10** S1xx Product Specifications are operational (Edition 2.0.0)	2026 : 100% of PS** includes cyber security and data quality assessment	Number of downloads of S-44 Edition 6.0.0 and following ones
Value 31/12/2021	**0% of MS distribute official products** *Several MS distribute S-102 & S-111 compliant with current editions of PS*	**0/10** *S-100 Edition 5.0.0 endorsed at HSSC 14*	**0%** *No PS in Edition 2.0.0*	**59**

** Based on that 62 of 94 IHO MS produce S-57 ENCs (March 2021)*

*** S-101, S-102, S-104, S-111, S-122, S-124, S-127, S-128, S-129, S-131*

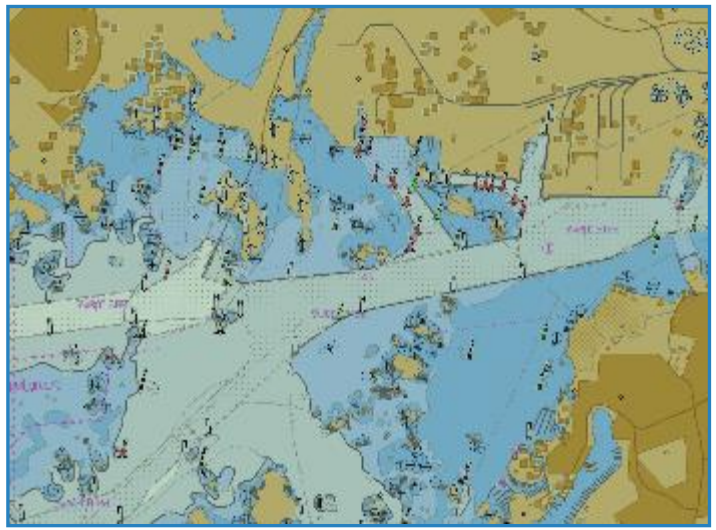
Why do we need S-100?

Paper Charts to Todays ENCs

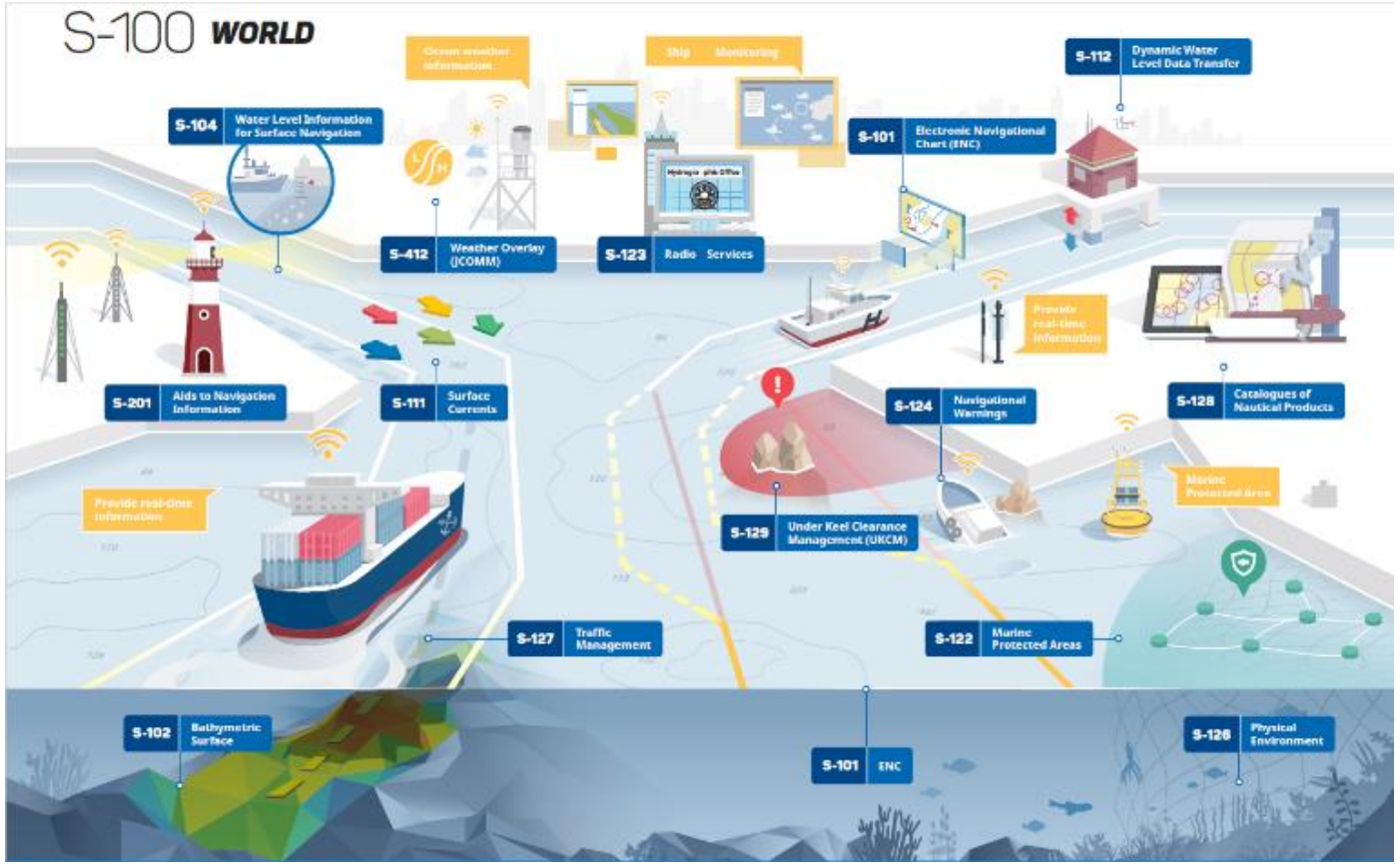


ECDIS, an electronic version of the paper chart

Future ECDIS supporting E-navigation



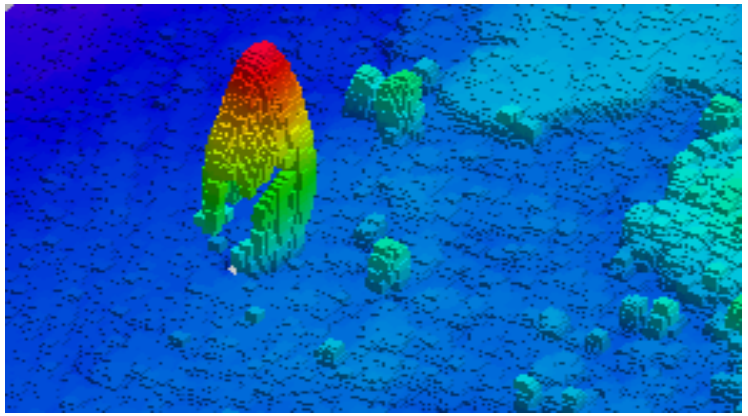
ECDIS with one ENC layer



ECDIS with multiple interoperable layers adding the vertical and real time information dimension to the main ENC layer

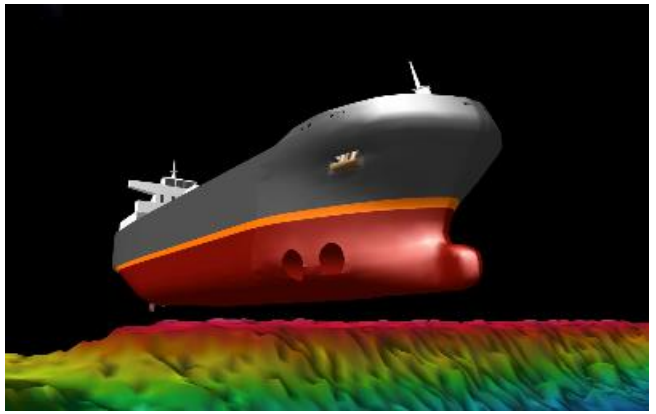
Major Benefits with S-100

Improved Safety



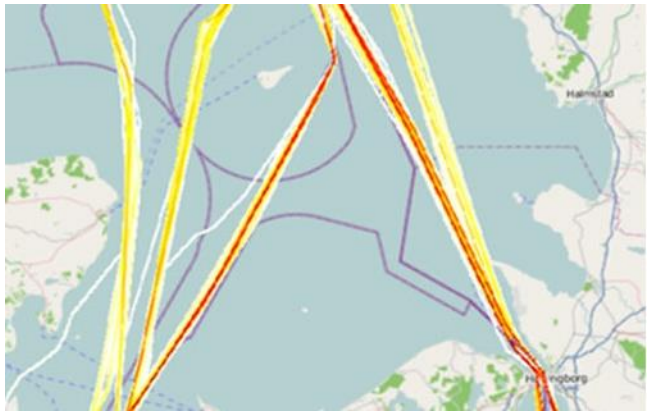
High resolution bathymetry in combination with other datasets.

Optimized Loading



Under Keel Clearance Management with S-100

Route Optimization and Just in Time

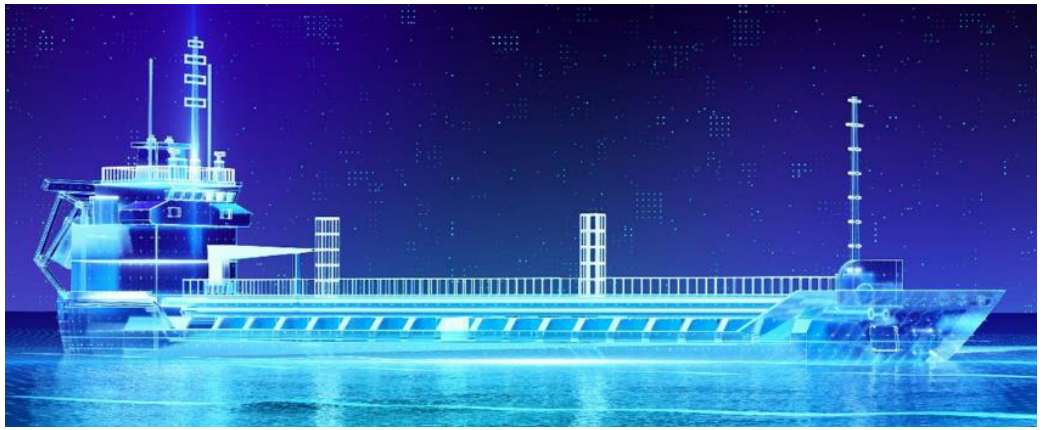


Decreased fuel consumption. Avoid squat, usage of tide, currents and weather information

Increased Safety, Efficiency and Reduced Environmental Impact

Major Benefits with S-100

Maintainable and Cyber Secure



Updates of S-100 Product Specifications can be managed in S-100 ECDIS and Cyber Security is improved.

Automated Navigation

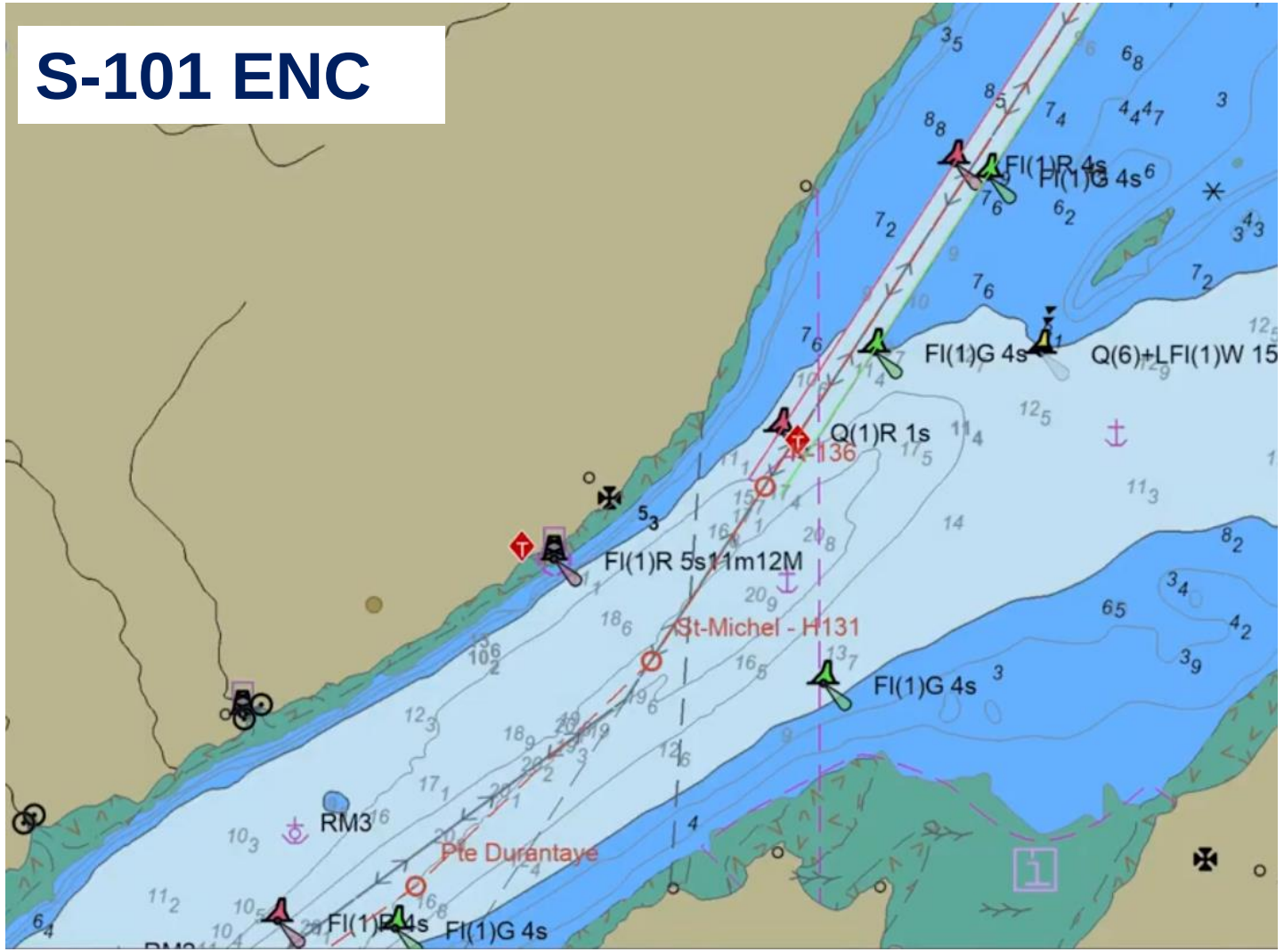
Machine readable nautical information can facilitate IMO MASS – Maritime Autonomous Surface Ships

Cyber secure, optimal decision-aids, multiple usage beyond safety of navigation, future proof and a first step towards MASS

Fundamental changes in S-100 ECDIS

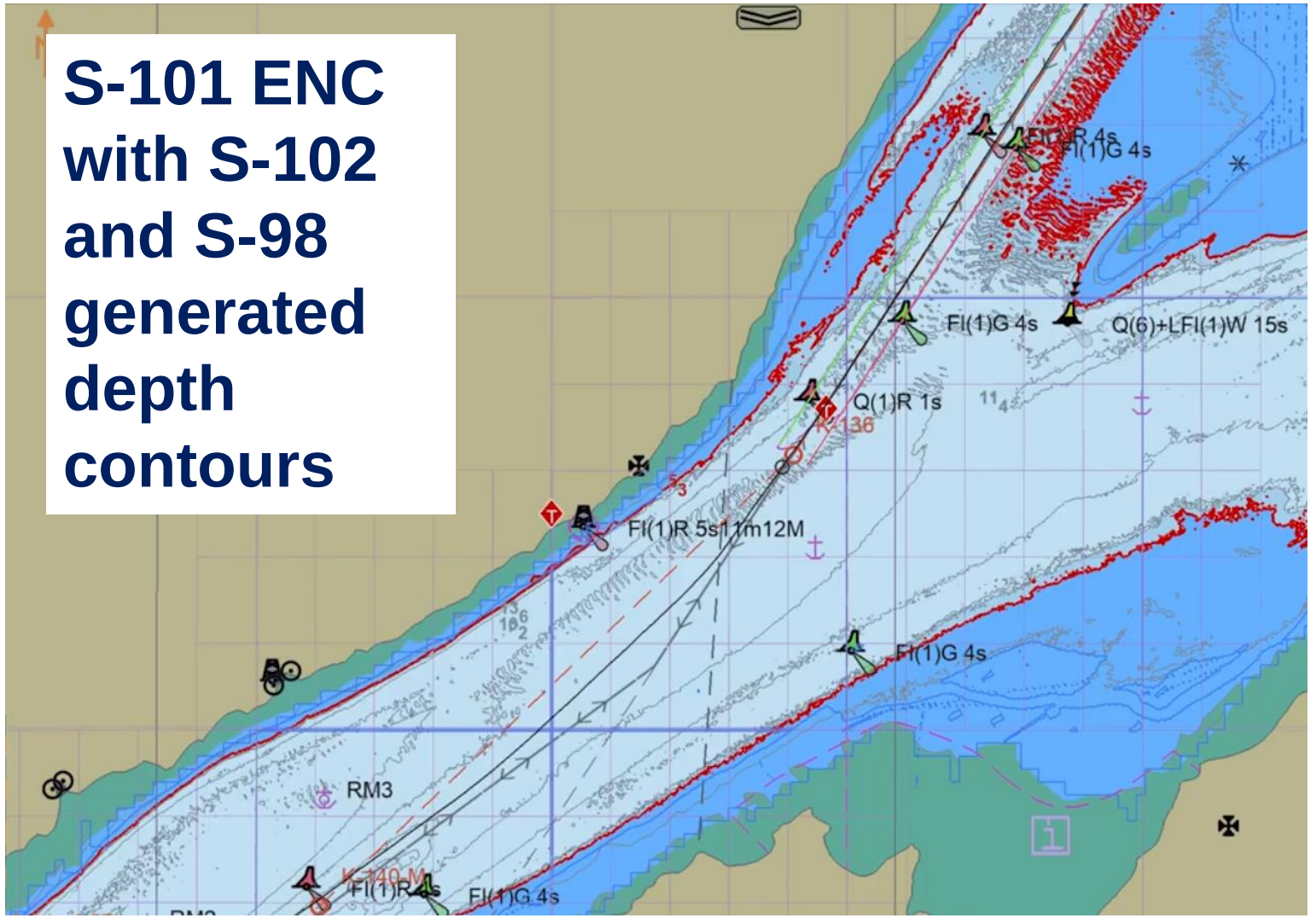
- The single layer official S-57 ENCs will be replaced by multiple, interacting layers of navigational data
- The S-101 ENC will always be the navigational base layer
- In the new IMO ECDIS Performance Standards the term *Electronic Navigational Data Service (ENDS)* is used for the multiple layers to be used in S-100 ECDIS
- ***Electronic Navigational Data Service*** **(ENDS)** means a special-purpose database compiled from nautical chart and nautical publication data, standardized as to content, structure and format, **issued for use with ECDIS by or on the authority of a Government, authorized Hydrographic Office or other relevant government institution**, and conforming to IHO standards; and, is designed to meet the requirement of marine navigation and the nautical charts and nautical publications carriage requirements in SOLAS regulations V/19 and V/27. **The navigational base layer of ENDS is the Electronic Navigational Chart (ENC).**
- S-98 is the product specification which will handle how multiple layers are portrayed and how alarms are triggered

Suppression of S-101 ENC depth information



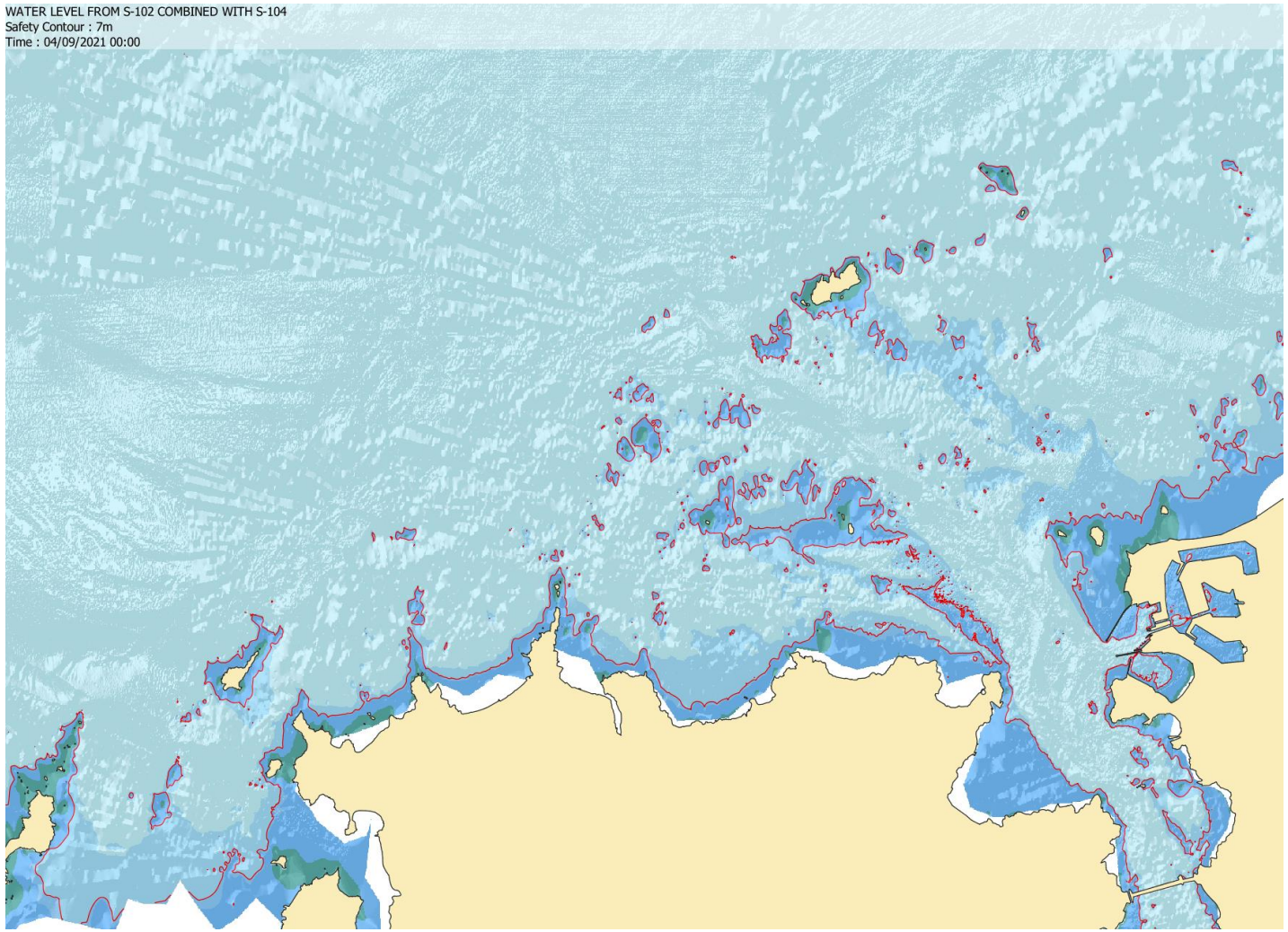
With permission from the Canadian Hydrographic Service

Suppression of S-101 ENC depth information with S-102 using S-98



With permission from the Canadian Hydrographic Service

Suppression of S-101 ENC depth information with S-102 and S-104 using S-98



Safety Contour 7m. The safety contour changes are based on S-102 bathymetry and Water Level Adjustment (WLA), using S-104, over a period of 21 hours.

With permission from SHOM

How can we achieve S-100?

First step

Navigational
Route Monitoring Mode

S-101 ENC
S-102 Bathymetry
S-104 Water Level
S-111 Surface Currents
S-124 Navigational Warnings
S-129 UKC Management

Critical Framework

IHO Geospatial Information Registry
S-98 Interoperability Specification
S-100 Universal Hydrographic Data Model
S-128 Catalogue of Nautical Products
S-164 Test Data Set for S-100 and ECDIS
Type Approval

Next step

Navigational
Route Planning Mode

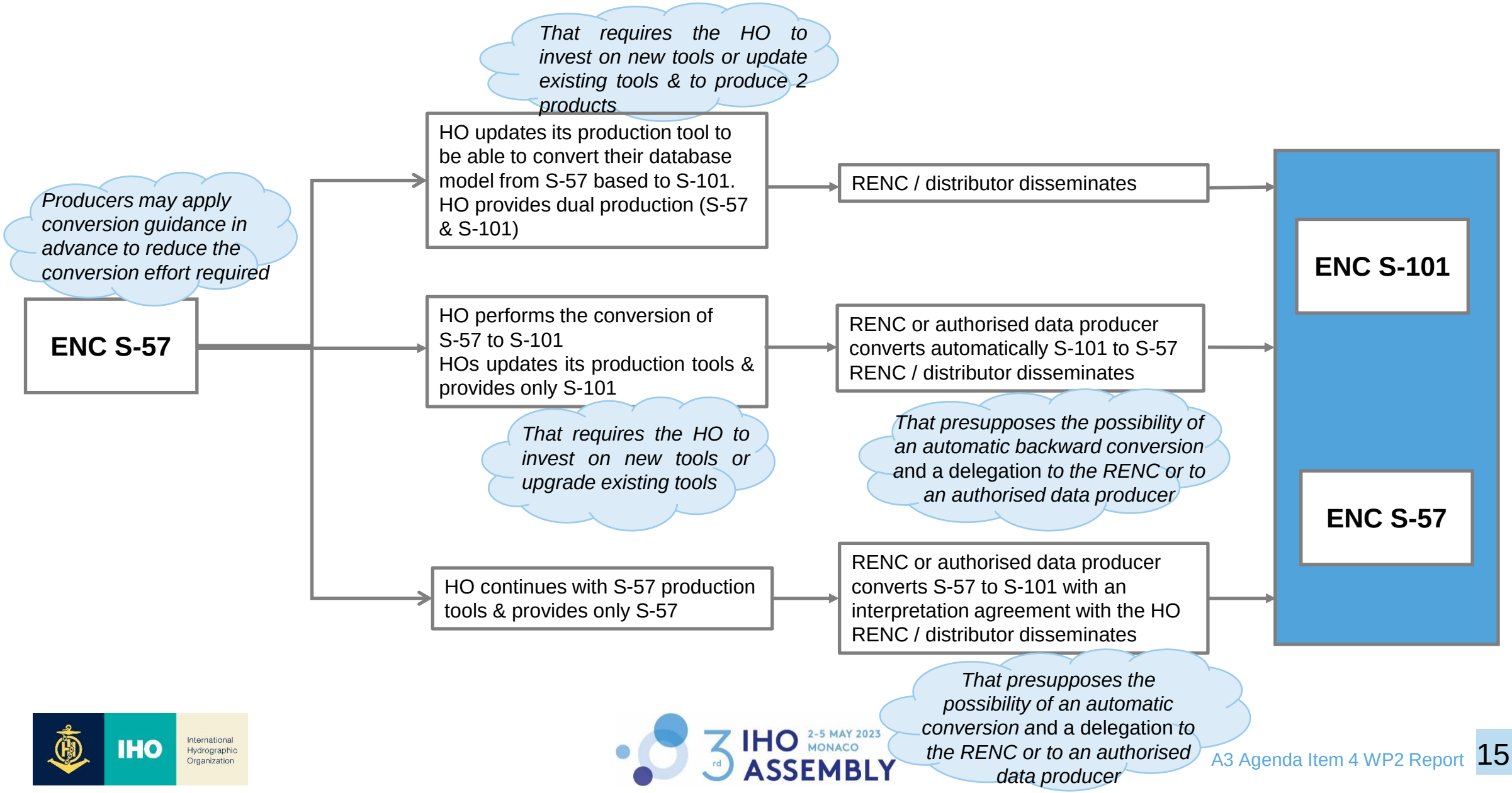
S-122 Marine Protected Areas
S-123 Marine Radio Services
S-125 Marine Aids to Navigation (AtoN)
S-126 Marine Physical Environment
S-127 Marine Traffic Management
S-131 Marine Harbour Infrastructure

+ S-100 Products used in Monitoring Mode

Transition from S-57 to S-101 ENC

- ENCWG has developed a S-57 ENC to S-101 Conversion Guidance which was approved in its first edition at HSSC14. For implementation and testing. Published as S-65 Ed 1.0.0.
- HSSC14 also tasked the ENCWG to develop an encoding guidance for the backward conversion from S-101 to S-57. It is expected that the backwards conversion would be a more automatic process.
- The IHO-Singapore Tech Lab, IC-ENC and PRIMAR have ongoing activities regarding S-57 to S-101 conversion and vice versa.
- All these initiatives are aimed to support the transition from S-57 ENCs to S-101 ENCs, so IHO MS can achieve substantial coverage of S-101 ENC in advance of the new IMO ECDIS Performance Standards in force dates.

Options for HOs on parallel production S-57 and S-101



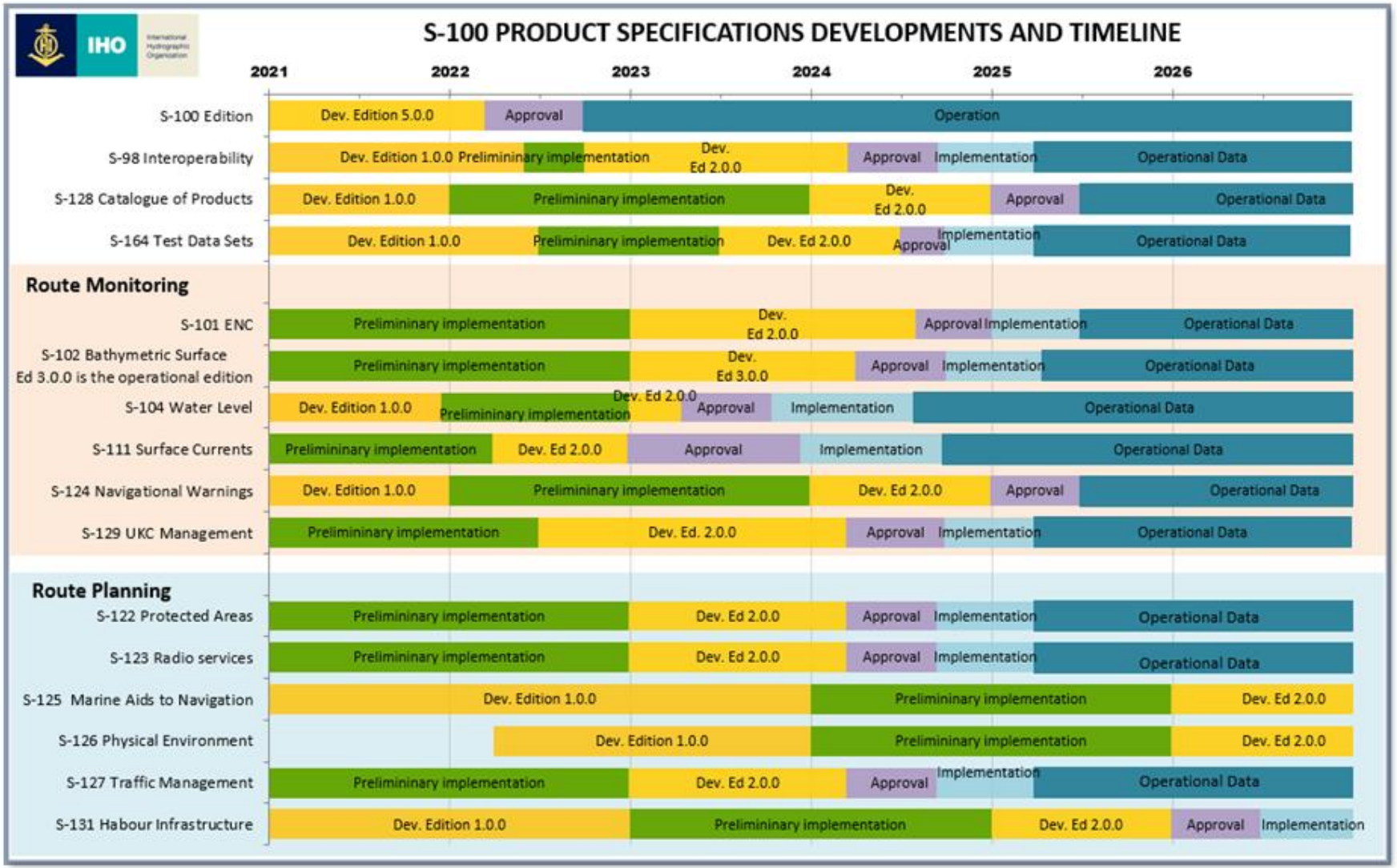
IMO Approval of S-100 in ECDIS Performance Standards

- The IHO organized a drafting group consisted of relevant parts of the HSSC Chair group, CIRM, IEC, INTERTANKO and a few other relevant stakeholders.
- The drafting group was chaired by the IHO Technical Director and a draft redline version was submitted by IHO, cosponsored by CIRM and Intertanko, to the IMO NCSR9 meeting, held in June 2022.
- With the exception of the withdrawal of functionalities for route exchange all other proposed changes were endorsed by NCSR9. The proposal was subsequently approved by IMO MSC106 in November 2022.
- A transition period was agreed upon, meaning that S-100 ECDIS will be legal to use after **1 January 2026** and from **1 January 2029** new systems must comply with the new IMO Resolution MSC.530(106) on ECDIS Performance Standards.

When should we be ready for S-100 and consequences for IHO and IHO MS

- Inclusion of S-100 in the IMO regulatory framework is a major success for IHO.
- IHO has now commitments towards IMO and other stakeholders to achieve operational status on the prioritized S-100 product specifications.
- Timely Development of S-101 Product Specification under special monitoring (ISO 9001) by HSSC.
- Active contribution in S-100 related WGs and PTs must be increased.
- Member States to achieve substantial coverage of S-101 by 2026. Coordinated by IRCC, WENDWG and RHC.
- S-100 ECDIS legal to use, 1 January 2026, at the end of the IHO work programme 2023 – 2026.

S-100 Timeline



Available in the IHO S-100 Roadmap, Annex 2. Updated annually after the HSSC Meeting and reported to IHO Council and IMO NCSR.

This version is updated July 2022

The implementation of the recommendations on the Future of the Paper Nautical Chart

- A project team is established under NCWG to develop a Baseline Symbology to support the automated production of paper charts from S-101 data.
- Some MS suggested a varied approach to achieve better guidance.
- HSSC and NCWG perspective is that Chart Specification S-4 gives enough flexibility. The general approach agreed upon at A-2 2020, regarding paper charts, is reasonable.
- Council 6 (2022): US (supported by AU, DE, DK, KR, and NZ) to document use cases, develop associated guidelines and identify challenges with S-4. Proposal to be submitted to the HSSC/NCWG.

Other highlights in the ongoing HSSC Work Plan

- The ENCWG has finalized a revision of the Use of the Object catalogue, S-57 Annex A and a new edition of the ENC Validation Checks, S-58 edition 7.0.0 was approved by IHO Member States 2022.
- The new Hydrographic Survey WG is progressing well. The Hydrographic Survey Standard S-44 Edition 6.1.0 was approved by IHO Member States 2022.
- The MASSPT is expected to deliver their final report at HSSC 15.
- The S-130 PT (Polygonal demarcation of global sea areas) have been established and delivered its first status report at HSSC 14.
- HSSC 15 will take place in Helsinki Finland 5 - 9 June 2023, with one day reserved for a Stakeholder session.

Future Considerations and Challenges

- IHO MS active contribution in the technical WG/PTs should be increased. Active participation – fundamental difference for HOs to implement new technology, standards and S-100 products and services.
- Industry partners in the WG/PTs are appreciated. Though, a risk to become too dependant on industry when S-100 is developed?
- S-100 is a complex echo system:
  - IHO is the focal point
  - IMO e-Nav is dependent on S-100
  - IALA, WMO, IEC and others are contributing but need support from IHO
  - Kind contribution from ROK to setup and maintain the IHO Geospatial Information Registry
  - Operational resources within IHO are limited. A sustainable structure is needed to maintain the technical and administrative infrastructure around S-100.
  - Can we, IHO, contribute to needed resources?

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Acknowledgments:
To all MS, IGO/NGO and industry partners being active in HSSC and its WGs and PTs

Thank you

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