Current Status of Next-Generation S-100 Service Standardization

Digital@Sea Asia-Pacific 2026

19 October 2026

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International Hydrographic Organization

IHO

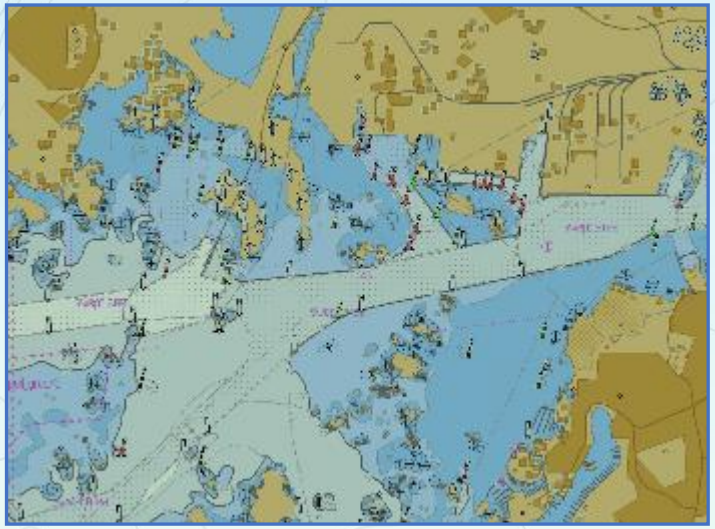
International Hydrographic Organization

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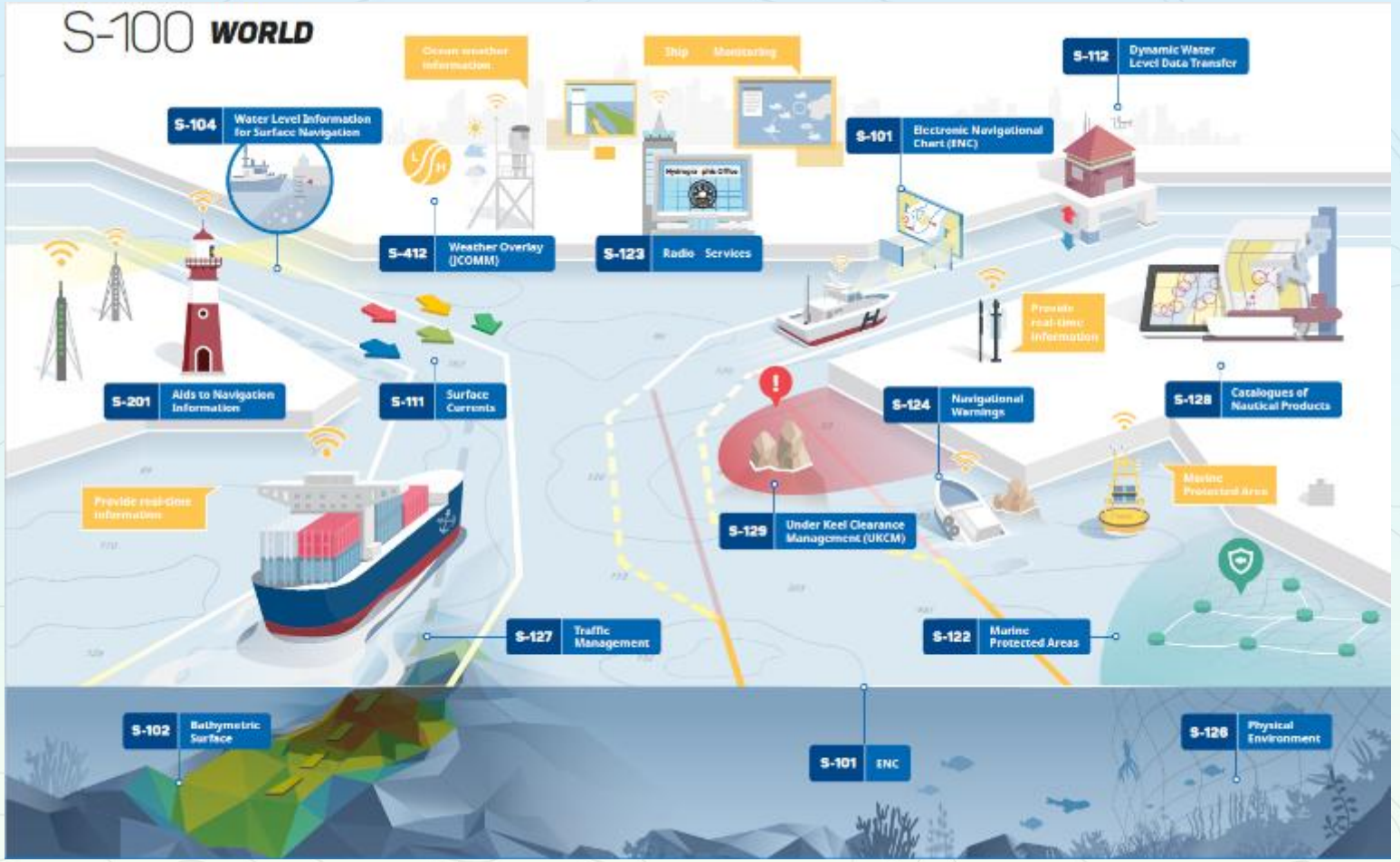
1. Transition: S-57 to S-101 ENC and S-100 products
2. S-100 Universal Data Model
3. IHO Infrastructure Centre
4. S-100 implementation Phases
5. The Security Scheme
6. S-100 Benefits
7. Conclusions

Transition: S-57 to S-101 ENC and S-100 products

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2D ECDIS

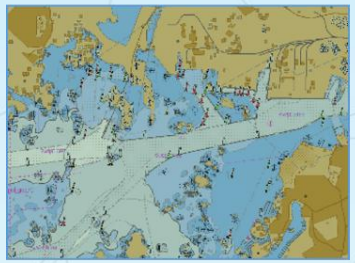


4D ECDIS, additional vertical and real time information dimension

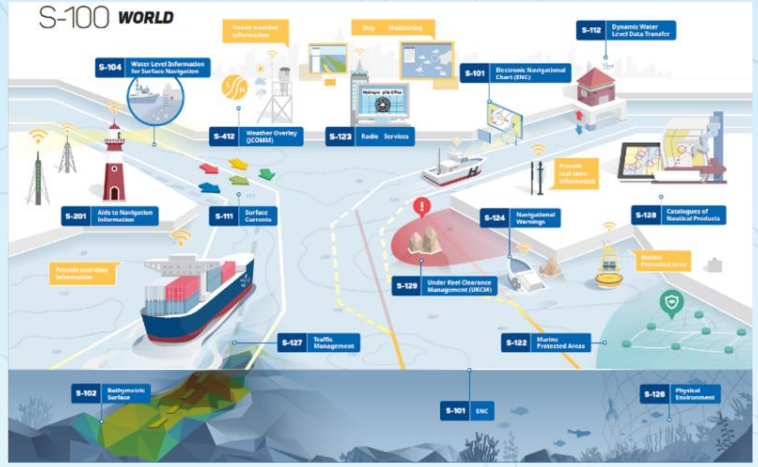
Timeline: S-57 to S-101 ENC and S-100 products

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THE TRANSITION FROM S-57 TO S-100:



2D ECDIS



4D ECDIS, additional vertical and real time information dimension

S-100 ECDIS legal to use Since:

1ST JAN 2026

Until 1st JAN 2026
- IHO S-57/S-52

ECDIS/ENC Transition
- S-101 is ready with some coverage
- Global S-57 is maintained

S-100/S-101 Only
- End of Transition Period
- No Requirement for S-57 support
- All users have S-100 ECDIS
- DF mode can be disabled



Preparation / Migration
- (Some) producers develop operational S-101 production capability
- **OEMs develop S-100 ECDIS + DF mode**
- IMO/IEC Documents updated for S-100
- Development of validation and distribution network

ECDIS Rollout
- OEMs rollout S-100 ECDIS + DF mode
- Producers release S-101 alongside S-57
- (All) remaining producers develop and implement full production capability
- Those not on S-100 ECDIS use S-57

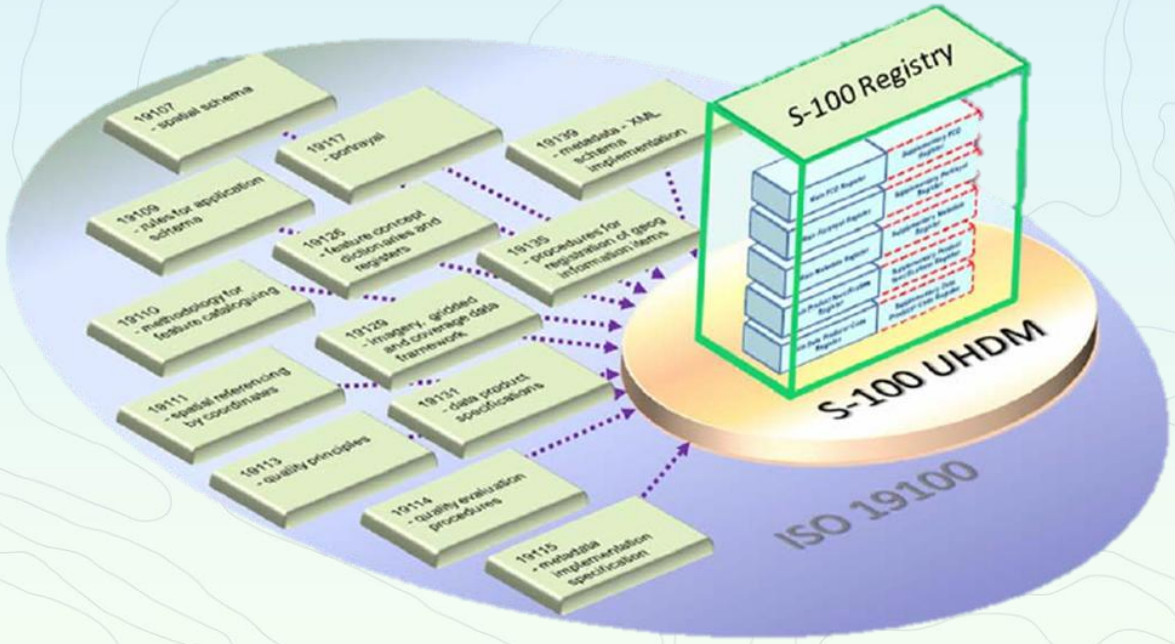
S-100 ECDIS must comply with the new IMO Resolution on ECDIS Performance Standards from:

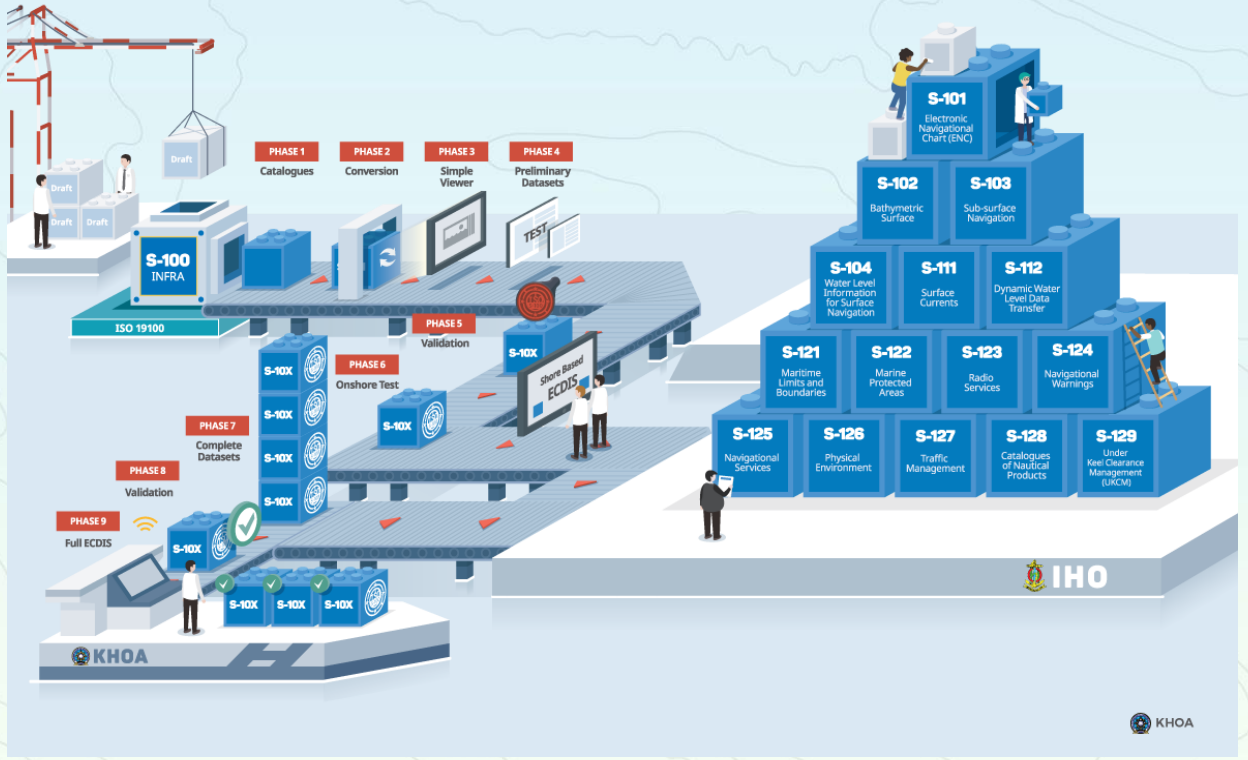
1ST JAN 2029

S-100 Universal Data Model

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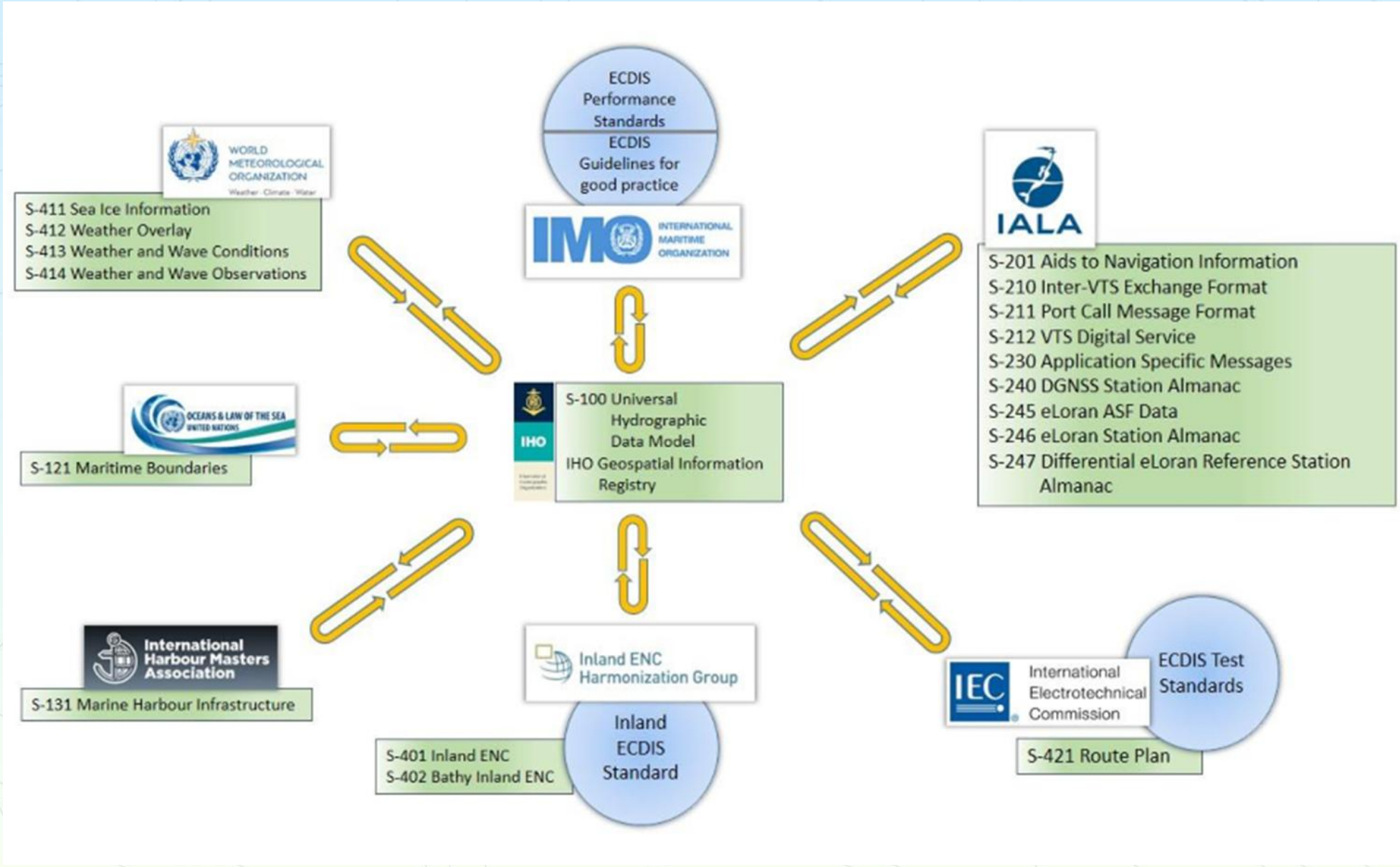
The **S-100** Standard is a framework document that is intended for the development of **digital products and services for hydrographic, maritime and GIS communities**. It comprises multiple parts that are based on the geospatial standards developed by **ISO/TC211**





S-100 Universal Data Model

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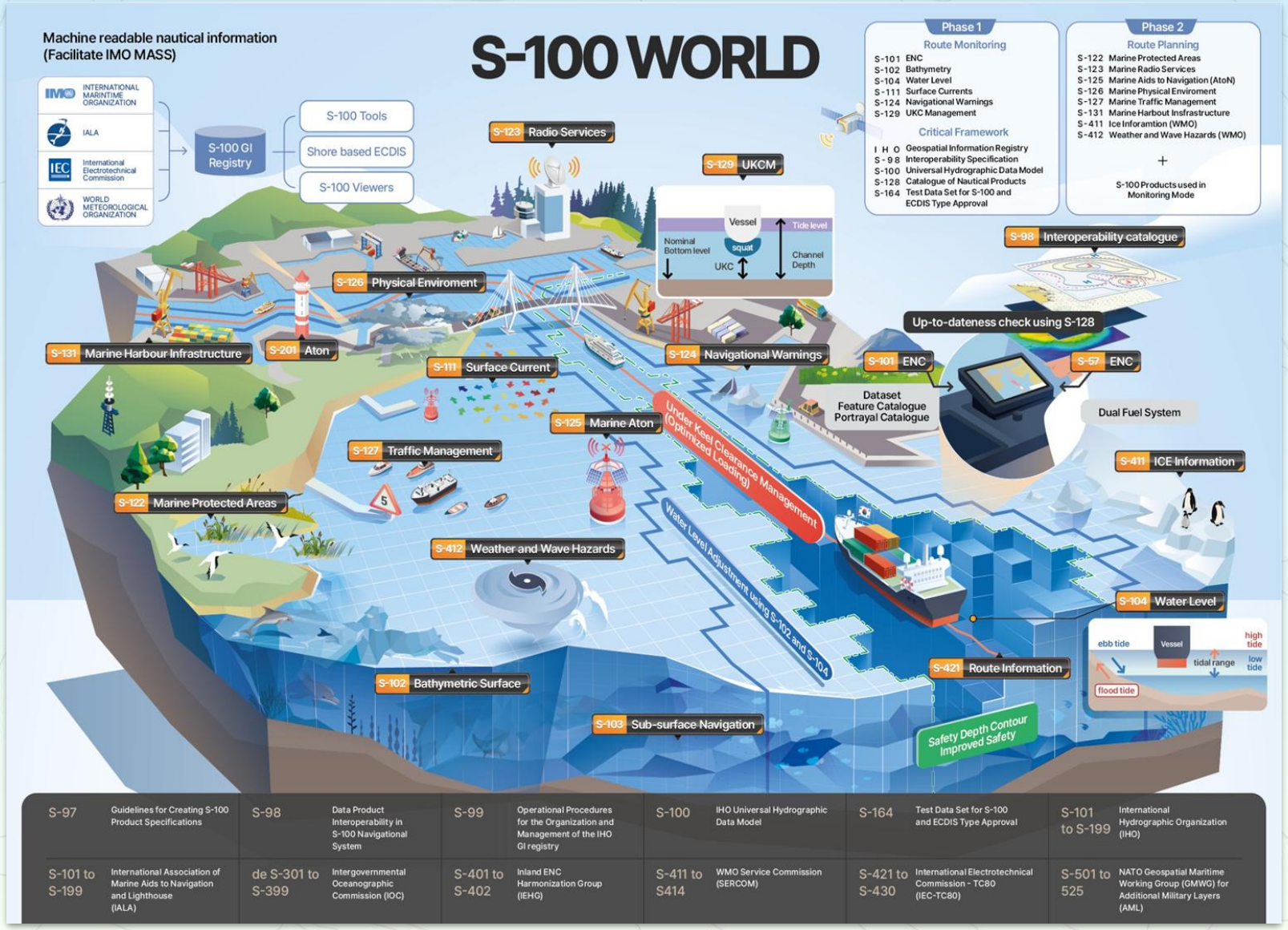


IHO S-100 Data Framework

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S-100 based Data Products

- **S-101**: Electronic Navigational Charts (ENC)
- **S-102:** Bathymetric Surface
- **S-104:** Water Level Information
- **S-111:** Surface Currents
- **S-124:** Navigation Warnings
- …
- **S-41X:** Weather Overlays



S-200 and S-400 Data Products

International Hydrographic Organization

IALA



WMO – World Meteorological Organization

S-41X Marine Weather Overlays

S - 411

Dynamic Ice Information

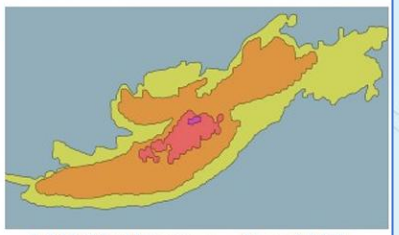
Portrayal Pending



S - 412

Marine Weather Warnings

Polygons

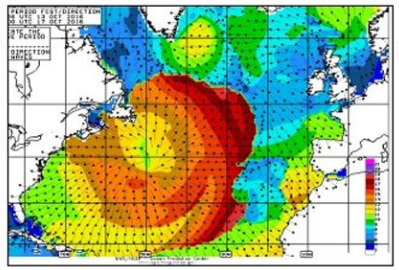


S-412 Wind Warnings – Navy NIWC ECDIS Viewer

S - 413

Marine Weather and Wave Conditions

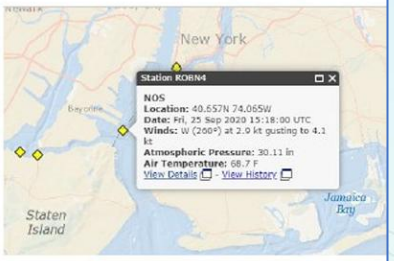
Graphics & Gridded Data



S - 414

Marine Weather and Wave Observations

Point-Based Data



- IHO's development of the S-100 framework has enabled other International Organisations to develop S-100 Product Specifications (PS) within their domain.
- In addition to IALA and WMO the Inland ENC Harmonization Group (IEHG), the International Electrotechnical Commission (IEC) and NATO are developing S-100 PS. IOC is considering.
- **Important to understand the e-Navigation landscape when considering IHO technical infrastructure and secure distribution, as well as the role of Hydrographic Offices in national S-100 implementation.**

IHO Infrastructure Centre

International Hydrographic Organization

35F, BIFC2 in Busan, Rep. of Korea



To provide specific technical and administrative services required to support IHO standardized products:

- Support of the S-100 standards framework
- Support of the S-100 based Product Specifications lifecycle
- Management, maintenance and operation of the IHO GI Registry
- Support of navigation system type approval as it regards S-100 standards
- Management, maintenance and operation of the IHO S-100 security scheme
- Support of S-100 based operative services and secure S-100 data service distribution
- Support any additional IHO infrastructure assistance beyond S-100.

IHO Infrastructure Centre

International Hydrographic Organization

TUESDAY

10

NOVEMBER 2026

Busan, Republic of Korea

Inauguration Ceremony
IHO Infrastructure Centre

VENUE

28 Namcheon-dong-ro, Nam-gu, Busan

BIFC2

Date

2026.11.10







Unveiling ceremony in front of the IHO Infrastructure Centre on the 35th floor to mark the official opening

S-100 implementation Priorities

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S-100 Products to support the IMO SOLAS chapter V carriage requirements on Nautical Charts, Nautical Publications, Meteorological Services and Navigational and Meteorological Warnings*.

Phase 1
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

Phase 2
Route Planning Mode

S-122 Marine Protected Areas
S-123 Marine Radio Services
S-125 Marine Aids to Navigation (AtoN)
S-127 Marine Traffic Management
S-131 Marine Harbour Infrastructure
S-411 Ice Information (WMO)
S-412 Weather and Wave Hazards (WMO)

+ S-100 Products used in Monitoring Mode

Phase 3
Route Planning Mode

S-126 Marine Physical Enviroment
S-413 Marine Weather and Wave Conditions (WMO)
S-414 Marine Weather and Wave Observations (WMO)

+ S-100 Products used in Monitoring Mode

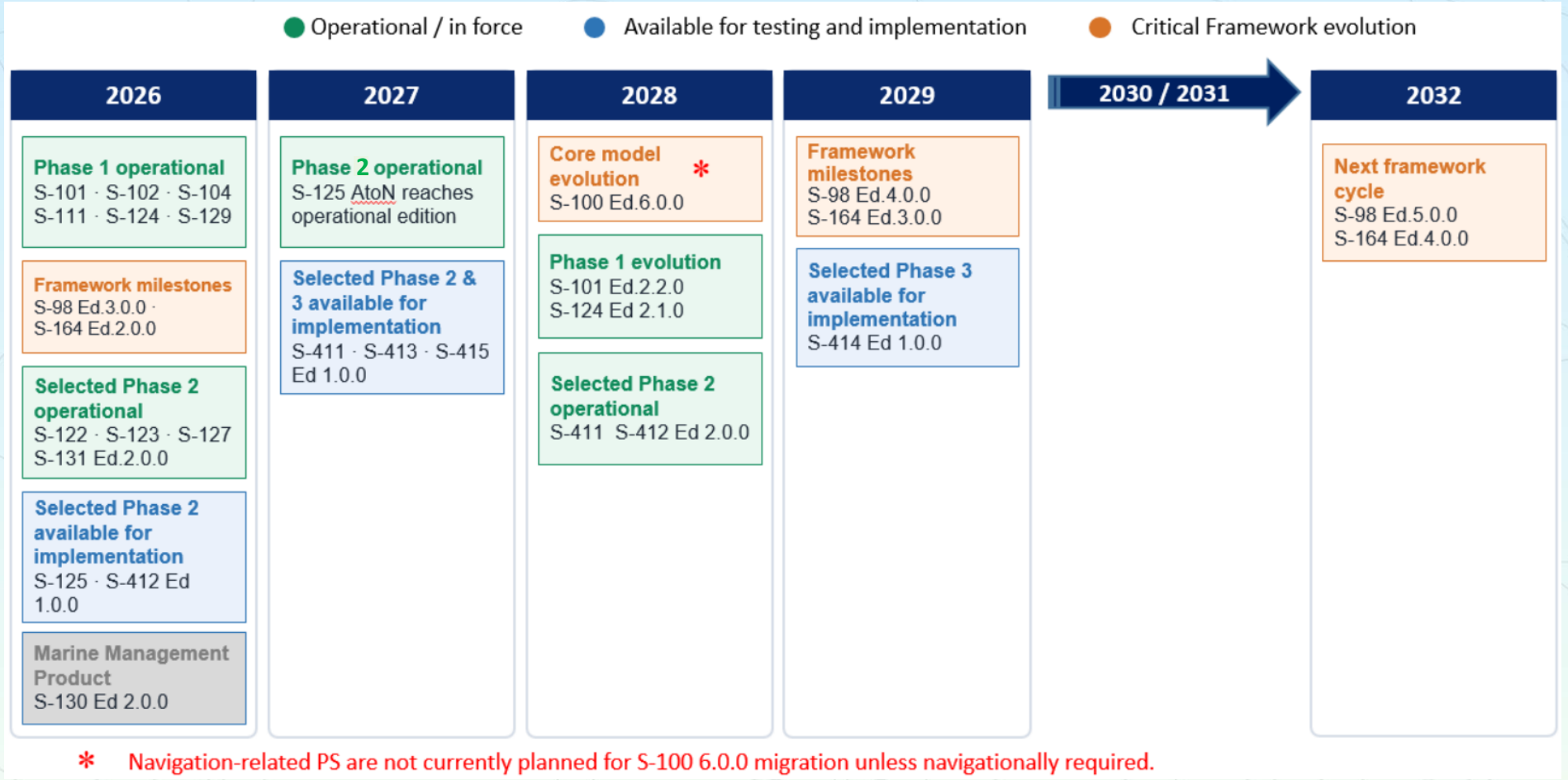
*It should be noted that SOLAS requirements on Navigational and Meteorological Warnings are still based on Radiocommunication Services (GMDSS), SOLAS chapter IV. S-100 MSI related products (Maritime Safety Information) are supplementary products until further decisions are taken by IMO.

S-100 TIMELINE

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Table A – IHO list of S-100 products with special focus	
Phase 1 / Route monitoring	
S-101	Electronic Navigational Chart (ENC)
S-102	Bathymetric Surface
S-104	Water Level Information for Surface Navigation
S-111	Surface Currents
S-124	Navigational Warnings
S-129	Under Keel Clearance Management
Critical Framework	
	IHO Geospatial Information Registry
S-98	Interoperability Specification
S-100	Universal Hydrographic Data Model
S-128	Catalogue of Nautical Products
S-158:xxx	Validation checks
S-164	Test Data Sets for S-100 and ECDIS Type Approval
Phase 2 / Route planning	
S-122	Marine Protected Areas
S-123	Marine Radio Services
S-125	Marine Aids to Navigational (AtoN)
S-127	Marine Traffic Management
S-131	Marine Harbour Infrastructure
S-411 (WMO)	Ice Information
S-412 (WMO)	Weather and Wave Hazards
Phase 3 / Route Planning Mode	
S-126	Marine Physical Environment
S-413 (WMO)	Marine Weather and Wave Conditions
S-414 (WMO)	Marine Weather and Wave Observations
S-415 (WMO)	Marine Weather Synoptic

Table B – IHO list of S-100 Marine Management products	
S-116	Undersea Feature Names
S-121	Maritime Limits and Boundaries
S-130	Polygonal Demarcation of Global Sea Areas



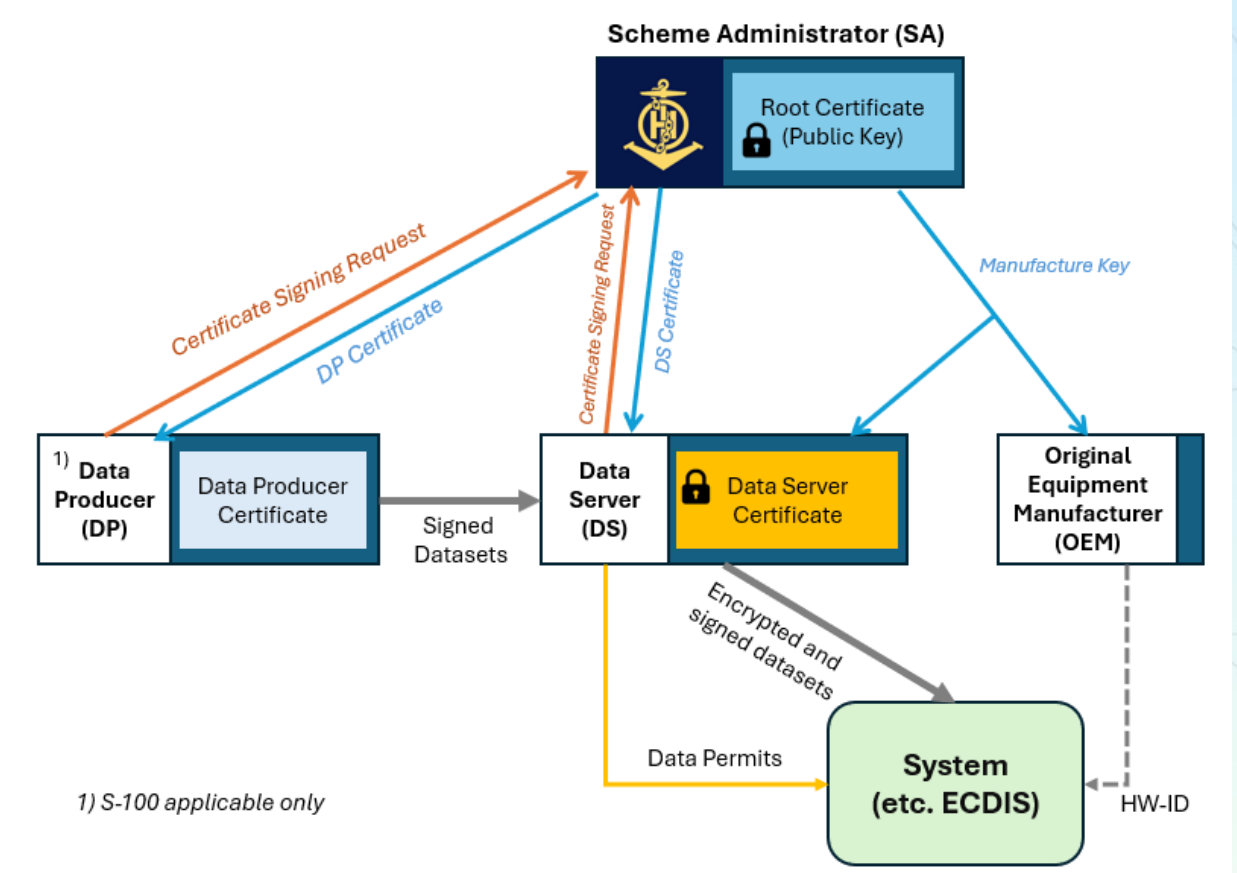
* Navigation-related PS are not currently planned for S-100 6.0.0 migration unless navigationally required.

The IHO Security Scheme

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- S-100 Part15 specifies a method of securing digital products and information. The purpose of data protection is :

1. **Piracy Protection**: To prevent unauthorized use of data by encrypting the product information.
2. **Selective Access**: To restrict access to only the products that a customer has acquired a license for.
3. **Authentication**: To provide assurance that the products have come from approved sources.



The IHO Security Scheme

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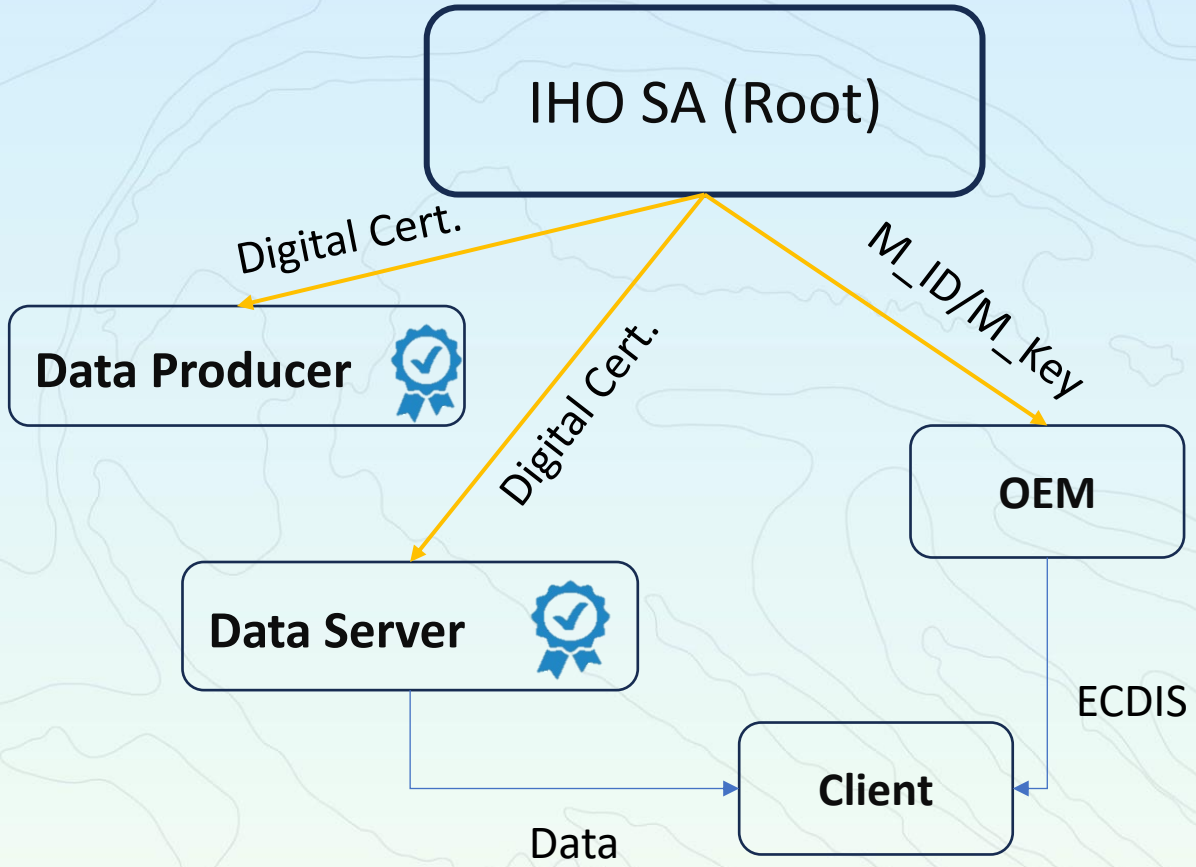
Scheme Administrator (SA) is solely responsible for maintaining and coordinating the Protection Scheme.

Data Producer: producing S-100 products

Data Servers (DS) : responsible for the encryption and/or digital signing of the datasets for distribution.

Original Equipment Manufacturers (OEMs): to build a software application according to the S-100 part15.

Data Clients (DC) are the end users of datasets



Digital signing and encrypting S-100 products

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IHO Scheme Admin. (Root)

Data Producer

Data Server

UPN

Client

OEM

S-111
S-104
S-102
S-101



Authentication



Encryption

Data + cell key



UPN
(User Permit Number)

IHO Geospatial Information Registry

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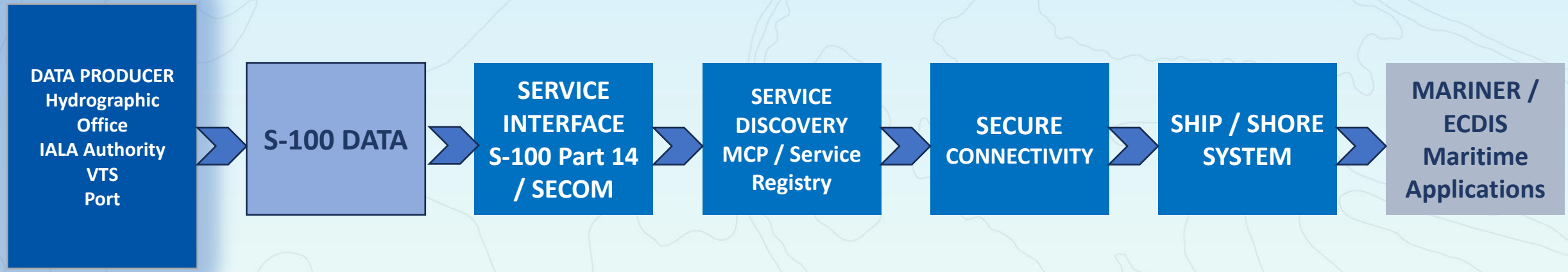


S-100: IP based Distribution Service Architecture

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From Data Producer to End User



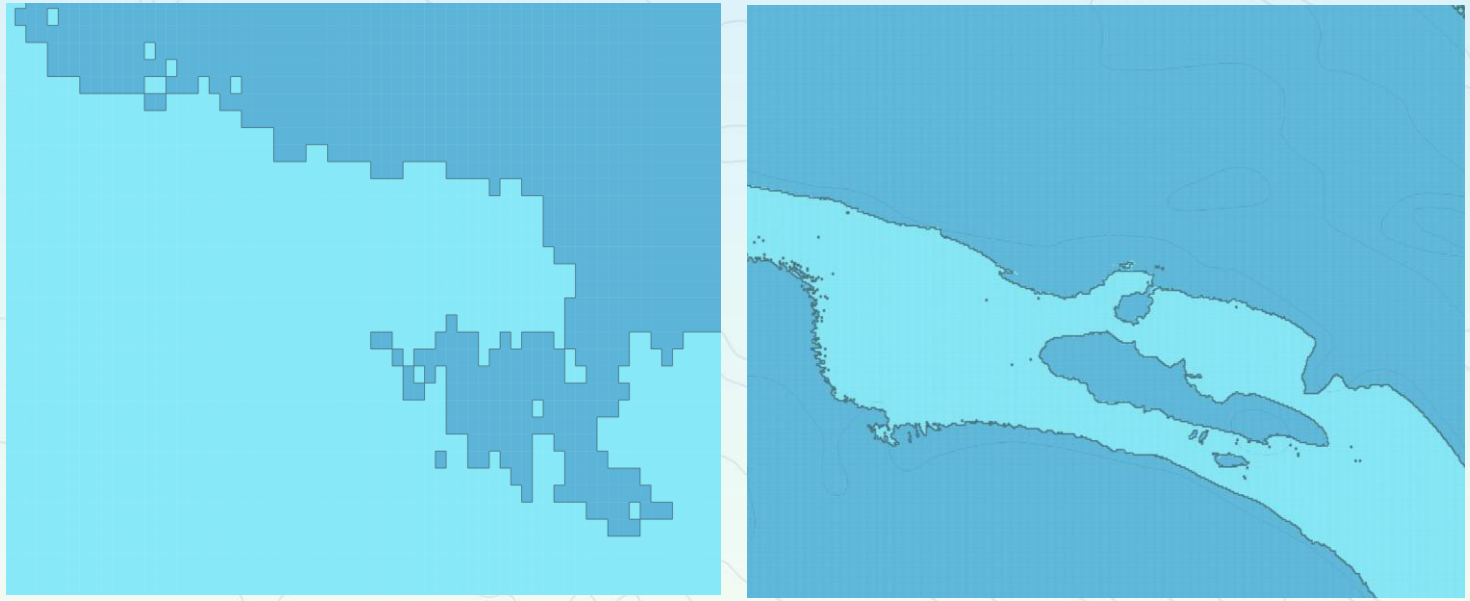
S-98 - INTEROPERABILITY SPECIFICATION: A CORE COMPONENT OF S-100

- The single layer ENC S-57 is replaced by multiple interacting layers of navigational products in S-100 ECDIS
- S-98 defines how multiple **layers interact** and how they are **portrayed**

S-98 defines how to draw a safety contour on a grid of S-102 depths

S-102 contains a grid of depth values with no predefined contours

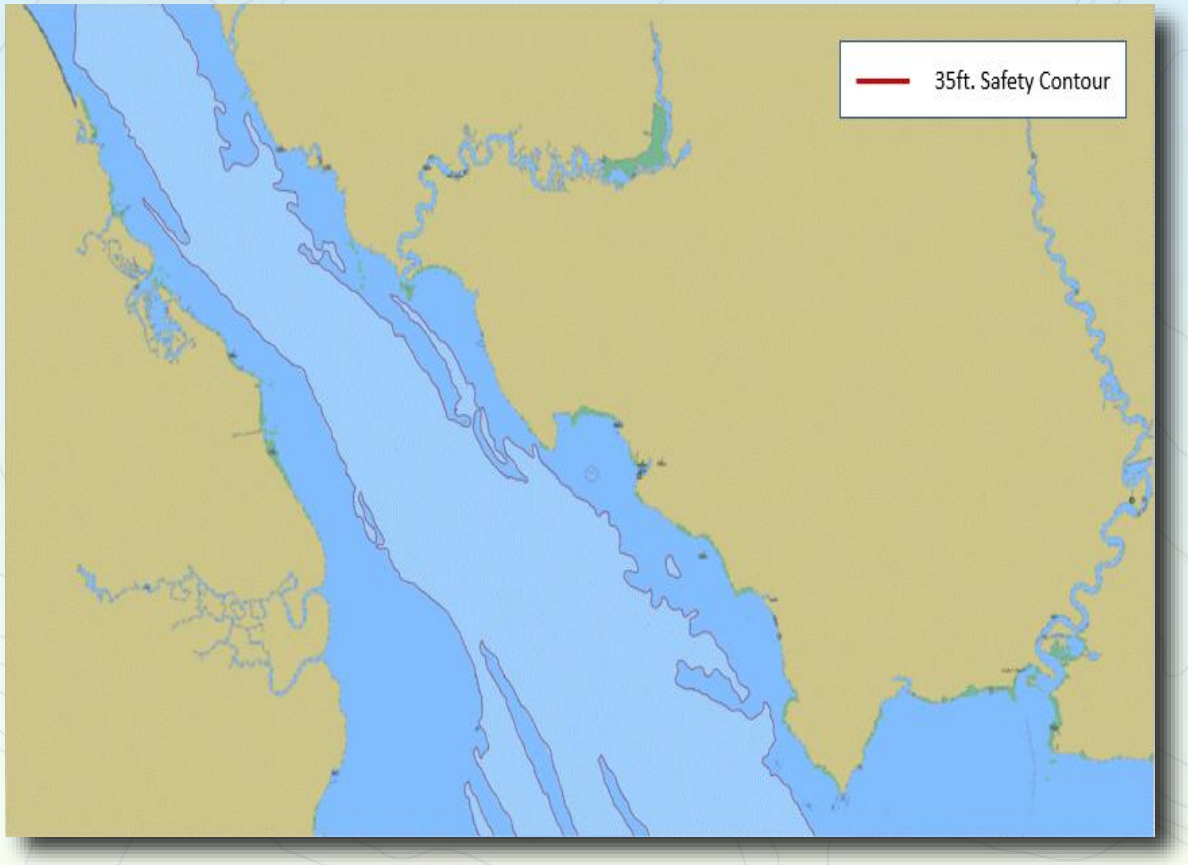
S-102 supresses S-101 Depth Areas

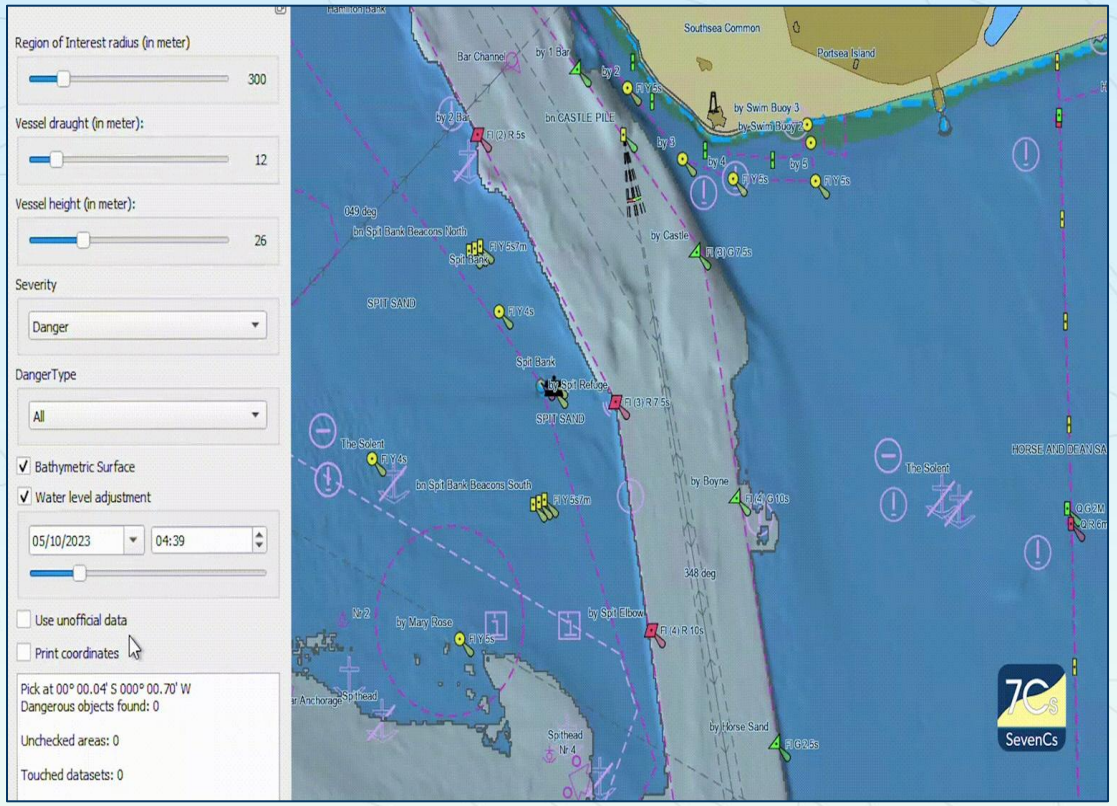


Integrated Water Level and Bathymetry

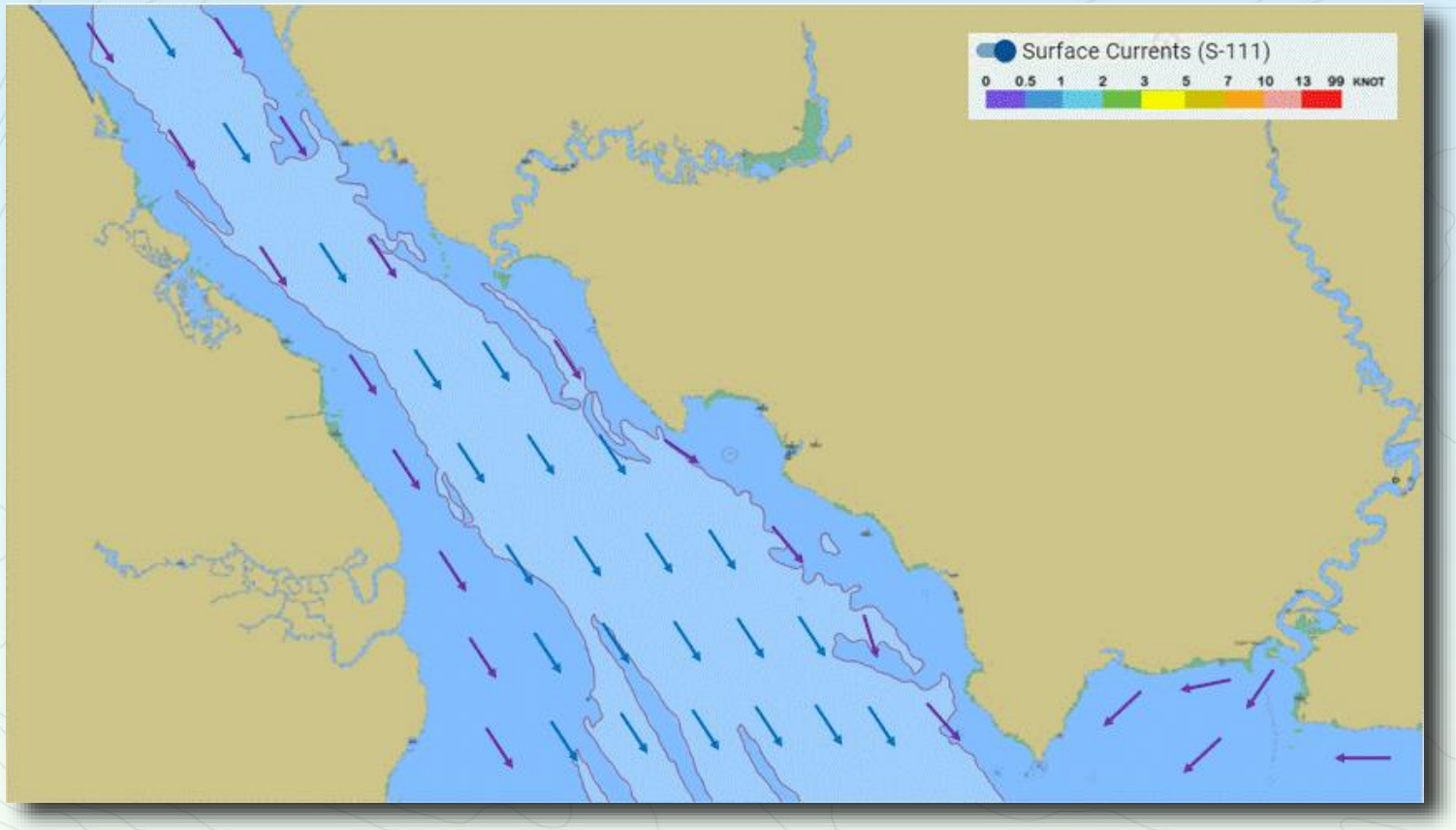
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Combining S-102 bathymetry and a Water Level Adjustment (WLA) from S-104 water levels, dynamic safety contours can be created.





Integrated Surface Currents

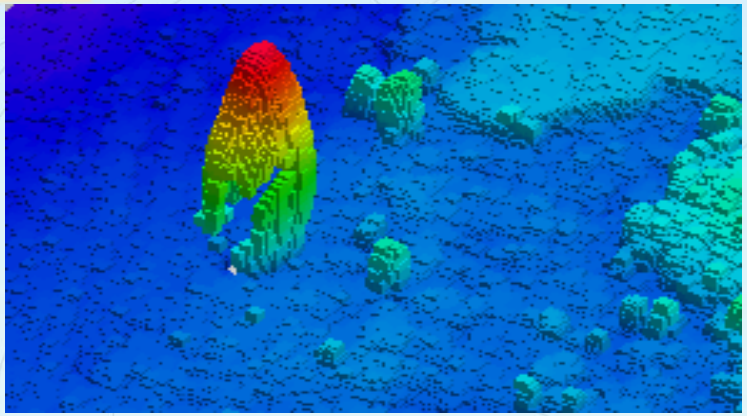


Combining S-102 bathymetry, Water Level Adjustment (S-104) and surface currents (S-111) gives a more complete picture of the environmental conditions.

Benefits with S-100

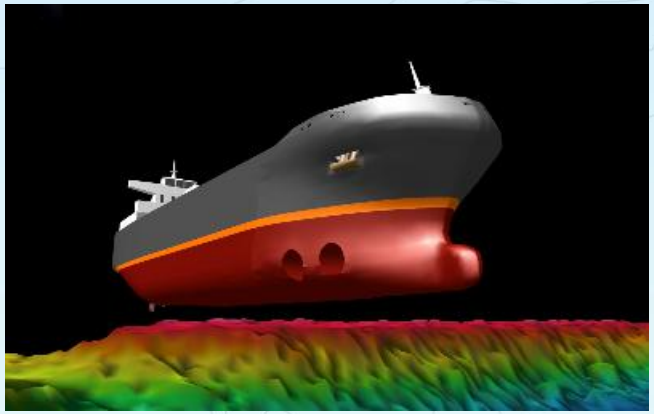
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Improved Safety



High resolution bathymetry in combination with other datasets.

Optimized Loading



Under Keel Clearance Management with S-100

Route Optimization and Just in Time



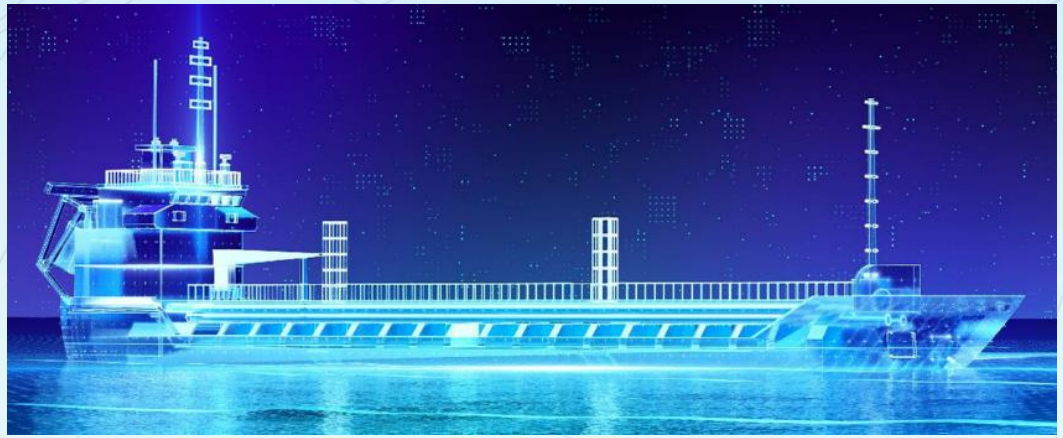
Decreased fuel consumption. Avoid squat, usage of tide, currents and weather information

Increased Safety, Efficiency and Reduced Environmental Impact

Benefits with S-100

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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 – Maritime Autonomous Surface Ships

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

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Thank You!

adcc@iho.int