16th Meeting of the Hydrographic Services and Standards Committee

Expert Contributors (EC) – by Chair's invitation

Activities in support of the S-100 Implementation Roadmap, concerns, and recommendations

Agenda Item 07.12B

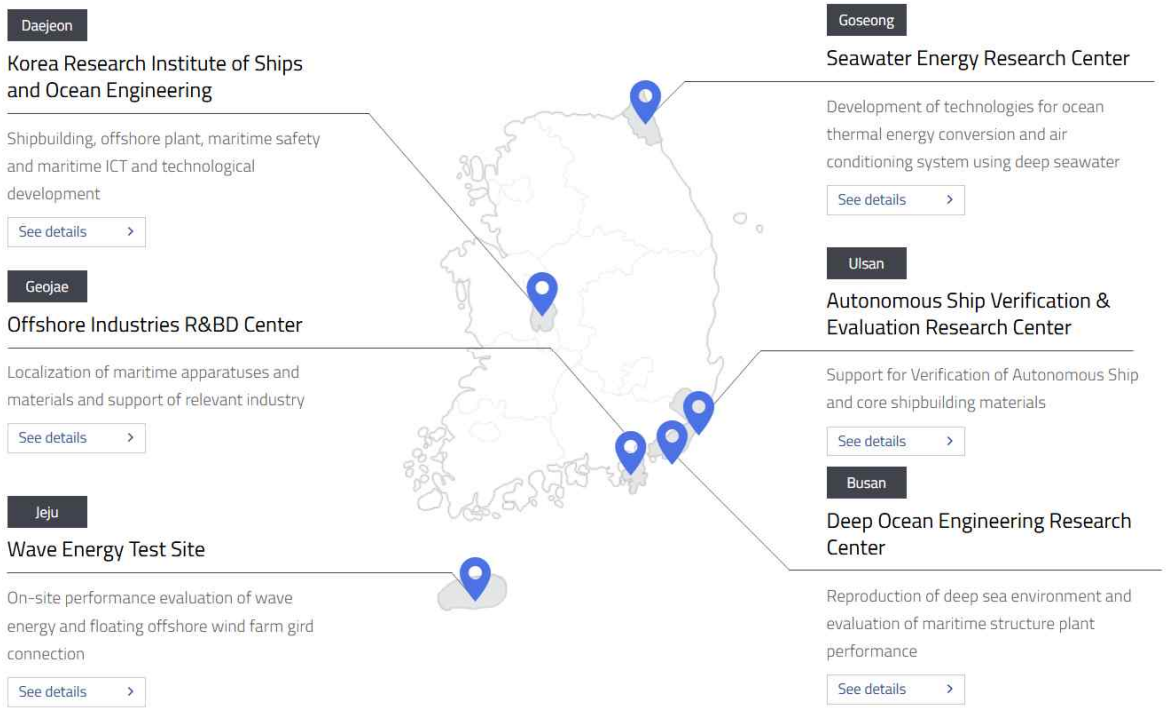
HSSC-16, Tokyo, Japan, 27 – 31 May 2024

IHO

International Hydrographic Organization

OVERVIEW OF KRISO

- Established as Ship Research Institute affiliated with the Korea Institute of Science and Technology in 1973,
- KRISO has continuously conducted R&D in the field of ship and offshore plants, contributing to the development of the shipbuilding and maritime industry in Korea



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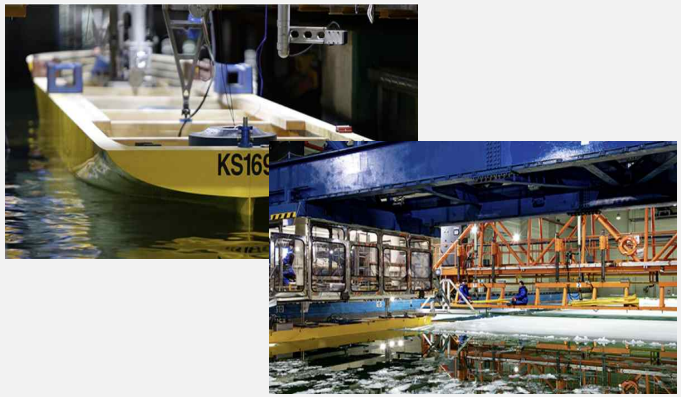
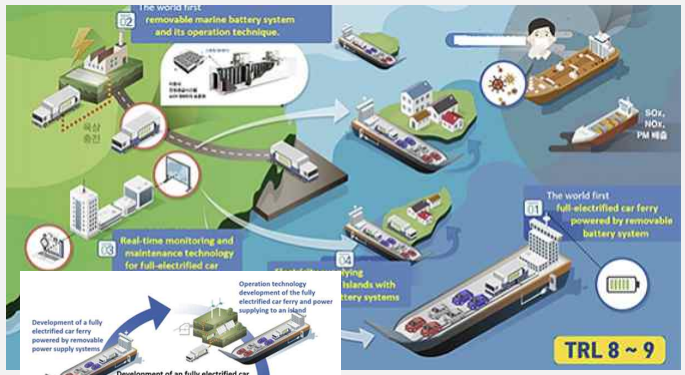
OVERVIEW OF KRISO (MAJOR RESEARCH THEMES)

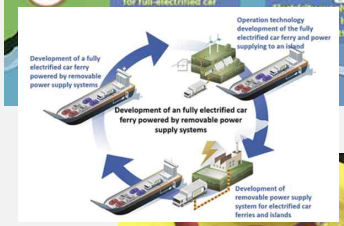
- Enhancement of ship operation performance, and development of eco-friendly future-oriented ship technology

Development of advanced technology to improve ship operation performance



Development of core technology for low-noise electric ships





Development of core technology for autonomous ships

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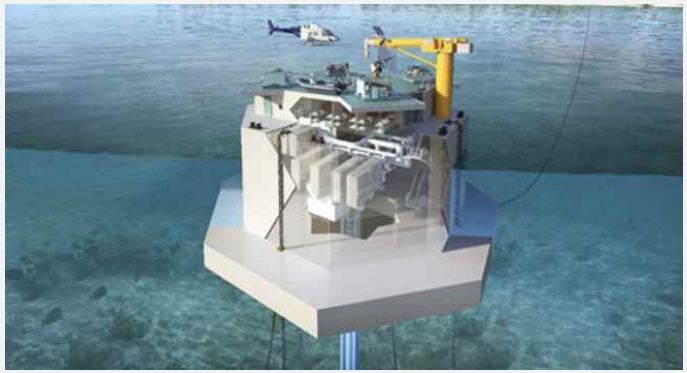
OVERVIEW OF KRISO (MAJOR RESEARCH THEMES)

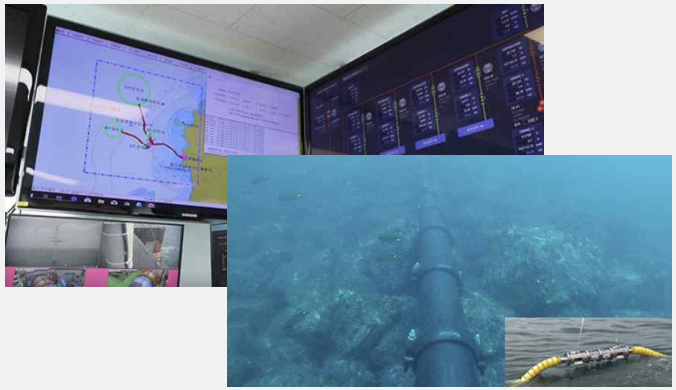
- Development of core technology for future offshore plants

Development of fluid-structure performance evaluation for offshore plants

Development of new industrial services and equipment for offshore plants

Development of leading technology for commercialization of marine energy and resources





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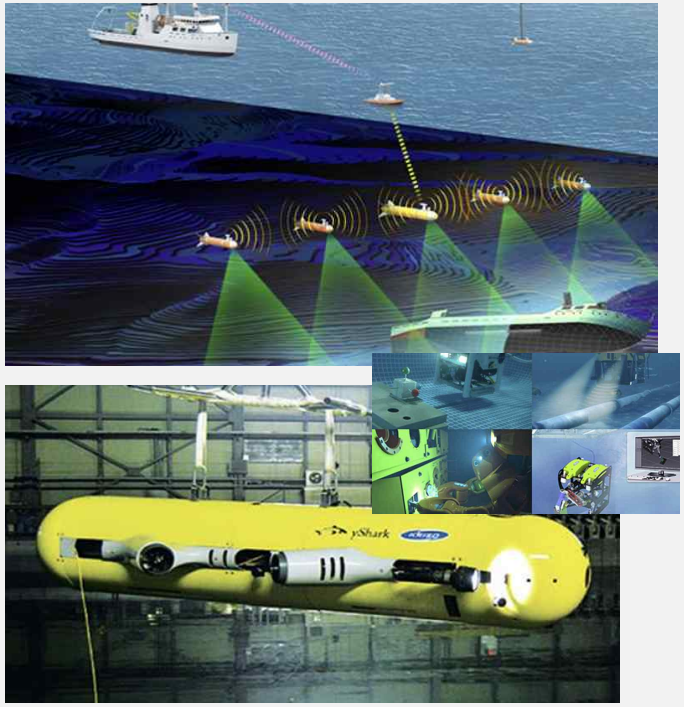
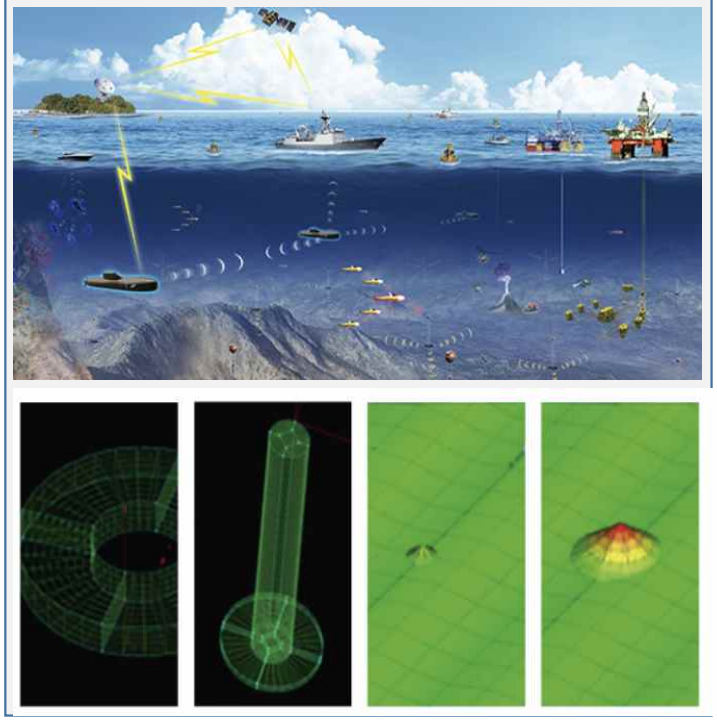
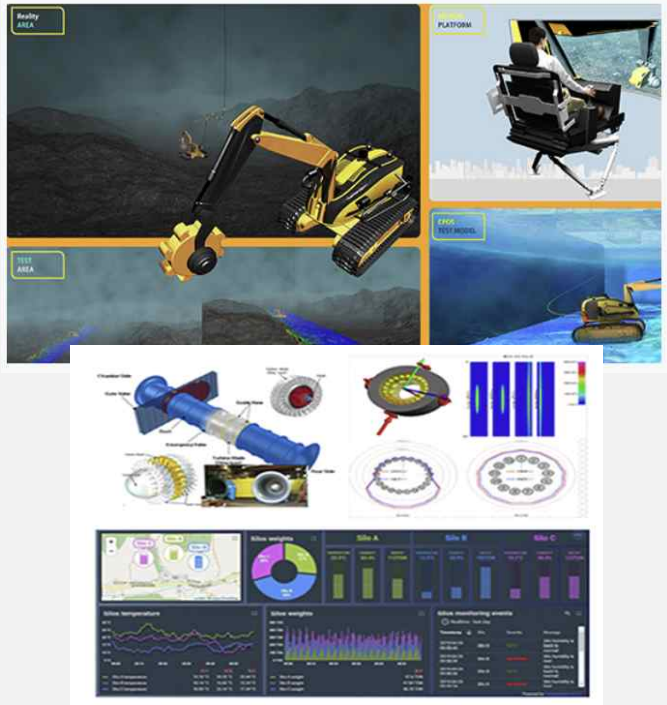
OVERVIEW OF KRISO (MAJOR RESEARCH THEMES)

- Development of advanced maritime equipment and ICT convergence technology

Development of smart maritime equipment and robot technology	Development of smart maritime communications and ocean survey equipment	Development of smart maritime equipment operating technology based on cyber physical system
		

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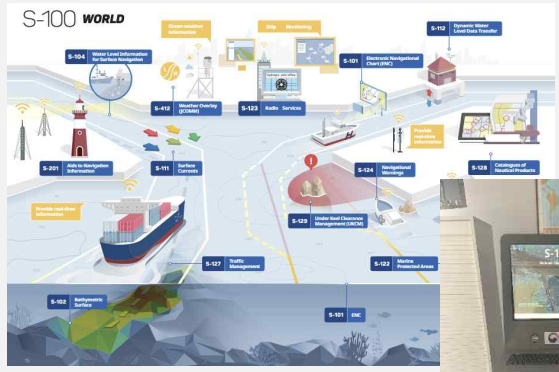
OVERVIEW OF KRISO (MAJOR RESEARCH THEMES)

- Development of maritime transportation and maritime accident response technology

Development of smart maritime transportation technology

Development of rapid maritime accident response technology

Development of marine GIS and GNSS technology



ACTIVITIES IN SUPPORT OF THE S-100 IMPLEMENTATION

International Hydrographic Organization

- KHOA S-100 Team

Korea Hydrographic and Oceanographic Agency

KHOA — Manage S-100 testbed project

KRISO Korea Research Institute of Ships & Ocean Engineering

KRISO — Support KHOA and lead the project

Bluemap	Greenblue	GMT	Data Production Industry
S-100 Tools KHOA Viewer Open source code	IHO GI Registry	ECDIS OEM Shore based ECDIS DF ECDIS	Production of S-1XX TDS

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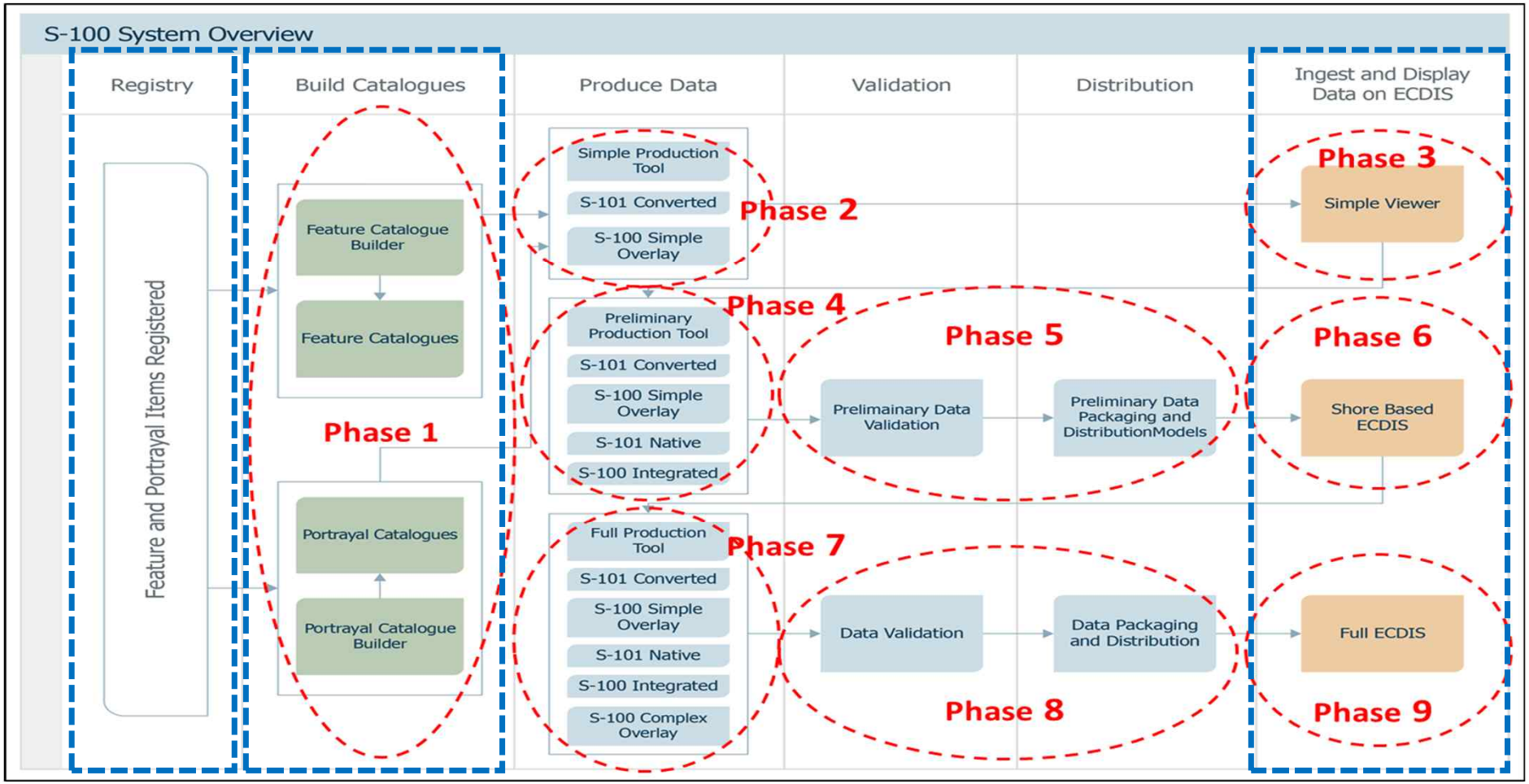
ACTIVITIES IN SUPPORT OF THE S-100 IMPLEMENTATION

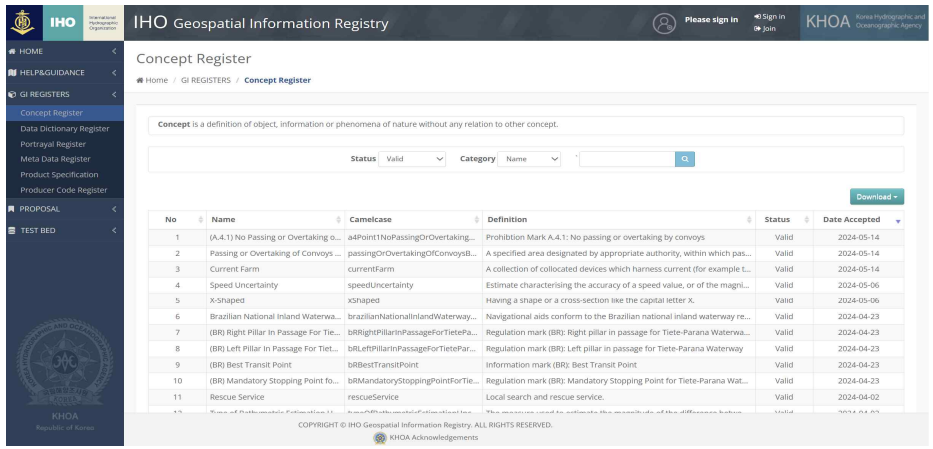
- S-100 test framework

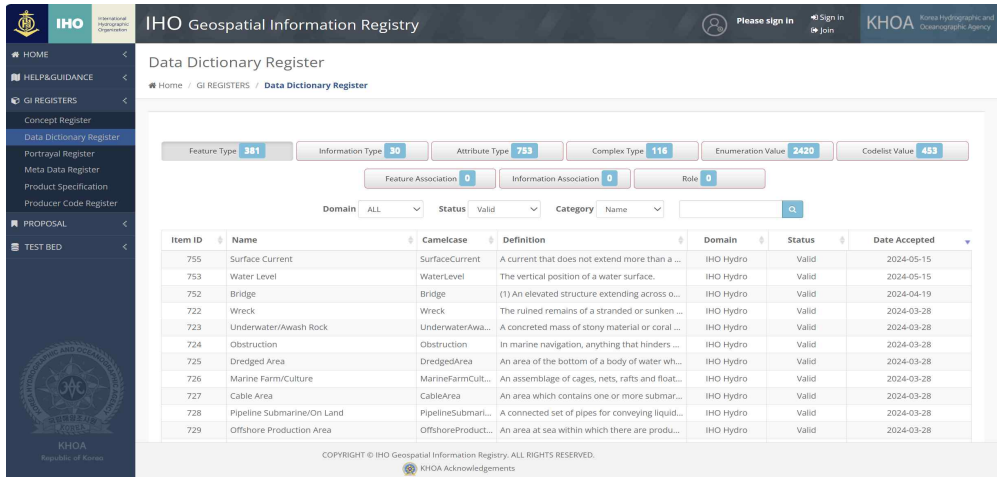


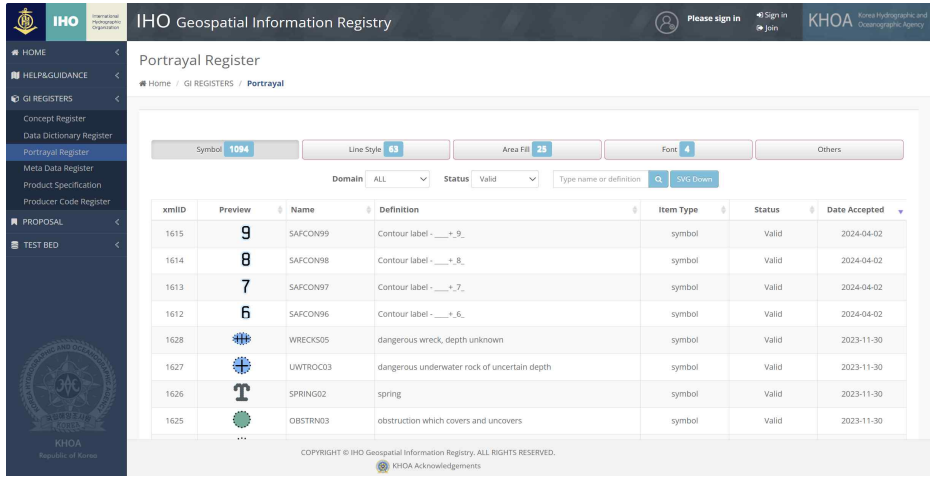
ACTIVITIES IN SUPPORT OF THE S-100 IMPLEMENTATION

International Hydrographic Organization

- IHO GI Registry





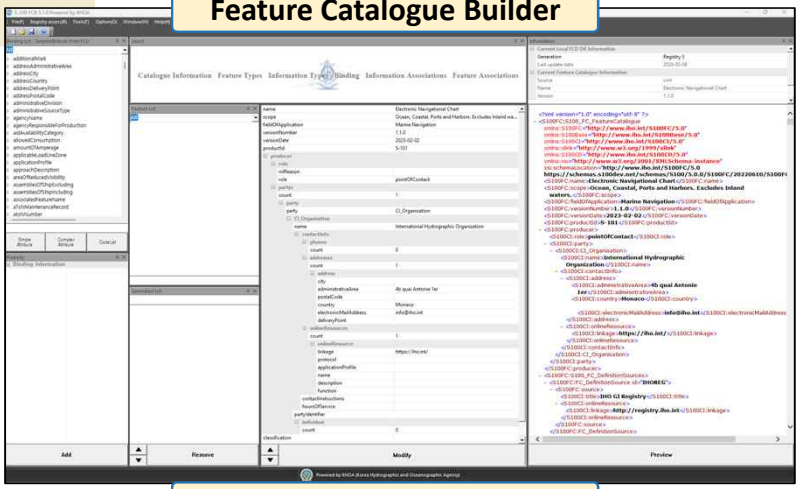


ACTIVITIES IN SUPPORT OF THE S-100 IMPLEMENTATION

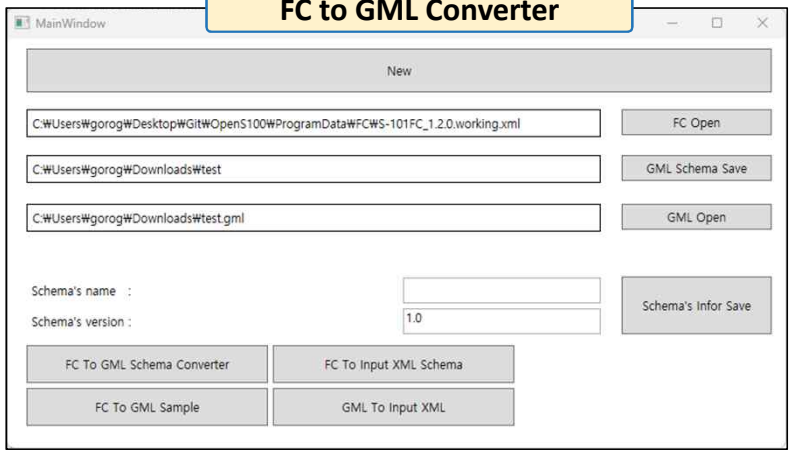
International Hydrographic Organization

- S-100 Tools

Feature Catalogue Builder

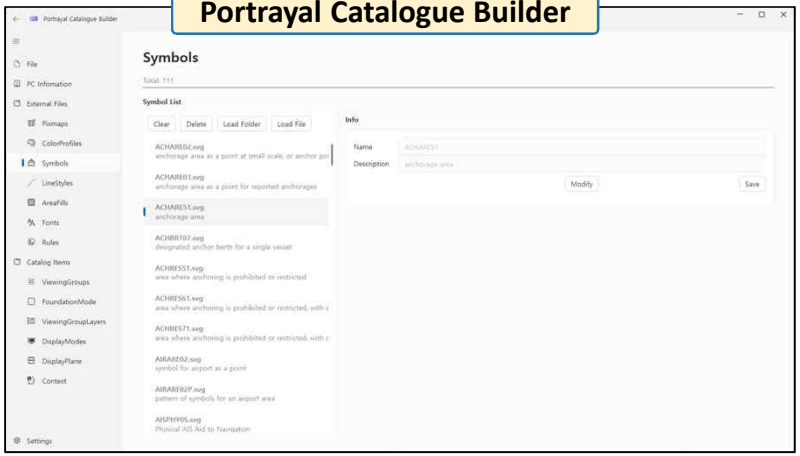


FC to GML Converter

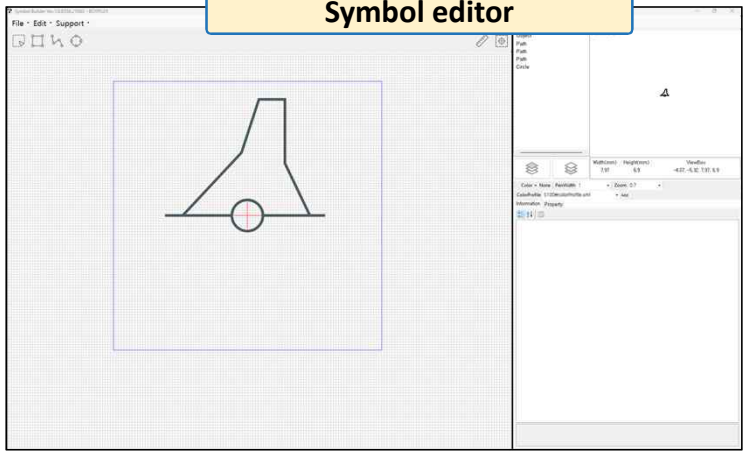


DCEG Composer

Portrayal Catalogue Builder



Symbol editor



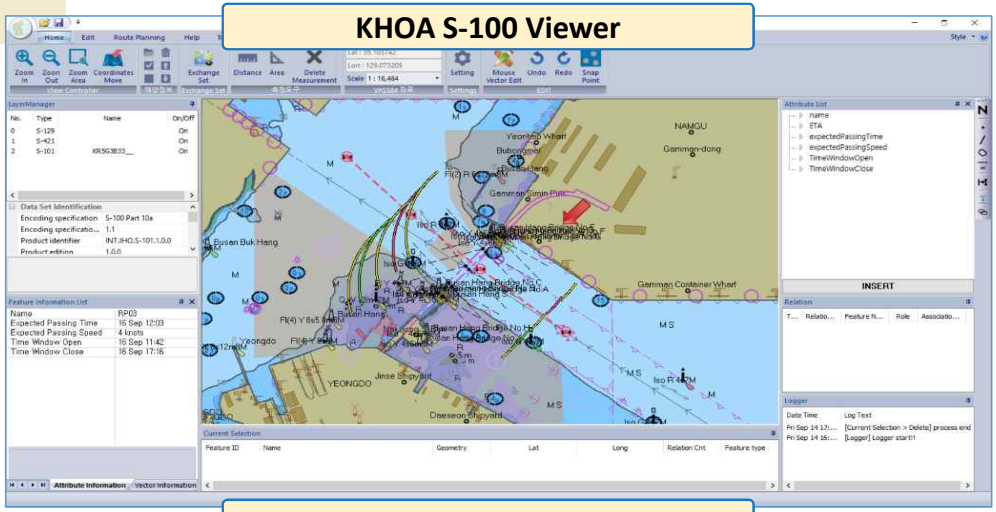
IC Editor

ACTIVITIES IN SUPPORT OF THE S-100 IMPLEMENTATION

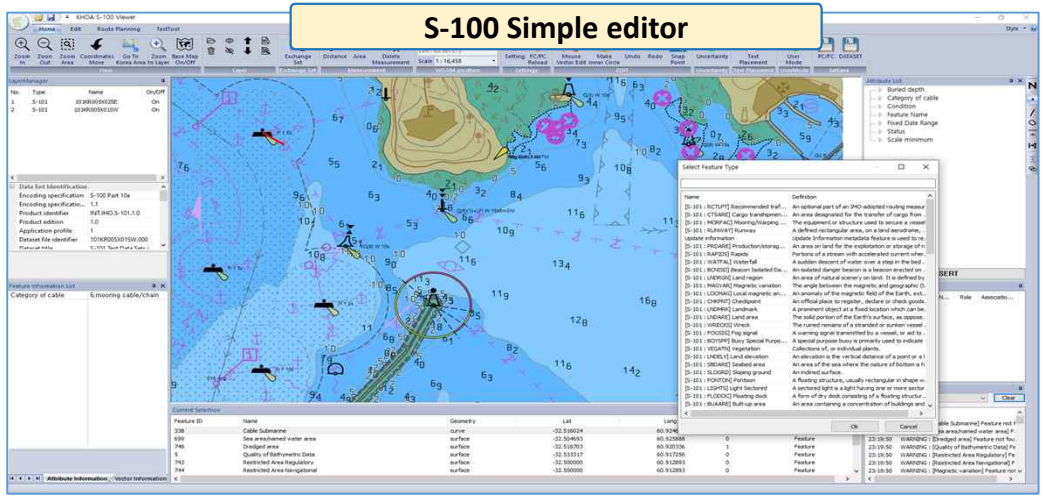
International Hydrographic Organization

- S-100 Tools for KHOA

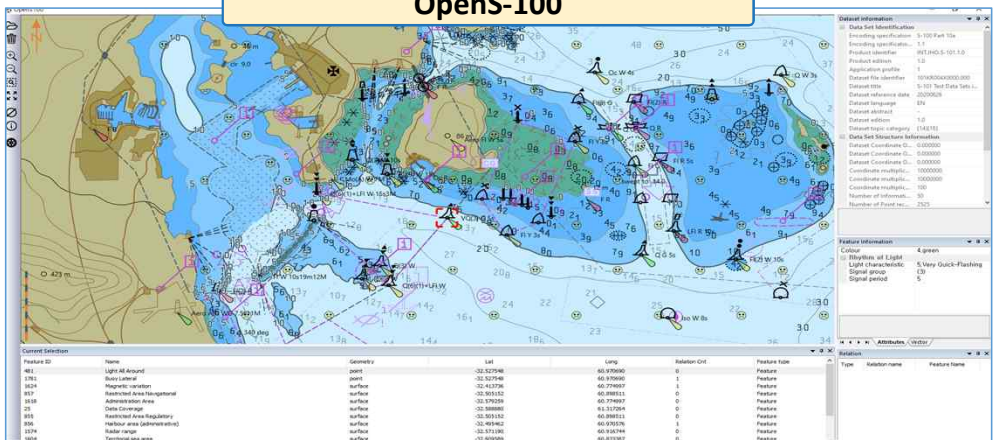
KHOA S-100 Viewer



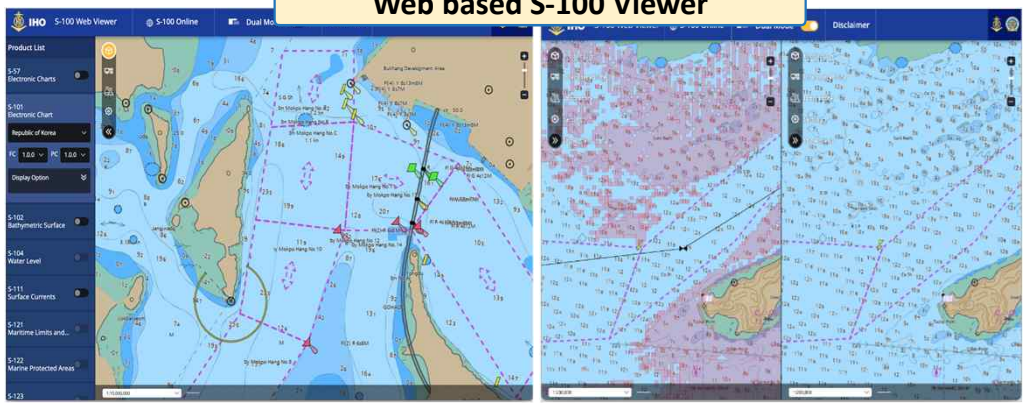
S-100 Simple editor



OpenS-100



Web based S-100 Viewer



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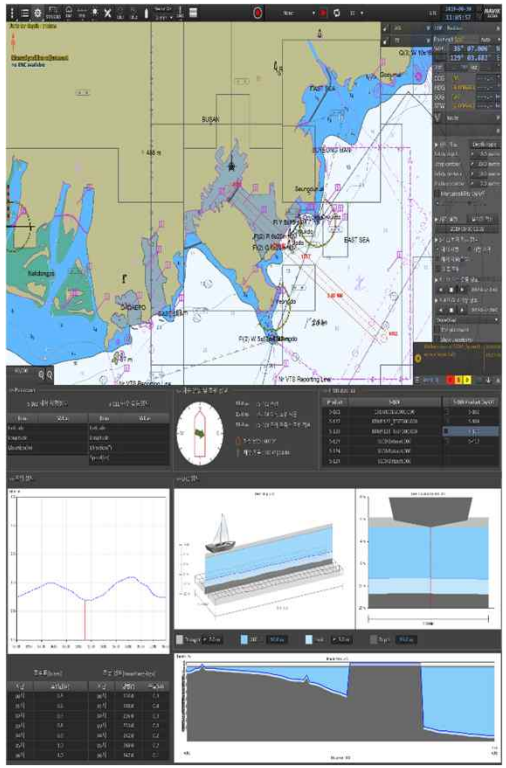
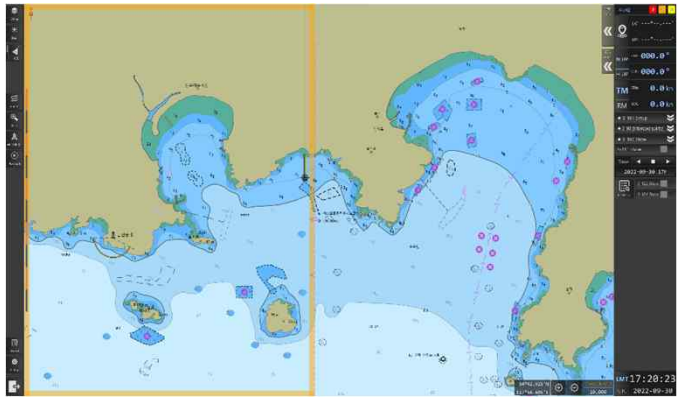
ACTIVITIES IN SUPPORT OF THE S-100 IMPLEMENTATION

- Shore based ECDIS / DF mode





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ACTIVITIES IN SUPPORT OF THE S-100 IMPLEMENTATION

- S-100 Testing Center

CONCERNS IN S-100 IMPLEMENTATION

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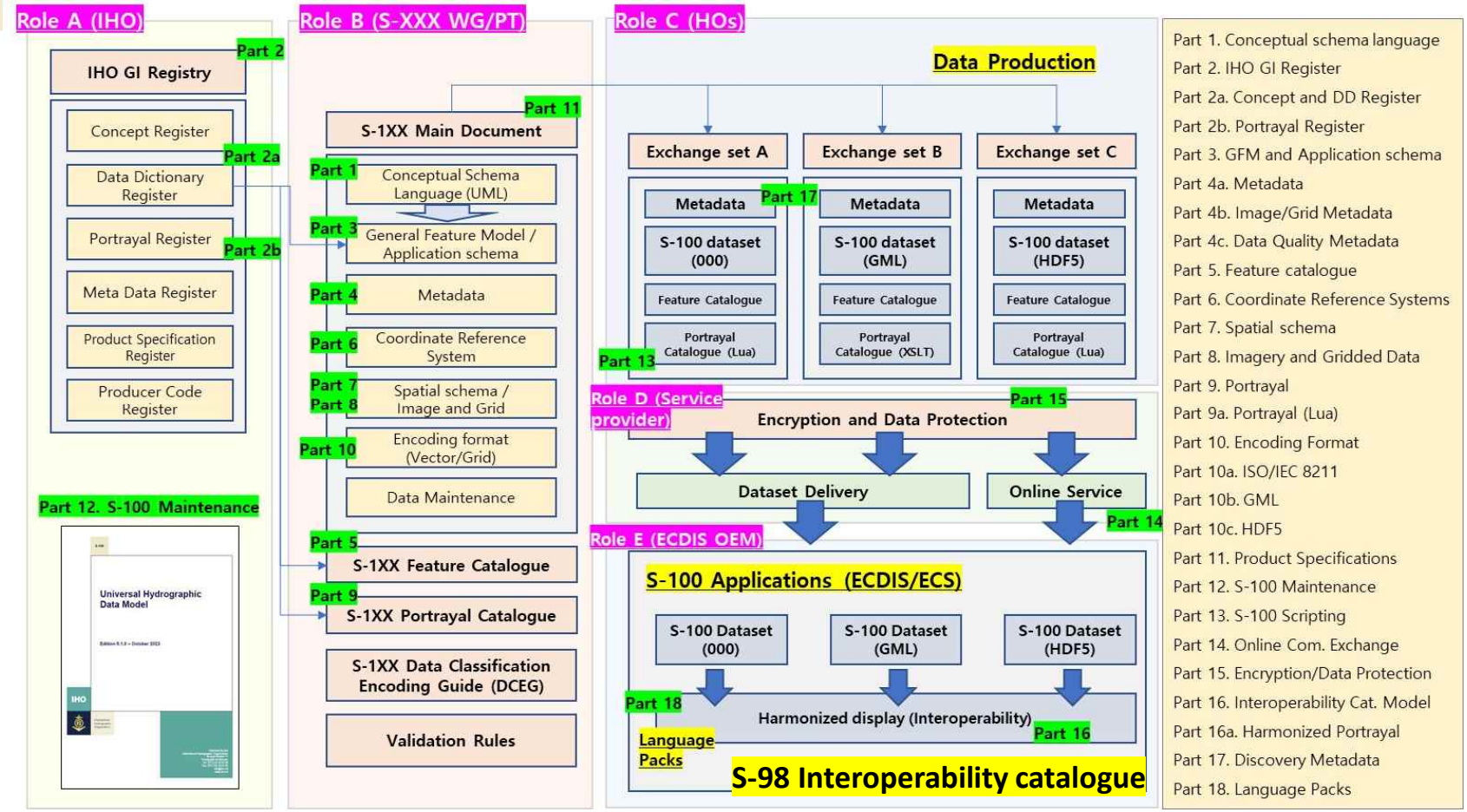
- How S-100 and critical framework are operated



Phase 1 (Route Monitoring)

S-101 ENC, S-102 Bathy
S-104 Water Level
S-111 Surface current
S-124 Nav warning
S-129 UKC Management

Phase 2 (Route Planning)

S-122 MPA, S-123 MRS
S-125 Marine Aton
S-126 MPE, S-127 MTM
S-131 MHI
S-411 ICE, S-412 Weather

Role F (Port State Control)

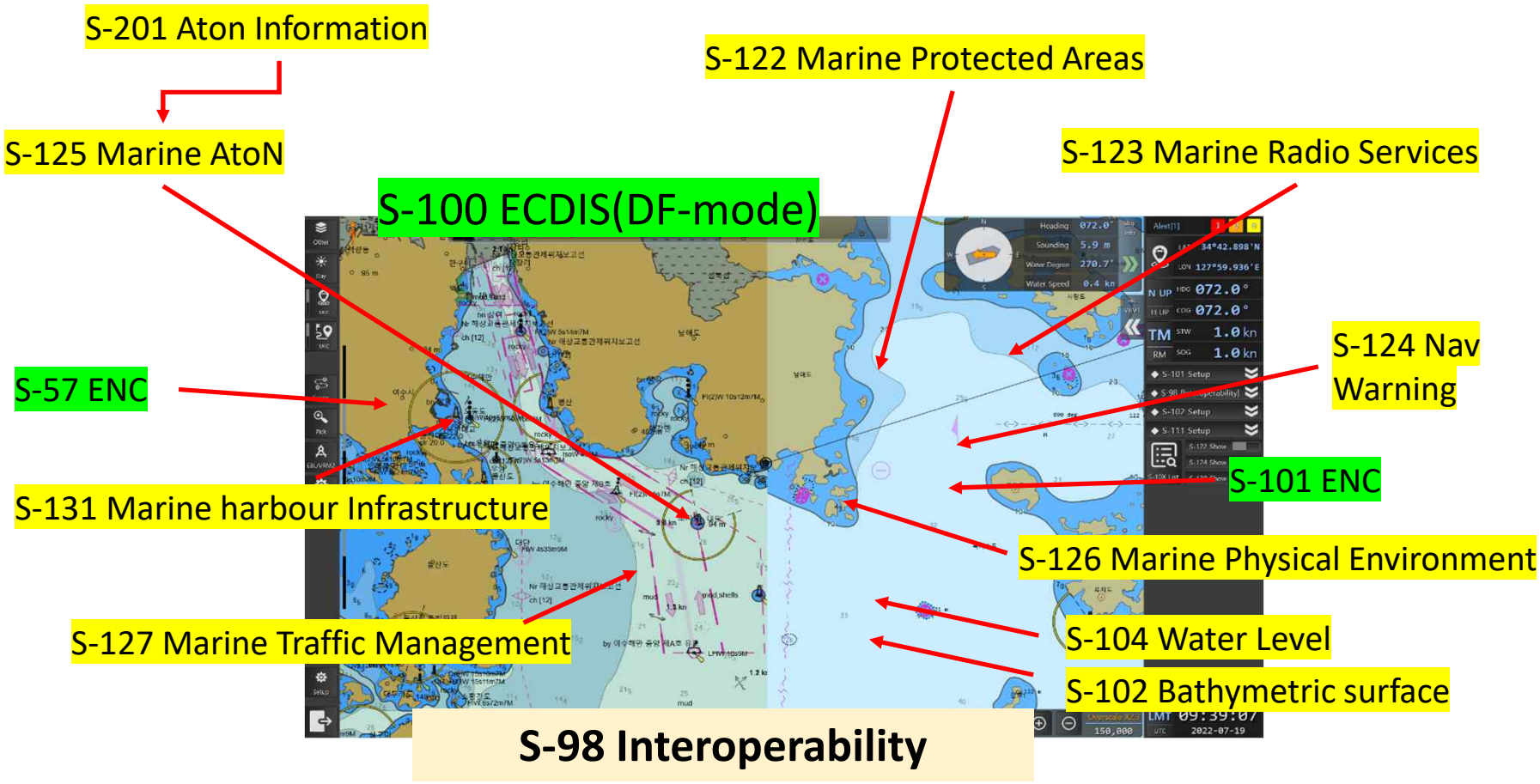
S-128 CNP
Up-to-dateness check

Role G (ECDIS type approval)

Testing with S-164

CONCERNS IN S-100 IMPLEMENTATION

- S-100 ECDIS (DF-Mode)



CONCERNS IN S-100 IMPLEMENTATION

International Hydrographic Organization

- New concepts and functions

Full Machine Readability

IHO GI Registry

- Concept register
- Data Dictionary register
- Portrayal register
- Product spec. register

- Product spec.
- Feature Cat.
- Portrayal Cat.

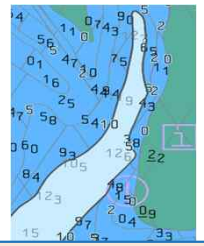
Alarm/Indication

S-100 Data | Meta data

WLA

Interoperability

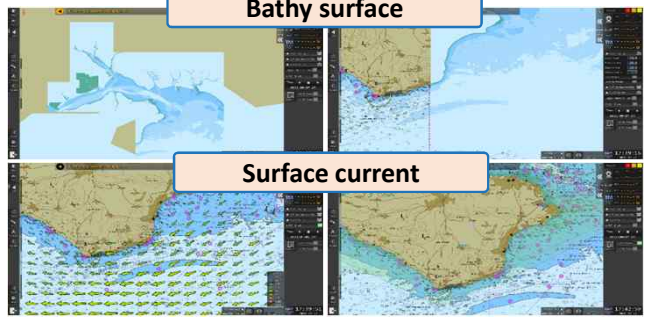
Improved Safety using dynamic data



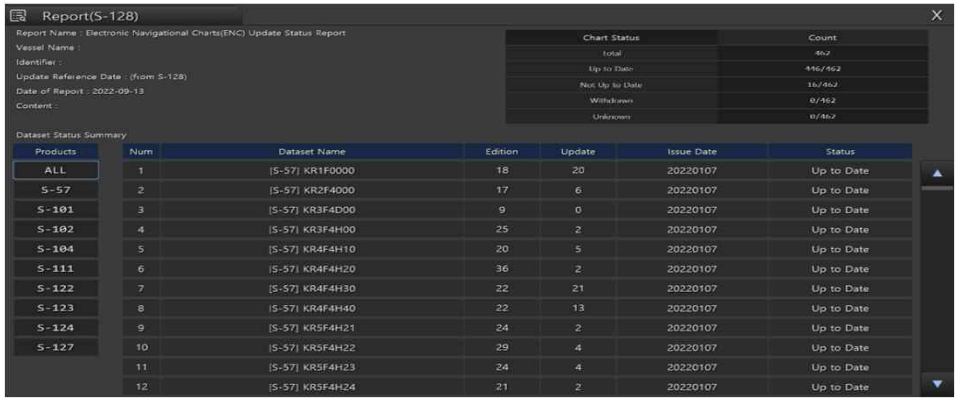
Depth Contour (3m, 5m, 10m, ...)

Bathy surface

Surface current



Up-to-dateness check by S-128



Route Optimization and Just in Time

CONCERNS IN S-100 IMPLEMENTATION

International Hydrographic Organization

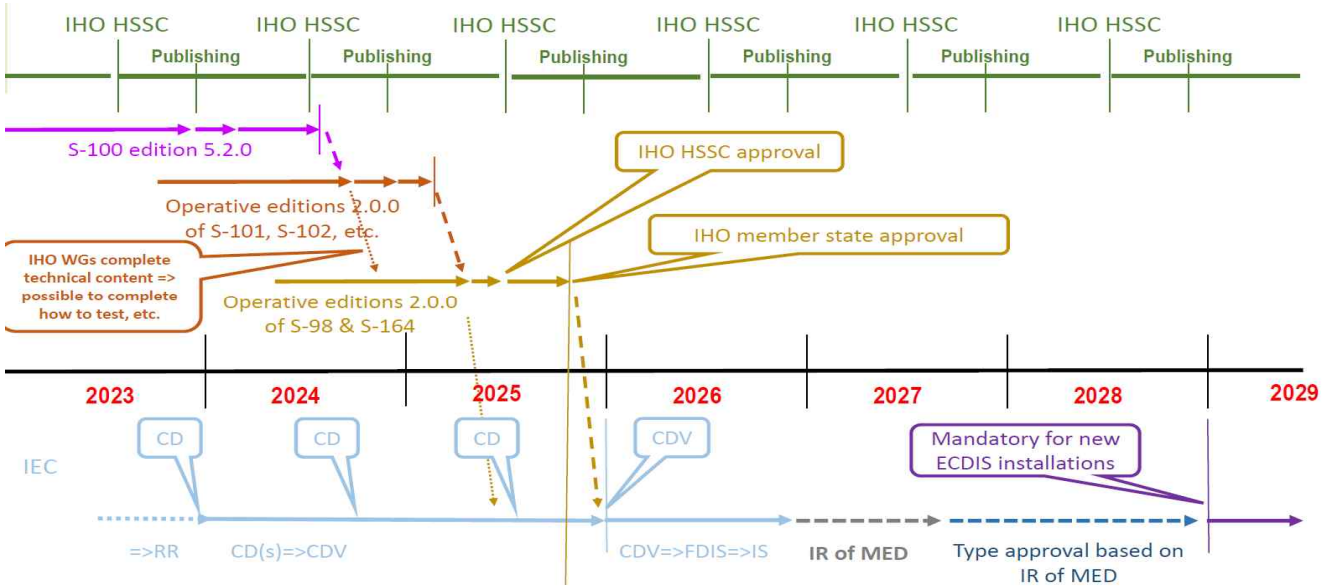
- S-100 Readiness Levels (S-97)

Required Product Specification component	Level 1 V1.0.0	Level 2 V1 – 1.0.0	Level 3 > V2.0.0	Level 4 > V2.0.0	Level 5 > V2.0.0
Main Document (Defines the relevant parts of S-100 that are required for the Product Specification)	X	X	X	X	X
A Default Encoding	X	X	X	X	X
S-100 Compliant Feature Catalogue	X (draft)	X (updated)	X (final)	X	X
Data Classification and Encoding Guide	X (draft)	X	X (final)	X	X
S-100 Compliant Portrayal Catalogue NOTE: Not every Specification will need a Portrayal Catalogue – this should be determined as part of the development process and stakeholder feedback.		X	X	X	X
Data Quality Checks		X	X	X	X
Test Data Sets		X	X	X	X
Data Validation (and test datasets)		X	X	X	X
Exchange Catalogue		X	X	X	X
Encryption / Digital Signatures			X	X	X
Interoperability			X (draft)*	X (tested)*	X*
Alerts and Indications				X*	X*
Operational data				X*	X*

CONCERNS IN S-100 IMPLEMENTATION

- S-421 was included in ECDIS Performance Standard
- Phase 1 products Ed 2.0.0 will be published in 2024
- Phase 2 products Ed 2.0.0 are supposed to be published
- S-98 Ed. 2.0.0 will be published in 2025
- S-164 Ed. 2.0.0 will be published in 2025

IEC 61174 ED5, TIMELINE



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CONCERNS IN S-100 IMPLEMENTATION

- S-100 introduced new concepts and technologies
- New concepts and technologies must perform tests repeatedly and precisely before implementing S-100
- Due to the adjustment of the publication schedule for the operational version of S-98/S-164, the preparation schedule for the industry has become tighter.
- In order to successfully prepare for S-100 implementation, application and sharing of the testing version should be actively promoted rather than waiting until the development of the operational version is completed.

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RECOMMENDATIONS

- Testing topics

S-164 TDS (All Testing Scenario)

WLA (Water Level Adjustment)

Interoperability (S-98 Lv 1, Lv 2)

Phase 1 products FC/PC/TDS

Phase 2 products FC/PC/TDS

S-100 Part 15 Protection schemes

Up-to-dateness Check by S-128

Multi Language Support

Improved Pick Report

IEC S-421 Route Exchange

IEC SECOM

Alert & Indication

Dual Fuel Mode

Exchange set Model (Metadata)

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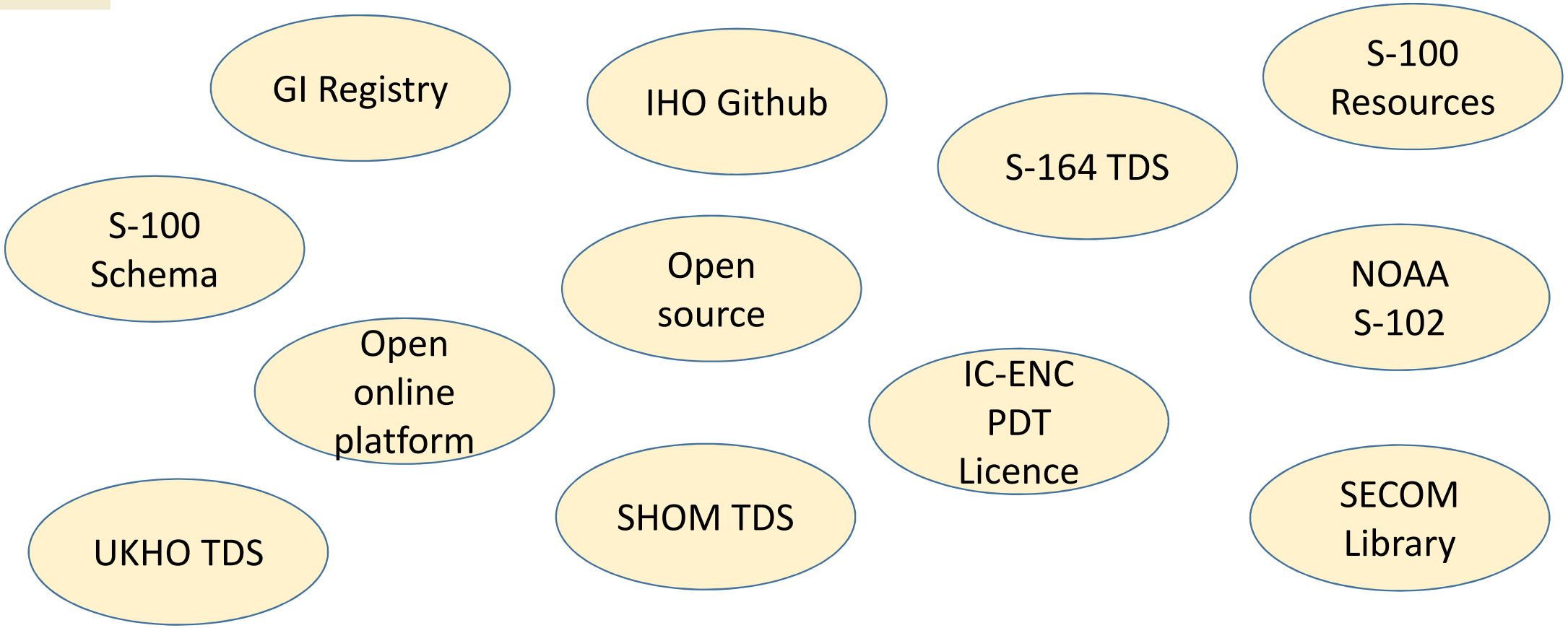
RECOMMENDATIONS

- Materials/TDS/Resources for Testing



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RECOMMENDATIONS

- Testing activities
  - KHOA S-100 testbed project (Sea trial, Usability/Economic impact)
  - NIWC Shore based ECDIS
  - IHO-Singapore lab (Malacca strait, Italian Navy - Vespucci)
  - UK-France Sea trial
  - S-100 Validation Tools

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RECOMMENDATIONS

- The HSSC is invited to:
  - Consider to include S-421/SECOM in the S-100 implementation roadmap
  - Organize a special correspondence group responsible for S-100 testing and demonstration.
  - Develop a testing schedule considering the S-98, S-164 operational version and IEC 61174 5th edition development.
    - Type approval testing by S-164 TDS, Shore test and Sea Trial
    - Test to investigate the views and opinions of mariners
    - Usability test of S-100 data
  - Provide S-100 TDS by IMO member states to ensure smooth progress of S-100 testing
  - Develop a tutorial or guidance on how to implement S-100 from an industry perspective
  - Hold a VTC or workshop to share and discuss S-100 test results with the industry.