EUSBSR
EU STRATEGY FOR THE BALTIC SEA REGION

Policy Area Safe

EUSBSR PA SAFE Operational Advisory Board – “Providing reliable navigational conditions to the Baltic Sea”

Online meeting, 2024-09-23,

Policy Area Coordinators; Seppo Mäkinen, Traficom,
Ulf Siwe, Swedish Maritime Administration,
Emelie Persson Tingström, Swedish Maritime Administration

Interreg Baltic Sea Region

Co-funded by the European Union

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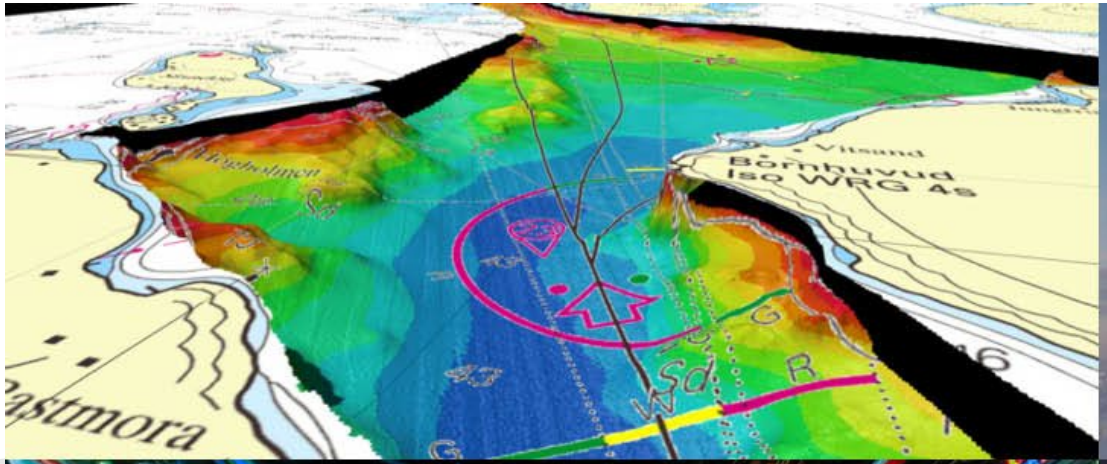
EU STRATEGY FOR THE BALTIC SEA REGION

Policy Area Safe



Agenda

Welcome words

1. Presentation round
2. Inspirational speakers on trends within “providing reliable navigational conditions to the Baltic Sea.”
   a) Smart fairways of the future, Fredrik Karlsson, Innovation coordinator and Head of Simulations at the Swedish Maritime Administration
   b) New services and possibilities with new standards, Benjamin Hell, S-100 coordinator at the Swedish Maritime Administration

   BREAK
3. Tour de table – Thoughts on “providing reliable navigational conditions to the Baltic Sea.”
   Trends, insights, future work, issues, policy needs, comments, ideas
4. Other issues
5. Meeting closure

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Smart fairways of the future

Machine readable nautical information
(Facilitate IMO MASS)

S-100 WORLD

INTERNATIONAL MARITIME ORGANIZATION
IALA
International Electrotechnical Commission
WORLD METEOROLOGICAL ORGANIZATION

S-100 GI Registry

S-100 Tools
Shore based ECDIS
S-100 Viewers

Phase 1

Route Monitoring

- 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

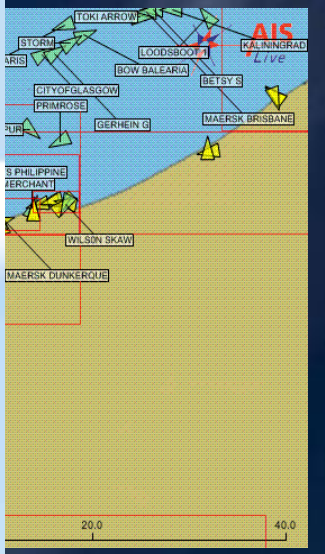
- S-122 Marine Protected Areas
- S-123 Marine Radio Services
- S-125 Marine Aids to Navigation (AtoN)
- S-126 Marine Physical Enviroment
- S-127 Marine Traffic Management
- S-131 Marine Harbour Infrastructure
- S-411 Ice Inforamtion (WMO)
- S-412 Weather and Wave Hazards (WMO)

+

S-100 Products used in Monitoring Mode

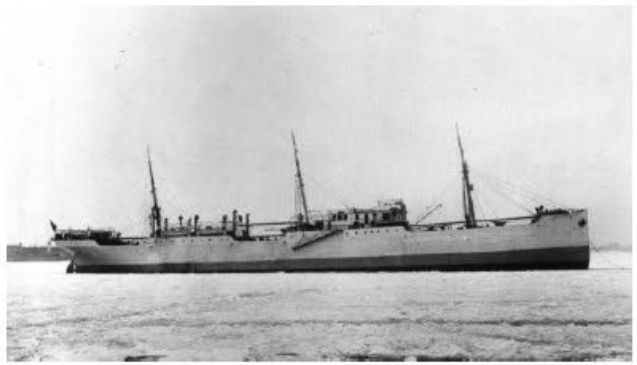
S-123 Radio Services
S-129 UKCM
S-126 Physical Enviroment
S-131 Marine Harbour Infrastructure
S-201 Aton
S-111 Surface Current
S-124 Navigational Warnings
S-98 Interoperability catalogue
Up-to-dateness check using S-128
S-101 ENC
S-57 ENC
Dataset
Feature Catalogue
Portrayal Catalogue
Dual Fuel System
S-125 Marine Aton
S-127 Traffic Management
S-122 Marine Protected Areas
S-411 ICE Information
S-412 Weather and Wave Hazards
S-104 Water Level
S-421 Route Information
S-102 Bathymetric Surface
S-103 Sub-surface Navigation
Safety Depth Contour
Improved Safety

S-97	Guidelines for Creating S-100 Product Specifications	S-98	Data Product Interoperability in S-100 Navigational System	S-99	Operational Procedures for the Organization and Management of the IHO GI registry	S-100	IHO Universal Hydrographic Data Model	S-164	Test Data Set for S-100 and ECDIS Type Approval	S-101 to S-199	International Hydrographic Organization (IHO)
S-101 to S-199	International Association of Marine Aids to Navigation and Lighthouse (IALA)	de S-301 to S-399	Intergovernmental Oceanographic Commission (IOC)	S-401 to S-402	Inland ENC Harmonization Group (IEHG)	S-411 to S414	WMO Service Commission (SERCOM)	S-421 to S-430	International Electrotechnical Commission - TC80 (IEC-TC80)	S-501 to 525	NATO Geospatial Maritime Working Group (GMWG) for Additional Military Layers (AML)



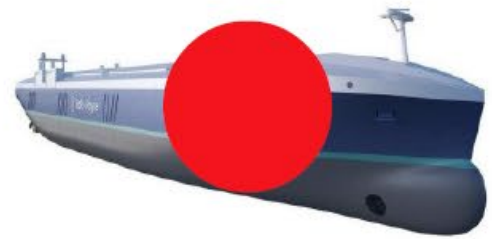
A possible new maritime technology jump

From wind power to engine

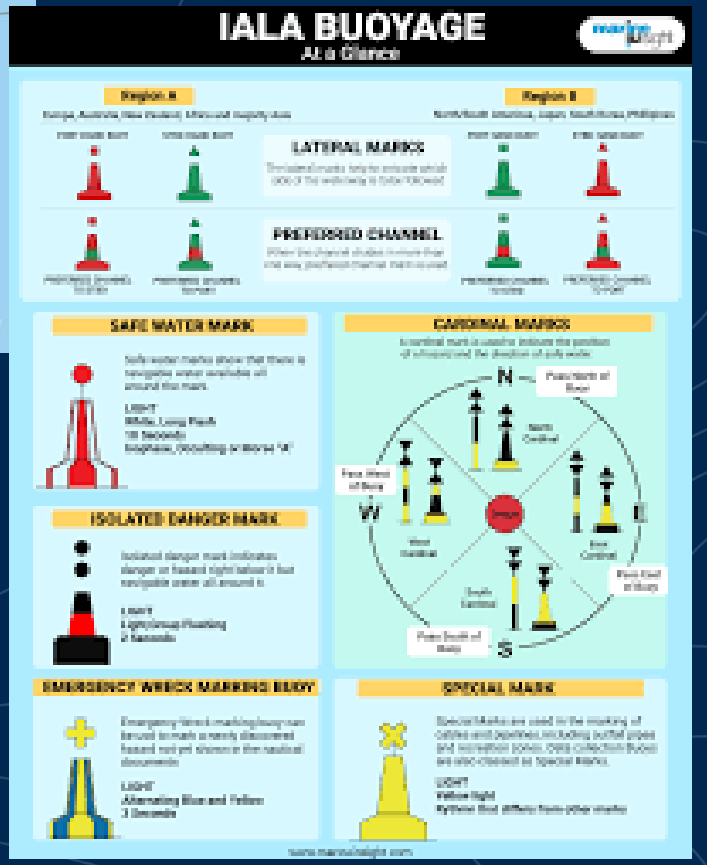


Containerization

Autonomy



IALA - International Association of Marine Aids to Navigation and Lighthouse Authorities



- Standards as Maritime Buoyage Systems
- ~ 100 national members and 200 Industry members

SWEDISH MARITIME ADMINISTRATION

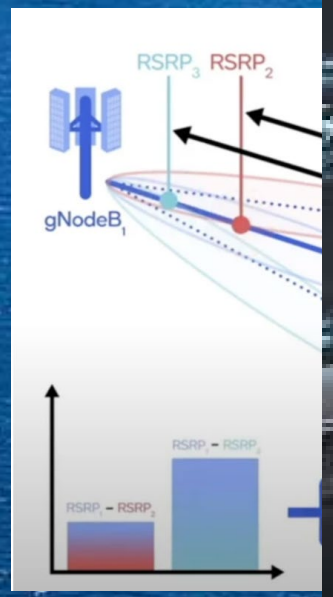
IALA - International Association of Marine Aids to Navigation and Lighthouse Authorities

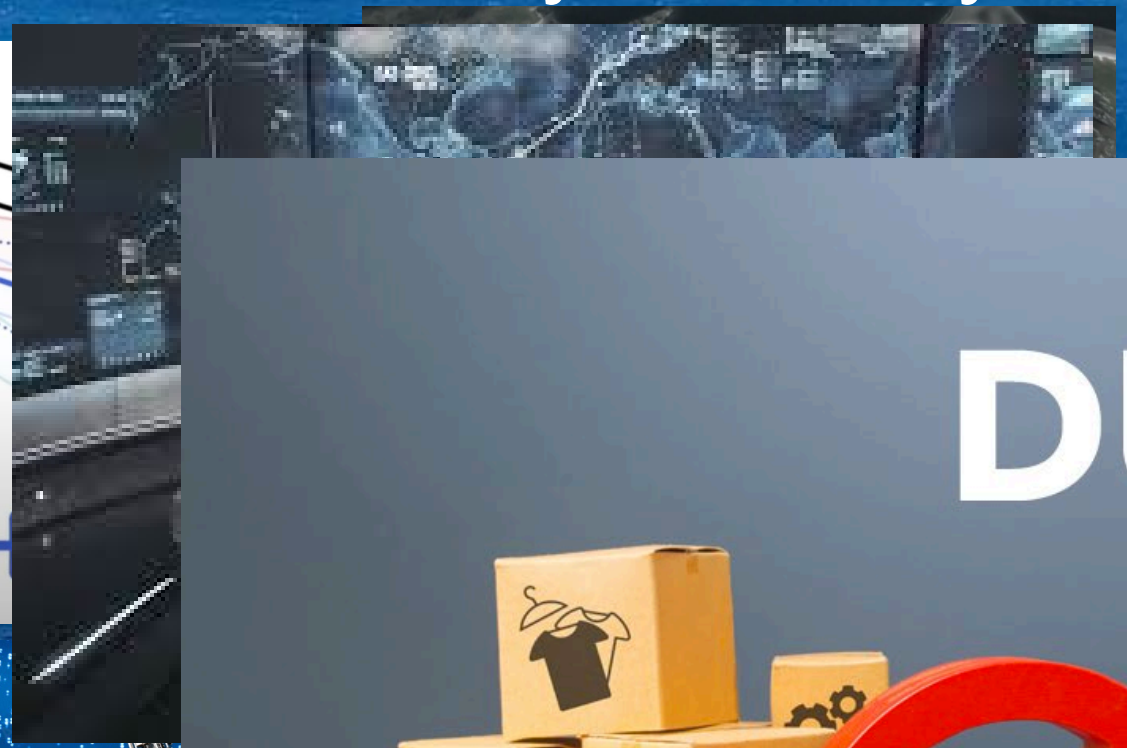
Standards and recommendations regarding;

- VTS information
- Positioning (R-mode)
- Communication (VDES)
- Traffic organization (VTS)
- MASS
- “Mixed traffic” (Auto vs conv)
- Reporting (SRS/VTS)
- Port interaction (JIT)

SWEDISH MARITIME ADMINISTRATION

Does the fairway have any role in this transition?





Future fairway will [probably…] to greater extent contain…

- **Infrastructure for data communication**
- **Infrastructure for “remote” positioning [VTS, Remote operations, pilotage], radar, Lidar, 5/6G, R-mode, CCTV, NFC**
- **Fewer but smarter floating devices… (Dynamic fairway, telemetry about status, position and more)**
- **Dual-Use sensors (environmental, SAR, spil detection)**
- **Drone take-of and landing possibilities [Sensor on demand…]**

SWEDISH MARITIME ADMINISTRATION

3 ongoing projects…

I. Future Fairways:

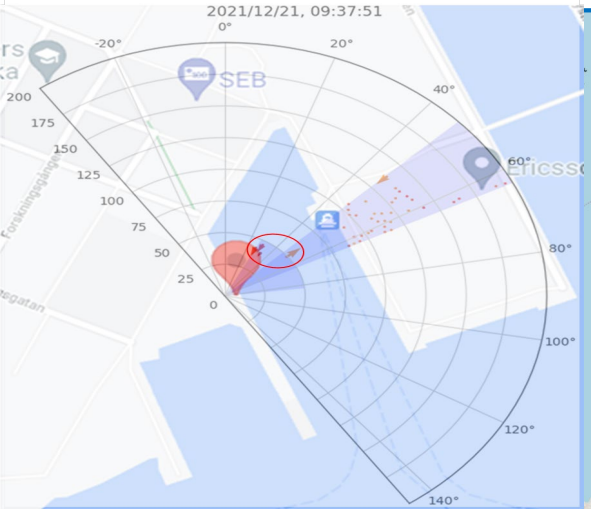
- Dynamic Fairway
- Connected fairway
- Maintenance free fairway

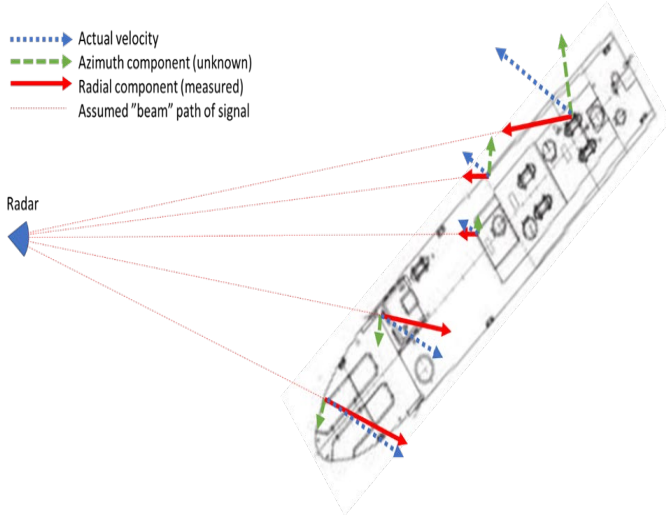
II. EPA - Enhanced Perception Ashore

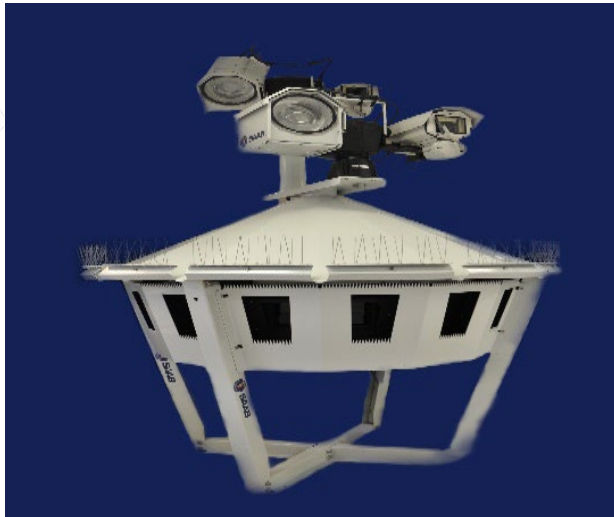
- Shore Sensors
- Automotive radar
- Maintenance free fairway

III. Remote Pilotage

- manoeuvring to quay
- Smal object detection
- Decision support







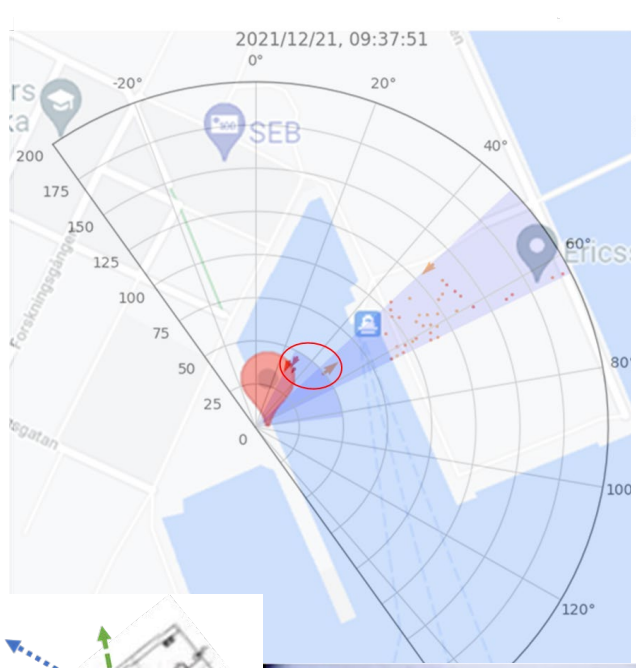
EPA - Enhanced Perception Ashore

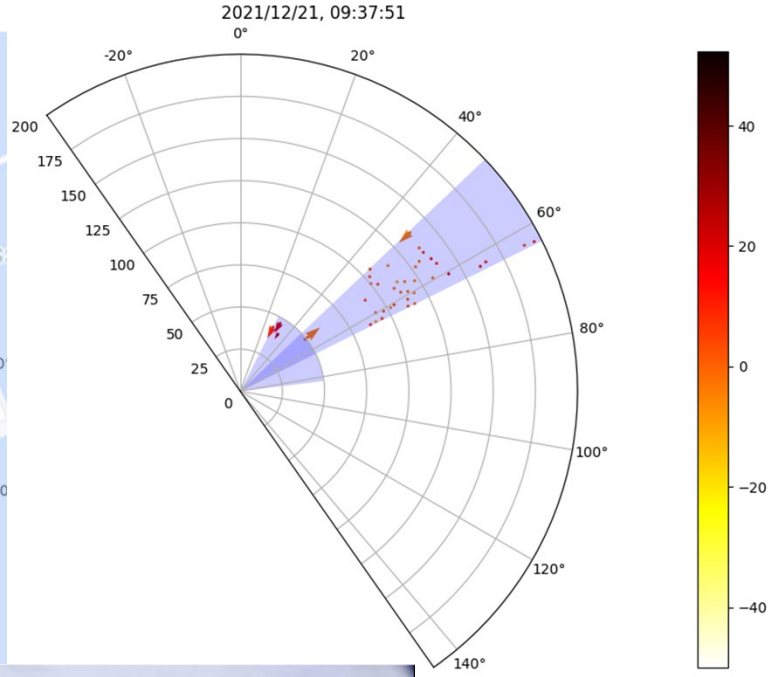
Automotive radar

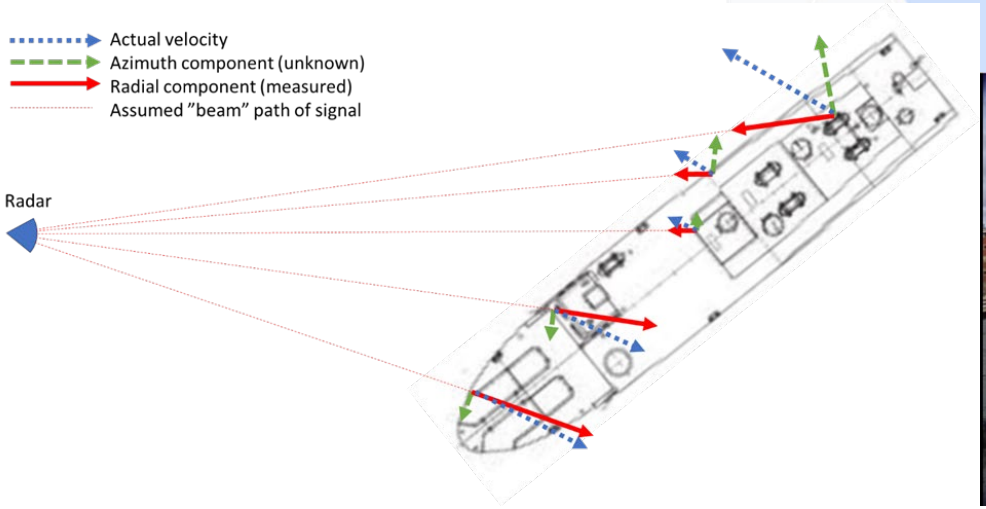
Continental ARS308-C

Two sectors long and short range

Clustering algorithms for object detection







SWEDISH MARITIME ADMINISTRATION

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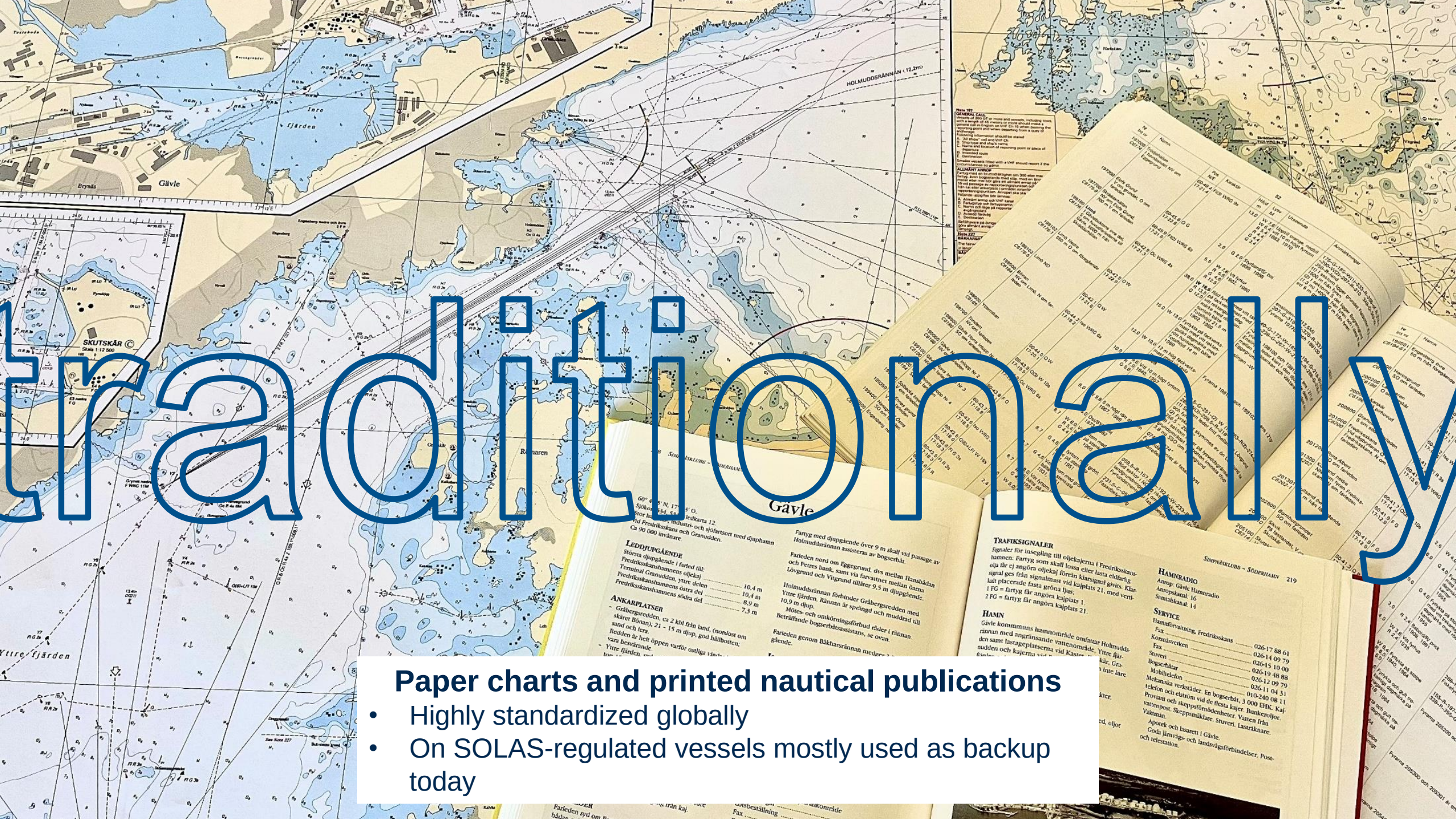
New services and possibilities with new standards

S-100: A maritime geodata standard framework for navigation and more

Benjamin Hell (S-100 coordinator Swedish Maritime Administration)
benjamin.hell@sjofartsverket.se

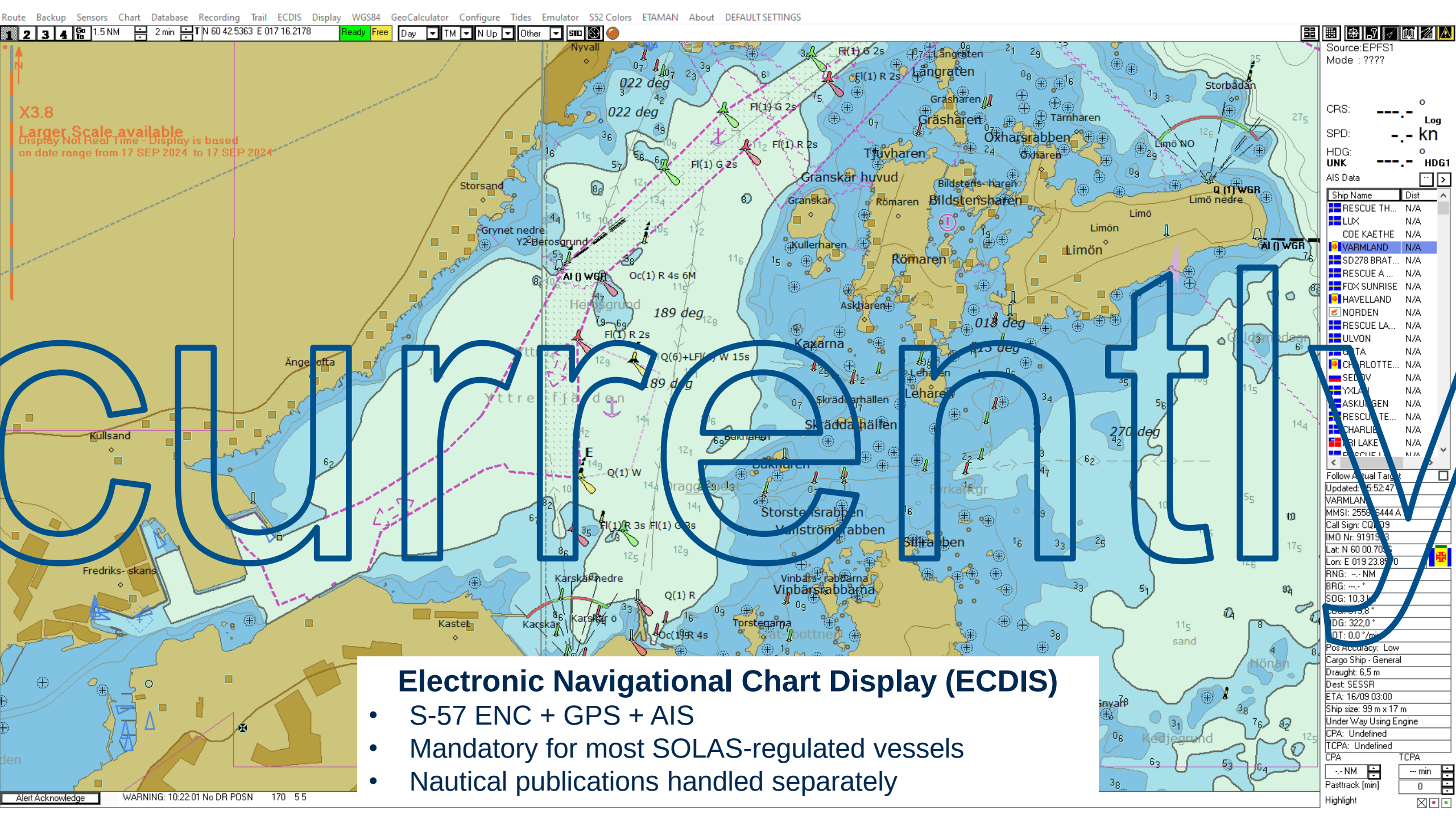
IHO International Hydrographic Organization

SJÖFARTSVERKET



Paper charts and printed nautical publications

- Highly standardized globally
- On SOLAS-regulated vessels mostly used as backup today



currently

Electronic Navigational Chart Display (ECDIS)

- S-57 ENC + GPS + AIS
- Mandatory for most SOLAS-regulated vessels
- Nautical publications handled separately

In the future

S-100:

- Geodata centered, not map centered
- Modular, with various possible data layers
- Machine readable
- More flexible and robust delivery to end user
- Real time data and services

See even:

- https://iho.int/en/introduction-0
- https://iho.int/en/s-100-implementation-strategy

Machine readable nautical information
(Facilitate IMO MASS)

S-100 WORLD

INTERNATIONAL MARITIME ORGANIZATION
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WORLD METEOROLOGICAL ORGANIZATION

S-100 GI Registry

S-100 Tools
Shore based ECDIS
S-100 Viewers

Phase 1

Route Monitoring

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

Critical Framework

- I H O Geospatial Information Registry
- S-98 Interoperability Specification
- S-100 Universal Hydrographic Data Model
- S-128 Catalogue of Nautical Products
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- S-131 Marine Harbout Insfrastructure
- S-411 Ice Inforamtion (WMO)
- S-412 Weather and Wave Hazards (WMO)

+

S-100 Products used in Monitoring Mode

S-123 Radio Services
S-129 UKCM
S-98 Interoperability catalogue
S-126 Physical Enviroment
S-131 Marine Harbour Infrastructure
S-201 Aton
S-111 Surface Current
S-124 Navigational Warnings
S-125 Marine Aton
S-127 Traffic Management
S-122 Marine Protected Areas
S-412 Weather and Wave Hazards
S-102 Bathymetric Surface
S-103 Sub-surface Navigation

Vessel
Tide level
Nominal Bottom level
squat
UKC
Channel Depth

Up-to-dateness check using S-128
S-101 ENC
S-57 ENC
Dataset
Feature Catalogue
Portrayal Catalogue
Dual Fuel System
S-411 ICE Information
Under Keel Clearance Management (Optimised Loading)
Water Level Adjustment using S-102 and S-104
S-104 Water Level
S-421 Route Information
Safety Depth Contour Improved Safety

ebb tide
Vessel
high tide
tidal range
low tide
flood tide

Highlights enabled by S-100 products

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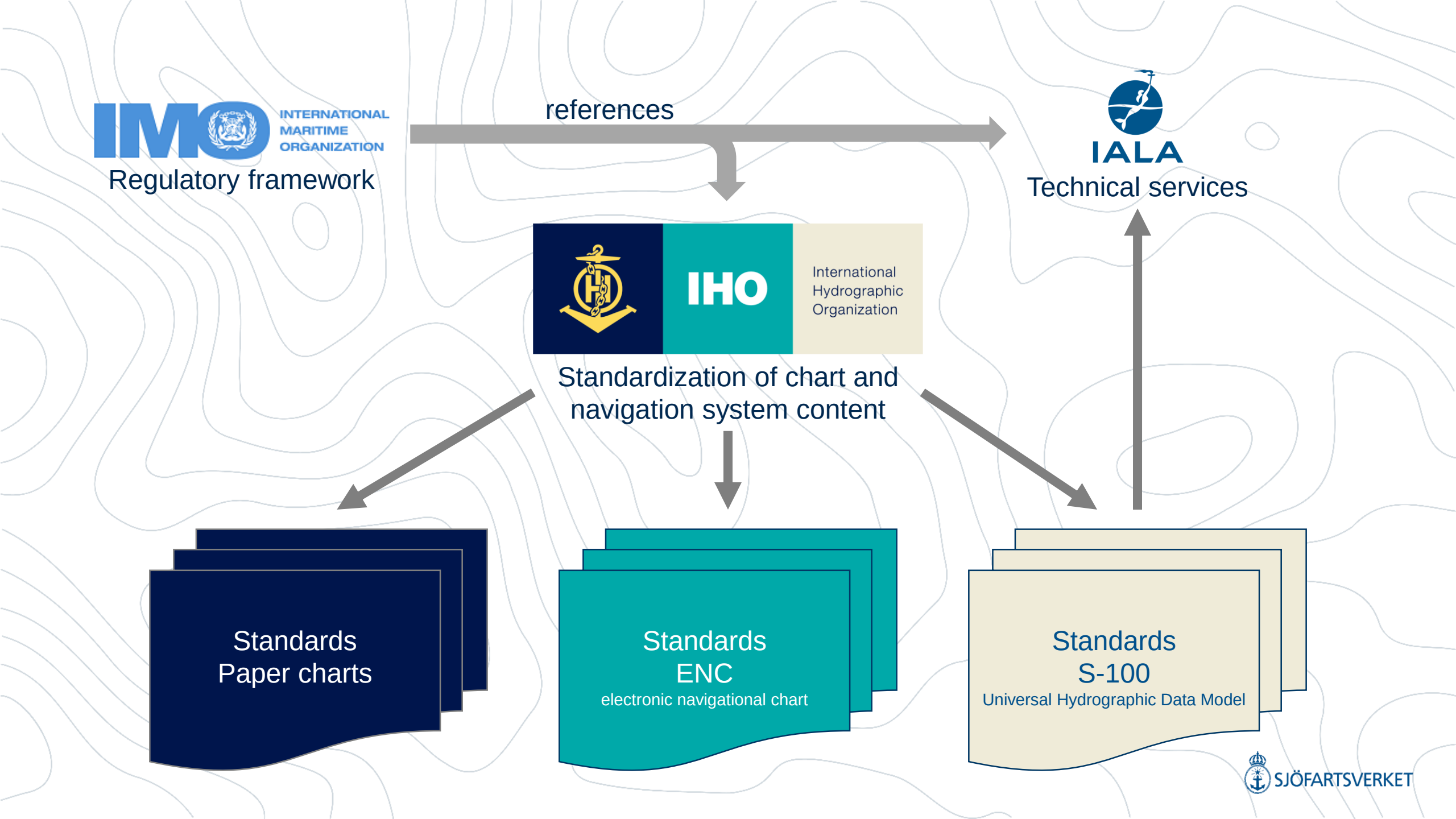
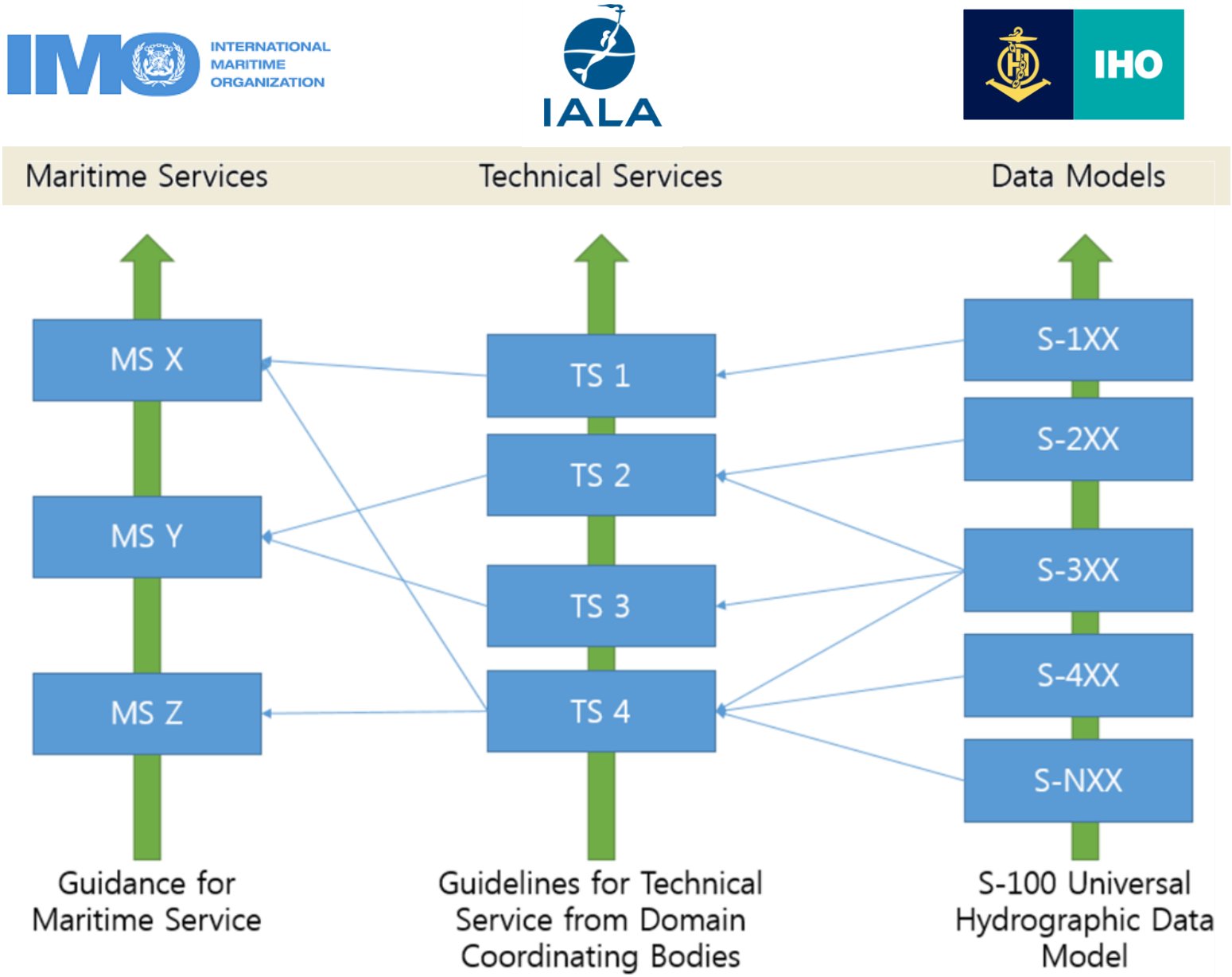

IMO
INTERNATIONAL MARITIME ORGANIZATION
Regulatory framework
references
IALA
Technical services
IHO
International Hydrographic Organization
Standardization of chart and navigation system content
Standards
Paper charts
Standards
ENC
electronic navigational chart
Standards
S-100
Universal Hydrographic Data Model
SJÖFARTSVERKET



SJÖFARTSVERKET

IMO:s Maritime Services / e-Navigation

Maritime Service	S-100
MS 1 – Vessel traffic service	S-127, S-212, S-210 (and others)
MS 2 – Aids to navigation service	S-125 AtoN status, S-124 nav.warn, S-201 AtoN data…
MS 3 – (Reserved for future use)	-
MS 4 – Port support service	S-131 port infrastructure, S-421 route exchange, S-211
MS 5 – Maritime safety information service	S-124 navigational warnings, S-412 weather warnings
MS 6 – Pilotage service	Tbd., S-127, S-421
MS 7 – Tug service	Tbd.
MS 8 – Vessel shore reporting	S-211 m.fl., S-421, EMSWe, complex!
MS 9 – Telemedical assistance service	Tbd.
MS 10 – Maritime assistance service	Tbd.
MS 11 – Nautical chart service	S-101 ENC, S-102 depth, S-125 AtoN status, S-122 MPA
MS 12 – Nautical publications service	Flera S-12x, S-128 catalogue
MS 13 – Ice navigation service	S-411 ice info, S-124+412 MSI, S-102 depth
MS 14 – Meteorological information service	S-413 conditions, S-414 observations, S-412 hazards
MS 15 – Real-time hydrographic and environmental information services	S-104 water level, S-111 currents, S-129 UKCM
MS 16 – Search and rescue service	Tbd., S-421, search patterns/areas, drift patterns

Implementation time frame

S-124 navigational warnings

S-104 water level service

S-102 depth data in fairways

S-101 ENC

SJÖFARTSVERKET

2023 | 2024 | 2025 | **2026** | 2027 | 2028 | **2029**

S-100 ECDIS legal

IHO

INTERNATIONAL MARITIME ORGANIZATION

IEC

IHO approved product specifikations

S-101 ENC

S-102 high-res depth

S-104 water level

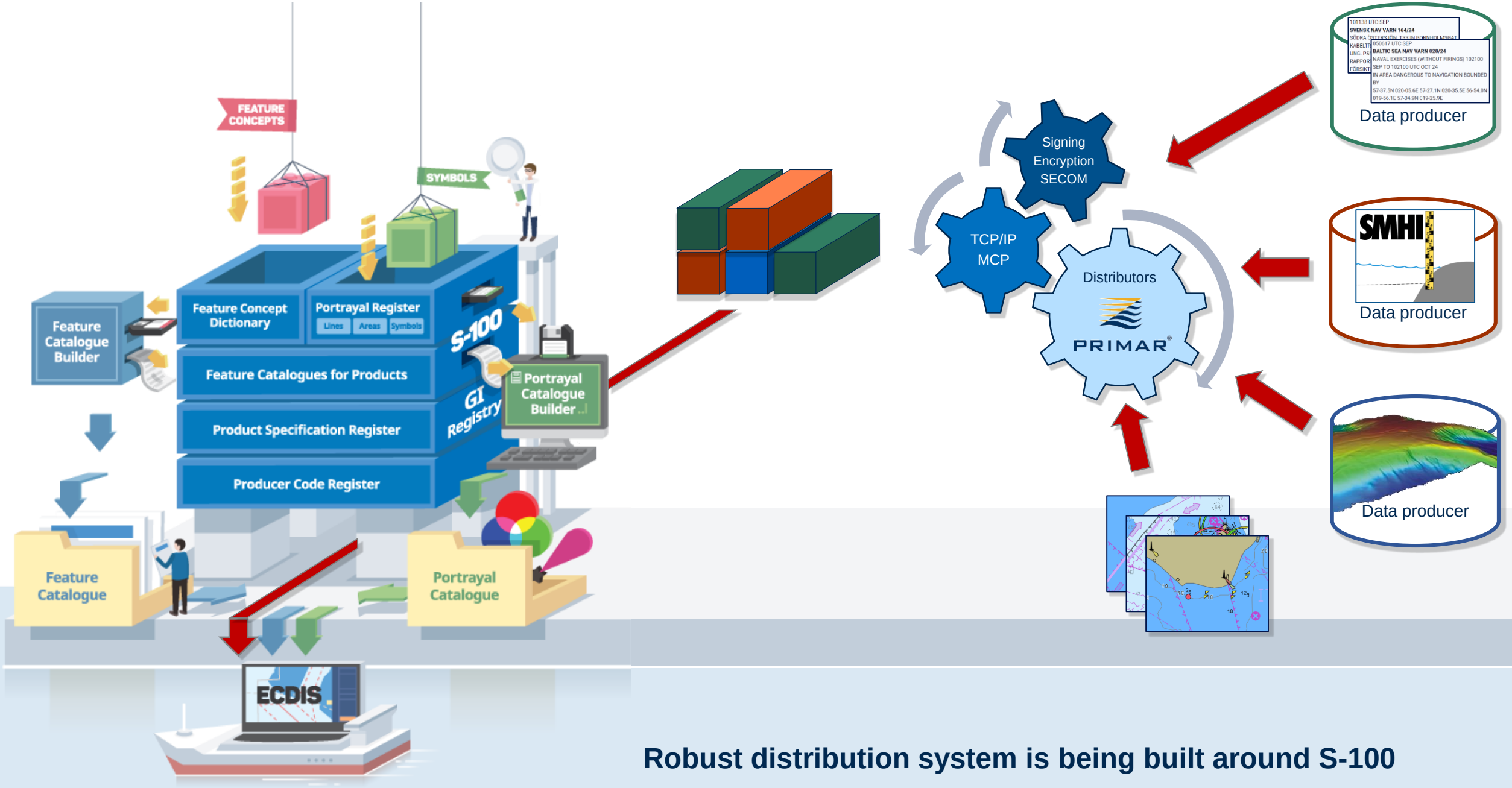
S-111 surface currents

S-124 navigational warnings

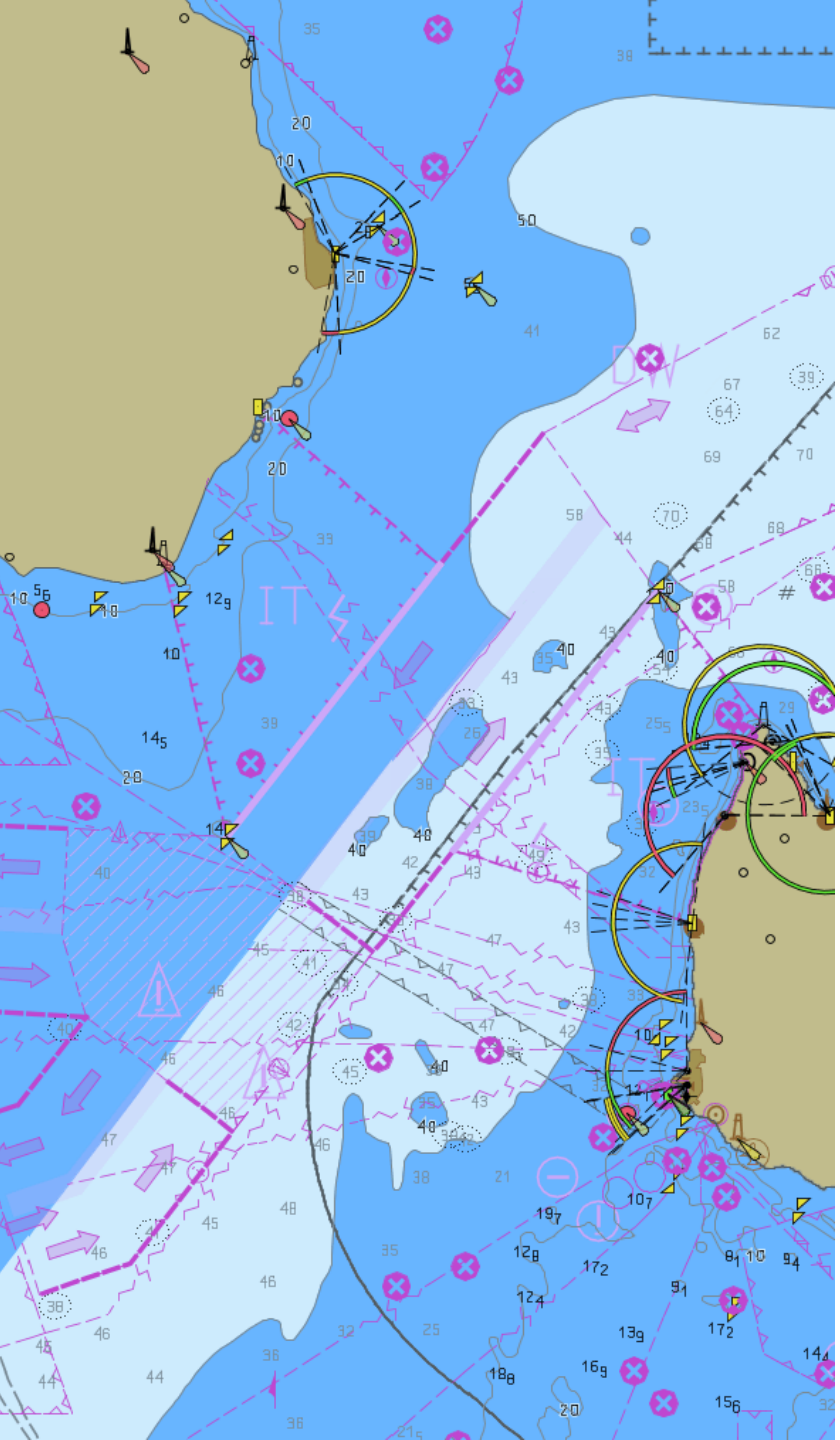
S-129 Under Keel Clearance Management

S-100 ECDIS mandatory for new installations

SJÖFARTSVERKET



Robust distribution system is being built around S-100



Decision makers / e-navigators:

- Remember S-100 when developing systems for maritime data, especially geodata and data to/from vessels
- All S-100 based products share a common ground regarding data models, formats, visualisation, compatibility and distribution possibilities
- Currently, not that many systems are S-100 compatible. But the development hopefully progresses relatively fast.
- See S-100 as an opportunity and a toolset to enable data flows between different systems and players
- S-100 will become relevant for many more organisations, not only hydrographic offices

SJÖFARTSVERKET

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Policy Area Safe

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