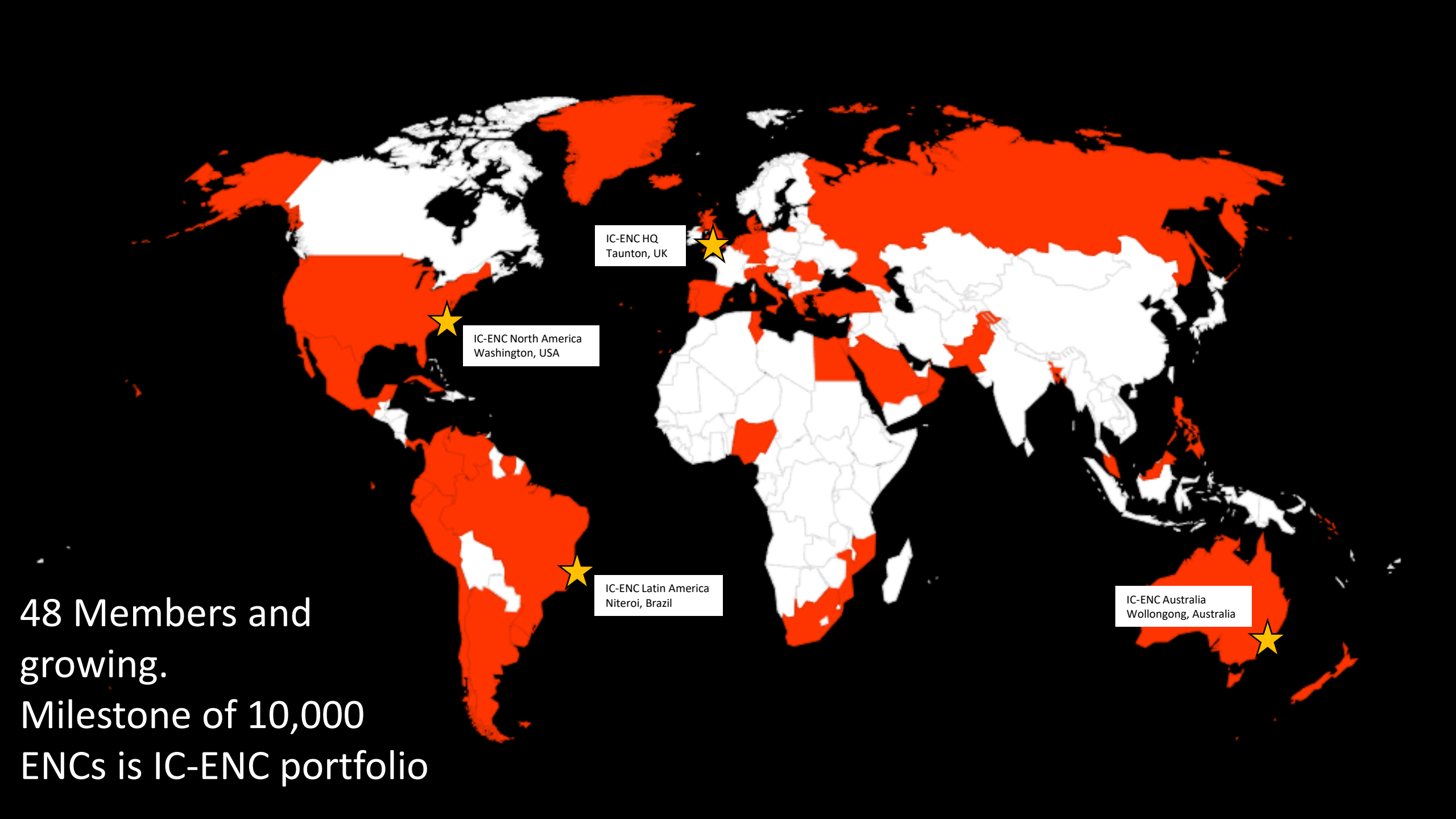
IC-ENC Working together to assure navigational safety

HSSC15 STAKEHOLDERS' SESSION 1

PS5 IC-ENC

Wednesday 7 June 2023

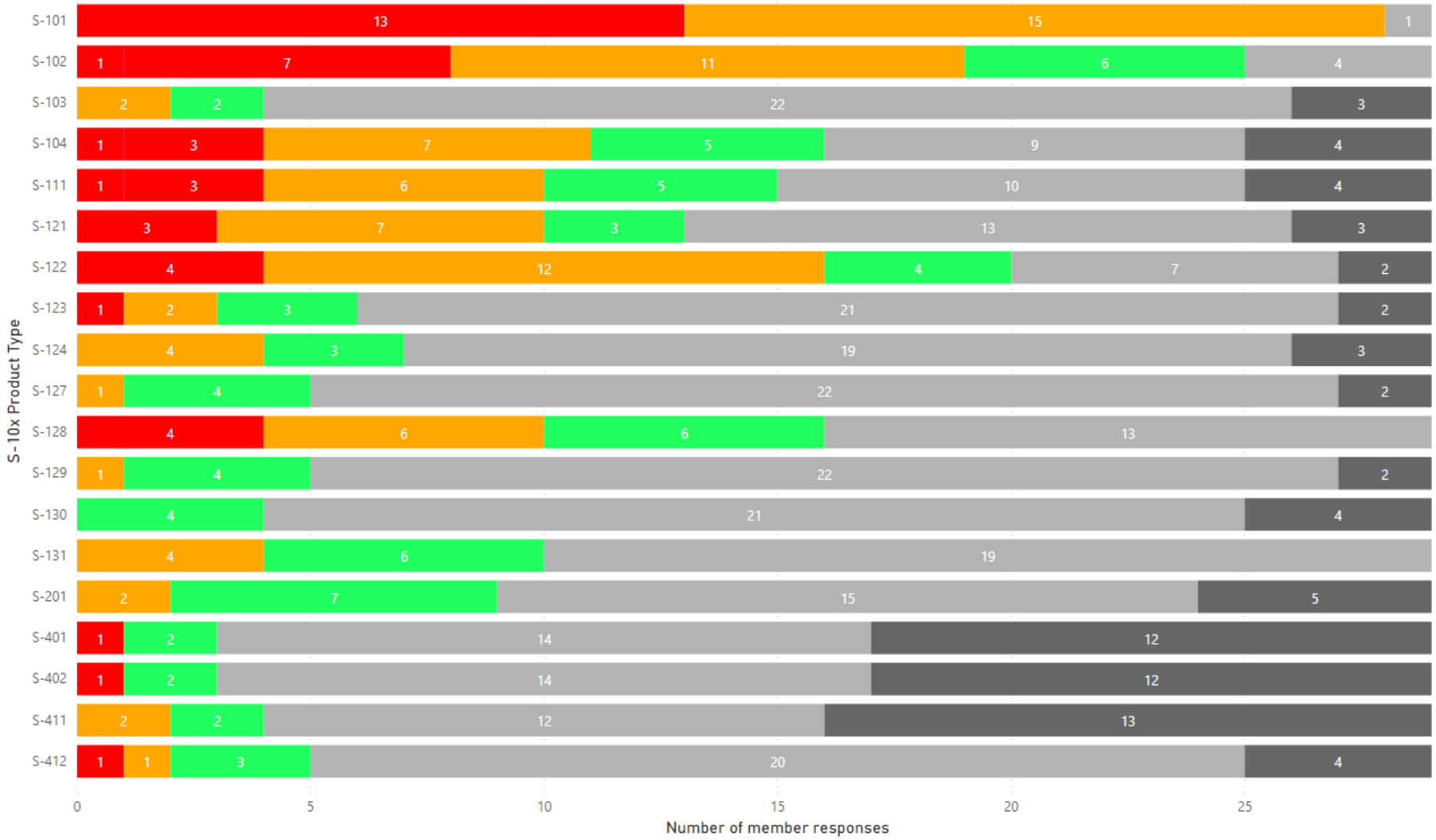
Su Marks, IC-ENC S-100 Manager



48 Members and growing.
Milestone of 10,000 ENCs is IC-ENC portfolio

IC-ENC

2022 IC-ENC Members S-10x Production Plans Survey



Timescale	
Now/very near	Now or expected during 2022
Near-term	2023 - 2024
Medium-term	Within the next 5 years - by 2027
Long-term	Within the next 10 years - by 2032
Unknown	Unknown
N/A	N/A

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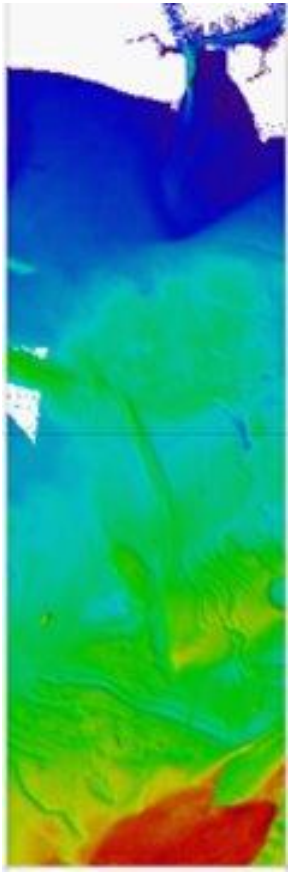
To support our Members with their S-100 requirements…



…IC-ENC is developing Production Support, Validation, Distribution and Revenue Management services for:

- S-101 - ENC (and *Conversion Readiness Service* (S-57 to S-101))
- S-102 - Bathymetric Surface Product
- S-104 - Water Level Information for Surface Navigation
- S-111 - Surface Currents
- S-122 - Marine Protected Areas
- S-128 - Catalogue of Nautical Products

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ENC Service developments

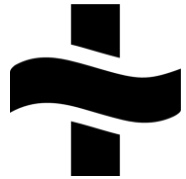
IC-ENC

S-57 ENC Validation

- IC-ENC conducts independent validation of data received from members
  - Ingest and registration checks – DMD
  - ECDIS load checks – 7Cs eGlobe, Transas 4000, JRC
  - Validation checks – 7Cs Analyzer, dKart Inspector

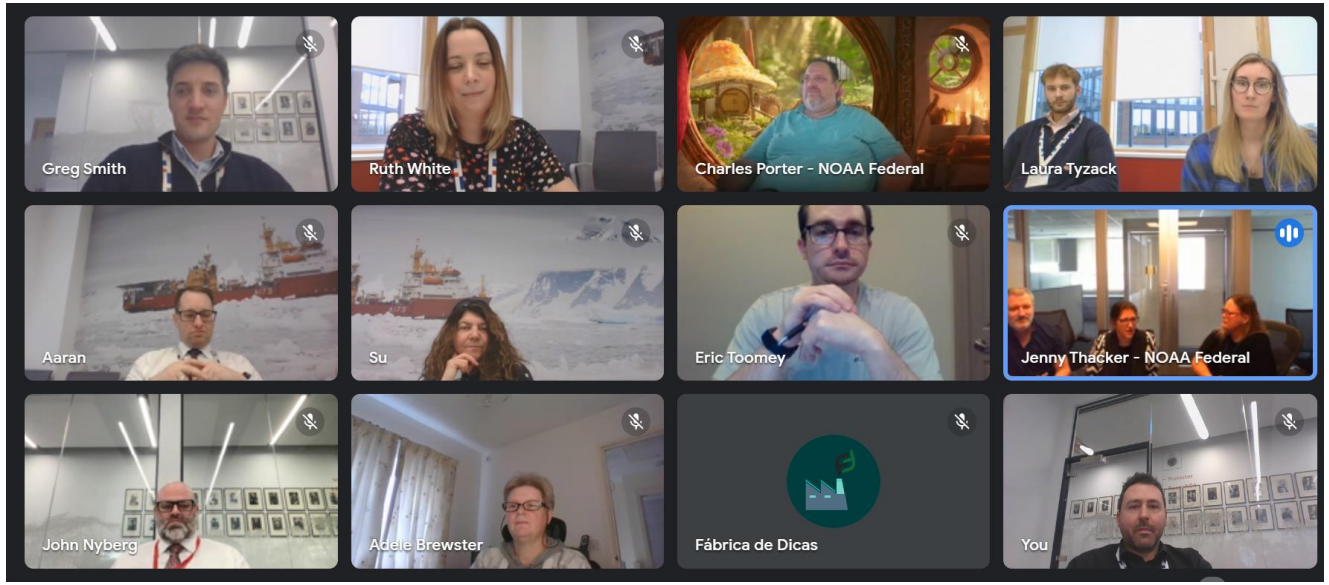
- Additional horizontal/vertical consistency checks and checks for overlaps/gaps are conducted

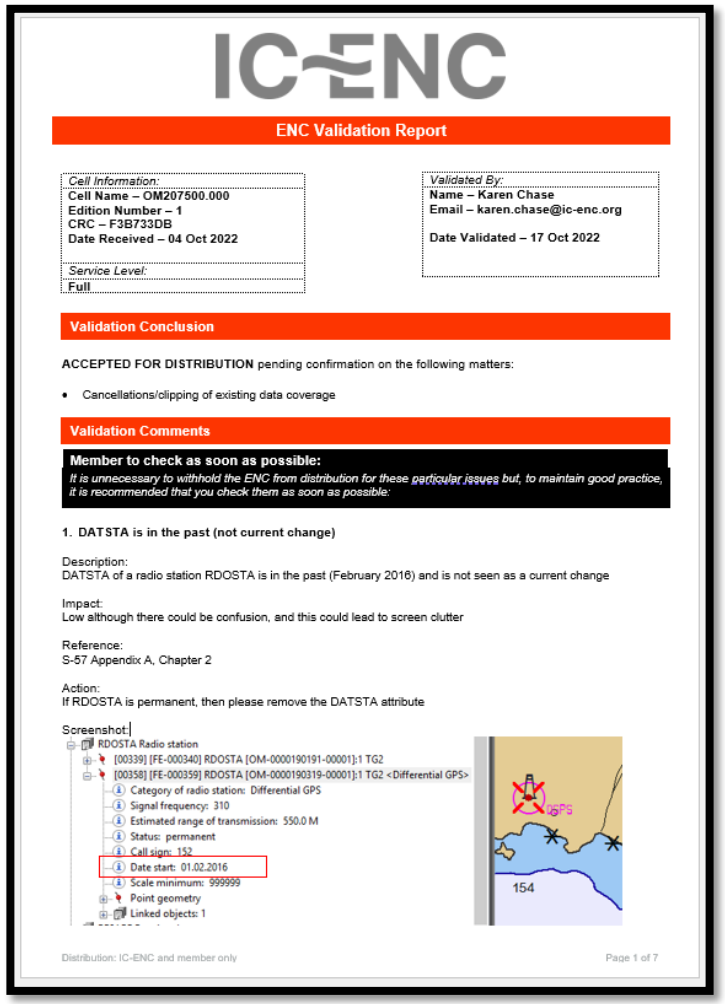
- A validation feedback report is provided to the member for each validation conducted



S-57 ENC Validation – 2022 figures

- Over 15000 Validations completed in 2022.
- 782 New Cells released to VARs.
- **486 ENC files containing safety critical issues prevented from distribution.** 1400 with improvement recommendations





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ENC Validation Report

Cell Information:
Cell Name – OM207500.000
Edition Number – 1
CRC – F3B733DB
Date Received – 04 Oct 2022

Service Level:
Full

Validated By:
Name – Karen Chase
Email – karen.chase@ic-enc.org

Date Validated – 17 Oct 2022

Validation Conclusion

ACCEPTED FOR DISTRIBUTION pending confirmation on the following matters:

- Cancellations/clipping of existing data coverage

Validation Comments

Member to check as soon as possible:
It is unnecessary to withhold the ENC from distribution for these particular issues but, to maintain good practice, it is recommended that you check them as soon as possible:

1. DATSTA is in the past (not current change)

Description:
DATSTA of a radio station RDOSTA is in the past (February 2016) and is not seen as a current change

Impact:
Low although there could be confusion, and this could lead to screen clutter

Reference:
S-57 Appendix A, Chapter 2

Action:
If RDOSTA is permanent, then please remove the DATSTA attribute

Screenshot:

RDOSTA Radio station
[00339] [FE-000340] RDOSTA [OM-0000190191-00001]:1 TG2
[00358] [FE-000359] RDOSTA [OM-0000190319-00001]:1 TG2 <Differential GPS>
Category of radio station: Differential GPS
Signal frequency: 310
Estimated range of transmission: 550.0 M
Status: permanent
Call sign: 152
Date start: 01.02.2016
Scale minimum: 999999
Point geometry
Linked objects: 1

154

Distribution: IC-ENC and member only

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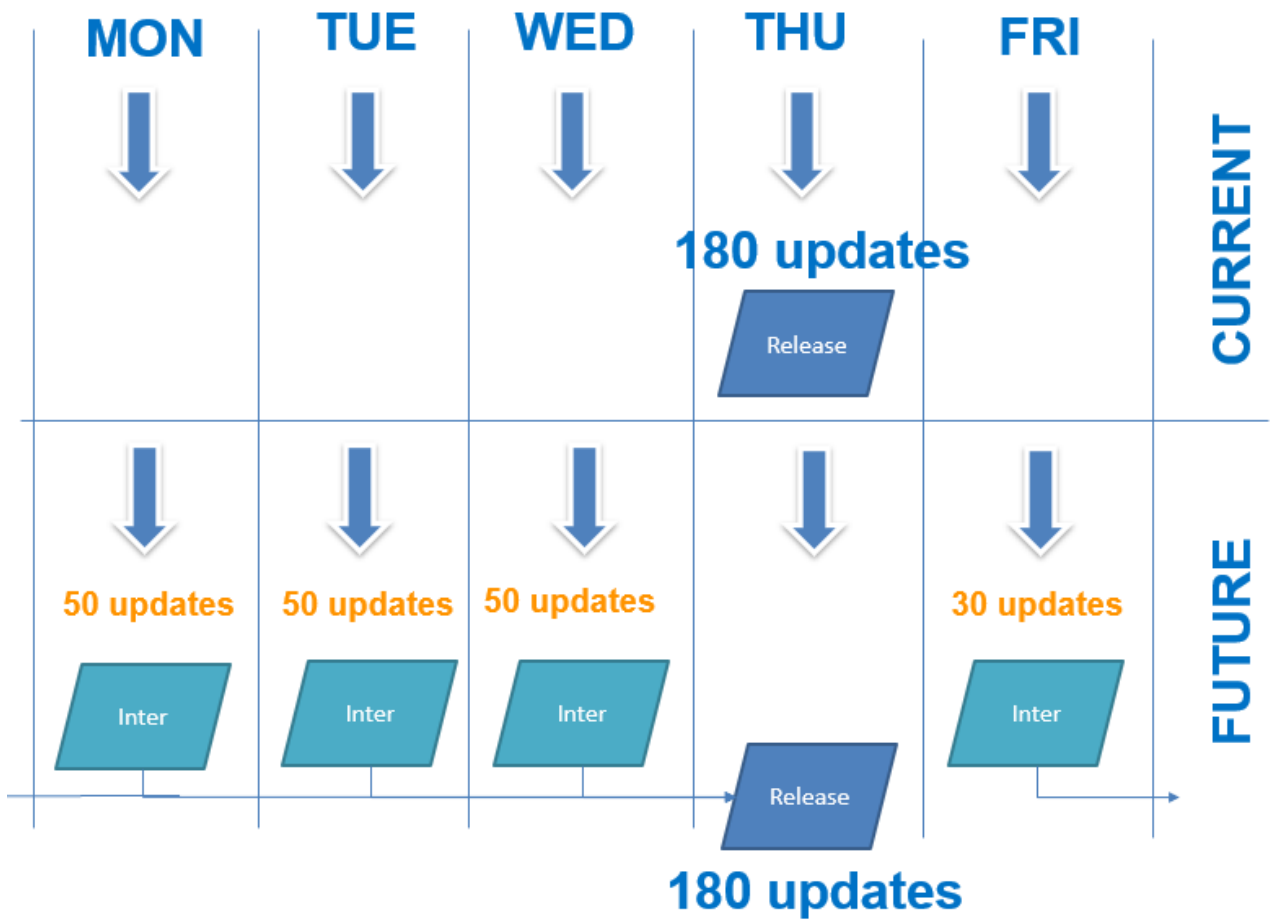
Frequency of ENC release to VARs



- **This week** we will publish a Daily Exchange Set to VARs to allow them to develop their receipt/upload processes.
- Process has been built to be able to increase frequency of release even further (i.e. multiple times per day) as required in the S100 era.

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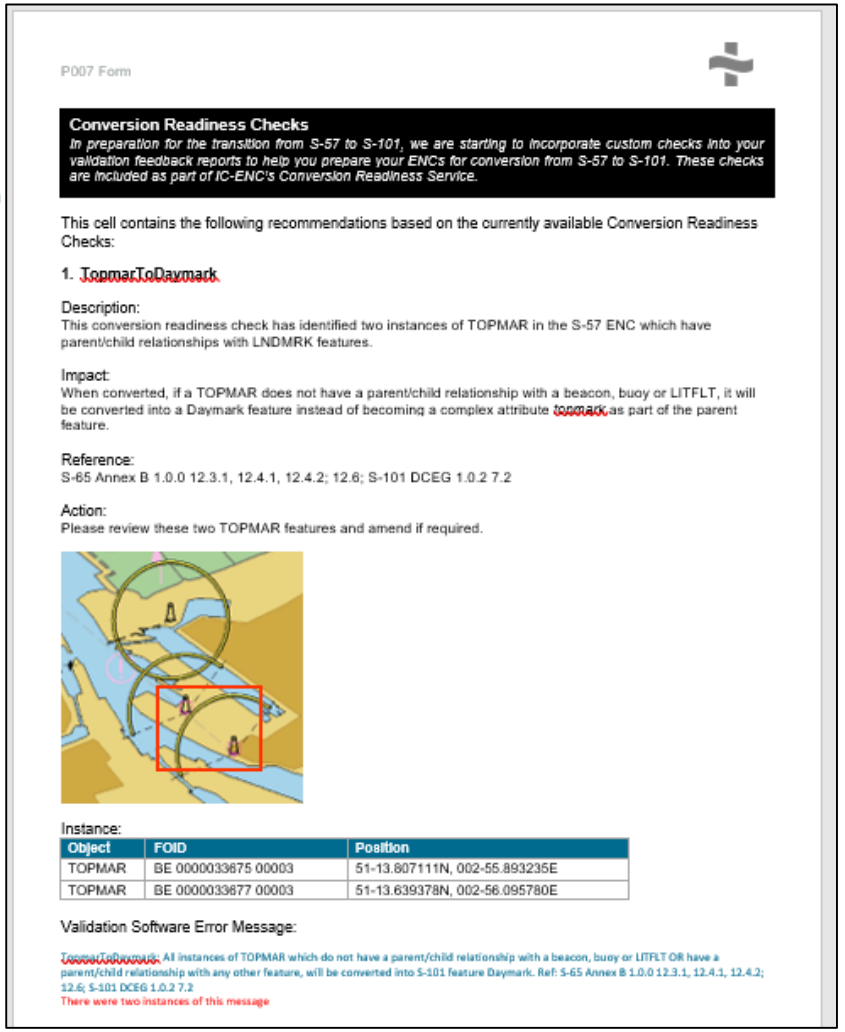
ENC Conversion Readiness Service

- Support members in optimising their S-57 ENCs for conversion to S-101, i.e. “conversion ready ENCs”
- This service is an extension of the S-57 Validation Service and is now being performed on all base cell validations (New cells, New Editions).
- Key components:
  - A set of 20 Conversion Readiness Checks – SevenCs Analzyer (check files have been made available to Members)
  - Sample assessment of datasets - 10 ENCs from each Member.
  - Software tool testing
  - ENC Global query capability
  - IC-ENC Technical Conferences



P007 Form

Conversion Readiness Checks

In preparation for the transition from S-57 to S-101, we are starting to incorporate custom checks into your validation feedback reports to help you prepare your ENCs for conversion from S-57 to S-101. These checks are included as part of IC-ENC's Conversion Readiness Service.

This cell contains the following recommendations based on the currently available Conversion Readiness Checks:

1. TopmarToDaymark

Description:
This conversion readiness check has identified two instances of TOPMAR in the S-57 ENC which have parent/child relationships with LNDMRK features.

Impact:
When converted, if a TOPMAR does not have a parent/child relationship with a beacon, buoy or LITFLT, it will be converted into a Daymark feature instead of becoming a complex attribute topmark as part of the parent feature.

Reference:
S-65 Annex B 1.0.0 12.3.1, 12.4.1, 12.4.2; 12.6; S-101 DCEG 1.0.2 7.2

Action:
Please review these two TOPMAR features and amend if required.

Instance:

Object	FOID	Position
TOPMAR	BE 0000033675 00003	51-13.807111N, 002-55.893235E
TOPMAR	BE 0000033677 00003	51-13.639378N, 002-56.095780E

Validation Software Error Message:

TopmarToDaymark: All instances of TOPMAR which do not have a parent/child relationship with a beacon, buoy or LITFLT OR have a parent/child relationship with any other feature, will be converted into S-101 feature Daymark. Ref: S-65 Annex B 1.0.0 12.3.1, 12.4.1, 12.4.2; 12.6; S-101 DCEG 1.0.2 7.2
There were two instances of this message

Example validation report output

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S-10x Service developments

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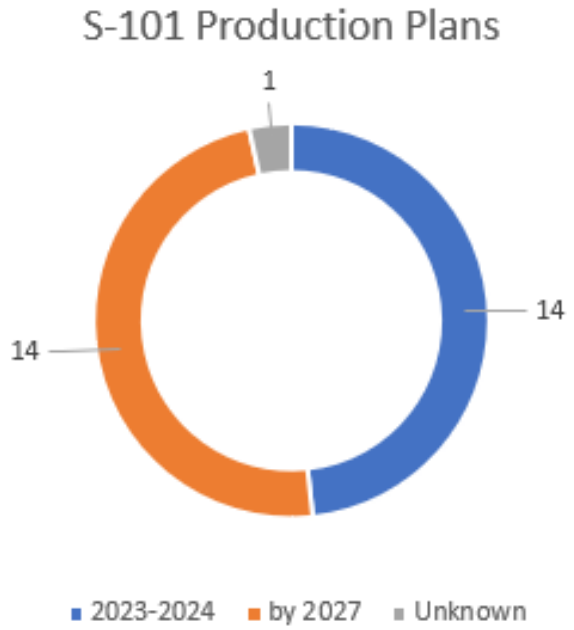
S-101 Service

S-101 Electronic Navigational Chart (ENC):

Aim:

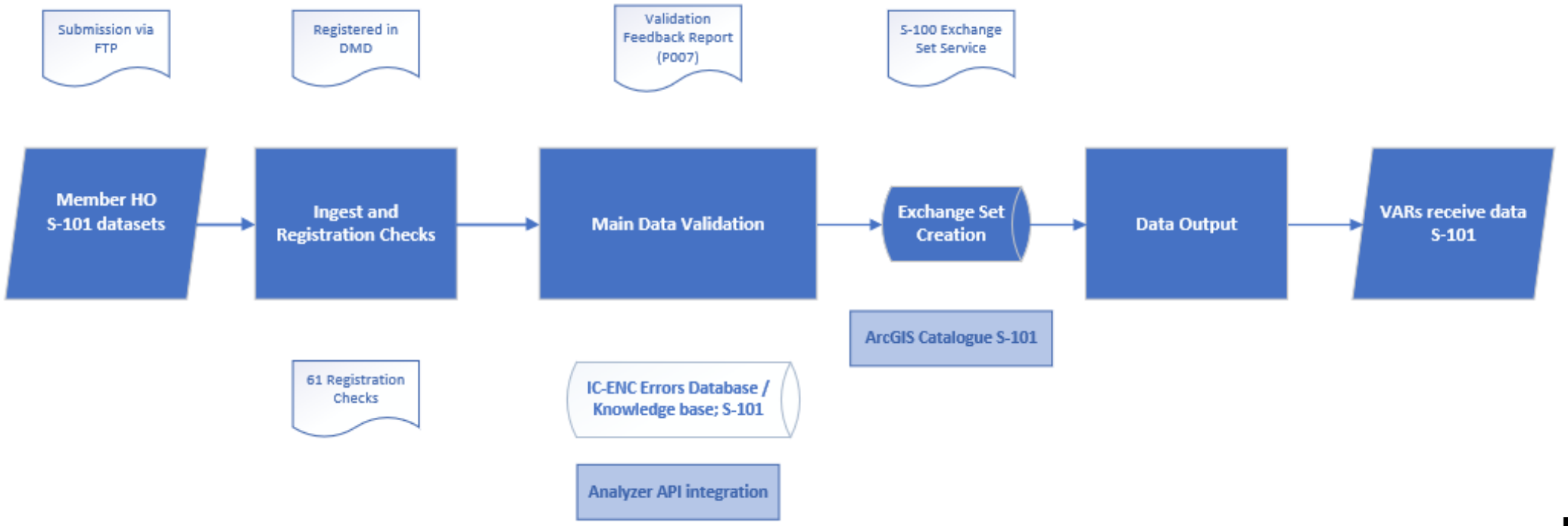
- Establish an end-to-end S-101 service, data ingest, assessment and data output



	Strategic view	Service Vision		Service Description		Product Profile		Technical Development - Proof of Concept					PDT License			Exchange Set Service	Digital Signatures	Technical Development - Full		
Service	Steering Committee endorse RENC service	Draft Vision	Vision Approved by Members	Draft Description	Description Approved by Members	Draft Product Profile	Product Profile Approved by Members	Draft Initial Validation (Registration/Custom) Checks	Initial Validation (Registration) Checks Approved	Ingest and Initial Validation / Registration Process built	Initial Release Process built	Milestone: Proof of Concept service available to Members and Intermediaries	Discrete products available under PDT license	IC-ENC initial service available under PDT License	PDT feedback loop established	Full S-100 Exchange Set (S-100 Part 15)	Full Digital Signatures (S-100 Part 15)	Draft Metadata Template	Metadata Template Approved by Members	Review of Vision, Description & Product Profile. (Re)Approved by Members
				2022-Q1	2022-Q2	2022-Q1	2022-Q2	2022-Q1	2022-Q2	2022-Q2	2022-Q4	2022-Q4	2022-Q4	2022-Q4	2022-Q4	2022-Q3	2022-Q4	2023	2023	2023
S-101	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	8 - Complete (ahead of schedule)	Yes	2 - Started and on track	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	2 - Started and on track	1 - Not due to start yet	1 - Not due to start yet

IC-ENC

S-101 Service



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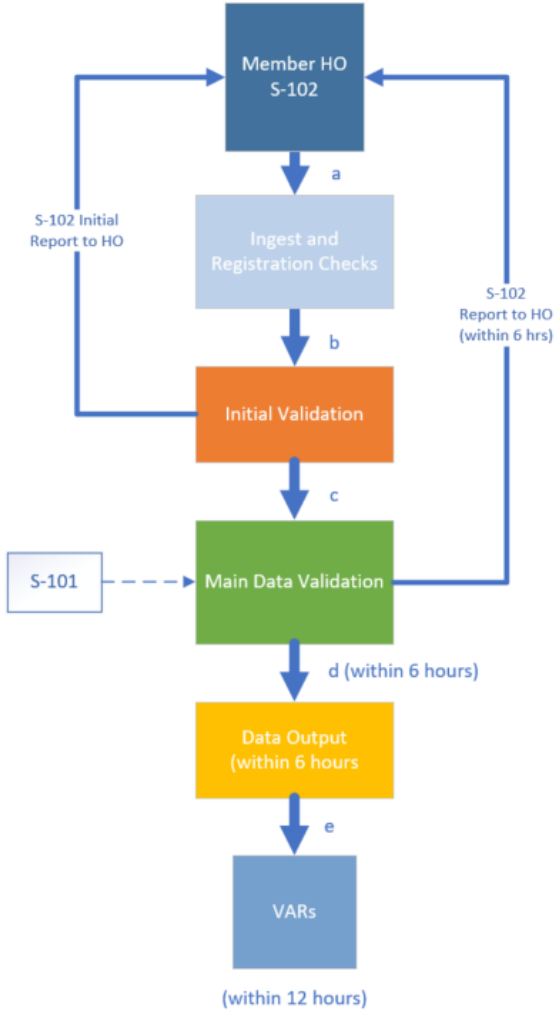
S-102 Service

S-102 Bathymetric Surface Product:

Aim:

- Establish an end-to-end S-102 service, data ingest, assessment and data output



	Strategic view	Service Vision		Service Description		Product Profile		Technical Development - Proof of Concept					PDT License			Exchange Set Service	Digital Signatures	Technical Development - Full		
Service	Steering Committee endorse RENC service	Draft Vision	Vision Approved by Members	Draft Description	Description Approved by Members	Draft Product Profile	Product Profile Approved by Members	Draft Initial Validation (Registration/Custom) Checks	Initial Validation (Registration) Checks Approved	Ingest and Initial Validation / Registration Process built	Initial Release Process built	Milestone: Proof of Concept service available to Members and Intermediaries	Discrete products available under PDT license	IC-ENC initial service available under PDT License	PDT feedback loop established	Full S-100 Exchange Set (S-100 Part 15)	Full Digital Signatures (S-100 Part 15)	Draft Metadata Template	Metadata Template Approved by Members	Review of Vision, Description & Product Profile. (Re)Approved by Members
										2022-Q1	2022-Q1	2022-Q2	2022-Q2	2022-Q3	2022-Q3	2022-Q3	2022-Q4	2022-Q1	2022-Q2	2023
S-102	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	Yes	7 - Complete	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	7 - Complete	7 - Complete	1 - Not due to start yet

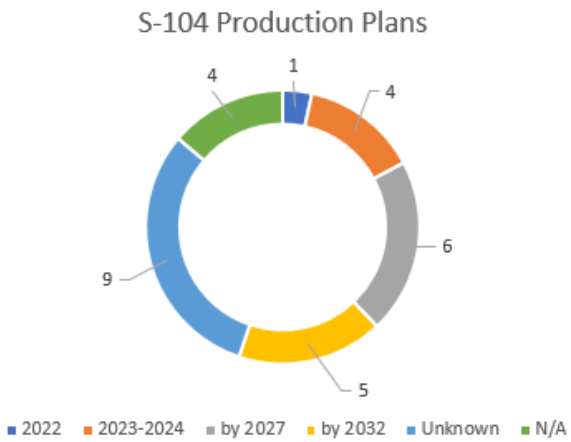
S-104 and S-111 Services

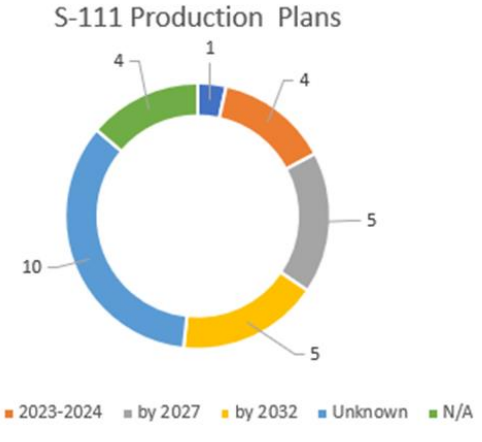
S-104 Water Level Information for Surface Navigation:

S-111 Surface Currents:

Aim:

- Establish end-to-end S-104 and S-111 services, data ingest, assessment and data output

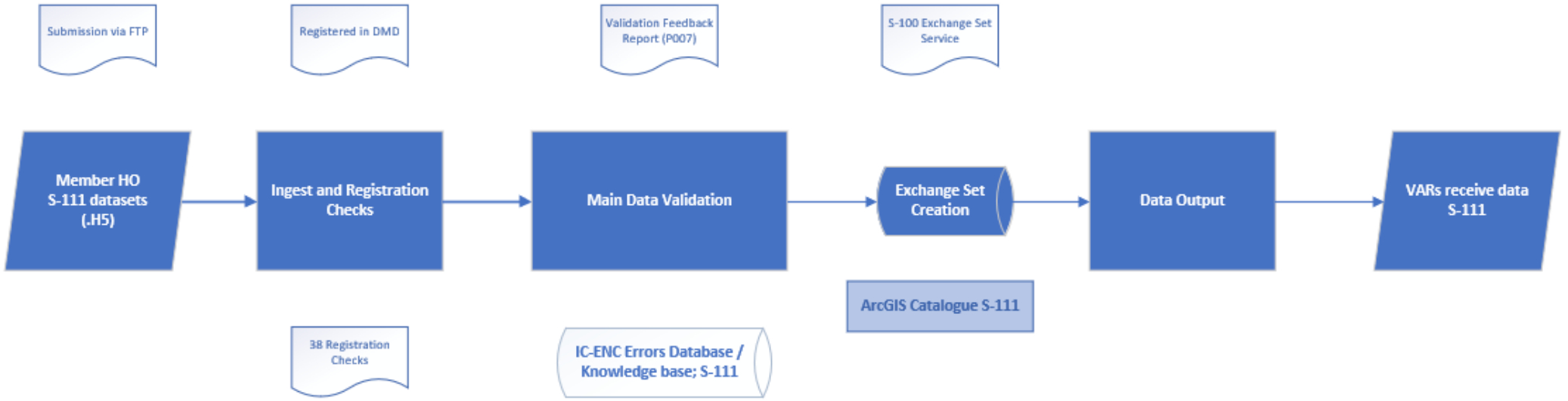




	Strategic view	Service Vision		Service Description		Product Profile		Technical Development - Proof of Concept					PDT License			Exchange Set Service	Digital Signatures	Technical Development - Full		
Service	Steering Committee endorse RENC service	Draft Vision	Vision Approved by Members	Draft Description	Description Approved by Members	Draft Product Profile	Product Profile Approved by Members	Draft Initial Validation (Registration/Custom) Checks	Initial Validation (Registration) Checks Approved	Ingest and Initial Validation / Registration Process built	Initial Release Process built	Milestone: Proof of Concept service available to Members and Intermediaries	Discrete products available under PDT license	IC-ENC initial service available under PDT License	PDT feedback loop established	Full S-100 Exchange Set (S-100 Part 15)	Full Digital Signatures (S-100 Part 15)	Draft Metadata Template	Metadata Template Approved by Members	Review of Vision, Description & Product Profile. (Re)Approved by Members
		2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2022-Q3	2022-Q4	2023	2023	2023
S-104	7 - Complete	8 - Complete (ahead of schedule)	8 - Complete (ahead of schedule)	1 - Not due to start yet	1 - Not due to start yet	1 - Not due to start yet	1 - Not due to start yet	8 - Complete (ahead of schedule)	1 - Not due to start yet	1 - Not due to start yet	1 - Not due to start yet	No	1 - Not due to start yet	1 - Not due to start yet	1 - Not due to start yet	4 - Started but mild delay / risks	4 - Started but mild delay / risks	1 - Not due to start yet	1 - Not due to start yet	1 - Not due to start yet
		2022-Q1	2022-Q2	2022-Q1	2022-Q2	2022-Q1	2022-Q2	2022-Q1	2022-Q2	2022-Q3	2022-Q4	2022-Q4	2022-Q4	2022-Q4	2022-Q4	2022-Q3	2022-Q4	2022-Q1	2022-Q2	2023
S-111	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	8 - Complete (ahead of schedule)	8 - Complete (ahead of schedule)	Yes	2 - Started and on track	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	7 - Complete	7 - Complete	1 - Not due to start yet

IC-ENC

S-104/S-111 Service (automated throughput)



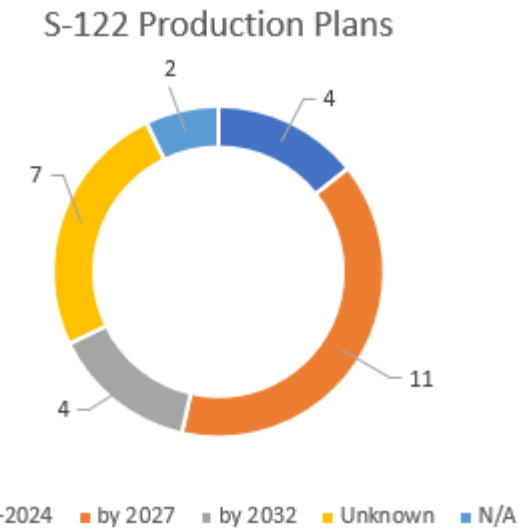
IC-ENC

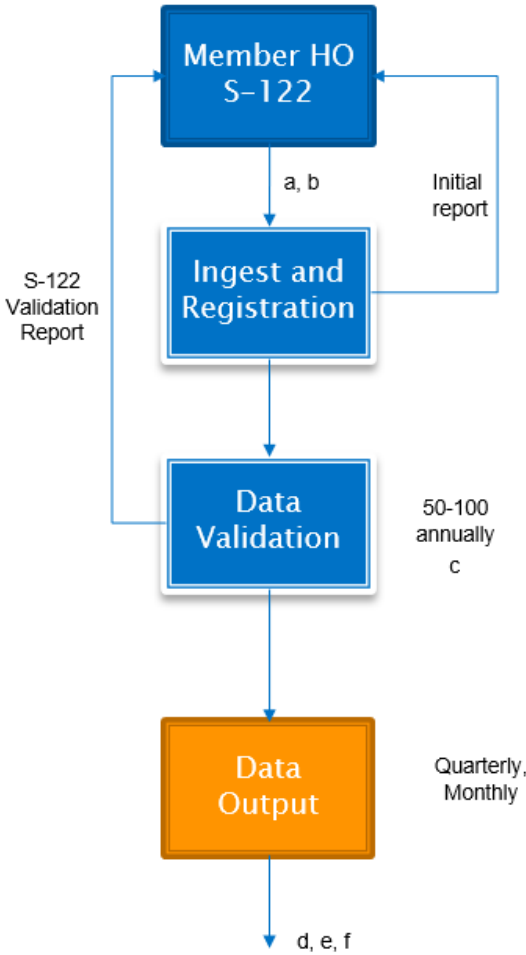
S-122 Service

S-122 Marine Protected Areas:

Aim:

Capability to ingest, assess, and output S-122 data, as an end-to-end service.





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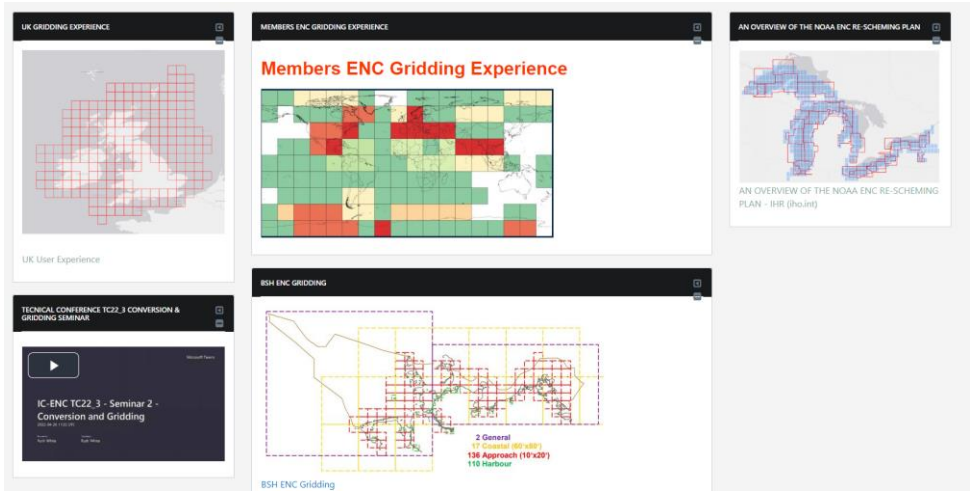
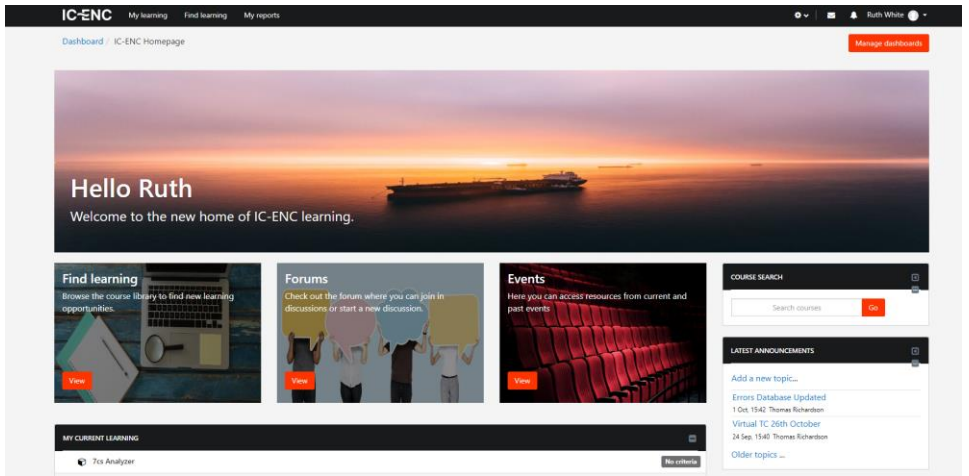
				2022-Q1	2022-Q2	2022-Q1	2022-Q2		2022-Q2	2022-Q1	2022-Q1	2022-Q2	2022-Q2	2022-Q3	2022-Q3	2022-Q3	2022-Q4	2022-Q1	2022-Q2	2023
S-122 (outside of DMD)	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	7 - Complete	No	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	4 - Started but mild delay / risks	7 - Complete	7 - Complete	1 - Not due to start yet

IC-ENC

Learning Management System Developments

- The LMS is being developed through the Production Support Working Groups input (CL, NG, NL, PT, SR, UK, US)
- The LMS has **nearly 500 users.**
- It is evolving and dedicated draft dashboards are being created and developed on subjects such as HD ENCs and ENC Gridding (S57/S101), ENC Conversion, S100.
- We deliver training/seminars etc through it.
- Forum for Member collaboration.





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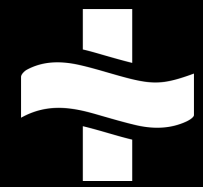
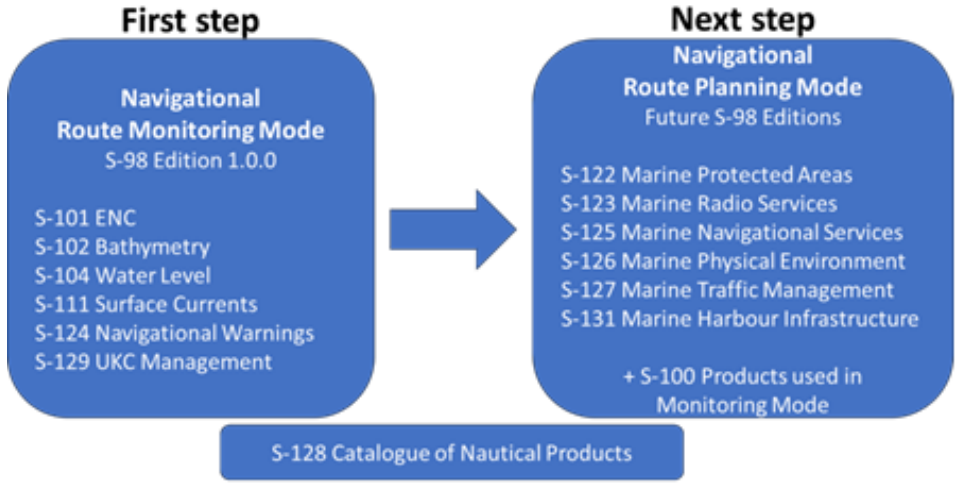
S-128



Addition of S-128 into IC-ENC Work Plan

- 2023 IC-ENC Work Plan theme for S-128: Catalogue of Nautical Products (CNP)
  - Describes the status of nautical products
  - Edition 1.0.0 endorsed at HSSC14 for implementation and testing
- Part of the critical framework in the IHO S-100 Roadmap

  - ECDIS requirements:
    - Essential part of the S-100 ECDIS for update status
    - Provides coverage information to show availability of datasets
  - Source for IC-ENC S-100 graphical catalogue.
  - RENC to RENC collaboration - joint S-128 paper to WENDWG13



The IHO Navigational Package to be handled by the Interoperability Specification S-98. Additional layers may be added in the future.

IC-ENC

S-128 DMD Integration

- IC-ENC Data Management Database initial capability built to generate S-128 datasets.
- .GML files generated using IHO S-128 schema.
- To be generated for all IC-ENC exchange sets (in time, it will replace some existing S57 metafiles).
- Dataset naming convention: 12800ICS101ABC123.GML


```
><gml:patches><gml:PolygonPatch><gml:exterior><gml:LinearRing><gml:pos></gml:pos><gml:pos></
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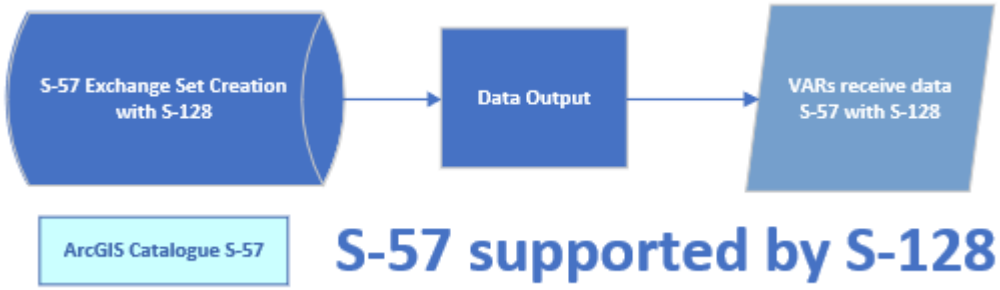
name	ENC Product Specification
version	1.0.2
updateDate	NULL
updateNumber	NULL

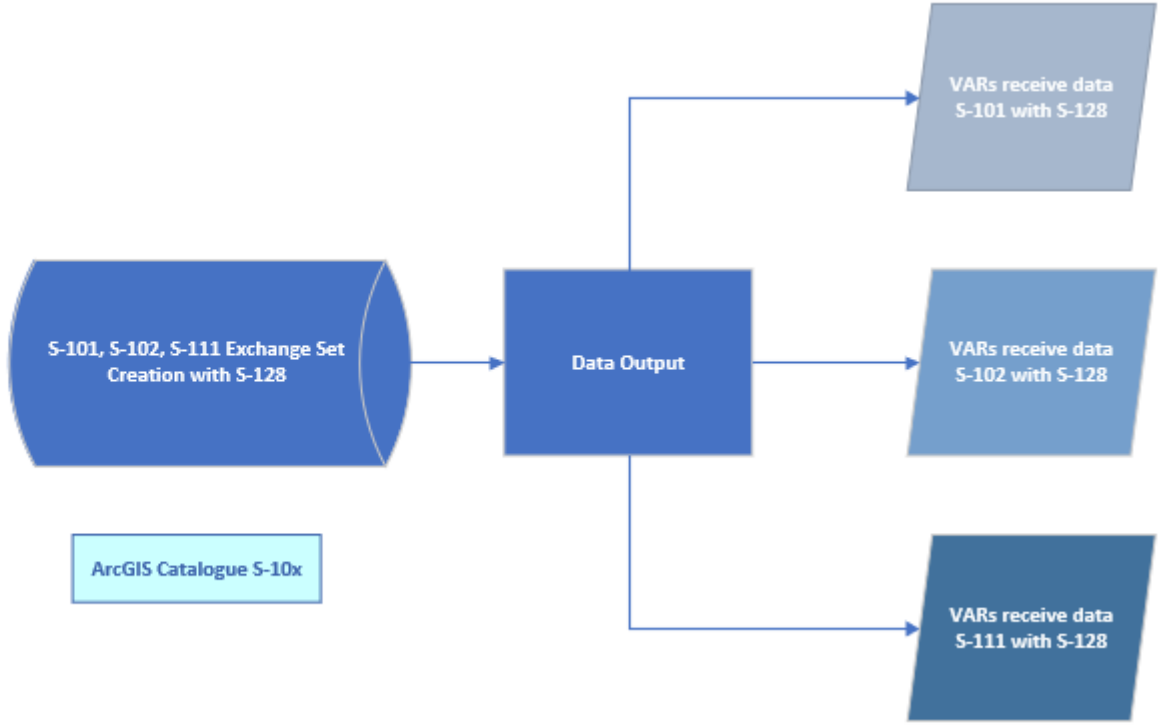
IC-ENC

S-128 Process Flow



S-57 supported by S-128

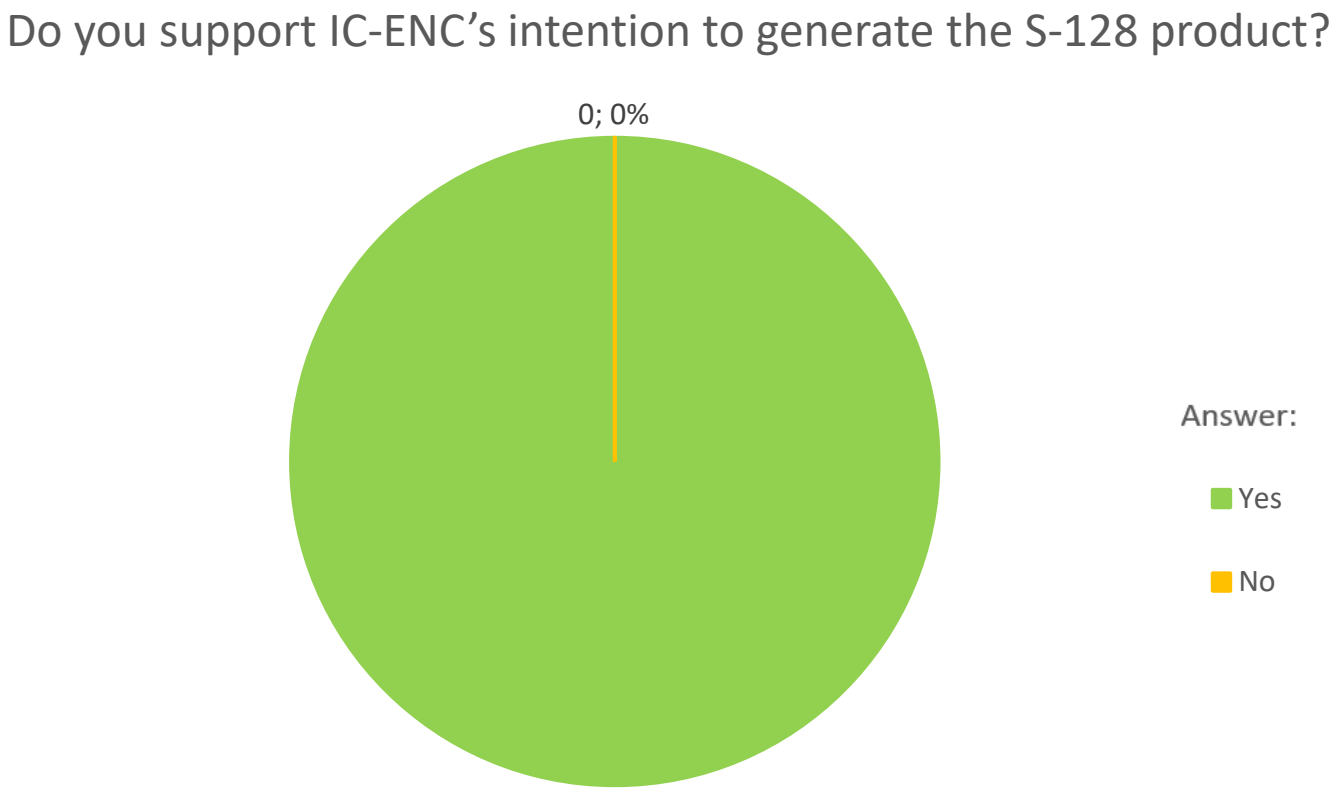
S-10x supported by S-128



Result: Technical Conference support IC-ENC generating the S-128 datasets on behalf of Members; IC-ENC will not ingest S-128 datasets

S-128 Technical Conference Vote

Action TC22_5/3: *SM to consolidate IC-ENC plans/thinking with the pros and cons for S-128 into a TC paper and follow up via correspondence to TC in January 2023.*



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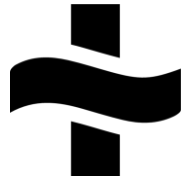
S-1XX Product Development and Testing scheme

IC-ENC

Product Development & Testing Licence

- A new development designed to support the S-100 era
- It supports innovation and developments of new service, tools, technology, hardware etc.
- 20 out of 48 IC-ENC Members have responded and "opted in"
  AU, BE, BH, DE, DK, EG, ES, FO, GB, GR, IS, MY, NL, NZ, PH, PK, PT, SR, US, ZA.
- IC-ENC Circular Letter 2021/30 - this can be resent to Members on request
- Comprehensive **feedback** mechanism in development (structured user research) in order to feed the lessons learned back to Members, IHO groups etc.



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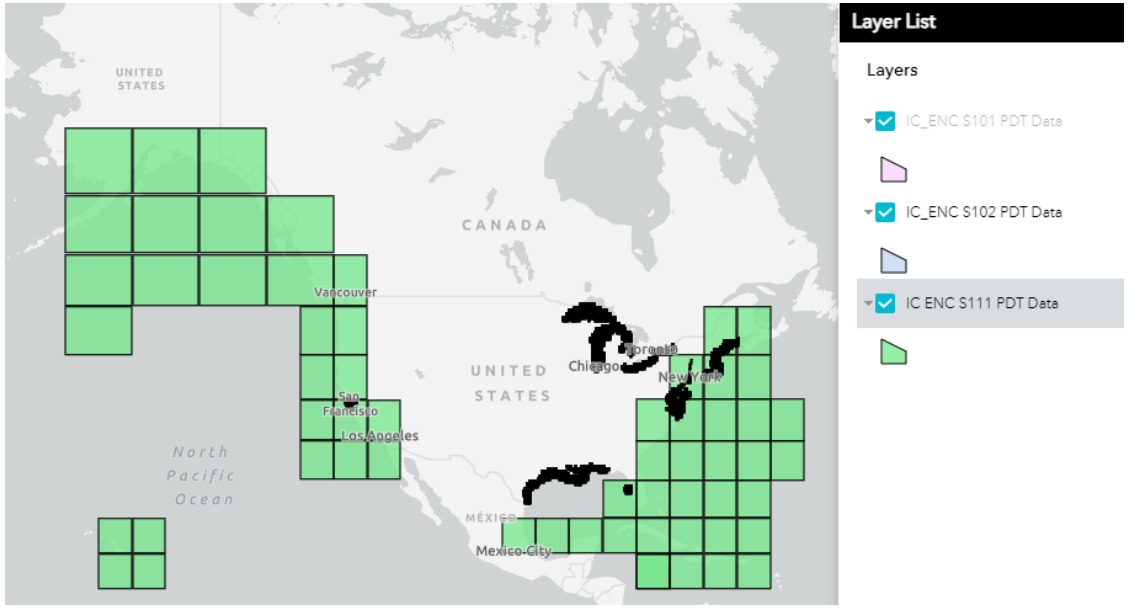
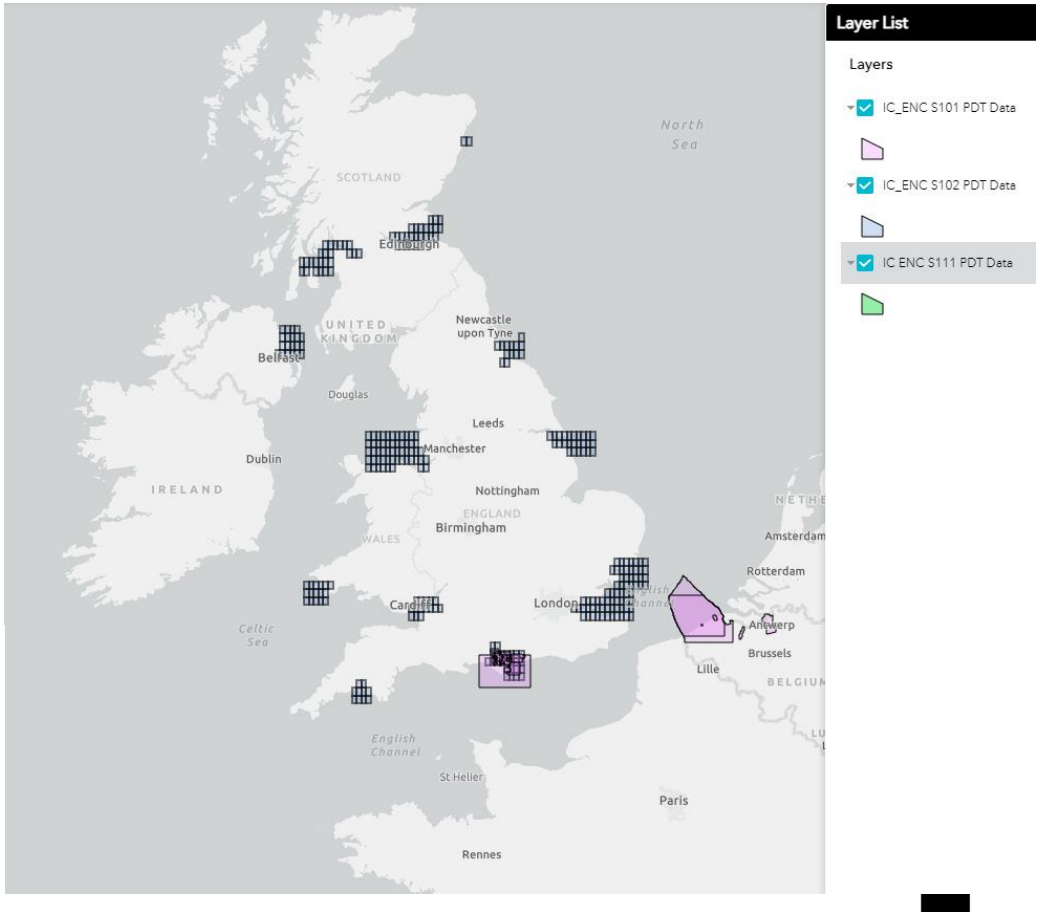
Product Development & Testing - content





Release	Date	Data added	Comments
3	20230113	17 x GB S-101 ENCs 303 x GB S-102 datasets	
2	20221031	7 x BE S-101 ENCs 47 x NOAA S-111 exchange sets	The BE S-101 ENCs were created by IC-ENC by converting the S-57 ENCs using CARIS HPD 4.1.29
1	20220425	86 x NOAA S-102 datasets 1 x NOAA S-111 dataset	

https://ic-enc.maps.arcgis.com/apps/webappviewer/index.html?id=b9271c06904546ad8dfb3f8413b8

IC ENC

Working together to
assure navigational safety

Distribution & Revenue Management Services

IC-ENC

Distribution is via appointed "Value Added Resellers"

ADMIRALTY Maritime Data Solutions

ChartWorld Navigation Experts

NAVTOR

PRIMAR®

- These organisations are appointed to deliver ENCs to **ECDIS** navigators securely and swiftly. A new **Online Product Viewing Service** policy to allow shore-based viewing of ENCs to support safety at sea is coming.
- IC-ENC appoints, oversees and audits this distribution chain, and manages the revenue generated.
- Last financial year: over USD60million returned to IC-ENC members through this process.
- All four VARs have joined the S100 PDT scheme, their feedback will inform IC-ENC's proposals for **distribution policies for S100 products**

IC-ENC

Distribution is via appointed “Value Added Rese

ChartWorld Navigation Experts

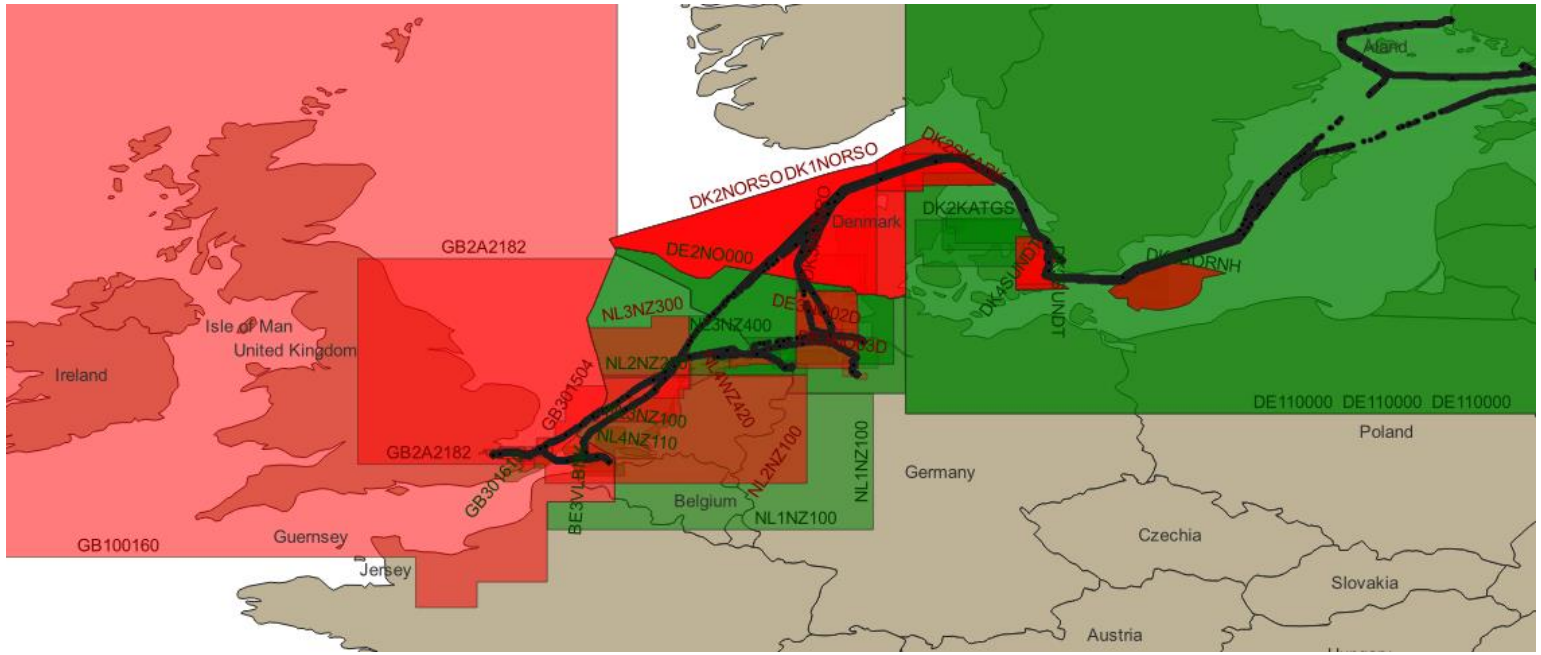
Quality charts for OpenCPN
O-charts
rr-consult (operating as O-charts)

iNavX
iNavX, powered by SilTech

- These organisations are appointed to use ENC data to support the safe navigation of **non-ECDIS** vessels.
- This is a new service, and now **over half** of IC-ENC Members participate.
- We are in the process of onboarding further Members and distribution companies.

IC-ENC

Distribution Assurance Activity – audit tool

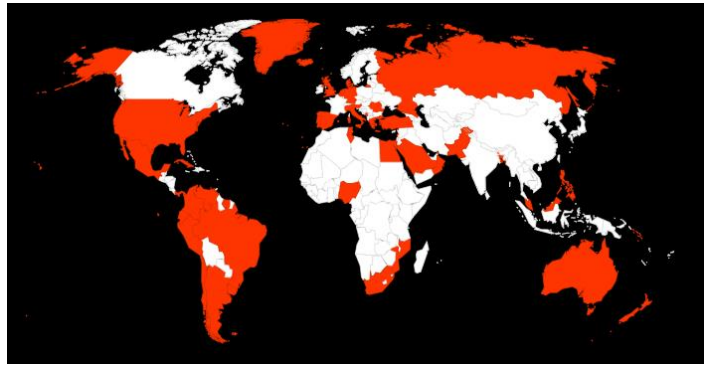


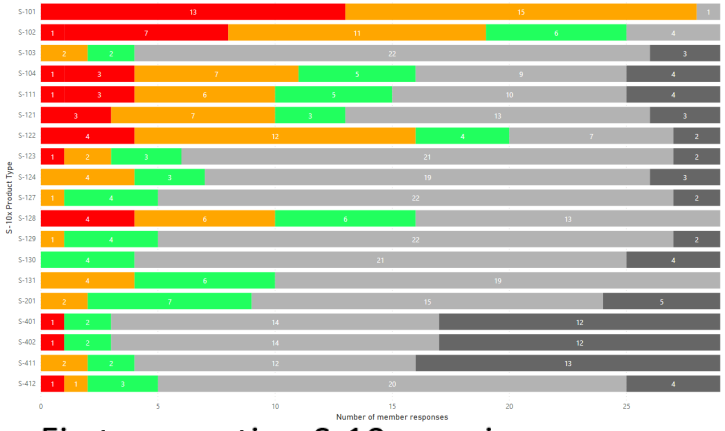
- Analysis using: AIS, ENC catalogue, Vessel characteristics database, sales reports.
- We are now working with the VARs on the first set of results from this tool.
- Both ENC supply chain and financial implications.

IC-ENC Working together to assure navigational safety

Summary

IC-ENC Summary

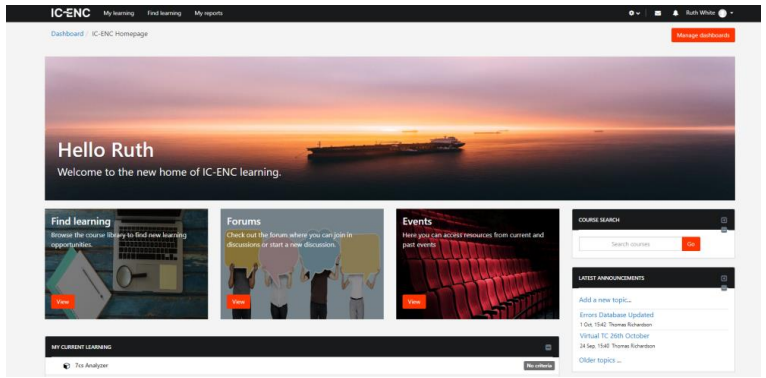


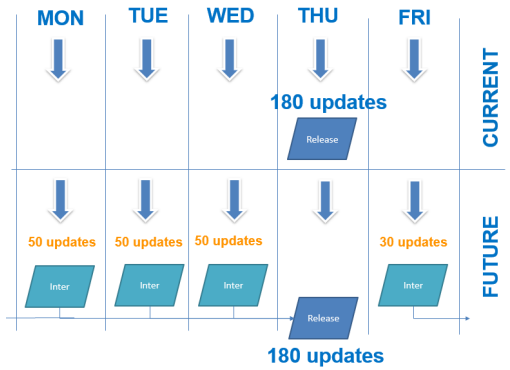


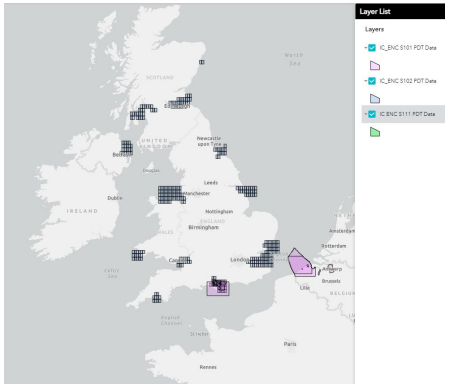
- First generation S-10x services:
  - S-101 - Electronic Navigational Chart (ENC)
  - S-102 - Bathymetric Surface Product
  - S-104 - Water Level Information for Surface Navigation
  - S-111 - Surface Currents
  - S-122 - Marine Protected Areas
  - S-128 - Catalogue
  - Conversion Readiness Service (S-57 to S-101)

- We have a large number of Members across the globe…
- …each has different challenges, priorities and plans for S-100…
- ….yet we have achieved agreement amongst the membership to set IC-ENC's priorities and are developing our future services…

Summary







- …through help and support to Members…
- …and by improving our technology….
- ….we now have the first set of Members' S-100 products available…

Summary

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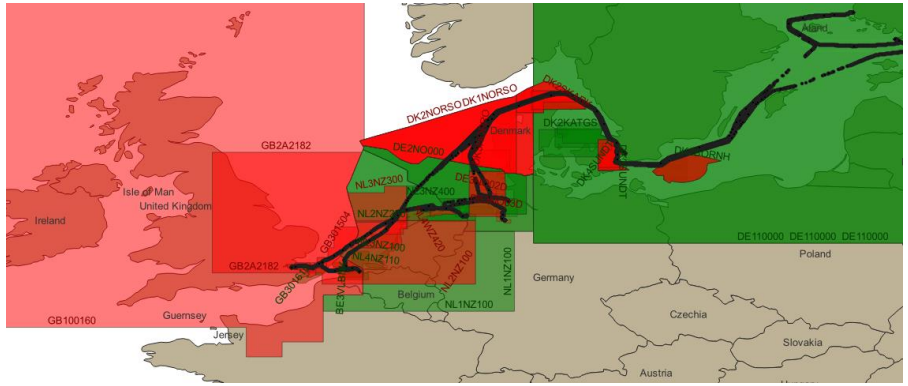
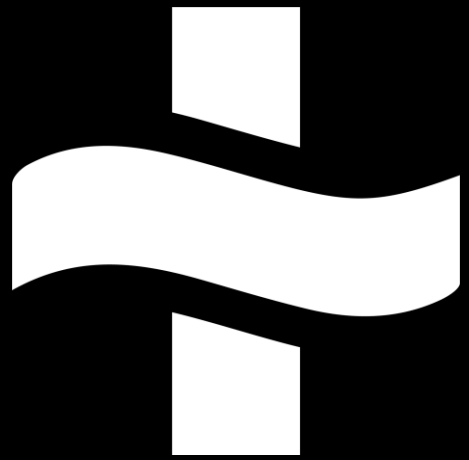


- …to our Value Added Reseller partners….
- …over whom we are improving our management and oversight.

- www.ic-enc.org

su.marks@ic-enc.org