14th Meeting of the Hydrographic Services and Standards Committee

Report of the S-100WG

Agenda Item 5.1

- Membership
  23 member states, 15+ industry members
- Meetings
  - S100WG6 (Virtual) – 10-14 January, 2022
- Chair
  - Ms. Julia Powell (US-NOAA)
- Vice Chair(s)
  - Ms. Elizabeth Hahessy (DK)
  - **NEW** - Ms. Izzy Kim (ROK)

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- S-100 Edition 4.0.0 → Edition 5.0.0
- S-98 Interoperability Specification <u>Edition 1.0.0</u>
- S-102 Edition 2.1.0
- Dual Fuel Governance <u>Document</u>

4.2	Maintenance of roadmap for S-100 implementation decade	HSSC13/08 (former HSSC12/05, HSSC11/09)	When the S-100 Implementation Strategy is finalized as an official IHO document, **S-100WG** to consider submitting a proposal by which this Strategy (Annex 2 to Roadmap in fact) supersedes the S-100 Master Plan. In addition to the relevant updates to be made to the main text of the S-100 Implementation Strategy.	**HSSC-14**	Roadmap v2.0, December 2021 available on Council webpage. Impact on Master Plan to be considered

- Recommend closing this action and removing the S100WG maintained plan from the website and archiving it

| 5.1F | SENC | HSSC13/27 | **S-100WG** to consider the SENC delivery issues raised by France, add this work item in its work plan and report at the next meeting. | **HSSC-14** | |

After consultation with France it is recommended to close this action. Refer to separate paper submitted by France on this issue

- Edition 4.0.0 published in 2018
- Edition 5.0.0 is a cumulation of the past 4 years of testing and development against S-100
- [Change proposal log](#) captures additional proposals
  - Updates to Portrayal
  - HDF-5 encoding updates for feature oriented discrete coverage (future versions of S-102 – post 2.1.0)
  - Updates to GML encoding profile for improved interoperability to commercial tools

- # Summary of Major Extensions
  - ## Real Time Functionality
    - Implementation of temporal extent to facilitate time sensitive representation of data
    - Used for water level adjustment (S-98 Annex C)
  - ## Encryption
    - Increase in key length to 2048 bits to increase security to better align with e-Navigation frameworks
  - ## Interoperability Framework and Harmonized Portrayal – New Part 16
  - ## Discovery Metadata – New Part 17
    - New part to improve the functionality for data discovery
  - ## Language Packs – New Part 18
    - Multilingual support for S-100

MAINTAIN AND EXTEND S-100 [A.1] - FINALIZATION PLAN

- Schedule Proposed to HSSC14

Month/Year	Action	Notes
March 2022	Submission to HSSC14	
May 2022	Consideration at HSSC14	
June 2022	IHO Circular Letter for MS vote	
Fall 2022	Publication of the next edition of S-100	Edition 5.0.0

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- S-100 is a framework
- Product Specification's are tied to specific editions of S-100
  - Edition 3.0.0 and Edition 4.0.0 are still valid editions
- Product Specification's that are intended for use in an operational manner (those in S-98) will need to migrate to Edition 5.0.0

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- HSSC14 is requested to approve S-100 Edition 5.0.0 and forward it to MS via Circular Letter for Approval

- Finalized Edition 1.0.0
  - Reorganized S-98
    - S-100 Part 16 created as an abstract specification of interoperability
      - Contains the UML model and how to create the Interoperability Catalogue
    - S-98 Main Document – Describes how the abstract functionalities described in S-100 Part 16 are encoded and implemented
    - S-98 – Part A/B/C/D – Describes each interoperability level from 1 to 4
      - Provides the application schema
    - S-98 Annex A – Operational Context, Scenarios, and Use Cases
    - S-98 Annex B – Validation Checks
    - S-98 Annex C – Harmonized User Experience for ECDIS and INS
      - New part

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- S-98 Annex C – Harmonized User Experience for ECDIS and INS
  - This annex is the successor to the IHO S-52 standard for chart content and display in ECDIS
  - Focuses on the principles for portraying S-101 ENC and S-100 based data on ECDIS
  - Includes the provision for water level adjustment
    - Currently forbidden by S-52

Depth information may be adjusted by water level height. When water level adjustment is provided:

1. The system shall default to no water level adjustment.
2. The mariner may select one for the following methods of depth adjustment:
    a. Current date and time
    b. A mariner specified date and time
    c. Where the ECDIS supports schedules, the depth at the predicted date and time of transit in each area along a route (*Comment: This is the feature that will reduce the mariner workload. Additionally, manually setting the time is prone to errors*)
3. When water level adjustment is applied (full details provided in Appendix C-4):
    a. The safety contour, depth zone shades, safety depth and indication of isolated dangers shall use the adjusted depth
    b. The pick report shall indicate both adjusted and unadjusted depth
    c. The applied water level adjustment method shall be provided in the legend.
    d. Other details of the water level adjustment shall be readily available, such as the data source, relevant times, and applicable areas.
    e. It shall be possible to remove all water level adjustment via simple operator action.
    f. There shall be a permanent indication "Water level adjustment".
4. ECDIS voyage recording shall include:
    a. The state of water level adjustment (method applied).
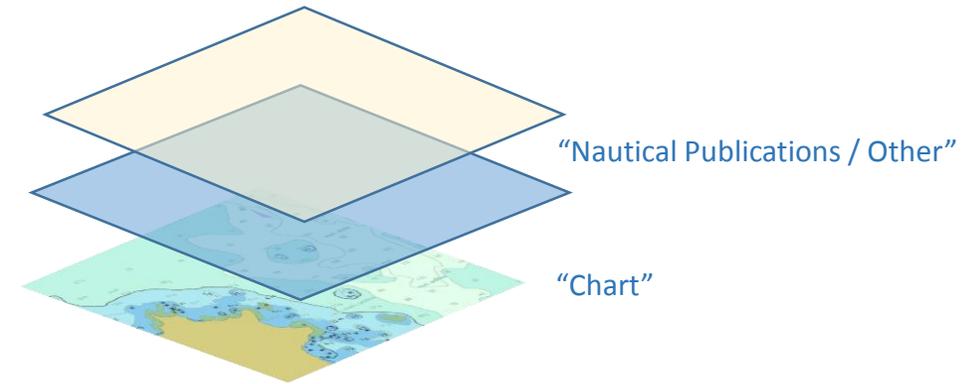   b. All other information necessary to reconstruct depths as presented to the mariner.

S-100 fundamentally changes what is on the ECDIS.

Single Layer official S-57 ENCs are replaced by multiple, interacting layers of navigational data.

"Nautical Publications / Other"

"Chart"

S-100 ECDIS

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On an S-57 ECDIS a Safety Contour is drawn to separate Safe water from unsafe water.

A selection of possible contours are contained in the ENC, from which the closest to the user selected value is used.

Depths/Soundings, Heights and elevations exist in various parts of the ENC.

There is no ability to adjust depth data for tide or water level.

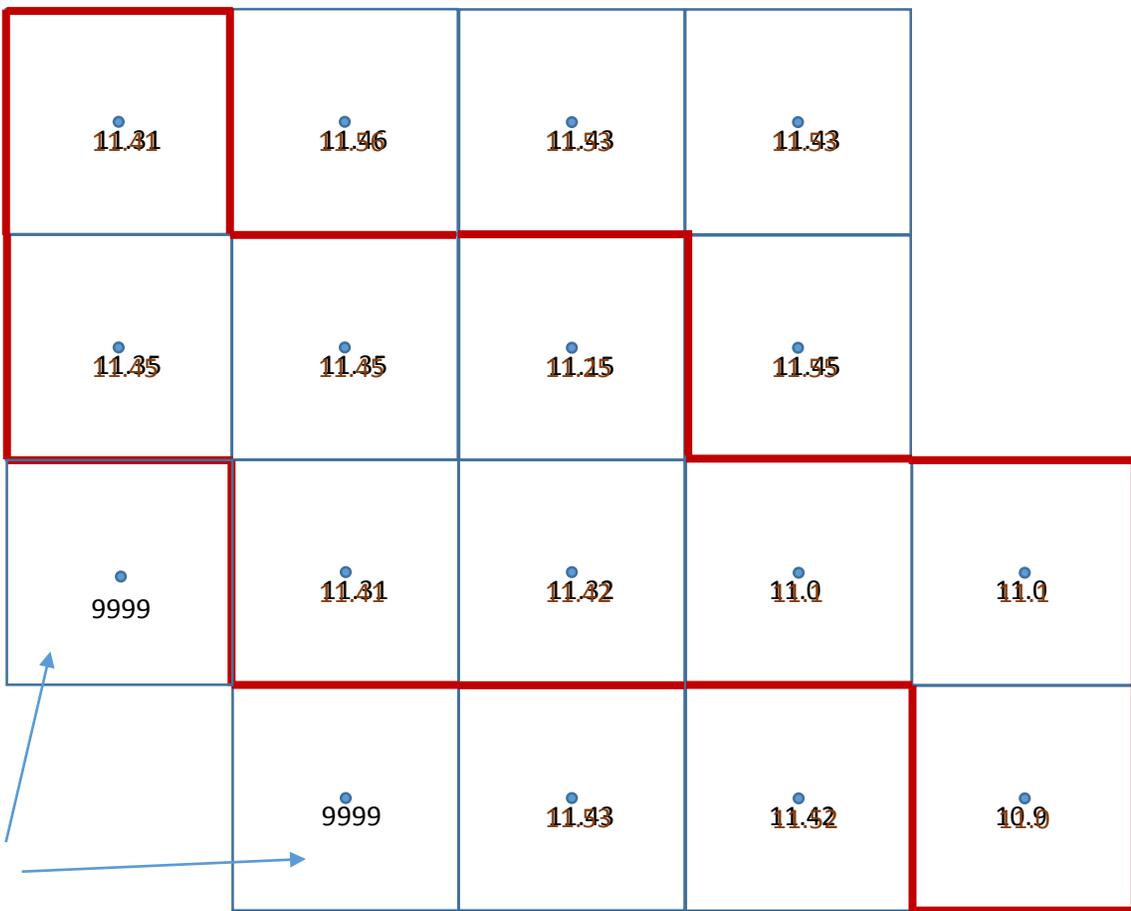In S-100 ECDIS S-102 and S-104 can be added to S-101 ENCs.
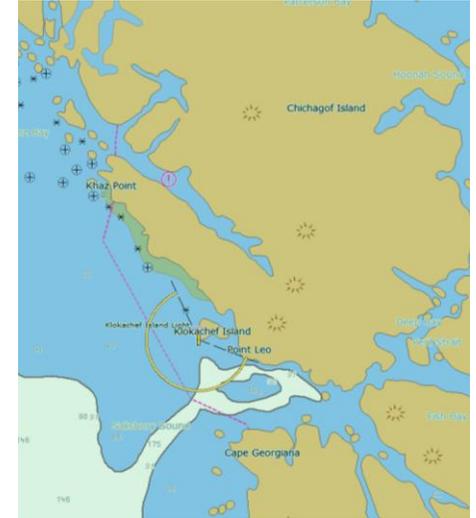
- **S-98 defines how multiple layers are portrayed**
- **S-102 contains a grid of depth values with no predefined contours**
- **S-102 replaces S-101 Depth Areas.**
- **S-98 now defines how to <u>draw</u> a safety contour on a grid of S-102 depths**
- **S-98 also defines how to <u>adjust</u> ALL depth values according to S-104**

S-104 Depth Value = 0.1m

User Defined Safety Contour Value

S-102 No Data Value

S-102 Scaled (Safety Contour Data Value = 11.4m)
S-102 Scaled (Safety Contour Data Value = 11.4m)
S-104 Scaled (Water Level Corrected Depths)

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Charts + S-102 Dense bathymetry + S-104 Water Level gives a fundamental "depth" against which UKC and Vertical Clearance can be measured and managed on the S-100 ECDIS

This is a key feature for ECDIS users and OEMs

This ONLY works if :

1) S-102 depth values can be consistently substituted for S-101
2) S-104 Water Levels can be added to (S-102 or S-101) depths

This ONLY works if the vertical datums against which S-102 and S-104 values are defined are <u>the same</u>.

- ## HSSC14 is requested to approve S-98 Edition 1.0.0
  - NOTE: Due to timing and resources, this still needs to go through an editorial and formatting review by the IHO Sec (TSSO) with no changes to content.

Month/Year	Action	Notes
March - July 2021	Adjudication of S-98 Comments and S100 Part 16	Discussed high impact comments at TSM8
January 2022	Submission to S100WG for approval	Virtual Meeting
March 2022	Submission to HSSC14	
May 2022	Consideration at HSSC14	
July 2022	HSSC Letter announcing S-98 Edition 1.0.0	

- Post Edition 1.0.0 work
  - Continue to revise based on implementation and testing to stabilize S-98
  - Potentially create an additional annex to S-98 providing the "rules" for what constitutes an ECDIS software upgrade based on revisions to product specifications that are part of the S-98 Interoperability rules
    - For example, if just the catalogue was updated this would not require a software update on the ECDIS as S-100 is designed for this mechanism.
    - However, a catalogue containing a "new" feature would tick over a new edition – which could force a new software update – which is not the intent of S-100
   - This needs to be worked out prior to Edition 2.0.0

S-100 INFRASTRUCTURE [C.1,2,3]

- Continues to be maintained by the Republic of Korea

- Will be migrated over to Edition 5.0.0 over the next year

- S-100 toolkit launcher
  - Install and manage all versions of Tools including FCB, PCB, DCEG composer.
  - All tools are improved by fixing errors reported

- HSSC14 to note the upgrade path of the S-100 GI Registry to align to Edition 5.0.0
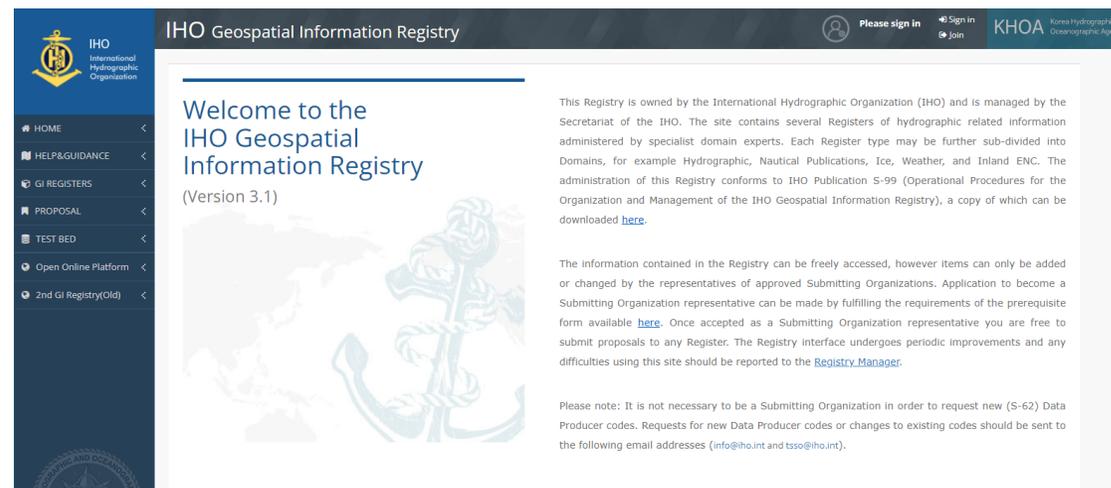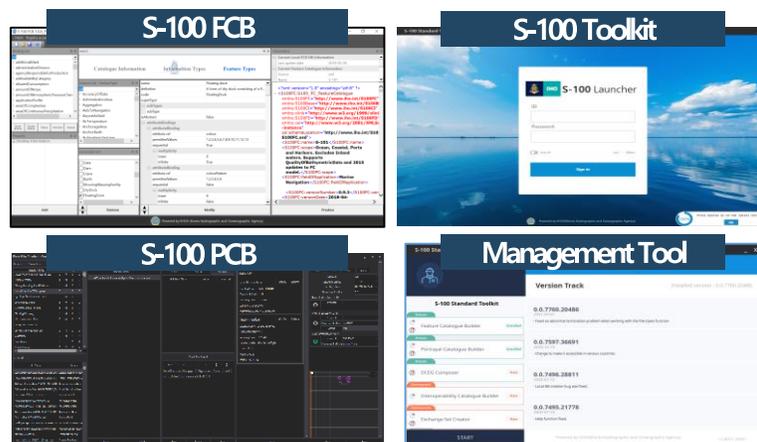
- HSSC13 approved the use of IHO special project funds for phase 2 of S-164 development
  - Between 50-80K Euros
  - Estimated timeline 12 to 16 months
- S-101 PT is leveraging this for their S-164 development
- Due to work on S-100 Edition 5.0.0 and S-98 Edition 1.0.0 work was slow to progress on S-164
- Planning on setting up an S-164 sub-group to manage this effort

- HSSC14 to note the slow progress on the development of S-164 and the initial implementation of edition of edition 1.0.0 for 2023

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- Primary focus has been on the main framework to S-100

- Recognize the need to harmonize validation across the entire S-100 framework

- Will be establishing a S-100 validation sub group to harmonize validation checks across the framework, including S-98.

- HSSC14 to note the slow progress on S-100 Validation and include it as an activity on the S100WG workplan

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- Complete revision to align with version 3.1 of the IHO Geospatial Information (GI) Registry and S-100 Edition 5.0.0

- S100WG approved the changes to S-99 Edition 2.0.0

- HSSC14 is invited to approve S-99 Edition 2.0.0 and forward it to Member States via CL for approval

S-101 PROJECT TEAM UPDATES

- See separate presentation

S-102 PROJECT TEAM UPDATE [D.6]

- Work continued on developing Edition 2.1.0
- Substantive changes include:
  1. Removal of Tracking List
  2. Removal of physical transfer as delivery method
  3. Removal of referenced, metadata for Tiling Schema
  4. Amendment to metadata storage
- This results in a product specification that continues to be optimized for navigation requirements and interoperability with S-101 via S-98

*It is noted that WG approval for incremental updates under TR 2/2007 is applicable to 1.0.0 editions, however, S-102 is a special case in that the 3.0.0 edition is widely recognized as the edition for implementation

- Navigation vs. Non-navigation
- The S102PT recommended to the S100WG that S-102 would be better served by increasing its focus on navigational usage
  - S-102 can continue to iteratively develop with this focus
  - Increased focus on navigational usage does not preclude non-navigational usage

S-102 IMPACT STUDY

- Reference HSSC13/20
- As required by TR 2/2007 an impact study was conducted regarding the migration to edition 2.1.0
- Issued via S100WG circular letter
  - 15 respondents
- Included questions focused on just the navigational use
  - These responses will help focus Edition 3.0.0 on an operational edition for navigational uses

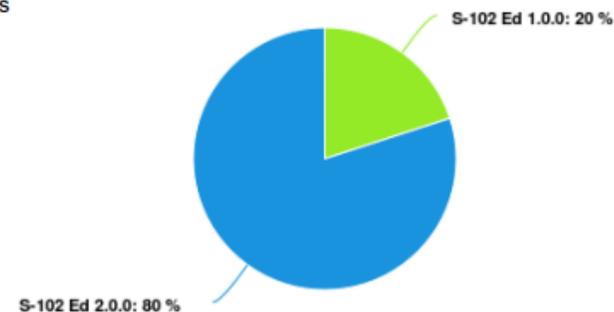Part 2: Questions pertaining to S-102 revision Ed.2.1.0 for navigational usage only

1. Have you implemented S-102 Ed 1.0.0 or Ed 2.0.0?
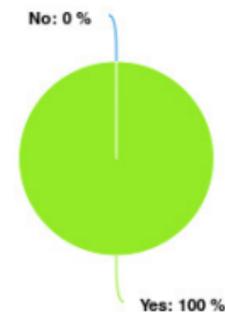
15/15 responses

No: 33.33 %

Yes: 66.67 %
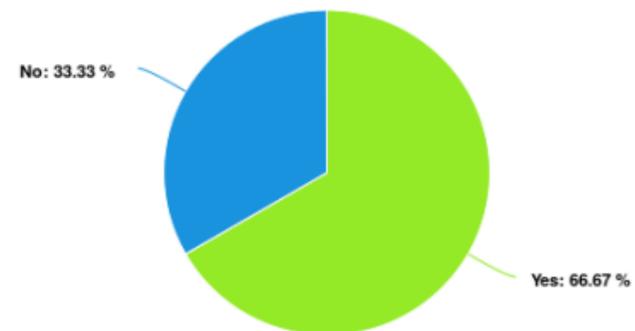
2. If 'yes' to (1), which version of S-102 have you implemented?

10/10 "yes" responses

S-102 Ed 1.0.0: 20 %

S-102 Ed 2.0.0: 80 %

3. If 'yes' to (1), would you implement an upgrade to S-102 Ed 2.1.0?

10/10 "yes" responses

No: 0 %

Yes: 100 %

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- Even though S-102 is being fine tuned for the navigation use case it does not preclude it from being used for non-navigational uses

- S100WG recommends that S-102 be solely focused on navigation for interoperability with S-101 and S-104 via S-98
  - If we need to cater to the non-navigational needs then the product specification will be come unmanageable and difficult to implement

- S102PT recommends that a new product specification number be issued for non-navigational uses
  - Work will begin on this after S-102 Edition 3.0.0 is published for operations (late 2024)
  - In addition the BAG format is already widely used for non-navigational use of bathymetric data

S-102 DEVELOPMENT TIMELINE [D.6]

- It is widely considered that Edition 3.0.0 of S-102 will be the OPERATIONAL EDITION

- S-102PT will focus on iterative testing and development of S-102 with a focus on interoperability via S-98

- Targeting late 2024 for Edition 3.0.0
  - Will need to be able to issue iterative editions between 2.1.0 and 3.0.0
  - Include alignment to S-100 Edition 5.0.0
  - Ask for special dispensation to iteratively develop S-102 until edition 3.0.0 without having to undergo the full TR 2/2007 approval process

*It is noted that WG approval for incremental updates under TR 2/2007 is applicable to 1.0.0 editions, however, S-102 is a special case in that the 3.0.0 edition is widely recognized as the edition for implementation

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- HSSC14 is requested to note the results of the S-102 Impact Study

- HSSC14 is requested to note the move towards a navigation implementation of S-102

- HSSC14 is requested to approve S-102 Edition 2.1.0 for testing and development and via MS CL

- HSSC14 is requested to consider suspension of TR 2/2007 for S-102 Edition 2.2.0 until Edition 3.0.0 to allow for iterative development to align with S-98, S-101 and S-104 (each of which are at a 1.0.0 stage).

S-129 UNDER KEEL CLEARANCE MANAGEMENT – PROGRESS TO DATE [D.7]

Date	Description
Jun 2019	S-129 Edition 1.0.0 published for implementation and testing
Jun – Sep 2019	Testing (KHOA)
Jun-Aug 2020	Testing (NIWC)
Aug 2020	FC & PC revised (KHOA, KRISO)
Oct 2020 – May 2021	Testing (NIWC) – issues found (particularly w/ PC & XSLT files)
(Further development and testing on hold until S-100 Ed. 5.0.0)	
Dec 2021	S-129 Operational Tests, as part of S-100 Demonstrator Project (led by ECC, Kongsberg)

S-129 Plan Timeline [D.7]
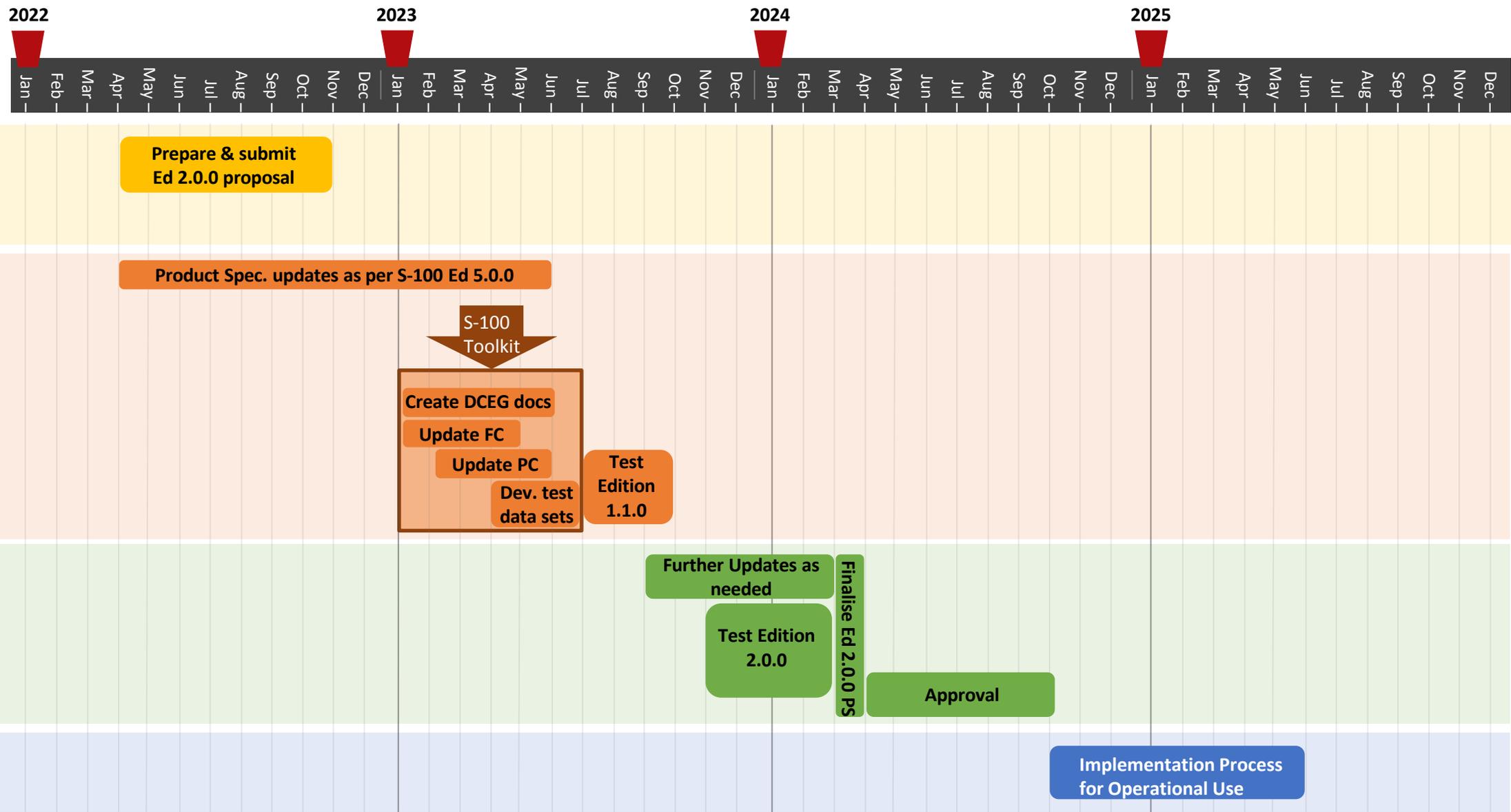
S-129 ITEMS TO NOTE [D.7]

- S-129 PT chair Nick Lemon (AMSA) retired in 2021
- Jason Rhee (OMC International) volunteered to lead the S-129PT
  - Supported by the Australian Hydrographic Office
- Lindsey Perryman (AMSA) continues as the Vice Chair
- HSSC14 is requested to note the S-129PT and approve the continuation of the S-129PT workplan towards edition 2.0.0

International
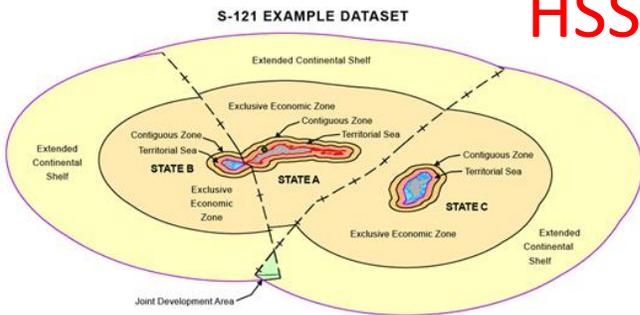Hydrographic
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- S-121 continues to be testing in partnership with OGC testbeds
- Continue to liaise with ISO on marine geo regulation which will be a generic S-121 Implementation
- Will work to align to S-100 Edition 5.0.0 (target 2024)

HSSC to note the progress of the S-121 Project Team

S-121 EXAMPLE DATASET

- HSSC13/26 - **HSSC** tasked **S-100WG/S-101PT** to liaise with Stakeholders (OEM, etc.) and invite **IHO MS** to contribute in the development of a governance document that formalizes the guiding principles of DF-Concept for incorporation into the S-100 Implementation Roadmap.

- IHO let out a tender to coordinate the development of the DF-Governance Document

- [see separate presentation on the details of the DF-Governance Document]

- HSSC14 is requested to approve the draft S-100 ECDIS Governance Document and consider how it should be maintained in the future
  - Perhaps as an annex to the S-100 Strategic Implementation Plan

1. S-164 Test Datasets

2. S-100 Validation Checks

3. Upgrade of the S-100 Infrastructure to Edition 5.0.0

4. Continue to progress S-101 towards edition 2.0.0

5. Continue to move S-102 and S-129 towards an operational editions

- HSSC14 is requested to approve S-100 Edition 5.0.0 and forward it to MS via Circular Letter for Approval
- HSSC14 is requested to approve S-98 Edition 1.0.0
- HSSC14 to note the upgrade path of the S-100 GI Registry to align to Edition 5.0.0
- HSSC14 to note the progress on S-1OOP to build as a gateway to the S-100 world
- HSSC14 to note the slow progress on the development of S-164 and the initial implementation of edition of edition 1.0.0 for 2023
- HSSC14 to note the slow progress on S-100 Validation and include it as an activity on the S100WG workplan
- HSSC14 is invited to approve S-99 Edition 2.0.0 and forward it to Member States via CL for approval

- HSSC14 is requested to note the results of the S-102 Impact Study

- HSSC14 is requested to note the move towards a navigation implementation of S-102

- HSSC14 is requested to approve S-102 Edition 2.1.0 for testing and development and via MS CL

- HSSC14 is requested to consider suspension of TR 2/2007 for S-102 Edition 2.2.0 until Edition 3.0.0 to allow for iterative development to align with S-98, S-101 and S-104 (each of which are at a 1.0.0 stage).

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- HSSC to note the progress of the S-121 Project Team
- HSSC14 is requested to approve the draft DF-Governance Document and consider how it should be maintained in the future
  - Perhaps as an annex to the S-100 Strategic Implementation Plan
- HSSC14 to approve the S100WG 2022-2023 workplan

Thank You!