International Hydrographic Organization

# S-100 - UNIVERSAL HYDROGRAPHIC DATA MODEL
# Background Brief

XIII REUNIÓN
COMISIÓN REGIONAL HIDROGRÁFICA DEL PACÍFICO SURORIENTAL (CHRPSE)
Cartagena de Indias, Colombia
21 a 27 de Agosto 2017

Taller de Actualización para Hidrógrafos y Cartógrafos

# S-100 Basics

S-100 - IHO Universal Hydrographic Data Model - provides a contemporary data framework that can support a wide variety of digital data sources, products and services required by the hydrographic, maritime and spatial data infrastructure communities
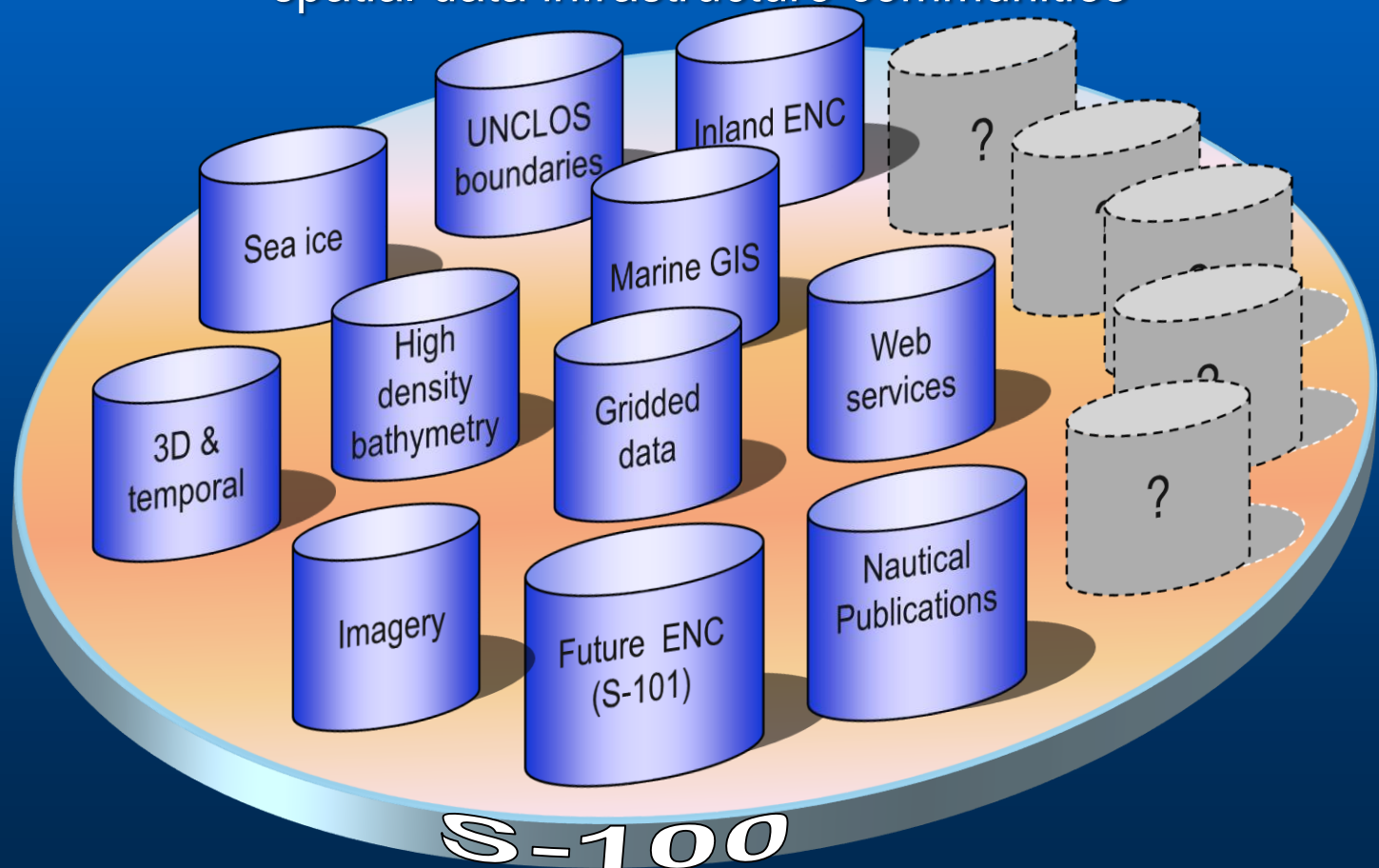
# Background

- 1987: adoption of the first IHO digital format for the exchange of hydrographic data ("CEDD format")

- 1992: publication of IHO Publication S-57 – Transfer Standard for Digital Hydrographic Data

- 2000: publication of S-57 Edition 3.1

  - S-57 used mainly for encoding Electronic Navigation Charts (ENC)

  - Ed. 3.1 frozen until further notice

  - preparation of Ed. 4 initiated to include additional data types such as bathymetric and matrix data

- 2005: change of name

| | | |
|---|---|---|
| S-57 edition 4.0 | → | S-100 |
| S-57 Edition 4.0 ENC Product Specification | → | S-101 |

# Main characteristics of S-100

- Data content separated from the carrier (file format)

  *Note: S-57 data model embedded in ISO/IEC 8211 encapsulation*

- Manageable flexibility that can accommodate change

- Alignment with ISO 191xx series of current geospatial information standards - interoperable with other domains

- ISO-conforming web-based registry

- Specifies methods and tools for data management, processing, analyzing, accessing, presenting and transferring data between different users, systems and locations
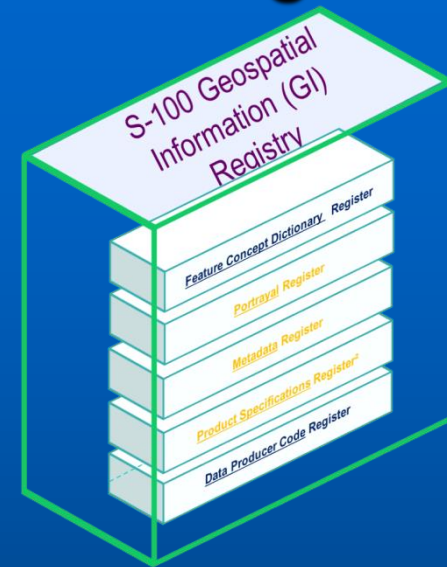
# S-100 – Based on ISO/TC211 Conceptual Standards
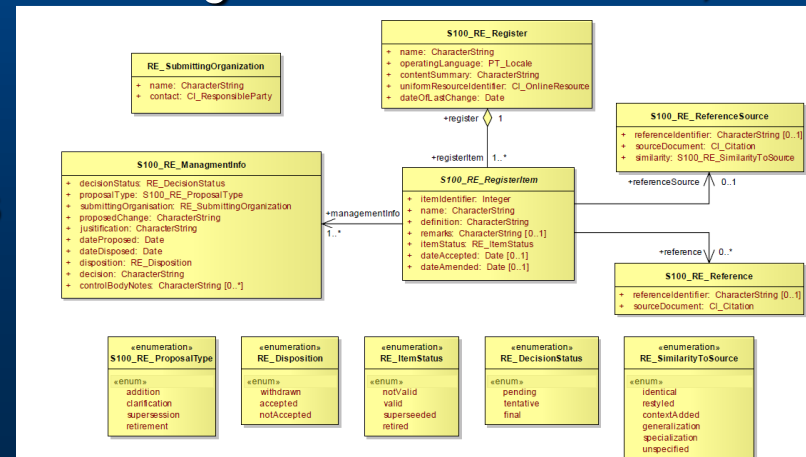


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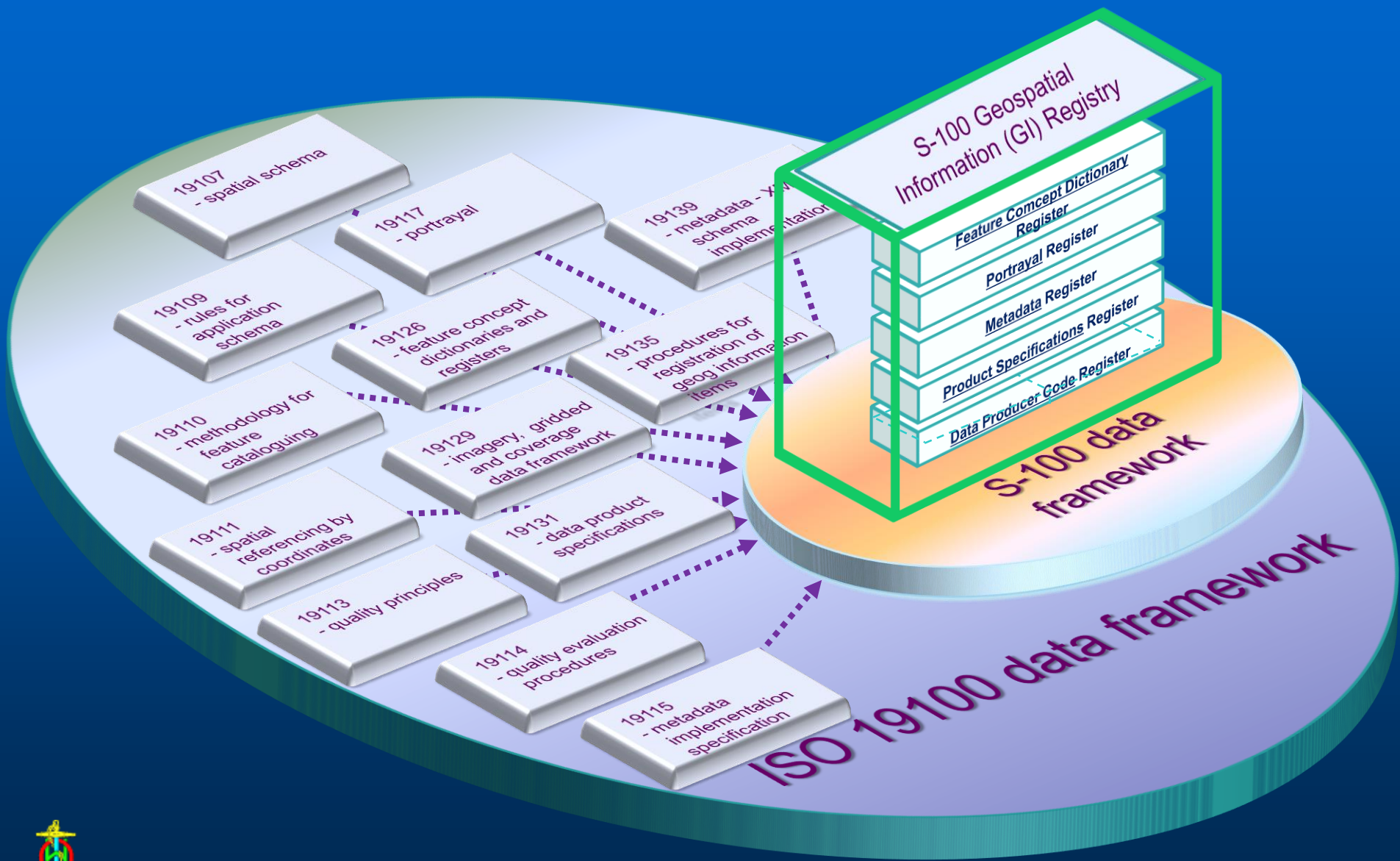
# S-100 Geospatial Information Registry

- **Registry**
  - *A registry is the information system on which registers are maintained.*
    - ➢ Registry = collection of registers

- **Registers**
  - *A register is simply a managed list. It is easier to maintain than a fixed document, because new items can be added as needed to the register, and existing items in the register can be clarified, superseded or retired.*

    - ➢ Register = collection of tables

# S-100 Registers

S-100 Geospatial Information (GI) Registry

- Feature Concept Dictionary Register
- Portrayal Register
- Metadata Register
- Product Specifications Register²
- Data Producer Code Register

## *Feature Concept Dictionary (FCD) Register*

- *Register containing definitions on how to digitally describe and encode any piece of information*
  - *a buoy*
  - *a sounding*
  - *a ship position*
  - *a radio service*
  - *.....*

## *Portrayal Register*

- *Register containing the elements of portrayal schemes such as point symbols, pattern symbols, complex line styles, and colour symbols*

## *Metadata Register*

- *Register containing the core set of metadata items and a structure for defining additional items (to be established, subject to further requirements)*

# S-100 Registers



S-100 Geospatial Information (GI) Registry

- Feature Concept Dictionary Register
- Portrayal Register
- Metadata Register
- Product Specifications Register[2]
- Data Producer Code Register

_Product Specifications Register_

- _Description of which elements from FCD and other registers are used to define a data exchange standard (under construction)_

_Data Producer Code Register_

- _Register containing the list of codes identifying the producers of a particular data product (under construction)_

# S-100 Product Specification

■ **Product Specification**

*A product specification is a description of all the features, attributes and relationships of a given application and their mapping to a dataset. It is a complete description of all the elements required to define a particular geographic data product.*

- product identification
- data content and structure
- coordinate reference system
- data quality

- data capture
- data maintenance
- portrayal
- encoding
- product delivery

# S-100 Product Specification

- Product Specification – main document defining the product

- Feature Catalogue (XML) – Application scheme, Features and Attributes

- Portrayal Catalogue (XML) - (optional) – Display rules and symbols

- Encoding - e.g. GML, ISO8211, WKT, KML etc …

- Capture guide (optional) – Guidance/rules for capturing product data.

# S-100 Domains

- **Domains**

*Within the Feature Concept, the Portrayal and the Metadata Registers each entry is assigned to a recognised domain. The purpose of designating domains and a related Domain Control Body is to ensure that the key stakeholders (as represented by the domains) are consulted in any subsequent proposals to adjust items contained in a Register.*

Domains of Feature Concept Dictionary Register:

- nautical charts
- nautical publications
- inland ENCs
- port ENCs
- sea ice coverage
- weather
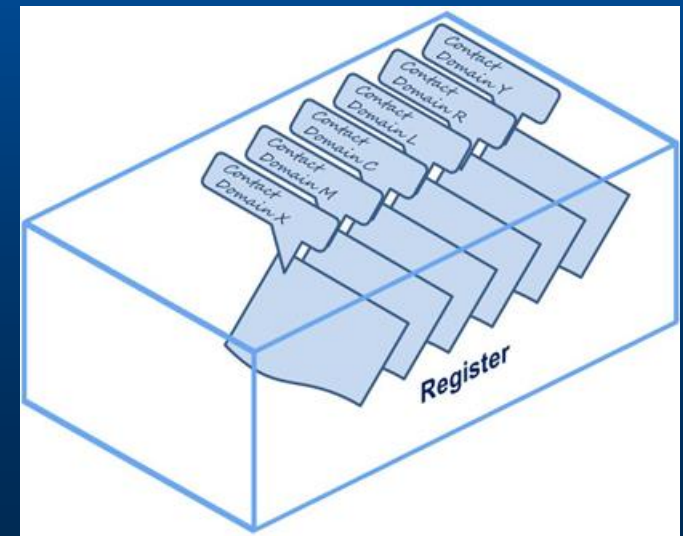
# S-100 References

- S-100 - Universal Hydrographic Data Model

  Edition 3.0.0 - April 2017

- S-99 - Operational Procedures for the Organization and Management of the S-100 Geospatial Information Registry

  Edition 1.1.0 - November 2012

- S-100 on-line GI Registry:  http://registry.iho.int/

# Status and Perspectives

http://registry.iho.int

# Status and Perspectives

- **S-100**
  - Edition 3.0.0 - April 2017
    - additional encoding formats
    - portrayal elements
    - use of *alerts* and *indications*
  - Further evolution required to support service-centric model and further development of product specifications
    - revised or new edition expected in 2019 / 2021
- **Product Specifications**
  - Focus on geospatial products

# Status and Perspectives

- **Product Specifications**
  - IHO Product Specifications
    - S-102 - Bathymetric Surface Product Specification : Edition 1.0.0 - April 2012
    - Under development:
      - S-100 Interoperability specification for ECDIS
      - S-101 – ENC
      - S-103 – Sub-surface navigation
      - S-104 - Water Level Information for Surface Navigation

      - S-111 - Surface Currents
      - S-112 - Dynamic Water Level  Transfer

      - S-121 - Maritime Limits and Boundaries
      - S-122 - Marine Protected Areas
      - S-123 - Radio Services
      - S-124 - Navigational Warnings
      - S-125 - Navigational Services
      - S-126 - Physical Environment
      - S-127 - Traffic Management
      - S-128 - Catalogues of Nautical Products
      - S-129 - Under Keel Clearance Management

# Status and Perspectives

- **Product Specifications**

  - Non-IHO Product Specifications

    - IALA S-201 - Aids to Navigation Information
    - IALA S-210 - Inter-VTS Exchange Format
    - IALA S-230 - Application Specific Messages
    - IALA S-240 - DGNSS Station Almanac
    - IALA S-245 - eLoran ASF Data
    - IALA S-246 - eLoran Station Almanac
    - IALA S-247 - Differential eLoran Reference Station Almanac

    - IEHG S-401 - Inland ENC
    - JCOMM S-411 - Ice Information (developed by ETSI)
    - JCOMM S-412 - Weather Overlay (developed by ETMSS)

- **GI Registry: IALA, IEHG & JCOMM involved in maintaining domains**

# Development of S-100 Product Specifications

## Base Standards and Services (Building Blocks)

- S-100 - Geospatial Framework
- IHO GI Registry
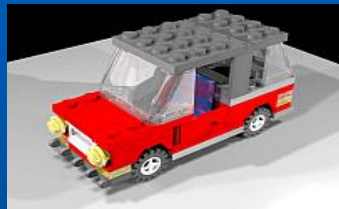
### Product Specifications

S-101 - ENC
S-102 - Bathymetric Surface
S-122 - Marine Protected Areas
S-123 - Radio Services
S-104 - Water Level Information
S-111 - Surface Currents
S-401 - Inland ENC
S-121 - Maritime Boundaries
Other IHO Product Specifications

Other non-IHO Product Specifications

Hydrographic Services and Standards Committee (HSSC)

S-100 WG

Nautical Information Provision WG (NIPWG)

Data Quality WG

Nautical Cartography WG (NCWG)

Tides, Water Level and Currents WG (TWCWG)

Hydrographic Dictionary WG (HDWG)

Inland ENC (IEHC)

E-Navigation

UN DOALOS

Others …

# Status and Perspectives

- Time scale for the take-up of S-100?

  - E-navigation

    - S-100 endorsed as the baseline for the "Common Maritime Data Structure"

    - Barriers to implementing S-101 in the near future

      - Overhead associated with dual S-57 and S-101 ENCs

      - Cost of upgrading ECDIS

    - Key driver: availability and appeal of S-100 based products & services associated with e-navigation

  - MSDI applications

    - S-102 registered in the EU Inspire framework

    - Development of web map services to provide access to S-102 products

- Ability to use S-100 to model non-geographic information?

  - Successful exploration of the feasibility of an S-100 based PS for notice of arrival and pilot requests

# Transition to an S-100 ECDIS

**Next Generation ECDIS**

**S-100 based Single Window**

**Challenges**

**S-100, S-101, S-xxx Standards**

- **S-101** Next Generation ENC
- **S-102** Bathymetry
- **S-401** Inland ENC
- **S-xxx** Nautical Publication
- **S-xxx** Weather/Environment
- **S-xxx** Marine Information Overlay
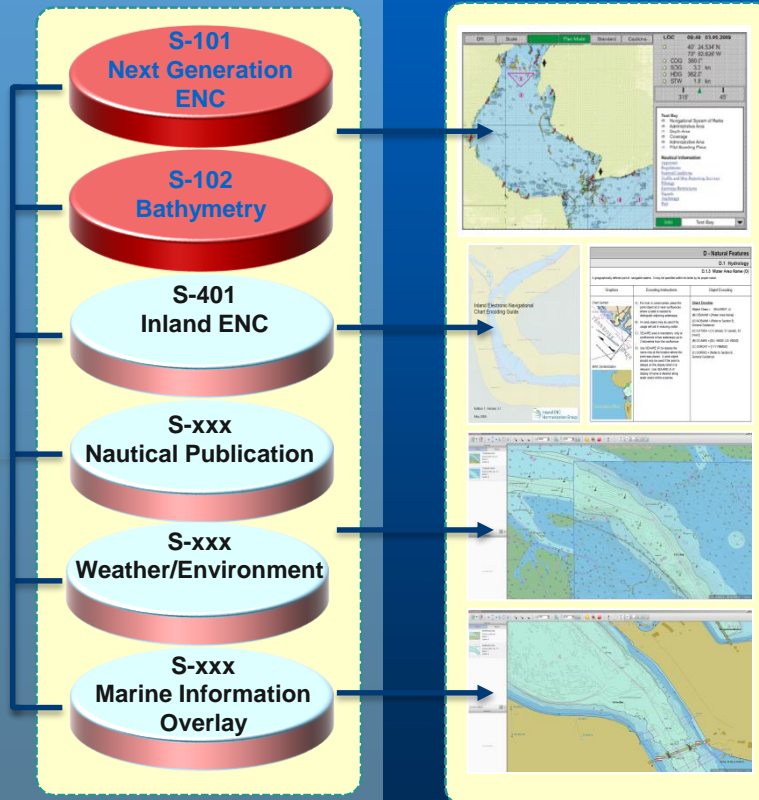
- ✓ **S-57 to S-101 conversion**
- ✓ **S-101 Implementation**
- ✓ **S-101 Display**
- ✓ **S-10x Product Overlays**
- ✓ **Conventional ECDIS functions**
- ✓ **New ECDIS functions**
- ✓ **S-101 ENC Onboard Test**
- ✓ **S-101 ENC Quality Assessment**
- ✓ **S-101 ENC Protection**
- ✓ **S-10x Product distribution**

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# Ramp up for the future: S-101 Next Generation ENC Test bed and time line



Release for operational use

Approvals

Converter update

Sample Data available

S-57 to S-101 Converter

Draft Version

2014

2015

2016

2017

2018

2019
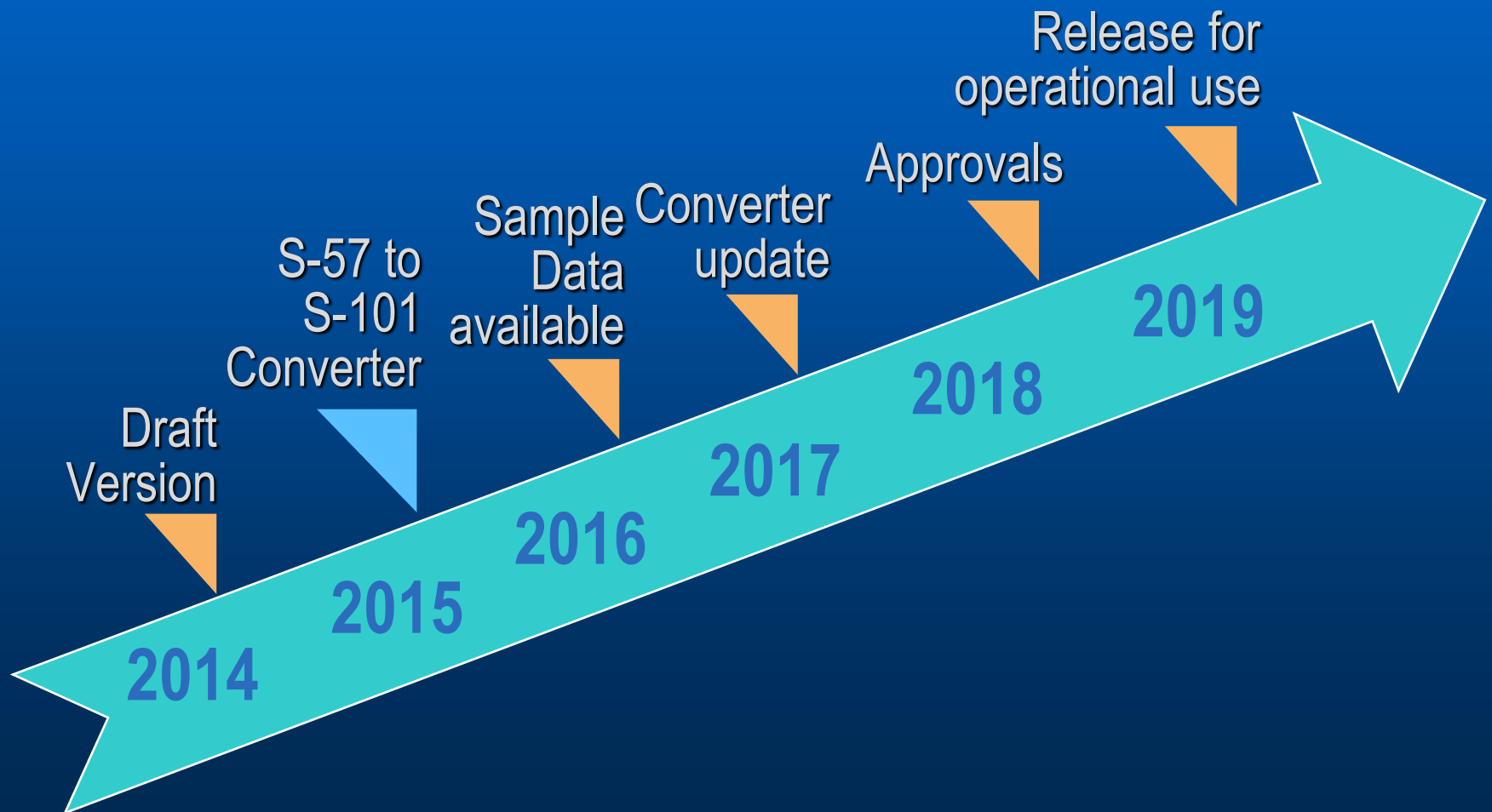
# S-100 How to

- **Identify the requirement**
  - What information does one want to exchange in a digital, standardised way ?
    - *"enter once – use many"* applications
- **Are the definitions that one needs already in the S-100 Registry?**
  - Yes => Go ahead
    - develop own Product Specification / Exchange Standard

# S-100 How to

- No? (Definitions not in the Registry):
  - Find or become a submitting organization to :
    - revise an existing entry
    - propose something new
  - Then develop  own Product Specification / Exchange Standard
- IHO/HSSC will not create or control definitions or standards outside its scope
  - But it can help and advise if asked …

# More information …

# More information …

# Questions?

For more information: http://www.iho.int

IHO Contact: info@iho.int