IHO Marine Geospatial Standard based on ISO 19000 series

4th June 2021

Yong BAEK, IHO Secratariate
International Hydrographic Organization (IHO) is an intergovernmental organization which supports the safety of navigation and the protection of the marine environment.

June 21, 2021: the IHO celebrates its first 100 years
Hydrography focuses on the physical features of oceans, coastal areas, lakes and rivers, as well as with the prediction of their change over time.
INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)

- Scientific Research
- Nautical Cartography
- Defense and Surveillance
- Safety Navigation
- Blue Economy & Blue Growth
- Data Quality
- Standards
- Maritime services & shipping

“Hydrography is much more than nautical charts”
(Pushidrosal, Indonesia)
A framework standard that is intended for the development of digital products and services for hydrographic, maritime and GIS communities.

It comprises multiple parts that are based on the geospatial standards developed by ISO/TC211.
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| Imagery and Gridded Data                       | S-100 Part 8| ISO 19123:2007, Geographic information - Schema for coverage geometry and functions ISO 19129, Geographic information - Imagery, Gridded and Coverage Data Framework |
| Portrayal                                      | S-100 Part 9| ISO 19135:2005, Geographic Information - Portrayal                              |
| Portrayal (Lua)                                | S-100 Part 9a| ISO 19108:2005, Geographic information - Lua Portrayal Implementation          |
| ISO/IEC 8811 Encoding                         | S-100 Part 10b| ISO 19135:2007 Geographic information - Geography Markup Language               |
| GML Encoding                                   | S-100 Part 10c| ISO 19135:2007 Geographic information - Geography Markup Language               |
| HDF5 Encoding                                  | S-100 Part 11| ISO 19131:2008 Geographic information - Data product specifications           |
| Product Specifications                        |               | S-100 Part 12| ISO 19108:2005, Geographic information - Rules for application schema           |
| S-100 Maintenance Procedures                  |               | S-100 Part 13| Provides scripting support for S-100 based product specifications               |
| S-100 Scripting Language                      |               | S-100 Part 14| Specifies an online exchange mechanism for S-100                               |
| Online Communication Exchange                 |               | S-100 Part 15| Specifies encryption and data protection for S-100 based products               |
| Encryption and Data Protection                 |               |
S-100 UNIVERSAL HYDROGRAPHIC DATA MODEL

https://youtu.be/VIAP4Uo11xw
WHAT DOES S100 MEAN FOR THE MARITIME COMMUNITY?

- Leads to a global **consistency** of products
- Equipment and Software Manufactures implement at the S100 level
  - Product Specifications are tied to versions of S-100
- Leverages machine readable catalogs for ease of updating different product specifications
- Internationally recognized framework for the structure and delivery of products for the hydrographic and maritime community
### S-100 Based Product Specifications

#### IHO
- S-101 Electronic Nautical Chart (ENC)
- S-102 Bathymetric Surface (Edition 2)
- S-103 Sub-surface Navigation
- S-104 Water Level Information for Surface Navigation
- S-111 Surface Currents
- 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 (UKCM)
- S-130 Polygonal Demarcations of Global Sea Areas
- S-131 Marine Harbour Infrastructure
- S-164 IHO Test Data Sets for S-100 ECDIS

#### IALA
- S-201 Aids to Navigation Information
- S-211 Port Call Messages
- S-210 Inter-VTS Exchange Format
- S-230 Application Specific Messages
- S-240 DGNSS Station Almanac
- S-245 eLoran ASF Data
- S-246 eLoran Station Almanac

#### IOC
- S-301 to S-399 – Oceanographic uses

#### IEHG
- S-401 – IEHG Inland ENC
- S-402 - IEHG Inland Bathymetric ENC

#### WMO / JCOM
- S-411 JCOMM Ice Information
- S-412 JCOMM Weather Overlay

#### IEC
- S-421 – Route Plan Exchange Format

#### NATO (GMWG)
- S-501 to S-525 - AMLs
Yesterday paper charts – Today ENCs

IMO SOLAS V/19 1974 (as amended):

19.2.1 All ships irrespective of size shall have:

19.2.1.4 nautical charts and nautical publications to plan and display the ship’s route for the intended voyage and to plot and monitor positions throughout the voyage. An electronic chart display and information system (ECDIS) is also accepted as meeting the chart carriage requirements of this subparagraph. Ships to which paragraph [2.10] applies shall comply with the carriage requirements for ECDIS detailed therein;
Future ECDIS supporting E-navigation

S-100 WORLD

S-101 ENC as the future fuel for IMO ECDIS

2D ECDIS

4D ECDIS, additional vertical and real time information dimension
MAJOR BENEFITS WITH S-100

Improved Safety
New rocks are discovered frequently when modern survey methods are used.

Route Optimization and Just in Time
Decreased fuel consumption. Avoid squat, use tide, currents and weather information.

Optimized Loading
Under Keel Clearance Management with S-100 and future improved vertical positioning with GNSSS.

Automated Navigation
Machine readable nautical information can facilitate all four levels of MASS – Maritime Autonomous Surface Ships as defined by IMO.
Using S-100 in Norway

Manoeuvring Sleipnir, biggest crane ship in the world, in a narrow fairway, with Bathymetry S-102 data
Using S-100 in US

**S-104 Water Level**

**S-111 Surface current**
Using S-100 in Korea

Sea Trial (click here)
Thank you

IHOhydro

International Hydrographic Organization