THE UNIVERSAL HYDROGRAPHIC DATA MODEL S-100: A REVOLUTIONARY APPROACH TO THE NAUTICAL CARTOGRAPHY AND MARITIME SERVICES

International Hydrographic Organization

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AGENDA

• THE INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)

• THE UNIVERSAL HYDROGRAPHIC DATA MODEL S-100

• S-100 BEST PRACTISES

• CONCLUSIONS
Intergovernmental Organization in its own right

Governance very similar to UN Bodies: Assembly/Council

Technical consultative Organization: works with recommended standards
S-100: THE UNIVERSAL HYDROGRAPHIC DATA MODEL

... WHY SUCH A HUGE INTEREST?

WORLD MARITIME TRAFFIC

VALUE OF THE TRAFFIC VIA THE SEA IN THE U.S.A.

USA: Maritime traffic:
- **42%**: value of the U.S. economy transported by sea
- **71%**: weight in total U.S. international economy

PROJECTION OF GLOBAL GROWTH
S-100: THE UNIVERSAL HYDROGRAPHIC DATA MODEL

- A universal Standard to develop digital products and services for the Hydrographic, Maritime and GIS communities
- It includes many parts from the geospatial standard developed by ISO/TC211

Edition 5.0.0 – May 2022
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... IMO SOLAS 1974 (PAST AND PRESENT)

YESTERDAY: Paper Chart

TODAY: Electronic Nautical Chart (ENC)

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;
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TODAY: ENC

2D ECDIS

THE FUTURE: S-101 ENC as future for IMO ECDIS

4D ECDIS (included vertical dimension and real time information)
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... S-100 PRODUCTS (S-1XX PRODUCT SPECIFICATIONS)
S-100: THE UNIVERSAL HYDROGRAPHIC DATA MODEL

THE PRODUCT SPECIFICATIONS TODAY

S-100 Data Products:

- S-101: Electronic Navigational Charts
- S-102: Bathymetric Surface
- S-104: Water Level Information for Surface Navigation
- S-111: Surface Currents
- S-41X: Weather Overlays
S-100: THE UNIVERSAL HYDROGRAPHIC DATA MODEL

... A "BUILDING BLOCK" SOLUTION

- This provides a picture of the future generation products’ development, as well as the other digital products requested by the Hydrographic, Maritime and GIS communities.
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... WHAT’S THE MEANING FOR THE MARITIME COMMUNITY?

- Global coherence of the products
- S-100 is implemented directly by the producers
- Product Specifications are derived and directly linked to the different versions/editions of S-100
- The Standard uses readable catalogues to facilitate the update of the Product Specifications
- The Standard is internationally recognized by the Hydrographic and Maritime communities
S-100: THE UNIVERSAL HYDROGRAPHIC DATA MODEL

... NEW BENEFITS DERIVING FROM S-100:

- More Safety
  - New dangers for navigation are discovered frequently when new modern detecting methods are used

- Course and time optimization
  - Fuel consumption reduction thanks to the use of tides, currents and meteorological information in real time

- Charge optimization
  - Improvement of the underkeel clearance management with the use of S-100 and GNSS vertical positioning

- Autonomous navigation
  - Nautical information machine readable to facilitate all the MASS levels - Maritime Autonomous Surface Ships as defined by IMO
S-100: Best practices - AUGUST 2019: SEA TRIALS IN ROK OF THE FIRST S-100 PRODUCT SPECIFICATIONS

KHOA & IHO
S-100: Best practices - S-102 IN NORWAY!

Sleipnir manouvers: the biggest crane ship in the world in a narrow navigable passage using S-102
Many incidents in the Lower Mississippi are caused by underkeel shallow waters.
S-100: Best practices - South of Baton Rouge (USA): Use of S-102
Office of Coast Survey
National Oceanic and Atmospheric Administration

S-102 “Bathymetric information” can improve safety and allow better draft
S-100: Best practices - USE OF S-104 E S-111 IN THE U.S.A.!

Brooklyn Bridge (NYH1920) Depth: 44 feet
LAT/LON: 40.7060° N 73.9977° W

Note: Depth is measured below chart datum.

NOAA / NOS / CO-OPS Tidal Current Predictions
NYH1920 Brooklyn Bridge Depth: 44 feet 2021-04-01 to 2021-04-02 (LST/LDT)
Mean Flood Dir: 49° (T); Mean Ebb Dir: 225° (T)

S-104 Tide levels
S-111 Surface currents
The data provided by the S-104 product provides clear information on where it is safe for the ship to maneuver.
The surface current data provided by the S-111 product helps optimize the ship's route, in terms of less fuel used, reduced CO2 emissions and cost.
S-100: Best practices - S-41X: WAVES AND WEATHER CONDITIONS AT SEA

S-412: Weather Overlay

S-413: Weather and Wave Conditions

S-414: Wave and Weather Observations
S-100: Best practices - S-41X: DEPARTING FROM NEW ORLEANS (USA)

S-41X product provides weather-marine information critical to navigational safety
CONCLUSIONS:

- S-100 IS A REVOLUTION FOR THE MARITIME INTERNATIONAL COMMUNITY
- S-100 PROVIDES A COMPLETE 4D PICTURE OF THE MARINE ENVIRONMENT, USING DATA AND INFORMATION USEFUL FOR THE MARINERS
- THE S-100 DEVELOPMENT IS HAPPENING WITH ALL THE INTERNATIONAL MARITIME STAKEHOLDERS
- THE USE OF S-100 WILL IMPROVE THE RESPECT FOR THE MARINE ENVIRONMENT
Thank you for your attention