



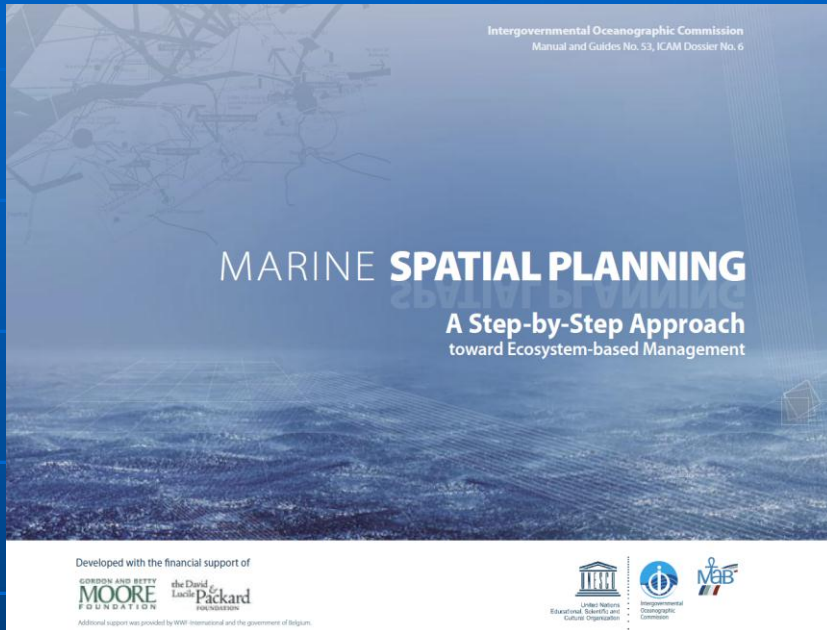
E-NAVIGATION UNDERWAY 2013

IHO S-100: an essential contribution to Maritime Spatial Planning and e-Navigation

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International Hydrographic Organization



IHO S-100: an essential contribution to Maritime Spatial Planning and e-Navigation



A public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process.

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E-navigation

The Maritime Safety Committee (MSC) at its 81st session decided to include, in the work programmes of the NAV and Radiocommunications and Search and Rescue (COMSAR) Sub-Committees, a high priority item on "Development of an e-navigation strategy", with a target completion date of 2008 and with the NAV Sub-Committee acting as co-ordinator. NAV 52, which met in July 2006, was instructed to give preliminary consideration to this important topic.

The aim is to develop a strategic vision for e-navigation, to integrate existing and new navigational tools, in particular electronic tools, in an all-embracing system that will contribute to enhanced navigational safety (with all the positive repercussions this will have on maritime safety overall and environmental protection) while simultaneously reducing the burden on the navigator. As the basic

The harmonized collection, integration, exchange, presentation and analysis of marine information on-board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment

MSC 85/26/Add.1 - Annex 20



Background



- International Hydrographic Organization (IHO)
- *intergovernmental, consultative and technical*
 - *established in 1921*
 - *support safety of navigation and contribute to the protection of the environment*
 - *establish and maintain appropriate standards to assist in the proper and efficient use of hydrographic data and information (“measure once, use many times”)*

➤ ...



Background

- 1987: adoption of IHO “CEDD” format
- 1992: 1st edition of IHO publication S-57

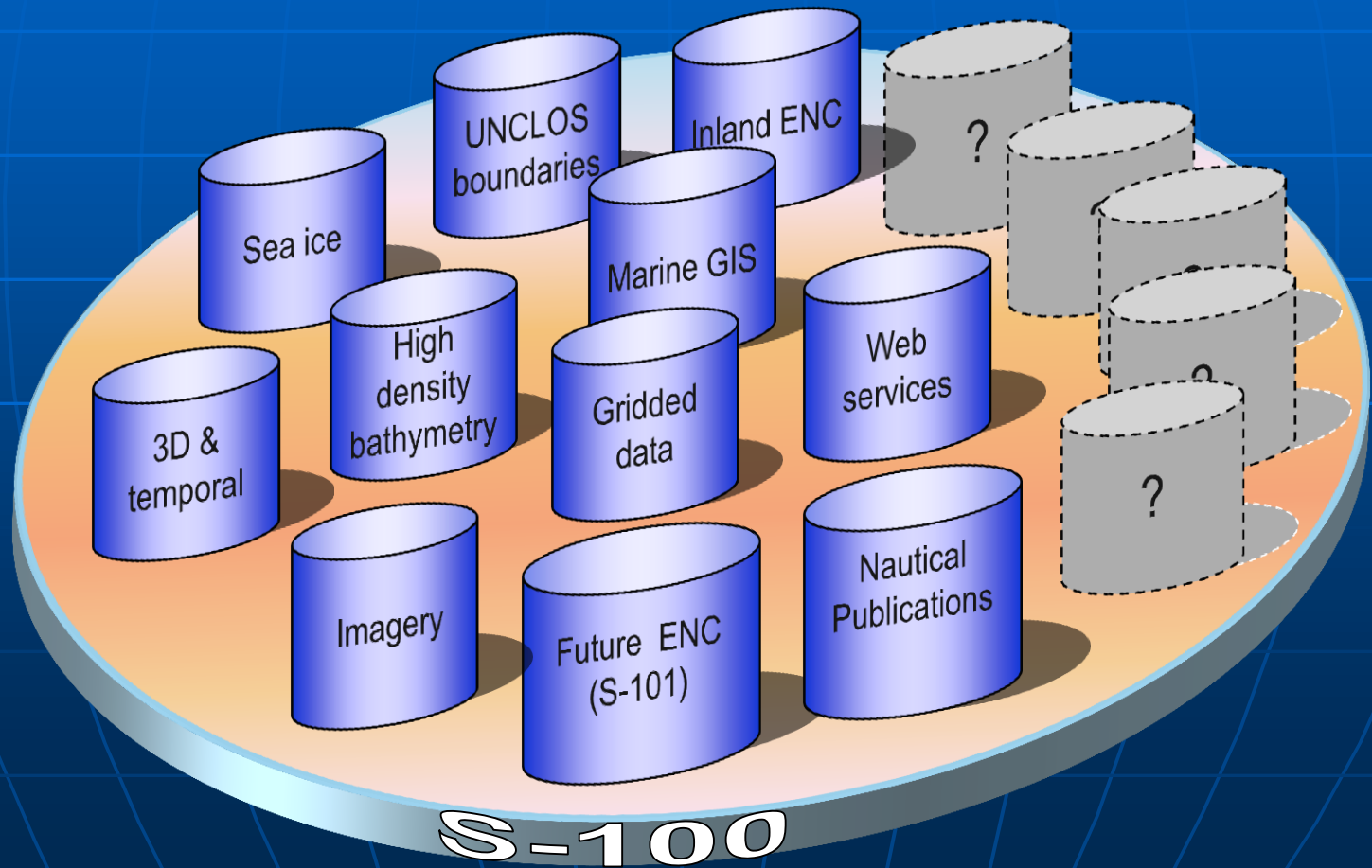
Transfer Standard for Digital Hydrographic Data

- 2000: publication of S-57 Edition 3.1
 - evolution of S-57 driven by ECDIS/ENC development
 - currently “active” but “frozen”
- 2001: development of a new standard begins



Description of S-100

S-100 provides a contemporary hydrographic geospatial data standard that can support a wide variety of digital data sources, products and services



Description of S-100

- Data content separated from the carrier (file format)

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

- Manageable flexibility
- 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



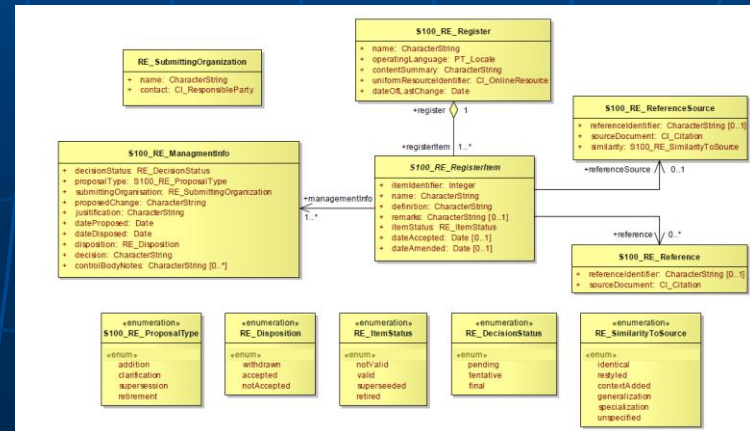
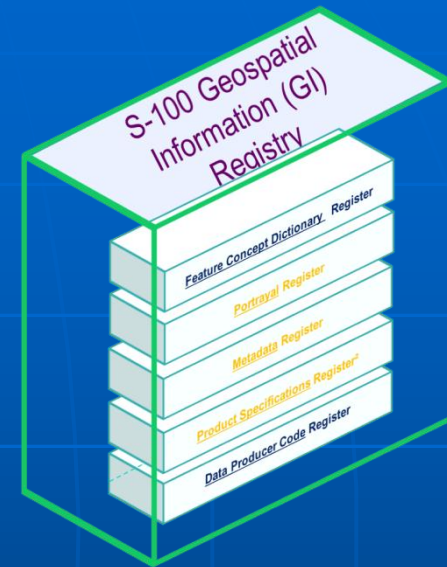
Description of S-100

■ Registry

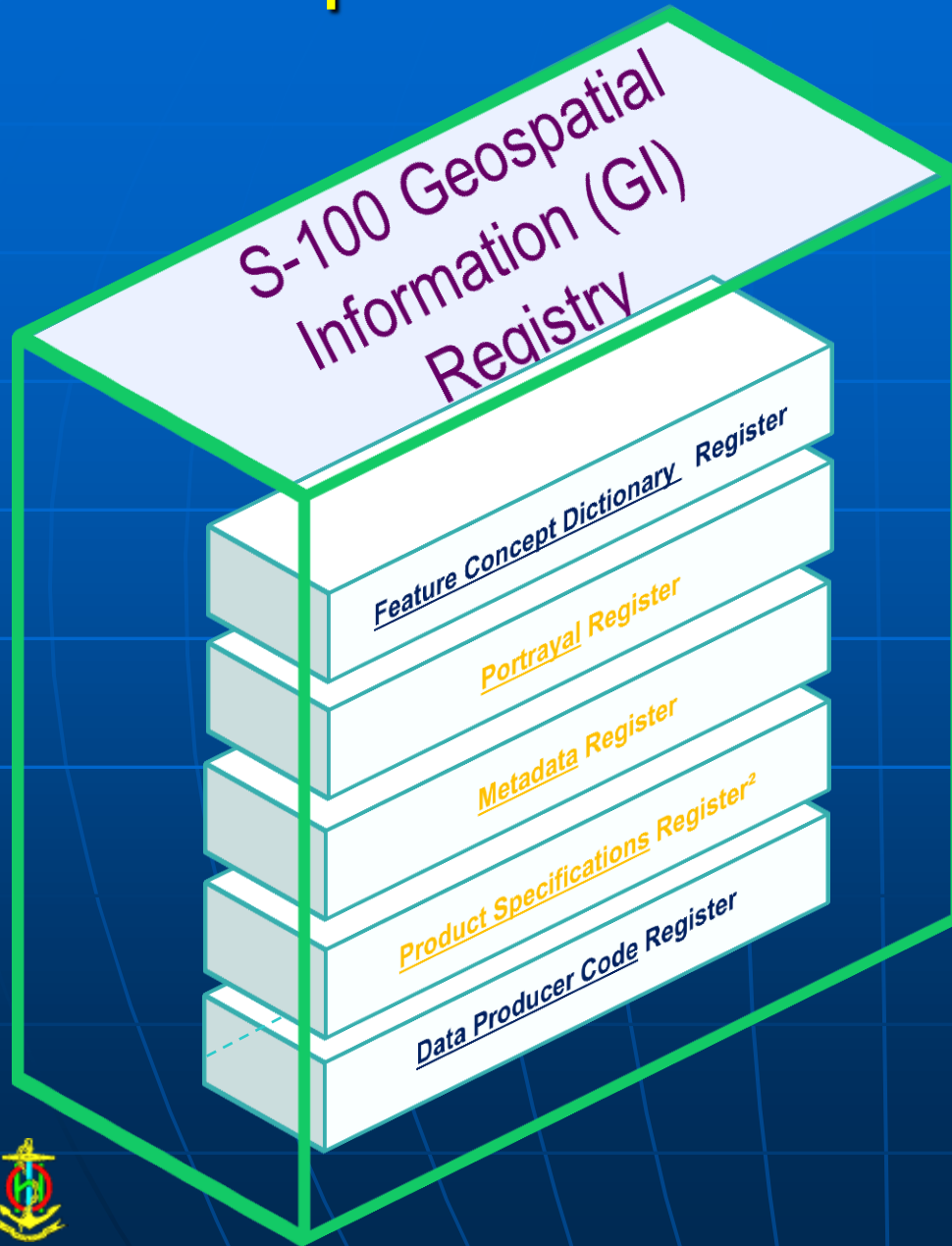
- A registry is the information system on which a register is maintained.
 - Registry = collection of registers

■ 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



Description of S-100



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
 -

Product Specifications Register

- Description of which elements from FCD and other registers are used to define a data exchange standard
 - IHO ENC product specification
 - real-time tidal height exchange standard
 - sea ice product specification
 - ship reporting exchange standard
 - VTMS route definition product spec.
 -



Description of S-100

■ 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



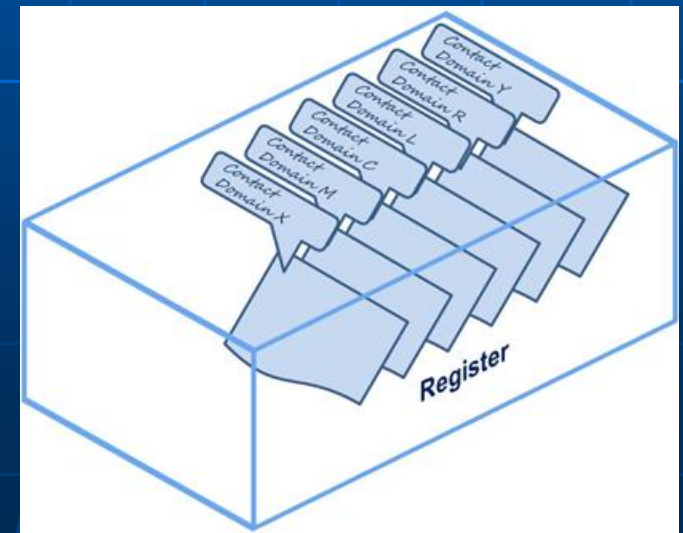
Description of S-100

■ 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 ENC's
- port ENC's
- sea ice coverage
- marine information overlays



Description of S-100

■ References

- S-100 - Universal Hydrographic Data Model
Edition 1.0.0 - January 2010
- S-99 - Operational Procedures for the Organization and Management of the S-100 Geospatial Information Registry
Edition 1.0.0 - January 2011
Revision (Edition 1.1.0) to be published in February 2013



S-100 and e-Navigation

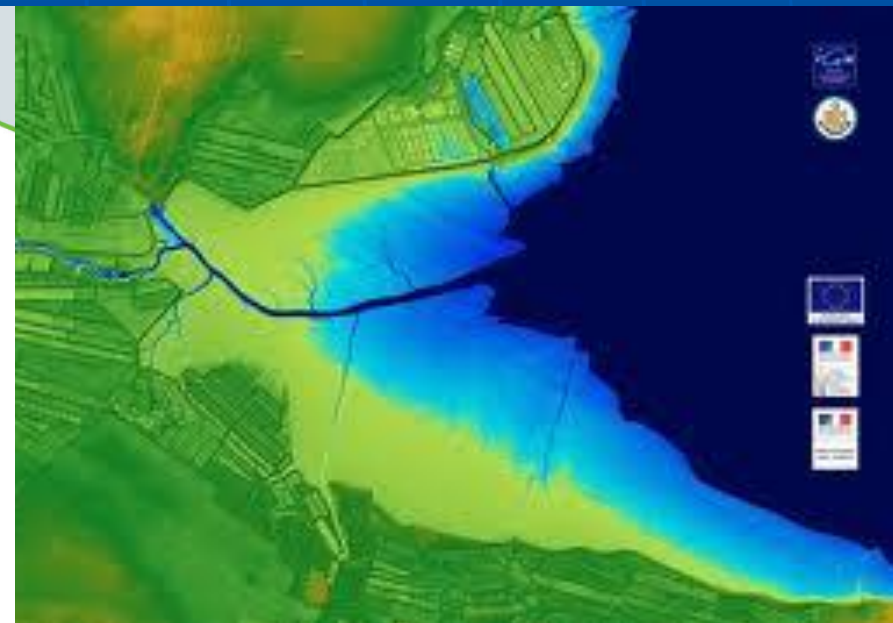
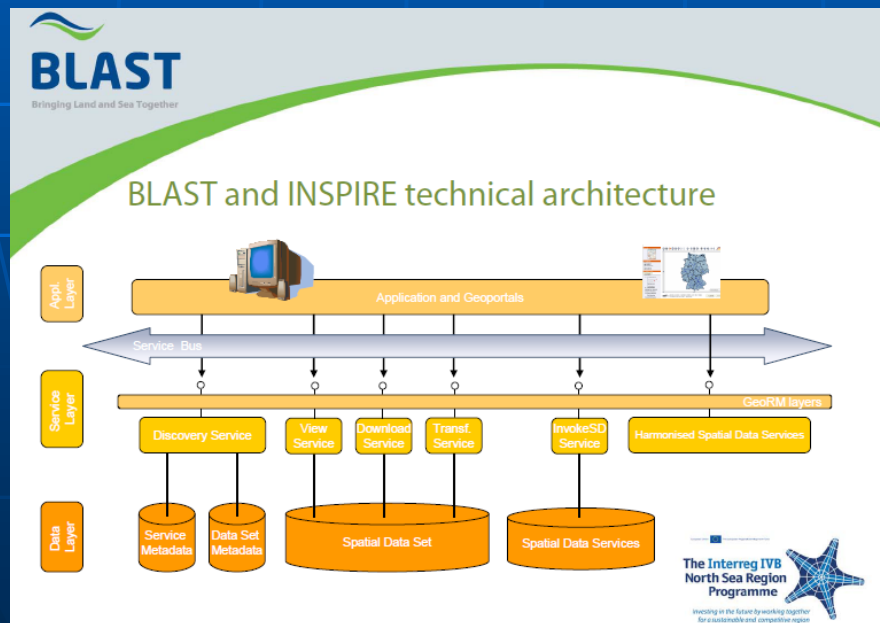
- IMO e-Navigation strategy identifies the need for “**an internationally agreed common data structure**” (CMDS) that allows information to be exchanged, read and interpreted by ship-borne and shore-based ICT systems.
- It is foreseen that CMDS development will be an incremental process driven by user requirements.
- **S-100** agreed as an **appropriate baseline standard** for creating a framework for e-Navigation data access and services under the scope of SOLAS.
- IMO has agreed the establishment of an **IMO/IHO Harmonization Group on Data Modelling** to lead future work in that direction.
- **Test beds** carried out or in progress using **S-100** based data models



S-100 and Maritime Spatial Planning

- **Maritime Spatial Planning** relies on the existence of a **Marine Spatial Data Infrastructure (MSDI)**

SDI = range of activities, processes, relationships and physical entities that, taken together, provide for integrated management of spatial data, information and services



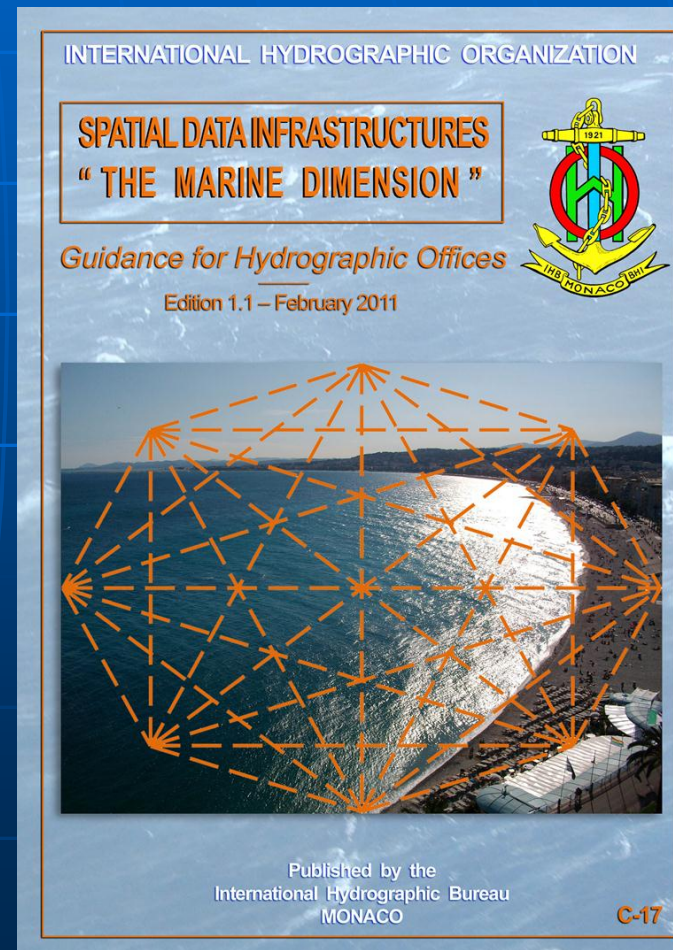
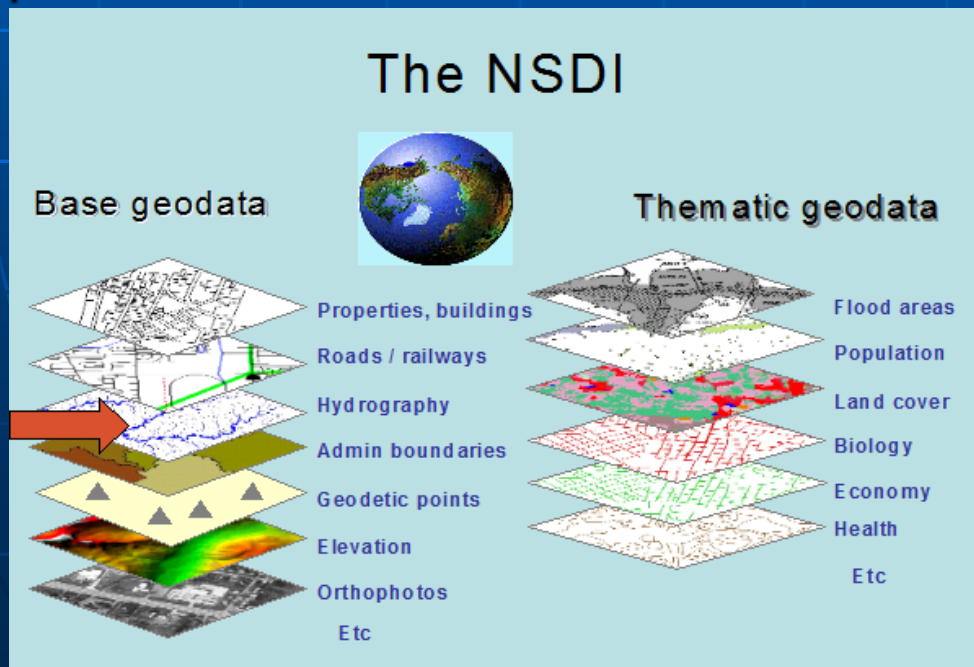
S-100 and Maritime Spatial Planning

- **MSDI** support myriad uses:
 - Habitat mapping & heritage assessment
 - Conservation assessment & designation
 - Site selection (e.g. renewable energy and oil & gas extraction)
 - Route optimisation
 - Vessel location and disposal monitoring
 - Homeland security and defence
 - Aggregates extraction
 - Fisheries regulation
 - Coastal protection & shoreline management
 - Licensing & consent evaluation
 - Emergency planning & management
 - Survey planning & execution



S-100 and Maritime Spatial Planning

- Main MSDI element = information content
- Reference information = “base map”
- MSDI = base map + thematic layers
- S-100 offers the appropriate framework for the development of standardized MSDI products and services



Status and Perspectives

■ S-100

- Edition 1.0.0 - January 2010
- Section on portrayal registers under development
- Approval of Edition 2.0.0 foreseen in 2014
- Further evolution required to support service-centric model

■ 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-101 - ENC: draft 1st Edition expected in 2013
- S-10x – Marine Protected Areas
- S-10x - Digital Routeing Guide
- Generic template to guide the development of product specification marine information overlays

• Product Specifications being developed with other organizations

- Marine Boundaries Data (UN DOALOS)
- Sea Ice (JCOMM/ETSI)
- Ocean Forecasts (JCOMM/ETMSS)

■ GI Registry: IALA & IEHG involved in maintaining domains



Status and Perspectives

- Time scale for the take-up of S-100?
 - E-Navigation
 - Little enthusiasm for moving to S-101 in the near future
 - Overhead associated with dual S-57 and S-101 ENC's
 - 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 high precision bathymetry 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



Conclusion

- S-100 offers the appropriate open framework for supporting the development of e-Navigation and Maritime Spatial Planning efficiently
- The IHO welcomes any initiative to share, use and expand this framework for the benefit of the maritime stakeholders
- The IHO will help and advise ... if asked.





Questions?

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

S-100 GI Registry:

http://registry.iho.int/s100_gi_registry/home.php

IHO Contact: info@iho.int

