



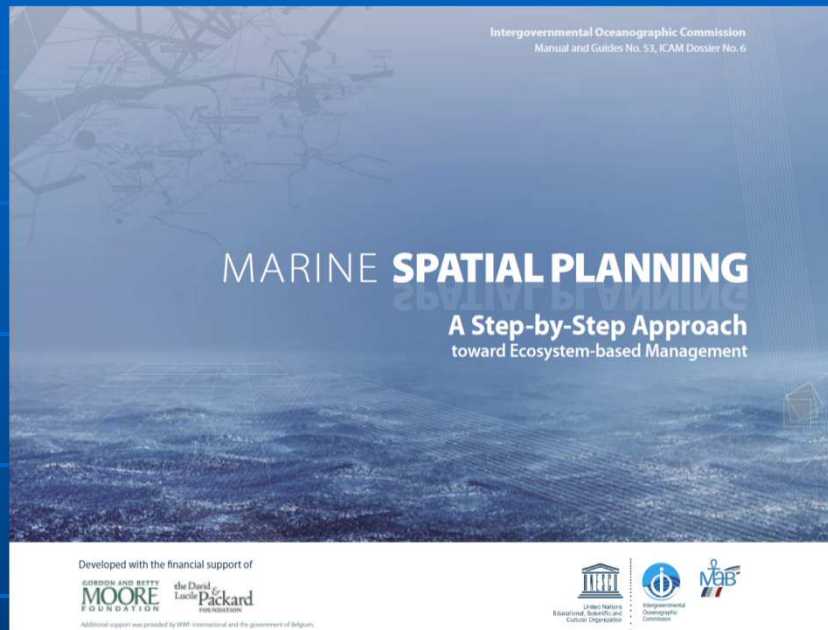
E-NAVIGATION

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

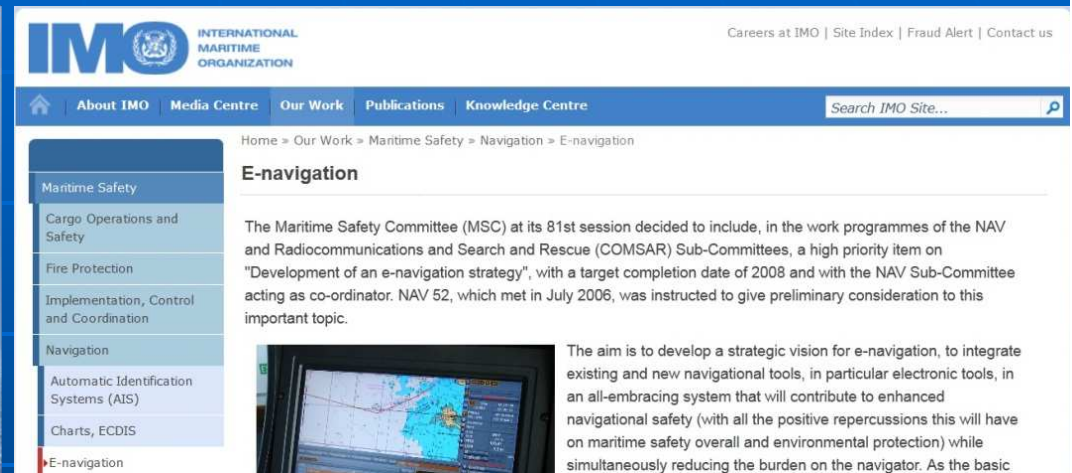
International Hydrographic Organization



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.



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

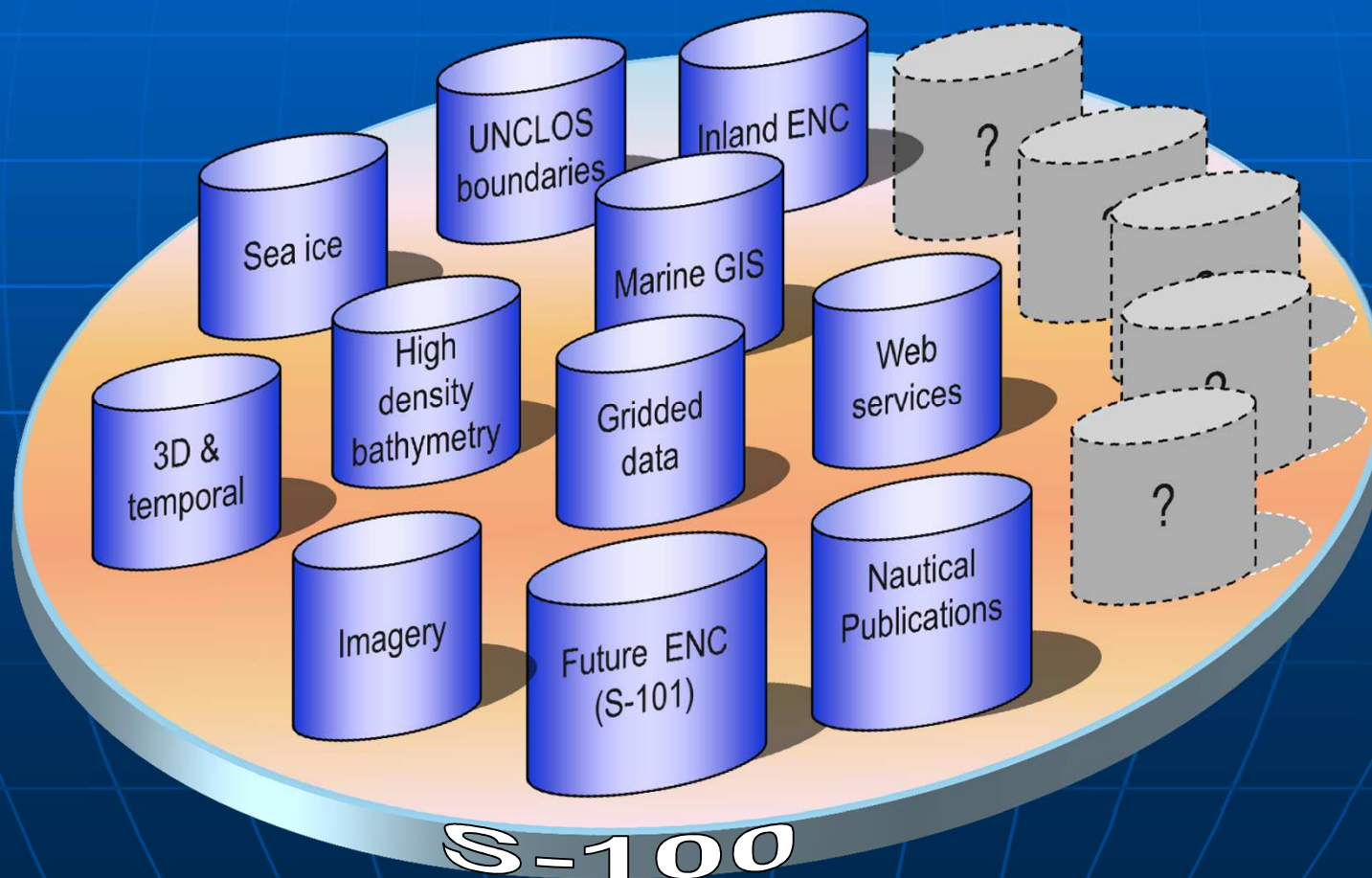
Transfer Standard for Digital Hydrographic Data

- 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

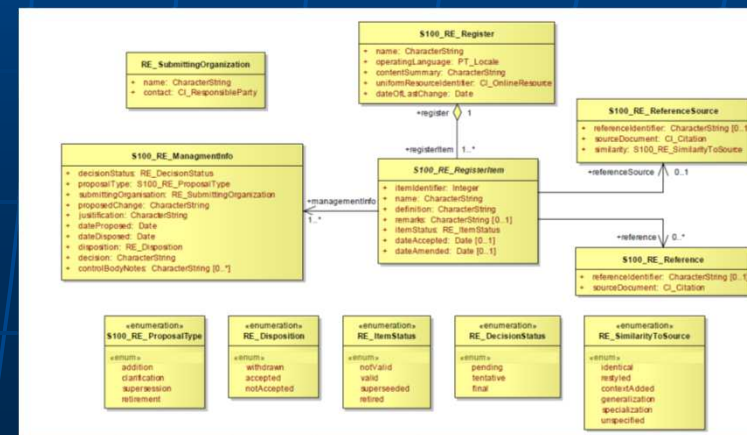
■ Registry

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

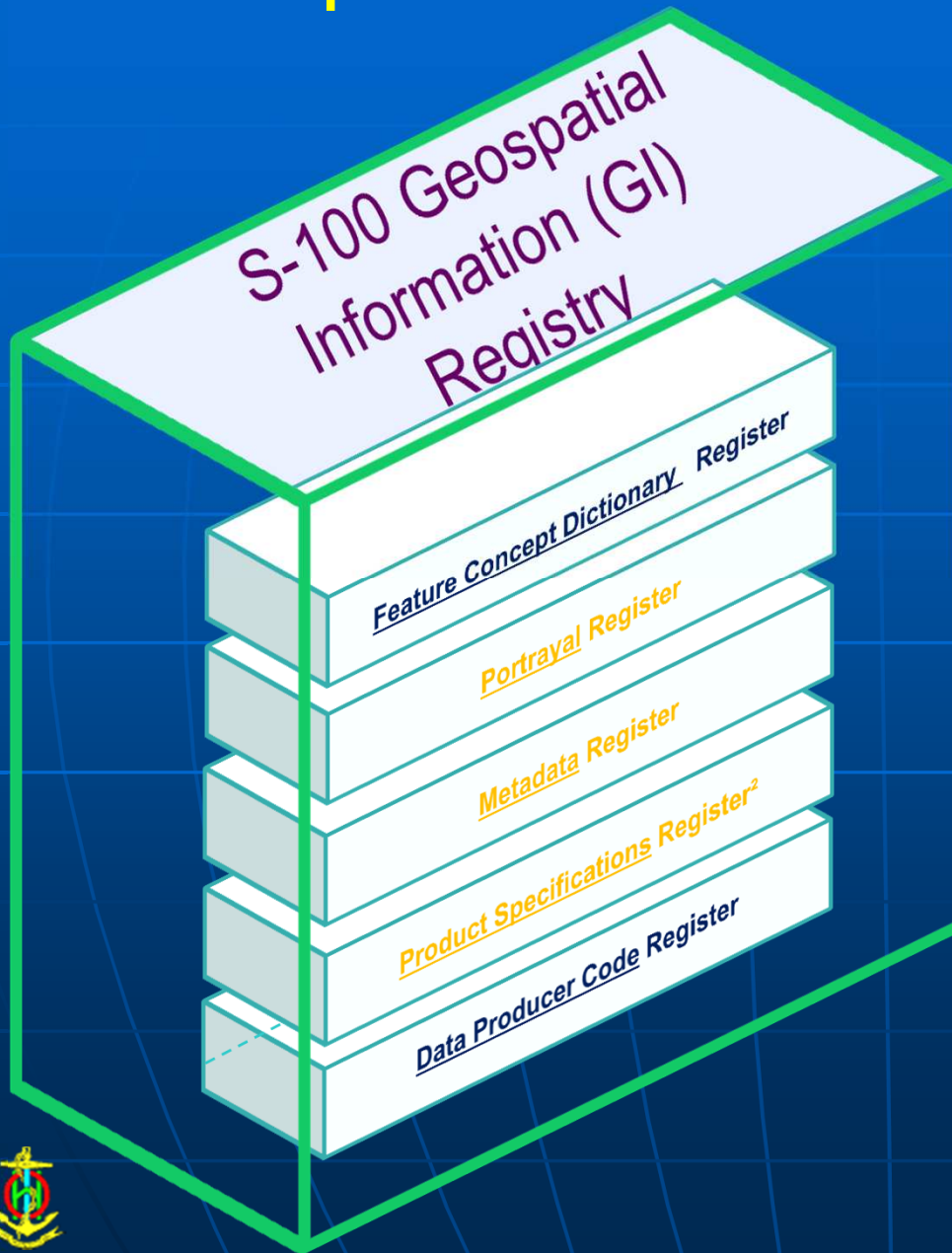


■ Registers

- *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



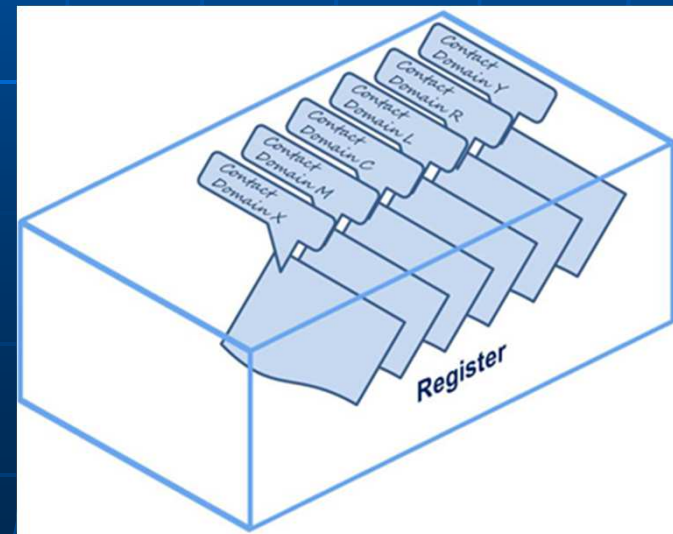
Description of S-100

■ 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

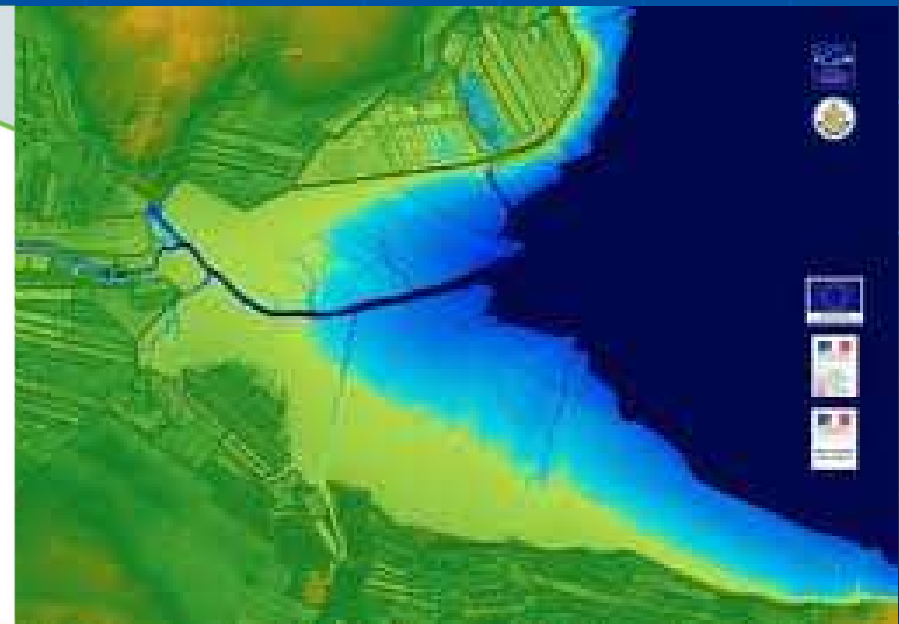
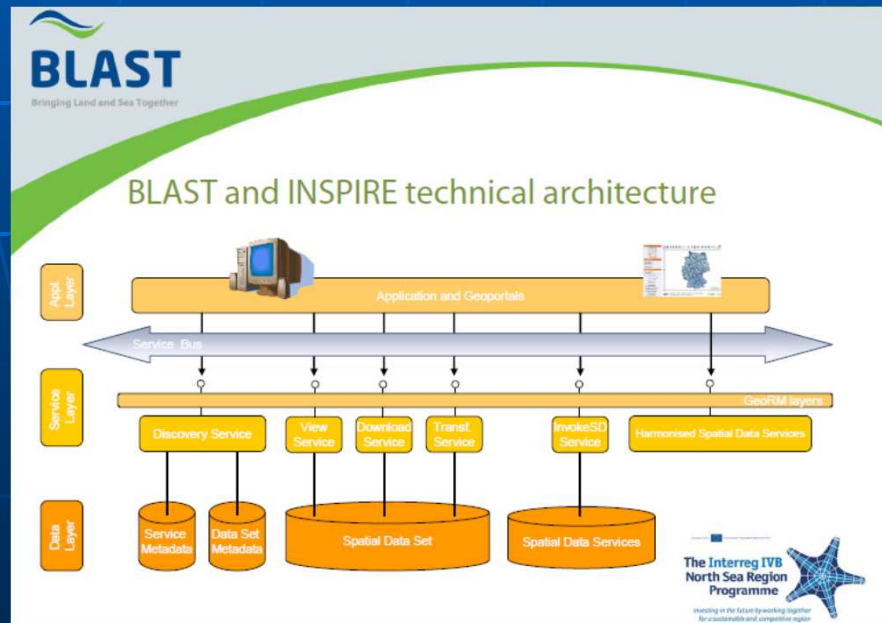
- IMO e-Navigation strategy identifies the need for “an internationally agreed common data structure” (CMDS) that allows information to be exchanged, read and interpreted by ship-borne and shore-based ICT systems.
- It is foreseen that CMDS development will be an incremental process driven by user requirements.
- 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

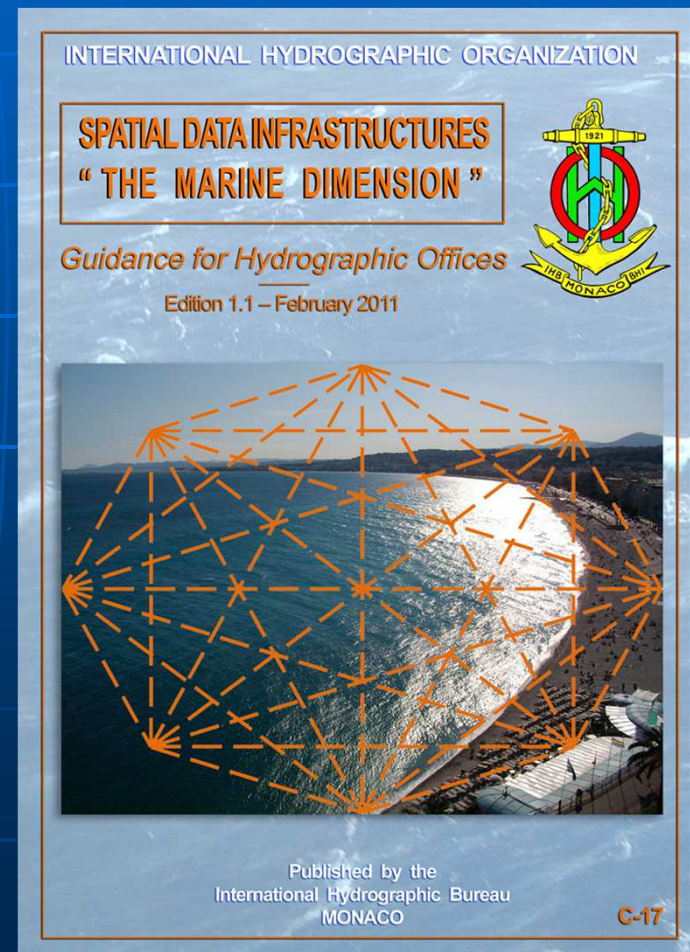
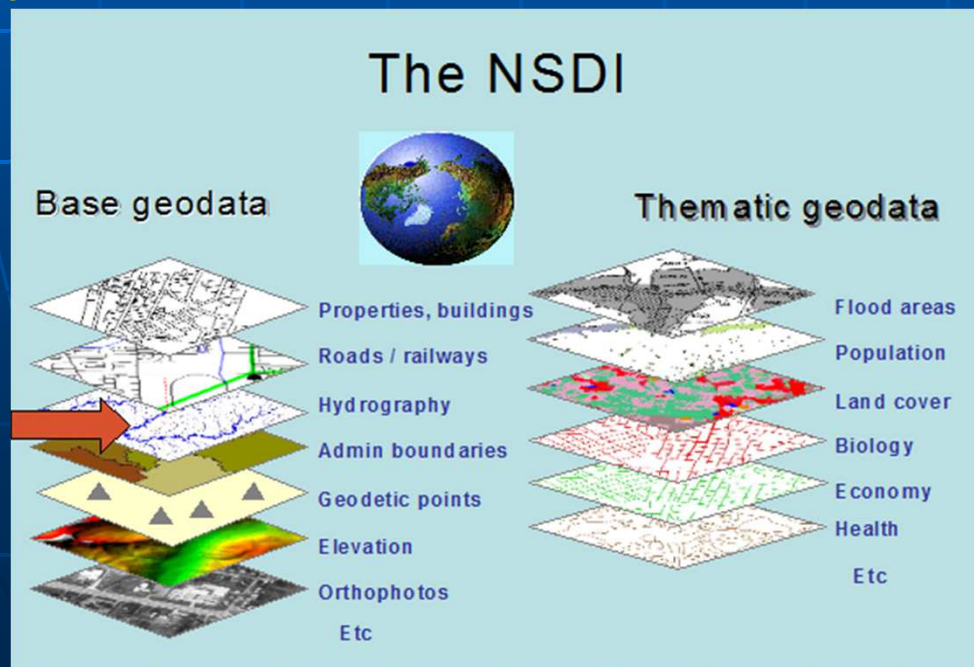
■ MSDI support myriad uses:

- 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 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

