The International Seminar on United Nations Global Geospatial Information Management

Singapore, 10 – 12 May 2022

Session #1 - “Effective and integrated marine geospatial information management”

The IHO Marine Spatial Data Infrastructures Working Group. (MSDIWG)

Jens Peter Hartmann
Danish Geodata Agency
Danish Hydrographic Office
Chair IHO MSDIWG

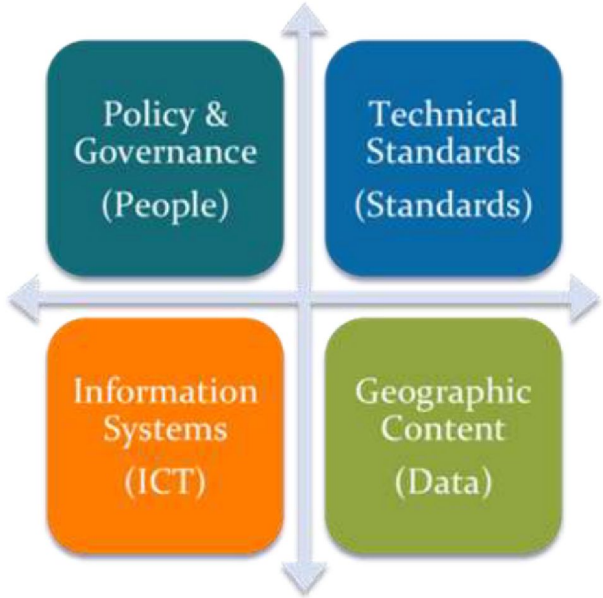
The IHO MSDIWG

*Effective and integrated marine geospatial information management must be **fit-for-purpose, appropriate and adequate, interoperable and sustainable, accessible and inclusive**, and able to accelerate efforts to increase the **availability and accessibility** of marine geospatial information.*

*This session discusses the **integrative capabilities, potential and opportunities** of marine geospatial information, products and services for the benefit of society, economy and environment.*

The Four pillars of MSDI

IHO Publication C-17



IHO International Hydrographic Organization

Policy & Governance (People)

MSDI provides a framework for the provision of hydrographic information beyond the traditional field of surface navigation.

- Increased activity with multiple uses
- Multiple stakeholders and users with demands for the same area
- Major external impact from “new” organisations e.g.:
  - Marine Strategy
  - Marine Spatial Planning
  - Coastal Zone Planning

- Increased demands for coordination and planning within the maritime/marine area
- Increased demands for coordination of activities on land
- Increased demands for coordination with neighbouring countries

Not doing anything will not be an option

MSDI
Geo Data of the Sea

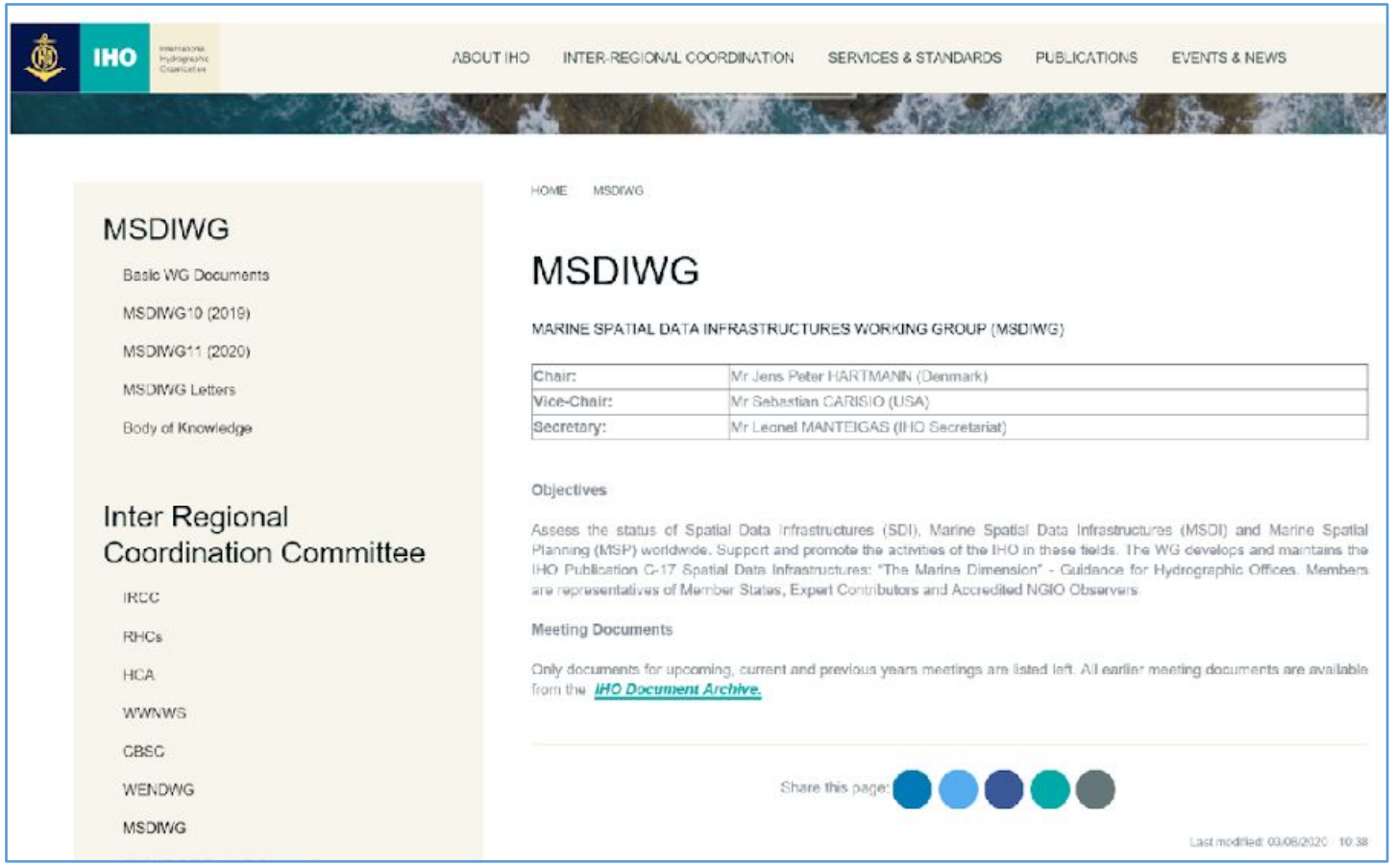
IHO International Hydrographic Organization

IHO MSDIWG Functions

- Identify the **Hydrographic Community inputs** to National Spatial Data Infrastructures (NSDI)
- **Monitor** national and international SDI activities
- Promote the use of **IHO standards** and member state **marine data** in SDI activities.
- **Liaise**, as appropriate, with other relevant technical bodies
- **Propose any Technical and/or Administrative Resolutions** that may be required to reflect IHO involvement in the support of SDI.
- **Identify actions and procedures** that the IHO might take to contribute to the development of Spatial Data Infrastructure (SDI) and / or MSDI in support of Member States.

Policy & Governance (People)

The IHO MSDIWG



The IHO - MARINE SPATIAL DATA INFRASTRUCTURE value chain

IHO → IRCC ⇄ IHO MSDIWG

RHC (E.g. SAIHC, BSHC, NSHC, ARHC) ⇄ RHC-MSDIWG

BS-NSMSDIWG

Arctic MSDIWG

Link to IHO MSDI webpage https://iho.int/en/msdiwg

IHO MSDIWG: 58 members

- 29 MS - 14 Expert Contributors

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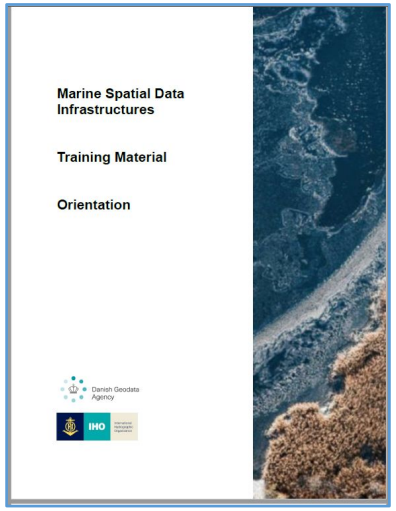
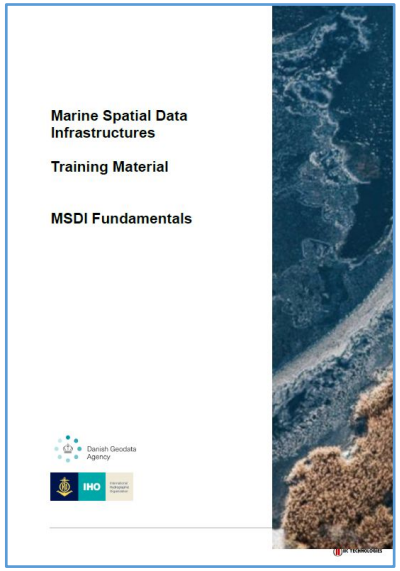
Policy & Governance (People)

MSDI Training material

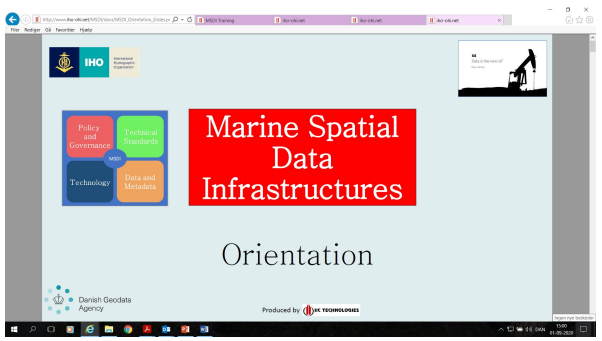
1. Download from the IHO website
2. Download via Dropbox
3. Use the interactive material in Youtube

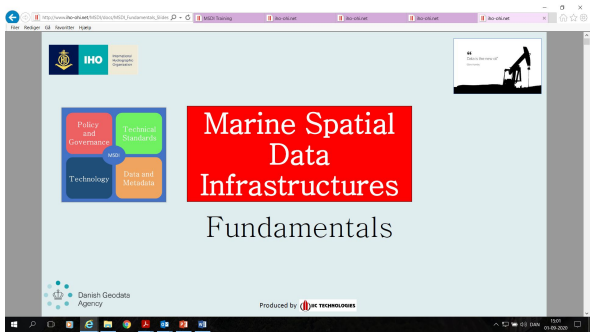
Training Booklet



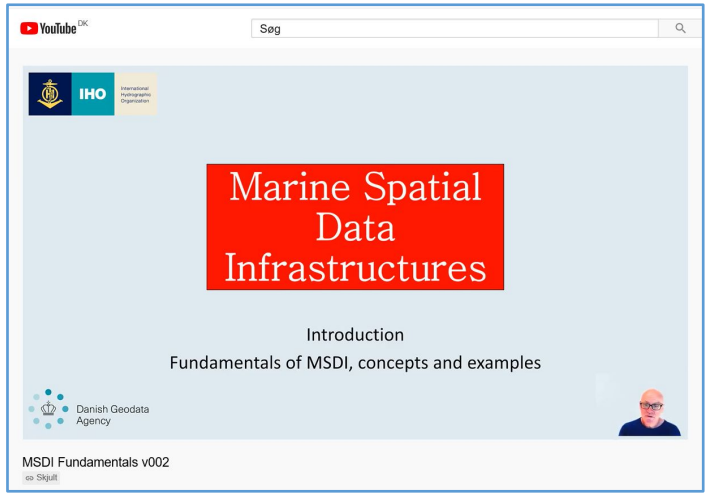


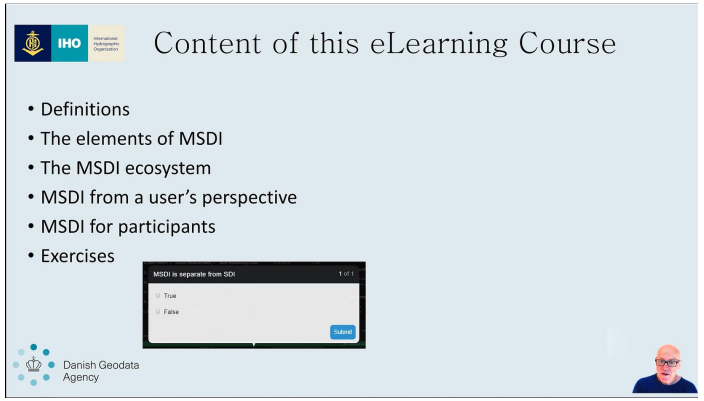
Presentation slides





MSDI Fundamentals interactive eLearning Course





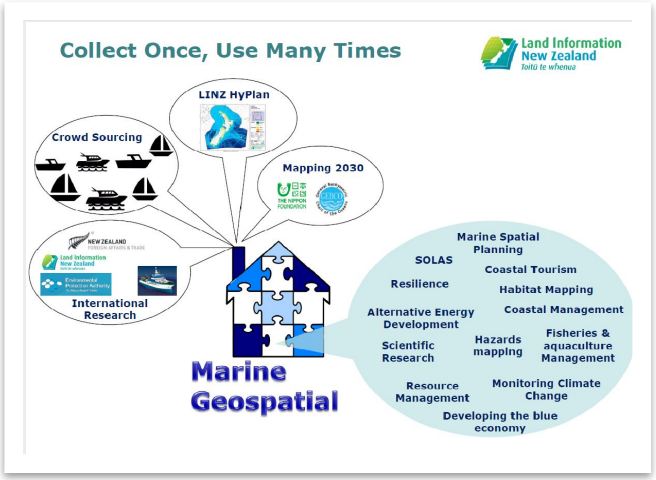
Link https://iho.int/en/body-of-knowledge

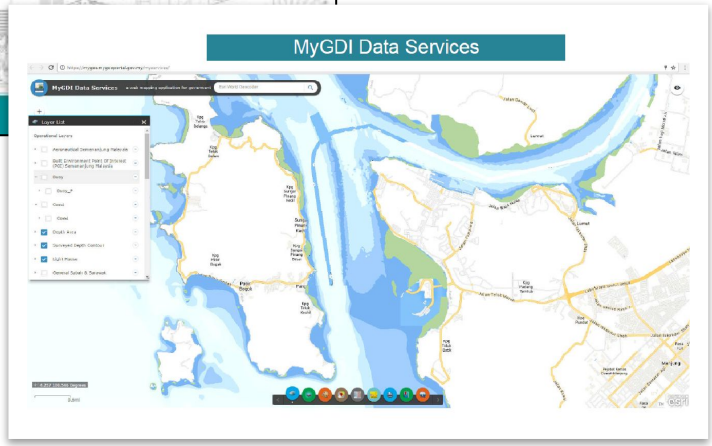
IHO International Hydrographic Organization

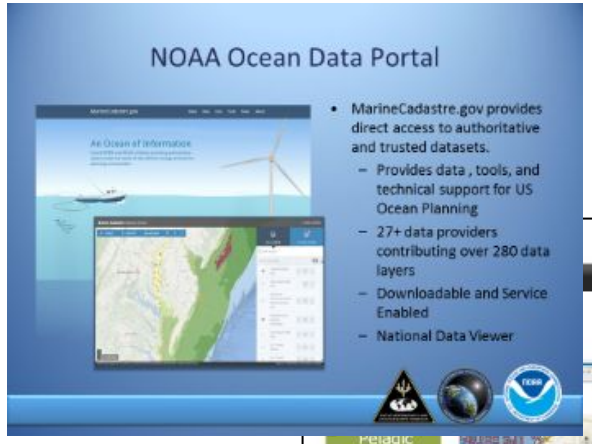
Policy & Governance (People) | Technical Standards (Standards) | Information Systems (ICT) | Geographic Content (Data)

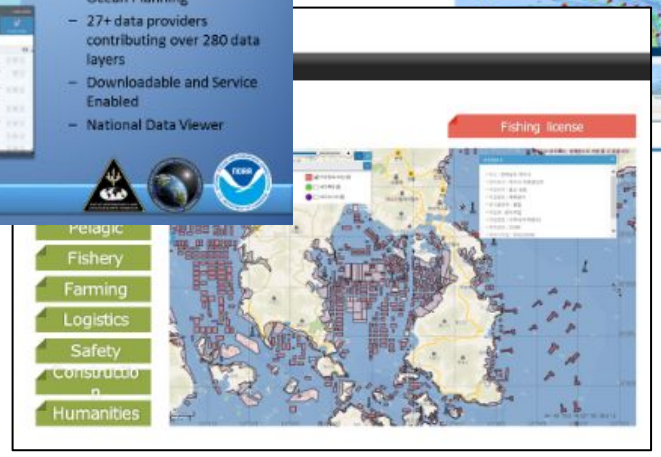
National presentation from members on the status of MSDI related to:

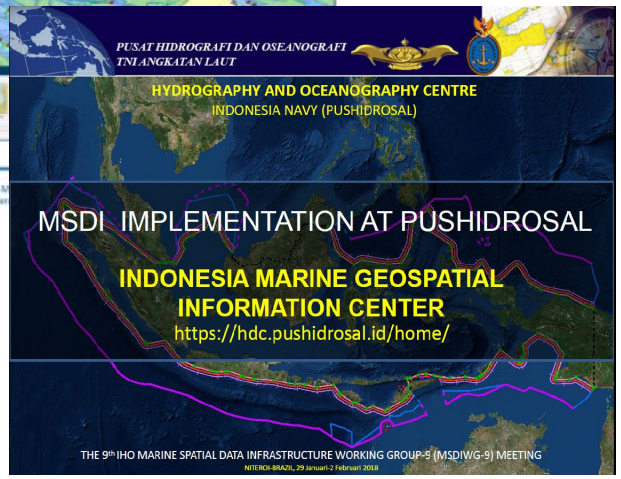
- The national SDI and MSDI cooperation
- National MSP

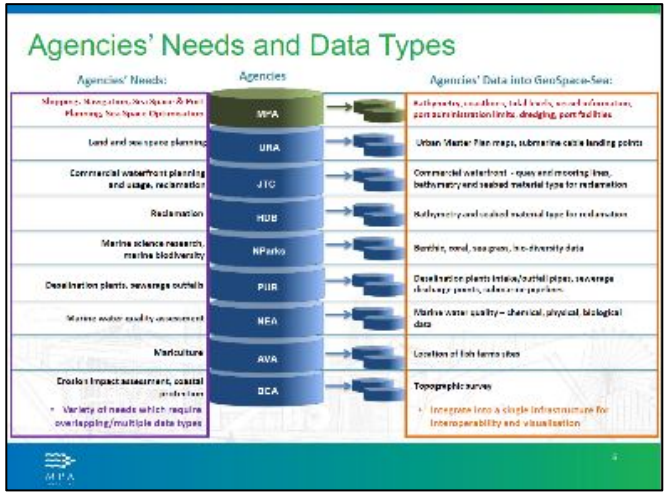












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Information from IHO MSDI Body of Knowledge

Technical Standards (Standards)

Standards

Body of Knowledge

MSDI Training material (in-kind contribution from Denmark) >>>> NEW <<<<
- Download from the IHO website
- Download via Dropbox
- Use the interactive material in Youtube

Marine SDI Documents:
- IHO-OGC Marine SDI Concept Development Study (CDS) >>>> NEW <<<<
- White Paper - Realizing the benefits of Spatial Data Infrastructures in the Hydrographic Community
- SDI/MSDI Related Standards
- Frequently Asked Questions on SDI
- SDI Stakeholders
- Hydrographic Data Policy for SDI (Best practices for Hydrographic Offices)
- White Paper - The Hydrographic and Oceanographic Dimension to Marine Spatial Data Infrastructure Development
  Developing the capability (A contribution from the MSDIWG Experts Contributors)

Miscellaneous:
- Arctic SDI prepared by the Norwegian Hydrographic Service >>>> NEW <<<<
- IHO MSDIWG Case Study Template
- Template for a license agreement embracing rights for the derivation of data
- New Zealand Bathymetry Investigation Report (2015)
- MSP Governance Framework Report (2014)
- Links to the SDI/MSDI portals worldwide (access in the MSDIWG Basic Documents)
- UN-GGIM: A Guide to the Role of Standards in Geospatial Information Management (2015)
- UN-GGIM: A Guide to the Role of Standards in Geospatial Information Management - Companion document
- UN-GGIM: Future trends in geospatial information management: the five to ten year vision (July 2013)
- BLAST [Bringing Land and Sea Together] Project

MSDI Case Study Template

Version: 03 April 2018

International Hydrographic Organization (IHO)
Marine Spatial Data Infrastructures Working Group (MSDIWG)
MSDI Case Study Summary Information Sheet

Case Study
Click Here To Enter Case Study Title

Case Study Type: Click here to choose an item.

Summary
Click here to answer: What is the subject/topic/focus of this case study? (approx. 25 words)
Click here to answer: When and why was it produced/what is its purpose or intended use? (approx. 100 words)
Click here to answer: How is it relevant to MSDI (e.g., list details related to specific MSDI components, access best practices, focus: national/regional/international)? (approx. 200 words)
Click here to answer: Are there any limitations (e.g., restricted access, intended use, licensing)? (approx. 50 words)
Click here to answer: Who are the users or intended users? (approx. 25 words)
Click here to answer: Identify specific recommendations on how the resource could be used, or how users could benefit from the resource. (approx. 100 words)

Sources: Click here to provide URLs for this case study's source.

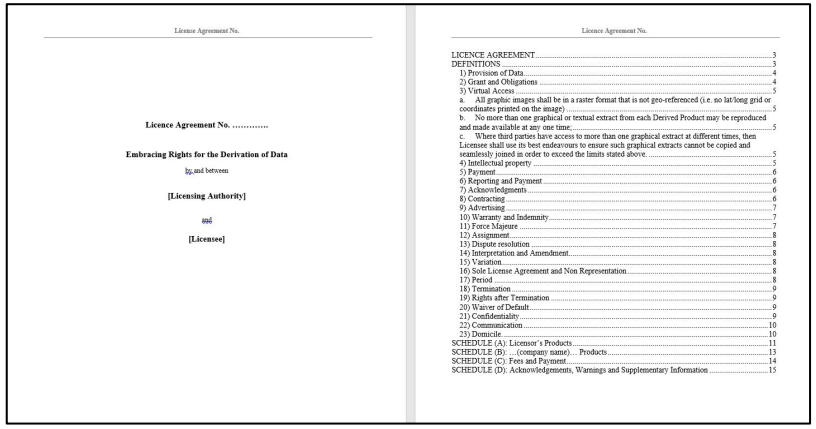
Submitted by: Click here to provide name.
Click here to provide title.
Click here to provide affiliation.
Click here to provide contact information (e.g. email address).

Date Submitted: Click here to enter a submission date.

Data Governance & Infrastructure Components Exemplified by Case Study:
(Checked ☒ components apply.)

☐ Access, Data Sharing & Exchange	☐ Policy & Organization, Strategy
☐ Data Assurance	☐ Quality Control Procedures
☐ Data Quality	☐ Standards
☐ Documentation	☐ Storage
☐ Information Control Technologies	☐ User Needs & Response
☐ Interoperability	

Template for a license agreement



License Agreement No. ……

Embracing Rights for the Derivation of Data

by and between

[Licensing Authority]

and

[Licensee]

LICENCE AGREEMENT 3
DEFINITIONS 3
1) Provision of Data 4
2) Grant and Obligations 4
3) Virtual Access 5
a. All graphic images shall be in a raster format that is not geo-referenced (i.e. no lat/long grid or coordinates printed on the image) 5
b. No more than one graphical or textual extract from each Derived Product may be reproduced and made available at any one time; 5
c. Where third parties have access to more than one graphical extract at different times, then Licensee shall use its best endeavours to ensure such graphical extracts cannot be copied and seamlessly joined in order to exceed the limits stated above. 5
4) Intellectual property 5
5) Payment 6
6) Reporting and Payment 6
7) Acknowledgements 6
8) Contracting 6
9) Advertising 7
10) Warranty and Indemnity 7
11) Force Majeure 7
12) Assignment 8
13) Dispute resolution 8
14) Interpretation and Amendment 8
15) Variation 8
16) Sole License Agreement and Non Representation 8
17) Period 8
18) Termination 9
19) Rights after Termination 9
20) Waiver of Default 9
21) Confidentiality 9
22) Communication 10
23) Domicile 10
SCHEDULE (A): Licensor's Products 11
SCHEDULE (B): …(company name)…. Products 13
SCHEDULE (C): Fees and Payment 14
SCHEDULE (D): Acknowledgements, Warnings and Supplementary Information 15

FAQ's on SDI and MSDI

IHO/HSSC Marine Spatial Data Infrastructure Working Group

SPATIAL DATA INFRASTRUCTURE (SDI)

Frequently Asked Questions (FAQ's)

1. **What is SDI?**

SDI is a term used to summarise a range of activities, processes, relationships and physical entities that, taken together, provide for integrated management of spatial data, information and services. The term:

- covers the processes that integrate technology, policies, criteria, standards and people necessary to promote geospatial data sharing throughout all levels of the public sector;
- embraces the structure of working practices and relationships among data producers and users that facilitates data sharing and use. It covers the set of actions and new ways of accessing, sharing and using geographic data that enable far more comprehensive analysis at all levels of government, the commercial and not-for-profit sectors and academia; and
- describes the hardware, software and system components necessary to support these processes

2. **In what way does SDI affect Hydrographic Offices?**

An Hydrographic Service (HO), through systematic data collection carried out on the coast and at sea, produces and disseminates information in support of maritime navigation safety and marine environment preservation, defence and exploitation.
The development of an SDI is a natural extension in the management and dissemination of such information in an integrated manner.

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

Marine Spatial Data Infrastructures Working Group (MSDIWG)

SDI/MSDI Related Standards

Last update: 6 April 2020

Tier 1 Standards

Visualization & Portrayal
OGC/ISO 19128 Web Map Service (WMS)
OGC Web Map Tile Service (WMTS) 1.0
OGC Styled Layer Descriptor 1.1 (SLD)
OGC Web Map Context 1.1 (WMC)
OGC KML 2.2

Catalogue & Discovery
ISO 19115, Geographic information – Metadata
OGC Catalogue Services Specification 2.0.2 (CSW)
ISO Metadata Application Profile
OGC (ISO19115 Metadata) Extension Package of CS-W ebRIM4 Profile 1.0

Tier 2 Standards

Distributed Maintenance & Use (Technology)
OGC/ISO 19136 Geography Markup Language (GML)
OGC/ISO 19142 Web Feature Service 2.0
OGC/ISO 19143 Filter Encoding 2.0
OGC Web Coverage Service (WCS) 2.0

Domain Model standards (Content)
OGC CityGML
ISO 19144, Geographic information -- Classification systems
ISO 19152, Geographic information -- Land Administration Domain Model (LADM)
GeoSciML – Geological structure and bore holes
OGC WaterML 2.0 - Sharing in-situ sensor water observations
S-57/S-100 - IHO Transfer Standard for Digital Hydrographic Data

Tier 3 Standards

Geospatial Processing
OGC Web Processing Service (WPS)

Mobile Devices
OGC Open GeoSMS
OGC GeoPackage

Real Time

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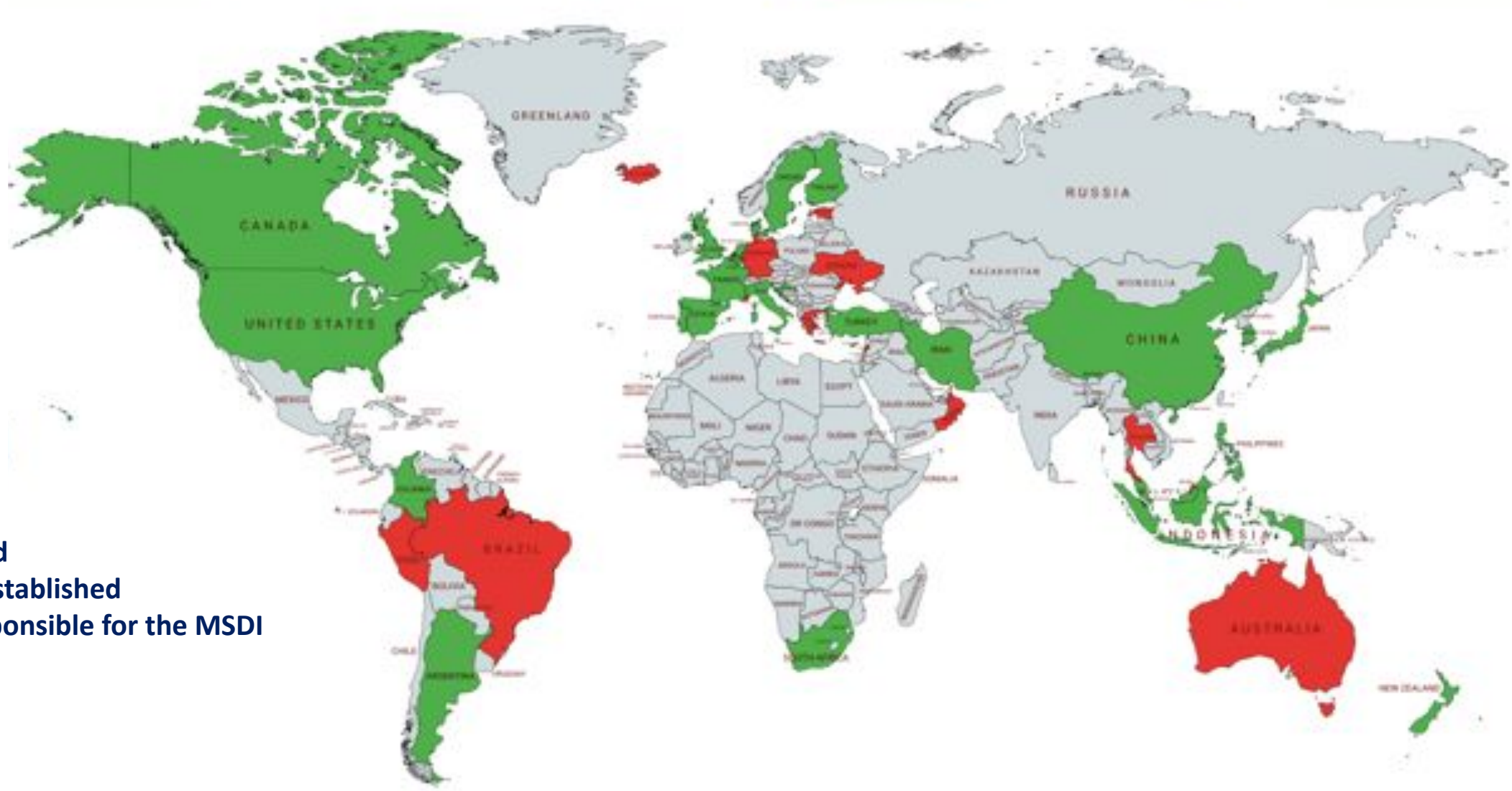
Link https://iho.int/en/body-of-knowledge

Technical Standards (Standards)

Identification of the Marine Spatial Data Infrastructures (MSDI)

- Question: Is there a MSDI established in your country? Yes/No

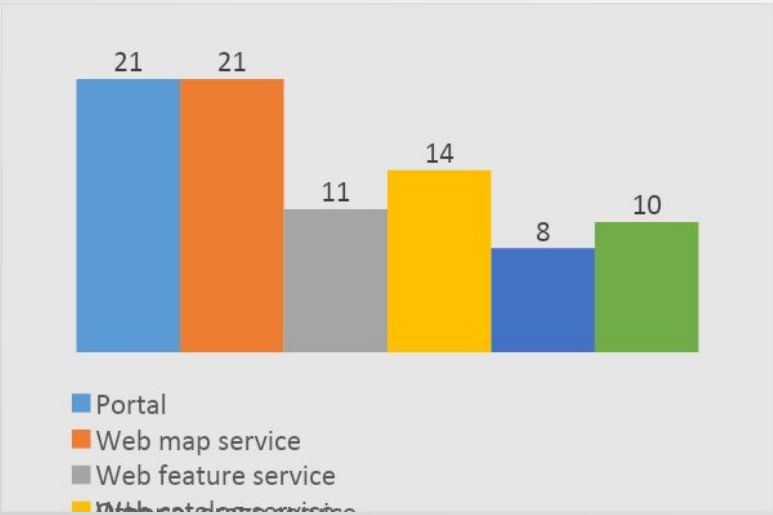


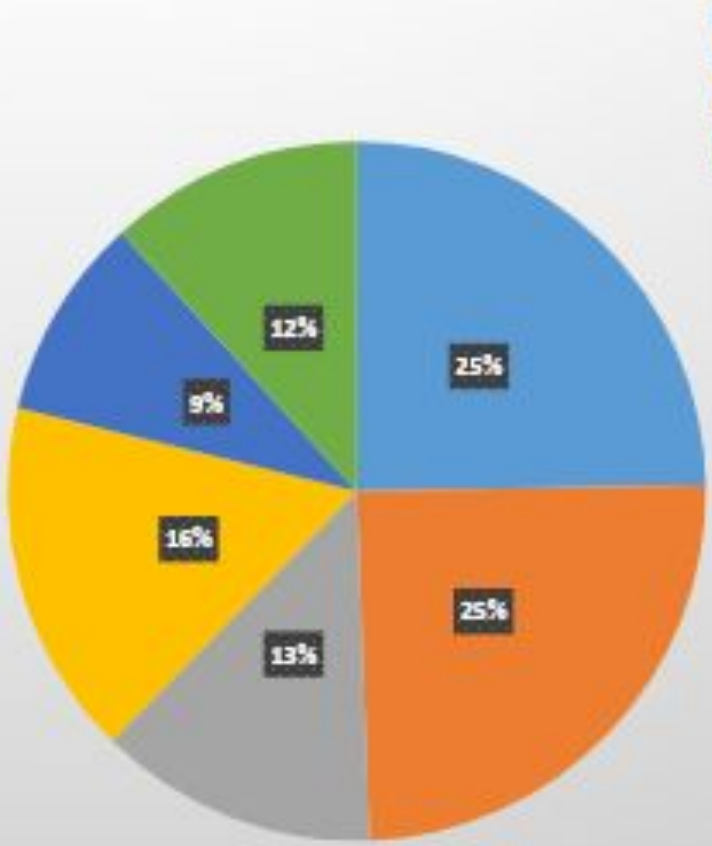
41 answers received
28 national MSDI established
12 national HO responsible for the MSDI

Technical Standards (Standards)

Support Usage

Question: What are the main applications of your MSDI?



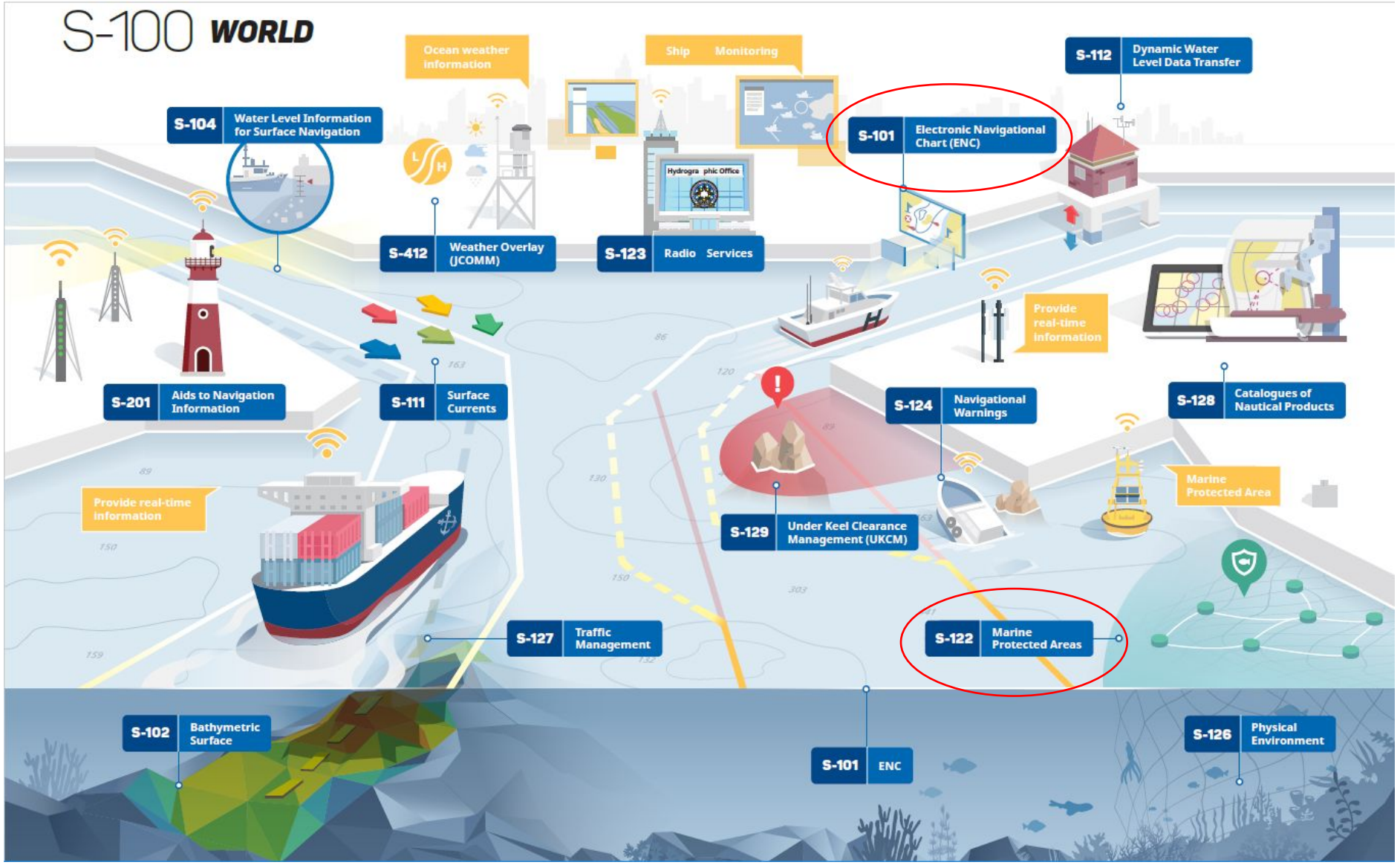


Web map tile service, Web processing service, Geoservices REST
Geoserver and Geonetwork
The applications for MSDI have not been identified
A first edition of a geoportal is active, but contains no hydrographic data.
Data are available for download in shapefile or Geotiff from a web portal which is currently accessible on the Government Intranet System. Documents such as PDF can also be tagged to the layers. However, the uploader can decide whether a dataset can be shared publicly or restricted to allow access to only specific users.
Portal, 2D and 3D Marine Viewers (search catalogue, geoprocessing services and API, web services (e.g. WMS, WFS, WCS))

Geographic Content (Data)

The IHO Universal Hydrographic Data Model

The S-100 Standard is a framework document that is intended for the development of digital products and services for hydrographic, maritime and GIS communities.



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Geographic Content (Data)

The challenged from a MSDI perspective

- Primarily a focus on mariners and navigation
- New data providers in addition to the traditional hydrographic offices
- New users and new use cases
- A need for distribution focusing on new users

IHO Timeline – Products of initial focus

S-100 Implementation, S-98 Interoperability Specification
The IHO Navigational Package

First step

Navigational Route Monitoring Mode
S-98 Edition 1.0.0

S-101 ENC
S-102 Bathymetry
S-104 Water Level
S-111 Surface Currents
S-124 Navigational Warnings
S-129 UKC Management

Next step

Navigational Route Planning Mode
Future S-98 Editions

S-122 Marine Protected Areas
S-123 Marine Radio Services
S-125 Marine Navigational Services
S-126 Marine Physical Environment
S-127 Marine Traffic Management
S-131 Marine Harbour Infrastructure

+ S-100 Products used in Monitoring Mode

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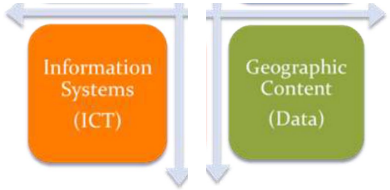


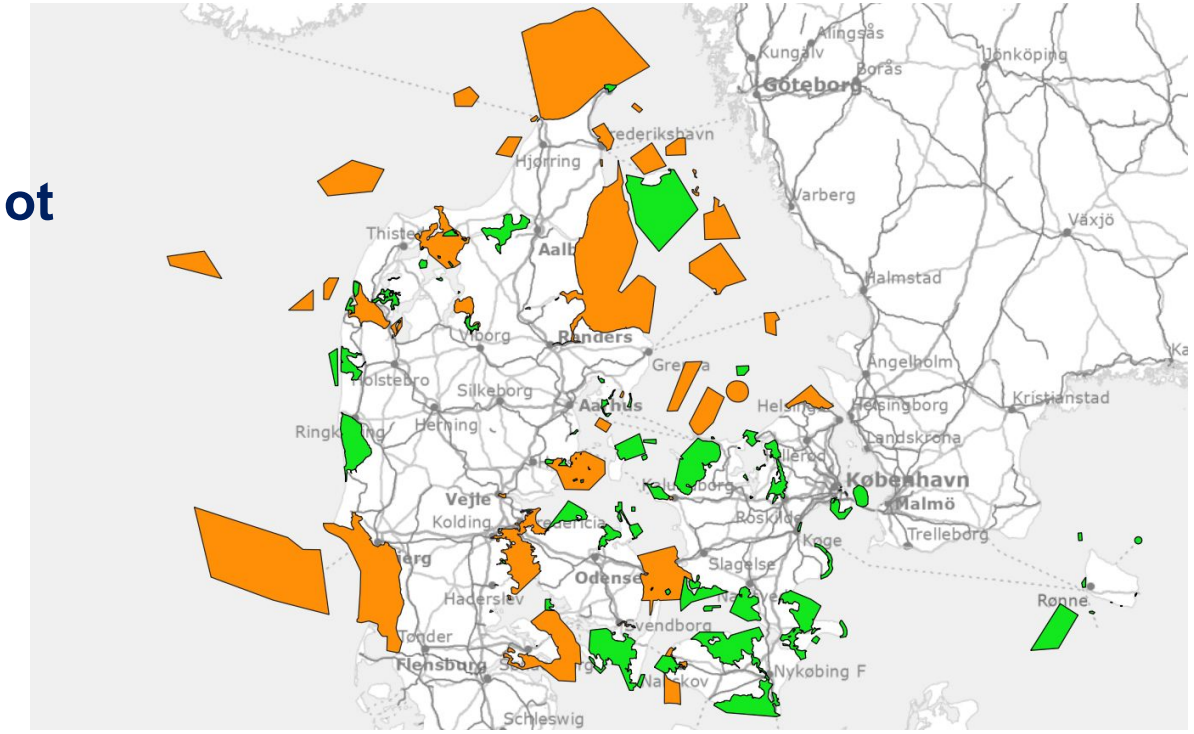
OGC – IHO Federated Marine SDI Demonstration Pilot

Our preliminary ideas about the scope of DGA participation in the OGC – IHO Federated Marine SDI Demonstration Pilot

The Baltic Sea / North Sea as an S-100 test bed
In this part of the project, the DGA focus will be on the following main areas:

Testing of various S-100 data sets relevant to MSDI and MSP, especially of S-122.
It has been decided that BS-NSMSDIWG should establish a pilot project for the Baltic Sea and the North Sea where there will be special focus on testing S-122 data. It will also be relevant here to test other S-100 data sets

Establishment of demonstration project regarding distribution of relevant S-100 data sets for the Baltic Sea and the North Sea for MSDI and MSP.
This part of the project fits well with the above BS-NSMSDIWG project but also with the work in DGA with to establish a future distribution solution.



Definition of Marine Protected Areas:
"A clearly defined geographical space recognized, dedicated, and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values."

Definition of Marine Protected Areas:
Marine Protected Areas (MPAs) involve the protective management of natural areas according to pre-defined management objectives. MPAs can be conserved for a number of reasons including economic resources, biodiversity conservation, and species protection. They are created by delineating zones with permitted and non-permitted uses within that zone.

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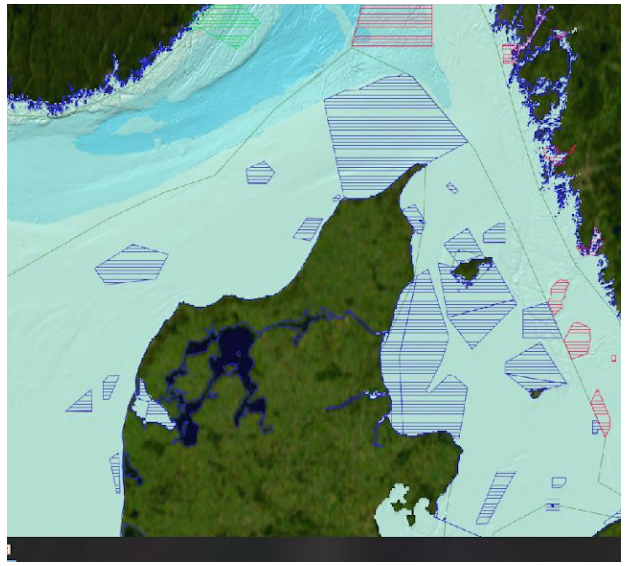
Geographic Content (Data)

Interoperability & co-operation Baltic sea / North Sea S-122 Pilot



Interoperability

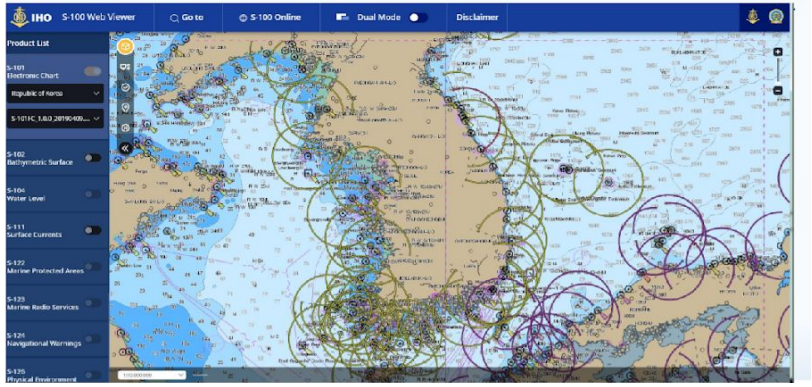
- S-101 will be the base layer – everything needed for safe navigation
  => *must not be made 'less safe' by release of other products, they are supplements*

- How will all these products work together?
  => *not standalone / harmonized*

- How co-ordinate across products/agencies?
  => *Both internally and externally*

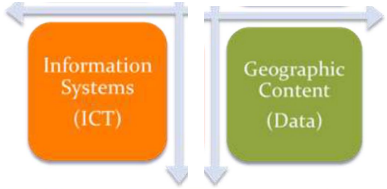
- How perform maintenance across products?
  => *different production/QC times & methods*

- How manage distribution?
  => *different routes/speeds for different products*

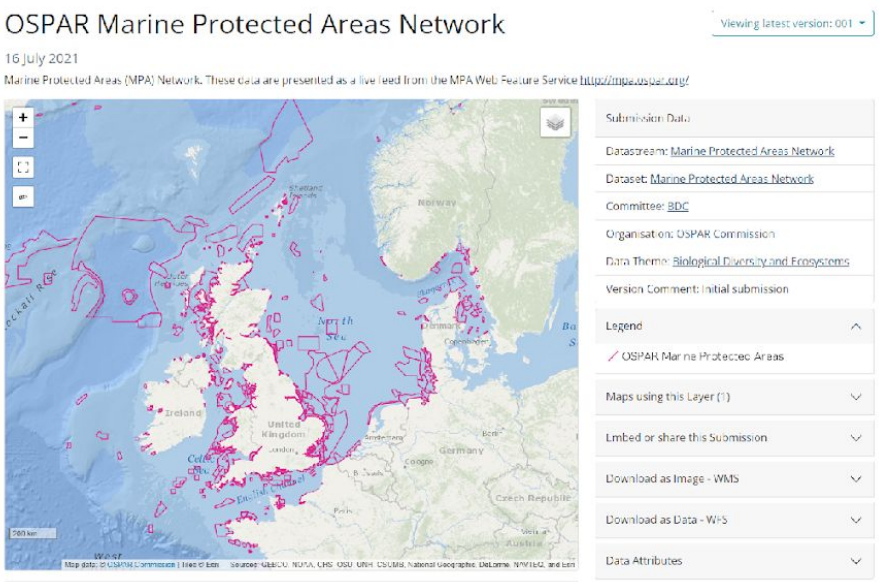


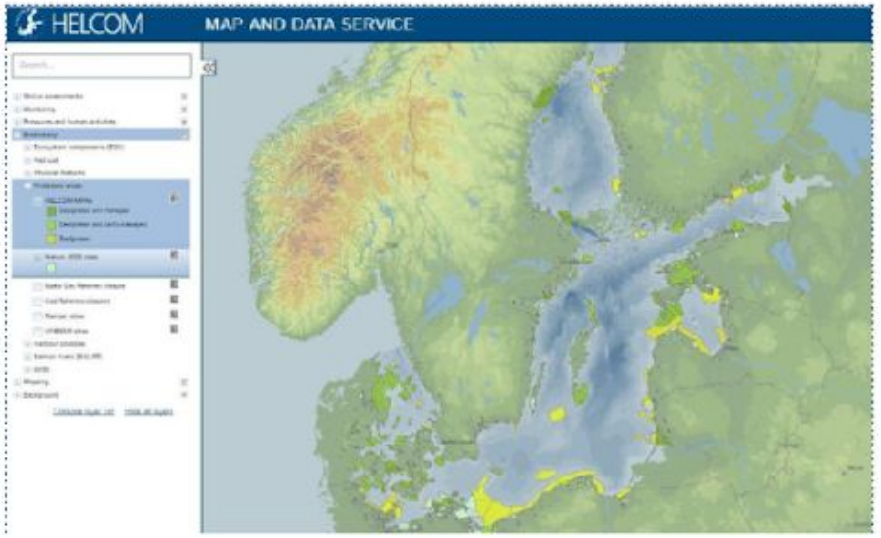
Co-operation

- To ensure consistency in content and method
- Avoid duplicated work
- National agencies producing S-100 datasets

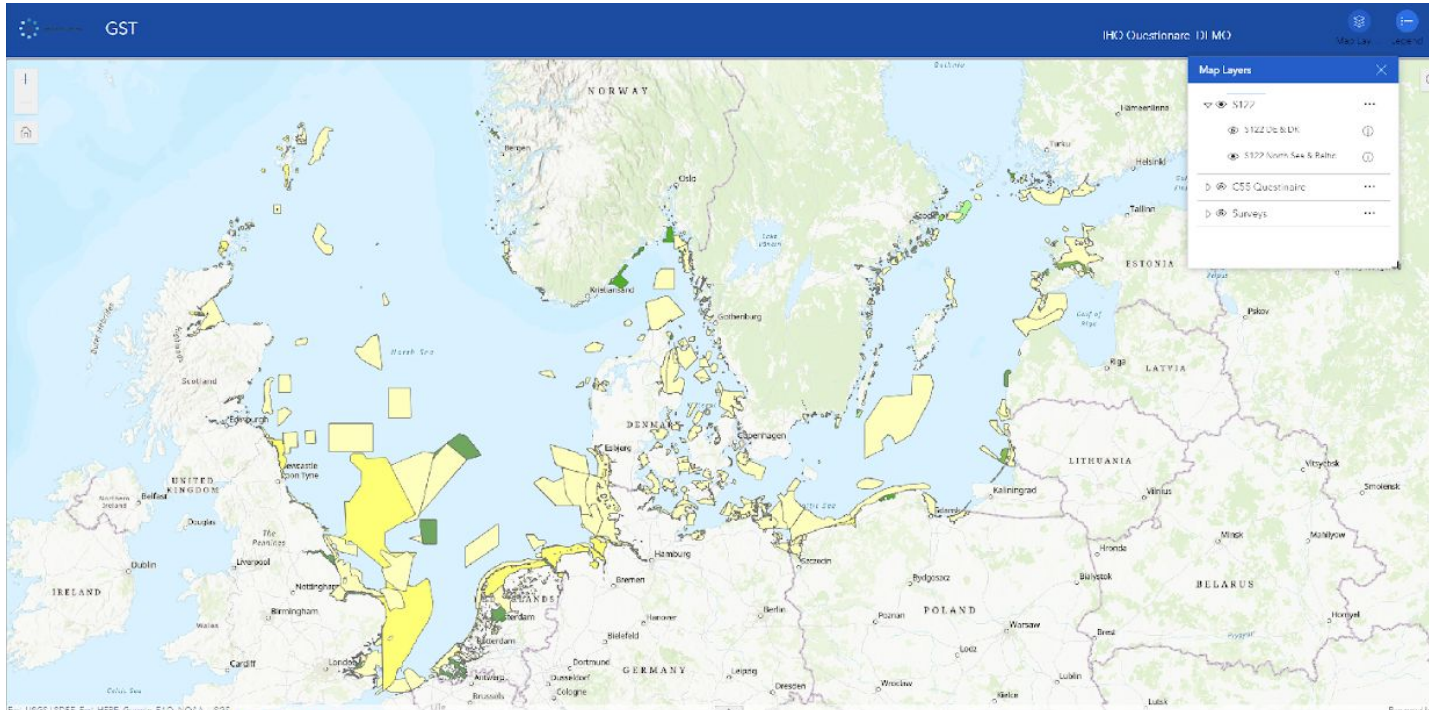


Is the MSP data fit for a S-122 conversion and what are the challenges?



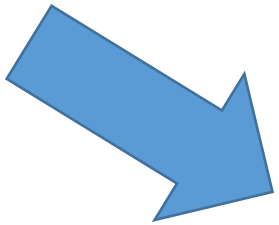


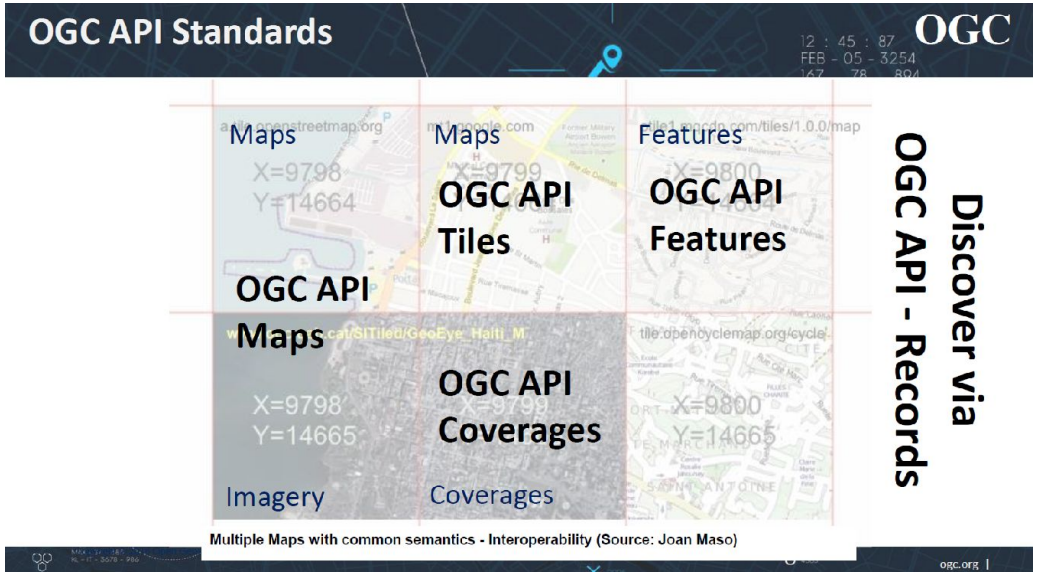
MPA data converted to S-122

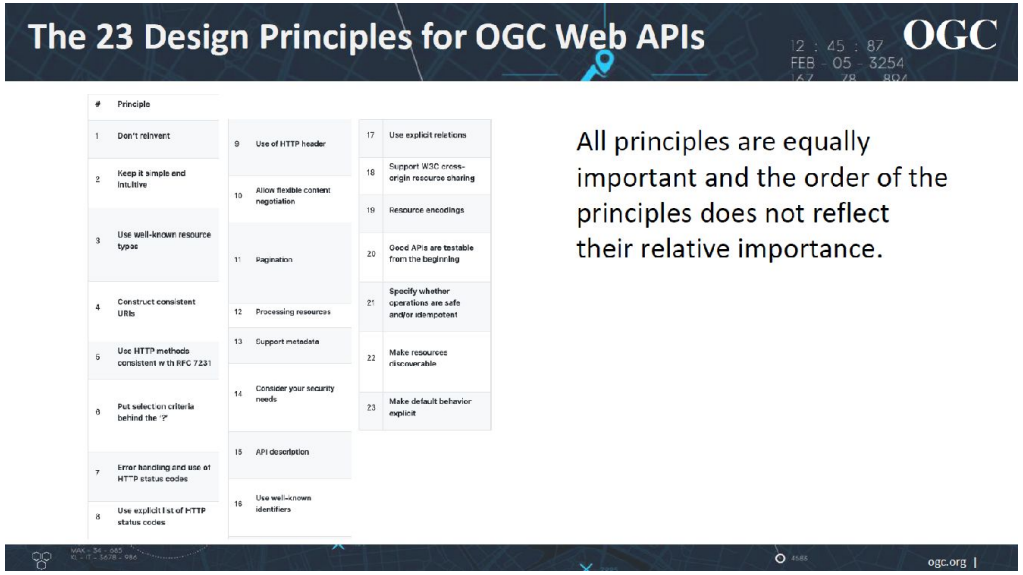


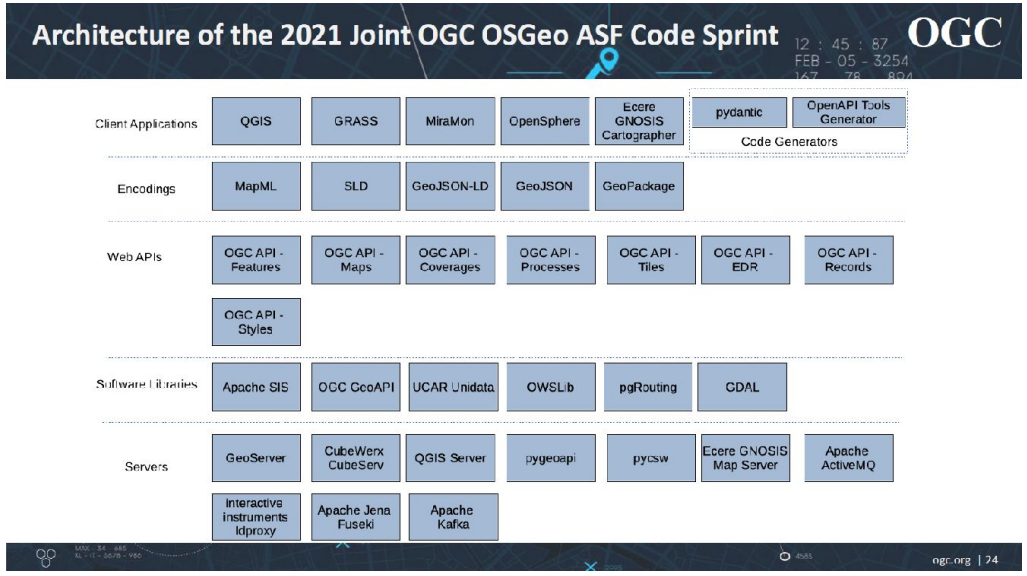
Information Systems (ICT)

From OGC Web Services Standards to OGC API standards









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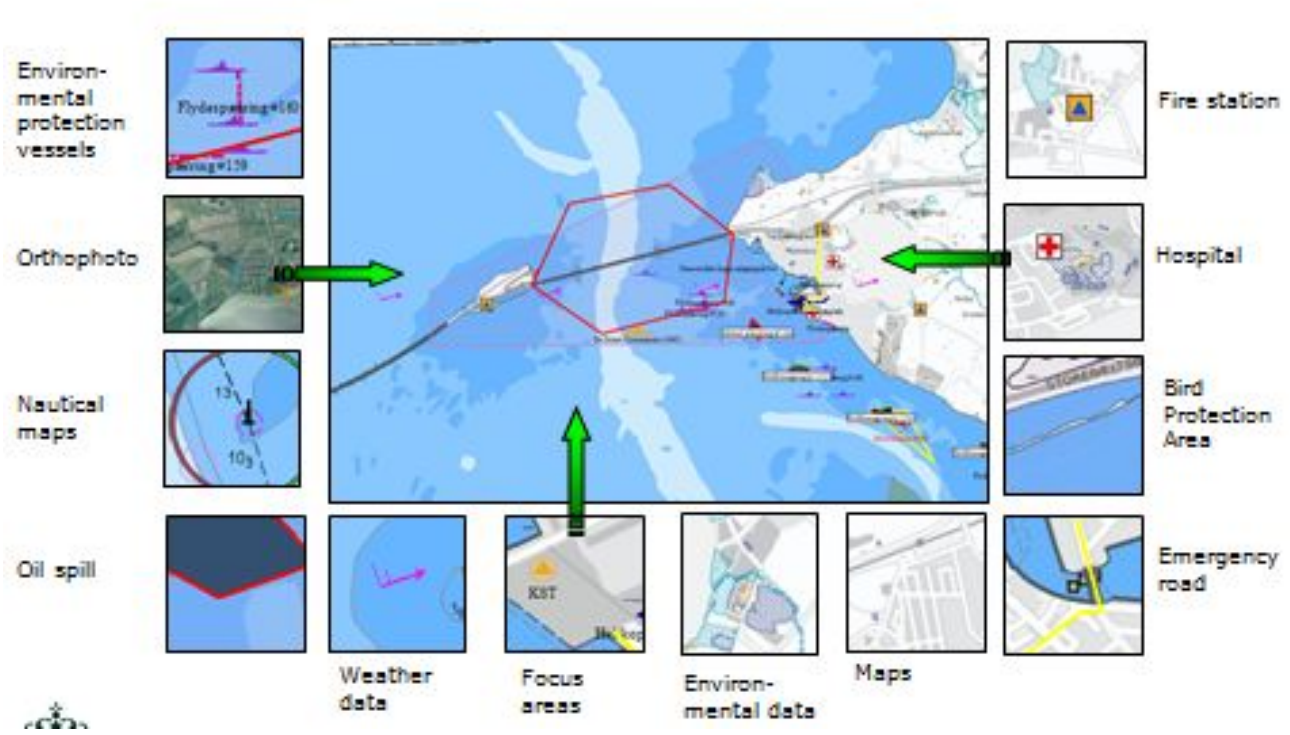
Developing your marine spatial data infrastructure

Creating a MSDI for a Common Operational Picture:

- Definition of different use cases
- Knowledge about data and data providers/owners
- The right Information => dataset
- Knowledge about dataset => metadata
- Access to data when needed
- Quality of data
- Specific datasets should be updated, by the data owner
- Governances



Conclusions/ reflections from the MSDIWG

Sharing knowledge:

- Preparing for S-100
- Discoverability of data e.g. metadata
- Information from national and regional MSDI implementation

IHO MSDIWG Focus arears:

- OGC MSDI Concept Development Study and how to proceed => OGC Pilot
- Security and integrity from a MSDI perspective
- S-100 and the implementation plan from a MSDI perspective
- IHO strategy from a MSDI perspective
- MSDI training material the need for adjustments and updates.
- C-17, the need for update
- UN Sustainable Development Goals (SDGs) and how a MSDI can support the SDGs
- MSDI Governances, e.g. Data policies, funding/financial models
- MSP with relation to IHO MSDI and how to proceed with MSP from a IHO MSDIWG perspective

MSDI ver. 2.0

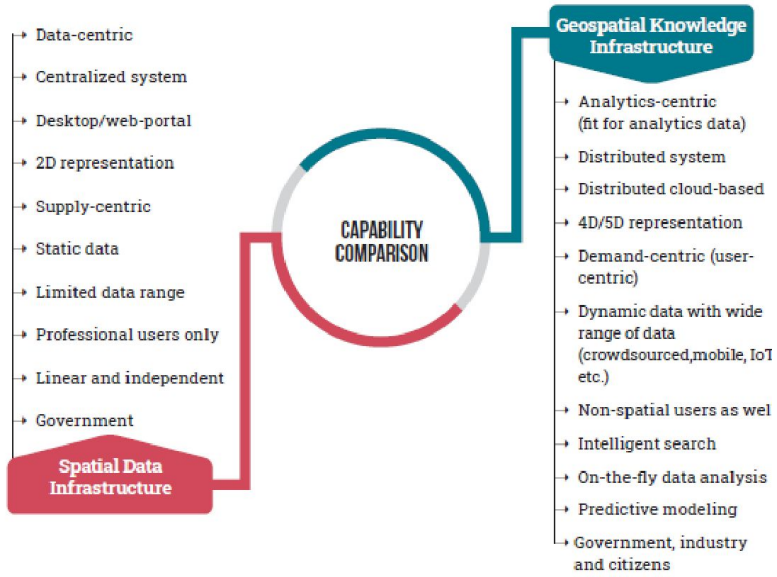
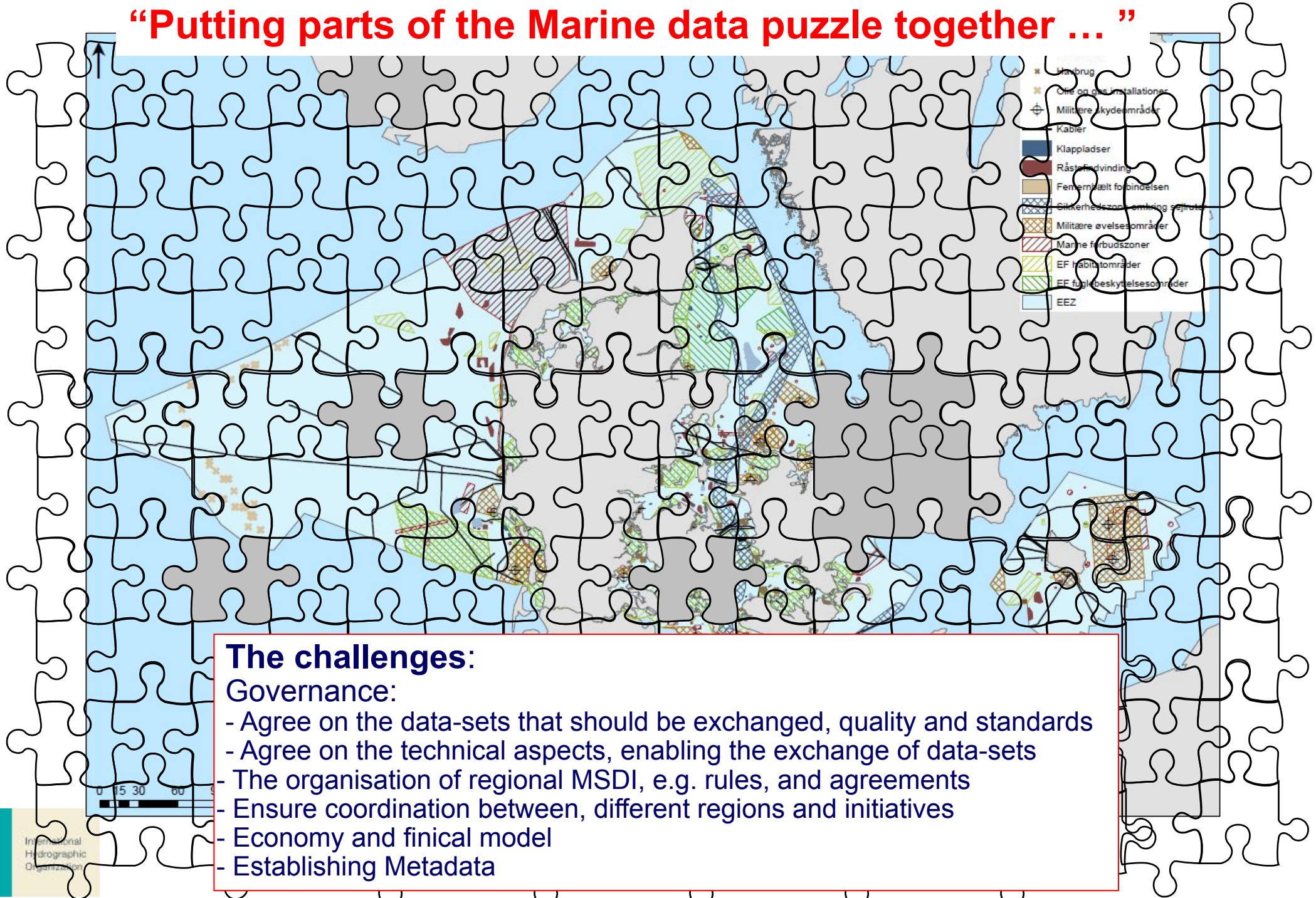


Figure 2: The journey from original Spatial Data Infrastructure thinking to Geospatial Knowledge Infrastructure thinking

Geospatial Knowledge Infrastructure White Paper

“Putting parts of the Marine data puzzle together … ”



The challenges:

Governance:

- Agree on the data-sets that should be exchanged, quality and standards
- Agree on the technical aspects, enabling the exchange of data-sets
- The organisation of regional MSDI, e.g. rules, and agreements
- Ensure coordination between, different regions and initiatives
- Economy and finical model
- Establishing Metadata

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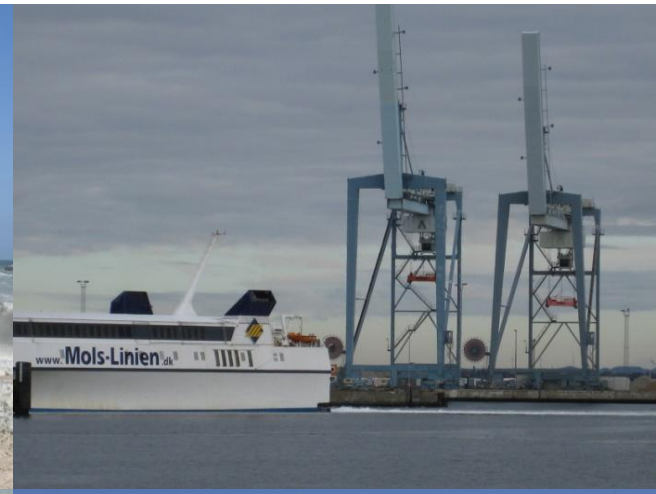
Questions?







Thanks for your attention

For more information: https://iho.int/en/msdiwg

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