CHRIS20-06.7A

20th CHRIS MEETING
Niterói, RJ, Brazil, 3-7 November 2008

REPORT OF THE MARINE SPATIAL DATA INFRASTRUCTURE WORKING GROUP (MSDIWG)

From January 2008 – September 2008

Submitted by:	John Pepper, UK
Progress Report:	Report of work undertaken against objectives set since CHRIS-19
Actions to be taken:	CHRIS to note the report and endorse future plans
Related Documents:	See Annexes 1 – 7
Related Projects:	Not applicable

Chairman	Mr John PEPPER (UK)
Vice Chair	Ms Maureen KENNY (USA)
Secretary	Vacant
Membership	
IHO	Argentina, **Australia,** Brazil, Canada, **Denmark, Estonia, Finland, France,** Germany, Italy Japan, Korea (Rep of), Latvia, **Nigeria, Netherlands, Norway, Slovenia**, Spain, Singapore, **Sweden, UK, USA**, **IHB**
Non-IHO	University of Melbourne, Australia; **SeaZone Solutions**, UK

Members in bold type are participating members

Meetings	MSDIWG Meeting No 1 held on 3-4 February 2008 and MSDIWG Meeting No 2 held on 10-11 September 2008 both hosted by IHB.

REPORT OF IHOMSDIWG to CHRIS/20
November 2008 v1.0

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1. Background

The International Hydrographic Organisation (IHO) represents the member interests of the National Hydrographic Offices and the hydrographic community across the World.

In November 2005, the IHO hosted a Seminar in Rostock, Germany entitled "The Role of Hydrographic Services with regard to Geospatial Data and Planning Infrastructure". The seminar recognised formally that hydrographic data was not only important in support of Safety of Life at Sea but also to Defence and the wider Environment.

The role of IHO is to impart knowledge, provide guidance and standards to practitioners and inform Government and other stakeholders on hydrographic matters. The change in the IHO constitution to embrace the need to encourage wider use of hydrographic information represented an opportunity for the IHO to use this wealth of knowledge and experience to underpin the development of best practice in the creation of marine components of National Spatial Data Infrastructures (NSDI). A position paper [Ref: Annex 3] was provided to IHO in June 2007 identifying how the Hydrographic Office community might engage in the development of Marine Spatial Data Infrastructure [MSDI].

Regional SDI's are emerging. For example; in the European Union, the Infrastructure for Spatial Information in Europe (INSPIRE) Directive becomes effective in May 2009. It requires all Member States to develop interoperability between datasets (e.g. land and sea interface at the coast line); harmonise data and metadata standards, develop network services and encourage the re-use / sharing of public sector information.

HO's may wish to establish a role for themselves and the information they are responsible for in the development and management of NSDI programmes. The IHO recognises that this can only be done on the basis of the structure of the individual National Administration and that this will differ from country to country.

The 17th International Hydrographic Conference, in May 2007, directed that CHRIS establish a Marine Spatial Data Infrastructure Working Group (MSDIWG), the purpose of which was to analyse and recommend the nature and level of the IHO role in assisting Member States to support their NSDI through development of and / or aligning with the Marine Spatial Data communities in the development of a MSDI. The MSDIWG was duly constituted with an agreed work plan at CHRIS-19 and met initially in February 2008 [Ref: Annex 2 for list of participating members].

2. MSDIWG 2008 Objectives

2.1 To prepare, undertake and complete an audit of IHO Member States to establish their level of knowledge and understanding of the benefit of supporting National SDI initiatives and their capability in supporting the development of Marine SDI.

2.2 To analyse the results of the research audit and establish the benchmark for future IHO support and / or capacity building required and to assist in the development of an IHO SDI Guide.

2.3 To provide the preliminary IHO SDI Guide framework for Member States incorporating necessary step by step approach to SDI.

2.4 To provide, to CHRIS Meeting 20, a report of WG activities to date and to recommend (if necessary) an extension to the life of the WG in the light of results and / or progress achieved in the 2008 work programme.

3. What is a Spatial Data Infrastructure (SDI)?

SDI is a term used to summarise a range of concepts, processes, relationships and physical entities that, taken together, provide for integrated management of spatial data and information. The term covers the processes that integrate technology, policies, criteria, standards and people necessary to promote geospatial data use throughout all levels of Government. It covers the base or structure of 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. It also describes the hardware, software and system components necessary to support these processes [Ref: Annex 3].

Marine SDI is the component of NSDI that encompasses marine geographic and business information in its broadest sense covering sea areas, inland navigable and non-navigable waters. This would typically include seabed topography, geology, marine infrastructure (e.g. bathymetry, wrecks, offshore installations, pipelines and cables etc); administrative and legal boundaries, areas of conservation, marine habitats and oceanography.

4. The Research Programme

Method

A workshop was held at IHB Monaco in February 2008 at which the research programme was devised. The purpose of this work was to analyze and recommend the level and nature of the IHO role in assisting Member States in support of their NSDI.

A Maturity Matrix approach was developed, looking at five cluster categories of NSDI/MSDI:

Category 1 Strategy and policy
Category 2 Communications and people
Category 3 Data management
Category 4 Data frameworks and standards
Category 5 Data dissemination.

Sub-groups of MSDIWG participating members were allocated a category. Five maturity levels for each category (from 1 = basic to 5 = optimized) were devised enabling potential respondents to choose both their present (2008) level for each category and the level they aspired to be at by 2011 in terms of status of MSDI in each Member State and level of Hydrographic Office involvement (if any).

Three further qualitative questions were designed to gather more information covering the following topics:

- activities and plans to achieve these aspirations
- perceived barriers to achieving the aspirations or in making progress
- how the IHO could assist in either overcoming the barriers or putting plans into action.

The completed Maturity Matrix and accompanying questionnaire (complete with detailed instructions on how to fill it in) was circulated to Member States by the IHB in late April 2008 [Ref: Annex 4]. A target date for completed responses to be returned to the IHB was set at 6th June 2008. This was subsequently extended by the IHB until late June to allow for those respondents requiring "sign off" outside of their Hydrographic Office.

From the sample of 80 questionnaires circulated by the IHB to Member States, an excellent response from 43 countries was achieved (54% response rate). The breakdown of responses was: Europe - 17; Africa - 3; Asia – 8; Central/South America - 8; Oceania – 3; USA & Canada -2. Two responses were incomplete as far as the matrix was concerned so were discarded from that part of the analysis

Detailed analysis of responses was undertaken during July 2008 by the UKHO Market Research Team in conjunction with members of the MSDIWG and the IHB. Analysis of the Maturity Matrix was numbers-based whilst the non-matrix questions comprising open ended answers were grouped, and a set of generic phrases developed against which to code the responses.

Initial research findings were circulated amongst MSDIWG members in August prior to the presentation of all detailed quantitative and qualitative responses at the MSDIWG meeting on 10th-11th September 2008.

Discussions centred on the research findings and suggestions for an IHO role and its supporting activities going forward were formulated at the meeting.

A full set of results and analysis is available from the IHB upon request.

5. Overview of results [See Annex 5]

5.1 Maturity Matrix [Q1]

From the maturity matrix, the following was recorded:

- An average current (2008) maturity status was found to be at level 3 (defined and standardized) on the maturity matrix with aspirations to move to level 4 (managed) by 2011 through a range of planned activities.
- This overall average, however, hides some significant variations in maturity levels, most significantly:
    - the majority of countries are at levels 1 to 3 on 4 of the 5 categories *(strategy and policy; data management; data frameworks/standards and data dissemination).*
    - Most significant development up to 2011 will be on *data management, data standards / frameworks, and data dissemination* categories.
    - There is a gap in current status between "developed" and "emerging / developing" nations[1], significantly on *people and communications, data dissemination and MSDI strategy / policy* categories.
    - The gap between "developed" and "emerging/developing" nations will reduce on *people and communications and data dissemination* but widen on *MSDI strategy / policy* over the coming 3 years.
    - Grouped on a regional basis, from responses received: Northern Europe and the other developed countries (Australia, Japan, New Zealand, USA) are more mature across all categories of the matrix, followed by Eastern Europe, Southern Europe / North Africa, Central/South America, and Asia. Eastern Europe, in particular, will make rapid progress to 2011 in all categories [See Annex 5].

5.2 Responses to qualitative questions [Q2-4]

The following are the main coded responses:

5.2.1. SDI Policy

- Few respondents stated they have no MSDI / NSDI policy or strategy.[2]
- Several respondents stated that MSDI is / will be a part of the NSDI in their country.
- The majority of respondents have set up or are setting up committees or a designated authority to develop policy / strategy. As part of this process partnerships with bodies / authorities including data owners and users are already formed or forming.
- Development of the database is a key activity. About a third of the countries have some sort of MSDI system / database underway with major activities relating to digitisation and integration.
- Most respondents are either already working to or looking to work within international or national standards, [e.g S-57/S-100, ISO 19100 / 19115 / TC211].
- In Europe, the INSPIRE Directive is an important driver of the creation of a NSDI / MSDI. INSPIRE helps prioritise themes and work packages.
- Although currently limited, data dissemination is planned to be primarily via the web, through new portal developments and use of WMS/WFS.

5.2.2 Barriers to progress

[1] MSDIWG used the United Nations classifications for "developed" and "developing" nations and in the grouping of countries regionally to ensure consistency of approach

[2] There is an element of confusion in the narratives from some Member States. MSDIWG are cautious of the level of understanding of MSDI/NSDI from some responses

- The main barriers were described as *resources, funding and other policy priorities*.
- About half the respondents indicated that there are no barriers. However, "no barriers" does not mean it will happen or happen quickly!
- No agreed national or common spatial data policy or framework.
- MSDI is subordinate to NSDI strategies and policies. Visibility of marine matters is low.
- No responsibility for / or responsible MSDI expert, so focal point needs to be designated.
- Barriers between agencies: historical, political, bureaucratic, and national versus 'local' conflicts.
- Different departments involved have different priorities. Co-operation and co-ordination between stakeholders to be developed.
- Data held by different organisations and at different levels.
- The need for harmonisation and interoperability; decisions need to be made on vertical datum and format issues.
- Copyright, IPR, Digital Rights Management (DRM), licensing and cost of data, "free" data, etc.
- Basic geographic data with no legal obligations versus navigational geographic data with legal implications.
- Policy issues regarding distributing digital data via the internet.

5.2.3 Defining the IHO Role [Ref: Annexes 6 & 7]

The barriers help define the role the IHO can play in helping countries to "close the capability gap" in the development and delivery of their MSDI:

- 25% of the respondents across the 5 categories indicated that they did not require any assistance[3].
- Many respondents requested assistance in the form of training or as published guidelines / procedures. Online e-training considered the most cost-effective with face-to-face instructor-pupil training the best but expensive.
- Requested knowledge / experience sharing related to MSDI strategies and implementation activities. This could take the form of workgroups or via the web to help spread best practice. This notion was more popular in Europe than formal training. Less developed nations suggested that developed countries should share (transfer) their knowledge and experience to or could mentor them facilitated by the IHO.
- Assistance should be concentrated on the "emerging / developing" countries and take the form of knowledge transfer in relation to:
  - developing and delivering an MSDI strategy / policy;
  - the benefits of MSDI and 'pitfall' avoidance;
  - helping countries to obtain funding through business case development;
  - relevant standards and frameworks;
  - lists of organizations and personnel, and their related expertise who are competent/ expert in this area of knowledge;
  - 'training' on technical issues such as data management (building the database and metadata records) and information dissemination (through development of web-based systems).

6. Conclusions

6.1 The exercise served its purpose to measure the current and future aspired status of MSDI within Member States providing headline information to enable IHO MSDIWG to understand the issues involved.

6.2 The analysis has provided clear evidence that there is a need for assistance in developing Hydrographic Office roles in MSDI/ NSDI which will enable the IHO to define its role and possible help it can give to Member States as they work towards a fully optimised MSDI.

6.2 Clear pointers have been articulated of the areas where training and knowledge transfer is required. These are mainly in data management, MSDI framework development, data standards and dissemination. IHO should be encouraged to develop and disseminate guidelines and procedures in these areas.

[3] This represents Member States already at a relatively high maturity level in MSDI/NSDI initiatives (e.g. Europe; Australia, USA, Canada)

6.3 Capacity and capability across the HO community will be improved through increased resources, funding and policy development.

6.4 Member States in Southern Europe/ North Africa, Asia, Africa, Central and South America will benefit most from IHO assistance.

6.5 The work undertaken has provided good information for those Member States who responded. Some concerns exist as to how non-responding Member States understand and / or participate in MSDI/ NSDI development in their respective countries.

7. Recommendations

7.1 IHO develops its SDI policy towards Member States as part of its enhanced mission particularly aimed at Member States who, in their responses indicated a low level of maturity but also those Member States for whom no information has been received.

7.2 IHO develops, through the MSDIWG, a definitive SDI "Cook Book" to assist IHO Member States to be better prepared to develop and / or join MSDI at their National or Regional level.

7.3 IHO develops its SDI capacity building plan [e.g. in-country practical training and advice] to provide the necessary skills, knowledge and understanding of key components of SDI as described above.

7.4 IHO considers the development of a web based facility to encourage, knowledge transfer, best practice and on-line guidance and training material.

7.5 MSDI to be a standing agenda item on Regional Hydrographic Commissions in order to monitor and report progress in Member States' MSDI engagement and development. MSDIWG will provide benchmarks against which reporting might be measured.

7.6 IHO, through the CHRIS committee, supports the continuation of the work of the MSDIWG in 2009 -2011 to enable it to deliver the outputs defined at 7.1-7.5.

8. Actions Required of CHRIS

The CHRIS is invited to:
1) Approve this Report.
2) Endorse the recommendations of the MSDIWG.

ANNEX 1 **CHRIS19-07.2A rev.4**

19th CHRIS MEETING
Rotterdam, Netherlands, 5-9 November 2007

MARINE SPATIAL DATA INFRASTRUCTURE WORKING GROUP (MSDIWG)

Terms of Reference

1. Objective

Identify the Hydrographic Community inputs to National Spatial Data Infrastructures (NSDI).

2. Authority

This Working Group (WG) is a subsidiary of the IHO CHRIS. Its work is subject to IHO CHRIS approval.

3. Procedures

The WG should:

a) Identify, in line with the objectives, mission and vision of the IHO, the level and nature of the IHO's role in assisting Member States (M/S) in their support of NSDI.

b) Liaise, as appropriate, with other relevant technical bodies such as the IOC, and the World Data Centers in Oceanography, Bathymetry and Marine Geophysics.

c) Propose any Technical and/or Administrative Resolutions that may be required to reflect IHO involvement in the support of NSDI.

d) Identify actions and procedures that the IHO might take to contribute to the development of National Spatial Data Infrastructure (NSDI) and / or MSDI in support of Member States.

e) Determine any actions that the IHO and individual M/S might take to forge links with other bodies (e.g. OGC, ISO TC211, IOC) to ensure M/S are best placed to meet the developing challenges associated with data management and governance.

f) Identify and recommend possible solutions to any significant technical issues related to interoperability between maritime and land based inputs to NSDI, and in particular:

   1) Datum issues.

   2) S-100 interoperability with NSDI.

   3) S-100 interoperability with oceanographic, marine biological, geological and geophysical data structures.

g) Identify any IHO capacity building requirements.

h) The WG should work by correspondence, and use group meetings, workshops or symposia only if required.

i) Submit a report and recommendations to CHRIS/20 in 2008 for subsequent consideration at the 4th Extraordinary International Hydrographic Conference in 2009.

4. Composition and Chairmanship

a) The WG shall comprise representatives of Member States, Expert Contributors and Accredited NGIO Observers, all of whom have expressed their willingness to participate.

b) Member States, Expert Contributors and Accredited NGIO Observers may indicate their willingness to participate at any time. A membership list shall be maintained and

confirmed annually.

c) Expert Contributor membership is open to entities and organisations that can provide a relevant and constructive contribution to the work of the WG.

d) The Chair and Vice-Chair shall be a representative of a Member State. The election of the Chair and Vice-Chair should normally be decided at the first meeting after each ordinary session of the Conference (Conference to be replaced by Assembly when the revised IHO Convention enters force) and, in such case, shall be determined by vote of the Member States present and voting.

e) Decisions should generally be made by consensus. If votes are required on issues or to endorse proposals presented to the WG, only M/S may cast a vote. Votes shall be on the basis of one vote per M/S represented. In the event that votes are required between meetings or in the absence of meetings, including for elections of the Chair and Vice Chair, this shall be achieved through a postal ballot of those M/S on the current membership list.

f) If a secretary is required it should normally be drawn from a member of the WG.

g) If the Chair is unable to carry out the duties of the office, the Vice-Chair shall act as the Chair with the same powers and duties.

h) Expert Contributors shall seek approval of membership from the Chairman.

i) Expert Contributor membership may be withdrawn in the event that a majority of the M/S represented in the WG agrees that an Expert Contributor's continued participation is irrelevant or unconstructive to the work of the WG.

j) All members shall inform the Chairman in advance of their intention to attend any meetings of the WG.

k) In the event that a large number of Expert Contributor members seek to attend a meeting, the Chairman may restrict attendance by inviting Expert Contributors to act through one or more collective representatives.

ANNEX 2

IHO/CHRIS Marine Spatial Data Infrastructure Working Group (MSDIWG) Participating Members

IHO MS Name & Email

Australia	Mr Gordon HOMES	Gordon.homes@defence.gov.au
Denmark	Mr Thomas RAVN	thrav@kms.dk
Estonia	Mr Peeter VÄLING	Peeter.Valing@vta.ee
France	Ms Caroline Texier	caroline.texier@shom.fr
Finland	Mr Rainer MUSTANIEMI	rainer.mustaniemi@fma.fi
Netherlands	Ms Ellen VOS	em.vos@mindef.nl
Nigeria	Capt Adamini MUSTAPHA	nnho_nnhydrographicoffice@yahoo.com
Norway	Mr Tore HAYE	sksk@statkart.no
Slovenia	Mr Igor KARNICNIK	igor.karnicnik@geod-is.si
Sweden	Mr Patrik Wiberg	patrik.wiberg@sjofartsverket.se
UK	Mr John PEPPER (**Chair**)	john.pepper@UKHO.gov.uk
USA	Ms Maureen KENNY (**Vice Chair**)	Maureen.Kenny@noaa.gov
IHB	Ing en Chef Michel HUET	mhuet@ihb.mc
IHO	Mr Joon Ho Jin	pap@ihb.mc

Expert Contributor(s) Name & Email

SeaZone [UK]	Dr. Mike OSBORNE	mike.osborne@seazone.com
UKHO [UK]	Mr Ian STOCK	Ian.Stock@UKHO.gov.uk

ANNEX 3
Report to IHO on SDI – June 2007

Marine SDI and the International Hydrographic Community

By Dr Mike Osborne (SeaZone) and John Pepper (UK Hydrographic Office)

Background

The International Hydrographic Organisation (IHO) represents the member interests of the National Hydrographic Offices and the hydrographic community across the World. The IHO has focussed successfully on the primary role of its membership, to ensure the development and sustainability of standards associated with the capture, management and use of hydrographic data in support of UN Convention for Safety of Life at Sea (SOLAS). It does this through the publication of "official" navigational charts and supporting publications.

In November 2005, the IHO hosted a Seminar in Rostock, Germany entitled "The Role of Hydrographic Services with regard to Geospatial Data and Planning Infrastructure". The seminar recognised formally that hydrographic data was not only important in support of Safety of Life at Sea but also to Defence and the wider Environment.

The hydrographic community has a reputation based on quality and professionalism. It has built up a store of experience and expertise that is relevant when considering wider use of hydrographic data. The role of IHO is to impart knowledge, provide guidance and standards to practitioners and inform Government and other stakeholders on hydrographic matters. The change in the IHO's constitution to embrace the need to encourage wider use of hydrographic information represents an opportunity for the IHO to use this wealth of knowledge and experience to underpin the development of best practice in the creation marine components of NSDI.

Regional SDI's are emerging. For example; in the European Union, legislation is being formulated to create an Infrastructure for Spatial Information in Europe (INSPIRE) to develop interoperability between datasets (e.g. land and sea interface at the coast line); harmonise data and metadata standards, develop network services and encourage the re-use / sharing of public sector information. The EU Directive will be announced in late 2006.

HO's may wish to establish a role for themselves and the information they are responsible for in the development and management of National Spatial Data Infrastructure (NSDI) programmes. The IHO recognises that this can only be done on the basis of the structure of the individual National Administration and that this will differ from country to country.

What is a SDI?

A Spatial Data Infrastructure is a term used to summarise a range of concepts, processes, relationships and physical entities that, taken together, provide for

integrated management of spatial data and information. The term covers the processes that integrate technology, policies, criteria, standards and people necessary to promote geospatial data sharing throughout all levels of Government. It covers the base or structure of 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. It also describes the hardware, software and system components necessary to support these processes.

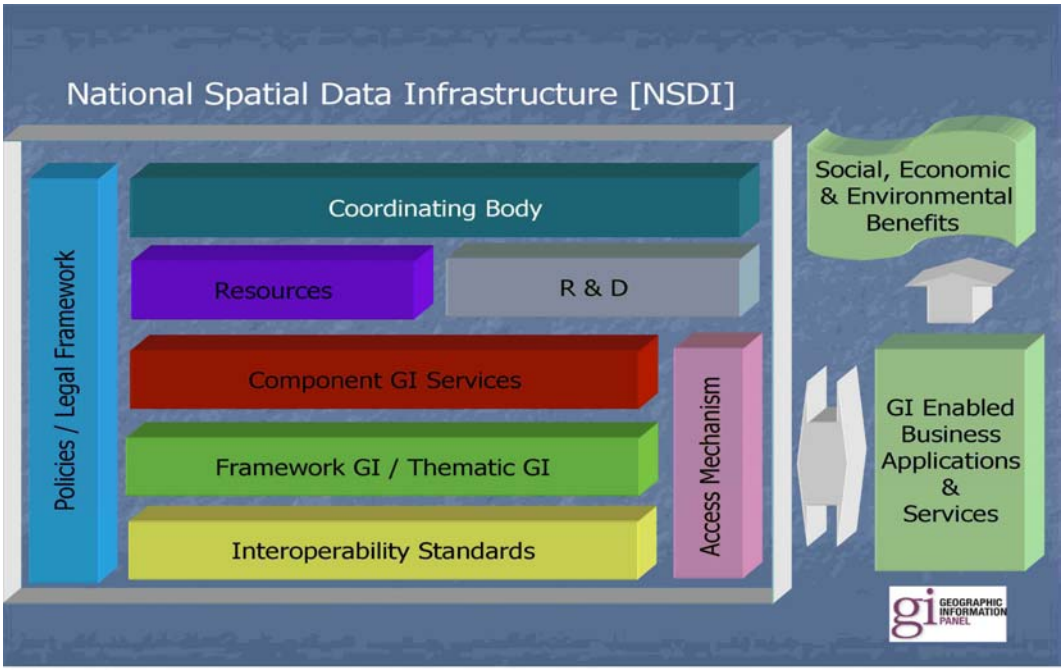


Figure 1 Components of the UK NSDI (Source: UK GI Panel, Oct 2006)

Marine SDI

Marine Spatial Data Infrastructure (MSDI) is the component of NSDI that encompasses marine geographic and business information in its widest sense. This would typically include seabed topography, geology, marine infrastructure (e.g. wrecks, offshore installations, pipelines and cables etc); administrative and legal boundaries, areas of conservation and marine habitats and oceanography.

What constitutes a SDI?

SDI is a framework comprising the following key components:

Policy

Above all there needs to be a policy to create information that is interoperable. This is often linked to a nations or organisations strategy for geographic information.

People & Organisations

There needs to be willingness and practical co-operation between the various organisations that create, share and use information to implement the overall policy.

Enablers

Enablers are essential building blocks in the development of NSDI's providing the framework for data acquisition, management and updating. Examples include:

- Standards; Standards for geographic information are being created internationally (ISO19xxx, OGC) and in many areas sectoral standards reference these standards (e.g. S-100).

- Geodetic Reference System; the horizontal and vertical datum to which geospatial information (content) is referenced and the coordinate transformations between systems.

- Metadata; at its simplest metadata is 'data about data' and describes the characteristics of a dataset (i.e. content, value and limitations).

Content

Content (data) is at the core of SDI and should be application-neutral thereby ensuring that it meets the needs of the widest user base. Users should have immediate and easy access to up to date, accurate and appropriate information that is linked to other information in a way that reflects how it exists in the real world. Content can be described in the following illustration:

- Reference Information; Geographic features that are used as a locational reference for application information or are used in geographic analysis by a majority of users. Reference information is formed of base and associated reference information.

- Application Information; Any business-oriented information that requires connectivity through a geographic reference of some kind (such as a building, field, road or user defined feature such as a property parcel) to enable the end-user to analyse and interpret the integrated information from different sources.

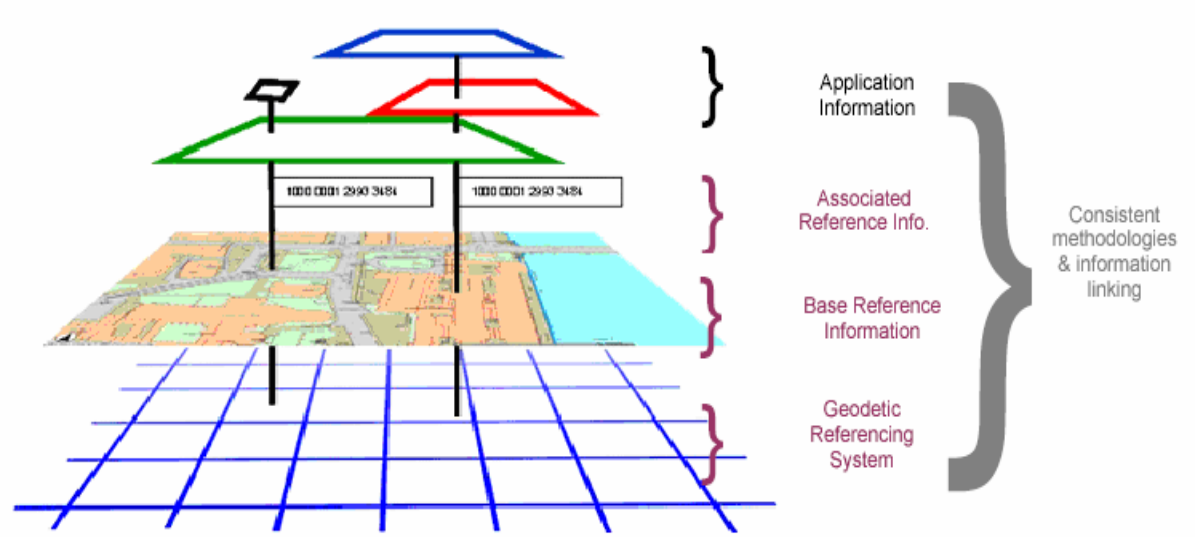


Figure 2 Layers of content within a NSDI (Source: DNF, 2004)

The role of the HO in supporting NSDI

Hydrographic Offices wishing to or being invited by their National Governments to be involved in the development and management of National SDI should consider the following questions:

- Does the structure of the national SDI allow for a comprehensive marine SDI (MSDI), a MSDI that excludes hydrographic information or only a specialised hydrographic SDI (HSDI)?
- Does the NSDI allow for a HO to become responsible for or partner in their national MSDI and its incorporation into the NSDI?
- Does the type of data provided by HO's support NSDI and / or MSDI?
- Does the HO collect data purely for the safety of navigation or does it meet the needs of a wider user community?
- Does the quality and usability of existing spatial databases within the framework of the NSDI include access to metadata?
- What are the requirements for quality assurance of data outside of its use in support of SOLAS?
- Does the establishment of user requirements for supply of hydrographic information impact on any necessary restrictions on data access?
- Does the financial, administrative and technical requirements and / or national policy on cost recovery impact on the establishment and maintenance of the infrastructure?

Recommendations

The IHO accepts that the development and management of SDI rests with the Member States and that the role of national HO's within NSDI will be for that

country to define. However, the IHO is keen to raise awareness of the benefit of supporting MSDI' s and NSDI's across its membership.

The IHO offers to examine the needs of members and provide capacity building support to requests from Member States. IHO will also determine its role within the framework of an evolving global SDI (GSDI).

The IHO has an opportunity to take on a wider remit as part of its role in representing the hydrographic community and to ensure that it's members interests are represented in the creation of MSDI's and NSDI's.

The IHO asks conference to endorse the establishment of a task group independent of existing IHO working groups (as this topic is multi-faceted) to review, inform and assist those working groups and to forge links with other bodies (e.g. OGC, ISO TC211, IOC) so that IHO interests are represented.

ANNEX 4 Matrix for research and questionnaire

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

ORGANISATION HYDROGRAPHIQUE INTERNATIONALE

IHB File No. S3/8151/MSDIWG

CIRCULAR LETTER 41/2008
25 April 2008

IHO Marine Spatial Data Infrastructure Working Group
- Request for Information –

References: a) 17th IHC Decision 22 – *Establishment of a Working Group on Marine Spatial Data Infrastructure Development*
b) IHB Circular Letter 122/2007 dated 18 December 2007 – *Report on the 19th CHRIS Meeting*

This Circular Letter seeks Member States' input by 6 June 2008

Dear Hydrographer,

The 17th International Hydrographic Conference directed that the CHRIS establish a Marine Spatial Data Infrastructure Working Group (MSDIWG) to analyze and recommend the level and nature of the IHO role in assisting Member States in support of their national Spatial Data Infrastructure (NSDI). The MSDIWG is tasked with submitting a report with recommendations to CHRIS/20 in November 2008 for subsequent consideration at the 4th Extraordinary International Hydrographic Conference in 2009.

National Spatial Data Infrastructure is the term used to cover a range of concepts, processes, relationships and physical entities that, taken together, provide for integrated management of spatial data and information. The term covers:

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

In order to complete its task, the MSDIWG is requesting information on the current status of MSDI in each Member State and also on aspirations for the future. Responses should be submitted using the questionnaire at Annex A to this Circular Letter. The questionnaire should be returned to the IHB (*info@ihb.mc*) by **6 June 2008**.

On behalf of the Directing Committee
Yours sincerely,

Captain Robert WARD
Director

Annex A: MSDIWG Questionnaire on Marine Spatial Data Infrastructures

Annex A to IHB CL41/2008
S3/8151/MSDIWG

Marine Spatial Data Infrastructure (MSDI) Survey

QUESTIONNAIRE and SELF ASSESSMENT SHEETS

*(to be returned to the IHB **by 6 June 2008***
E-mail: info@ihb.mc - Fax: +377 93 10 81 40)

Note: The boxes will expand as you type your answers

Member State:

Contact Details:

Name	
Position / Job title / Role	
Organisation	
Address	
Telephone contact	
E-mail contact	

1. Please complete the Self Assessment/Completion Sheets overleaf **before** answering the following questions.

Covering Notes on filling in the Self Completion/Assessment Sheets are provided in Appendix 1 to Annex A.

Explanatory information designed to assist you to identify the appropriate Level of activity are provided in Appendix 2 to Annex A.

2 What activities and plans do you have / will you be putting in place to develop an MSDI over the next 3 years?" *Write in against each attribute*

SDI Strategy & Policy	
People & Communication	
Data Management	
Data Framework / Standards	
Data Dissemination	

3 What do you consider to be the main barriers to either achieving where you want to be in 3 years time or in making progress in developing your MSDI? *Write in against each attribute*

SDI Strategy & Policy	
People & Communication	
Data Management	
Data Framework / Standards	
Data Dissemination	

4 What assistance could the IHO offer to enable you to reach your goals for NSDI and MSDI over the next 3 years and beyond? *Write in against each attribute*

SDI Strategy & Policy	
People & Communication	
Data Management	
Data Framework / Standards	
Data Dissemination	

1.

IHO Spatial Data Infrastructure (SDI) Self Assessment/Completion Sheet 1

STATUS IN 2008

Highlight or circle the most appropriate description in each category:

Category	Status Description				
	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Spatial Data Strategy / Policy	No NSDI Policy or MSDI Strategy exists.	Either NSDI Policy or MSDI strategy in development.	Both NSDI Policy and MSDI Strategy in development.	NSDI Policy published but MSDI Strategy not fully developed OR NSDI Policy not fully developed but MSDI Strategy in place.	NSDI Policy published and MSDI Strategy in place.
People / Communicating	We don't know who (or there is no one) to talk to about MSDI or SDI.	We know who to talk to but are not involved	We are communicating with others but there is no formal structure in place or the structure is in the process of development.	. We are participating in the national committee structure.	We are the key player in the national committee for NSDI or MSDI.
Data Management	Data available only in analogue (paper) format	. S-57 and / or raster format data held. No other digital data held. Paper or file-based storage.	S57 and / or digital hydrographic survey data in database, but not logical or standardised, OR if logical and standardised it is not complete. Data can be copied.	Database is complete, held by theme with metadata, and supporting all product outputs. Data responsibilities identified as unique inside HO only	Database is part of NSDI with no replication of the database. Data responsibilities identified as unique outside of HO at National level..
Data Frameworks / Standards	No knowledge of relevant standards or framework	Relevant standards understood but not used.	Relevant standards are understood; some frameworks available and used to a limited extent.	Relevant standards are understood and partially used.	. Fully compliant with all relevant standards.
Data Dissemination	Data is distributed in analogue (paper) only.	Data is distributed in analogue only. Digital data is available but for use only within the HO.	The HO produces and distributes digital data via selected off-line (eg CD) media.	Digital data available via internet based methods, but for limited user groups and with limited functionality.	All data fully available in digital format; it is fully searchable, describable and system downloadable through standardised interfaces.

IHO Spatial Data Infrastructure (SDI) Self Completion/Assessment Sheet 2

STATUS IN 2011

Highlight or circle the most appropriate description in each category:

Category	Status Description				
	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Spatial Data Strategy / Policy	No NSDI Policy or MSDI Strategy exists.	Either NSDI Policy or MSDI strategy in development.	Both NSDI Policy and MSDI Strategy in development.	NSDI Policy published but MSDI Strategy not fully developed OR NSDI Policy not fully developed but MSDI Strategy in place.	NSDI Policy published and MSDI Strategy in place.
People / Communicating	We don't know who (or there is no one) to talk to about MSDI or SDI.	We know who to talk to but are not involved	We are communicating with others but there is no formal structure in place or the structure is in the process of development.	. We are participating in the national committee structure.	We are the key player in the national committee for NSDI or MSDI.
Data Management	Data available only in analogue (paper) format	. S-57 and / or raster format data held. No other digital data held. Paper or file-based storage.	S57 and / or digital hydrographic survey data in database, but not logical or standardised, OR if logical and standardised it is not complete. Data can be copied.	Database is complete, held by theme with metadata, and supporting all product outputs. Data responsibilities identified as unique inside HO only	Database is part of NSDI with no replication of the database. Data responsibilities identified as unique outside of HO at National level..
Data Frameworks / Standards	No knowledge of relevant standards or framework	Relevant standards understood but not used.	Relevant standards are understood; some frameworks available and used to a limited extent.	Relevant standards are understood and partially used.	. Fully compliant with all relevant standards.
Data Dissemination	Data is distributed in analogue (paper) only.	Data is distributed in analogue only. Digital data is available but for use only within the HO.	The HO produces and distributes digital data via selected off-line (eg CD) media.	Digital data available via internet based methods, but for limited user groups and with limited functionality.	All data fully available in digital format; it is fully searchable, describable and system downloadable through standardised interfaces.

Appendix 1 to Annex A

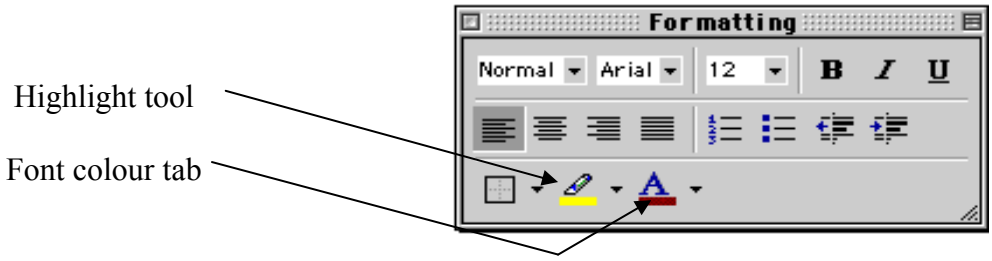
NOTES

The Self Assessment Sheet and Questionnaire are intended to be completed on a PC and then submitted by e-mail.
Alternatively, the completed questionnaire can be submitted by fax; in which case print the MSDI Self Assessment Sheets before you complete it, but complete the questionnaire on-line before printing it.

On the SDI Self Completion/Assessment Sheet …

1 For each of the five subjects, highlight the description that best describes your organisation's current and likely status in three years time.

Highlight the appropriate descriptions using either the highlighting tool or the font colour tool.



Alternatively, circle the relevant descriptions.

2. Complete one table for your current status (2008) and another for your likely status in three years time (2011).

Appendix 2 to Annex A

Explanatory information on Level 1-5 for each activity / element on the IHO Self Completion/Assessment Sheet, designed to help you select the levels appropriate to your organisation.

SPATIAL DATA STRATEGY / POLICY

Level 1 No NSDI Policy or MSDI Strategy exists
Description: There are no plans to develop either NSDI or MSDI strategies or policies. Little or no level of understanding of SDI requirements exists in the Hydrographic Office. No leadership and / or ownership identified at all.

Level 2 Either NSDI Policy OR MSDI Strategy in development
Description: Some effort made to commence the process of defining requirements for either NSDI or MSDI. Leadership and / or ownership identified but formal processes not yet in place. Some communications made but a limited level of understanding in place in the Hydrographic Office (HO).

Level 3 Both NSDI Policy and MSDI Strategy in development
Description: Formal processes and documentation of requirements in place and active engagement with stakeholders made. Work on framework underway but some distance from completion. Level of understanding growing with stakeholder buy-in assured. HO aware and / or participating.

Level 4 NSDI Policy published but MSDI Strategy not fully developed OR NSDI Policy not fully developed but MSDI Strategy in place
Description: Formal processes in place and documentation complete for one element of the requirement (either NDSI or MSDI) supported by leadership. Stakeholders fully engaged with level of understanding allowing implementation of areas completed. Work continues with established level of understanding of requirements and confirmed participation within the HO.

Level 5 NSDI Policy published and MSDI Strategy in place
Description: Formal processes in place and documentation complete for both NSDI and MSDI. MSDI and NSDI may or may not be up and running across sectors. Attention now on putting processes in place and/or obtaining feedback from stakeholders necessary to improve performance, depending on status. The HO is fully engaged and participating in the improvements programme.

PEOPLE / COMMUNICATING

Level 1 We don't know who (or there is no one) to talk to about MSDI or SDI.
Description: The HO is not involved in SDI development and is not aware of any SDI initiatives in the country.

Level 2 We know who to talk to but are not involved.
Description: The HO is not involved in SDI development but is aware of SDI initiatives in the country and knows who is involved.

Level 3 We are communicating with others but there is no formal structure in place or the structure is in the process of development.

Description: The HO is talking with partners about SDI developments but no concrete initiatives have yet been taken in the country. There are no formal projects or co-operative arrangements in place.

Level 4 We are participating in the national committee structure.
Description: The HO is part of an ongoing SDI initiative in the country but is not a leading partner.

Level 5 We are the key player in the national committee for NSDI or MSDI.
Description: The HO is playing a leading role in an ongoing SDI initiative in the country. The HO is either managing the project or are central to the initiative due to either technical competence or control of content resources

DATA MANAGEMENT

Level 1 Data available only in analogue (paper) format.
Description: All data is held in paper format. If there is any digital data, it is held by the HO in raster format.

Level 2 S-57 and / or raster format data held. No other digital data held. Paper or file-based storage.
Description: The only digital data available is held by the HO in S-57 and/or raster format. There is no data stored in a database but only on paper form or file-based.

Level 3 S57 and / or digital hydrographic survey data in database but not logical and standardised, OR if logical and standardised is not complete. Data can be copied.
Description: Part of the data is stored in databases but can overlap and is neither necessarily unique nor exhaustive. Mutations in the data are processed on multiple locations within the HO. Not all the data is stored together with the corresponding metadata.
Not all the products are produced from databases.

Level 4 Database is complete, held by theme with metadata, and supporting all product outputs. Data responsibilities identified as unique inside HO only.
Description: Within the HO, the data is entirely stored together with the corresponding metadata, in only one place (except for backups) and do not overlap. The responsibilities for the data are clearly identified with respect to each data theme.
Outside the HO the same data might be stored by other organisations as well.
All products are produced from the databases.

Level 5 Database is part of NSDI with no replication of the database. Data responsibilities identified as unique outside of HO at National level.
Description: The databases of the HO are part of the NSDI. The data (and the corresponding metadata) are unique within the NSDI. The HO is responsible for the contributions to the NSDI.
All products produced by the HO are produced from its own databases or from the databases of other organisations .within the NSDI.

DATA FRAMEWORKS / STANDARDS

Overview: Do you have a framework for the use of common standards, datums and guidelines (rules + policies) for interoperability between agencies providing spatial data within your country?
Components:

- Common horizontal and vertical datums within your country or easy ways for conversion between several datums.
- Common base data and/or common encoding of spatial data in databases of different agencies.
- Common format for data exchange or easy ways for converting data from/to different common formats.
- Use of international standards for data encoding/access/exchange like International Standards Organisation (ISO) 19xxx series and Open Geospatial Consortia (OGC), Web Mapping Services (WMS),Web Feature Services (WFS), Geographic Mark-up Language (GML) etc.

Level 1 No knowledge of relevant standards or framework.
Description: No such framework has even been considered with no idea about such standards. Every agency is doing something on their own, no cooperation between agencies. Different horizontal and/or vertical datums used for land and marine data. Marine data can't be combined with other national spatial data sources.

Level 2 Relevant standards understood but not used.
Description: Heard about common standards, some discussion of creating something similar to common spatial data framework has also taken place, but no real actions or such work done. So far, hydrographic data cannot be combined with other national spatial data sources.

Level 3 Relevant standards are understood; some framework available and used to a limited extent.
Description : Common standards accepted and somewhat used by some agencies, different datum issues solved (at least by conversion). Existing databases for reference data available, but not yet accessible by standardized way. Still different data encodings in different agencies and no coordination in this field. A lot of extra work for each case needed (by the end user) in order to combine marine data with other national spatial data sources.

Level 4 Relevant standards are understood and partially used.
Description: Most agencies use common standards for spatial data access, datum issues solved, base data easily available and most of it also interoperable through common encoding and use of OGC standards (WMS, WFS services working in many agencies). Some extra work for each case needed (by client) in order to combine marine data with other national spatial data sources.

Level 5 Fully compliant with all relevant standards.
Description: All agencies providing spatial data are using international standards for data querying/accessing. Data are interoperable because of common encoding used and base data availability. Data is available directly or by automated conversion in common national datums. It is possible seamlessly to create a new map using OGC and similar standards from different source data (including hydrographic data) so that it can be displayed and / or downloaded using for example standard GIS platforms.

DATA DISSEMINATION

Level 1 Data in analogue (paper) format only.
Description: The HO distributes only analogue information (eg paper charts). Digital data NOT available.

Level 2 Data is distributed in analogue form only. **Digital data available but for use only within the HO.**
Description: The HO uses digital production methods internally. But all products for external use are analogue; no digital data is distributed to other users.

Level 3 The HO produces and distributes some digital data via selected off-line media.
Description: The HO produces and distributes digital data for selected purposes via offline media, e.g. raster or S57 data via CDs.

Level 4 Digital data available via internet-based methods, but for limited user groups and with limited functionality.
Description: The HO offers net-based distribution, but with limited functionality, not fully searchable, describable and system downloadable and for limited user groups.

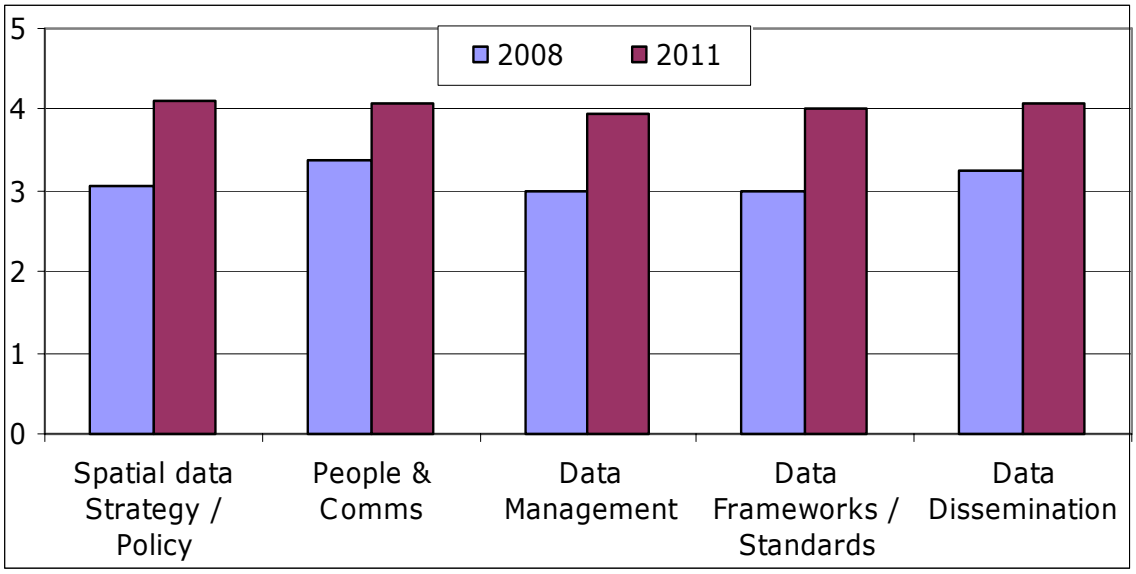
Level 5 ALL data fully available in digital format; it is and searchable, describable and system downloadable through standardized interface.

Description: The HO distributes data through national or international SDIs to all potential users with full functionality

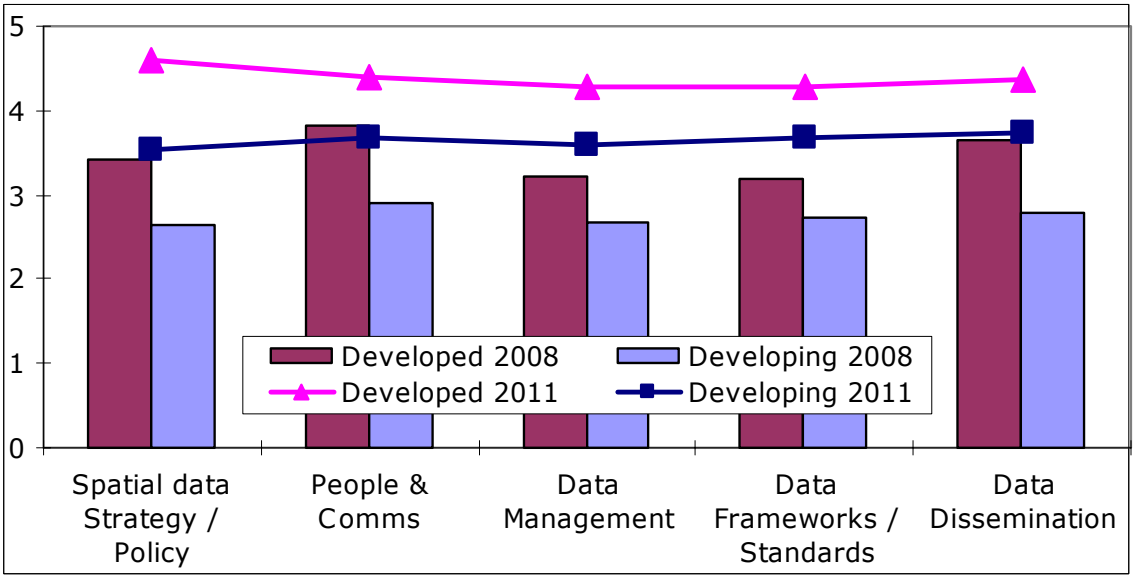
Note: In this category, terms & conditions may apply (e.g. licensing costs for data, third party data agreements) to some or all of the above levels

ANNEX 5 RESPONSES - SUMMARY GRAPHS

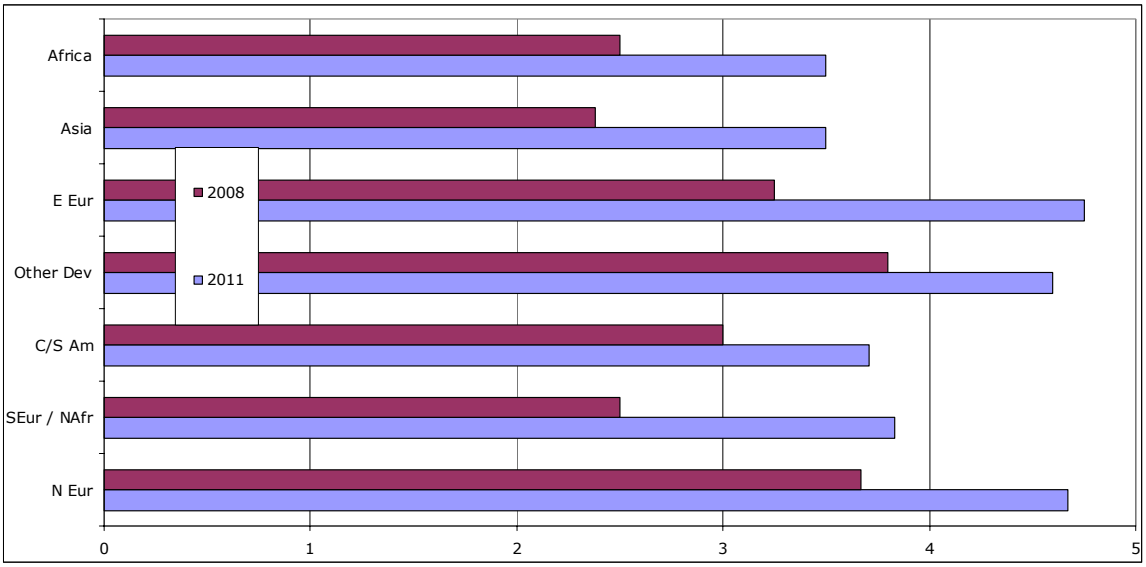
MSDI Matrix scores
2008 and 2011 for all respondents



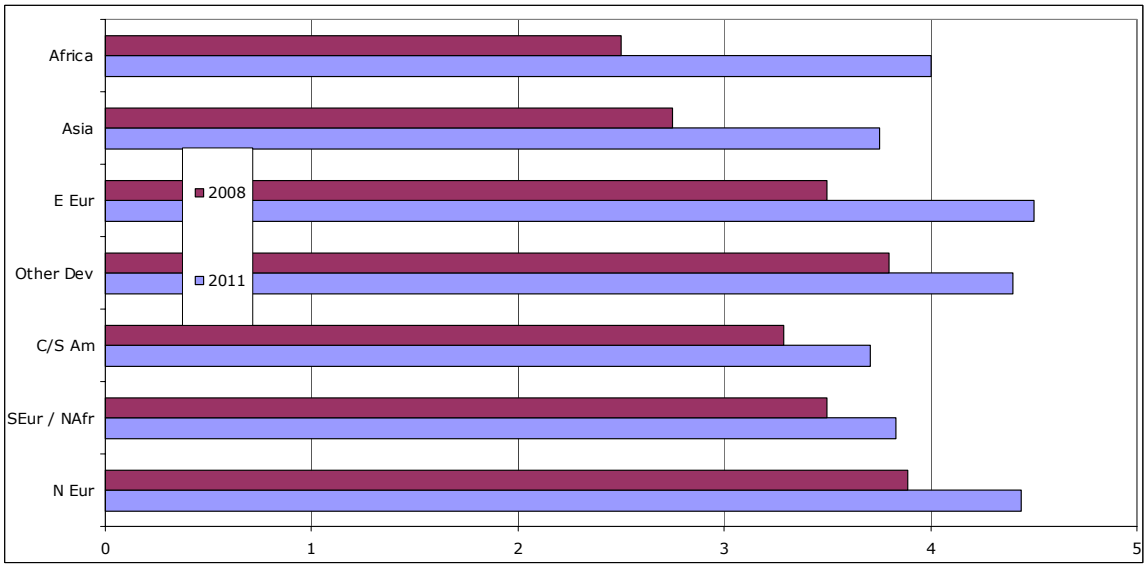
Developed and Developing Nations compared
[2008 and 2011]



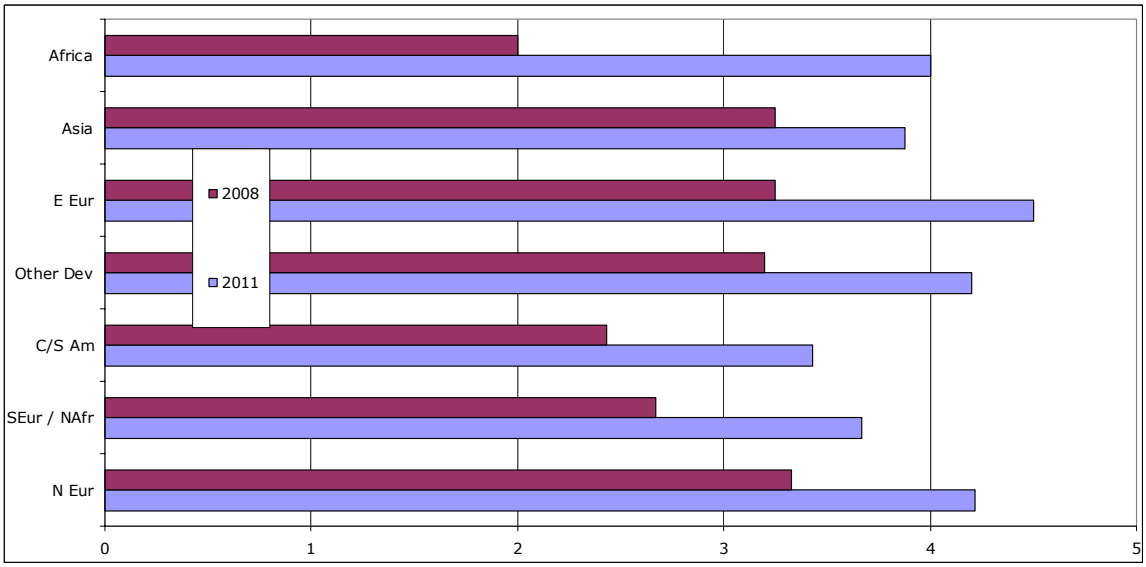
Regional analysis – Spatial Data Strategy / Policy [2008 and 2011]



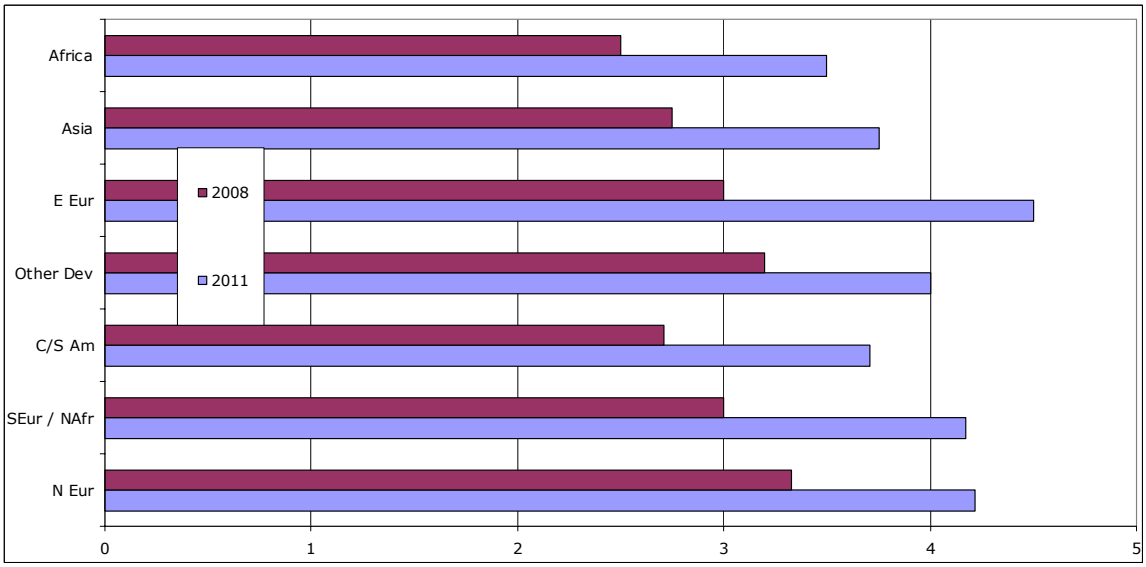
Regional analysis – People & Communications [2008 and 2011]



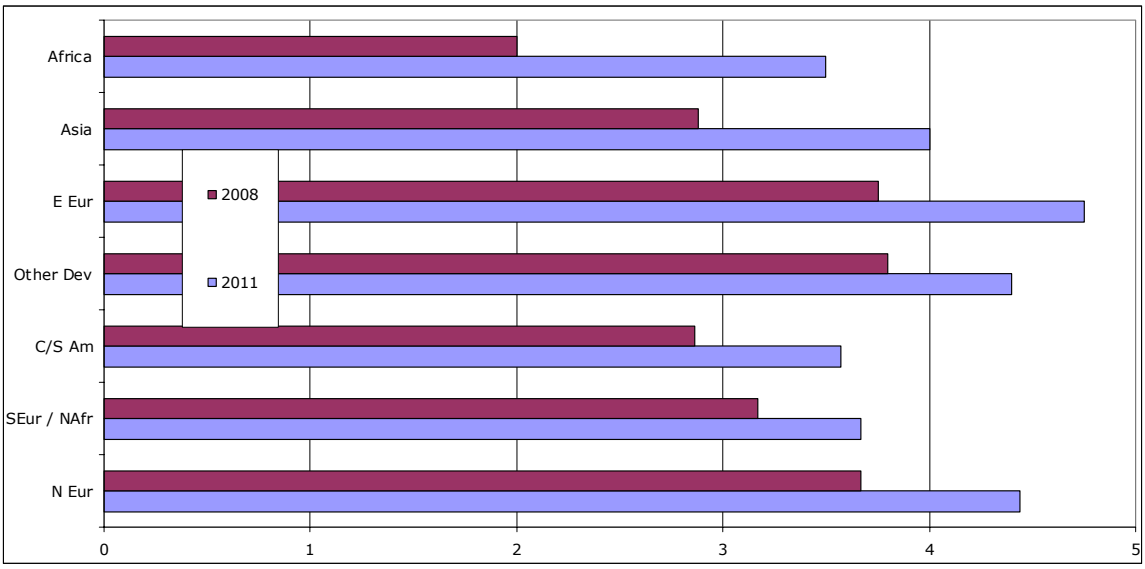
Regional analysis – Data Management [2008 and 2011]



Regional analysis – Frameworks and Standards [2008 and 2011]



Regional analysis – Data Dissemination [2008 and 2011]



List of responding Member States

Argentina
Australia
Brazil
Canada
Chile
Colombia
Croatia
Cuba
Cyprus
Denmark
Ecuador
Estonia
Finland
France
Germany
Greece
Guatemala
Iceland
India
Italy
Japan
Korea
Latvia
Myanmar
Netherlands
New Zealand
Nigeria
Norway
Pakistan
Papua New Guinea
Peru
Portugal
Qatar
S Africa
Singapore
Slovenia
Spain
Sri Lanka
Sweden
Tunisia
Turkey
UK
USA

ANNEX 6 THE HYDROGRAPHIC OFFICE ROLE IN MSDI

The following tables were generated by Working Group members in meeting breakout sessions and are designed to provide initial thoughts that would underpin future activities and guidance for the IHO and / or for Member States for development of MSDI corporate objectives.

Table 1: Steps required to develop MSDI

Steps HOs should take to have an SDI presence	Resources Required
1) Identify responsible person to lead SDI initiative. Stimulus may be internal ('an SDI champion') or external (e.g. national directive)	MSDI portal
2) Prepare white paper including introduction to MSDI, benefits to HO, list of stakeholders and outline plan (roadmap)	Marine SDI Guidelines incl. templates for stakeholder/road maps
3) Decision to proceed (or not) including scope, depth and timescale. Add to corporate and objectives, join national SDI and represent at regional hydrographic commission	Powerpoint template to help present case, worked examples, MSDI pilot/model
4) Develop strategic plan 4.1 Situational audit (where are we) 4.2 Vision (where are we going, when) 4.3 Gap analysis 4.4 Set strategic objectives 4.5 Detailed action plan (incl. costs) 4.6 Risk analysis	Template plan? Points on what to look for. Must cater for HOs at Level 1 or 2 by having intermediate (small) steps
5) Plan implementation	Guidelines, Specifications
6) Review and Feedback to IHO	

Table 2: Opportunities and benefits of MSDI

Opportunities	Benefits	Best Practice Guidance
Embrace wider base / Develop new products and services	Stimulate additional resources and funding	*Engage - respond - communicate*
Encourage enlightened / robust data management (metadata)	Efficiency savings (capture / correct once, use many times)	*Adopt common standards / best practice*
Realise inherent value / benefit in data	Increased market exposure	*Identify / respond to user needs*
Pride / prestige of being part of SDI community	Reduces isolation	*Get involved*
Reduce replication and encourage coordination	Effectiveness, efficiency, better use of public money	*Community based approach*
Better information leading improved decision making	Improved security, cost savings, reduce risk	*End user engagement*

Table 3: Overcoming barriers and obstacles at all levels

Barriers	Recommended Action
Government Policy	Communicate and collaborate to develop policies together
Ethos / culture	Training; communication - selling the benefits
Funding	Business Case through defining value and benefit of "joined up" approach
Trust in other Govt Agencies	Mutual respect through working together
Resources	Demonstrate efficiency savings to achieve increased resources
Business Model	Demonstrate benefits of more inclusive approach
Objectives counter to SDI	Identify opportunities and benefits of SDI
Security (release / granularity)	Demonstrate the benefit of release at appropriate resolution; define level of real risk
Knowledge (market/tech/ etc)	Training and capacity building
Value and benefit of SDI	Efficiency savings and more effective way of doing things
Data management practices	Knowledge transfer; training and confidence building

ANNEX 7

INPUTS TO IHO MARINE SDI GUIDANCE DOCUMENT (AN EXAMPLE)

1. Content

Foreword
- Why this is important – IHO President

Glossary of Terms
Introduction
- What is this document
- Purpose and target
- Role of the IHO

What is Marine SDI
- What is a Spatial Data Infrastructure (and what it isn't)
- Local, National, Regional, International and Sectoral
- Objectives for an SDI
- Policy, Components, Principles governing SDI creation
- Marine SDI (including data content)

Opportunities and Benefits of an SDI
- Policy, See Table
- Who can use it
- What does SDI support
- HO as a provider and a user (trust?)

Getting Involved *(Guidance starts here)*
- Champion, stakeholders (internal and external)
- Engage, respond, communicate
- Allowing others to get involved with you
- Regional initiatives/legislation
- Role of Regional Hydrographic Commissions

Policy *(can be used as template for HO policy or being mandated)*
Planning your involvement in SDI
- Identifying champion
- Prepare white paper (ref to template)
- Scope, depth and timescale (Business Case)

Developing your SDI Plan
- Audit
- Vision
- Gap Analysis
- Objective Setting
- Action Plan
- Risk Analysis

Carrying the Plan Forward
- Knowledge
- Training
- Support

Reviewing Progress
- Monitoring
- Feedback to IHO

Where to Get Help
- Guides (best practice templates)
- IHO Portal (Forum, Blog)
- Seminars, Workshops/ Roadshows
- Specific Training Sessions
- e-Training material
- List of experts
- Pilot / Links to example SDIs (see Ian Stock's table)

Acknowledgements
- IHO MSDIWG members and constitution [testimonials]

Annexes
- Data content in detail
- Example Stakeholder Map
- Example Road Map
- White Paper Template
- Plan Template
- Powerpoint Template
- Process diagrams [e.g. data specifications; metadata; data management]

Decision points

- Why MSDI? (What is in it for the HO?)
- What is it all about?
- Getting started (basic steps within your HO; appoint a champion, HO business plan, decision steps)
- Data steps? (see below)
- Technology steps (analogue to digital, WMS/WFS)?
- People (getting the right people involved)?
- Policies (internal, national and regional)?
- Legal framework (copyright, ownership, liability, custodianship)?
- Institutional arrangements (between HOs and other national institutions)

- Training (what is needed, by whom and when)?
- Connecting MSDI to the NSDI?
- Links to existing SDI's (best practices)?
- Standards (data, technology, metadata)?
- Data management (maintenance)?
- Harmonisation of data sets (national and regional)?
- Remember the barriers!

2. Components explored

2.1 Data: Illustrative steps to establishing full MSDI capability

- Identify what data you hold.
- Assign metadata – at the very minimum to include a Minimum Bounding Rectangle in Lat, Log to provide the geospatial reference.
- Make the metadata searchable through some search engine, internally at least.
- Include the search engine capability on the organization's web page.
- Establish a licensing regime supported and underpinned where applicable by government policy.
- If you have not already done so, capture data sets in digital form, e.g. scan manuscript documents into TIFF, GeoTIFF, JPEG etc ensuring that the scan density is such that the user community can use it without resorting to the hard copy to resolve readability.
- Capture data as close to source scale/ resolution as possible [i.e. not at product scale]
- Where possible use optical character recognition to capture the data in vector format. This requires rigorous checking and validation.
- Where OCR is not an option, e.g. hand-drawn soundings, vector capture will require double digitization to ensure the quality and completeness of data capture.
- Update the metadata search facility to identify raster or vector data availability.
- Facilitate download of data sets as flat files.

- Facilitate automated search and download of data sets via web mapping services.

- Develop a seamless validated database of vector data using international standards, e.g. S-57 or S-100 feature data dictionary or data model.

- Where security of data is an issue, develop an acceptable level at which data can be made available either in-country or internationally. This may involve data thinning or gridding to a level where data may be declassified.

- Facilitate automated search and download of data via web feature services.

2.2 What data are relevant to MSDI?

Hydrographic Office data which **may** be part of an MSDI relates to any navigational or other[4] water body:

- source data (e.g. dense data)
- product data (e.g. ENC data, digital nautical publications)
- Metadata (data about data)

Types of hydrographic data (by theme) **may** include:

- Bathymetry
- Coastline
- Tidal data (heights and streams)
- Oceanographic data, e.g. sound velocity, salinity, temperature, currents.
- Aids to Navigations, e.g. lights, landmarks, buoys.
- Maritime information and regulations, e.g. administrative limits, traffic separation schemes
- Obstructions and wrecks
- Geographical names, e.g. sea names, undersea feature names, charted coastal names
- Seafloor type (e.g. sand, rocks, mud)
- Constructions/infrastructure at sea (e.g. wind farms, oil platforms, submarine cables)
- Shoreline constructions/infrastructures (e.g. tide gauges, jetties) *where not part of Land Mapping SDI input*

Other data issues to consider:

- Data ownership: Spatial description in one single database (feature custodian database); enabling different attributes in other databases.
- Raster or vector data? Vector data topology to be described in terms of points, lines, polygons.
- Coordinates (e.g. xyz)
- WGS-84 datum.
- Vertical Datum.
- Time [t] as a vector element.
- Conformance to standards: S-57, S-100, ISO 19100 series, OGC standards.

[4] This remit will depend on the constitution of the individual HO

2.3 Training and knowledge transfer

Tools and techniques for each of 5 categories

Tools/techniques	MSDI policy and strategy	People and Communications	Data Management	Data frameworks and standards	Data dissemination
Portal / including blog site	Yes	Yes	Yes	Yes	Yes
Seminars and workshops / road shows	Yes	Yes		Yes	
Specific training sessions			Yes		Yes
Guides – best practice and templates	Yes		Yes	Yes	Yes
E-training sessions			Yes		Yes
Links to experts / organisations [inc; RHC] / best practice HO sites	Yes	Yes	Yes	Yes	Yes

Where to start?

- Develop guides and templates – use existing information from mature HO's [via short guides from their full-blown documents]
- Produce synopses of other 'driver' documents, eg INSPIRE
- Build lists of experts (individuals and organisations) and their expertise
- Build lists of relevant standards and frameworks and state (simply) their relevance and application
- Build portal and populate with guides and lists
- Design seminars and workshops

Find out HO community requirements – based on feedback at seminars and via research, and existing within Hydrographic Commission – for specific training courses and help topics

What should be in guides or on portal?

Benefits of (to overcome barriers, especially funding and politics)

- an MSDI strategy
- sharing and co-operating