7th IRCC MEETING
Mexico City, Mexico, 1-3 June 2015

Report of the Marine Spatial Data Infrastructures Working Group (MSDIWG)

Submitted by:	Chairman, MSDIWG
Related Documents:	None
Related Projects:	None

Chair:	Jens Peter Hartmann, Denmark
Vice-Chair:	Ellen Vos, Netherlands
Secretary:	John Pepper, OceanWise
Member States:	Argentina, Australia, Brazil, Canada, Cuba, Denmark, Estonia, Finland, France, Germany, Italy, Japan, Nigeria, Netherlands, Norway, Portugal, Republic of Korea, Romania, Slovenia, Spain, Singapore, Ukraine, UK, USA
Expert Contributors:	CARIS; Envitia; ESRI; EUCC; OceanWise; Wuhan Univ, China; Geosciences Australia See Annex A for full details of membership

Meetings Held During Reporting Period

The sixth meeting of IHO Marine Spatial Data Infrastructures Working Group (MSDIWG) took place in London, UK, hosted by UKHO, from 4-6 March 2015. The outcome of the meeting is available from the IRCC section of the IHO Website under the MSDIWG.

The MSDIWG meeting was preceded on 3 March by an MSDI Open Forum meeting. The overall title for the Open Forum meeting was "Building a maritime spatial data infrastructure - Are the principles at odds with strategies for delivery"

The aim of both events was to focus on MSDI and to propose ways to progress MSDI implementation within the Organization and its Member States. Furthermore the purpose of the MSDIWG6 meeting was to adjust the Terms of Reference (ToR) and to establish a new Work Programme in order to be submitted to IRCC7.

Next Planned Meeting

The IHO MSDIWG expects to hold a day-long Open Forum and the seventh MSDIWG meeting from 25 to 29 January 2016, hosted by the Japan Hydrography and Oceanography Department (JHOD) in Tokyo, Japan.

MSDIWG discussed options to extend the activities to 5 days to enable it to host a one-day Demonstration Workshop for expert contributing bodies adjacent to the Open Forum and MSDIWG-7. This would allow non-MSDIWG stakeholders (e.g. EAHC MS, government, academia, industry, donor agencies, NGO representatives) to come along to see what the

MSDIWG commercial partners can offer. Attendees at the workshop would then be encouraged to stay on for the Open Forum. This approach is being developed in consultation with the hosts.

The Open Forum meeting will be followed by a three day-long MSDIWG7 meeting at the same venue and the meeting will include WG Work Plan task group break-out sessions.

The key interest for the IHO is that MSDI provides a framework for the provision of hydrographic information beyond the traditional field of surface navigation.

Terms of Reference of MSDIWG:
The MSDIWG-6 reviewed the new role of MSDIWG as part of IRCC and endorsed the change of focus resulting from the move to IRCC governance and as a consequence the Terms of Reference of MSDIWG were adjusted. See Annex B.

Work Programme
The group reviewed the new role of MSDIWG as part of IRCC and endorsed the change of focus resulting from the move to IRCC governance. The 2015-16 Work Programme was refined at the MSDIWG6 meeting. This was based on the HSSC6 agreed 2014-15 Work Programme for the WG and the change to IRCC.
Key to being able to deliver this Work Programme is the seven supporting tasks now in place, namely:

MSDIWG Tasks:
A. Identify and promote national and regional best practices
B. Assess the existing and new standards in the provision of marine components of spatial data infrastructures
C. MSDI training and education
D. Facilitate (external) MSDI communication
E. Maintain and extend the publication IHO MSDI C-17 (IHO Task 2.9.2 refers)
F. Conduct annual meetings of MSDIWG, arranged back to back with 1-day MSDI Open Forum (IHO Task 2.9.1 refers)
G. Ensure that MSDI is a standing agenda item for RHCs' meetings (IHO Res 2/1997, as amended, refers)
See Annex C for full details of the work programme.

Progress on HSSC Action Items
The MSDIWG has moved from HSSC to IRCC on 1 January 2015. Communication between MSDIWG and HSSC (with the main focus on technical issues and standardization) will in the future be through IRCC.

Action HSSC4/32 is for MSDIWG4" to consider, within its work plan, the development of content for an "introduction to MSDI" training course ". This development was requested by the IRCC Chair following the CBSC conclusion that such a course was necessary and should be developed by the MSDIWG.

This action point is included in future work of the MSDIWG as stated in Annex C.

Action HSSC5/49: MSDIWG to consider the impact of the UN-GGIM initiative on its work programme, taking into account the items identified in paragraph 11 of HSSC5-05.7B, and report to HSSC6.

The MSDIWG has contributed to IHB in its response to UN-GGIM establishing its publication "A Guide to the Role of Standards in Geospatial Information Management".

The MSDIWG suggest that IHO welcome this initiative and use this opportunity to state the important role that hydrography plays in the geospatial information sector generally and also explores ways of improving marine spatial data management.

IHO should state its general support for these principles and that IHO has policies and initiatives in place to implement them. This includes the existence of the MSDIWG and its work programme and the fact that knowledge of MSDI - and by association these principles - is already being delivered to Member States as part of the IHO's capacity building programme. However more time and effort in this respect is required.

The UN-GGIM guidelines are available from the IRCC section of the IHO Website in the MSDIWG section: http://iho.int/mtg_docs/com_wg/MSDIWG/MSDIWG_Misc/MSDIWG-BOK.html

Input to HSSC through IRCC

S-1XX specifications
The MSDIWG would like to promote the developing S-1XX specifications as much as possible, specifically in non-navigational use-cases. The MSDIWG seeks cross-pollination with the HSSC communications on these S-1XX specifications,

Especially the relationship between S-102 and the INSPIRE Elevation theme is an important issue as it pertains to bathymetry data. The reason for this request is to attempt to avoid a possible format conflict and to help ensure that hydrographic offices are not in a position where they need to maintain two separate bathymetry layers. One for primary charting activities and another to serve the regional or national spatial data infrastructure initiatives for purposes that go beyond charting e.g. marine spatial planning or oil spill response. The MSDIWG understands that the S-100 work group will be undertaking a revision of S-102 in its work plan (item D.8.) this would present an opportunity for this investigation.

INSPIRE
Although INSPIRE is a primarily European Union activity it is perhaps the best example of a Spatial Data Infrastructure and therefore is recognized well beyond the borders of Europe.
Many European hydrographic offices have requirements under INSPIRE so it would be beneficial to adopt a policy of collect once and use many times as it relates to one of the most important data assets held by hydrographic offices i.e. bathymetry.

Under INSPIRE there are maintenance groups that drive the direction and scope of the various themes including Elevation. The MSDIWG suggests that it may be worthwhile for the IHO group responsible for data standards such as S-102 also to attend the maintenance group responsible for this related theme. This way hydrography has a louder voice within INSPIRE and the work done under INSPIRE can be consider in the development of S-100 which should allow these two bathymetry related standards to be developed more harmoniously.

The HSSC should be asked through the IRCC to table the following items/questions:
- Does the new S-102 specification align with INSPIRE Elevation data specification. These specifications are both possible containers for bathymetry and the MSDIWG would like to get more in-depth insights in possible interoperability issues?
- Stating which bodies and communities are developing S-1XX specifications and the level of maturity of these specifications. Reference to use-cases and business cases would be very welcome in this report
- Does EC-JRC, in developing INSPIRE specifications; take account of S-100 Universal Hydrographic Data Model?
- Make IHO EU MS's aware of the importance of engaging in the INSPIRE implementation and maintenance processes in the INSPIRE MIG framework
- Make IHO EU MS aware of the EU Location Framework of which Norway is Vice-Chair.
- Make all IHO MS's aware of the MSDI Training Syllabus
- Make all IHO MS's aware of the IHOMSDI LinkedIn Group established by Caris

Progress on IRCC Action Items

Action IRCC4/23: Investigate the possibility to deliver a MSDI courses with IOC and/or other organizations.

This action point is included in the future work of the MSDIWG as stated in the Work Programme.

Task IRCC5 11/2013: Contribute to the development of MSDI.

A paper on how IHO can contribute to the development of MSDI was forwarded to IRCC6. The MSDIWG presented the paper at IRCC6. The paper focuses on how IHO could contribute to the development of MSDI. The paper ended up with conclusions and recommendations in order for IRCC to contribute to the development of MSDI and it was recommended that IRCC should:

- Take note of the items in the paper and invite MS, observers and expert contributors to participate in active debate, workshops and briefings facilitated by RHCs as a matter of course, not by exception.
- Empower RHCs to imbue a sense of urgency in MS to take a more proactive role in engaging with government, commerce, academia and the third sector to seek a renewed mandate for hydrography as the valid "science of the oceans" in the fast changing information world.
- Encourage RHCs take advantage of the growing library of physical and online resources that MS can use to further their understanding, interest and knowledge of NSDI and MSDI.
- Iidentify "ambassadors" who are willing and able to take the MSDI message to MS to energize them in taking the actions necessary to bring about organizational change.
- Support RHCs in facilitating further Capacity Building short MSDI training courses for practitioners and MSDI briefing sessions for senior managers and/ or directors in MS to enable them to provide the necessary vision and direction for Hydrographic Offices/Services (HO/HS).

IRCC6 acknowledged the recommendations from the MSDIWG and two actions items was established:

Action IRCC6/43: Include a MSDI agenda item at IRCC7

Action IRCC6/44: Facilitate the move of the MSDIWG from HSSC to IRCC

The MSDIWG fully supported the decisions taken by IRCC6.

At HSSC6 it was decided to transfer the MSDIWG from HSSC to IRCC and the MSDIWG is now a WG under IRCC.

Establishing a MSDI training syllabus
The syllabus is about making sure decision makers and employees have the skills, knowledge and understanding to approach the different elements of MSDI. It is not intended to set out exactly what instructors should do.
The syllabus sets out the learning outcomes that, as a minimum, must be achieved. It is important that components and elements from national and regional perspectives are also considered and added to the MSDI training course, in order to achieve the right skills, knowledge and understanding needed from a national perspective.

The syllabus is divided in four, one MSDI orientation and three detailed MSDI courses:
1. General introduction to MSDI.
2. Fundamentals of a Marine Spatial Data Infrastructure (MSDI)
3. Database Design, Data Management and MSDI for Practitioners (i.e. Hydrographic Surveyors, Cartographers, Oceanographers, IT specialists)

4.   Marine Spatial Data Infrastructure (MSDI) for Senior Managers (i.e. Directors, Hydrographers, HR Managers)

The draft Syllabus for Educational and Training Programmes for Marine Spatial Data Infrastructures is attached as Annex D.

Problems Encountered

There are increasing demands being placed on a very few members of MSDIWG to attend IHO sponsored events such as Regional Hydrographic Commissions and MSDI meetings (e.g. Baltic Sea RHC MSDIWG), organizing and delivering MSDIWG meetings annually; attending meetings with other regional bodies as well as invitations to speak at industry seminars and meetings on the subject of MSDI. This is being stimulated by the wider maritime community seeking to gain a greater understanding and perspective of MSDI, the importance of MSDI globally and how this will impact on them. In addition there is an appetite to gain a greater understanding of the workings of the WG and what it will deliver over time. In order to mitigate the risk of limited resources provided by HOs is leading to an inability to respond positively to these requests. Other Items of Note

INSPIRE
The European Directive INSPIRE (the Infrastructure for Spatial Information in the European Community) held its annual conference in June 2014 in Aalborg, Denmark. The implementation of the INSPIRE Directive is halfway, at crossroads, so a mid-term evaluation has just been conducted. During the closing plenary session Mr. Alessandro Annoni (EC/JRC) concluded that one of the next steps is to include Marine (Spatial) Data Infrastructure explicitly in the scope of INSPIRE. During the summer a Marine Pilot has been initiated to extend the German example presented by Mr. Johannes Melles (BSH) across the borders with Denmark and the Netherlands.

There was a parallel track dedicated to "Water and INSPIRE: A Sea View" chaired by Mr. Andrej Abramic (EC/JRC), including a contribution on behalf of the MSDIWG on the relation between land and marine information. Other contributions contained:
- relations between hydrographic data and (European) legislation and reporting, including Marine Strategy Framework Directive and Marine Spatial Planning
- requirements from the European Maritime Safety Agency
- different perspectives on the re-use of hydrographic data
- a Danish example on MSDI

To get some interaction with the INSPIRE community a MSDI workshop was organized at the INSPIRE conference, resulting in about 30 attendees. Summary of this workshop was published in Hydro International.

The EU directive on MSP
The European Parliament and the Council have released a new directive about establishing a framework for maritime spatial planning. The directive is expected to have influence on MSDI for the European MS and MS outside Europe. In the directive there is a particular focus on data and the exchange of data:

Article 6 - Minimum requirements for maritime spatial planning. Member States shall establish procedural steps to contribute to the objectives listed in Article 5, taking into account relevant activities and uses in marine waters:
(e) Organise the use of the best available data in accordance with Article 10.
(f) Ensure trans-boundary cooperation between Member States in accordance with Article 12.
(g) Promote cooperation with third countries in accordance with Article 13.

Article 8 - Set-up of maritime spatial plans
1. When establishing and implementing maritime spatial planning, Member States shall set up maritime spatial plans which identify the spatial and temporal distribution of relevant existing and future activities, uses in the marine waters in order to contribute to the objectives set out in Article 5.
2. In doing so and in accordance with Article 2(3), Member States shall take into consideration relevant interactions of activities and uses. Without prejudice to Member States' competences, possible activities and uses and interests may include:

- *aquaculture areas;*
- *fishing areas;*
- *installations and infrastructures for the exploration, exploitation and extraction of oil, gas, mineral and aggregates, and other energy resources and the production of renewable energy;*
- *maritime transport routes and traffic flows;*
- *military training areas;*
- *nature and species conservation sites and protected areas;*
- *raw material extraction areas;*
- *scientific research;*
- *submarine cable and pipeline routes;*
- *tourism;*
- *underwater cultural heritage.*

As a consequence the countries around the Baltic Sea are expected to establish a Baltic Sea Region MSP Data Expert Group as a sub-group of the HELCOM/VASAB MSP Working Group. The main task of this group will be to identify data needs and products, and to develop Terms of Reference for a Regional Spatial Data Infrastructure in order to support the process of MSP. The BSMSDI WG intends to participate in the work of the MSP Data Expert Group.

Involvement in RHC
RHCs are critical to ensuring that its MS are made aware of the strengths and weaknesses that exists in many MS; the opportunities that exist for MS having a wider and enduring role in the future maritime information world but also the threats that exist if cultural and organizational change cannot be effectively delivered and quickly.

Fundamental to enabling the development of an effective MSDI is the definition and implementation of appropriate governance. This requires a clear definition of all stakeholder interests and anticipated outcomes. Successful implementation will require commitment by MS to grasp a better understanding of the four key components of MSDI, and how these interact to deliver more efficient operational HO/HS, better placed to meet the needs of a wider data user community. To do this, HO/HS will need to invest time and money in the processes of organisational and personal "change". Clear success criteria and progress milestones will need to be defined before embarking on programmes of work.

Education
The IHO is committed, through its Capacity Building Programme for 2013-2017, to support MS improve their corporate governance in respect of data management, database design and MSDI through a variety of training courses and briefing sessions, ranging from half-day workshops and briefings to more comprehensive 5-day residential courses aimed at all levels of staff including practitioners, managers and directors. Training and Education has never been more important and timely as pressures grow on HO/HS to engage in initiatives aimed at greater sharing and exchange of data, information and ideas in order to meet governmental as well as market requirements. This may well require a MS

to fundamentally change the way it operates both as an organisation and how its people adapt to new ways of working. There is no doubt that the biggest obstacle in successfully adapting to change rests in the mindset of its individual people and the organisation as a whole and their willingness to do so.

The MSDIWG has forwarded an application to CBSC-13 in order to deliver a MSDI training course.

Towards Data Centricity
The output of most HO/HS is focused on products rather than data. Most HO/HS focus on supplying products to a narrow group of users, driven by the need for compliance with SOLAS or support to national navies. Although a large amount of data is collected, only a small amount is passed on to the recipient of the product. Thus, the extent of knowledge transfer is only a small part of the potential of the original data. However, most hydrographic data sets have the potential of delivering a wider range of information to a wider range of users.

MSDI requires data to be held in a generic way, rather than as a particular product for a specific user group or purpose. The development of the Universal Hydrographic Data Model (S-100) is a strong enabler of enhanced data sharing across multi-disciplinary groups. S-100 is well understood to contribute to e-navigation, but its development is still relatively immature with very little data existing yet. The potential for HO/HS to contribute to MSDI and e-navigation is becoming more realistic, but requires serious consideration in terms of how data is managed.

HO/HS need to consider their ability to provide data rather than products. At present most HO/HS work in a relatively restricted domain, mostly due to their government status, tightly defined responsibilities and funding arrangements. This limits their opportunities to reach their full potential as data custodians rather than product producers. Authorities who define the role of HO/HS need to be challenged to encourage support for increasing the potential of hydrographic data beyond existing use.

Conclusions and Recommended Actions

The IHO is seeking to develop its Vision of being the authoritative worldwide hydrographic body which actively engages all coastal and interested States to advance maritime safety and efficiency and which supports the protection and sustainable use of the marine environment.
To support the role of the IHO in ensuring that the Hydrographic community is fit and able to meet the global remit of extracting greater wealth and knowledge from the world's oceans, the MSDIWG is supporting the IHO to adopt a more proactive stance in the way data is collected, managed, and disseminated by HO/HS thereby providing a leading role in developing the "blue economy".

The work in the MSDIWG is well underway and a new Work Programme and a supporting Action Plan has been established. The new Work Programme will establish the framework for the WG, in order to cope with the challenges in a forward-looking perspective.

The move of the MSDIWG from HSSC to IRCC is in accordance with the discussions at HSSC6 and IRCC6. The move of the MSDIWG from HSSC to IRCC is not expected to have major impact on the work in the MSDIWG in a short term. In a longer term, the MSDIWG will probably have more focus on governance, strategic and political items and as a consequence the more technical issues will be addressed by the appropriate WG under HSSC.

The MSDIWG recommends that IRCC should consider setting up MSDI subgroups and to appoint a MSDI contact person in every RHC in order to facilitate MSDI implementation on a national and regional level and to report to IRCC about the status and challenges with MSDI implementation on a RHC and national level.

IRRC-7 is requested to endorse the adjusted RoP and the new work plan.

IRRC-7 is requested to endorse the establishment of the MSDI training syllabus as an Annex to the publication C-17.

Action Required of IRCC

The IRCC is invited to:
     a) note the MSDIWG report;
     b) approve the proposed ToR;
     c) appoint the MSDIWG to continue its work under the new set of ToR;
     d) approve the MSDIWG Work Programme;
     e) endorse the MSDIWG establishment of the MSDI training syllabus;
     f) request HSSC to consider the technical MSDI inputs.
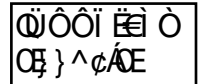
Marine Spatial Data Infrastructures Working Group (MSDIWG)

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(12 March 2015)

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MARINE SPATIAL DATA INFRASTRUCTURES WORKING GROUP (MSDIWG)

Draft Terms of Reference
(Submitted to IRCC7 for approval)

Ref: 1) 1st HSSC Meeting (Singapore, October 2009)
2) 5th HSSC Meeting (Shanghai, China, November 2013)
3) 6th HSSC Meeting (Valparaiso, Chile, November 2014)
4) 7th IRCC Meeting (Mexico City, Mexico, June 2015)

1. Objective

Support the activities of the IHO related to Spatial Data Infrastructures (SDI) and/or Marine Spatial Data Infrastructures (MSDI).

2. Authority

This Working Group (WG) is a subsidiary of the Inter-Regional Coordination Committee (IRCC). Its work is subject to IRCC approval.

3. Procedures

The WG should:

3.1. Monitor national, regional and international SDI activities and trends, and present information on those activities to IRCC members by correspondence and at the annual meeting.

3.2. Promote the use of IHO standards and member state marine data in SDI activities.

3.3. Liaise, as appropriate, with other relevant bodies to increase the visibility of marine spatial data.

3.4. Identify actions, procedures and resolutions that the IHO might take to contribute to the development of SDI and / or MSDI in support of Member States.

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

3.6. Identify and recommend possible solutions to any significant technical issues related to interoperability between maritime and land based inputs to SDI, and in particular:

   a) Datum issues.
   b) S-100 interoperability with SDI.
   c) S-100 interoperability with oceanographic, marine biological, geological and geophysical data structures.

3.7. Identify any IHO capacity building requirements related to MSDI.

3.8. Develop a syllabus for MSDI familiarization.

3.9. The WG should work by correspondence, and use group meetings, workshops or symposia only if required. When meetings are scheduled, and in order to allow any WG submissions and reports to be submitted to IRCC on time, WG meetings should not normally occur later than nine weeks before a meeting of the IRCC.

3.10. Submit a report annually to IRCC.

4. Composition and Chairmanship

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

4.2. 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.

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

4.4. 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. If the Chair is unable to carry out the duties of the office, the Vice-Chair shall assume the Chair with the same powers and duties.

4.5. Decisions should generally be made by consensus. If votes are required on issues or to endorse proposals presented to the WG, only Member States may cast a vote. Votes shall be on the basis of one vote per Member States 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 Member States on the current membership list.

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

4.7. Expert Contributors shall seek approval of membership from the Chair. Expert Contributor membership may be withdrawn in the event that a majority of the Member States represented in the WG agrees that an Expert Contributor's continued participation is irrelevant or unconstructive to the work of the WG.

4.8. All members shall inform the Chair in advance of their intention to attend any meetings of the WG. In the event that a large number of Expert Contributor members seek to attend a meeting, the Chair may restrict attendance by inviting Expert Contributors to act through one or more collective representatives.
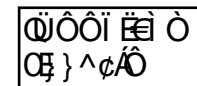
IHO Marine Spatial Data Infrastructures Working Group (MSDIWG) Work Programme

MSDIWG WORK PROGRAMME 2015–2020 Approved
by MSDIWG6

MSDIWG Tasks

A	Identify and promote national and regional best practices
B	Assess the existing and new standards in the provision of marine components of spatial data infrastructures
C	MSDI training and education
D	Facilitate (external) MSDI communication
E	Maintain and extend the publication IHO MSDI C-17 (IHO Task 2.9.2 refers)
F	Conduct annual meetings of MSDIWG, arranged back to back with 1-day MSDI Open Forum (IHO Task 2.9.1 refers)
G	Ensure that MSDI is a standing agenda item for RHCs' meetings (IHO Res 2/1997, as amended, refers)

No	Work item	Priority H-high M-med L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Responsible / contact person(s)	Related Pubs / Standard	Remarks
A.1	Set up a survey to establish current position in respect of benefits and challenges faced by MS's role in NSDI and/ or MSDI	H	Prepare questionnaire Review status of MS Analyse/report results MS report to each MSDIWG annual meeting listing successes and challenges and ways of overcoming them	Feb 2015	Jun 2016	P	Canada MS		

No	Work item	Priority H-high M-med L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Responsible / contact person(s)	Related Pubs / Standard	Remarks
A.2	Monitor and report on national, regional and international MSDI activities and report to enable increased visibility of hydrographic importance	M	Engage with relevant initiatives Report level of MS involvement	Apr 2014	Jan 2019	O			Report to MSDIWG-6.
A.3	MS to identify relevant use cases for MSDI and report to MSDIWG	H	Create the foundation for MSDI business cases/case studies Create relevant use cases, from potential users of MSDI	Feb 2016	Jun 2018	P	GSDI		
B.1	Identify HO datasets and use cases for the use in MSDI	H	Create/develop and maintain relevant MSDI matrixes INSPIRE	Feb 2015	Jan 2018	O	Ocean		
B.2	Review standards and specifications relevant for MSDI	M	Determine and log any issues of concern in WG regarding existing and new standards (S-57, S100, INSPIRE, UN-GGIM, ISO and OGC) Seek clarification on any concerns in S-1XX development as seen from a MSDI perspective				Netherlands		
B. 3	Provide annual technical reports to HSSC through IRCC if needed	H					Chair		
C.1	Establish and maintain a MSDI training syllabus for use across IHO community	H	Establish syllabuses for 3 MSDI courses and a MSDI orientation For Senior Managers (i.e. Directors, Hydrographers, HR Managers) Practitioners (i.e. Hydrographic Surveyors, Cartographers, Oceanographers, IT specialists)	Jan 2014	Jan 2018	O	Chair & Secretary.		

No	Work item	Priority H-high M-med L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Responsible / contact person(s)	Related Pubs / Standard	Remarks
C.2	E-learning	H	Request CBSC through IRCC to facilitate e-learning for MSDI	Feb 2016	Jan 2018	P	Chair/sec		
C.3	Outreach to academia and other bodies to promote and contribute to MSDI in the hydrographic community	M	Investigate the possibilities for establish a MSDI work shop wider audience	Feb 2016	Feb 2019	P	Chair/sec		
D.1	Update the IHO MSDI webpage	M	Maintain MSDI reference documentation on the IHO website Identify and make available MS Web sites/papers that address technical issues such as datum, WMS, WFS for charting data. Poll MSDIWG members for input work, with IHB to post on IHO Web site. Investigate the possibility for an additional new web address for the MSDI webpage	Oct 2013	2018		IHB		
D.2	MSDI communication and dissemination		Support the establishment of a Linked in MSDI group Creation of a MSDI "white" paper				CARIS		
D.3									

No	Work item	Priority H-high M-med L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Responsible / contact person(s)	Related Pubs / Standard	Remarks
E.1	Update the publication IHO MSDI C-17	**H**	Update information Provide case studies Best practice guidelines defined	Feb 2015	Oct 2019	P		C 17 C-17/CBSC MSDI Syllabus, INSPIRE, OGC, ISO, IHO, RHC reports, MSDIWG MS inputs	
E.2	Presentation of C-17	H	Investigate new options with IHB of presenting C-17 as a web publication						
F.1	Conduct 2016 meeting of MSDIWG, arranged back to back with 1-day MSDI Open Forum	H	3-day workshop to be run Q1 of each year; 2016 Japan	Feb 2015	Feb 2016	o	MSDIWG Management Group (Chair/Vice Chair, Sec, IHB rep); representative		
F.2	Conduct 2017 -20 meetings of MSDIWG, arranged back to back with 1-day MSDI Open Forum	M	Date and venue defined Logistics in place Conference programme defined Develop Workshop programmes	Sep 2013	Jan 2018	P	MSDIWG Management Group (Chair/Vice Chair, Sec, IHB rep)		

No	Work item	Priority H-high M-med L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Responsible / contact person(s)	Related Pubs / Standard	Remarks
G.1	Ensure that MSDI is a standing agenda item for RHCs' meetings (IHO Res 2/1997 as amended)	H	MSDIWG paper to IRCC re-stating importance of RHC's placing MSDI as an agenda item at RHC meetings. MSDI inputs and actions from RHC's fed back to MSDIWG Ensure that MSDI is a standing agenda item for RHCs' meetings and RHCs' report back to MSDIWG: Investigate new options: Should the MSDIWG appoint MSDI ambassadors in RHC? Should the MSDIWG provide standard MSDI presentations to RHC? Should the MSDIWG establish best practise MSDI cases for RHC?	July 2015	June 2016	O	MSDIWG Chair/Vice Chair	HSSC, IRCC, CBSC	

MSDIWG Meetings (Task F)

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**Guidance for Hydrographic Offices
IHO Publication C-17**

Annex 1

**Syllabus for Educational and Training Programmes for
Marine Spatial Data Infrastructures**

Version 0.3 – April 2015

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Preface

The concept of Marine Spatial Data Infrastructures (MSDI) is gaining wider appreciation. MSDI is the combination of a variety of data types, for efficient analysis by a wide range of disciplines, such as maritime spatial planning, environmental management and emergency response. This requires the data to be held in a generic way, rather than for a particular product for a limited user group or for a specific purpose.

MSDI require data, technology, standards, and policies to work together for the common good. There is a tendency to focus on ICT and data, without sufficient focus on standards and people issues. It is also a common mistake to think that existing products fulfill data requirements. But for effective exploitation of the true value of the data, it cannot be restricted by the intentions of the product compiler or editor. MSDI are not collections of hydrographic products, but infrastructures that promote interoperability.

Many countries have already established National Spatial Data Infrastructures, or have initiatives to do so. The marine element is often less well developed and there is a tendency to start building SDI on spatial products rather than spatial data. This is a good start, but there is considerable scope for improvement.

The development of the IHO Universal Hydrographic Data Model (S-100) is a strong enabler of enhanced data sharing across multi-disciplinary groups. A declared intention of S-100 is that it will make the use of hydrographic data easier. It will extend the use of hydrographic data beyond the focus on navigation, going beyond ENCs to include imagery, dynamic data, and high-density bathymetry. Being based on ISO19100, S-100 has international and multidisciplinary recognition, such as with the Open Geospatial Consortium (OGC).

Given the scope of MSDI, e-navigation and e-maritime and no doubt other initiatives, Hydrographic Offices (HO) need to consider the extent of their domain and influence, and how this might need to change to address future expectation. At present most HOs work in a relatively restricted domain, mostly due to their government status, tightly defined responsibilities and funding arrangements. This limits their opportunities to reach their full potential as data custodians rather than product producers. Authorities who define the role of HOs need to be challenged to encourage them to support the wider potential of hydrographic data.

The potential for HOs to contribute to national and regional spatial data infrastructures is becoming more realistic. This requires serious consideration in terms of the consequences to how data is managed. It is therefore important to use a data centric approach, holding unique features such that they are stored once but used many times and to use S-100 internally and consider and promote wider use of data.

This syllabus should be seen as a tool to establish the fundamental knowledge about MSDI.

Comments arising from the experience gained should be addressed to the Chairman of the Marine Spatial Data Infrastructure working group.

This document is published periodically. Please check with IHO for the latest edition, including current amendments.

Definitions

TBA

The aim of the syllabus

The syllabus is about making sure decision makers and employers have the skills, knowledge and understanding to approach the different elements of MSDI.

It is not intended to set out exactly what the instructor should do.

The MSDI syllabus is a tool for communicating what should be the minimum content of a MSDI course. It acts as a "road map" for the MSDI courses and puts the students on the same path as the instructor. By setting the tone and describing the course structure, the syllabus is critical in implementing effective learning.

Learning outcomes

The syllabus sets out the learning outcomes that as a minimum must be achieved. It is important that components and elements from national and regional perspectives are also considered and added to the MSDI training course, in order to achieve the right skills, knowledge and understanding that is needed from a national perspective

In making sure these learning outcomes are achieved, the instructor should be able to:

- identify areas where the students are failing to demonstrate competence
- help the students to understand the barriers that are stopping them from demonstrating competence

Syllabus outline

The syllabus is divided in four, one MSDI orientation and 3 more detailed MSDI courses:

1. Provides a general introduction to MSDI.

2. Is a Syllabus for Fundamentals of a Marine Spatial Data Infrastructure (MSDI)

3. Is a Syllabus for Database Design, Data Management and MSDI for Practitioners (i.e. Hydrographic Surveyors, Cartographers, Oceanographers, IT specialists)

4. Is a Syllabus for Marine Spatial Data Infrastructure (MSDI) for Senior Managers (i.e. Directors, Hydrographers, Human Resource Managers)

Target audiences are provided at the top of each course.

Recommendations

All MSDI training courses should have basic information such as:

- Course Description
- Course Date(s) and Times
- Instructor Contact Information (if applicable)
- Course Objectives / Goals
- Learning Objectives to meet the Course Objectives/Goals
- Course Completion Requirements
- Requirement(s) for Text and or Other Materials
- Any Technology Requirements (if applicable)
- Technical support (if applicable)

It is important that the instructor also has the right skills and knowledge about SDI and MSDI therefore the MSDIWG recommends that instructors from organisations, private companies and universities that participate in the MSDIWG primarily be chosen. Participating in the MSDIWG meetings is expected to give these organisations the knowledge and skills needed. An updated list is available in this document and on the IHO MSDIWG webpage.

Annex 1.1: Syllabus for MSDI orientation

Target Audience: Decision makers (e.g. National Hydrographers, Oceanographers, Investors, Planners, Asset Managers, Scientists)

Description: MSDI Awareness Briefing

Expected duration: 2 to 4 hour Briefing Session

Objectives: To provide a basic awareness and appreciation of the importance of MSDI in hydrographic and oceanographic management decision making

Required Material: None

Technical Requirements/ Support: None/Laptop computer, Audio-Visual projector,

Subject	Description	Content	Outcome
1.1	**Introduction**	• Welcome and introductions • Programme • Aims and objectives of the day	
1.2	**Spatial Data Infrastructure**	• What it is SDI • Policy and Governance (People) • Technical Standards (Standards) • Information Systems / Services (ICT) • Geographic Content (Data)	Have a basic understanding of spatial data infrastructures (SDI) and the important marine components (MSDI)
1.3	**Wider uses and applications of HO data**	• The future role of Hydrographic Offices • Supporting "The Blue Economy" • The role of HOs within a SDI (hydrography is much more than charting!) • The business case for MSDI?	Understand the strengths, weaknesses, opportunities and threats facing HO's and how HO's can contribute to the wider economy
1.4	**MSDI - Obstacles to progress?**	• People as individuals and as part of teams • Organisational culture • Organisational structures • Making change happen • Sustainable change	Understand why "change" is mission critical to achieving best practise and delivering MSDI and why without the support of people, success is far from guaranteed!

Annex 1.2: Syllabus for Fundamentals of a Marine Spatial Data Infrastructure (MSDI)

Target Audience: All Practitioners and Middle Managers (i.e. Hydrographic Surveyors, Cartographers, Oceanographers, IT specialists)

Description: A "Fundamentals of Data Management Best Practice and MSDI" Briefing Session

Expected duration: 1 Day Briefing Session

Objectives: Provide a basic understanding of MSDI and its importance to Hydrography and Oceanography

Required Material: A prior knowledge of the content of IHO Publication C-17

Technical Requirements/ Support: Computer hardware, Audio-Visual projector, web access
(optional)

Subject	Description	Content	Outcome
2.1	**Introduction**	• Welcome and introductions • Programme • Aims and objectives of the day	
2.2	**Spatial Data Infrastructure**	• What it is SDI • Policy and Governance (People) • Technical Standards (Standards) • Information Systems / Services (ICT) • Geographic Content (Data)	Have a basic understanding of spatial data infrastructures (SDI) and the important marine components (MSDI)
2.3	**Wider uses and applications of HO data**	• The future role of Hydrographic Offices • Supporting "The Blue Economy" • The role of HO's within a SDI (hydrography is much more than charting!)	Understand the strengths, weaknesses, opportunities and threats facing HO's and how HO's can contribute to the wider economy
2.4	**Data Sharing and Efficiencies**	• Achieving best practise • Data sharing • Delivering operational efficiencies	Have the knowledge and understanding of how other organisations are tackling SDI development at the national or regional level
2.5	**Data Management**	• Data policies and principles • Data management systems and	Gain an understanding of the fundamentals of effective data

		and Data Base Development	design • Metadata • Sources of data • Structure, attribution and relationships • Versioning and data outputs	management, database design structure and implementation and why metadata is as important as data itself!
2.6		**Technical Standards**	The importance and role of data standards including the IHO S-100: The Geospatial Standard for Hydrographic Data and extending S-100 for other products and services	Gain a basic knowledge of standards employed in the geospatial world; the implications of S-100 for the HO community and the opportunities to extend the S-1XX specifications in a common manner
2.7		**Introduction to Data Publishing in the Electronic Age**	The work of the Open Geospatial Consortium (OGC); Data Sharing and Network Services (Discover, View and Download)	Have an understanding of what publishing means using a variety of media and how web services are developing to assist the user to access metadata and data for onward use (including experience in Europe with INSPIRE)
2.8		**MSDI - Obstacles to progress?**	• People as individuals and as part of teams • Organisational culture • Organisational structures • Making change happen • Sustainable change • The business case for change?	Understand why "change" is mission critical to achieving best practise and delivering MSDI and why without the support of people, success is far from guaranteed!
2.9		**Factors that hinder development of MSDI**	Factors that hinder development, how these can be overcome by understanding, careful design, sympathetic communication with stakeholders and an understanding and appreciation of the value and benefit that change brings over time	Have the confidence and knowledge to manage and / or contribute to the change process and identify the benefits and opportunities of MSDI and the role HO's should play in NSDI
2.10		**Evaluation**	• Review Key Points and Messages • Has the briefing met your expectations? • How can you deliver MSDI and best practise? • What will success look like? • What are the next steps?	Reinforce key messages learnt so that attendees have a knowledge and understanding and of the fundamentals of MSDI and how people, organisations and processes influence outcomes

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Annex 1.3: Syllabus for Database Design, Data Management and MSDI for Practitioners

Target Audience: Practitioners (i.e. Hydrographic Surveyors, Cartographers, Oceanographers, IT specialists)

Description: A basic theoretical and practical course on Data Management, Database Design, Data Publishing and MSDI

Expected duration: 5 Day Session

Objectives: To provide a fundamental operational appreciation and understanding of MSDI and how it enables hydrographic and oceanographic operational efficiencies

Required Material: Prior awareness and understanding of subject areas to be covered and awareness of practical applications and GIS

Technical Requirements/ Support: Computer software and hardware, database access, Audio-Visual projector, web access

Day 1			
Subject	**Description**	**Content**	**Outcome**
3.1.1	**Introduction**	• Welcome and introductions • Programme • Aims and objectives of the course • Opening remarks by course sponsor	Presentations and round table introductions by students and instructors to get to know each other and understand course requirements
PART 1: THEORETICAL SESSION FRAMEWORK			
3.1.2	**Spatial Data Infrastructure**	The basic concepts of SDI: • What it is and what it is not! • Policy and Governance (People) • Technical Standards (Standards) • Information Systems / Services (ICT) • Geographic Content (Data)	Students gain an understanding of spatial data infrastructures (SDI) including the importance and role of data management and databases
3.1.3	**General presentation of SDI**	Introducing the conceptual design of SDI, the challenges and obstacles faced to achieve its implementation, and the role of the HO community in its development	Students will gain knowledge of how other countries are tackling SDI development and will confirm their understanding of the topic
3.1.4	**Perspectives on SDI**	The benefits and opportunities of SDI and the factors that hinder	Each student gains a good understanding of SDI and the role

		development, and how these can be overcome by careful design and sympathetic communication with stakeholders	the HO can play in NSDI
3.1.5	**Effective Data Management**	A theoretical and practical introduction to data management • Data policies and principles • Data management systems • Database design • Conceptual and logical design • Physical implementation	A theoretical and practical appreciation of data management, modelling, database design and implementation.
3.1.6	**Database Development**	The design of a simple data management solution including: • Sources of data • Structure and attribution • Relationships between features • Versioning and data outputs	Each student/group to deliver a simple design structure for a database comprising Hydrographic and /or Oceanographic content.
3.1.7	**Introduction to Metadata**	The value and benefit of good metadata. • Data audit and inventory • Purpose • Metadata standards • Creation and management • Publication and use in data discovery	Students gain a good understanding of metadata, its use and its importance
3.1.8	**Metadata Creation**	To create international standard compliant metadata for a bathymetry dataset. Demonstration of metadata	Students complete a simple exercise to create metadata for bathymetry
3.1.9	**Review**	Key messages and learning points from day	Students understand the main aspects of the day's lessons

Day 2			
Subject	**Description**	**Content**	**Outcome**
3.2.1	**Technical Standards**	The importance and role of data standards. • Categories • Description • Importance • Selection	Students gain a basic understanding of data standards
3.2.2	**IHO S-100:**	The Geospatial Standard for Hydrographic Data. The implications of S-100 for the HO community	Understanding the value and benefit of a holistic standard for hydrographic geospatial information

3.2.3	Data Specifications	The importance and role of data specifications. • What is a data specification? • The importance of data specifications • Description of data specifications in MSDI • The extensions to S-100 (e.g. S-101 for Electronic Navigational Charts)	Students gain a basic understanding of data specifications
3.2.4	Data Modelling and Specifications development	The creation of a data model and specification for a non-navigational application of hydrographic data based on S-100. Topic area to be decided by students	Students work in groups to define different components of a new S-10X specification which includes source data management and data modelling using appropriate data themes as an example identifying the issues and challenges to be resolved
3.2.5	Review of Data Specifications	Introduction to data specifications	The student to gain knowledge, understanding and importance of Data Specifications
3.2.6	Data Publishing	Presentations on product specifications and the work of the Open Geospatial Consortium (OGC) Presentation on Data Exchange and Sharing; Network Services (View and Download) - including experience in Europe	Students understand what is meant by publishing. The student to gain an overview of the effectiveness and efficiencies gained by a joined-up approach through SDI
3.2.7	Review	Key messages and learning points from day	Students understand the main aspects of the day's lessons

Day 3			
Subject	**Description**	**Content**	**Outcome**
3.3.1	What are the obstacles to progress?	"change" issues	Students present their findings.
3.3.2	Cultural and Organisational change	How to manage the process of change	Understanding of why "people" issues are so important in the development of MSDI? Ways to engage in the process of Change
3.3.3	Ownership of the process	How to reinforce the message and how to take ownership of the process of change	Students have the confidence and knowledge to contribute to the Change process

3.3.4	Sustainable Change in the Hydrographic Community	How to identify the key things to ensure change is sustainable	Students appreciate the value and benefit of change over time
3.3.5	Review of PART 1 of the course	What has been communicated so far, questions and answers	Students have a good level of understanding of the theoretical elements of the course
PART 2: PRACTICAL SESSION FRAMEWORK			
3.3.6	Technology supporting SDI:	• Relational Database Management Systems (RDBMS) • Interoperability to form data themes in Marine Spatial Data Infrastructures	Students gain a basic overview of Data Management and Database Design

3.3.7	Data Model and workflow	• Client/Server architecture
		• Data Model for elevation data (bathymetry and terrestrial):
		  - Grids and Point Clouds
		  - PostgreSQL and Oracle
		• Data model for marine cartographic data:
		  - Feature and Spatial Objects
		  - Oracle RDBMS
		• User access control
			Students to gain a basic understanding and hands-on of different data models used for high-resolution data and cartographic vector data through demonstrations and practical exercises

3.3.8	Working with Elevation Data	• Database organization for elevation data (bathymetry and terrestrial): - Elevation objects • Importing data into existing models • Managing survey products • Metadata • Interoperability	Students to have hands-on experience managing elevation data and starting the process leading to a final product Students to have concepts of metadata (both standards compliant and organisation specific) reinforced through exercises configuring marine spatial databases
3.3.9	Review	Key messages and learning points from day	Students understand the main aspects of the day's lessons

Day 4			
Subject	**Description**	**Content**	**Outcome**
3.4.1	Working with Elevation Data	Continuation of session 3.3.8	
3.4.2	Data Organisation and Design	• Usages: - Thematic and non-thematic	Students to have concepts of database design (e.g. scale

		- Scaled and un-scaled • Metadata - Project • Source and products • Data portrayal • Importing data into existing models	independent data) and the importance of metadata (both standards compliant and organisation specific) reinforced through exercises configuring marine spatial databases

3.4.3	**Project Management and editing**	• Traceability
		     - Certification
		     - History
		 • Metadata
		 • Data integrity
			Students to have concepts reinforced on the importance of metadata (both standards compliant and organisation specific)

3.4.4	**Product Creation**	• Standards and Product Specifications • Data and metadata exchange	Students will complete the exercises leading to creating a final product and gain the experience leading to data publication and information exchange
3.4.5	**Sharing and Interoperability**	• Discovery • Open Geospatial Consortium (OGC) Services and Web Mapping	Students to have additional hands-on experience in the practical application of data standards, data publishing and information exchange in MSDI
3.4.6	**Review**	Key messages and learning points from day	Students understand the main aspects of the day's lessons

Day 5			
Subject	**Description**	**Content**	**Outcome**
3.5.1	**Sharing and Interoperability**	Continuation of session 3.4.5	
3.5.2	**Review of main content of the Training Course**	Written assessment exercise to ascertain level of knowledge and understanding	Students to individually complete a questionnaire
3.5.3	**Course Wash-Up**	• Review assessment results • Review of Aims and Objectives • Review Key Points and Messages • Group Discussion – has the course met your expectations? • Feedback Forms completed by students	Students to have a basis theoretical and practical understanding and knowledge of the fundamentals of SDI; database design, data management and data publishing
3.5.4	**Closing Session**	• Certificates distributed to successful students • Closing remarks by course sponsor	

Annex 1.4: Syllabus for Marine Spatial Data Infrastructure (MSDI) for Managers

Target Audience:	Senior Managers (i.e. Directors, Hydrographers, Oceanographers, Human Resource Managers)
Description:	Data Management and MSDI "Best Practice" Awareness Course
Expected duration:	2 day Session
Objectives:	To provide a basic level of understanding of the value and benefits to be derived from data management and MSDI
Required Material:	Prior knowledge of IHO Publication C-17 and its content
Technical Requirements/ Support:	Computer hardware, Audio-Visual projector, web access (optional)

DAY 1			
Subject	**Description**	**Content**	**Outcome**
4.1.1	**Introduction**	• Welcome and introductions • Programme • Aims and objectives of the course	
4.1.2	**Spatial Data Infrastructure**	• What it is SDI • Policy and Governance (People) • Technical Standards (Standards) • Information Systems / Services (ICT) • Geographic Content (Data)	Attendees will gain an understanding of spatial data infrastructures (SDI) including the importance and role of data management and databases
4.1.3	**General presentation of SDI**	Introducing attendees to the conceptual design of SDI, the challenges and obstacles faced to achieve its implementation, and the MS within a SDI	Attendees will gain knowledge and understanding of how other organisations are tackling SDI development at the national or regional level
4.1.4	**Perspectives on SDI**	Discussing the factors that hinder development, and how these can be overcome by careful design and sympathetic communication with stakeholders	Attendees are able to identify the benefits and opportunities of SDI and the role HO can play in NSDI
4.1.5	**Data Management**	A theoretical understanding and appreciation of "best practise" • Data policies and principles	Attendees gain an understanding of the fundamentals of effective data management, database

		• Data management systems • Database design • Conceptual and logical design • Physical implementation • Metadata	design and implementation
4.1.5	**Database Development**	To design a simple data management solution including: • Sources of data • Structure and attribution • Relationships between features • Versioning and data outputs	Attendees are able to understand a simple design structure for a database comprising hydrographic and /or oceanographic content
1.6	**Introduction to Metadata**	The value and benefit of good metadata • Data audit and inventory • Metadata standards • Creation and management • Publication and use in data discovery	An understanding of why metadata is as important as data itself
4.1.7	**Review**	Key messages and learning points from day	To understand the main aspects of the day's lessons

DAY 2			
Subject	**Description**	**Content**	**Outcome**
4.2.1	**Technical Standards explained**	The importance and role of data standards • Categories • Description • Importance • Selection	A basic knowledge of international standards employed in the geospatial world
4.2.2	**The Geospatial Standard for Hydrographic Data**	The implications of S-100 for the HO community	Understanding of why S-100 is important to the MS and how it can facilitate product and service developments in future
4.2.3	**Data Specifications explained**	The importance and role of data specifications • What is a data specification? • The Importance of data specifications • Description of data specifications in MSDI	An understanding of what data specifications are and how they underpin MSDI
4.2.4	**S-1XX based product/service specifications**	The extensions to S-100 (e.g. S-101 for Electronic Navigational Charts)	Knowledge of the opportunities that exist to extend the S-1XX

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			family of products and services in a common
4.2.5	**Introduction to Data Publishing**	Product specifications and the work of the Open Geospatial Consortium (OGC)	Gaining an understanding of what is meant by publishing using a variety of media to do so
4.2.6	**Data Publishing in the Electronic Age**	Data Exchange and Sharing; Network Services (Discover, View and Download	Understand in what way web services are developing to assist the user to access metadata and data for onward use including experience in Europe with INSPIRE.
4.2.7	**MSDI - Obstacles to progress?**	Cultural and Organisational "change" issues • People as individuals and as part of teams • Organisational culture • Organisational structures	Understanding why "change" is mission critical to achieving best practise and delivering MSDI and why without the support of people, success is far from guaranteed!
4.2.8	**Achieving Sustainable Change in the Hydrographic Office**	Identifying the key things to ensure change is sustainable • Ownership of the process of change • Making Change sustainable • Making the business case for MSDI	Gaining the confidence and knowledge to contribute to the Change process and understanding and appreciating the value and benefit of change over time
4.2.9	**Course Wash-Up**	Group Discussion – has the course met your expectations? • Review of Aims and Objectives • Review Key Points and Messages • Feedback Forms completed	Attendees have a basis understanding and knowledge of the fundamentals of SDI; database design, data management and data publishing and how people and organisations influence outcomes

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