

**11th MEETING OF THE IHO INTER-REGIONAL COORDINATING COMMITTEE
IHO-IRCC11
Genoa, Italy, 3-5 June 2019**

Report of the MSDI Working Group

Submitted by:	Chair, MSDI Working Group
Related Documents:	C-17. Spatial Data Infrastructures: “The Marine Dimension” - Guidance for Hydrographic Offices, Edition 2.0.0, January 2017
Related Projects:	MSDI Concept Development Study (MSDI-CDS) http://www.opengeospatial.org/projects/initiatives/msdi-cds-2018
Chair:	Jens Peter Weiss Hartmann, Denmark
Vice-Chair:	Sebastian Cariso, USA
Secretary:	John Pepper, OceanWise (until March 2019) Assistant Director Alberto Costa Neves, IHO Secretariat (from March 2019)
Member States:	Argentina, Australia, Brazil, Canada, Cuba, Denmark, Estonia, Finland, France, Germany, Indonesia, Italy, Japan, Malaysia, Nigeria, Netherlands, New Zealand, Norway, Philippines, Portugal, Republic of Korea, Romania, Slovenia, Spain, Singapore, Thailand, Ukraine, UK, USA
Expert Contributors:	OGC; ICPC/EGS Group; Teledyne Caris; Esri; GSDI Association; OceanWise; YottaOcean Inc.; Geosciences Australia; IIC Technologies Inc.
<i>see Annex A for full details</i>	

1. Meetings Held During Reporting Period

Dates and venues of meetings held during the reporting period.

The MSDIWG10 meeting of IHO Marine Spatial Data Infrastructures Working Group (MSDIWG) took place in Busan, Republic of Korea, 4 - 5 March 2019. The meeting was followed by the OGC Marine DWG Meeting, 6 March 2019 and the UN-GGIM Working Group on Marine Geospatial Information (WGMGI1) Meeting, 7 - 9 March 2019.

Members of the MSDIWG has represented the MSDIWG in other IHO WG meetings e.g. HSSC11, SPRWG1, CSBWG7, CBSC11 and in several Regional Hydrographic Commission meetings.

Dates and venue for next meeting.

The IHO/MSDIWG will arrange a MSDI Open Forum meeting, the MSDIWG11 meeting with an integrated OGC Marine Domain WG part in 2020 in Rostock, Germany 24-27 February.

Logistics and meeting details will be available at:

www.iho.int/msdiwg

2. Work Program

Work Plan 2018–2021. The Work Programme was discussed and evaluated at the MSDIWG10 based on recent achieved results with a focus on MSDI from an international, regional and national perspective. In order to deliver this Work Programme, eight MSDI Tasks have been established. The work programme can be found on the above link and in Annex B of this report.

The IHO/MSDIWG will continue to facilitate a MSDI Open Forum which would allow non-MSDIWG stakeholders (e.g., Regional Hydrographic Commission (RHC) Members, government, academia, industry, funding agencies and NGOs) to attend to identify what the MSDIWG and the commercial partners can offer. Attendees at the Open Forum would then be encouraged to stay on for the MSDIWG11 meeting. This approach is being developed in consultation with the hosts.

The Open Forum meeting will be followed by a three-day-long MSDIWG11 meeting at the same venue and the meeting will include WG Work Plan task group break-out sessions. The MSDIWG will investigate the possibility to arrange the meeting as a back-to-back meeting with the UN-GGIM WGMGI2 meeting.

The key interest for the IHO is enabling Member States to ensure MSDI provides a framework for the provision of hydrographic information beyond the traditional field of surface navigation. The MSDIWG is working with the UN-GGIM Shared Guiding Principles for Geospatial Information Management as a framework and the principles are incorporated in the existing work program for the MSDIWG. The Shared Guiding Principles for Geospatial Information Management are available at the MSDIWG web page at:

www.iho.int/msdiwg → Body of Knowledge

3. Progress on IRCC Action Items

MSDI Ambassadors.

IRCC9/18 (RHC Chairs to encourage Member States in the region to nominate RHC MSDI Ambassadors to promote MSDI and to help Member States to prepare the national reports with respect to the status of MSDI). A vital element of this work would be to collect and collate responses from Member State on MSDI prior to each RHC meeting. Several RHCs have now established regional MSDIWs, and at the IHO MSDIWG10 meeting reports from RHC MSDIWG were presented.

It is important that RHC consider taking MSDI as a RHC agenda item and that National Reports should incorporate the status of MSDI, plans for involvement in MSDI and challenges facing the HO. It is recommended that the National Reports include the topics from C-17, item 2.1 on what constitutes a MSDI:

- Policy and Governance
- People & Organizations
- Enablers (the framework for data acquisition, management, updating and dissemination)
 - Standards
 - Technology
 - Metadata
- IHO S-100 Universal Hydrographic Data Model
- Content
- Education and Learning

Education and Learning.

IRCC10/10 (MSDIWG to develop basic MSDI training material in order to allow RHCs to deliver trainings with their own personnel). At the latest IRCC meeting, MSDI was highlighted as an important component of the future development of hydrographic offices. It was concluded that there is either no, or very little, basic teaching material available for MSDI training that is free of charge for IHO Member States. IRCC therefore decided to task the IHO MSDIWG to establish basic MSDI training material, in order for IHO Member States and the RHCs to conduct basic MSDI education/training. The Danish Geodata Agency (DGA) volunteered to finance the development of the training material. The MSDI training material should be available free of charge from the IHO webpage and from the DGA webpage.

The establishment of MSDI training material, including the teaching material, will be divided into two phases:

Phase 1. MSDI orientation. The course is aimed at students who are marine-focused, but have very little experience of MSDI concepts or practice.

This course is modelled on the IHO MSDIWG standard orientation syllabus and is aimed at decision makers possibly at a senior level, not necessarily from a hydrographic background, but certainly involved in marine geospatial data.

Phase 2. Fundamentals of a Marine Spatial Data Infrastructure. The course is aimed at students who are marine geospatial professionals but who have very little experience of MSDI. It is designed as an introductory, one-day course in the fundamentals of MSDI concepts, theory, and practice.

The course is based on material in the public domain, the many sources of information about MSDI available, and includes notes on the accompanying slides and exercises to be considered as appropriately. These exercises would also be useful in a group context for the delivery of workshops supporting the course.

There are two main uses of these documents in conjunction with the course slides themselves.

1. A participant who wants to download and self-learn from the materials provided.
2. A participant who wishes to deliver the materials in a group setting with stakeholders.

In phase 1, the actual MSDI and teaching material will be established, which could/should be based on the publication C-17 Spatial Data Infrastructures "The Marine Dimension", including Annex 1. Syllabus for Educational and Training Programs for Marine Spatial Data Infrastructures. There should be focus on the content specified in the two introductory teaching courses 1) MSDI orientation and 2) Fundamentals of Marine Spatial Data Infrastructure (MSDI). The result/deliverables in this phase will be the actual MSDI training material and the teaching material for use by e.g. internal "teachers" in the hydrographic offices.

In phase 2, a MSDI e-learning program will be developed that should allow people to access MSDI teaching externally and even receive the teaching on-line. The MSDI teaching materials will be available on the IHO's website for free and on the DGA's own website. Progress will be summarized during the reporting period.

Terms of Reference of MSDIWG.

At the IRCC10 meeting, a proposal to extend the task of the IHO MSDIWG to also include Marine Spatial Planning (MSP) was discussed, since MSP is seen as an important issue in many countries around the world. The IRCC10 meeting agreed that the IHO MSDIWG should follow the development in MSP implementation worldwide and focus on the following topics:

- establish a list of relevant MS National MSP Data Contact Points and contact persons
- establish a list of additional relevant institutions, contact person/data experts
- study the most relevant MSP issues in a cross-border / trans-boundary context in relation to data and information seen from a MS perspective
- compile minimum requirements for Hydrographic data for Maritime Spatial Plan Data and recommendations of distribution/sharing of this data
- provide an overview on (national / regional) MSP best practice
- establish MSP on the IHO website under body of knowledge.

Consequently, the MSDIWG Terms of Reference and Rules of Procedures has been adjusted to address these topics (Annex C). The MSDIWG Terms of Reference and Rules of Procedures has also been adjusted to be aligned with the other IRCC WGs.

4. Problems Encountered

The main challenges for the MSDI WG is to raise awareness of the importance of MSDI, and to provide training and education to support MSDI development at the Member State and RHC levels. These challenges are being addressed with the training material (in development), the planned upgrade of the C-17 and the establishment of MSDI Ambassadors at RHCs.

5. Any Other Items of Note

UN-GGIM WORKING GROUP ON MARINE GEOSPATIAL INFORMATION (WGMGI)

The first expert meeting of the Working Group was arranged as a back-to-back meeting with the IHO MSDI WG meeting. The meeting was attended by 42 expert representatives from Australia, Brazil, Denmark, Germany, Italy, Jamaica, Netherlands, Norway, Republic of Korea, Singapore, United Kingdom, United States of America, International Hydrographic Organization, Open Geospatial Consortium and UN-GGIM/Private Sector Network.

This meeting, among others, agreed that marine geospatial information must be made available, accessible and discoverable for a multiplicity of purposes within collaborative information systems nationally to deliver reliable, timely, and quality information necessary for citizens, organizations, and governments to build accountable actions and make informed/evidenced-based policies and decisions. For more information please visit the meeting web-page <http://ggim.un.org/meetings/2019/WG-MGI-Busan>. There is also a link to the meeting web-page from the Working Group's web-page at: <http://ggim.un.org/UNGGIM-wg8>.

Data integrity, marine boundaries from a MSDI perspective.

The MSDI WG has discussed data security from a MSDI perspective. The conclusion the MSDI WG came to when looking at these issues from the MSDI perspective was that one of the main priority is actually data "integrity", also dealt with comprehensively by IHO S-63. Data integrity establishes two pieces of knowledge for data users, (1) knowing who a piece of data came from and (2) the knowledge that the data has not changed in its journey to the end user.

This is important from a MSDI perspective because the core concept of MSDI is reuse of marine geospatial data outside its traditional use case of primary SOLAS navigation, and within a much broader sphere of activity. The nature of some of the datasets may well be sensitive, not because they are confidential, but because there is a high impact cost of them being wrong. If an MSDI provider wrongly attributes a dataset to a particular official body or incorrectly reproduces a dataset (either by visualizing it poorly or providing a copy of the incorrect data), the repercussions can be large.

By way of example, consider that one of the fundamental datasets recently under consideration are UNCLOS maritime limits and boundaries (other examples exist but this is a robust, simple example which is useful for the purposes of illustrating the problem). UNCLOS official limits and boundaries are a foundation dataset and often used to further denote other official limits and boundaries such as marine protected areas, fishing zones and many others, defining rights and responsibilities as part of a harmonized marine cadastral system. These datasets are simple, by comparison with the complex geospatial data which make up ENC, but because they represent the results of, often long standing, political agreements and treaties, their economic and political weight can be enormous and the impact of their incorrect reproduction within a MSDI environment is of concern.

The challenge technically is to provide the means and mechanisms, therefore, to protect the data integrity and assure the end user of the provenance of the data they are receiving.

Is there a ready-made solution?

- Ongoing the IHO and MSDI community needs to consider this issue
- Consider adapting existing mechanisms:
 - Stream based may not be suitable for "data centric" models
 - IHO S-63 (and S-101) relies on a specific end user system
 - Other standards exist but may need adaptation

- All data integrity systems require a “trust network” to define identity.

MSDI Concept Development Study (MSDI-CDS)

During the IHO MSDIWG8 meeting in Vancouver 2017, the idea was formed to create an OGC study that could establish the framework for future development of MSDI. The MSDI-CDS is being organized by the Open Geospatial Consortium (OGC) and supported by the National Geospatial-Intelligence Agency (NGA) on behalf of the International Hydrographic Organization (IHO) and its MSDIWG, a primary organization involved in this study.

The MSDI-CDS will provide a foundation and framework for MSDI development. This will assist content/data providers in the marine domain with future discoverability, accessibility and interoperability considerations when providing core data to a broader and growing userbase, in addition to those served by the products/services for which marine spatial data is traditionally collected.

As part of the Study, OGC is bringing together key stakeholders across the diverse marine community in order to assess the current state of data and product exchange technologies, defining the future of MSDI, and developing the foundations for a potential follow-on pilot.

Ultimately, the MSDI-CDS seeks to advance the state of Spatial Data Infrastructures (SDIs) that support marine geospatial data sharing across diverse activities. Specifically, the purpose of the MSDI Workshop was to guide the Study as well as future OGC Innovation Program activities by:

1. Engaging different stakeholders from the marine domain, and finding out where best they could benefit from a MSDI
2. Helping participants better understand activities occurring at OGC and other key Organizations
3. Engaging executive level participants to understand the most important challenges
4. Engaging operational and technical stakeholders to gather and share information on the current state for using geospatial data and services in marine activities, including:
 - a. Understanding what data, applications, tools and services stakeholders need
 - b. Understanding what data, applications, tools and services are available
 - c. Understanding the discoverability, accessibility, and usability of resources
 - d. Understanding interoperability challenges and integration opportunities
 - e. Identifying gaps in data, applications, tools and services

6. Conclusions and Recommended Actions

There are two components when dealing with Data integrity. There is clearly a need for a sound technical solution – in the ENC world IHO S-63 was developed and implemented globally within the ECDIS community for precisely this purpose, but very much in an ECDIS context, ignoring the wider uses of digital hydrographic data. The S-63 defined a bespoke global network of bodies together with a system of digital assurance in the form of digital signatures which delivers a measure of data integrity to every ENC end user. Users know the origin of the data they are using and that it is complete. IHO S-100 has adopted a modernised version of the S-63 scheme within its new Part 15 (within S-100 edition 4.0.0) and this will provide a similar mechanism for digital signatures without the requirement to enforce data encryption as well. This may meet some of the needs of the MSDI community, but this remains to be tested by stakeholders.

The other important element to consider is the communication and promotion of the importance of data integrity among the end user community. This should not be underestimated, particularly in the context of MSDI data. The MSDI user community is far more diverse than the ENC world, and there is no standardised “end user system” (like an ECDIS). MSDI data originators often have no concrete idea who is using data or for exactly what purpose. This implies that whatever data integrity measure is used, it needs to remain an integral part of the data itself and be delivered with it in a non-transformed way so that it can be verified once the data gets to the end user. The promotion of the

importance of data integrity should be an integral part of the MSDI picture with users fully understanding the origin of the data they are using.

The final technical report from the MSDI-CDS will provide both an interoperability reference architecture for MSDI and the foundation for a potential second phase Pilot initiative. If activated, the Phase 2 Pilot would be an IHO/OGC initiative with active involvement by several supporting IHO and/or OGC member organizations. The goal of Phase 2 is to articulate the value of interoperability and to demonstrate the benefits of standards through pilot(s) and demonstrations. This will be done by piloting a recommended SDI architecture to support a Marine SDI and developing demonstrations. The above recommendations would allow MSDIWG members to access the results from the MSDI-CDS and assist members who are interested in supporting a MSDI follow-on Pilot initiative.

7. Justification and Impacts

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

The creation of regional MSDIWGs will give the Member States direct possibility to actively participate in the development of a well-functioning MSDI within the region's hydrographic domain and its surroundings. Additionally, regional MSDIWGs benefit from both national and regional SDI activities in order to lead and address MSDI matters for the countries in the region.

Action Required of IRCC

The IRCC is invited to:

- a. note the report
- b. take note of the MSDI Concept Development Study (MSDI-CDS)
- c. approve the new ToR and RoP (Annex C)
- d. discuss if the recommended topics to be included in the MS MSDI presentations is sufficient
- e. acknowledge and support the work of the IHO Project Team on the implementation of the UN-GGIM Shared Guiding Principles for Geospatial Information within the IHO.
- f. discuss any item with relevance to SDI/MSDI/MSP and to take appropriate actions.

Annex A

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MSDIWG Proposed Work Plan - 2018 - 2021

MSDI Tasks

A	Communication and dissemination								
B	Operational - Data sharing and management								
C	Policies and governances – RHC. (Ensure that MSDI is a standing agenda item for RHCs' meetings (IHO Res 2/1997, as amended, refers))								
D	Standards (OGC and HSSC)								
E	Innovation – Future perspectives (2021 - 2030)								
F	Training and education								
G	Maintain and extend the publication IHO MSDI C-17 (IHO Task 3.9.2.1 refers)								
H	Conduct annual meetings of MSDIWG, arranged back to back with 1-day MSDI Open Forum (IHO Task 3.9.1 refers)								
No	Work item	Priority H- high M- med L-low	Milestones	Start Date	End Date	Status P- planned O- ongoing C- comple ted	Responsible / contact person(s)	Relate d Pubs / Stand ard	Remarks
A.1	Implement MSDI Maturity Assessments (national and regional) to enable consistent reporting from MS through RHC to IRCC.	H	1. Design template(s) 2. Assessment templates in place 3. Assessment templates in use	Jun 17	Jan 19	O	Denmark, OceanWise		Items 2 & 3 OceanWise send templates to WG MS for comment
A.2	Identify definitions, appropriate and relevant standards and components of (M)SDI. Ref: D1 and D2	H	1. Provide a consolidated list of definitions, components, standards	Jan 17	Jan 18	C	Malaysia		
A.3	Develop and provide guidelines on MSDI implementation.	M	1. Guidelines in place based on outputs from tasks B1-3: C2	2017	2019	O	IIC OceanWise Canada		

A.4	Develop MS or RHC relevant Case Studies. Ref: C2	M	1. Arctic Region 2. Baltic Region 3. Brazil 4. East Asia Region	2017 2017 2018 2018	2019 2019 2020 2021	P	USA Denmark Brazil Korea		Awaiting template
A.5	Create video recording of MSDI for HO and wider marine community	M	1. Develop content: a. Messages from C-17 b. Key points of MSDI c. Role of MSDIWG 2. Edit 3. Record 4. Edit 5. Approve	Mar 17	Jan 19	O	Korea		Video out for WG MS for review. Spanish version requested
B.1	Create an implementation "roadmap" template for MSDI (at national and/or regional level)	H	1. Gather information 2. Compile information 3. Publish template for implementation	Mar 17	Dec 18	O	IIC Esri USA		USA NGA comment req'd
B.2	Identify core data for input to MSDI to support multiple applications [Ref: B1]	M	1. Marine Cadastre 2. Emergency Response 3. Coastal Zone Management	Mar 17	2019	O	IIC Germany Canada OceanWise		OceanWise to circulate
B.3	Identify wider user requirements for bathymetry data	H	1. Develop primary use case for Arctic Bathymetry SDI 2. Update concept development study (\$) 3. Propose test-bed 4. Build test-bed (\$)	2017	2018	O	OGC USA (NGA)		
C.1	Draft data policy statements for MSDI (Ref:A3)	M	1. Define relevant statements 2. Compile compendium of Data Policy statements	2017	2019	P	USA OceanWise		
C.2	Develop a conceptual architecture for MSDI	M	1. Develop architecture(s) 2. Compile compendium of MSDI architectures	2017	2018	C	Malaysia		

C.3	Develop a governance model for MSDI	M	1. Deliver best practice governance models to BoK (Ref: B3)	2017	2019	O	Denmark USA (NGA)		
C.4	Data Sharing and Publishing Licence	M	1. Provide licensing models and templates as 'best practice' to MSDI BoK	2018	2019	O	NZ, USA, OceanWise, Indonesia, Malaysia Esri		
D.1	Identify relevant standards to support MSDI implementation and operation.	H	2. Provide annual reports to IRCC and HSSC 3. DGGS (Ref: B3)	Jun 17	Jan 20	O	OGC Marine DWG		
D.2	Assess the suitability and shortcomings of standards in supporting data interoperability.	M	1. Identify standards relevant to bathymetry (Ref: B3) 2. Marine Cadastre 3. Oceanography	2018	2019	O	OGC Marine DWG (inc: Portugal)		
E.1	Identify and report on the future trends affecting MSDI e.g. autonomous platforms, standards, big data, cloud, internet of things and artificial intelligence.	M	1. Information gathering (Horizon Scanning) 2. Publish White Paper (inc: PPP)	2018	2019	O	Esri OceanWise USA Portugal Caris		
E.2	Establish an IHO MSDI Vision for 2030.	L	1. Prepare draft Position Paper ("think piece") to include technologies, methodologies, sustainability 2. Align with other Visions	2018	2019	O	OceanWise UK US (NGA)		
F.1	Develop and maintain training syllabi	M	1. Review and update in line with relevant developments, methods and content	2018	2020	O	Denmark OceanWise		
F.2	Support development and delivery of e-learning platforms	L	1. Coordinate activities with East Asia (KHOA) 2. Compile list of existing e-learning modules relevant to MSDI	2018	2020	O	Esri OceanWise KHOA		

F.3	Develop a MSDI communications plan for MSDI BoK	M	<ol style="list-style-type: none"> 1. Identify the need, audience and focus 2. Report findings 3. Deliver Plan 	2018	2020	P	IHO NZ(LINZ) Netherlands US (NOAA)		
G.1	Maintain IHO publication C-17 to reflect developments in ICT, Content, Standards and Governance of MSDI	H	<ol style="list-style-type: none"> 1. Manage on-line dynamic content 2. Create a Wiki 3. Request IRCC remove document from IHO Res: 2/2007 	2017	2020	O	OceanWise Esri USA Denmark Germany Portugal		V2.0 now approved by IRCC
H.1	Conduct 2019 -21 meetings of MSDIWG, arranged back to back with 1-day MSDI Open Forum and OGC Marine DWG	H	<ol style="list-style-type: none"> 1. Date and venue defined 2. Logistics in place 3. Open Forum programme defined 4. Develop content for DWG workshops 	2017	2021	O	MSDIWG Management Group (Chair/Vice Chair, Sec, IHB)		2019- ROK: 2020- Germany; 2021 - Singapore

MARINE SPATIAL DATA INFRASTRUCTURES WORKING GROUP (MSDIWG)
Draft Proposed Terms of Reference and Rules of Procedure

References:

- a) HSSC1 Meeting, Singapore, October 2009
- b) HSSC5 Meeting, Shanghai, China, November 2013
- c) HSSC6 Meeting, Valparaiso, Chile, November 2014
- d) IRCC7 Meeting, Mexico City, Mexico, June 2015
- e) **IRCC11 Meeting, Genoa, Italy, June 2019**

TERMS OF REFERENCE

1. Objective: support the activities of the IHO related to Spatial Data Infrastructures (SDI) and/or Marine Spatial Data Infrastructures (MSDI) **and/or Marine Spatial Planning (MSP)**.
2. Authority: this Working Group (WG) is a subsidiary **body** of the Inter-Regional Coordination Committee (IRCC). Its work is subject to IRCC approval.
3. 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 **Follow the development in MSP implementation worldwide.**
 - 3.10 **Establish a list of relevant MS National MSP Data Contact Points and contact persons.**
 - 3.11 **Establish a list of additional relevant institutions, contact person/data experts.**
 - 3.12 **Study the most relevant MSP issues in a cross-border / trans-boundary context in relation to data and information seen from a MS perspective.**
 - 3.13 **Compile minimum requirements for Hydrographic data for Maritime Spatial Plan Data and recommendations of distribution/sharing of this data.**
 - 3.14 **Provide an overview on (national / regional) MSP best practice.**
 - 3.15 **Establish MSP on the IHO website under body of knowledge.**

RULES OF PROCEDURE

1. WG shall comprise representatives of Member States, Expert Contributors and Accredited NGO Observers, all of whom have expressed their willingness to participate. **Membership is open to all Member States of the IHO.**
2. Member States, Expert Contributors and Accredited NGO Observers may indicate their willingness to participate at any time. A membership list shall be maintained and confirmed annually.
3. 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 Assembly 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. **The Chair shall have a seat in the IRCC and shall report on the activities of the WG to the IRCC meetings and to the IRCC Chair for further report to each ordinary session of the Assembly through the Council.**
5. 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.
6. 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.
7. If a secretary is required it should normally be drawn from a member of the WG. **The draft minutes of meetings shall normally be distributed by the Secretary within six weeks of the end of meetings and member comments should be returned within three weeks. Final minutes should be distributed and posted on the IHO website within three months after a meeting.**
8. Expert Contributor membership is open to entities and organizations that can provide a relevant and constructive contribution to the work of the WG.9. 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.
10. 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.
11. **The working language of the WG shall be English.**