3rd Crowd-Sourced Bathymetry Working Group (CSBWG3) Meeting

7-8 November 2016, Warnemünde, Germany

(Paragraph numbering is the same as the Agenda Item numbering and does not necessarily reflect the order in which matters were discussed. When more than one participant attended from a State, each is identified by their initials after the three letter country code.)

1. Opening

The Chair, Ms Jennifer Jencks (NOAA/NCEI-USA), opened the meeting, welcomed all participants, and explained why the change of Chair had taken place. She thanked those at Leibniz Institute for Baltic Sea Research (IOW) and the Bundesamt für Seeschifffahrt und Hydrographie (BSH), the German Federal Maritime and Hydrographic Agency, for their assistance with the meeting arrangements. She highlighted the Crowd-Sourced Bathymetry Guidance Document (CSBGD) was the main output for the group with the target of producing a mature draft for circulation to stakeholders before the end of November. The Chair explained how she intended to conduct the meeting, which was to include focused breakout sessions led by the various Correspondence Group (CG) leaders to progress the CSBGD towards the target timeline.

IHO Secretary General, Robert Ward, (SG) provided background on the Chair's long engagement and involvement with the Crowd-Sourced Bathymetry (CSB) initiative. He then highlighted the scope and contents of the documents and how it is intended to be used. He provided more general background on the CSB concept and described the encouraging level of general community comment on the initiative, particularly from the potential observer communities. He noted the frame work of the CSBGD had been presented to the 8th meeting of the Inter-Regional Coordination Committee (IRCC8), he noted there remains a mixed reaction amongst Hydrographic Offices (HOs); some highly enthusiastic, others cautious. He said that he was in the process of drafting an IHO Resolution on ways to improve the current shortfall in bathymetric knowledge of much of the world's seas and oceans to be presented to IHO Member States at the first session of the IHO Assembly for its consideration in April 2017. He indicated that the Resolution would encompass CSB, Satellite Derived Bathymetry (SDB), the IHO Data Centre for Digital Bathymetry (DCDB) and MSDI as options and methods to improve the situation. He highlighted the anticipated timeline for the approval of the CSBGD, being presentation to IRCC9 and the first session of the Council before going out to the Member States (MS) for final approval and adoption by the end of 2017.

2. Administrative Arrangements

The Secretary provided domestic and administrative details for the meeting.

3. Introductions

All participants – representing Canada, Denmark, Finland, France, Germany, India, Italy, Norway, Portugal and USA (NOAA-NECI, NOAA-OCS, NGA), UNH-JHC/CCOM, SevenCs and Sea-ID – introduced themselves and gave a short description of their background and current role, see Annex A for list of participants. Apologies were received from Anthony Klemm (NOAA-OCS), James Miller (NOAA-OCS), Patrick Keown (NOAA-OCS), Raymond Sawyer (NAVO), James Ford (NGA), Tim Thornton (TeamSurv) and Paul Cooper (Caris). The draft meeting agenda was reviewed and adopted.

NOR highlighted the need to identify the potential contributor communities and exactly what CSB is for the IHO and for the wider community. FRA highlighted the link with the GEBCO Project. CAN (Serge Gosselin - SG) noted that CSB had an increased profile within Canada and commented that it was an activity that had to be undertaken within Canadian waters to help increase data coverage in the large areas where no data existed at present. IND noted they received large quantities of data from agencies other than their navy hydrographic vessels and that there was a need to know how to use this

data. ITA noted the importance of CSB to assist in updating charts due to a lack of resources and assets.

CAN (SG) was elected unanimously to the position of vice-Chair. He explained why Canada considered CSB important for the future.

The agenda was adopted, see Annex B, and Annex C for a list of meeting documents.

4. Previous Meeting report and Action List

The report of CSBWG2 was approved and actions were reviewed, it was noted that all the outstanding actions were included in the agenda for the meeting.

5. Updates on current projects

RosePoint

USA (Evan Robertson - ER) gave a general background brief on CSB, bathymetry and the lack of data. He highlighted how CSB will help improve data coverage and identify where charts are out of date. He explained how monitoring vessel traffic using CSB is a useful application of the data. Comparing CSB data to charted soundings can be done relatively simply. The NOAA OCS method involves creating a color-coded map showing where CSB depth variations differ from the charted soundings – red = shoaler than 1m, green = between -1m and +1m and blue = deeper than 1m. He detailed the current model created for the gathering, contributing and storing of CSB; he noted a potential alternative model using individual contributors rather than trusted nodes. He displayed a project flow diagram for data from trusted node or individual contributor through the DCDB to availability for potential data users. Discussion on future enhancements including file naming to make it more meaningful and searchable, and the importance of providing anonymity for contributors, if requested, was agreed. USA (Brian Calder - BC) noted the anonymity element should not be constructed in such a way that it cannot be removed at a later data if appropriate. Discussions highlighted potential uses of CSB. USA (Adam Reed - AR) provided an update on the Rose Point project and the uses that NOAA OCS have envisioned.

DCDB development

Several items which need to be addressed were highlighted. The Chair noted there would be 3 months-worth of programming support (4 programmers) to address the current issues commencing in January. SG asked what were the limitations on progress: resources, programming time, funds or personnel? SG indicated CSB funding in support of improving the DCDB to support CSB was to be included in the 2018-2020 IHO Work Plan and budget. The Chair noted 12 weeks had been funded and progress would be taken as far possible. Sea-ID (Kenneth Himschoot - KH) enquired whether some tasks could be undertaken as open-source development activities, he suggested the developers could collaborate and make the solutions and methods open-source to assist the overall progress.

NOR drew attention to the work being undertaken in Norway with Olex; contributors provide data to Olex and MAREANO provided detailed DEMs back to Olex for the use of the contributors. The difference between Olex (focused on the grid) and the IHO CSB which is looking more at the source data and supporting metadata to support a wider variety of uses was noted. Sea-ID (KH) noted that further installations of its CSB capability were taking place in early 2017, which could generate as much as half billion soundings by the end of the year. He also highlighted that concern over the uncertainty of liability and legal issues were impeding the take-up of new contributors; the question of data ownership and the preserving the Right of Innocent Passage remained issues which needed to be addressed

TeamSurv

TeamSurv provided an update brief on its activities and developments, including work in the Channel Islands and contributions to EODnet, and also its work on SDB projects. CAN (SG) noted that we should avoid recreating solutions and look for the possibility of building on others developments, particularly for applications and software. TeamSurv highlighted its concern over the need to clarify the licencing issues prior to uploading data to the IHO DCDB. SG commented on the role of the *trusted nodes* and depending upon their business model, he acknowledged that some exposure to liability could exist. TeamSurv noted that there was a need for some sort of licence to be in place in order that other organizations would be prepared to handle the CSB data. SG highlighted that the data would be freely available to be used as considered appropriate with the caveat of 'User Beware'. He noted that there was a significant difference between data stored by HO's data and data in the DCDB. USA (BC) revealed that Google would not use NOAA data without some form of licence. SG informed the meeting that he was in contact with the Secretariat of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) and that he had been provided with several examples of how licensing might be implemented under the Creative Commons licensing principles.

Sea ID

Sea-ID (KH) provided an update on activities and developments. He highlighted hardware costs had reduced; a new arrangement with a charting company had been established to enable the visualisation of contributed data. He highlighted the legal concerns which he felt needed to be resolved to provide confidence for continued participation of current contributors. He particularly asked about liability, ownership and visualisation. DNK (Jens Peter Weiss Hartmann - PW) asked how users might distinguish between authoritative data and CSB, he noted there needs to be a method to clearly show the difference when CSB is included in nautical charts. USA (AR) questioned whether no data is better than CSB, IND suggested an addition in the source data/reliability diagram may be a route. SG pointed out that determining how CSB data may be used in charts or chart improvement is not the role of the WG, it is primarily the role of HOs to decide on whether and how to use CSB for chart improvements, in the same way that judgements on the use of third party data has always been undertaken. USA (Whitney Anderson - WH) agreed it was the role of HOs, USA (BC) noted the need to have some form of data quality maker.

EMODnet

FRA provided an update on SHOM activities in relation to CSB and EMODnet developments and activities. He highlighted a new project 'Data Inject'. He displayed some INSU datasets against SHOM datasets compared with data corrected as IHO S-44 Order 2, differences were noted and explained. He enquired how it was proposed to deal with tides and tidal corrections.

Miscellaneous:

USA (AR) informed the meeting that Fugro-US were interested in engaging and wished to know how they could contribute. He understood that in future data collected during transits would be contributed, and as a result Fugro had asked about data format and metadata.

6. Review of Progress

The meeting received reports from the coordinators of the four Correspondence Groups describing what progress had been achieved intersessionally since the CSBWG2 meeting and during the breakout sessions conducted during the CSBWG3 meeting.

Uncertainty Correspondence Group (UCG):

The main topics covered and outcomes were:

- Value that we can derive from the dataset is strongly influenced by the uncertainty;
- The uncertainty is influenced by the completeness of the metadata;
- The interpretation of the uncertainty is essential for the responsible use of the data;
- There are multiple ways of expressing the uncertainty;
- The goal is to capture the information required to assist in assessing an uncertainty in one of these ways (but not to actually mandate a method to do so).
- The more supporting metadata that is available, the better the assessment of uncertainty is likely to be;
- The reputation of an observer or trusted node increases according to the amount of metadata information that is available, among other factors;
- The uncertainty section is intended to highlight the concepts involved in assessment of uncertainty, and to outline the information that needs to be collected for stable and reliable estimation of uncertainty; and
- It is intended that more details will be available on more technical subjects and aspects in an appendix to the Uncertainty section.

USA (BC) indicated there was additional information which may need to be included in the metadata. He noted that some contributors may be more reliable than others and this needs to be recorded.

There was considerable discussion on whether tidally corrected data should be accepted. The general view was that all data should be raw uncorrected data to which a data user could apply whatever tidal correction was considered appropriate for their use. As a result, there was general agreement that CSB data should only be rendered without tidal corrections.

Data Format and Metadata Correspondence Group (DFMCG):

It was reported that the chapter was mostly complete. It was agreed there was a need to create a validator for the GEOJASON format. **Action Sea-ID (KH)**

Systems and Hardware Correspondence Group (SHCG):

It was reported that the chapter was completed. As a result, the CG leader contributed to the work of the other CGs in completing their chapters.

Trusted Nodes (TNCG):

The trusted node correspondence group focused on identifying the methods for contributing data to the global database of bathymetric data (DCDB). The trusted node model was explained and includes information regarding the various aspects of the data submissions that are agreed upon by the trusted node and the data centre.

SG asked whether consideration had been given to how the Trusted Nodes may react if a direct contribution model was implemented that, in effect, by-passed the Trusted Nodes. The general feeling was that Trusted Nodes may be able to offer certain services or ease of use that will continue to be attractive to many potential CSB data gatherers.

The position of Open Seamap in relation to the CSB initiative needs to be considered.

Michael Bergmann, President of the Comité International Radio-Maritime (CIRM) - an IHO Observer organization, attended part of the meeting and commented that equipment capable of tracking vessel movements and logging various environmental data was already in use and their operators could be a potential source of contributors.

Legal (LCG):

SG explained that the WG produced guidance documentation should include comment which alerts all those involved that there are a number of considerations that need to be taken into account. The CSBGD will highlight those considerations, but not provide any definitive legal opinions or legal advice. It was acknowledged there was a need to identify to potential contributors where there may be issues (Territorial Seas, maritime areas of national jurisdiction). SG indicated that the IHO can request all the Member States (MS) to advise on whether their maritime legislation accepts CSB (data collected for the public good) to be collected in their waters and added to the DCDB. This information can be provided on the IHO website as guidance on where countries stand on this issue. SG repeated earlier comments on the information provided by the UN-GGIM Secretariat and in particular the use of the "creative commons" licensing arrangements, noting that there are specific adaptations for the use of Intergovernmental Organizations (IGOs). While several group discussions and one break out session took place to establish principles during the meeting, the range of other activities prevented the CG from completing the chapter during the meeting. Nevertheless, the Chair and SG developed a text immediately after the meeting for further circulation and development by correspondence.

The main topics covered and outcomes were:

- Consider changing the chapter title from Legal Issues to Jurisdiction Issues; subsequently it was agreed to use the title Legal Considerations;
- Important to remember that the role of the chapter is to alert the reader of potential legal considerations that may need to be taken into account, not to provide a definitive solution;
- Simplify the chapter, removed sections on Agreed Consent and UNCLOS specifics;
- Attempted to identify and provide insight (not advice) on 3 issues: (1) exposure to liability, (2) potential liability within various maritime zones and (3) data licensing (ownership of data); and
- This might be done by providing notes for each of the principal in relation to (1) exposure to liability (2) liability within various maritime zones.

7. CSBDG Development Roadmap and Milestones

The Secretary briefed the meeting on the proposed development timeline for the CSBGD; the target for final approval and publication as an IHO document should be the end 2017. He noted there was a need to identify appropriate stakeholders from whom input should be sought. SG emphasised the need to follow the IHO protocols for the approval and adoption process. CAN (SG) commented there was a need to make sure that the WG did not undermine the document with unrealistic expectations and to carefully explain exactly for what the CSBGD is intended. SG noted that the CSBGD introduction needs to describe the entire concept and thereby guide the reader to the sections and subjects relevant to them. TeamSurv agreed that the CSBGD needs to be focused and simple. USA (WA) highlighted the need to identify the primary audience for each section and to avoid excessive levels of detail.

USA (WA) briefed the meeting on the compilation status of the CSBGD and her recommendations regarding the style, tone and level of the text. SG drew attention to the fact that Collectors and Contributors of Data includes fleet managers, managers of scientific institutes, etc. as well as mariners (effectively all except HOs). TeamSurv recommended keeping the document non-technical with technical annexes providing greater levels of detail, when warranted; there was general agreement that the GEBCO Cookbook provided a good model to follow with each section/chapter relatively self-contained. SG suggested that the CSBGD could refer to current IHO publications for additional information rather than to reproduce already published information. CAN (SG) noted the Metadata and Uncertainty sections were of major significance for HOs with respect to data assessment. It was agreed that a one page preface was required to lead into the Introduction with the aim of selling the message. [Post meeting note: SG drafted such an introduction immediately after the meeting.] FRA

highlighted the need for diagrams and illustrations, USA (BC) suggested including reading order advice depending on particular interest of reader.

The initial list of stakeholders was reviewed and finalized, noting other IGOs and NGOs would be included from the IHO observers.

8. Review of ToRs and RoPs

The ToRs and RoPs were reviewed and the changes approved by IRCC8 were highlighted. The changes resulting from the amendments to the IHO Convention were noted. See Annex E for the amendments.

The timeline was detailed and agreed to obtain stakeholder feedback prior to the CSBWG4 meeting in February and further consideration prior to submission to IRCC9.

9. Any other business

It was agreed that an appropriate definition for IHO CSB was required and should be included in the CSBGD. The definition should acknowledge that CSB is non-systematic bathymetric data collected whilst a vessel is underway, in other words: *passage sounding*.

10. Venue and dates of the 4th CSBWG Meeting

It was agreed there was a need for a further meeting of the WG after feedback has been received from stakeholders and prior to IRCC9 in June 2017. The CCOM/JHC offered to host a meeting at the University of New Hampshire on 15-16 February 2017 and noted it was proposed to host a meeting of the Atlantic Seabed Mapping International Working Group during the same week. **Action IHB/USA (BC)**

11. Action Items

A draft list of Action Items from the meeting was generated. All Action Items are marked in this report and are collated together at Annex D. An updated list of the Action Items will be maintained on the CSBWG4 webpage and all those who have actions to complete should keep the Chair and the Secretary informed of any progress. **Action ALL**

It was agreed that the IHO would circulate a draft meeting report to all attendees by 11 November. **Action IHO**

Attendees were requested to provide any comments by 25 November. **Action ALL**

It was intended the final meeting report would be published by 2 December. **Action IHO**

The IHO and the Chair would prepare the final report to IRCC9 using the format required by IRCC. It was noted the report to IRCC9 needs to be submitted by 21 April 2017. **Action Chair**

The Chair requested IHO to generate a draft Agenda for CSBWG4 and include it as Annex F to the report. The draft Agenda may require further amendment following intersessional progress.

12. Closing remarks

The Chair thanked everyone for attending the meeting and for their effort and enthusiasm towards the task. She particularly thanked the contributions of TeamSurv and SeaID. She indicated the forthcoming events for which tasks need to be completed and at which the draft of the CSBGD will be presented. She encouraged all present to maintain their current level of engagement and urged them to progress the action items for which they had responsibility.

The Chair thanked the Bundesamt für Seeschifffahrt und Hydrographie (BSH) for the support the arrangements for the meeting and she also thanked the Leibniz Institute for Baltic Sea Research (IOW) for the excellent facilities. She stressed the continued importance of liaison with other IHO bodies and the appropriate engagement with industry to progress the work items. She also noted the significant progress achieved, a result of the participants clearly taking ownership of the project and tasks.

The meeting closed at 1645.

The following Annexes are attached:

A. CSBWG3 – List of Participants.
B. CSBWG3 – Agenda
C. CSBWG3 – List of Documents
D. CSBWG3 – List of Actions
E. CSBWG3 – ToRs and RoPs
F. CSBWG3 – Draft Agenda for CSBWG4
G. CSBWG3 – List of Members

IHO Crowd-Sourced Bathymetry Working Group (CSBWG)
List of Participants CSBWG3

Member State	Organization	Name	E-mail
Canada	CHS	Serge Gosselin	Serge.Gosselin@dfo-mpo.gc.ca
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Denmark	DGA	Jens Peter Weiss Hartmann	jepha@gst.dk
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USA	NOAA National Centers for Environmental Information (NCEI)	Jennifer Jencks (Chair)	jennifer.jencks@noaa.gov
USA	Centre for Coastal and Ocean Mapping, University of New Hampshire	Brian Calder	brc@ccom.unh.edu
USA	NOAA NCEI	Evan Robertson	evan.robertson@noaa.gov
USA	NOAA	Adam Reed	adam.reed@noaa.gov
USA	NGA	Whitney Anderson	whitney.e.anderson@nga.mil
IHO	Secretariat	Robert Ward	sg@iho.int
IHO	Secretariat	David Wyatt (Secretary)	adso@iho.int
Expert Contributor	Sea-ID	Kenneth Himschoot	Kenneth.himschoot@sea-id.org
Expert Contributor	Sea-ID	Andrew Schofield	andrew.schofield@sea-id.org

Expert Contributor	SevenCs	Steffen-Hinrich Boie	steffen.boie@sevencs.com
Remote Participation			
Expert Contributor	TeamSurv	Tim Thornton	Tim.Thornton@teamsurv.com

3rd Crowd-Source Bathymetry Working Group (CSBWG3) Meeting
Warnemünde, Germany – 7-8 November 2016

1. Welcome and opening remarks by the Chair.

2. Domestic and administrative arrangements (*Secretary*).

3. Introduction of participants, apologies and approval of agenda.

4. Approval CSBWG2 Report and Review of Actions.

5. Updates of Current Projects:

    .1 Introduction;
    .2 RosePoint;
    .3 DCDB development;
    .4 TeamSurv;
    .5 Sea ID;
    .6 EMODnet.

6. Review progress on development of draft CSB Guidance Document (CSBGD):

    .7 Introduction;
    .8 Basic system/sensor descriptions;
    .9 Metadata;
    .10 Data formats;
    .11 DCDB development;
    .12 Progress against agreed milestones.

7. Review of CSBGD development timeline and milestones – IRCC9, 19th IHC/Assembly1.

8. Review of ToRs and RoPs.

9. Any other business.

10. Date and venue of next meeting – CSBWG4 – and intersessional activities.

11. Review of Action List and draft agenda for CSBWG4.

12. Closing remarks by Chair.

CSBWG3 - List of Documents

Document No	Document Title
CSBWG3-Invitation Letter	Letter of Invitation
CSBWG3-Registration Form	Registration Form - Word Version
CSBWG3-Logistic Information	Logistic Information
CSBWG3-Document Template	Document Template (Word version)
CSBWG3-3-Agenda	CSBWG3 Draft Agenda v2.0
CSBWG3-3-Agenda	CSBWG3 Draft Annotated Agenda v3.0
CSBWG3-4-Action List	List of Actions - CSBWG2 - updated 4 November 2016
CSBWG3-6	IHO CSB Guidance Document Draft v3.0
CSBWG3-8	ToRs_and_RoPs
CSBWG3-9a	Hydro International article-The Pull of the Poles
CSBWG3-9b	Marsh Report-March 2016
CSBWG3-11	Proposed draft agenda for CSBWG4
CSBWG3-Presentations	Presentations.zip
CSBWG3-Participants	CSBWG3 List of Participants

LIST OF ACTIONS – Updated 29 November 2016

Agenda Item	Subject	Status/Date	Comments	Action
CSBWG3				
4	IHO website	On going	Check IHO website for documents and information	All
6.2	Metadata and Data Formats	CSBWG4	Validator for the GEOJASON format.	Sea-ID (KH)
7	CSBGD	14 Nov	Provide initial revised sections to Editor	CG Leads
7	CSBGD	16 Nov	Circulate initial revised draft for comment and feedback	Editor
7	CSBGD	22 Nov	Provide comment and input to Editor	All
7	CSBGD	28 Nov	Circulate second revised draft for comment and feedback	Editor
7	CSBGD	2 Dec	Provide final comments and input to Editor	All
7	CSBWG	5 Dec	Provide initial draft CSBGD to IHO for publication on IHO website	Editor
7	CSBWG	5 Dec	Generate list of stakeholders as well as IHO Member States to whom the draft GD should be distributed	IHO
7	CSBGD	6 Dec	Circulate initial draft CSBGD to stakeholders for comment and input	Chair/IHO
7	CSBGD	3 Feb	Receive comments and feedback from stakeholders	Stakeholders
7	CSBGD	10 Feb	Circulate updated draft to CSBWG for comment and feedback	Editor
7	CSBGD	CSBWG4	Prepare final draft CSBGD for discussion	Editor
~~12~~	~~CSBWG4~~	~~30 Nov~~ Complete	~~Circulate an initial letter of invitation~~	~~IHO~~
13	Action List	CSBWG4	Keep chair and IHB informed of progress with allocated actions	All
~~13~~	~~CSBWG3 Draft Report~~	~~11 Nov~~ Complete	~~Draft to be circulated for comment~~	~~IHO~~
~~13~~	~~CSBWG3 Draft Report~~	~~25 Nov~~ Complete	~~All to provide comments on draft report to IHB~~	~~All~~

~~13~~	~~CSBWG3 Final Report~~	~~2 Dec~~ Complete	~~Publish final report~~	~~IHO~~
13	Report to IRCC9	31 Mar	Provide outline draft to Chair	IHO
13	Report to IRCC9	21 Apr	Submit report and draft CSBGD to IRCC9	Chair

CROWD-SOURCED BATHYMETRY WORKING GROUP (CSBWG)

Terms of Reference

(as adopted by IRCC-7, June 2015**)**

1. Preamble

The 5th Extraordinary International Hydrographic Conference (EIHC-5) considered Proposal 4 on Crowd Sourced Bathymetry (CSB) and decided by Decision 8 to task the IRCC to establish a Working Group (WG) to prepare a new IHO publication on policy for trusted crowd-sourced bathymetry, taking into account EIHC-5 Proposal 4 and the comments made during the Conference.

2. Objectives

a. Prepare a draft IHO publication on policy for trusted crowd-sourced bathymetry for consideration and endorsement by the 8th meeting of the IRCC in 2016.

b. The draft IHO publication on policy for trusted crowd-sourced bathymetry should provide guidelines on the collection and assessment of CSB data, not only for potential use for charting purposes but also for its wider use in non-navigational applications. The WG should:

   (1) take into account EIHC-5 Proposal 4 and the comments made during the Conference;

   (2) take into account the ongoing work to enhance the IHO Data Centre for Digital Bathymetry (DCDB) as a data discovery and upload/download portal for Crowd-Sourced Bathymetry;

   (3) take into account the lessons learned and specifications created during the IHO CSB pilot project involving the Professional Yachting Association, Sea-ID and the DCDB, together with any other relevant CSB trials or operational services;

   (4) actively seek input from other international organizations, industry and invited Expert Contributors on their methods and use of crowd-sourced information;

   (5) seek advice and input from relevant HSSC Working Groups as required;

   (6) identify the nature and minimum level of metadata required to accompany any crowd-sourced bathymetry data;

   (7) identify methods for assessing and designating the uncertainty of crowd-sourced bathymetry, both as individual observations from a single observer and as repeat or duplicate observations from the same or different observers;

   (8) identify preferred formats for the submission, exchange and preservation of crowd-sourced bathymetry data, taking into account the relevant international standards and existing industry or community practices; and

   (9) base its recommendations, wherever possible, on established and accepted crowd-sourced data gathering principles.

c. The WG should identify potential legal and liability issues associated with the collection or use of crowd-sourced data and provide this information to IRCC for further consideration and guidance on how they should be addressed.

3. Authority

a. The WG is a subsidiary of the Inter Regional Coordination Committee (IRCC) and its work is subject to IRCC approval.

b. The need for the WG to continue shall be confirmed at each meeting of the IRCC.

4. Composition and Chairmanship

a. The WG shall comprise representatives of IHO Member States, invited Expert Contributors, including members of IHO-IOC Technical Sub Committee on Ocean mapping (TSCOM) and Observers from accredited NGIO, all of whom have expressed their willingness to participate, and a representative of the IHO Secretariat ~~IHB ("IHB" to be replaced by "IHO Secretariat" when the IHO Secretariat is established)~~.

b. Member States, invited Expert Contributors and Observers may indicate their willingness to participate at any time. A membership list shall be maintained, posted on the IHO website and confirmed annually.

c. Invited Expert Contributor membership is open to entities and organizations 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. Unless already decided by the IRCC, the election of the Chair and Vice-Chair should be decided at the first meeting following each ordinary session of the Assembly ~~Conference ("Conference" to be replaced by "Assembly" when the revised IHO Convention enters into force)~~ and, in such case, shall be determined by vote of the Member States present and voting.

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

f. 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.

g. Invited Expert Contributors shall seek approval of membership from the Chair.

h. Invited Expert Contributor membership may be withdrawn in the event that a majority of the MS represented in the WG agree that an Expert Contributor's continued participation is irrelevant or unconstructive to the work of the WG.

i. All members shall inform the Chair in advance of their intention to attend meetings of the WG.

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

5. Procedures

a. The WG should work primarily by correspondence.

b. The WG should attempt to meet annually, and wherever possible, with another convenient forum.

c. The WG should seek advice and input from relevant HSSC WGs as required.

d. Decisions should generally be made by consensus. If voting is required on issues or to endorse proposals presented to the WG, only IHO Member States may cast a vote. Votes at meetings shall be on the basis of one vote per MS represented at the meeting. Votes by correspondence shall be on the basis of one vote per MS represented in the WG. In all cases of voting, a majority shall be determined based on the number of Member States casting a vote.

4th Crowd-Source Bathymetry Working Group (CSBWG4) Meeting
UNH, USA – 15-16 February 2017

1. Welcome and opening remarks by the Chair.

2. Domestic and administrative arrangements (*Host/Secretary*).

3. Introduction of participants, apologies and approval of agenda.

4. Approval CSBWG3 Report and Review of Actions.

5. Updates of Current Projects:

   .1 Introduction;
   .2 RosePoint;
   .3 DCDB development;
   .4 TeamSurv;
   .5 Sea ID;
   .6 EMODnet.

6. Overview review of stakeholder feedback from circulation of the initial draft CSB Guidance Document (CSBGD) (*Editor*):

   .1 Introduction;
   .2 Overview of System and Sensor;
   .3 Metadata;
   .4 Data Collection;
   .5 Uncertainty;
   .6 Data Contribution;
   .7 DCDB;
   .8 Legal Considerations;
   .9 Annexes and Appendices; and
   .10 Lists

7. Progress incorporation of feedback comments and input into each section, via breakout sessions, to develop final draft version:

   .11 Introduction;
   .12 Overview of System and Sensor;
   .13 Metadata;
   .14 Data Collection;
   .15 Uncertainty;
   .16 Data Contribution;
   .17 DCDB;
   .18 Legal Considerations;
   .19 Annexes and Appendices; and
   .20 Lists

8. Review of CSBGD development timeline and milestones – IRCC9, 19th IHC/Assembly1.

9. Review of ToRs and RoPs.

10. Any other business.

11. Date and venue of next meeting – CSBWG5 – and intersessional activities.

12. Review of Action List and draft agenda for CSBWG5.

13. Closing remarks by Chair.