

## Report of the Crowd-Sourced Bathymetry Working Group

**Submitted by:** Chair

**Related Documents:** IHO CSBWG2 report, draft IHO CSB Guidance Document

**Related Projects:** none

<b>Chair:</b>	Lisa Taylor, USA
<b>Vice-Chair:</b>	Vacant
<b>Secretary:</b>	David Wyatt, IHB
<b>Member States:</b>	Argentina, Australia, Brazil, China, France, India, Italy, Japan, Nigeria, Portugal, Turkey, UK, USA
<b>Expert Contributors:</b>	Caris, Olex AS, Sea-ID, PYA, TeamSurv, GEBCO, SevenCs/Chartworld

*See Annex A for full details*

### 1. Meetings Held During Reporting Period

The working group held its second meeting at the offices of the National Oceanographic and Atmospheric Administration (NOAA) - National Centers for Environmental Information (NCEI) in Boulder, Colorado, USA on 10-11 February 2016. The Chair of the CSBWG, Ms Lisa Taylor (USA), chaired the meeting which was attended by representatives from three Member States (Italy, Japan and USA), and observers and expert contributors from Olex AS and Sea ID, which are two companies involved in crowd-sourcing technologies. Assistant Director David Wyatt represented the IHB.

### 2. Work Programme

The CSBWG received verbal reports from the coordinators of its Correspondence Groups. The reports covered Metadata and Data Formats, Uncertainty, and Systems and Hardware. Discussion sessions were held with the software engineering team working on developing enhancements to the IHO Data Center for Digital Bathymetry (DCDB) database infrastructure and user web-portal as well as with NOAA Legal Counsel for the USA Extended Continental Shelf Project Office. The meeting focused on the structure and contents of the CSB Guidance Document, an executive summary of the document is at Annex B. The meeting received a brief on the ongoing DCDB enhancements and how these would impact the development of the CSBGD.

Revisions to the ToRs were developed to enable the WG to properly address some of the potential legal and liability issues which had been identified. The proposed revisions are at Annex C.

It was agreed that a further meeting of the working group would be beneficial after IRCC8 and prior to the next International Hydrographic Conference/Assembly and IRRC9 to be

held in April and May 2017 respectively. This would assist in ensuring the completion of the guidance document by taking into account any further guidance from the IRCC. A third meeting of the CSBWG is therefore planned for 7-8 November 2016 at the IHB in Monaco.

### **3. Progress on IRCC Action Items**

The Crowd-Sourced Bathymetry Working Group (CSBWG) is tasked by the Inter-Regional Coordination Committee (IRCC) to develop a draft IHO publication on policy for trusted crowd-sourced bathymetry (CSB). This CSB Guidance Document will provide guidelines on the collection and assessment of CSB data for inclusion in the global bathymetric data set which is maintained in the IHO Data Centre for Digital Bathymetry (DCDB). This data is intended to be available as a reference for the widest possible use, which may also include nautical charting in some cases.

### **4. Problems Encountered**

None

### **5. Any Other Items of Note**

The details of other organizations engaged in crowdsourcing was given and it was agreed further investigation of these organizations was desirable and the WG should consider inviting some additional members associated with these organizations to the next meeting

### **6. Conclusions and Recommendations**

The continued importance of liaison with other IHO bodies, as well as appropriate engagement with industry to progress the work items, was identified as a key enabler for the project. It was also noted the significant progress achieved.

### **7. Justification and Impacts**

N/A

### **8. Actions Required of IRCC**

The IRCC is invited to:

- a. Note the contents of this report;
- b. Approve the proposed revisions to the ToRs;
- c. Reappoint the WG to continue its work under the revised ToRs; and
- d. Take what other action is deemed necessary.

Annexes:

- A. List of members.
- B. Executive summary of the CSB Guidance Document.
- C. Proposed revision to the CSGWG ToRs.

**IHO Crowd-Sourced Bathymetry Working Group (CSBWG)  
List of Members**

<b>Member State</b>	<b>Organization</b>	<b>Name</b>	<b>E-mail (correspondence)</b>	<b>E-mail (Google Calendar, Drive, &amp; Hangout access)</b>
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## **IHO CSB Guidance Document Annotated Outline**

### **1. Introduction**

This section sets the context for subsequent sections by describing the need for crowd-sourced bathymetry (CSB) data, the purpose and scope of the document, the target audience and the document structure. It also sets the expectation that the document is intended to be updated and improved over time with feedback from mariners as the guidance is put to use.

### **2. Basic Systems and Sensors**

This section generally describes the basic components of the integrated system used to collect bathymetric data including echo sounder technology, positional systems, motion sensors, offsets and data loggers. Examples of how these components fit together and the data flow through the system are described with diagrams.

### **3. Data formats and Metadata**

This section provides an overview of the critical role that metadata plays in maximizing the use of CSB data. Specific examples are provided for how metadata allows the eventual end-users to make informed decisions on how to use the data. A table describes data and metadata fields.

### **4. Data Uncertainty**

This section provides an explanation of what data uncertainty is and an overview of the sources and consequences of bathymetric data uncertainty. It describes a spectrum of potential uncertainty ranges achievable with CSB and corresponding potential uses. Detailed descriptions of uncertainty estimation methods are provided via an Annex and links to further reading.

### **5. Systems and Hardware**

This section provides an overview of the diversity of hardware and systems available and describes best practices and recommendations for CSB data collection, storage and transmission based on current pilot and established projects. It details an example of the practical set up of hardware and software on a vessel and describes the current models for collecting data.

### **6. Contributing data to the IHO Data Centre for Digital Bathymetry**

This section describes the role of the IHO DCDB and outlines the steps for contributing bathymetric data to the public 'crowd'. It provides detailed examples of acceptable data formats and minimal metadata requirements for contributing data and describes how contributors and users can discover and access the data through the DCDB on-line interface.

### **7. Legal and Liability Issues**

This section identifies potential legal and liability issues for consideration including logging in the territorial sea and EEZ, agreed consent and data ownership. It does not take a position or seek to advise on these issues.



## **CROWD-SOURCED BATHYMETRY WORKING GROUP (CSBWG)**

### **Terms of Reference**

(as adopted by IRCC-7, June 2015)

#### **1. Preamble**

The 5<sup>th</sup> 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 8<sup>th</sup> 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. ~~with general advice on any relevant liability or legal issues associated with the collection or use of crowd-sourced data.~~

#### **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 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 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.