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IHO Crowdsourced Bathymetry Industry Workshop

Creating stakeholder partnerships for mobilizing action towards the collection and sharing of crowdsourced bathymetry data.

12-13 February 2019

Quebec City, Canada

Summary

The IHO Crowdsourced Bathymetry Working Group organized its first Industry Workshop in Québec City on the 11th and 12th February 2019. The goal of mapping the entire ocean floor, in support of the UN 2030 Sustainable Development Agenda and The Nippon Foundation–GEBCO Seabed 2030 project, is enormous.

To achieve these ambitious goals, the IHO recognizes that we need to encourage and support everyone to contribute. Industry could and should be a major participant and leader for many reasons: 1) industry operate ships that often sail in poorly mapped waters and have the capacity and ability to collect data, 2) they develop and use new technologies that continue to improve mapping capabilities, 3) they foster and have access to extensive networks of diverse contributors, and 4) they can help focus these initiatives to be more relevant to the needs of our user communities.

The IHO CSB Industry Workshop began with an overview of the IHO CSB initiative and the NF-GEBCO Seabed 2030 project. It continued with presentations describing current CSB contributor projects, examples of CSB data uses, and industry-attendee perspectives. The second day culminated in a round table discussion on how to develop the initiative further with respect to expanding contributors, incentives, recognition, and potential hurdles.

Industry was represented from a wide variety of sectors, including submarine cables, software solution companies, data collection equipment manufacturers and survey companies, as well as management and training for private ship owners. Several industry leaders were identified as key ambassadors for the IHO CSB initiative, including Carnival (cruise line sector), Fugro (marine survey sector) and PGS (seismic survey sector). This was followed by discussions on who could serve a similar role within other sectors.

With inter-governmental, government and non-governmental agencies, organizations, research institutes, various industry representatives, as well as representatives from different coastal states attending this first IHO CSB Industry Workshop, there was a strong, united drive to work together, commit and contribute to increasing our knowledge of the oceans and completing this picture of our ocean floor.

We are excited to build on these new relationships and take the IHO CSB initiative to the next level!

Workshop Rationale

The IHO Crowdsourced Bathymetry Industry workshop was organized to promote dialogue between industry and the crowdsourcing bathymetry community to influence stakeholders to leverage and share data, knowledge, and infrastructure, towards crowdsourced bathymetry mapping. By investigating opportunities for collaboration, mechanisms for mutually beneficial sharing of data and information, and influencing future ocean exploration and resource development / management investment, contributors will play an important role in developing an ocean scale public-private partnership pathway towards a sustainable Blue Economy.

The IHO Crowdsourced Bathymetry Working Group (IHO CSBWG) specifically sought participation of industry representatives to contribute to the discussion on accelerated gathering and sharing of crowdsourced bathymetry data. Input is critical from companies and associations with vested interests in seafloor data, to define future best practice, and advance the collection and sharing of these valuable datasets. This data will ultimately support the conservation and sustainable use of the world's oceans in line with the UN Decade of Ocean Science for Sustainable Development (2021-2030): Sustainable Development and the Seabed 2030 global mapping initiative.

Workshop Goal

To bring together key representatives from the IHO CSBWG and the private sector and discuss the potential for future collaborations to advance the IHO Crowdsourced Bathymetry Initiative.

Objectives:

- Welcome, listen, share and discuss industry questioning, issues, concerns and vision on CSB
- Raise awareness of corporate leadership/opportunities to stimulate action for the collection and sharing of CSB data;
- Discuss CSB acquisition methods/procedures/opportunities;
- Information sharing on transit/CSB data acquisition and exchange formats and protocols;
- Determine tools, methods and protocols to leverage/stimulate a generic participative approach for CSB data collection;
- Develop synergies with global initiatives including Seabed 2030

Expected results and uptake

Workshop discussions and recommendations will pave the way towards improved private-sector participation in the collection of crowdsourced bathymetry data in the context of the IHO CSB initiative and Seabed 2030.

Workshop Presentations:

https://www.iho.int/mtg_docs/com_wg/CSBWG/CSBWG7/CSBWG7.htm

Welcome and Opening Remarks

– Serge Gosselin, Canadian Hydrographic Service, Vice-Chair of the IHO Crowdsourced Bathymetry Working Group; Jennifer Jencks, NOAA, Chair of the IHO CSBWG; David Wyatt, IHO, Secretary of the IHO CSBWG

Workshop Introduction

All participants introduced themselves, provided brief details of their backgrounds and interest in CSB and the Workshop. List of participants at Workshop at Annex 1.

- Short overview of the IHO CSB Initiative – J. Jencks (1_WorkshopIntro_IHOCSBInitiative.pptx)

- Seabed 2030 – V. Ferrini (2_SB2030_Ferrini.pptx)

V. Ferrini gave a remote introduction and background brief on the NF-GEBCO Seabed 2030 Project. The Seabed 2030 mission is to empower the world to make *policy decisions*, *use the ocean sustainably* and *undertake scientific research* based on detailed bathymetric information of the Earth's seabed. Seabed 2030 supports United Nations Sustainable Development Goal 14 ("*to conserve and sustainably use the world's oceans, seas and marine resources"*) which will be impossible to achieve without a comprehensive map of worlds ocean floor.

The Seabed 2030 structure encompasses four regional and one global data assembly and coordination centers.

For general data ingestion actions, Seabed 2030 recommends crowdsourced bathymetry contributions be sent to the IHO's Data Centre for Digital Bathymetry (DCDB).

Seabed 2030 core principles are: cooperation (synergies with other initiatives as AORA, IHO CSB project), coordination, community engagement, crowdsourcing, credit and attribution, capacity building and communication.

- Workshop Goals and Outputs – J. Jencks

Chair reminded the participants on workshop main objectives (see above).

Overview of the CSBWG and the IHO DCDB

- Short overview of the CSBWG accomplishments to date – J. Jencks (3_IHOCSBWG_Overview.pptx)

Chair provided an overview of the work of the CSBWG and what had been achieved since 2014. There was considerable discussion on the IHO Circular Letter (CL 11/2019) and the two voting requests.

- Overview of the IHO Data Centre for Digital Bathymetry, current CSB data flow pipeline, and the CSB data contributions to date – J. Jencks (4_IHODCDB_Overview.pptx)

Chair highlighted the developments of the DCDB, which had been undertaken and planned for improving the access, viewing and upload/download capabilities of CSB data. There were questions on the role of a "Trusted Node" and how to become involved. Numerous questions on use of CSB in charts and how data quality can be assessed and represented, a more open-minded approach may be needed.

Paving the Way

- AORA/ASMIWG Transect Data Collection – T. Furey (5_AORA_ASMIWG_TransectDataCollection_Furey.pptx)

Thomas Furey provided background and update on the AROA and ASIMWG activities. Questions around how to encourage scientists to obtain additional data above that which is focused on their project.

- Rosepoint Navigation Systems – A. Klemm (6_RosePointDevelopment_Klemm.pptx)

Anthony Klemm provided a presentation on the NOAA/Rose Point Navigation System collaboration on collecting data through the Rose Point Coastal Explorer ECS software and subsequent provision through Rose Point. Rose Point is the first, and currently only, Trusted Node for CSB data. He highlighted the need to expand the crowd beyond the 'small' numbers currently involved. What percentage of Rose Point user vessels are involved? He noted that offsets were not recorded or checked from the information provided in the metadata. Analysis from contributors indicated that generating new data and making it available was the main motivation.

- VOS Bathymetry Module (VOSb) – A. Klemm for R. Cujdoe (7_NOAABathyModule_Cujdoe.pptx)

Anthony Klemm provided a presentation on the pilot work of Reggie Cudjoe to create a Voluntary Observing Ships bathymetry module (VOSb) to the current WMO-IOC JCOMM VOS.

It was suggested that bathymetry could be added to the AIS log, it was noted that this was achievable and Olex highlighted that was already taking place for their systems; however the validation of the metadata was a challenge. It was noted that most AIS fitted ships follow well-surveyed and known routes. Metadata validation is not a concern with Olex, and most of their not-following-well-surveyed-routes users have AIS. So these are not really issues. Olex explained that the problem with bathymetry over AIS is the severe limitations on data volume. Even if the AIS protocol were amended to include depth from the sounder in the same way as GPS and heading data, it would fall short. The Olex method of transferring bathymetry between boats over AIS is workable only where very few AIS targets are active, like in remote Arctic spots.

Current Data Uses

This session aimed at providing examples of current uses of CSB data.

- Great Barrier Reef – R. Beaman (8_GreatBarrierReef_Beaman.pptx)

Robin Beaman presented remotely a brief on CSB activities in the GBR and the uses to which the data is being put. He notes that RAN surveys cover the area for safety of navigation and generally avoid the reef areas. He displayed a data release permit and a consent and release form which aimed to remove any future liability for JCU from the use of the data. Explained that it's important to show to collectors how data has contributed to improved DTMs.

- Canadian Hydrographic Service – P. Wills (9_TheCanadianExperience_Wills.pptx)

Peter Wills provided a briefing on the CHS experiences of collecting and using CSB. He noted that data needed processing and that zero values obtained were mostly over depth for SBES capability. The development of the data handling model was discussed.

- NOAA's Hydrographic Services Division – A. Klemm (10_NOAACoastSurvey_CurrentUses_Klemm.pptx

Anthony Klemm provided a presentation on the NOAA experiences with CSB and its use to date.

Industry Perspective

This session aimed at collecting information on current industry perspectives and involvement (e.g. development strategies) on crowdsourced bathymetry mapping activities.

- SeaID - K. Himschoot

Kenneth Himschoot joined remotely to provide an update on Sea-ID activities and system developments. He suggested coastal states should receive a copy of the dataset once received at DCDB, he suggested physical rewards should be provided, data should be accessible and the DCDB should be the main repository of data. He described details of GNSS spoofing and examples of some incidents.

- Fugro – D. Millar (11_Fugro_Millar.pdf)

David Miller led the perspective for the industry participants. He provided the background of Fugro's involvement with GEBCO, Seabed 2030 and CSB and the benefits it had generated for the company. Does the survey industry have a representative body with which to engage and initiate discussions to advance the initiate? ICPC, IRSO, IAGC, IMC are some bodies at which Fugro has presented. Kevin Mackay suggested it should be a standard request to clients that data be made available on completion of the survey.

- Olex - O. Hestvik

Ole Hestvik provided the following statement on Olex activities and achievements:

"Over the last 20 years we have sold some 9000 Olex seafloor mapping systems, mostly to fishing boats. They map the oceans with GPS and echosounders. The fishermen use the Olex data to catch more fish. A boat with Olex is a self-contained seafloor mapper. But a single boat can only cover so much ground. To

speed up mapping, many participate in our shared seafloor programme. They donate their seafloors to us, in return for our whole collection. This is entirely voluntary. No contract or money is involved.

Fishing boats are truly the best source for shared seafloors. They have the best sensors, cover the most ground, and have the strongest need. They need it for their fishing. The current collection contains 8.6 billion soundings from 4000 vessels. Grid cell spacing is 5 meters.

But why only 4000 contributions, if there are 9000 vessels? Many fishermen don't want to share their data, thinking it is too valuable. Or they believe it isn't worth anything. Clearly, more would share if asked. But we do not push anyone. Now, each boat is different, with huge variety of sensors, no idea of transducer depth, and little command over sound velocity. They produce different data when covering the same grounds. In order to make a useful database, we spend quite an effort on cleaning and correcting their contributions.

Sometimes, we give exports to scientists. IHO projects like GEBCO, IBCAO and Seabed 2030 have gotten exports, as well as universities and mapping authorities in the US, UK, Canada, Norway, Iceland, and others. A search for "Olex bathymetry" on Google Scholar gives 244 papers. So, the Olex database is huge, well proven, and popular with fishermen and scientists. But it is proprietary, under our control. How to move on to the brave new world of IHO Crowdsourced Bathymetry? Should we just give IHO our database?

It is not that simple. The fishermen agreed to give their data to us, but not necessarily to IHO. Some fishermen do not want their seafloors to be given to others who do not share; but IHO want to give to anybody. The solution I therefore propose, is that IHO should collect directly from the Olex vessels. This will give IHO ownership and control. They can then give it to the world for all to use. We will donate software and training. IHO will need to secure consent from contributors, making them aware of the implications.

IHO should offer something in return for data. It could be navigational ENCs, official recognition, or a proud flag for their boat. We will disclose our data formats, so that other manufacturers may implement them. This will allow anyone to contribute data, not just Olex boats, and the IHO will not depend on Olex."

Evert Flier identified that there appeared to be a will to take the initiative forward. Ole indicated that the IHO needs to own the data by working directly with Olex contributors. This is due to the incompatible agreement under which the data was donated to Olex. But if the IHO want existing Olex data to be included in chart products like ENCs, that might be allowed, helping HOs make better charts is a noble cause benefitting all.

He suggested ENCs could be used as a currency to obtain bathymetric data, he suggested also that maybe a CBS flag could be flown by contributing vessels. The Chair asked whether an icon could be included for vessels to contribute the raw data directly in addition to the current route.

- FarSounder - H. Henley (12_FarSounder_Henley.pdf)

Heath Henley provided an update of FarSounder activities and developments in regards to collecting bathymetry data from FarSounder customers. He showed an overview of the first crowdsourced dataset that FarSounder will contribute to the DCDB. The dataset comprises a collection of ~2 million soundings during a cruise from Boston, MA to Antartica. FarSounder recently became the second "Trusted Node" to the DCDB. He highlighted that future development tasks could include contributing swath bathymetry

data collected using a 3D-FLS to the DCDB, and suggested that this data would be even more valuable than point soundings.

- Da Gama Maritime - S. Monk

Steve Monk provided the following summary on his involvement, interest, and thoughts on CSB.

"The problem:

- Yachts don't operate in the commercial shipping routes as a norm, therefore when an HO turns around and says the world is mapped to a commercial standard for the official ENC's this doesn't help the Super Yacht (SY) industry
- SY's have a habit of grounding in remote locations but don't report it outside their immediate chain of command due to the confidentiality agreements in place on board thus as an industry we can't learn about either the mistakes made on board or the new depth they found
- Training standards vary depending on whether crew have come through the SY career path or stepped over from commercial / military. Subsequently, their methods of operation on the bridge for chart work or proper use of the depth sounder can sometimes be sceptical
- Flag State representatives and management companies in particular aren't necessarily up-to-speed with the content of the charts and don't understand the difference between official ENC's, raster and unofficial charts or more importantly, where the data came from.
- Risk assessments on board for the use of ECDIS are dubious at best, if they're even done.

The fix

- Encouraging the SY industry to contribute to the gathering of data for the benefit of all should be a priority to help them understand where this will improve their safety of navigation
- Unofficial data gathered by CS need to be recognised by HO's and assessed for the suitability for placing on official cells
- The means by which to gather the data is something which equipment manufacturers (ECDIS, ECS or 3rd parties etc) need to be encouraged to initiate and make simplistic in the means of doing so. Automation would be best so crew aren't having to try and remember to do something when they're busy. If the Superyacht industry are to be pushed harder to contribute to the data gathering, there needs to be the ability for equipment data gathering providers such as SeaID and TeamServe, to support a sudden demand for installations.
- Once the data is gathered, there needs to be a simplistic means by which to display the data on the screen. If HO's aren't going to have the ability to assess it and add to official ENC's with the appropriate CATZOC then there should be a 'layer' which can be used to overlay on the ECDIS probably carrying the usual warning no-one reads that it's only an aid to navigation

I'm not saying any of the above would fix the standards of navigation on board as that comes down to training, but if we can get more depth information into the official charts and educate the industry on the demise of ARCS and not to panic, that will help."

- CIDCO - J. Desrochers (13_CIDCO_Desrochers.pptx)

Julien Desrochers provided a brief on Interdisciplinary Center for the Development of Ocean Mapping/Centre interdisciplinaire pour le développement de la cartographie des océans (CIDCO) activities of CSB in northern Canada. He explained how the data processing flow worked and the incentives used to encourage local Inuit communities participation in data gathering activities. He highlighted the importance of disseminating the results back to the communities to allow them to benefit from their work to assist them in their daily activities. He confirmed the data would be more widely available.

- ESRI - C. Raines (14_ESRI_Raines.pptx)

Caitlynn Raines provided a presentation on ESRI activities in the CSB area, highlighting their community maps programme. She noted that a successful CSB programme would move into the Big Data Management issues at which ERSI are looking. She noted that ESRI was developing a tool to show a world trackline coverage picture with associated metadata to allow ships to adjust their tracks to cover areas where no data existed.

- Hypack - H. Marshburn

Hannah Marshburn provided a brief on the activities of Hypack of relevance to CSB. She noted the challenge of having an owner company to whom her management reports and would need buy in.

- Teledyne CARIS - Jeremy Nicholson

Jeremy Nicholson provided a presentation on the activities of Teledyne CARIS. He noted the lack of developed capacity in many SIDS, where personnel resources were limited and often less skilled. He highlighted the benefits and challenges which need to be considered, particularly in the data quality area. He described the automatic processing capabilities which are being developed to allow improved throughput of gathered data, both in time and volume. Evert Flier highlighted the lack of understanding within HOs on the quantity of data potentially being generated and the ability to assess and gain confidence in the quality of the data.

- PGS - E. Flier (15_PGS.pptx)

Evert Flier provided a brief introduction to the Norwegian seismic company PGS and their activities, which could contribute to the CSB initiative. He highlighted the proposals made for them to increase their engagement and act as an industry leader within their sector through IAGC.

- Carnival Cruise Line & Macgregor - J. Jencks (16_Carnival_Macgregor.pptx)

Chair provided the progress on her engagement with Carnival and Macgregor to encourage them to contribute data to the CSB initiative and Seabed 2030 Project. Evert Flier suggested new build cruise ships could be fitted with MBES systems to improve the data quality and quantity provided.

- SevenCs/Chartworld - Bryan Kommerowski

The following statement was provided by SevenCs/Chartworld post-workshop: Since SevenCs already have several proven ECS/ECDIS products on the market, it makes senses that they have the same potential to feed and grow the DCDB as Rose Point's software. Rose Point and SevenCs also discussed a collaboration along these lines.

By summer 2019, SevenCs will release a new cross-platform ECS Software for Pilots and Private users. It would be a perfect timing and opportunity to consider an integration of a shared function. Of course, we do have to assess the technical effort we must put in, but we are keen to learn what we eventually can offer. There must be an automation, simplistic and seamless approach for the contributor to share the data within the software.

Still we do need to point out that we do not possess the collected data from our customers using our ECS/ECDIS today - the end user/customer still decides, whether they are willing to share the data with the IHO or not.

ChartWorld sees potential to use the DCDB and its data to create, process and distribute own private

charts out of it for areas which are not well surveyed. Consequently, we are keen to learn when the DCDB will be updated, so that the viewing, upload/download are easier to process the CSB. In particular we would be interested in possibilities for automated DCDB data queries and data download via Web Service interfaces. This would facilitate DCDB data access for applications that want to use the DCBD data.

Round Table Discussion

Chair introduced the objectives and explained that questions would be posed to Industry Participants to receive their feedback and generate discussion amongst the greater group. Topics to be covered were: Contributing CSB Data, Supporting the CSB Initiative, Outreach, Recognition, Data Uses, and Hurdles.

- ***A need for a "cultural shift" at Hydrographic Organizations***

Douglas Brunt (DB) highlighted the need for HOs to see and appreciate the relevance of CSB data and therefore identify ways the data can be used and presented. He noted a number of issues that HOs would want to be able to address and confirmed, such as how reliable the data was and how to process the expected quantities with the limited resources available within HOs. He identified the need to create appropriate recognition methods to incentivise and encourage participants.

Others noted there is a fear of data volume and quality. There is a need for automated data processing (reliable, repeatable and easy to use).

Need: Automated data processing that's reliable, repeatable and easy to use.

Suggestion: Engage the scientific community to (1) help create data processing tools and (2) help increase the number of use cases and therefore better show off value of CSB.

- ***Improved data discovery***

Glenn Wright (GW) provided details of a new build project from which data will be contributed from SBES and later MBES. DB highlighted the need to make the data discoverable. Mathieu Rondeau (MR) noted that products resulting from provided data should also be discoverable, although Chair noted that often multiple products are generated from the same data and therefore the challenge which version of the product was valid.

Steve Monk (SM) highlighted the challenge for users of the legal liabilities when using non-HO generated products, particularly from the Flag State oversight. Anthony Klemm (AK) noted the desire to obtain more raw data even if also used to create products.

- ***Engaging equipment companies***

Heath Henley (HH) suggested approaching the original collector rather than the equipment company, as companies like Garmin have restrictions on the provision of data beyond their use. David Miller (DM) suggested the HOs could use their leverage with appropriate companies, Vice-Chair and AK agreed to investigate whether NOAA and CHS could progress this. Jens Peter Weiss Hartman (JPWH) suggested that Garmin may not be aware, Chair suggested to approach the companies to see if their licence agreement could be rewritten to allow the release of the data. Brian Calder (BC) identified the importance highlighting the reasons why they should do this to potentially lose an economic stream or provide opportunities to competitors. Evert Flier (EF) and Peter Wills (PW) highlighted the UNCLOS

restrictions which are used. DM suggested that there were business opportunities, as companies would have access to additional data beyond that which they had.

EF suggested there were similarities between Navionic, Transas and Olex models. EF asked Ole Hestvik (OH) what incentives would work to make the Olex data available. OH identified there was a need to provide some recognition to the contributors (ENCs, CSB Flag, etc.), he noted that he had regular contact with customers through their need for software updates and data contributions. OH noted that many fishing vessels are content to share data between other fishing vessels but not to the wider community. The Norwegian Hydrographic Office has made Mareano data available to all in a general lat/lon/depth format. Olex customers, of course, use this data, and Olex redistributes it for free under CC-BY license on their web page. But it is not mixed in with data from Olex fishing vessels. Both datasets can be installed as separate databases on the same Olex machine and used by the fisherman, compared against each other, etc. Olex users are grateful for both datasets.

JPWH noted that Greenland local communities had asked how CSB can be displayed on the charts. OH confirmed that lower resolution dataset had been provided to GEBCO for inclusion in the grid. EF suggested a higher resolution set would be of greater use. OH suggested that there was a need to approach the fishing vessels and obtain the data, so that the IHO become the owner. OH suggested using multiple means with which to communicate with the fishing vessel community. Chair suggested Olex could assist in helping to communicate as well as creating the functionality to allow those who wished could contribute.

GW suggested approaching the various community representative organizations to engage through them to communicate with their members and highlight the benefits to science and knowledge gained from the contribution of data. Hannah Marshburn (HM) noted it was clear many communities wanted to participate but did not have the capability to do so. Chair noted that communities are enthusiastic but the manufactures need to develop the tools to allow the contributions. HM notes there are many training opportunities that could be considered for getting the CSB/Seabed 2030 message out (eg: Hypack trainers teaching a hydro community).

<u>Need:</u>

- To provide some recognition to data contributors (ENCs, CSB Flag, etc.)
- Communities are enthusiastic but the manufactures need to develop the tools to allow the contributions.

<u>Suggestion:</u>

- Approach the original collector rather than the equipment company, as companies like Garmin have restrictions on the provision of data beyond their use.
- HOs could use their leverage with appropriate companies
- Approach companies to see if their licence agreement could be rewritten to allow the release of the data.

- ***Hurdles***

Chair introduced the discussions, suggesting the need to identify the challenges and hurdles. Chris Dougherty (CD) highlighted the challenge for ICPC and Oil and Gas industries of engaging with multiple clients to obtain agreements. He noted the exact location of cables was a security issue, although not knowing the location caused anchor and fishing damage by vessels. It was suggested that the origin of the data could be masked to provide some protection could be provided. It was noted that Google and

another company were about to commence a worldwide cable laying project, which could generate significant data. DM noted that the ships servicing the cables could gather data whilst on transit to their work sites. SM noted the general bathymetry was of use, particularly if blended into other datasets. Vice-chair suggested the provision of data covering features of significance rather than the entire profile could be provided. DB noted that data included into gridded products would provide a degree of masking.

- ***Incentives***

IHO asked how industry can assist persuading coastal states to support the activity. DM suggested highlighting the value of the data to the coastal state in their development; he noted that the ability for them exploit the data was limited by their internal infrastructure.

It was discussed that Seabed 2030 was in the process of developing a "Value Proposition" document, suggested that we collaborate and help share within the community. (Action)

EF noted that the SG IHO and ES IOC were writing a joint letter to highlight their support for CSB and its contribution to the UN SDGs and Decade for Ocean Science and Development.

DM provided further information on potential tax advantages.

Vice-chair suggested the insurance industry could motivate and assist. IHO noted that the insurance industry was supportive and it would be one of the factors that would be taken into account was assessing premiums and claims. IHO suggested two tools could be of use – a track plot to assess where vessels had gone, a BIO to which vessels could add to create a contour overlay.

EF identified that the HOs need to acknowledge CSB data and find ways of using it to ensure they remain relevant ahead of smaller commercial operators.

Need:

- To determine how industry can assist persuading coastal states to support the activity.
- HOs need to acknowledge CSB data and find ways of using it to ensure they remain relevant ahead of smaller commercial operators.

Suggestion: Highlight the value of the data to the coastal state in their development

- ***Recognition***

Guillaume Morrissette (GM) noted that just being part of a larger community and initiative was not sufficient motivation and recognition. Julien Desrochers (JD) suggested a greater outreach effort to the communities and their leaders on the benefits of CSB to be motivated and then sustain involvement. Need to get to the point (similar to recycling) that it is a social crime not to contribute data when possible; the message needs to be formulated into a form that can be more widely distributed. This should be seen as a sustainable idea. Or, better yet, pursue the promotion of a "social benefit" or award to motivate those who don't desire to cooperate - reward for sharing, rather than criticize for not sharing.

Try to convince others to share by showing the benefits they will enjoy, such as better or more information for charts, an increase in scientific knowledge leading to better modelling and understanding of the oceans that will help the environment, and ultimately society. For the large companies we could emphasize the benefits of supporting society and indirectly increased profits via more positive images socially, more positive advertising, and possibly reduced taxes.

Need: To further develop the promotion of a "social benefit" or award to motivate those who don't desire to cooperate

Wrap Up and Conclusions

We need to build momentum! There are costs associated to collecting, processing, storing, etc. CSB data. We need ideas to mobilize and there is a great need to show the benefits of this data in the big picture…a real global image.

We need to continue to provide examples of incentives and benefits. We need to continue to exchange ideas.

This industry engagement opportunity was appreciated and acknowledged. Moving forward, IHO CSBWG participation is expected in industry conferences to raise awareness. CSBWG will brief Seabed 2030 to avoid duplications beyond provision of a presentation.

Further initiatives would be articulated among industry participants and those which were unable to attend.

Annex I - Attendance List

- **Public and private stakeholders**

Company/Organization	Name	Email
CIDCO	Julien Desrochers	Julien.desrochers@cidco.ca
CIDCO	Guillaume Morrissette	guillaume.morissette@cidco.ca
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GMATEK	Glenn Wright	glenn@gmatek.com
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SevenCs/ChartWorld	Bryan Kommerowski	bryan.kommerowski@sevencs.com
Teledyne CARIS	Jeremy Nicholson	Jeremy.Nicholson@teledyne.com
Remote Participation		
AORA/ASMIWG	Tommy Furey	thomas.furey@marine.ie
Sea-ID	Kenneth Himschoot	kenneth.himschoot@sea-id.org
NF-GEBCO Seabed 2030	Vicki Ferrini	ferrini@ldeo.columbia.edu
James Cook University	Robin Beaman	robin.beaman@jcu.edu.au

- **IHO Crowdsourced Bathymetry Working Group**

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