

GEBCO Ten Year plan Comments by Group 1

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Including:

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Executive Summary

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**not present on first GoToMeeting call – 20 May 2014.*

The members of the GEBCO ten-year vision Group 1 felt that GEBCO is, and should continue to be, the most comprehensive global bathymetry dataset; assembled by an inclusive, international community of experts, who support the open sharing of data and expertise.

Coordination through GEBCO is recognized as having tremendous potential for helping our community address several important challenges including:

- Identifying and filling gaps in global data coverage
- Raising public awareness about relevance of seafloor mapping, and about sparse global data coverage. GEBCO should be the authoritative source of information on how much of the ocean has been mapped.
- Ensuring proper attribution of data contributors and modern terms of use (e.g. free non-commercial use) that promote data sharing and are consistent with the needs of data contributors
- Continuing to grow broader international community of seafloor mapping experts
- Improving accreditation of GEBCO data usage.

Group 1 sees a dual role for GEBCO into the future - producing 1) comprehensive global bathymetry dataset, and 2) a supporting dataset including only measured bathymetry. Raising global awareness around the reality of the lack of seafloor measurement coverage is essential. GEBCO should be the authority on the statistics of seafloor data measurement coverage (and the identification of data gaps) and online material should be developed to support this. In addition, GEBCO has the potential to develop educational material on the nature and appearance of the seafloor by publishing images using a variety of social media formats.

Recognizing that the changing technological landscape brings exciting new opportunities as well as challenges, we feel that coordination through GEBCO working groups is important for our community. Web conferencing and social media should be used to help strengthen our community and increase frequency of interaction. It is also very important that the face of GEBCO (through the GEBCO website and other social media tools) be modern in both functionality and appearance.

We also recognize that some increase in funding will be necessary to help us achieve our goals over the next 10 years. While there may be potential sources of money that could be managed through GEBCO (e.g. sale of merchandise, donations, corporate sponsorship), ongoing support of our home institutions would be strengthened by formal recognition from GEBCO (e.g. letters, formalized committee membership) and by ensuring that GEBCO data releases are issued citable Data DOIs, and are accompanied by citable publications when possible. This model both helps to build the scholarly record and can empower individual members to pursue funding opportunities in their home institutions that can support ongoing work and help advance the goals of GEBCO.

Notes on GoToMeeting Discussion (Prioritized where possible)

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1. Feedback on the Preamble in GEBCO's terms of reference

1.1. Suggested edits by group highlighted in red

The goals of the IHO-IOC GEBCO Project are to:

- 1) Develop and constantly improve the portrayal of global ocean depths;
- 2) Act as the designated international authority for undersea feature names;
- 3) **Promote** the development and application of seafloor mapping technology;
- 4) Encourage and facilitate cooperation leading to the exchange and preservation of bathymetric data and associated metadata;
- 5) Foster collaboration among individuals and organizations with established and developing expertise so as to assist local and regional mapping efforts to attain a global standard of quality;
- 6) Identify oceanic areas that are poorly mapped and disseminate information to promote mapping of such areas
- 7) Promote education and training in ocean mapping **as well as a public outreach component**
- 8) Bring together the **international** ocean mapping community and users of bathymetry thereby leading to products that are more widely used;
- 9) Establish, develop and promote the development of regional mapping projects.

1.2. General comments out of discussion on ToR:

- Need a way to keep track of usage of GEBCO for accreditation purposes. Pauline Weatherall keeps some tracking of who downloads data, but we have no control. Perhaps consider adding a creative commons non-commercial license so others cannot download and sell GEBCO data products. That revenue, though possibly small, should help support GEBCO activities.
- We should encourage people who use GEBCO products to reference them in a standard way in all publications, so we can track how and where GEBCO data are used in the (scientific) literature. Tracking citations can be done with Google Scholar.
- We need better outreach for both general public and politicians. As experts, GEBCO members should be encouraged to raise awareness and the priority of ocean mapping in our individual countries. This would lead to a coordinated effort to promote ocean mapping.
- GEBCO should generate revenue – the GEBCO community needs to think about how to generate money. Need a plan for identifying funds to ensure the sustainability of GEBCO. Nippon Foundation can provide some funding, but we should look for other sources.
- Point #3 “Advance the development and application of seafloor mapping technology” does not really seem consistent with the goals of GEBCO. Members of GEBCO are involved with development and application of technology, but not necessarily GEBCO. We therefore suggest change from “advance” to “promote”
- Point #6 GEBCO also needs to disseminate information about poorly-mapped areas in an easily accessible interface to assist interested parties acquire new data in these unmapped areas. This should be in a format that can be easily taken to sea. GEBCO

should act as a leader in identifying areas that are poorly mapped. This may possibly be undertaken by leveraging the SID grid? And/or via regional mapping efforts - identify an area that needs attention. Identification of data holes may allow users to identify datasets not included (or yet in public-domain) and work on getting this data into GEBCO.

General consensus that GEBCO needs to work on outreach and general awareness of current state of seafloor data coverage

2. Limits --- we are bathymetry --- and other aspects of the seabed?

- GEBCO should continue to focus on bathymetry and compiling bathymetry.
 - There is plenty of work to do just on bathymetry and this should be our focus.
 - Combining data sets for a coherent picture
 - Include appropriate bathy products regardless of resolution (e.g. IBCAO, IBSCO, GEBCO-HiRes, EMODNet)
 - Discussion about whether or not to include non-ocean data (e.g. large freshwater bodies) was less decisive. Given that large lakes are not international waters, this may be less critical.
- Clearly presenting quality of bathymetry, data source etc. is important for outreach and expanded mapping efforts. Want to be sure that people do not incorrectly assume that the entire ocean has already been mapped.
- GEBCO should be also be an authoritative source of statistics about the percentage of ocean mapped etc. Would be good to produce a publication to accompany a new GEBCO grid that has all these statistics to help identify GEBCO as an authoritative source.

Group 1 suggests a possible dual role for GEBCO into the future both producing 1) a seamless grid of data including predicted and measured data and 2) grid of measured data only (supported by associated statistics)

3. Users/Clients --- who are ours? Hydrographers, researchers, Defence, industry - oil and gas, mineral, fisheries, NGOs, international bodies e.g. UN, FAO?

- We would like to know
 - How is GEBCO used now?
 - How has use of GEBCO changed in the last 10 years?

Pauline Weatherall cannot currently give quantitative statistics on GEBCO users from webpage (such as commercial vs. academic data requests) – she is not sure that she can track changes over time, but suggested that broader range of people now using data and she could give some specific examples of data requests – Group 1 therefore suggests some better way should be found to track this for future plans.

- How do we want GEBCO to be used?
 - Basis for models and science applications such as Disaster Prevention/Management (i.e. Tsunami-propagation modeling)
 - Law of the Sea
 - Outreach/Education
 - Media and Political Awareness (i.e. – which could drive licensing revenue for GEBCO too)

Group 1 thought that identifying and tracking GEBCO data users into the future will be important in future planning undertakings and in the definition of GEBCO's ongoing role and vision.

4. Source Data – from satellites, ships (commercial, yachts, navy, hydrographic offices, universities, research), buoys, AUV, gliders, surface autonomous, HO charts and ENCs

- Predicted vs. Measured Bathymetry?
 - In addition to an integrated product, maybe GEBCO could also provide a separate product with measured bathymetry only. This would also help with promoting the awareness of areas not mapped.
 - GEBCO should also try to provide more statistics about percentage of area mapped with direct measurements vs. predicted – possible source of ongoing citations)
- Should generate maps of coverage, accuracy, etc. Expand SID and plot it to help raise awareness.
- Crowd-sourced content? Quality and effort to integrate can become an issue
 - Do we want coverage or quality? How do we balance that? This is subjective...
 - Maybe we need different workflows for integrating data from different data sources?

Essentially the same conclusion as for Heading 2.

5. Data forms – maps, grids variable nested, GIS

- GIS, Grids, Maps (prioritized)
 - GEBCO High-Res - is it only multibeam data GEBCO High-Res would implicitly could show what's been mapped and help provide statistics.
- Expand Web Services
 - WMS
 - WCS?
 - WFS for SID?
- Need maps showing explicitly coverage of:
 - MBES; SBES data, data compilations etc.
 - Data uncertainty or some measure of quality of the data used etc.

- Predicted data only
- Could produce overlays of additional information in GIS (e.g. SID) – this supported by previously suggested published manuscript.
- Should also add *statistics* - GEBCO should be authoritative with stats about % ocean mapped, etc.
- Outreach
 - Paper maps (PDF) should be released at least every 5 years & *promoted*.
 - Suggest that GEBCO identify open-source tools that display GEBCO products (e.g. GeoMapApp) to help democratize data and help with visualization.
 - Provide the GEBCO grid in other formats (Geotiff or ArcASCII grid format, WCS etc.)
 - Take advantage of social media such as Twitter, LinkedIn, and others to generate awareness and build brand identity

Again the suggestion is that GEBCO should produce authoritative sea-floor mapping statistics and produce this in a citable format – this should include online material showing data coverage etc.

6. Data storage-- centres, distributed, cloud, commercial, performance

- Data storage solutions should be different for GEBCO Products and Components.
- GEBCO Products
 - Requirements:
 - Long-term preservation plan, Data DOIs, Download Stats
 - Ease of uploading and downloading
 - Cost-effective
 - Centralized funding and infrastructure model vs. distributed?
 - Many options: BODC, NGDC, Pangea, IEDA
- GEBCO Components
 - Not all data are necessary to preserve, but if in public domain raw data should be preserved at a long-term archive (e.g. NGDC or similar repositories)
 - Not all data are intended for distribution at full resolution
 - Workflow dependent
 - OK in a local working environment if necessary
- Clarify how we work and publish provided data – feeds back into possible creative commons license. This might enable the industry (and other contributors) to feel comfortable to where they put their data and how they will be used. Tracking of data usage therefore also more important.

7. Product channels --- web, cloud, phones etc, paper, books, “google/ facebook”, social media, films

- GEBCO WebSite needs a facelift
 - needs to look more modern and engaging
 - possibly engage a professional? (would require some \$)
 - possibly leverage templates for websites that are available rather than building from scratch
- Recommend a GEBCO Image Gallery
 - Disseminate cool 3D images of seafloor to generate interest
 - Cross post on FB and other social media
 - Set up a Dropbox or simple web gallery (e.g. Flickr) with upload options for GEBCO members to contribute images and brief summaries (include attribution and links to home institutions)
 - Establish competition for everyone who downloads our product to submit an image of how they use our product – give a small prize to the winner (Think - Caris does this and makes calendars of the best entries)
- Social media should have a small group of people who can add content to promote GEBCO. Could also involve GEBCO scholars and include cultural aspect, really promote international nature of GEBCO.
 - promote publications here too
- Should leverage Google infrastructure and outreach - layers, showcase, YouTube. This is an important strategic partnership that we should pursue.
- Emphasis should be on digital formats = highest priority as widest market – more than in just GMT format?
- Education media - provide products to schools. A lot of countries provide centralized school media. Dissemination via education pathways. Could try to promote getting GEBCO maps and basic info (stats) into classrooms that promote GEBCO and inspire curiosity about ocean mapping. School media supply.
- Other ideas included:
 - 3D Plot of some bathymetry products - can be used to demonstrate inundation.
 - Develop tutorials & educational kits
 - Datasets showing impact of sea-level rise, showing human relevance (think impact on navigation, show flight paths, distribution of environmental disasters (tsunami, storms etc) vs coverage of bathymetry)
 - Raise awareness of mapping global ocean - start at coast and move offshore...
 - Generate a pretty book for outreach (coffee table book) similar to “[Atlas of Deep Water Seabed of Ireland](#)” – Consider online templates (e.g. Shutterfly) rather than and/or in addition to formal publishing houses.

Overall - more active and up-to-date and on-trend outreach is needed

8. Funding – governments, charitable foundations, industry, wealthy people, NGOs, product sales

- While GEBCO is not supposed to sell data, there is concern about commercial entities downloading GEBCO data and profiting off of it. GEBCO needs to clearly state terms of use to ensure that data are stewarded and attribution is honored.
- With increasing interest from the private sector, perhaps GEBCO should consider monetizing commercial use
- Need to promote/enable support from home organizations (e.g. through citable publications; formal GEBCO sub-committees etc.)
- Generate a pretty book for outreach (coffee table book) similar to “[Atlas of Deep Water Seabed of Ireland](#)” that could produce some revenue and raise awareness.
- Low-hanging fruit (low effort): Sell GEBCO maps on t-shirts, coffee mugs, tote bags, mouse pads etc. - revenue would likely be low, but maybe worth it anyway...? (Leverage online stores like [cafepress.com](#)). Could place some of these products at IHO, museums, etc.? may increase visibility?
- Need to identify other foundations etc., in addition to the Nippon Foundation, that may be a source of funding. (probably should set up a task group to pursue this)
- Can we work as expert group to put together proposals or respond to calls from local research foundations (e.g. NSF, CNRS in France, or European fundings)

Group 1 recognizes that this is a topic that needs to be explored further at either GGC or sub-committee level – but that it is essential into the future

9. Capacity building – NF UNH, University scholarships, teach the teachers, IOC/IHO, special courses, remote teaching, projects, higher degrees. Education/Outreach

- Social media
 - Social media, engage Nippon Scholars, build networks
 - **ACTION** Need to establish a [GEBCO group](#) in LinkedIn and also groups for subcommittees
 - **Need to update the GEBCO LinkedIn Group**
- Broader Community Engagement
 - Web Gallery
 - Propose GEBCO/mapping-focused sessions at international scientific meetings
 - Publish Papers, Books (scientific and educational)
- Education
 - Use existing University Scholarships to help achieve specific goals (utilize GEBCO academics to identify available international scholarships / funds that can perhaps use GEBCO network to advertise more widely)
 - Develop Special Courses - *online* and in person if resources permit. Hands-on workshops are very effective. Focus on aspects of our efforts that both educate and help us achieve our mission.

- Utilize other workshops (e.g IHO RHC meetings) attended to host one day training seminars – MBSYSTEM / GMT / Open-source GIS etc.
- Suggestion that GEBCO annual meetings should also be used to actively discuss Nippon Foundation / GEBCO training program – look at past feedback and what is currently being taught – develop active working group looking at material covered (in total and/or in specialized and specific GEBCO course)

Need to establish a small active working group that focuses on all aspects of education and capacity-building in the future – and generation of educational material / courses

10. Technology – what will be new?

- Computer resources (hardware/software) are improving and will likely improve dissemination pathways. Need to continue to advance GEBCO products to make use of modern technologies and ensure accessibility. Need to stay current with technology to ensure that GEBCO is relevant to global scientific community.
 - Cloud-based computing - so having content accessible via web services is very important.
- 3D printing - presents new opportunities for teaching and outreach

Keep on-track with technology into the future

11. Data gaps – how to identify? how to fill? what resolution?

- Provide maps showing where actual measured bathymetry data exist. Perhaps this is a direct product of the GEBCO Regional Projects & GEBCO-HiRes? Also need something that can be used at sea to help opportunistically fill gaps.
 - Coverage by time (decade?)
 - Coverage by system (SBES, MBES)
 - Animation showing evolution of mapping coverage/quality over time
- Distribute GEBCO grids/data in a variety of formats:
 - Develop and improve existing Web Map Services (WMS) and Web Feature Services (WFS) – or take advantage of existing ones (think GeoMapApp)
 - Downloadable:
 - GIS shapefiles/grids (Geotiff and/or ArcASCII grids)
 - KML
 - Create a GoogleEarth Showcase
 - Maybe see if Google would do something to highlight lack of coverage (from GEBCO) -- maybe could change ocean basemap to show only survey data (not predicted) to draw attention to what's not been mapped. (for a couple of days). Possibly target this as a google tour that could be showcased as part of World Ocean Day PR campaign (2015?).
- By highlighting what's missing, we hope to get more data contributions.

- Fill data gaps opportunistically (offset tracklines during transits). Resolution to fill gaps largely determined by opportunity.

Development of a GEBCO coverage of measured data only with emphasis on highlighting data gaps (and importance of predicted bathymetry in these regions) and the associated statistics would start to highlight how little is known about the seafloor. This feeds into improving awareness and perhaps assisting in new data collection

12. Alliances -- Who are potential strategic partners?

- Some countries are clearly missing from the GEBCO community - how do we fix that? Can we? How do we provide incentive (in addition to “leading by example”)?
 - Partnership through UNESCO - maybe that can help bring additional countries into GEBCO.
 - Actively recruit NF scholars from countries not represented -- long-term investment.
- Google has tremendous outreach potential that we are currently under utilizing.
- Work together with local alliances such as EMODNET

13. How do we manage ourselves and projects?

- Need to make use of technologies like Dropbox, Google Drive for collaborative developments and management.
- Hold online meetings (GoToMeeting, Google Hangouts, and Skype etc.) of small working groups throughout the year to achieve goals. In person meetings once a year are valuable and should continue, promotes collaboration and cultural benefits.
- Consider adding a technical workshop component to the annual GEBCO meetings (concurrent with GGC meeting). Outcomes could be fed directly to Guiding Committee.
- Formalize organizational structure for different subcommittees/working groups?
 - Provides more justification for members to show home institutions.
 - Perhaps will develop into status similar to SCUFN
- Small active subcommittees and working groups to help achieve goals (incrementally).
 - Need some official endorsement or recognition from GEBCO to individuals participating voluntarily to help ensure ongoing support from home institutions.

Feedback point from this group is to ask whether a 10-year Vision subcommittee should be formalized

- *Ask what are organizational requirements? Could this m*
- *Maybe this is “official” within GEBCO but not at a higher level.*
- *Rotation of members? Length of service? etc. would need to be defined to ensure young blood (and alumni) coming in to stay on-trend – would also build GEBCO networks*

14. Who will do the work?

- Small sub-committees and working groups to help achieve goals (incrementally).
 - Need some official endorsement or recognition from GEBCO to individuals participating voluntarily to help ensure ongoing support from home institutions.
 - Leverage technologies/infrastructure from member organizations where possible
 - Publications
- Develop a culture of a student workforce
 - NF student projects could be coordinated and in-line with GEBCO tasks/goals
 - Lab visits a way to ensure some of these tasks completed
 - Establish a community of creating opportunities for international students (think internship/work experience for students at GEBCO member institutions, could tackle small tractable tasks. Need to, as a group, identify achievable tasks that can be tackled by students. This would need funding)
 - Processing Data (learn tools, focus on areas of interest)
 - Tasks that help Pauline Weatherall directly (e.g. work on website, web services etc.).
 - Generate outreach materials
 - Highlight images/narrative of interesting geology
 - Google Tour
 - Explore options for supporting international collaborations focused on students/education within various member countries.
 - Provide experience and increase employability for students

Develop active working groups (with some kind of internal formal structure) and look to leveraging international students as a potential workforce (not only Nippon Foundation / GEBCO alumni) – provides scholars with experiences, skills and access to GEBCO networks.

15. How do we best leverage interest from Private Companies? (e.g. outreach? etc.)

- Leverage private company interest in bathymetric data to promote GEBCO. By promoting GEBCO content, we may inspire more contributions to GEBCO. Increase visibility of GEBCO.
- Add page on GEBCO site highlighting where GEBCO data are used for a variety of applications, provide case studies. Regardless of access interface. Important to show both the real-world importance of and applicability of GEBCO data. Broadcast on social media as well (link to GEBCO news page). Subcommittee/volunteers needed to help with this level of outreach.

Need to work on showing importance of and applicability of GEBCO data