



GEBCO Nippon Foundation Seabed 2030 Project Business Plan

Contents

Executive Summary	3
1. The Business Plan	4
2. Project Strategy	4
3. Project Governance	5
3.1. Seabed 2030 Review Panel.....	6
4. Project Structure.....	7
4.1. Project Team.....	7
4.2. Seabed 2030 Strategic Advisory Group	8
4.3. Regional Data Assembly and Coordination Centers (RDACCs).	8
4.3.1. Selection of RDACCs.....	10
4.4. Global Data Assembly and Coordination Center (GDACC).....	10
4.4.1. Selection of GDACC	10
4.5. Hosts for regional and global centers	11
4.6. GEBCO sub-committees	11
4.7. The Nippon Foundation Scholars	12
4.8. The IHO Data Center for Digital Bathymetry (DCDB).	12
5. Project Plan	13
5.1. Establishment Phase	13
5.1.1. Establishment Phase milestones	14
5.2. Project Work Packages	14
5.2.1. WP 1: Gathering and merging existing bathymetric data.....	14
5.2.2. WP 2: Development of standards, data assembly and delivery tools.....	15
5.2.3. WP 3: Technology innovation.....	15
5.2.4. WP 4: Networking: Map the gaps	16
5.2.5. WP 5: Management	16
5.3. Project Milestones	18



5.4.	Progress towards a complete world ocean map.....	20
6.	Out of scope activities	21
	Appendix 1 – Seabed 2030 Project Director Terms of Reference.....	24
	Appendix 2 – Seabed 2030 Review Panel Terms of Reference	25
	Appendix 3 – Seabed 2030 Project Team Terms of Reference	27
	Appendix 4 – Seabed 2030 Regional Centers (RDACCs) Terms of Reference.....	28
	Appendix 5 – Seabed 2030 Global Centre (GDACC) Terms of Reference	29
	Appendix 6 – Seabed 2030 Establishment Team Terms of Reference.....	30
	Appendix 7 – Project Costs.....	35
	Appendix 8 – Seabed 2030 Strategic Advisory Group Terms of Reference	36
	Appendix 9 – List of Preliminary Seabed 2030 Contributors.....	37



Executive Summary

This document is the proposal for Seabed 2030 - a Nippon Foundation and GEBCO collaborative program to comprehensively map the world's seafloor by 2030.

In the opening address of the Forum for Future Ocean Floor Mapping in Monaco in June 2016, Mr. Sasakawa, Chairman of The Nippon Foundation, set forth the initiative to partner with GEBCO to cooperatively work towards mapping 100% of the topography of the World Ocean by 2030. This initiative led to the formulation of **Seabed 2030**, a global project within the IHO-IOC GEBCO framework with the focused goal of producing the definitive, **high resolution bathymetric map of the entire World Ocean**. This ambitious initiative is driven by the strong motivation 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.

This Business Plan describes how, through the Seabed 2030 project, GEBCO and The Nippon Foundation will cooperatively create the high resolution map of the world's oceans.

The Seabed 2030 project builds on more than 100 years of GEBCO's history and established regional connections to all corners of the World Ocean and benefits from the human network of mapping capacity built over 13 years through The Nippon Foundation – GEBCO training project. Through Seabed 2030, GEBCO will be recognized as the authoritative international initiative for mapping the World Ocean, from the coasts to the deepest trenches. The project will champion, develop and nurture the technical and human capacity to complete this task by 2030.

Seabed 2030 will establish a network of 4 regional centers. Each center will be the focus for gathering and assembling all available bathymetric data from the region and producing a regional map. A global center will merge the regional maps, producing the centralized GEBCO products. Complementing the regional centers, the Seabed 2030 Project Team will engage extensively with international marine, industry and intergovernmental organizations involved in ocean mapping and crowd sourcing initiatives to coordinate a global approach. Having the definitive view of the state of seabed mapping, Seabed 2030 will identify gaps in data coverage and prioritize and champion future survey operations to map the gaps. The extensive GEBCO community will provide the expertise to realize this ambitious but urgently needed initiative.



1. The Business Plan

This Business Plan describes the implementation of the Seabed 2030 project that GEBCO and The Nippon Foundation will cooperatively complete following the partnership initiated at the Forum in Monaco, June 2016. The underlying motivation for undertaking the quest of mapping all of the World Ocean by 2030, as well as an analysis of the present level of knowledge of the shape of the ocean floor, is detailed in the accompanying **Seabed 2030 Road Map**.

The **Project Strategy** behind the approach will be detailed, followed by a description of the **Project Governance** – here referring to the mechanism ensuring that the project fulfills its overall purpose, achieves the intended outcomes, and operates in an effective, efficient and ethical manner. We will then define how Seabed 2030 fits into the well-established IHO-IOC GEBCO network of mapping expertise and two types of new technical mapping centers to be developed, namely a Global Data Assembly and Coordination Center (**GDACC**) and Regional Data Assembly and Coordination Centers (**RDACCs**). We further describe how the project will be managed in the Section on **Project Structure**. The **Project Plan** will outline the sequence of events to successively establish and develop the mapping centers and the **Project Activities** that will be carried out throughout the project.

2. Project Strategy

The Seabed 2030 Project is a GEBCO project undertaken as a joint venture between GEBCO and The Nippon Foundation. The structure and implementation plan of Seabed 2030 builds on more than 100 years of GEBCO's history and established regional connections to all corners of the World Ocean and benefits from the human network of mapping capacity built over 12 years through The Nippon Foundation – GEBCO training project. Through Seabed 2030, GEBCO will be recognized as the authoritative international initiative for mapping the World Ocean, from the coasts to the deepest trenches. The project will champion, develop and nurture the technical and human capacity to complete this task by 2030.

The concept of a Regional Mapping Project has proved to be the most successful approach in GEBCO to map a specific ocean area. A regional mapping project can be summarized as a focused effort to gather and assemble all available bathymetric data from a specific ocean region into a digital database forming the data foundation for a bathymetric compilation. A committed "home" institute/center has proved to be the key for a successful Regional Mapping Project. The selected home should have a strong capacity within the field of ocean mapping and be internationally recognized. There must be human capacity assigned to work at the home institute/center. This includes leadership, networking with relevant countries,



organizations and data providers, database administration, bathymetric cleaning, merging and compilation as well product evaluation. The concept of Regional Mapping Projects, as well as the history behind how it has been developed, is further described in the Road Map.

GEBCO has been producing the GEBCO digital atlas in this mode for some years. Seabed 2030 is now extending this format with the formal establishment of Regional Data Assembly and Coordination Centers (RDACCs), each responsible for sections of the World Ocean. A Global Data Assembly and Coordination Center (GDACC) will be responsible for bringing all regional efforts together into global products as well as developing the means of optimal data distribution in order to meet all end-users needs.

3. Project Governance

GEBCO is a working group of the International Hydrographic Organization (IHO) and UNESCO – Intergovernmental Oceanographic Commission (IOC). GEBCO activities are directed by the GEBCO Guiding Committee (GGC). As a GEBCO project, the Seabed 2030 Project will be accountable to the GEBCO Guiding Committee (GGC). Prior to execution, the GGC will endorse Annual Work Plans and budgets developed by the Seabed 2030 Project Team. The GGC will also endorse the previous year's Annual Project Report completed by the Project Team. To ensure robust independent review of the Annual Project Report and Annual Project Work Plan, the GGC will receive expert guidance on the report and work plan from the Seabed 2030 Review Panel composed of independent experts and funder representatives. The Review Panel may also report to The Nippon Foundation as requested. The Review Panel terms of reference are in the Appendices.

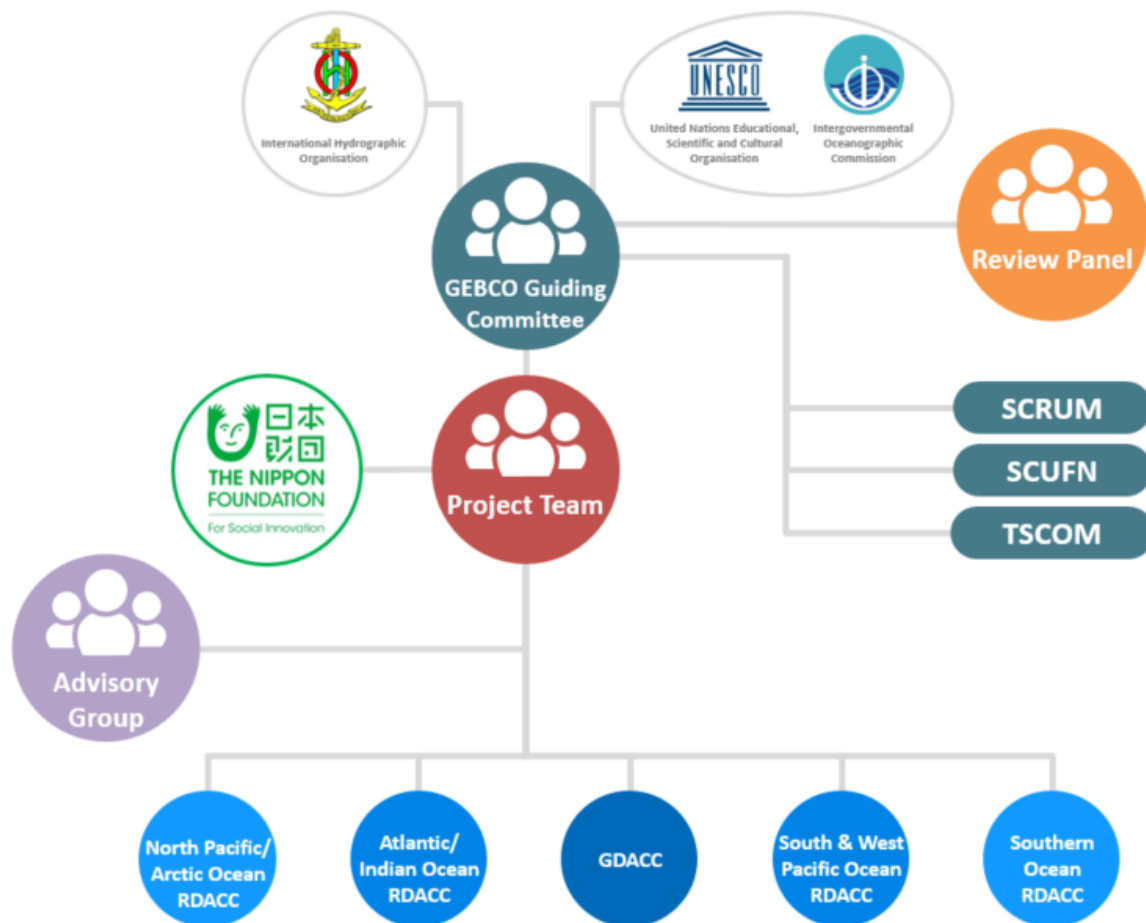


Figure 1. Seabed 2030 Project Structure.

Project funds will be transferred from The Nippon Foundation to the IHO Secretariat. IHO will disburse funds to the host organization of the Director. IHO will disburse funds to regional centers and the global center following GGC endorsement of annual work plans. Detailed spending rules will be developed and used to manage spending, in conjunction with the Center Agreements.

3.1. Seabed 2030 Review Panel

The purpose of the Review Panel is to provide the GEBCO Guiding Committee with independent input and review of the progress and deliverables from the project. Terms of reference for the Review Panel are in the Appendices.

4. Project Structure

4.1. Project Team

Seabed 2030 will be led by a Project Director supported by administrative support, whose location and host organization will be dependent on the individual selected for the position. Seabed 2030 will be managed by a Project Team composed of the Project Director serving as Chair of the Team and the leader of each of the Centers (Figure 2). The Project Team, with support from an administrative staff, will be responsible for key project decisions, managing centralized project activities and coordinating activities across the project and the regional and global centers. The Project Team will, through the Director, report progress to The Nippon Foundation. Terms of reference for the Project Team are in the Appendices.

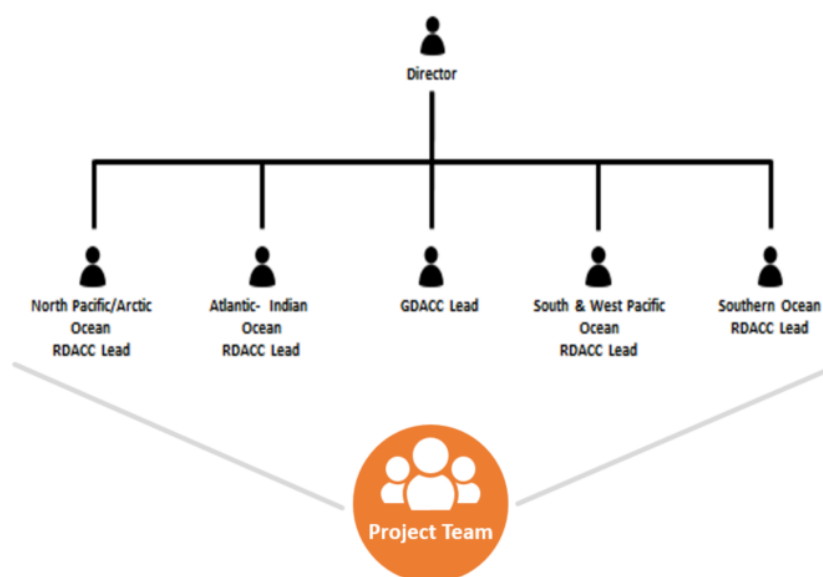


Figure 2. Seabed 2030 Project Team

In making management decisions, the Project Team will call on the collective GEBCO expertise including TSCOM, SCRUM and SCUFN, the wider GEBCO community of experts including The Nippon Foundation scholars and external experts through the Strategic Advisory Group. The work of the Seabed 2030 Project will be defined in an annual work plan and budget written by the Project Team and endorsed by the GGC. The Project Team will report annually to the GGC on project outcomes and progress against the annual work plan.



4.2. Seabed 2030 Strategic Advisory Group

The purpose of the Strategic Advisory Group is to ensure that the Project Team has access to required non-GEBCO expertise in making decisions, planning and implementing the work plans. The group is responsible for providing independent strategic and technical advice from the wider mapping community outside of GEBCO to the Seabed 2030 Project Team. Terms of reference for the Strategic Advisory Group are in the Appendices.

4.3. Regional Data Assembly and Coordination Centers (RDACCs).

Building on GEBCO's successful experience of working with Regional Mapping Projects, the Seabed 2030 project is based on the establishment of 4 Regional Data Assembly and Coordination Centers (RDACCs), each responsible for a defined ocean region (Figure 3). The division into four regions is based on ongoing regional mapping activities and collaborative networks between institutions within GEBCO. The area of the International Bathymetric Chart of the Arctic Ocean (IBCAO) has been increased to encompass the northern Pacific Ocean and the area of the International Bathymetric Chart of the Southern Ocean (IBCSO) has an extended northern boundary from 60°S to 50°S. From this follows two RDACCs: one for the North Pacific-Arctic Ocean region and the other for the Southern Ocean. The remaining part of the World Ocean is divided into a South and West Pacific Ocean region and an Atlantic-Indian Ocean region. Each RDACC is comprised of committed Seabed 2030 personnel that are responsible for championing and coordinating mapping activities within their prescribed oceanic region as well as for bathymetric data assembly, integration and synthesis.

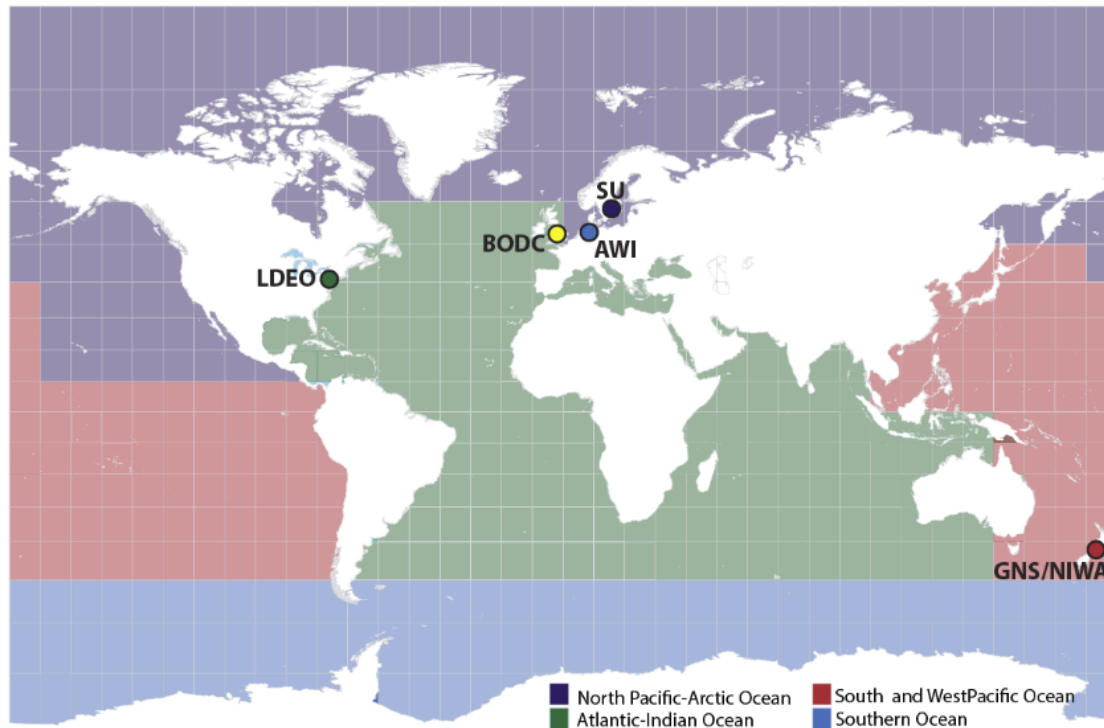


Figure 3. Seabed 2030 Centers.

Global Center (GDACC): **BODC**= British Oceanographic Data Centre, National Oceanography Centre, UK.
Regional Centers (RDACC): **AWI**= Alfred Wegener Institute, Germany; **NIWA**= National Institute of Water and Atmospheric Research, Wellington, NZ; **LDEO**= Lamont Doherty Earth Observatory, Columbia University, USA; **SU**= Stockholm University, Sweden. The color of the dots for the RDACCs corresponds to their ocean area of responsibility.

An Editorial Board will be established for each RDACC, which will consist of key representatives for the mapping activities within the ocean region of responsibility. Since the RDACCs responsibility will encompass huge areas of the World Ocean it is, however, not feasible that each country bordering the oceanic region is represented on the Editorial. The two RDACCs for the North Pacific-Arctic Ocean and the Southern Ocean will be formed from the IBCAO and the IBCSO, respectively, and benefit from the existing established Editorial Boards, which will be expanded to include members representing the larger oceanic areas of responsibility. It should be emphasized that the RDACCs will avoid duplication of other ongoing mapping activities, such as for example EMODnet in the EU area, by close



coordination of activities and work towards fostering a close collaboration for the most efficient use of global resources.

4.3.1. Selection of RDACCs

As the strategy of the Seabed 2030 is to build on the demonstrated successful approach of GEBCO and extend on-going GEBCO activities, selection of RDACCs will be based on:

- Demonstrated commitment and involvement in GEBCO activities.
- Bathymetric mapping expertise.
- Willingness for hosts to leverage existing mapping activities for the good of Seabed 2030.
- Minimizing the number of RDACCs as a means to minimize coordination effort and cost.

Considering the above criteria, the specialized nature of bathymetric mapping, the available funding and the activities of existing components of GEBCO, it has been determined that the optimum number of initial RDACCs is 4.

4.4. Global Data Assembly and Coordination Center (GDACC).

The grid and map outputs from the RDACCs will be provided to a Global Data Assembly and Coordination Center (GDACC), which will be responsible for producing centralized GEBCO products, management and distribution of the final bathymetric products to end users. The IHO-DCDB (see section 4.8) will remain the central GEBCO repository for bathymetric data.

4.4.1. Selection of GDACC

As the strategy of the Seabed 2030 is to build on the demonstrated successful approach of GEBCO and extend on-going GEBCO activities, the selection of the GDACC is based on continuity and the unique GEBCO-specific expertise and experience at the British Oceanographic Data Center (BODC). BODC has acted as the GEBCO GDACC for the previous 10 years. It receives financial support for the GEBCO Digital Atlas Manager position and for developing, hosting and maintaining the GEBCO web presence from the UK Natural Environment Research Council (NERC) and the UK National Oceanography Centre (NOC), its parent organizations. BODC also currently:

- Hosts the GEBCO Digital Atlas Manager
- Develops, manages and distributes the GEBCO Grid, the core GEBCO product
- Engages with GEBCO and non-GEBCO regional mapping projects to incorporate regional maps into the GEBCO grid.

4.5. Hosts for regional and global centers

Center	Proposed Host	Lead	Current Mapping activity	Current GEBCO connection
North Pacific/Arctic Ocean RDACC	SU - Stockholm University, Sweden	Prof Martin Jakobsson	Extensive active regional mapping activities underway	Very strong and active
Atlantic-Indian Ocean RDACC	LDEO - Lamont Doherty Earth Observatory, Columbia University, USA	Prof Suzane Carbotte	Extensive active regional mapping activities underway	Very strong and active
South & West Pacific Ocean RDACC	NIWA - National Institute of Water and Atmospheric Research, Wellington, NZ	Dr Geoffroy Lamarche	Active regional mapping activities underway	Very strong and active
Southern Ocean RDACC	AWI - Alfred Wegener Institut, Germany	Dr Boris Dorschel	Active regional mapping activities underway	Very strong and active
Global Center	BODC - British Oceanographic Data Centre, National Oceanography Centre, UK	Pauline Weatherall	Current GEBCO Digital Atlas Centre, integrating regional datasets, search and delivery application and website	Very strong and active

4.6. GEBCO sub-committees

The GEBCO sub-committees will play a fundamental role in Seabed 2030 by being the mechanism for harnessing the input of the wider GEBCO community of experts in the project. The sub-committees will provide advice, expertise and support to the Project Team as required throughout the project and will be consulted on the strategic direction of the project. The Technical Sub-committee on Ocean Mapping (TSCOM), Sub-committee on Regional Undersea Mapping (SCRUM), the Outreach Working group and Sub-Committee on Undersea Feature Names (SCUFN) will feed directly into the Seabed 2030 Project.



4.7. The Nippon Foundation Scholars

The Nippon Foundation scholars will be a key component of the global network of mapping experts. The mechanism for any formal representation in Seabed 2030 planning is to be developed but could be through the Alumni Association.

4.8. The IHO Data Center for Digital Bathymetry (DCDB).

The IHO-DCDB has served as the principle repository for bathymetric data contributed to the GEBCO project since the early 1990s. The IHO-DCDB, hosted by the US National Oceanic and Atmospheric Administration on behalf of the IHO Member States, archives and freely distributes all non-restricted bathymetric data provided by the mapping community. While there are no plans to allocate initial Seabed 2030 funding to the IHO-DCDB, the Center will continue to be the definitive data repository for bathymetric data and as such play a central role in GEBCO activities, in general, and the Seabed 2030 Project, in particular.

5. Project Plan

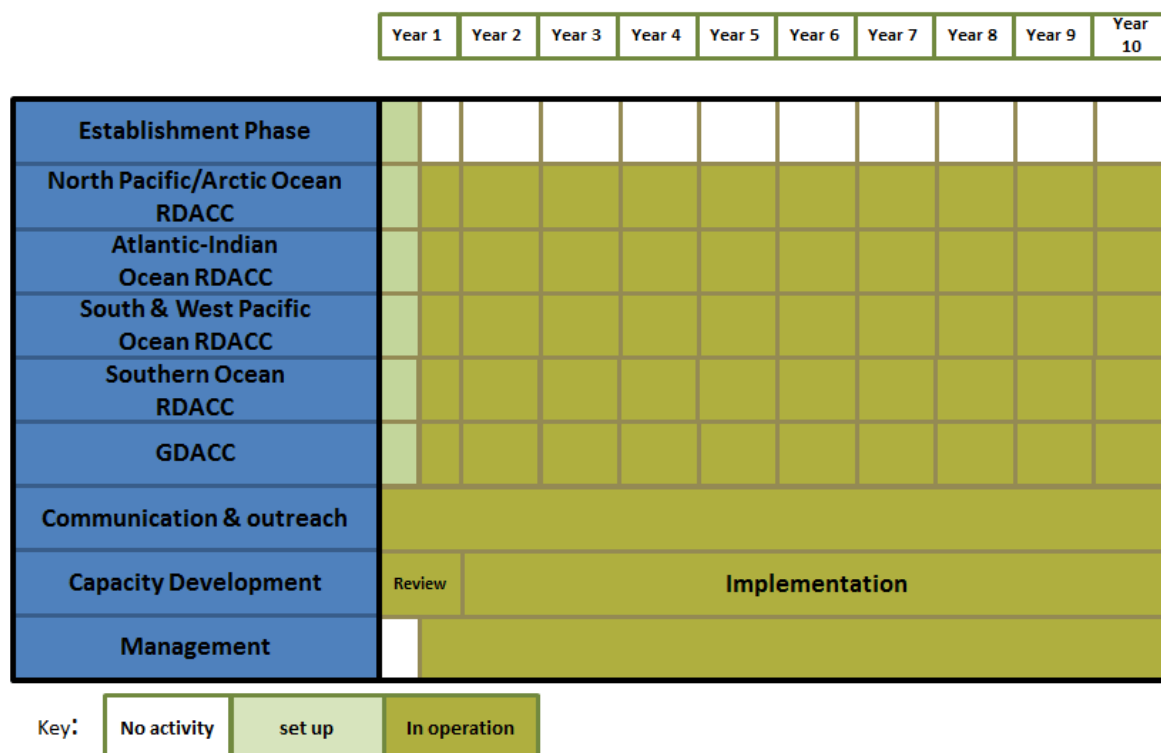


Figure 4 Seabed 2030 Project Plan

5.1. Establishment Phase

Setting up the project

Seabed 2030 will commence with a 6 month Establishment Phase managed by the Establishment Team consisting of GEBCO Guiding Committee members and independent experts. The purpose of the Establishment Team is to put in place the structures, teams and centers to take Seabed 2030 forward and to oversee some of the early activities before the Project Team and centers are fully established.

The Establishment Team will report to the GGC and liaise with The Nippon Foundation, IHO and IOC. On completion of its purpose, the Establishment Team will disband. Terms of reference for the Establishment Team are in the Appendices. It is expected the Establishment Phase will last 6 months. During the Establishment Phase the Establishment Team will be responsible for communication and outreach activities to



ensure the global mapping community is engaged with and informed about the Project. Management of the project will transfer to the Project Team at the conclusion of the Establishment Phase.

5.1.1. Establishment Phase milestones

At the end of the Establishment phase the following milestones will be met:

1. Seabed 2030 Director in post
2. All terms of references agreed and completed
3. 4 RDACCs and GDACC established
4. RDACCs and GDACC technical positions in post
5. Support positions in post
6. Outreach material prepared and distributed informing of the launch of Seabed 2030
7. Seabed 2030 Project introduced at key internal meetings and forums
8. Seabed 2030 Project Team established and operational

5.2. Project Work Packages

Work on Seabed 2030 Project is arranged into 5 Work Packages:

WP 1: Gathering and synthesizing bathymetric data

WP 2: Development of standards, data assembly and delivery tools

WP 3: Technology innovation

WP 4: Networking: map the gaps

WP 5: Management

5.2.1. WP 1: Gathering and merging existing bathymetric data

Merging all available data into the high resolution ocean map

- ✓ Each RDACC will lead and coordinate the creation of a regional bathymetric map. Local mapping expertise built on the established centers and Regional Mapping Editorial Boards will ensure all available data within the region is identified and merged into the Seabed 2030 regional map.
- ✓ Within each region, the RDACCs will build a community of bathymetric mappers and data providers across all sectors (e.g., industry, academia, government, etc.) ensuring Seabed 2030 access to all available data.
- ✓ Within each region, the RDACCs will conduct a crowd sourcing project to collect data from fishing, merchant and recreational vessels.



- ✓ GDACC will assemble the regional maps into the global high resolution bathymetric map and other Seabed 2030 data products. The GDACC will also be responsible for merging in non-regionally sourced data.

5.2.2. WP 2: Development of standards, data assembly and delivery tools

Developing the tools and systems to facilitate building and using the map.

- ✓ A suite of data management and delivery tools and systems will be built to facilitate the easy merging of the disparate datasets into the high resolution bathymetric map at the regional and global scales.
- ✓ Visualization and data delivery tools will be built to give users easy and interactive access to the high resolution bathymetric map.
- ✓ RDACCs will be responsible for tools and systems at the regional scale.
- ✓ GDACC will be responsible for providing the tools and systems to integrate the regional maps into the global map.
- ✓ Seabed 2030 will continue to work with the IHO Crowd Sourced Bathymetry Working Group and commercial companies providing crowdsource technologies to define the required processes, standards and protocols to facilitate the easy integration of crowdsourced data into the Seabed 2030 products.
- ✓ The Seabed 2030 Project Team will be responsible for coordination and standardization across the RDACCs and GDACC.

5.2.3. WP 3: Technology innovation

Identifying and encouraging technical innovation in bathymetric mapping

- ✓ As the global focus of ocean mapping expertise, Seabed 2030 is best placed to identify technology gaps and challenges and advocate for innovative solutions within industry and academia.
- ✓ The Seabed 2030 Project Team will convene forums to engage bathymetric mappers and mapping technology providers to identify key technical areas requiring technology innovation.
- ✓ The Seabed 2030 Project Team will support technical innovation by championing early adoption and prototyping of innovative solutions on Seabed 2030 mapping expeditions



- ✓ The focus of this work package will be to use Seabed 2030's unique role to identify key challenges requiring technical innovation and encouraging other organizations to step up to solve them.
- ✓ Seabed 2030 will define a strategy for increasing the use of crowd sourcing by fishing and merchant vessels in deeper water.
- ✓ Seabed 2030 will undertake direct technology innovation through its participation in the Shell Ocean Discovery XPRIZE. Note: funds for Seabed 2030 participation in the XPRIZE competition are not part of the Seabed 2030 costs.

5.2.4. WP 4: Networking: Map the gaps

Future mapping expeditions to increase bathymetric coverage

- ✓ Using Seabed 2030's unique ocean mapping role, the Project Team will influence and direct future mapping expeditions to maximize the rate of increase of data coverage and return on mapping activities.
- ✓ Seabed 2030 Project Team will engage with international, national and crowdsourced mapping programs and initiatives to ensure coordination of mapping efforts.
- ✓ Seabed 2030 Project Team will coordinate crowdsourced activities in the key gap areas. The use of data from fishing, merchant and recreational vessels will be key to achieving complete bathymetric coverage.
- ✓ Seabed 2030 Project Team will develop/implement a scheme for funding expeditions to map identified gaps in the high resolution bathymetric map.

5.2.5. WP 5: Management

Managing the project

Center Coordination

Managing the day to day work

The Project Team, led by the Project Director, will be responsible for management of the Seabed 2030 Project. The Team will be responsible for developing and implementing the details of the project activities and for coordinating work across the Regional and Global Centers and central project activities. The Project Team will report progress to the GEBCO Guiding Committee and The Nippon Foundation.



Communication and Outreach

Extending the global GEBCO community.

Building a global community of all partners interested in ocean mapping (including, but not limited to hydrographers, industry, research scientists, the public, policy makers, other international organizations and funders) is fundamental to the success of Seabed 2030. The Director will be responsible for coordinating an extensive outreach and communication plan. This work will begin in the Establishment Phase under the direction of the Establishment Team. The Seabed 2030 Director will be responsible for working closely with the GEBCO Outreach Working Group to ensure consistent and coordinated activities across the breadth of GEBCO outreach activities.

Advocacy and coordination of the global mapping initiative

Focusing global effort on mapping the ocean

Currently, bathymetric data are dispersed across a large number of mapping organizations and data centers. Mapping activities are independently initiated and funded by a large and diverse number of organizations, including governmental agencies, industry, academia and research institutes. If the world is to meet the challenge of delivering a fully mapped ocean by 2030, strong coordination of access to existing data and planning of future global mapping effort is required.

Under the auspices of the IHO and IOC and through Seabed 2030, GEBCO will be *the* global focus of seabed mapping. The Director will represent Seabed 2030 and engage with all other international marine initiatives to ensure a coordinated global mapping programme. Having the definitive view of the state of seabed mapping, Seabed 2030 will identify gaps in data coverage, and prioritize and champion future survey operations to map the gaps.

The Director, in particular, and the Seabed 2030 Project Team in general, will be the global advocates for ocean mapping, engaging with international marine organizations, funders, policy makers and the public to champion the goals of Seabed 2030 and galvanize greater international investment in mapping the ocean.

Capacity Development Review

Extending global mapping expertise.

Review

To achieve the vision of Seabed 2030, challenging new skills and expertise will be required; there will also be greater demand for existing skills. Seabed 2030



will review the future capacity needs to achieve Seabed 2030 and will review existing capacity and capacity development programs, including The Nippon Foundation Training Program at University New Hampshire. The Review will document its conclusions and recommendations for future capacity development activities in a Capacity Development Plan.

The review will be initiated in the Establishment Phase, as soon as the Establishment Team is operational and will take 6 months to complete.

Implementation

The Capacity Development Plan will be implemented in Years 2 onwards. This Business Plan includes budget for the Review only. Further funding outside of the Seabed 2030 budget will be required to implement the Capacity Development Plan.

5.3. Project Milestones

Project milestones in the first 4 years of the Seabed 2030 Project

Year	WP 1 Ocean map	WP 2 Tools	WP 3 Technology	WP 4 Map the gaps	WP 5 Management
1	<ul style="list-style-type: none"> - Seabed 2030 Project Kick off meeting held - Establishment of regional Editorial Boards - 1st Regional mapping meetings held at each RDACC - Detailed analysis of available existing data begins - 1st 	<ul style="list-style-type: none"> - Standards and tools development roadmap agreed 	<ul style="list-style-type: none"> - Mapping community engaged to identify key areas requiring technology innovation. - XPRIZE participation continues 	<ul style="list-style-type: none"> - Initial scoping of funding scheme options 	<ul style="list-style-type: none"> - IHO/IOC endorsement - Introduction of Seabed 2030 at all major events - Industry engagement plan agreed - Capacity Development review published - Communication and Outreach plan agreed and implemented - Project reporting to GEBCO and the Nippon Foundation



2	<ul style="list-style-type: none"> - RDACCs create Version 1 of regional maps - Release of Version 1 of high resolution ocean map - Comprehensive catalogue of existing data published 	<ul style="list-style-type: none"> - RDACCs and GDACC implement standard data management processes and tools - First generation of delivery tools developed 	<ul style="list-style-type: none"> - Key technology challenges published - XPRIZE participation continues 	<ul style="list-style-type: none"> - Detailed analysis of funding scheme options - Seabed 2030 established internationally as the focus for ocean mapping 	<ul style="list-style-type: none"> - Implement industry engagement - Funding for capacity development plan secured - Implementation of Capacity Development plan - Project reporting to GEBCO and the Nippon Foundation - Further funding sources identified and pursued.
3	<ul style="list-style-type: none"> - RDACCs create Version 2 of regional maps - Release of Version 2 of high resolution ocean map 	<ul style="list-style-type: none"> - Enhanced data delivery tools published - New generation of delivery tools developed 	<ul style="list-style-type: none"> - Industry engaged to encourage targeted technology innovation by mapping technologists 	<ul style="list-style-type: none"> - Funding scheme for future mapping identified - Strategy for mapping coastal waters and EEZ waters completed 	<ul style="list-style-type: none"> - Project reporting to GEBCO and the Nippon Foundation - Detailed plan for Years 5 to 10 completed
4	<ul style="list-style-type: none"> - RDACCs create Version 3 of regional maps - Release of Version 3 of high resolution ocean map - Most existing bathymetric data will be ingested into high resolution ocean map 	<ul style="list-style-type: none"> - Enhanced data merging and gridding tools developed 	<ul style="list-style-type: none"> - Seabed 2030 mapping cruises act as early adopters of technology innovators. 	<ul style="list-style-type: none"> - Plan for funding scheme for future mapping ready to implement in Year 5 - Implementation plan for mapping coastal waters completed and ready to implement. 	<ul style="list-style-type: none"> - Project reporting to GEBCO and the Nippon Foundation - Detailed plan for Years 5 to 10 approved, funded and ready to implement

Note: In Year 1, RDACCs and GDACC will only be operational for 6 months

Years 1 to 4 focus on merging the existing available data from high seas. In early years there will be significant work on design, development and implementation of the supporting systems and tools to facilitate the creation and dissemination of the Seabed 2030 data products. Establishing Seabed 2030 as the focus for global ocean mapping will require significant effort and will position Seabed 2030 as the driver for strategy and coordination in the later years. Significant effort will be invested in engagement and design of a funding scheme to drive the mapping of the gaps in later years.



At the end of year 4, Seabed 2030 will have made available significant volumes of existing data from the high seas, have an accurate plan for the remaining data and have developed a funding scheme to address mapping the gaps. Using its central global mapping role, Seabed 2030 will have devised a strategy for a coordinated approach to the coastal waters. Later years the focus will move to coordinating and encouraging mapping of the gaps in the high seas and the coastal waters.

5.4. Progress towards a complete world ocean map

	Seabed 2030 phase	year	% complete			increase per year (%)
Now	1	2017	15		2017	0
End of year 1	2	2018	17		2018	2
End of year 2	2	2019	20		2019	3
End of year 3	2	2020	25		2020	5
End of year 4	2	2021	30		2021	5
End of year 5	3	2022	35		2022	5
End of year 6	4	2023	40		2023	5
End of year 7	4	2024	45		2024	5
End of year 8	4	2025	50		2025	5
End of year 9	4	2026	60		2026	10
End of year 10	4	2027	70		2027	10
End of year 11		2028	80		2028	10
End of year 12		2029	90		2029	10
End of year 13		2030	100		2030	10

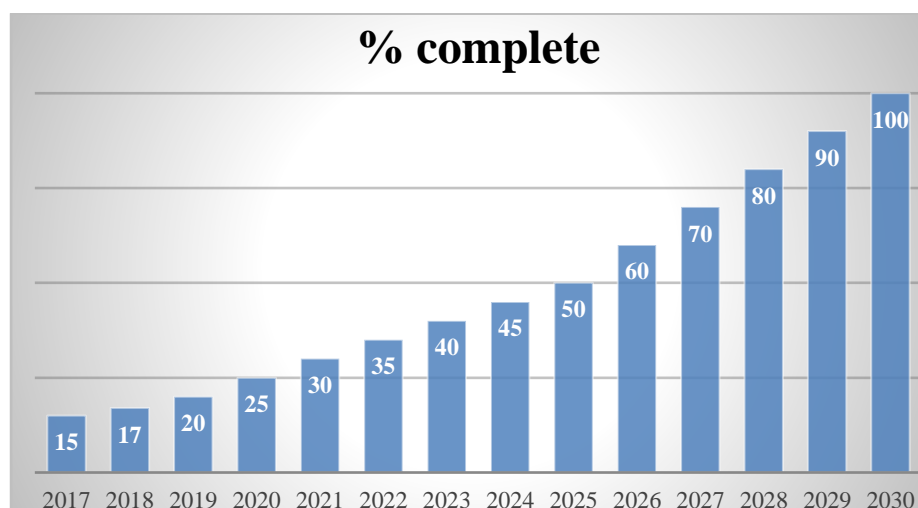


Figure 5 Percentage completion of the high-resolution world map

6. Out of scope activities

For clarity of the scope of the Seabed 2030 Project, in this section we include activities, that while related to Seabed2030, are not explicitly included in this Business Plan or the associated budget.

1) **Implementation of the findings of the Capacity Development Review**

Included in the Seabed 2030 Project and budget is the undertaking of a review of the future capacity development needs. Until the review is completed, it is not known what the capacity development needs or corresponding required budget are. Hence, there is no provision or plan for implementing the outcome of the review. The Capacity Development Review will include a suggested plan and budget to implement the identified capacity development needs.

2) **Convening a follow on Forum II.**

The initial Forum for Future Ocean Floor Mapping proved a significant success in focussing the world's mapping community to consider the future mapping needs and has directly contributed to the creation of the Seabed 2030 Project. In planning Seabed 2030 we believe it would be advantageous to convene a follow on event: Forum for Future Ocean Floor Mapping II in 2020 to update the community on progress of the Seabed 2030 Project and as a platform to further galvanize international commitment to mapping the ocean. However, we have not included this or an associated budget in the Business Plan.

3) **Participation in Shell Ocean Discovery XPRIZE**



As part of the Seabed 2030 Work Package 3: Technology Innovation, GEBCO, in collaboration with the Nippon Foundation are participating in the Shell Ocean Discovery XPRIZE competition. While participation in the XPRIZE is part of Seabed 2030, funding for this activity is not included in the Seabed 2030 costs and will be met from other sources.



NOTE on Appendices and Terms of References

It is planned that during the Establishment Phase the Terms of Reference of some of the components and positions will be further refined and completed.



Note: The Terms of Reference of the Seabed 2030 Project Director are indicative in nature to be used in the development phase of the Seabed 2030 Project. During the Establishment Phase and recruitment of the Project Director, a Position Description will be written.

Appendix 1 – Seabed 2030 Project Director Terms of Reference

Purpose

Overall lead for the Project.

Responsibilities:

- Implement the Seabed 2030 Project as outlined in the Seabed 2030 Project Business Plan and other associated project documentation.
- Lead the Seabed 2030 Project Team.
- Build and foster an effective Seabed 2030 network of partners that includes international mapping initiatives and projects, key international marine programs, industry, NGOs, academic institutions and government agencies.
- Internationally advocate for Seabed 2030 and seabed mapping in general.
- Secure capital sufficient to expand Seabed 2030 activities .
- Advocate for governments and other organizations to finance and carry out new seafloor mapping campaigns.
- Represent Seabed 2030 at international meetings and forums.
- Report on project deliverables, status and progress to the GEBCO Guiding Committee and the Nippon Foundation.
- Produce an annual work plan and submit it to the GEBCO Guiding Committee for endorsement.
- Coordinate and direct communication and outreach activities.

Personal attributes

- Extensive experience and expertise in:
 - o Managing complex international projects
 - o Developing and implementing funding models and fund raising, marketing and communication strategies.
 - o Leading high functioning cohesive teams.
 - o Partnering with and presenting to senior personnel in industry and intergovernmental, NGOs, national and academic organizations.
- Strong interpersonal skills including conflict management, negotiation, networking, communication, and navigating cultural differences.
- Willingness to travel internationally up to 25%.



Note: The Terms of Reference of the Seabed 2030 Review Panel are indicative in nature to be used in the development phase of the Seabed 2030 Project. During the Establishment Phase the Terms of Reference will be completed.

Appendix 2 – Seabed 2030 Review Panel Terms of Reference

Purpose:

- To provide the independent governance of the project.
- To provide assurance to IHO, IOC and the Nippon Foundation of the integrity of the Seabed 2030 Project.

Responsibilities:

- Provide the GGC with independent assessment of Project Annual Report.
- Provide the GGC with independent assessment of the Project Annual Plan and Budget.
- If requested by The Nippon Foundation the panel will also provide assessments to the Nippon Foundation.

Participants:

- Members of the Review Panel will be appointed by the GGC
- The Review Panel will consist of non-GEBCO members and representatives from IHO, IOC and the Nippon Foundation.
- Selection of non-GEBCO members of the Review Panel will be based on:
 - o Experience in governance of large international projects.
 - o Independence from GEBCO and Seabed 2030.
 - o Ability to contribute to Seabed 2030 strategic direction.
- Members of the GGC will not be eligible to participate in the Review Panel.
- People active or with a direct relationship with the Seabed 2030 Project will not be eligible to participate in the Review Panel.

Way of working

- The Project Director will provide the Review Panel with the Annual Report and next year's work plan and Budget for review in time for the Review Panel to assess and pass on outcomes to GGC in time for GGC annual meeting.
- The Review Panel will provide guidance to the GGC on the appropriateness of next year's plan and budget
- The Review Panel will be able to request the Project Team, through the Project Director, to provide further information on the Annual report and next years Delivery Plan.



- The Panel will provide guidance to the GGC on the effectiveness of the Project delivering last year's work plan based on the Annual Report.
- The Panel will provide guidance to the GGC on the appropriateness of the proposed Deliver Plan for the following year.

Funding

Participation of the Review Panel members will be funded from the Seabed 2030 Project Team Activity budget.



Note: The Terms of Reference of the Seabed 2030 Project Team are indicative in nature to be used in the development phase of the Seabed 2030 Project. During the Establishment Phase, the Establishment Team will complete the Terms of Reference of the Project Team.

Appendix 3 – Seabed 2030 Project Team Terms of Reference

Purpose:

To ensure GEBCO - The Nippon Foundation Seabed 2030 vision is realized.

Responsibilities:

- Overall operational management of GEBCO The Nippon Foundation Seabed 2030.
- Preparation of Detailed Work Plans & budget.
- Reporting to The Nippon Foundation and GEBCO Guiding Committee.

Participants:

- Seabed 2030 Project Director (chair).
- Seabed 2030 Project regional center Lead.
- Seabed 2030 Project global center Lead.

Way of working

- 4 quarterly meetings per year – held virtually.
- 1 annual Project Team meeting – held in person.
- Intersessional work virtually.

Administrative support: Program Team Administrator

Funding

- In center and project team budgets.



Note: The Terms of Reference of the Seabed 2030 RDACCs are indicative in nature to be used in the development phase of the Seabed 2030 Project. During the Establishment Phase, the Establishment Team, in consultation with the IHO Secretariat, will write 'Center Agreements' and 'Spending Rules' to document the responsibilities and obligations of the Centers

Appendix 4 – Seabed 2030 Regional Centers (RDACCs) Terms of Reference

Purpose:

Act as the focal point for bathymetric mapping activities in a prescribed region.

Responsibilities:

- Coordinate the access to all existing bathymetric data in region.
- Completion of regional map.
- Provision of regional map to global center for inclusion in GEBCO global map.
- Championing the regional mapping activities.

Funding:

- In regional center contract budgets approved by the Project Team.



Note: The Terms of Reference of the Seabed 2030 GDACC are indicative in nature to be used in the development phase of the Seabed 2030 Project. During the Establishment Phase, the Establishment Team, in consultation with the IHO Secretariat, will write 'GDACC Agreement' and 'Spending Rules' to document the responsibilities and obligations of the GDACCs

Appendix 5 – Seabed 2030 Global Centre (GDACC) Terms of Reference

Purpose: Publishing of the GEBCO products and global data management.

Responsibilities:

- Publishing GEBCO products.
- Providing discovery and delivery tools for the GEBCO products.
- Providing tools and products to allow easy use of the GEBCO products.
- Integration of all regional inputs into a global product.
- Developing strong linkages to non-regional data providers (e.g. industry) to secure the inclusion of such data into the GEBCO products.
- Data processing and assembling of non-regional data into GEBCO products.
- Development and support of GEBCO website as the central GEBCO portal.



Appendix 6 – Seabed 2030 Establishment Team Terms of Reference

Introduction

The first phase of the NF-GEBCO Seabed 2030 Project is a 6 month Establishment Phase in which the project structures and protocols will be created and implemented to prepare the project for its operational phases. The Establishment Phase activities will be undertaken by an Establishment Team. These Terms of Reference document the goals of the Establishment Phase.

The Establishment Phase is planned to begin by 1st August 2017.

Ways of working

Most of the work of the Establishment Team will be via email and skype/telephone meetings. There is no plan for the Establishment Team to meet in person other than for the interviews of the Project Director candidates. Once the goals of the Establishment Phase are achieved, the Team will disband. Contribution to the Establishment Team is on an unpaid basis. Travel and subsistence will be covered for the interviews of the Project Director candidates.

Composition of the Team

The Establishment team will comprise 4 members of the GEBCO Guiding Committee and up to 4 invited external experts.

Name	GEBCO role	Affiliation
Martin Jakobsson	GEBCO Guiding Committee member– Vice-Chair	Department of Geological Sciences, Stockholm University, Sweden
Robin Falconer	GEBCO Guiding Committee member , ex-GGC Chair	Robin Falconer Associates
Graham Allen	GEBCO Guiding Committee member	British Oceanographic Data Centre, National Oceanography Centre, UK



Marzia Rovere,	GEBCO Guiding Committee member	ISMAR - Consiglio Nazionale delle Ricerche, Italy
Lisa Taylor	Independent, Ex-GEBCO Guiding Committee member	National Centers for Environmental Information, NOAA, US
David Heydon	Independent	Deep Sea Mining Expert
David Millar	Independent	Fugro, US
Larry Mayer	Independent	Center for Coastal and Ocean Mapping/Joint Hydrographic Center University of New Hampshire, US

Goals

1) Recruit the Project Director

- A first draft of the position description has been prepared
- Finalize the Position Description and the advertisement
- Advertise the position
- Finalize recruitment/interview panel
- Conduct the interview and selection process

2) Establish the Regional Data Assembly and Coordination Centers (RDACC)

- The locations of the RDACCs have been agreed.
- Draft working agreement between GEBCO and the RDACCs
- Obtain approval of the agreement



3) Establish the Global Data Assembly and Coordination Center (GDACC)

The location of the GDACC has been agreed.

- Draft working agreement between GEBCO and the GDACC
- Obtain approval of the agreement

4) Establish the Project Team

- The directors of the GDACC and each RDACC have been provisionally proposed by each centre. These five and the overall project director will constitute the Project Team.
- Draft Terms of Reference for the Project Team.

5) Implement the required monetary accounts and governance at IHO

- Seek agreement with IHO on how to handle and disburse money to:
 - o Project Team for project activities
 - o RDACCs.
 - o GDACC.
 - o Project Director.

6) Commence capacity development review

- Determine scope and process.
- Determine participants.
- Write Terms of Reference.

7) Initiate outreach to ocean mapping community

- It is important that we start telling the world about Seabed 2030 and connecting with related organizations. Until the Project Team is set up, the Establishment Team will take the lead in outreach.

8) Reporting

- Report progress and status to:
 - o IHO
 - o IOC
 - o The Nippon Foundation
 - o GEBCO Guiding Committee

9) Transition

- Ensure a smooth transition of responsibility to the Seabed 2030 Project Team at the end of the Establishment Phase



Relevant documents

Document	Explanation
Seabed 2030 Project Business Plan.doc	All of the detailed plans. The foundational document for the proposed project. Money values have been excluded on purpose and at request of the Nippon Foundation
Seabed 2030 Business Plan Appendix 7 Costs.doc	A summary of the project costs. Is an appendix of above Business Plan but on purpose kept separate from the Business Plan itself
Seabed 2030 Business Plan Costs (Details).xls	The project budget in excel and in as much detail as we have. Lots of computed values and very fragile! Much of the original budget is still included (as hidden columns) so we did nt lose the original costs and suggested activities and so some of the current budgets are computed as fractions of the original budget (again so we could see how we have reduced the budget compared to original idea)
Seabed 2030 Project Overview.doc	A brief overview of the Project including summary budget. Created at the request of Nippon Foundation as a high level project summary for the Executive Board of Nippon Foundation
Seabed 2030 Project Plan.doc	A brief overview but with more details as requested by the Nippon Foundation
Seabed 2030 Project Application for Year 1.doc	After writing all of the above, the Nippon Foundation then requested an application for just Year 1. So this is it.
Seabed 2030 Year 1 budget.xls	The Year 1 budget details. I think all of this is now included in the Year 1 Application itself at the Nippon Foundation request.



Documents to be written

Goal	What	Lead	Status
Recruit Director	Write Project Director Position Description		
Project Team	Write Terms of Reference for Project Team & initiate Kick off meeting		
RDACC set up	Write GEBCO-RDACCs agreement		
GDACC set up	Write GEBCO-GDACC agreement		
IHO accounts	Write spending rules for disbursement of Center funds		
IHO accounts	Write spending rules for Project Team Activity funds		
Capacity Development Review	Write Terms of Reference for Review		



Appendix 7 – Project Costs

See separate document



Note: The Terms of Reference of the Seabed 2030 Strategic Advisory Group are indicative in nature to be used in the development phase of the Seabed 2030 Project. During the Establishment Phase the Terms of Reference will be reviewed and updated if required.

Appendix 8 – Seabed 2030 Strategic Advisory Group Terms of Reference

Purpose:

- To provide independent expert advice to the Seabed 2030 Project Team
- To augment and compliment the input and contribution from GEBCO sub-committees, e.g. TSCOM and SCRUM

Responsibilities:

- Provide technical and strategic advice to the Project Team

Participants:

- The Group will consist of between 4 and 6 experts.
- The group may co-opt additional members for specific tasks
- The Chair will be elected by the Group

Way of working

- The Strategic Advisory Group will provide advice on seabed mapping needs, strategic options and potential initiatives. Advice will be sought by the Seabed 2030 Project Team to input to future strategic direction and potential work plans.
- The group may obtain additional advice through co-opting additional members for specific subject areas.
- The Group will be kept informed of progress against agreed work plans.
- 1 annual meeting – held at a date that allows advice to be input to development of future work plans
- Intersessional work virtually when required

Funding

Participation of Group members will be funded from Seabed 2030 Project Team budget



Appendix 9 – List of Preliminary Seabed 2030 Contributors

Organization	Contact person	Contact person title	Email	Type of organization	Country
The Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI)	Boris Dorschel	Professor	boris.dorschel@awi.de	Academia/research institution	Germany
British Antarctic Survey (BAS)	Helen J Peat	Head UK Polar Data Centre	hjpe@bas.ac.uk	Governmental Agency	UK
Black Gold Energy	Dan Orange	Operations Manager-Offshore & member of Board of Directors	dan@seaseep.com	Industry	Brazil
Fugro America	Ed Saade	President	ESaade@fugro.com	Industry	USA
Fugro Pelagos Inc	David Millar	President	dmillar@fugro.com	Industry	USA
GNS Science	Vaughan Stagpoole	Head of Department: Marine Geoscience	V.Stagpoole@gns.cri.nz	Academia/research institution	New Zealand
Grid Arendal	Peter Harris	Managing Director	peter.harris@grida.no	Governmental Agency	Norway
Jamstec	Asahiko Taira	President	ataira@jamstec.go.jp	Governmental Agency	Japan
Lamont Doherty Earth Observatory	Suzanne Carbotte	Professor	carbotte@ldeo.columbia.edu	Academia/research institution	USA
Land Information New Zealand	Adam Greenland	National Hydrographer	agreenland@linz.govt.nz	Governmental Agency	New Zealand
Ocean Melting Greenland (OMG) program/NASA	Ian Fenty	Senior scientist	Ian.Fenty@jpl.nasa.gov	Academia/research institution	USA
NGA (National Geospatial-Intelligence Agency)	John Lowell	Sr Maritime National Geospatial-Intelligence Officer	John.E.Lowell@nga.mil	Governmental Agency	USA
National Geographic	Alex Moen		Amoen@ngs.org	Foundation	USA



National Oceanography Centre	Graham Allen	Chief Information Officer (CIO)	graham.allen@noc.ac.uk	Academia/research institution	UK
Neptune Canada	Kate Moran	CEO	kmoran@oceannetworks.ca	Academia/Industry	Canada
National Geospatial Intelligence Agency (NGA)	John Lowell	Senior Maritime National Geospatial-Intelligence Officer	John.E.Lowell@nga.mil	Governmental Agency	USA
NIWA	Rob Murdoch	General Manager, Research	Rob.Murdoch@niwa.co.nz	Academia/research institution	New Zealand
NOAA	Craig McLain	Director	craig.mclean@noaa.gov	Governmental Agency	USA
NOAA Office of Coast Survey	Shepard Smith	Rear Admiral (Director)	shep.smith@NOAA.GOV	Governmental Agency	USA
Ocean Exploration	Robert Ballard/Nicole Renault	President/VP of Exploration and Science Operations	captainemo@comcast.net nicole@oceanexplorationtrust.org	Trust	USA
Ocean Mapping Group	Ian Church	Assistant Professor	ian.church@unb.ca	Academia/research institution	Canada
Ocean Infinity	Jan Arvid Ingulfson/ Oliver Plunkett	Senior adviser and director	jan.ingulfson@swireseabed.com oliver.plunkett@oceaninfinity.com	Industry	UK/Norway/USA
Swedish Maritime Administration	Ulf Olsson	Director Hydrography	Ulf.Olsson@Sjofartsverket.se	Governmental Agency	Sweden

A preliminary list of organizations that have expressed support and an intention to be an active supporter of Seabed 2030.