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Reports of Meetings of Experts and Equivalent Bodies

IODE Steering Group for OBIS (SG-OBIS)

Seventh Session

IOC Project Office for IODE, Oostende, Belgium
12-16 November 2018

UNESCO

IOC/IODE-SG-OBIS-VII
Oostende, 12-16 November 2018
English only

Group picture, from left to right: Kuidong XU (China), Ismaïla NDOUR (Senegal), Sky BRISTOL (USA), Ursula VON ST ANGE (South Africa), Priyadi SANTOSO (Indonesia), Pieter PROVOOST (IOC), Lenore BAJONA (Canada), Kevin MACKAY (New Zealand), Ward APPELTANS (IOC), Thomas LANSSENS (Belgium), Pamela HIDALGO (Chile), Udhi HERNAWAN (Indonesia), Oleksandr NEPROKIN (Ukraine), Nina WAMBIJI (Kenya), Rae PRATIWI (IOC), Anton VAN DE PUTTE (Belgium), Mirtha LEWIS (Argentina), Christian ELLORAN (Philippines), Eduardo KLEIN (Venezuela), Carolina PERALTA BRICHTOVA (Venezuela), Nicolas BAILLY (Philippines), Bart VANHOORNE (Belgium), Dave WATTS (Australia), Tobias SPEARS (Canada), Hanieh SAEEDI (Germany), Takashi HOSONO (Japan), Katsunori FUJIKURA (Japan), Monica MACHUCA (Ecuador), Abdolvahab MAGHSOUDLOU (Iran), Pia HAECKY (Denmark), Izwandy BIN IDRIS (Malaysia), Tomoaki KITAYAMA (Japan), Martha VIDES (Colombia), John NICHOLLS (Ireland), Peter Pissierssens (IOC). Missing on picture: Derek BROUGHTON (UK), Daphnis DE POOTER (Belgium), Patrick HALPIN (USA)

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Executive Summary

The 7th Session of the IODE Steering Group for OBIS took place on 12-16 November 2018 at the IOC Project Office for IODE, Oostende, Belgium. The meeting was attended by 36 participants from 24 countries representing 24 OBIS nodes.

During the intersessional period, 4.3 million species distribution records were added to OBIS from 350 new datasets, providing 11,300 new marine species to OBIS. OBIS now has 52.1 million occurrences of 121,400 species from 2,533 datasets. The OBIS network grew with eight new OBIS nodes (31 OBIS nodes in total). In partnership with IOC's OceanTeacher Global Academy and contributions from many other institutions, OBIS has trained 317 people from 71 countries in 20 training courses, of which 8 OBIS training courses took place in 2018, and several more are already scheduled for 2019.

Soon with the release of OBIS 2.0 (expected in December 2018), OBIS will have a more solid foundation to build improved data processing/integration workflows, new data synthesis routines that add value to OBIS data, and new types of products and applications for scientific and decision-making analysis. The SG meeting established new focused and time limited projects, such as a Data Quality Control project team which will develop a quality assessment scheme iterating on a judicious set of criteria using the various quality control checks in the OBIS 2.0 system to flag and filter out the most suspect or problematic records. A Vocabulary Infrastructure project team will establish a basic framework for organizing and curating vocabularies used in OBIS. This will especially be important for the future of OBIS when incorporating new data types that characterize marine ecosystems in support of Essential Ocean Variables (EOVs) and other assessment and indicator needs.

OBIS is working toward a more open and inviting process of co-developing OBIS as a global networked open-source data system. A dynamic OBIS "software" ecosystem of code repositories will enable the community to organize, document, and contribute analytical codes that interface directly with the OBIS API, provide analyses, and share results. The OBIS communication team will use these tools to develop data-driven analytics to develop regular news leads on new and interesting phenomena suggested from the new data and leverage its network with the CBD, IPBES, and other groups to bring together researchers and other experts, including policymakers, to develop policy briefs specific to different issues such as BBNJ, ocean acidification, and others.

OBIS may seek a cooperative development with an emerging alliance under the Global Biodiversity Information Conference (GBIC) which could focus on realizing economies of scale in the core data integration infrastructure needed for OBIS operations with accompanying increases in our ability to apply specific marine biodiversity knowledge into the system (e.g., marine-specific observation and measurement types, specific taxonomic enhancements and quality control, importance of third dimension in spatial aspects of the data, etc.).

This co-development process will need to involve collaboration between the OBIS data manager and tool developers. Recent survey responses about the types of technical and methodological tools that many of the OBIS nodes are willing and able to contribute are evidence of a growing level of technical maturity across the network. Nonetheless, the overall sustainability of the OBIS network remains vulnerable. The OBIS network just lost three OBIS nodes due to the fact that their funding source dried out. Only one third of the OBIS nodes have their operational budget secured for 2019-2020 and are sufficiently resourced in terms of staffing. To optimally run the OBIS enterprise and process the backlog of datasets (>600 datasets), the OBIS nodes would collectively need an additional 25 full-time equivalents (FTEs), to a total of 76 FTEs or increase from 1.8 to 2.8 FTE per OBIS node. The situation at the OBIS secretariat, where currently only the OBIS project manager

position is covered by IOC's regular programme funds, is even more problematic. The OBIS data manager position, a mission-critical position, need to be secured beyond 2019 and OBIS is asking more urgency from the IOC Member States and non-governmental partners to pledge resources to UNESCO and/or the IOC special account for OBIS to enable IOC to create a regular programme post for the OBIS data manager and support the implementation of the OBIS work plan, in order to secure the continuation of OBIS under IOC/IODE beyond 2019.

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1 OPENING OF THE SESSION AND ADOPTION OF THE AGENDA

1. Mr Eduardo Klein and Mr Sky Bristol (SG-OBIS Co-Chairs) opened the 7th session of the IODE Steering Group for OBIS (SG-OBIS-VII) and welcomed all the participants, especially the new members: Pamela Hidalgo (Chile), Martha Vides (Colombia), Pia Haecky (Denmark), Monica Machuca (Ecuador), Hanieh Saeedi (Germany), Udhi Hernawan (Indonesia), Nina Wambiji (Kenya), Izwandy Bin Idris (Malaysia) and Carolina Peralta Brichtova (Venezuela). They also welcomed the observers Priyadi Santoso (Indonesia) and Tomoaki Kitayama (Japan) and UNESCO volunteer Rae Sita Pratiwi (Indonesia). With 39 participants, this is by far the largest steering group meeting. Apologies were received from Pat Halpin (OBIS-SEAMAP), Francisco Hernandez (EurOBIS), Leen Vandepitte (EurOBIS), Narayanane Saravanane (IndOBIS), Stamatina Nikolopoulou (MedOBIS). We did a round table introduction of the participants.

2. Mr Eduardo Klein then thanked the staff of the IODE Project Office for their great logistical support during the preparations for this meeting and also expressed appreciation for the financial support from the IOC/IODE programme and the OceanTeacher Global Academy (OTGA), without which this meeting would not be possible.

3. Mr Ward Appeltans (OBIS project manager) provided some logistical and practical information.

4. Mr Sky Bristol (SG-OBIS Co-Chair) then presented the draft agenda (annex 1) and asked if anyone wanted to propose additional agenda items.

5. The SG-OBIS adopted the agenda without changes, but a time table with daily goals and expectations was requested.

6. **The SG-OBIS thanked IODE for hosting and sponsoring the 7th session of the SG-OBIS and the OceanTeacher Global Academy for their support in co-hosting the SG with a training session.**

7. The official part of the meeting was adjourned for 2 days to organize a “data refresh hackathon” as well as allow time to finish a number of working documents for the SG, including the OceanObs’19 paper on OBIS.

8. During the data refresh hackathon, OBIS Node Managers received training in the new OBIS2.0 tools (QC report and metadata system), worked on legacy datasets (those that are not part of node IPTs) and brainstormed on eMoF vocabularies. There were 345 datasets representing 15.5 million records which did not belong to an OBIS node (see list). For these datasets, the OBIS secretariat created DarwinCore Archives and posted those on an IPT (http://ipt.obis.org/nonode). During the data refresh hackathon, the OBIS nodes examined this list and 136 datasets were adopted. During this process, the OBIS nodes learned about the new OBIS 2.0 data harvesting and quality control process as well as how to map the details of the institutions from the metadata with IOC’s OceanExpert database.

2 OBIS PROGRESS REPORT

2.1 OBIS SECRETARIAT

9. Mr Appeltans provided an overview of the OBIS secretariat activities during the intersessional period (21 months). In terms of numbers, 4.3 million presence records were added to OBIS from 350 new datasets, providing 11,300 new marine species to OBIS. In total, OBIS now has 52.1 million occurrences of 121,400 species from 2,533 datasets. In addition, OBIS holds 7.1 million absence records. The harvest and database reports are available at http://iobis.org/reports/.

10. Since February 2017, eight new OBIS nodes joined the network:

- The Permanent Commission for the South Pacific (CPPS)
- Institute of Oceanography and Environment (INOS) of the Universiti Malaysia Terengganu
- The Marine and Coastal Research Institute of Colombia (INVEMAR)
- The Marine Biological Association (MBA)
- Quantitative Aquatics (Philippines)
- The Tulane University Biodiversity Research Institute (USA)
- The Research Centre for Oceanography (RCO) of the Indonesian Institute of Sciences (LIPI)
- The Kenya Marine and Fisheries Research Institute (KMFRI)

11. In recent years, OBIS developed a RESTful Application Programming Interface (API) to help drive the new portal interface and an R package for analytical use, which is proven to be attractive to users and now drives multiple third-party applications. However, the system for harvesting new data was experiencing major delays due to ageing and out of date processes and software infrastructure. The process of quarterly data loads through a process that involves a fair bit of manual labor in addition to long processing times to rebuild database indexes and other aspects of the system was problematic in getting new data online and meeting user expectations - from both data providers and data consumers. The Intergovernmental Oceanographic Commission (IOC) of UNESCO has recognized the critical need to upgrade of the OBIS platform and decided to support the OBIS 2.0 re-engineering project with US$170,000 through extra-budgetary funding sources. A full status and progress report on the OBIS 2.0 developments is available under the Technical Task Team agenda item.

12. The OBIS secretariat was directly involved in five OBIS training courses, listed below:

- OBIS Asian Nodes and Coral Reef Training Course, Kuala Terengganu, Malaysia, 22 - 26 October 2017
- Harmful Algal Bloom Data Training Course, Oostende, Belgium, 25 - 28 September 2017
- OBIS Nodes Training Course, Oostende, Belgium, 27 Nov - 1 Dec 2017
- FEPS/OBIS/OTGA/SEF Marine Species Distribution Modeling, Oostende, Belgium, 12 - 16 March 2018
- U.S. IOOS/OBIS Biological Data Training Workshop, Seattle, USA, 8 - 9 February 2018

13. Providing training and technical support requires a substantial amount of time and resources but is and probably should remain a core activity of the OBIS secretariat.

14. Also outreach and communications is a key activity of the OBIS secretariat, especially by publishing news via the OBIS website, social media, e-newsletter and presenting OBIS at workshops and conferences. In addition, the secretariat keeps track of OBIS cited publications and regularly posts OBIS use cases on the website (http://iobis.org/usecases). With >10 OBIS cited papers per month, 2018 is going to be record year (http://iobis.org/library). The communication and outreach activities are further discussed under agenda item 2.3.5.

15. The OBIS secretariat is actively following-up on the process to develop a new legally-binding instrument under the Convention on the Law of the Sea, to conserve and sustainably use marine biodiversity of areas beyond national jurisdiction (BBNJ). The BBNJ process has moved from the Preparatory Committee into Intergovernmental Conference (IGC) negotiations. Four IGC sessions are planned in 2018-2020 of which the first took place on 4-17 September 2018. Mr Pat Halpin further introduced the BBNJ topic under agenda item 2.3.6.

16. In collaboration with the Government of Belgium, the OBIS secretariat hosted a BBNJ related workshop "Healthy Oceans, Resilient Islands". Nearly 100 representatives of 35 Small Islands and Developing States (SIDS), including experts from the UN and EU, met at the IOC project office for IODE, 7-9 March 2017, to discuss SIDS specific challenges and opportunities. This workshop contributed to the preparation for the third BBNJ Preparatory Committee Meeting. The SIDS representatives recognized the potential contribution of OBIS as a platform from which to build on. Mr Appeltans also presented OBIS as a data-clearing house for BBNJ in an EU BBNJ Workshop, 26-28 March 2018 in Brussels, organised by the Government of Belgium, in collaboration with the High Seas Alliance and the Pew Charitable Trusts.

17. Through the DIPS-4-Ocean Assessments project (a Flanders' UNESCO Science Trust Fund – FUST - project), OBIS can support assessment processes with information products and services. For example, OBIS products (http://iobis.org/data/maps) were used in regional assessments under the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Also, specific data were sent to authors of the IPBES global assessment (to be released at the 7th IPBES Plenary, 29 April – 4 May 2019 at UNESCO HQ in Paris). In addition to IPBES, OBIS is also involved in the preparations for the 2nd cycle of the World Ocean Assessment (under the UN Regular Process). The OBIS secretariat is actively involved in the preparations of Chapter 6b 'Marine Invertebrates'. Furthermore, several members of the OBIS Steering Group have been nominated by IOC-UNESCO and represented OBIS at the following WOA-2 workshops:

- Kevin Mackay: Regional workshop for the South Pacific. Auckland, New Zealand, 18 – 19 October 2017
- Antonio Marques: Regional workshop for the South Atlantic (between the African and American coasts) and the wider Caribbean. Camboriú, Brazil, 14 - 15 November 2017
- Oleksandr Neprokin: Regional workshop for the North Atlantic, the Baltic Sea, the Mediterranean Sea and the Black Sea region. Odessa, Ukraine, 17 - 18 October 2018
- Vahab Maghsoudlou and Saravanane Narayanane: Regional workshop for the Indian Ocean (including the Arabian Sea and the Bay of Bengal), the Red Sea and Gulf of Aden and the ROPME/RECOFI area. Doha, State of Qatar, 28 - 29 November 2018

18. The IODE pilot project OBIS-Event-Data was established through Recommendation IODE-XXIV.3 and adopted by the IOC Assembly Decision IOC-XXIX/6.2.1. This 2-year pilot project aimed at seeking early adopters of the OBIS-ENV-DATA standard and developing data products and scientific applications, in particular to support the work of the Biological and Ecosystem EOVs of GOOS and the Marine Biodiversity Observation Network of the Group on Earth Observations (GEO BON

MBON). The first workshop took place at the IODE project office on 23-26 April 2018 and was attended by 22 participants from 8 countries representing the major animal telemetry networks in Africa, Antarctica, Australia, Canada, Europe and the USA. The participants agreed to use the OBIS-ENV-DATA Darwin Core standard to exchange and publish detection data through OBIS (both acoustic and satellite). It was felt important that OBIS provides access to the relevant (aggregated) data to calculate scientific products (such as species home ranges, migration pathways and movement patterns) and provides links back to the original (raw) data sources to ensure proper data provenance and allow reproducibility. The guidelines for the implementation of the OBIS-ENV-DATA standard for tracking data are further refined and documented in a GitHub repository, in collaboration with the data standardization working group of the International Bio-logging Society as well as the Biodiversity Information Standards (TDWG) community which oversees development of Darwin Core. The full meeting report is available here.

19. The financial and staffing situation at the OBIS Secretariat remains critical. Currently only 0.5 FTE OBIS project manager is secured through UNESCO's regular programme. Two other positions are covered by extra-budgetary project funding: an OBIS data manager (Mr Pieter Provoost, which is secured until end of 2019) and an OBIS Data Science Officer position (Dr Samuel Bosch, which was occupied between 15 August 2017 and 30 September 2018). However, Dr Bosch left the secretariat on 1 October and it was decided to temporarily fill this position with a 6-month consultancy contract. The job announcement was advertised on 24 October 2018. In addition, a two-month consultancy contract funded through the OceanTeacher Global Academy (OTGA) was granted to Carolina Peralta (OBIS Caribbean) who developed OBIS training materials during July-August 2017. These materials are available on the OTGA moodle platform and are now being used in OBIS training courses.

20. Considering the financial and staffing situation, it is clear that new funding for maintenance of the OBIS infrastructure, training and help-desk support as well as for future portal developments is needed beyond 2019. A more permanent solution for the data manager position, a mission-critical post, fulfilling core activities, is vital for the continuation of OBIS, especially when demands for support is growing and will continue to grow with a growing network.

21. On 2 October 2018, we welcomed Mrs Rae Sita Pratiwi as a UNESCO volunteer. For 6 months, she will support OBIS with the development of the national OBIS node for Indonesia, hosted at LIPI's Research Centre for Oceanography, Jakarta. Rae's main tasks are (i) performing an assessment of capacity needs and suitability of the existing OBIS training material for Indonesia (gap analysis), (ii) assist with further development of OBIS training material for Indonesia, (iii) assist with the preparations/origination of an OBIS training course in Indonesia, and (iv) contribute to the development of science communication material on OBIS to increase awareness and involvement of Indonesian scientists/civil society in OBIS.

22. **The SG-OBIS stressed the importance to secure the OBIS data manager position beyond 2019 and requested the IOC Executive Secretary to prepare the documentation to the UNESCO Director-General to create a regular programme post for the OBIS Data Manager at the earliest opportunity, and preferably within the 40C/5 (2020-2021).**

23. **The SG-OBIS urged member states and non-governmental partners to provide extra-budgetary resources to the IOC Special Account for OBIS in order to support the implementation of the OBIS work plan and secure the continuation of OBIS beyond 2019.**

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Share a template for project proposals.	OBIS Secretariat		
Develop a portfolio of small project proposals, combining nodes from different countries.	All		
Share reports from the BBNJ process, and other processes such as GOOS with the SG-OBIS	OBIS Secretariat	Continuous	
Organize the 8th session of the SG-OBIS	OBIS Secretariat		25,000 US$ [IODE]

2.2 OBIS EXECUTIVE COMMITTEE

24. Mr Eduardo Klein introduced this agenda item. The 2nd OBIS Executive Committee (EC-OBIS) meeting took place 22 - 24 November 2017, Oostende, Belgium prior to the OBIS nodes training course, 27 November - 1 December 2017. The EC-OBIS is composed of the SG-OBIS chairs, the chairs of the OBIS Task Teams, the OBIS project manager and the OBIS data manager. The EC-OBIS is mainly responsible for follow-up of the workplan, the preparation of strategic decisions, the agenda of the SG-OBIS meetings, partnerships with other organizations, the development of OBIS sustainability and business plans.

25. At EC-OBIS-2, the task team chairs reported on the progress and challenges encountered and made suggestions for the next SG-OBIS meeting, which are discussed under agenda item 2.3. The EC-OBIS also reviewed the list of inactive OBIS nodes and instructed the OBIS Secretariat to inform these OBIS nodes about their status. The EC-OBIS discussed the importance to partner with the Global Ocean Observing System (GOOS) and suggested that serving the biological and ecosystem Essential Ocean Variables (EOVs) of GOOS should be a top priority for the coming years. The IODE pilot project OBIS-Event-Data is a good example of how OBIS can support the data management and product information generation for EOVs.

26. A closer collaboration with GOOS and the ability to serving taxonomic as well as habitat ecosystem EOVs led to the discussion on a name change for OBIS. The EC-OBIS recommended to move forward with changing its name from Ocean “Biogeographic” Information System to Ocean “Biodiversity” Information System, while keeping the same acronym. The rationale is provided under agenda item 3.1. This proposal will need to be approved by the SG-OBIS, and then put forward as a recommendation to the IOC Committee for IODE who needs to submit it for decision/resolution to the IOC Assembly, who will meet in July 2019.

27. The EC-OBIS reviewed the possibility of OBIS becoming a WMO-IOC Centre for Marine-Meteorological and Oceanographic Climate Data (CMOC). The World Ocean Database (WOD), which is also an IODE project, became a CMOC. The difference with a Global Data Assembly Centre is that CMOCs are also responsible for the generation and maintenance of specific products. The EC-OBIS found that it is still unclear what the additional burden would be on the Secretariat and if that outweighs the benefits and tasked the group to investigate the accreditation and 5-year review criteria for CMOCs before a final decision could be taken. This review has not been completed yet.

28. Mr Sky Bristol introduced an exercise adapted from the Science Gateways Community Institute, a group funded by the US National Science Foundation, to develop a brief "napkin drawing" and value proposition statements. This exercise was used by the SG-OBIS to continue refining the mission of OBIS and how it can be communicated to local, regional, and international stakeholders. SG-OBIS members formed small teams to build different ideas of a "pitch deck;" a couple of simple slides to essentially pitch the idea of OBIS to a potential donor, funder, or other stakeholder. Results of the exercise were captured in a companion document, presented in annex 2.

29. The SG-OBIS recommended that the articulation of value propositions specific to different stakeholder groups should be incorporated into communication materials through regular testing and refinement. Value propositions will evolve with the continued growth and maturity of OBIS and should be revisited regularly.

30. The SG-OBIS recommended that the OBIS Secretariat work with our presentation materials for OBIS to produce a configurable slide deck template that can be used across the OBIS Network to present/pitch OBIS in a consistent but targeted way to stakeholder and policy maker groups.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Develop slide deck template with common OBIS message	OBIS Secretariat	January 2019	10,000 US$ [IODE]
Adapt slide deck to local communication needs and present	Node Managers	January - July 2019	15,000-25,000 US$ [OBIS Nodes]
Report on the reception of the OBIS "pitch" to the OBIS Network	Node Managers	January - July 2019	
Iterate on slide deck design	OBIS Secretariat	January - July 2019	5,000 US$ [IODE]

2.3 OBIS TASK TEAMS

31. Mr Sky Bristol introduced this agenda item. At the 6th SG-OBIS session he already expressed concern over the lack of active engagement in the OBIS task teams. The OBIS task teams have an important task to prepare working documents, including recommendations and actions for discussion and decision at the SG meetings. This is crucial to make progress in OBIS, especially when the SG only meets once per year. The OBIS task team (co)chairs are also member of the OBIS Executive Committee which is the body to review progress and intervene in the work plan if necessary.

32. The chairs of the OBIS task teams were requested to report on progress achieved, challenges encountered and provide suggested actions, measures and recommendations for the SG-OBIS to consider for the 2019 OBIS work plan.

33. Each of the extant task teams present reported on activities in the intersessional period (summaries included below). Mr Sky Bristol discussed the concept of a slight refactoring on task teams to include more focused and agreed upon direction for discrete projects over the course of a work period. This concept will be experimented with in a couple of areas noted below.

34. The SG-OBIS recommended the continuation of the Capacity Development Task Team with current leadership (Mrs Carolina Peralta), the Communication and Outreach Task Team with new leadership (Mr John Nicholls), and the Taxonomy Task Team with current leadership (Mrs Leen Vandepitte).

35. The SG-OBIS recommended discontinuing the Data Content Enhancement Task Team and the Technical Task Team in favor of new focused and time limited projects identified during the training and development portion of SG-OBIS-7.

2.3.1 Capacity Development Task Team

36. Mrs Carolina Peralta (chair of the CD Task Team) introduced this agenda item. She reported on the OBIS training courses during the intersessional period and provided a status report on the activities as part of the OBIS training strategy 2017-2021. The SG-OBIS discussed the OBIS training strategy and identified weaknesses and strengths.

37. The SG-OBIS expressed its appreciation for the support of many organizations in organizing and funding OBIS training courses, such as the OceanTeacher Global Academy (IOC, through FUST), the US-IOOS (USA), University of Concepcion (Chile), INIOAS (Iran), Charles Darwin Foundation (Ecuador), Universidad Nacional Autónoma de Mexico UNAM (Mexico), Marine and Coastal Research Institute - INVEMAR (Colombia)

38. The SG-OBIS recommended to organize a training course for trainers in concert with OceanTeacher Global Academy practices to further develop the pool of trainers and train them in the use of new OBIS 2.0 tools and services.

39. The SG-OBIS recommended to put more effort in following-up on and mapping the alumni students to report on what they gained from the training, including the impact of being able to publish their data through OBIS.

40. The SG-OBIS recommended to continue updating and improving the training materials, including the new OBIS portal version (2.0), so as to create new material according to the target audience and theirs needs.

41. The SG-OBIS recommended to continue collaboration with other organizations to organize OBIS training courses, and recommended to partner with training initiatives, such as The Carpentries.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
OBIS train the trainers training course	CD-TT		30,000 US$ [OTGA, IODE PO]
Set up a mechanism for alumni to report on outcomes and impact	OBIS Secretariat		
Assess and report on the impact of training courses based on the alumni reporting mechanism	CD-TT		

Further develop training modules, including how-to videos targeting different audiences, in collaboration with OTGA and its RTCs, and in partnership with other initiatives, such as POGO, IOC-WESTPAC, Data Carpentry	CD-TT		

2.3.2 Data Content Enhancement Task Team

42. The Data Content Enhancement Task Team has not been active during the intersessional period and lacks a chair. The suggestion to set up a new OBIS vocab task team with the proposed Terms of Reference was not approved.

2.3.2.1 Vocabulary and ontology clearing-house

43. The SG-OBIS recommended the formation of a time-limited project to address the needs for controlled vocabularies in the implementation of Darwin Core and extended Measurement or Fact in the OBIS data model. The purpose of this first activity should be to establish a basic framework for organizing and curating vocabularies used in OBIS. A small, temporary project team should be formed to begin populating a vocabulary/ontology clearinghouse/hub for applicable vocabularies that are needed or are being used in OBIS today.

44. An immediately accessible and appropriate possibility for a vocabulary/ontology clearinghouse/hub is the ESIP Community Ontology Repository, a US-based effort that is specifically designed for this kind of purpose; often housing vocabularies that are already maintained in various places (e.g., NERC) but need to be expressed through a common framework in order to be integrated into live applications. The project team should reach out to and ally with semantic technology experts in the community such as those involved in vocabulary development with CSIRO in Australia. Once a few vocabularies are available in the clearinghouse, providing a single point of access using standard technologies (e.g., SPARQL, etc.), the OBIS Data Manager should co-develop with software engineers made available from at least one OBIS Node a) an easy browser for data managers to present terms to be applied on inbound datasets (e.g., replacing http://iobis.org/vocab/ with a live system) and b) new back-end technologies in the data processing pipeline to begin examining terms and exploiting the vocabularies. In order to facilitate the production of compliant Darwin Core archives, it will be important to provide value-added search/matching capabilities similar to WoRMS taxon matching for target/recommended vocabularies. It will also be important to clearly communicate the points of target/recommended vocabularies in order for data providers to obtain support for addressing unmatched terms in a timely manner.

45. OBIS also needs to begin providing targeted support to the scientific communities who desire to use OBIS as a data infrastructure but who lack formal vocabularies describing the scientific methods and protocols involved in their specific types of data (e.g., implementation planning groups for Essential Ocean Variables).

46. The SG-OBIS recommended that representatives from the OBIS community of Node Managers, data managers, and research scientists interested in developing community-specific vocabularies be oriented to the Vocabulary Maintenance Specification Task Group developed and released by TDWG.

47. The SG-OBIS recommended that, wherever possible, these "vocabulary facilitators" should strive to build on existing vocabulary efforts from BODC/NERC or others rather than starting with something completely new, and this motivated the previous recommendation on leveraging a vocabulary repository/clearinghouse mechanism to facilitate this process.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Form Vocabulary Infrastructure Project Team	Sky Bristol, Pieter Provoost	February 2019	3,000 US$ [IODE]
Identify and populate known vocabularies in repository	VIP Team	February - April 2019	3,000 US$ [IODE]
Develop API access to OBIS vocabularies and web browser tool	OBIS Data Manager	April 2019	10,000 US$ [IODE]
Develop Vocabulary Maintenance orientation webinar in concert with TDWG	OBIS Capacity Development Task Team/OTGA	March - April 2019	10,000 US$ [IODE]
Plan and conduct at least one scientific community vocabulary development engagement	TBD	April-October 2019	10,000 US$ [IODE] 25,000 US$ [in kind OBIS Node]

2.3.2.2 Data Quality control and Quality assessment

48. There was an immediate desire to address the most problematic issues of data that appear to be causing reputational harm to the OBIS image. However, there may be issues where filtering out too much data could be problematic from the standpoint of data providers. During testing of the high-level filters, we should examine and characterize the probable impact in terms of the nodes and data providers impacted by the change and the level of impact (e.g., percentage of records filtered out by dataset). We can use this to help hone the filtering and provide opportunities for discussion and improvement with providers. This type of quality assessment impact reporting should be baked into the system for future use.

49. The individual quality control checks in the OBIS pipeline should be componentized such that the same core logic can be packaged together into the robis package and into the back-end processing pipeline (as much as possible). The individual algorithms should be structured in such a way that they can be referred to by some type of identifier that is distinguishable to their source code. Those identities can then be referenced into a more coherent mapping between the low-level assessment characteristics and the higher level IODE quality flag scheme characteristics. These fundamental building blocks can also be versioned over time as refinements in the process are developed. A summary of the discussions of a data quality assessment break-out group is available in annex 3.

50. The SG-OBIS recommended using the OBIS 2.0 transition to apply a judicious set of criteria to filter out suspect data, test how this appears in the "beta" portal.obis.org interface (query tools and mapper), iterate on the criteria, and then implement a system where the most

suspect/problematic records are not included by default in the production OBIS portal/mapper tools.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Propose a data quality control and assessment scheme	Data QC project team	January-March 2019	
Implement the quality flag scheme in the OBIS 2.0 portal	OBIS data manager	June 2019	

2.3.3 Technical Task Team

51. Mr Pieter Provoost (OBIS Data Manager) introduced this agenda item on behalf of Mr Francisco Hernandez (Chair of the Tech Task Team). The previous SG meeting recommended to form a non-permanent OBIS engineering team. This team would develop and implement an engineering plan (roadmap) that builds on the high-level objectives of OBIS 2.0 for the next generation of OBIS.

52. At the 6th Session of the OBIS Steering Group (February 2017) the decision was made to design and implement a new technology platform for OBIS, with the following goals:

- To achieve near real time data integration from OBIS nodes
- To be able to scale the system to accommodate large data volumes
- To be able to ingest and serve methodological, environmental and biological measurements or facts
- To improve the real time analytics capabilities of OBIS
- To enable private access to data under embargo
- To improve the visibility of the OBIS network and its linkages

53. In March 2017, Pieter Provoost visited Sky Bristol and the IT team at USGS/OBIS-USA in Fort Collins to learn from their experiences and to exchange ideas about the architecture of the new platform. The decision was made to design the system as a collection of loosely coupled microservices orchestrated by a messaging platform. This should improve reusability, reduce complexity, enable scalability, eliminate the dependency on a single technology, and make it easier to replace parts of the system. Some time was spent looking into how USGS deploys software on the AWS platform, but no decision had been made as to where the OBIS 2.0 components would be deployed.

54. In June 2017, a technical meeting was held with VLIZ/EurOBIS and the decision was made to develop a proof-of-concept demonstrating the capabilities of the Elasticsearch search engine, which was selected to power the API of the new platform. All occurrence data were loaded into Elasticsearch, and an API as well as a download toolbox were developed. These components were deployed on new infrastructure provided by VLIZ and seem to perform very well.

55. The OBIS 2.0 progress report provides an overview of the status of the components. Most of the components needed for goals 1 - 4 and 6 have been developed. Major pending tasks are:

- The calculation of summary layers (biodiversity indices) served by GeoServer
- Access to Event and MeasurementOrFacts records

- Better mapping capabilities (high resolution view when zooming in)
- Adaptation of the robis R package to the new API

56. None of these tasks are critical for switching to the new architecture.

57. In terms of hardware it was determined that enough capacity will be available on local SSD storage once the old OBIS database has been decommissioned. It was decided that for now no additional hardware would be purchased, and OBIS will make use of cloud hosting to cover any gaps. Some cost estimates for cloud hosting have been gathered here. We are also looking into cloud hosting as a more permanent solution for hosting the Elasticsearch cluster and APIs, as cloud hosting is easier to scale based on demand than an on-premise solution.

58. The OBIS 2.0 progress report also includes a benchmark optimized for database workloads, which will be used to evaluate the suitability of any hosting solution.

59. Much of the content related to the Technical Task Team was also discussed in previous agenda items and is documented elsewhere in the report. In keeping with an overall theme of the meeting, discussions during this time focused on further engagement across the OBIS Network to develop technical aspects of the system using the community as a whole rather than relying on any one team or the OBIS Secretariat to conduct all technical work. A specific recommendation to this effect is listed below.

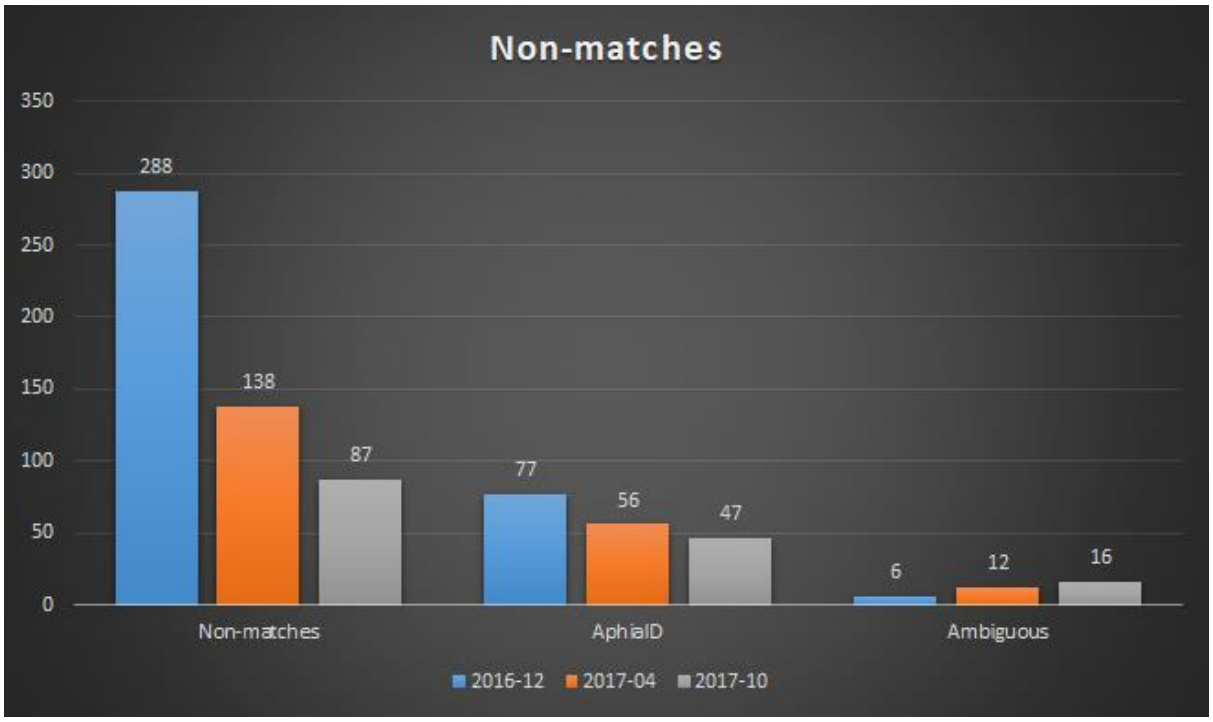
60. The SG-OBIS recommended that the software codes for OBIS 2.0 be examined for additional opportunities to componentize the system to support distributed and cooperative development. This concept should be explored by working with opportunities identified as issues in the codebase or new feature needs to seek direct code development from across the OBIS community rather than having this development conducted by the OBIS Data Manager. One or more experiments in this area will help to expose and exercise strengths and weaknesses in the software as an open source enterprise.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Evaluate the OBIS software codes, new feature requests, and other work items for opportunities in collaborative code development	OBIS Data Manager	January-March 2019	$3K [IODE]
Conduct experiments in collaborative code development with members of the OBIS Network and evaluate for impact	OBIS Data Manager, OBIS Network	March-July 2019	$10K [IODE]
Set up GeoServer for WFS access to OBIS data	OBIS Data Manager	March 2019	
Provide access to Event and MeasurementOrFact data	OBIS Data Manager	February 2019	
Adapt R packages to new API	OBIS Data Manager	December 2018	
Provide better mapping capabilities	OBIS Data Manager	February 2019	

2.3.4 Taxonomy Task Team

61. Mr Thomas Lanssens (VLIZ/EurOBIS) introduced this agenda item on behalf of Mrs Leen Vandepitte (Chair of the Taxonomy Task Team). He reported that due to some unforeseen circumstances in staffing, there is a slight delay in dealing with the taxon names that could not be matched with WoRMS, and the development of a blacklist, as agreed at the 2nd EC-OBIS session, has not started. Dealing with the non-matching names remains an ongoing task, which was initiated each time again after an OBIS harvest.

62. The non-matching taxon names from the last harvests are currently being handled and we are waiting for the OBIS node managers and the data providers to respond. The response on emails is low, usually only 10-20%. From OBIS 2.0 onwards (December 2018) this matching process will need to be revised, as there is no monthly harvest anymore. Probably (new) non-matching taxa could be retrieved after each dataset publication.



This graph shows a decline in the number of non-matches between December 2016 and October 2017, which could indicate a promising trend in lowering the number non-matching names in the future. This graph also shows that not all OBIS node managers are using the available tools to quality check the taxon names, as obvious matches (about one third) still could easily be matched (column: AphiaID).

63. The taxon matching process at VLIZ takes quite some time, as it requires communication with the WoRMS taxonomic editors. The last communication actions have however shown that feedback from editors is valuable and relatively fast. The bottleneck is in most cases with the OBIS node managers and/or data providers, where the response rate to questions is rather slow.

64. The Taxonomy Task Team expressed their desire to continue the processing of non-matching names, in close collaboration with the WoRMS editorial board and the OBIS node managers.

65. The Taxonomy Task Team will make a 'Black List' available, so that this can also be used when checking non-matching names. The Black list will contain names where editors have decided not to add these to WoRMS, with an explanation as to why. It will also contain "non-existing taxon names".

66. The SG-OBIS stressed that all OBIS node data managers should match taxon names to WoRMS and add the WoRMS LSIDs to the records. In case of non-matches, OBIS node data managers can add auxiliary information in DwC:taxonRemarks and communicate these names and information directly to the WoRMS data management team by email to info@marinespecies.org. The feedback report provided by WoRMS should be communicated back to the data providers and any ambiguous names need to be resolved and datasets be updated with the missing LSIDs.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Process remaining non-matching names of previous harvesting procedures	Tax-TT in collaboration with WoRMS	Continuous	In-kind LifeWatch
Make available non-matching Black List	Tax-TT in collaboration with WoRMS	2019	In-kind LifeWatch

2.3.5 Communication and Outreach Task Team

67. This agenda item was introduced by Mr Ward Appeltans (OBIS project manager). He provided an overview of communication activities. Below are some of the outreach statistics:

- OBIS in the media: New York Times article
- OBIS featured in the UNESCO sector-wide brochure on UNESCO's commitment to
- biodiversity
- Social media: 1,085 followers on Twitter; 1,932 followers on FaceBook
- OBIS website: 78,142 visitors (since 1 Feb 2017) of which 17% are returning visitors
- OBIS e-newsletter: 1,210 subscribers
- OBIS was presented at several events (e.g. FUST Oceans, EMBS2018, WCMB2018, TDWG2018 etc)

68. On 6 July 2018, one of the founding fathers of OBIS, Dr J. Frederick (Fred) Grassle, passed away. Thanks to Fred, OBIS was a core component of the Census of Marine Life. Upon the suggestion of the SG-OBIS, the IODE Management Group agreed to establish a Fred Grassle Memorial Lecture Series as part of the IODE scientific conferences. With this Memorial Lecture Series, we want to celebrate the vision of Fred Grassle of bringing together existing marine species distribution data into a common, searchable format for science and future generations. On 7 September 2018, the OBIS Secretariat launched a call for applications of outstanding scientists and data managers who have made a significant contribution to OBIS, either through contributing data to OBIS, by publishing important scientific breakthroughs using data in OBIS or by developing innovative tools that made science on OBIS data easier or improved the quality and quantity of data in OBIS. The selected applicant(s) will be honored by providing the Fred Grassle Memorial Lecture at the IODE Scientific Conference, 18-19 February 2019, in Tokyo (Japan).

69. Mrs Rae Sita Pratiwi (OBIS Indonesia liaison officer) provided insights into the outreach and communication strategy for the Indonesian Scientific community and Civil Society Organization by emphasizing Science & Technology as an essential component of development strategies. The biggest single factor determining any country's potential for achieving sustainable social and economic growth is its ability to access and apply the fruits of modern science and technology in a responsible manner. However, achieving this goal is more complex than it sounds. There are many political and economic obstacles to accessing science and technology, ranging from high costs to a lack of absorptive capacity. OBIS as the global platform (clearing-house) for accessing data and information on marine biodiversity for science, conservation and sustainable development has been narrowing the gap and strengthen the capacity of the marine scientist and ocean data management. On the other hand, as a science-emerged country and one of the world's richest nations in terms of its biodiversity, Indonesia has been recognized as the potentials of S&T implementation. This is crucial to raise the interest of 'science communication for development' initiatives and science communication to build rational communities that have been drawing attention to the need for increased action on this front.

70. The SG-OBIS welcomed the proposal by Mrs Rae Sita Pratiwi on an OBIS communications strategy for communicating science to relevant stakeholders and wider audiences.

71. Following an exercise on the development of policy briefs, the SG-OBIS recommended that OBIS build on its core strength to develop data-driven analytics based on high quality integrated data, synthesized with value-added properties, delivered through a platform that enables many different types of visual presentations. OBIS should leverage its network with CBD, IPBES, and other groups to bring together researchers and other experts, including policymakers, to develop policy briefs specific to different issues such as BBNJ, ocean acidification, and others.

72. The SG-OBIS developed and recommended the concept of using OBIS to develop regular news leads on new and interesting phenomena suggested from the data (e.g., new species in an area, fresh observation of a species not seen in X number of years, etc.). These would be followed up by OBIS Node Managers to validate findings and assemble further detail (e.g., photos, active relevant research, etc.) and then broadly distributed via social media channels and other means locally, regionally, and internationally with support of the Communications Task Team.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Complete and publish OBIS communication strategy	OBIS Secretariat	May 2019	10,000 US$ [IODE]
Research and develop infographic visualization methods for OBIS Portal	OBIS Secretariat/OBIS Nodes	January-March 2019	10,000 US$ [IODE]
Prepare updated policy brief(s) on BBNJ questions for March/April 2019 meeting	OBIS Secretariat/OBIS Nodes	February-March 2019	10,000 US$ [IODE]
Develop methods for characterizing unique characteristics at dataset and other levels in OBIS	OBIS Data Manager	January 2019	5,000 US$ [IODE]

Develop and begin using methods for news lead characterization and follow-up	OBIS C&O-TT	February-July 2019	

2.3.6 Science Advisory Task Team

73. This agenda item was introduced by Mr Pat Halpin (co-chair of the SATT). Mr Halpin proposed to change the name from Science Advisory Task Team to Strategic Advisory Task Team to extend the role and scope of the existing Science Advisory Task Team with the following terms of reference.

74. The Strategic Advisory Task Team will:

- Provide advice to the OBIS Steering Group on the OBIS science mission, policy and management relevance and strategic priorities.
- Identify new directions, potential pilot projects and areas of development for data-driven research and ocean policy and management applications.
- Be composed of a broad range of experts from relevant scientific disciplines and institutions with expertise in fields such as marine biodiversity, biogeography, ecology and ocean policy and management.
- Convene periodically with at least one meeting per year.
- Review OBIS directions and research and development activities, as well as investigate timely topics to help set future strategic directions.
- Provide reports to the OBIS Steering Group.
- Act as liaisons to other scientific institutions and related communities of practice.

75. The SG-OBIS adopted the new Terms of Reference for a renamed Strategic Advisory Task Team to be led by Mr. Pat Halpin.

2.4 OBIS NODES

76. The OBIS executive committee launched an OBIS nodes survey, which was open between 11-24 October 2018. 27 OBIS nodes responded, and no response was received from 4 OBIS nodes: SWA-OBIS (Brazil), ESP-OBIS (Chile), IndOBIS (India), KOBIS (Korea).

77. The results are available in annex 4. In summary:

- The majority of funding comes from governments, which in some cases is supplemented with private or other funding sources.
- The operational cost to run an OBIS node in most cases is limited and rarely exceeds US$ 30K with a few exceptions (3 OBIS nodes run with a budget US$ >100K). Notwithstanding, only one third of the OBIS nodes have this budget secured for 2019-2020.
- The total current workforce at the OBIS nodes is 50.45 FTEs but would need an extra 25.35 FTE.
- The average number of people working at an OBIS node is 1.8 FTE, but would be 2.8 FTE if fully resourced
- One third of the OBIS nodes are sufficiently resourced in terms of staffing.
- 611 datasets are currently in backlog (both new datasets and those that a refresh)

- The majority of the OBIS nodes have staff with the necessary capacity to run an OBIS node, however, some would benefit in acquiring stronger marketing skills in order to explain effectively what the OBIS Node is, how it operates, and what its value proposition is to attract new partners and funders.

75. The survey also included two extra questions:
    - Is there any specific way the OBIS network (other OBIS nodes, OBIS secretariat, IODE) or other IOC programmes could support your OBIS node?
    - Is your OBIS node developing any tools or applications that could be of benefit to other OBIS nodes? For example, automated tools for data processing, outreach, etc.

76. The OBIS nodes expressed the following needs from the OBIS network:

    - training in data management (5 nodes)
    - financial support (4 nodes)
    - support in technical/tool development (3 nodes)
    - support with local training courses (2 nodes)
    - helpdesk support (2 nodes)
    - data analysis support (1 node)
    - continued communication (1 node)

77. The second question resulted in an interesting listing of technological developments at the OBIS nodes level, which could help other OBIS nodes in data processing and publishing.

78. At the 24th session of the IOC Committee on IODE, IODE approved the OBIS Node Health Status Check and Transition Strategy (SG-OBIS-VI, annex 2). This means that the SG-OBIS needs to evaluate the health status of OBIS nodes and need to consider the succession plan of OBIS nodes that classify as inactive according to 6 criteria. The OBIS Secretariat should prepare a report of each OBIS node and report on the status 3 months prior to the SG meeting. At the SG meeting the co-chair will present the results, including the list of inactive nodes. The SG members, representing the OBIS nodes will then make a decision: (i) Request the inactive OBIS node to submit a plan with actions, deliverables and times to improve their performance, within 3 months, to the OBIS Secretariat. This plan is reviewed by the OBIS Executive Committee. The SG-OBIS can also recommend - to the IOC Committee on IODE - to remove the OBIS node from the IODE network.

79. On 3 September 2018, the OBIS secretariat informed the managers of seven OBIS nodes that they are considered inactive on the basis of the following criteria:

    - FishBase
        - The OBIS node does not have an IPT
        - The OBIS node has not provided new data for the last 2 years
    - KOBIS
        - The OBIS node does not have an IPT
        - The OBIS node has not provided new data for the last 2 years
    - SEAOBIS
        - The OBIS node has not provided new data for the last 2 years
    - IndOBIS
        - The OBIS node manager or a representative fails to attend (personally or virtually) the last 2 SG meetings without any written reason

  - The OBIS node has not provided new data for the last 2 years
- MicrOBIS
  - The OBIS node manager or a representative fails to attend (personally or virtually) the last 2 SG meetings without any written reason
  - The OBIS node does not have an IPT
  - The OBIS node has not provided new data for the last 2 years
- ESPOBIS
  - The OBIS node manager or a representative fails to attend (personally or virtually) the last 2 SG meetings without any written reason
  - The OBIS node does not have an IPT
  - The OBIS node has not provided new data for the last 2 years
- PEGO-OBIS
  - The OBIS node does not have an IPT
- WSA-OBIS
  - The OBIS node does not have an IPT
  - The OBIS node has not provided new data for the last 2 years

80. Meanwhile, PEGO-OBIS has installed their IPT, and two new datasets are published. After the communication was sent, KOBIS, MicrOBIS, and WSAOBIS informed the OBIS secretariat that they are no longer in a position to continue the OBIS node. The representatives of ESP-OBIS, SEAOBIS and FishBase took the floor.

81. Mrs Pamela Hidalgo (ESP-OBIS, Chile) reported on the status of the South-East Pacific OBIS node (ESP-OBIS) and presented the action plan to re-activate the node by January 2019. The ESP-OBIS was implemented during 2008 under the sponsorship and funding support provided by the Center for Oceanographic Research of The South Pacific (COPAS) hosted at Universidad de Concepción, Chile, and managed by Ruben Escribano and the Engineer Mr. Francisco Godoy as informatics and data manager. This OBIS node was hosted at a server at Universidad de Concepción and made public through its web site (www.ron/udec.cl). During 2008 and 2012 the OBIS node was very active in compiling and providing data bases of marine species from the region for a variety of taxonomic groups. This work was completed by researcher of the COPAS centers following OBIS schema with the technical assistance of Francisco Godoy, whose work mostly consisted in formatting data sets, uploading data and maintenance the web site.

82. Since 10 years of funding, the COPAS center ended in 2012, and ESP-OBIS did not have informatics support since then and it became more difficult to gather new data sets and manage the OBIS node without Francisco Godoy. After that it was also difficult to get institutional support from the University, mainly because the importance of having an OBIS node was not understood.

83. The new Millennium Institute of Oceanography (IMO) and new researchers at Universidad de Concepción working in marine biodiversity now opens the opportunity to activate our ESPOBIS node. Some financial support for training people in the Darwin Core schema and to maintain the web site and support students for compiling new data sets have been offered, so that the OBIS node can re-initiate its activity and so contribute to the OBIS Program

84. During the first term of 2018 we initiated actions to activate the node. The following steps have been taken up so far:

- An IPT instance for the ESP-OBIS node was created during May 2018 by Bart Vanhoorne (VLIZ/EurOBIS) upon our request.

- The training course on methods, formatting and OBIS schema was organized in Chile in collaboration with Eduardo Klein and Ana Carolina Peralta. This training course was held at Universidad de Concepción in October 2018. A total of 18 participants of which academics, students (from different doctoral and master programs) and marine science professionals from Chilean institutions (Universidad de Concepción, Universidad de Antofagasta and Universidad Católica de Norte) and other countries (Colombia, Cuba, Mexico, Peru and Spain) attended the training. As a result, databases are being completed by each participant and made available to ESP-OBIS.
- Monthly workshops on data formatting and uploading is to be held in Concepción as to compile and provide new datasets to the OBIS node. This workshop includes participation of researchers and graduate students that undertook the previous training course. The first workshop took place during late October 2018 at Universidad de Concepción. The participants of training course agreed to create a social-media communication group (Facebook, website, and others) named the OBIStas.
- A meeting with the Dean of our Faculty, Dra Margarita Marchant, Dr Victor Hernandez, Dr Cristian Hernandez, Dr Ruben Escribano and Dra Pamela Hidalgo, took place last week. The objective of this meeting was to present the OBIS Program and the action plan of ESP-OBIS.
- The first step, ESP-OBIS will be presented to the Faculty of Natural and Oceanographic Sciences community by P. Hidalgo (last week on November)
- We will invite other researches from the Faculty of Natural and Oceanographic Sciences to collaborate and participate in supporting our OBIS node. For this, a meeting will be organized by Pamela Hidalgo, with the presence of the Dean of our Faculty and Ruben Escribano (currently Deputy Director of IMO).
- One of the tasks and goals for the end of 2018 is to have an updated website of ESP-OBIS. For this, we will request support from our Faculty to develop and update the web site and commit informatics support for maintenance.
- It is expected that the ESP-OBIS node will be fully operational by January 2019.
- The OBIS node will be co-managed by Pamela Hidalgo and Ruben Escribano, who will be the principal investigators. Either may be connected and communicated with OBIS and attend the SG-OBIS meetings and task teams.
- Visits to public and private national institutions will be realized with the objective to invite collaborations with ESP-OBIS.

85. Mr Nicolas Bailly reported on the status of the Fish Thematic OBIS Node, which is now managed by two institutions: Tulane University, New Orleans, Louisiana, USA (Henri L. “Hank” Bart Jr.), and Quantitative Aquatics (Q-quatics), Bay, Laguna, Philippines (Nicolas Bailly). Under the FishNet programme (www.fishnet2.net), Tulane University will manage fish collection datasets and serve them to OBIS through the FishNet IPT. Under the FishBase programme (www.fishbase.org), Q-quatics will manage fish observation datasets and serve them to OBIS through the GBIF Sweden IPT.

86. FishBase serves fish collection datasets that are nowhere else served. They will be uploaded to FishNet for consistency of service. FishNet is currently appointing a new data manager. Then, the following actions will be undertaken:

- Assigning of AphiaID to the FishNet records.
- Splitting of the current FishBase file in the different component datasets to comply to GBIF / OBIS / IPT requirements (action started in September 2017).
- Cross-checking between FishBase, FishNet, and the list of IPT-orphan datasets established for the 7th SG-OBIS session to avoid duplicates.

- Finalizing the detailed action plan by 15 December 2018.

87. Mr Saravanane Narayane (IndOBIS) unfortunately could not join the SG-OBIS-7 meeting, but he reported by email that IndOBIS is part of the OBIS network since its beginning. IndOBIS is taking seriously the biodiversity documenting work as this has been included under the National Biodiversity Action Plan and Sustainable Development Goals. They have included the OBIS program under the Deep Ocean Mission linked with Blue economy. The program got financial approval and they recruited project staff. The students started working on the data sets, and compilation on cruise-wise information is ongoing. We will have fresh data sets ready for upload in a month or two.

88. The SG-OBIS decided that PEGO-OBIS is no longer inactive, accepted the action plan of ESP-OBIS and decided to request an action plan from the following OBIS nodes: IndOBIS, SEAOBIS, and FishBASE no later than 15 December 2018.

89. The SG-OBIS recommended the removal of the following OBIS nodes from the network: KOBIS, MicrOBIS, and WSA-OBIS and requested the IOC Committee on IODE to consider this recommendation.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Monitor the health status of the OBIS nodes, inform the OBIS nodes about their status 3 months before the next SG meeting and report on the status at the SG meeting	OBIS Secretariat and SG-OBIS Co-Chairs	intersession	
Decide on the health status of the OBIS nodes and request an action plan or removal of the node from the OBIS node network	SG-OBIS	Next session	

2.5 OBIS PROJECTS

2.5.1 FUST/DIPS-4-Ocean Assessments

90. Mr Ward Appeltans (OBIS project manager) reported on the project: Development of Information Products and Services based on OBIS and HAEDAT to support the WOA, IPBES and a Global HAB Status Report (DIPS-4-Ocean Assessments).

91. Funded through the UNESCO/Flanders Fund-in-Trust for the support of UNESCO's activities in the field of Science (FUST) this project runs between 2015-2019 and aims to develop biodiversity indices based on the Ocean Biogeographic Information System (OBIS) to support global assessments on the state of the marine environment, as well as publish an IOC UNESCO Global Harmful Algal Bloom (HAB) Status Report based a global HAB data set in OBIS, the Harmful Algal Event Database (HAEDAT) and the World Register of Marine Species/HAB (WoRMS/HAB) on the distribution and impact of harmful algae.

92. During the intersessional period, the OBIS secretariat has been supporting IPBES and WOA (see agenda item 2: secretariat report). However, the development of new products temporarily slowed

down because our current work on re-engineering the OBIS infrastructure and technology stack (OBIS 2.0). IOC has provided funding for these developments covering the salary of the OBIS data manager during Oct 2017 - Dec 2018. Therefore, the DIPS project was extended with one year, until the end of 2019.

93. Nonetheless, the OBIS data manager has developed a new mapper including data download functions based on the new OBIS 2.0 API. The OBIS exploration portal shows new statistics including a quality report on the dataset level and allows to filter records on these quality flags.

94. During 2019, OBIS will develop the OBIS-HAB data portal and a new HAE-DAT data input/output interface, which will result in merging HAEDAT into OBIS. At the 18th International Conference on Harmful Algae, 21-26 October 2018 - with 735 participants - at least 8 presentations included HAB data from HAEDAT and OBIS. There is now community wide reference to HAEDAT and OBIS as the system for HAB data and the Global HAB Status Report is seen as a community supported effort.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Merge HAEDAT into OBIS, extend data entry tool and develop OBIS-HAB data portal to support the Global HAB status report	OBIS data manager	December 2019	DIPS-4-Ocean Assessments (FUST)

2.5.2 IODE pilot project OBIS-Event-Data

95. This agenda item was introduced by Ward Appeltans on behalf of Francisco Hernandez (VLIZ), chair of the OBIS-Event-Data pilot project. This IODE pilot project OBIS EVENT DATA for Scientific Applications (OBIS-EVENT-DATA) was established through Recommendation IODE-XXIV.3. The main objectives of this project are to (i) enhance the scientific applications of OBIS-ENV-DATA with the aim to support data and information product development within the framework of GOOS and GEO BON MBON, (ii) select early adopters of OBIS-ENV-DATA from among the marine biodiversity monitoring communities of Practice, (iii) further validation/evaluation of OBIS-ENV-DATA, (iv) develop data products and applications, (v) develop training packages for scientists and (vi) report results at IODE-XXV in 2019.

96. The first OBIS-Event-Data workshop took place between 23-26 April 2018, in which 22 participants from 8 countries representing the major animal telemetry networks in Africa, Antarctica, Australia, Canada, Europe and the USA met at the IOC project office for IODE in Ostend to test the OBIS-ENV-DATA standard through the development of data products for scientific applications. The workshop report is available here.

97. In summary, the participants agreed to use the OBIS-ENV-DATA Darwin Core standard to exchange and publish detection data through OBIS (both acoustic and satellite) and work with OBIS and the scientific community to develop data products for the Essential Ocean Variables (EOV) of the Global Ocean Observing System (GOOS), in particular the “Marine turtles, birds, mammals abundance and distribution EOV” and the “Fish abundance and distribution EOV”.

98. The guidelines for the implementation of the OBIS-ENV-DATA standard for tracking data (acoustic and satellite detections) were agreed upon and are further refined and documented in collaboration with the data standardization working group of the International Bio-logging Society as well as the

Biodiversity Information Standards (TDWG) community which oversees development of Darwin Core. See GitHub repository.

99. In collaboration with the scientific community involved in animal tracking, the OBIS secretariat would like to develop a data aggregation tool (which will be available as an R package) to calculate home ranges, migration pathways and movement patterns based on the tracking data in OBIS. It was felt important that OBIS provides access to the relevant (aggregated) data used to calculate the scientific products and provide links back to the original (raw) data sources to ensure proper data provenance and allow reproducibility.

100. Mrs Lenore Bajona (OTN) reported that OTN is currently developing such a data aggregation tool as an open-source project and will be happy to contribute this to the OBIS toolset.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Develop a tracking data aggregation tool (R package) to support the development of EOV products based on animal telemetry	OTN		In-kind OTN
Report the results of the OBIS-Event-Data project	Francisco Hernandez	Report: Oct 2018 Present: Feb 2019	

2.5.3 FUST/small data matters (small-scale activity)

101. On 15 May 2018, during the FUST Ocean event in Brussels, the Flanders Government announced to grant US$ 50,000 to OBIS for a small-scale activity “Small data matters - a tool for catching incidental records to fill our knowledge gaps in global biodiversity data systems”. This project aims to develop an online data entry and editing tool that will make it easier to publish (a small number of incidental) observations to OBIS, allowing individual researchers to report important observations from under-represented areas and time periods and underreported species. The tool is specifically meant for scientists, based at NGOs and marine research institutions from least developed countries and small island developing states where the capacity to manage, archive and publish data through data centres or OBIS nodes is often lacking. The consultant needs to partner with OBIS nodes, in particular those in Kenya and Senegal to help in the design and test phase. The grant will also support a data mobilization workshop in Africa using the new tool.

102. The tool will be compatible with the OBIS-ENV-DATA format of the Darwin Core data standard. One of the priorities of this online tool is obtaining high-quality data and metadata, hence the tool should link to the new OBIS metadata user interface, and use the quality control services provided by OBIS, such as taxonomy, outlier detection and missing values. The tool needs to provide a data quality report back to the data provider. The OBIS secretariat launched a call for applications for a 6-month consultant to develop this tool.

103. The SG-OBIS welcomed the development of an online data entry tool as an additional vehicle to publish species distribution records, without the need to fully understand all the aspects of OBIS data practices including Darwin Core standards and the Ecological Metadata Language, and recommended to establish a process that includes the endorsement of data entry collaborators by OBIS nodes, and visualize them as science collaborators linked to OBIS nodes.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Develop a data entry tool for incidence occurrence records according to the "small data matters" project work plan	OBIS data manager, with support from a consultant	Jan-June 2019	$36,000 (FUST)
Organize a data entry workshop in Africa	OBIS Kenya, OBIS Senegal	May-June 2019	$10,000 (FUST)

2.6 OBIS PARTNERSHIPS

104. Currently, OBIS has signed two agreements, one with the Global Biodiversity Information Facility (GBIF) and one jointly with the Global Ocean Observing System and the Marine Biodiversity Observation Network of GEO BON.

105. The SG-OBIS recommended to its members to engage actively with global, regional and local biodiversity initiatives, such as IPBES, World Ocean Assessment, CBD etc, presenting the benefits that OBIS could provide to those potential alliances. Signing new partnership agreements should be considered.

2.6.1 GOOS and MBON

106. Mr Ward Appeltans reported on the 3rd GOOS Biology and Ecosystems (BioEco) Panel meeting (7-9 Nov 2018, Florida, USA). The BioEco panel members recognized the role of OBIS as a global data integrator for managing, curating and sharing marine biodiversity and ecosystem data. The panel members agreed that alignment with DarwinCore standards and feeding the data into OBIS is identified as one of the goals of each EOV. The BioEco panel noted the proposed a data architecture system as a global macroalgal repository with OBIS in which the Australian OBIS node will play an important brokering role. Another example is the work of the IOC HAB programme, which is currently writing up the Global HAB Status Report drawing from data in OBIS and the Harmful Algal Event Database (HAE-DAT).

107. The BioEco panel requested OBIS to support the GOOS BioEco work plan with:

- Development of a metadata registry to map the GOOS EOV observing networks (linked to the Future Earth/NCEAS Pegasus project)
- Further improve the OBIS data portal, making it possible to search and provide views on EOVs (including sampling methods).
- Support the development of DarwinCore guidelines and data protocols for EOV data and publish these as Ocean Best Practices (OBP), in collaboration with a new OBIS Vocab Task Team and the Vocab maintenance working group under Biodiversity Information Standards (TDWG). It was suggested that the DOIs of these OBPs could be added to the dataset metadata.

108. Mr Eduardo Klein reported on the GOOS macroalgae EOV workshop (24-26 September 2018, Hobart, Australia). OBIS was invited to the GOOS Biology and Ecosystems panel implementation plan workshop: "Planning the implementation of a global long-term observing and data sharing strategy for macroalgal communities" held at the University of Tasmania, Hobart Australia on September 24-

26, 2018, see meeting report. The group agreed on the use of OBIS as a data integration platform for macroalgae data. For that OBIS will need to develop methods the allow the ingestion of community data (like "macroalgae") which don't have a matching name in WoRMS. Also, we have agreed to work with the group in developing vocabulary terms specific for this particular EOV.

109. The SG-OBIS recommended the OBIS vocabulary infrastructure project task group to engage with the macroalgae community to jointly develop the necessary vocabulary terms related to that EOV.

110. The SG-OBIS recommended the establishment of a small project for incorporating and exposing community-type data with the participation of members of the OBIS community.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Establish a small-scale project for community-type data	VIP team, selected OBIS nodes	July 2019	$5000

2.6.2 Global Biodiversity Information Conference

111. Mr Sky Bristol (SG-OBIS Co-Chair) represented OBIS at the 2nd Global Biodiversity Information Conference (GBIC2), 24-27 July 2018, Denmark. Around the world, there are fairly large number of different implementations of data systems based on the Darwin Core standard that vary from one another only slightly at a technical level. The variation between implementations from OBIS and GBIF to VertNet, the Atlas of Living Australia, and others is relatively small at their foundation. The primary motivation being discussed in the ongoing Global Biodiversity Information Conference, of which GBIC2 was just one component, is a desire to identify the processes and characteristics in common between different implementations to determine where economies of scale may exist in the commodity elements of each system. Commodities being sought are the basic building blocks of the systems such as the basic data processing and integration elements.

112. The overall consensus from discussion at GBIC2 were that there are more similarities than differences between what we are all doing in this space. Attendees of a technical track also discussed advances in technology and ways of thinking about data models that have occurred in the last 10 years, leading to many new ways of building technological systems that allow for much more heterogeneity in the end members of a network. In general, the community engaged in GBIC discussions is envisioning a future architecture that could be beneficial to the OBIS network, allowing us to concentrate on data improvements, data enhancement, and analyses that OBIS members are uniquely qualified for while taking advantage of commodity technical components backed by a larger network of global technologists and software engineers.

113. Based on these developments, it may be beneficial for OBIS to begin envisioning and working toward its 3rd generation (beyond OBIS 2.0) based on a shared infrastructure with the larger global community engaged in species observation data. The basic architecture being discussed would enable OBIS to take advantage of and contribute to core software components developed and maintained in the commons. These could either be deployed on OBIS-specific infrastructure or shared infrastructure in some type of common platform. We could contribute our own fundamental algorithms and processing pipelines for marine observation events, measurements, and species occurrences, including continuing to leverage WoRMS as our taxonomic baseline. At the same time,

we could take advantage of other methods for data enhancement and annotation coming from the broader community where applicable.

114. This approach would also help to resolve challenges we have in the international community of use today where the mix of various data platforms is often confusing to both data producers wishing to share their data and researchers needing access to data for analysis.

115. The technological promise of a joint venture with other implementations of Darwin Core is the most compelling aspect of the potential future direction we may consider. Governance for the evolution of the technology would be relatively straightforward, relying on current software engineering best practices for componentization, loose coupling, and well-managed versioning to mitigate technical risks. Governance models for the management structure for such a system are less clear, but many of the potential risks, in terms of the potential entanglement with another construct incompatible with the UNESCO-IOC-IODE-OBIS model, could be mitigated through careful planning.

116. Whatever future infrastructure OBIS continues to evolve into is going to come with operational costs that we will always be seeking to reduce in order to concentrate the majority of scant funds on new developments that directly help data management and analytical uses of the system. Future models being discussed in the GBIC context range from some existing organization providing centralized management of a common cloud-based data processing, storage, and services infrastructure to the potential for a new international non-profit to be established in the most cost-effective way possible. The nonprofit model has been fairly successful in a number of other cases such as DataCite and the IGSN e.V. two organizations using a membership model to support a basic set of standards and technologies. Member organizations pay a modest fee to leverage the capabilities and help support the basic functionality. Membership comes with a responsibility to help advise and guide the global capacity, but that also helps to ensure checks and balances and a voice in the operation. The spinoff of TerriaJS as a private enterprise from the originally government-funded effort to build the Australian National Map is another model that could involve a mixture of open source and commercial ventures, potentially introducing revenue streams to help support research infrastructure.

117. In general, the OBIS Executive Committee members who have been involved in the GBIC discussion feel that it represents a possibly very positive future direction for OBIS, with the proviso that any such move needs to come with a careful implementation plan toward a positive disruption rather than simply a disruption. We welcome other members of the OBIS Network with an interest in being involved in these discussions to become part of the newly forming Engineering project team, where the focus of these discussions will reside.

118. The SG-OBIS recommended continued engagement with the Global Biodiversity Information Conference and joining OBIS with a proposed alliance for biodiversity knowledge coming from the 2018 GBIC2 meeting. Engagement with this alliance should focus on realizing economies of scale in the core data integration infrastructure needed for OBIS operations with accompanying increases in our ability to apply specific marine biodiversity knowledge into the system (e.g., marine-specific observation and measurement types, specific taxonomic enhancements and quality control, importance of third dimension in spatial aspects of the data, etc.).

3 STRATEGIC DIRECTIONS FOR OBIS

3.1 Proposal for OBIS name change to *Ocean Biodiversity Information System*

119. This agenda item was introduced by Mr Eduardo Klein (co-chair). The Ocean Biogeographic Information System was created during the decade of the Census of Marine Life (CoML), as the main repository for all the organisms identified in its projects around the World. The term "Biogeographic" was coined inside OBIS as the CoML will be able to provide elements for biogeographical analysis of the species distribution, associated with the environmental variables that were collected simultaneously. Indeed, few hundreds of scientific articles resulted from the CoML, and many of them contributed significantly to the understanding of the past, present and future distribution of marine species and provided striking evidences of the connection pathways in the ocean. Nowadays, Marine Biodiversity is a common term in scientific, policy and international conventions. Specifically, marine biodiversity is the object of the UN sustainable Development Goal 14 (live under the sea) and the CBD Aichi targets 5 to 10 directly or indirectly. Many Member States have reporting obligations on the status of its biological diversity in their maritime jurisdiction. Also, there is an ongoing initiative to promote an international agreement under the UN for the conservation and sustainable use of biodiversity in area beyond national jurisdiction.

120. The use of "Biodiversity" in the OBIS project name might reflect a change in the scope of the project, specifically in the new services we will provide, exposing the new ENV-DATA schema and future products (tools, indicators) directly related to biodiversity.

121. The SG-OBIS recommended to change the name of OBIS. The word 'biogeographic' does not very well present the breadth of data OBIS deals with but postponed this change until biodiversity and ecological information products are provided and the communication team has developed the material to justify the name change. The 8th Session of the SG-OBIS should review this recommendation.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Develop a communication strategy associated with the name change	COTT	November 2019	$16,000

3.2 OBIS role in the UN Decade of Ocean Science for Sustainable Development

122. This agenda item was introduced by Mr Ward Appeltans (OBIS project manager). On 6 December 2017, the UN General Assembly, as part of the Omnibus Resolution for Oceans and the law of the sea (A/RES/72/73), decided to "proclaim the United Nations Decade of Ocean Science for Sustainable Development" for the 10-year period beginning on 1 January 2021, and called upon the Intergovernmental Oceanographic Commission to prepare an implementation plan for the Decade in consultation with Member States, UN Bodies, and relevant stakeholders.

123. This decision, a result of a two-year process initiated by IOC Member States, represents a consensus by the global community on the importance, need for and role of ocean science and observations, data and information exchange for the environment and society. Through this process, science is

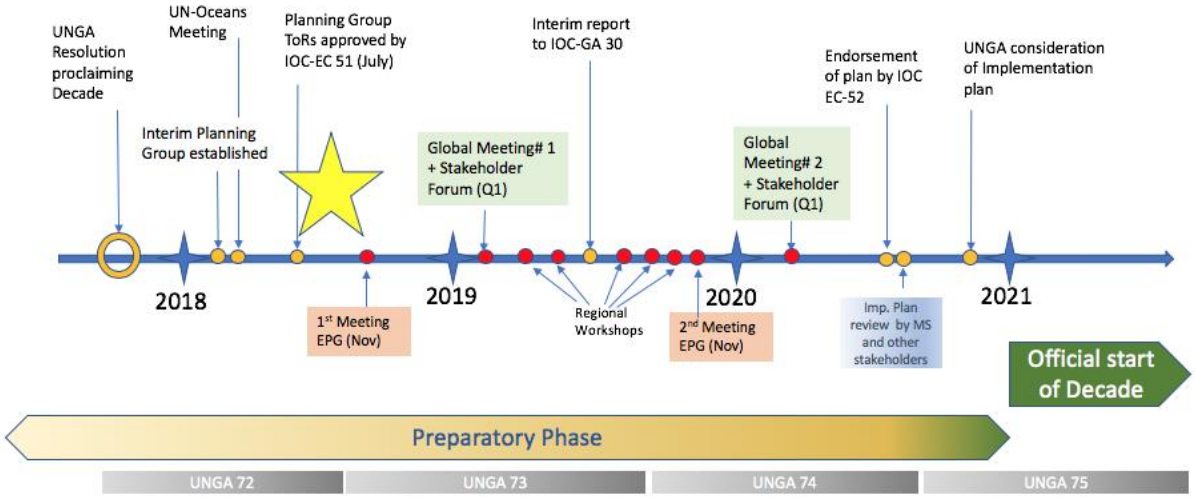
recognized as a prerequisite for managing the ocean sustainably, and therefore, as a key pillar for the implementation of the 2030 Agenda and particularly SDG 14 related to the ocean.

124. The Decade should aim to ensure timely delivery of understandable, useful results and solutions to governments, national and other agencies, for integration into adaptive ocean management.

125. The UNGA Resolution tasked IOC with the preparation of an Implementation Plan for the Decade, which will need to be prepared over a three-year period (2018–2020), before being considered by the UN General Assembly at its session in September 2020. This will require the formulation of the key elements of the Implementation plan, such as:

- plans for research and technical infrastructure (a Science Plan) aligned and in harmony with the Decade goals;
- plans for engagement of the scientific community, national and international institutions as well as the UN-wide system and communication;
- a plan for capacity development, training and education to strengthen science capacity and transfer of marine technology; and
- a plan for resource mobilisation (a Decade business plan).

126. Finally, the Decade structure and governance mechanisms will need to be elaborated during the preparatory phase and fully functional from the start of the Decade and beyond.



Timeline for the Preparatory Phase of the UN Ocean Decade.

127. On 4th September 2018, The SG-OBIS submitted the nomination of Mr Patrick Halpin (OBIS-SEAMAP) to the Executive Planning Group (EPG). The selection process was not finalized at the moment of writing. In addition to the EPG, there will be several regional workshops and two meetings of the stakeholder forum in which members of the OBIS network will be invited to participate.

128. The SG-OBIS recommended members of the OBIS network to take active part in the consultation and preparatory process and provide input into the implementation plan through participating in the stakeholder fora and the regional workshops, in order to make biodiversity and data management a key element of the UN Decade of Ocean Science for Sustainable Development.

3.3 OBIS potential role in BBNJ

129. Mr Pat Halpin (OBIS-SEAMAP) joined the SG-OBIS meeting remotely and provided an excellent summary of his team (OBIS-SEAMAP) activities with regard to BBNJ negotiations. The discussions and presentation materials meshed well with previous SG-OBIS discussions on how to describe the OBIS value proposition. Mr Halpin described the benefits of OBIS across the four different aspects of the BBNJ package under negotiation with the parties.

130. The SG-OBIS recommended the active promotion of relevant OBIS contributions to a potential new BBNJ agreement. It is also recommended that the OBIS Nodes actively develop a list of the specific questions and issues being posed by member states in the BBNJ negotiations for which OBIS can provide relevant information and reports. These questions will be used to build reports, visualizations, and presentation materials for the OBIS portal and other media.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Develop BBNJ webpage built on BBNJ questions being posed by the country delegations	OBIS secretariat	March 2019	
Develop ABNJ products	OBIS secretariat	March 2019	

3.4 OBIS 2.x emerging needs and opportunities

131. This agenda item was introduced by Mr Sky Bristol. With the release of OBIS 2.0, we now have a more solid foundation to build improved data processing/integration workflows, new data synthesis routines that add value to OBIS data, and new types of products and applications for scientific and decision-making analysis. We are working toward a more open and inviting process of co-developing OBIS as a global networked data system rather than what has been a more traditional hierarchical system. Recent survey responses about the types of technical and methodological tools that many of the OBIS Nodes are willing and able to contribute are evidence of a growing level of technical maturity across the network.

132. Over the coming months, we should see the full capability come online for near real-time data integration for IPT-served observation datasets. This will decrease the latency between the data management process at the Nodes and the availability of quality flagged data from the OBIS API and web portal. Working group activities to adopt and improve controlled vocabularies within the context of TDWG will provide incremental improvements in the data system in terms of new metrics and tools powered by these capabilities. Continued partnership with GBIF and others in the global species observation community should begin providing opportunities for increased efficiencies in the overall network and potential future convergence on a shared technology platform leading to economies of scale.

133. A focus in the coming months on the generation of Essential Ocean Variables and associated indicators, reports, and tools will help OBIS become a foreground operational platform for societal decision analysis in addition to continuing as a foundational research engine. As we focus on building data-driven products for the EOVs (metrics, visualizations, new API methods, etc.), we will also continue to encounter new data types and additional need for refinement on existing data types.

New data types that will need particular attention are those dealing with a basis other than taxonomic identification (e.g., coral coverage), where decisions will need to be made on whether or not to pursue certain types of data and subsequent implications on the OBIS data model, workflows, capacity development, and other dynamics.

134. Responses to the pre-meeting survey indicating where OBIS Nodes are currently engaged in the development of scientific and decision-making applications were particularly exciting to the future of OBIS. Scientific and data management staff at the OBIS Nodes have a rich connection to the global user community and can provide unique insights into how these data can be applied. We envision developing a dynamic ecosystem of analytics and tools that are driven live by the OBIS API such that they are immediately responsive to new data flowing into the system. This co-development process will need to involve collaboration between the IODE-OBIS data manager and tool developers to identify and solve dependencies in an iterative fashion.

135. The SG-OBIS recommended that a process should be developed for contribution of analysis and reporting code as part of an OBIS "software ecosystem." The new "code repository" for OBIS should be seeded with examples, perhaps starting with the focused work on BBNJ issues, of how to organize, document, and contribute analytical codes that interface with OBIS, provide analyses, and share results. This ecosystem can be mined by OBIS for analytical design patterns, new data combinations, and other ideas that can contribute to core OBIS functionality.

136. New data types are emerging as vital for the future of OBIS in helping to characterize marine ecosystems in support of Essential Ocean Variables and other assessment and indicator needs. The SG-OBIS recommended continuing to expand use of the Event Core and Measurement or Fact aspects of the data schema to explore encoding of datasets that identify taxa observations at higher taxonomic levels (e.g., *Animalia* for plankton community observations, *Plantae* for macroalgae observations). In addition, completely new methods of interfacing with and incorporating information from other data systems should be explored. For instance, the proposed high-level system interconnection architecture proposed by the Macroalgae EOV group provides a good opportunity to work with new data types.

137. NODCs represent an important and underutilized part of the OBIS network where the community should be able to count on these institutions for core data repository and management capacity. The SG-OBIS recommended that OBIS undertake a study to fit NODCs into the OBIS network construct and characterize the shared data management responsibility between NODCs, ADUs, and OBIS Nodes in fulfilling this mission for the biological data appropriate for OBIS.

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
Explore methods for collaborative code development (JupyterHub and others)	Pieter Provoost and OBIS-USA Node	February-March 2019	5,000 US$ [IODE]
Implement collaborative code platform for OBIS	Pieter Provoost and OBIS-USA Node	April-October 2019	10,000 US$ [IODE]
Finalize OBIS Network graph data, API, and visualization	OBIS Secretariat	May 2019	10,000 US$ [IODE]
Incorporate NODCs into the OBIS Network graph and develop "data repository health metrics" concept	OBIS Secretariat	June 2019	5,000 US$ [IODE]

Survey OBIS Network and NODCs to assess repository services in the network	OBIS Secretariat/SG-OBIS	July-October 2019	10,000 US$ [IODE]

4 OBIS WORK PLAN 2019

ACTION ITEM	RESPONSIBLE	TIMELINE	BUDGET
OBIS Secretariat			
Share a template for project proposals.	OBIS Secretariat		
Develop a portfolio of small project proposals, combining nodes from different countries.	All		
Share reports from the BBNJ process, and other processes such as GOOS with the SG-OBIS	OBIS Secretariat	Continuous	
Develop BBNJ webpage built on BBNJ questions being posed by the country delegations	OBIS secretariat	March 2019	
Develop ABNJ products	OBIS secretariat	March 2019	
Explore methods for collaborative code development (JupyterHub and others)	Pieter Provoost and OBIS-USA Node	February-March 2019	5,000 US$ [IODE]
Implement collaborative code platform for OBIS	Pieter Provoost and OBIS-USA Node	April-October 2019	10,000 US$ [IODE]
Finalize OBIS Network graph data, API, and visualization	OBIS Secretariat	May 2019	10,000 US$ [IODE]
Incorporate NODCs into the OBIS Network graph and develop “data repository health metrics” concept	OBIS Secretariat	June 2019	5,000 US$ [IODE]
Survey OBIS Network and NODCs to assess repository services in the network	OBIS Secretariat/SG-OBIS	July-October 2019	10,000 US$ [IODE]
OBIS Executive Committee			
Plan the 8th session of the SG-OBIS	EC-OBIS		25,000 US$ [IODE]

Monitor the health status of the OBIS nodes, inform the OBIS nodes about their status 3 months before the next SG meeting and report on the status at the SG meeting	OBIS Secretariat and SG-OBIS Co-Chairs	intersession	
Decide on the health status of the OBIS nodes and request an action plan or removal of the node from the OBIS node network	SG-OBIS	Next session	
Capacity Development Task Team			
OBIS train the trainers training course	CD-TT		30,000 US$ [OTGA, IODE PO]
Set up a mechanism for alumni to report on outcomes and impact	OBIS Secretariat		
Assess and report on the impact of training courses based on the alumni reporting mechanism	CD-TT		
Further develop training modules, including how-to videos targeting different audiences, in collaboration with OTGA and its RTCs, and in partnership with other initiatives, such as POGO, IOC-WESTPAC, Data Carpentry	CD-TT		
Vocabulary Infrastructure Project Team			
Form Vocabulary Infrastructure Project Team	Sky Bristol, Pieter Provoost	February 2019	3,000 US$ [IODE]
Identify and populate known vocabularies in repository	VIP Team	February - April 2019	3,000 US$ [IODE]
Develop API access to OBIS vocabularies and web browser tool	OBIS Data Manager	April 2019	10,000 US$ [IODE]
Develop Vocabulary Maintenance orientation webinar in concert with TDWG	OBIS Capacity Development Task Team/OTGA	March - April 2019	10,000 US$ [IODE]
Plan and conduct at least one scientific community vocabulary development engagement	TBD	April-October 2019	10,000 US$ [IODE] 25,000 US$ [in kind OBIS Node]
Establish a small-scale project for community-type data	VIP team, selected OBIS nodes	July 2019	$5000

Data QC project team			
Propose a data quality control and assessment scheme	Data QC project team	January-March 2019	
Implement the quality flag scheme in the OBIS 2.0 portal	OBIS data manager	June 2019	
Engineering project team			
Evaluate the OBIS software codes, new feature requests, and other work items for opportunities in collaborative code development	OBIS Data Manager	January-March 2019	$3K [IODE]
Conduct experiments in collaborative code development with members of the OBIS Network and evaluate for impact	OBIS Data Manager, OBIS Network	March-July 2019	$10K [IODE]
Set up GeoServer for WFS access to OBIS data	OBIS Data Manager	March 2019	
Provide access to Event and MeasurementOrFact data	OBIS Data Manager	February 2019	
Adapt R packages to new API	OBIS Data Manager	December 2018	
Provide better mapping capabilities	OBIS Data Manager	February 2019	
Taxonomy Task Team			
Process remaining non-matching names of previous harvesting procedures	Tax-TT in collaboration with WoRMS	Continuous	In-kind LifeWatch
Make available non-matching Black List	Tax-TT in collaboration with WoRMS	2019	In-kind LifeWatch
Communication and Outreach Task Team			
Complete and publish OBIS communication strategy	OBIS Secretariat	May 2019	10,000 US$ [IODE]
Develop slide deck template with common OBIS message	OBIS Secretariat	January 2019	10,000 US$ [IODE]
Adapt slide deck to local communication needs and present	Node Managers	January - July 2019	15,000-25,000 US$ [OBIS Nodes]

Report on the reception of the OBIS "pitch" to the OBIS Network	Node Managers	January - July 2019	
Iterate on slide deck design	OBIS Secretariat	January - July 2019	5,000 US$ [IODE]
Research and develop infographic visualization methods for OBIS Portal	OBIS Secretariat/OBIS Nodes	January-March 2019	10,000 US$ [IODE]
Prepare updated policy brief(s) on BBNJ questions for March/April 2019 meeting	OBIS Secretariat/OBIS Nodes	February-March 2019	10,000 US$ [IODE]
Develop methods for characterizing unique characteristics at dataset and other levels in OBIS	OBIS Data Manager	January 2019	5,000 US$ [IODE]
Develop and begin using methods for news lead characterization and follow-up	COTT	February-July 2019	
Develop a communication strategy associated with the name change	COTT	November 2019	$16,000
OBIS projects			
Merge HAEDAT into OBIS, extend data entry tool and develop OBIS-HAB data portal to support the Global HAB status report	OBIS data manager	December 2019	DIPS-4-Ocean Assessments (FUST)
Develop a tracking data aggregation tool (R package) to support the development of EOV products based on animal telemetry	OTN		In-kind OTN
Report the results of the OBIS-Event-Data project	Francisco Hernandez	Report: Oct 2018 Present: Feb 2019	
Develop a data entry tool for incidence occurrence records according to the "small data matters" project work plan	OBIS data manager, with support from a consultant	Jan-June 2019	$36,000 (FUST)
Organize a data entry workshop in Africa	OBIS Kenya, OBIS Senegal	May-June 2019	$10,000 (FUST)

5 ADOPTION OF RECOMMENDATIONS, WORK PLAN AND REPORT

138. The SG-OBIS adopted all the decisions and recommendations (in bold in the report) and action items (see work plan under 4).

6 DATE AND PLACE OF NEXT SESSION

139. OBIS nodes were asked to send in offers to host the 8th SG-OBIS session. The offers should include a proposal to cover part of the costs, e.g. travel of a limited number of participants and local costs such meeting room, internet and catering. The facilities should also have the capacity to accommodate around 40 people. When no offers are received before 16 November 2018, the place of the next session would be the IOC project office for IODE in Oostende, Belgium.

140. The following offer was received and reviewed:

- On behalf of INVEMAR's Director, Francisco Arias-Isaza, INVEMAR as an OBIS node of Colombia kindly offered their infrastructure and communication facilities for hosting the event in Santa Marta, Colombia (meeting room and internet connection) as well as catering during the event for 30 to 40 people. Additionally, as a Regional Training Center for Latin America, they suggested to organize the SG-OBIS back-to-back with an OBIS course for Latin America and Caribbean in 2019 with the possibility of sharing OBIS' experiences in the Region.

141. **The SG-OBIS welcomed the offer and will study the overall cost before making a decision on the place of the 8th session of the IODE Steering Group for OBIS. The SG-OBIS decided to hold the 8th session on 7-9 November 2019.**

7 ANY OTHER BUSINESS

142. No other issues were raised.

8 CLOSING OF THE SESSION

143. SG-OBIS co-chairs Eduardo Klein and Sky Bristol closed the session on 16 November 2018 at 12:52 and thanked everyone for their active participation and expressed great appreciation to the IOC/IODE team in Ostend for their excellent hospitality and smooth organization of the meeting.

Annex 1: Agenda of the 7th Session of the IODE Steering Group for OBIS

12-16 November 2018
IOC Project Office for IODE, Oostende, Belgium

AGENDA

1 OPENING OF THE SESSION AND ADOPTION OF THE AGENDA

2 OBIS PROGRESS REPORT
- 2.1 OBIS SECRETARIAT
- 2.2 OBIS EXECUTIVE COMMITTEE
- 2.3 OBIS TASK TEAMS
  - 2.3.1 Capacity Development Task Team
  - 2.3.2. Data Content Enhancement Task Team
  - 2.3.3 Technical Task Team
  - 2.3.4 Taxonomy Task Team
  - 2.3.5 Communication and Outreach Task Team
  - 2.3.6 Science Advisory Task Team
- 2.4 OBIS NODES
- 2.5 OBIS PROJECTS
- 2.6 OBIS PARTNERSHIPS

3 STRATEGIC DIRECTIONS FOR OBIS
- 3.1 Proposal for OBIS name change to Ocean Biodiversity Information System
- 3.2 OBIS role in the UN Decade of Ocean Science for Sustainable Development
- 3.3 OBIS potential role in BBNJ
- 3.4 OBIS 3.0 requirements and planning

4 OBIS WORK PLAN 2019

5 ADOPTION OF RECOMMENDATIONS, WORK PLAN AND REPORT

6 DATE AND PLACE OF NEXT SESSION

7 ANY OTHER BUSINESS

8 CLOSING OF THE SESSION

Annex 2: Outcomes of the OBIS value proposition break-out groups

Will help (WHO?)	**Doing (WHAT?)**	**By (HOW?)**
Government (decision-makers	Policy making and implementation	By making them aware of OBIS and giving them relevant summary statistics and information
Scientists (Researchers and students etc)	Research, responding to scientific issues Creating awareness and also feed back into OBIS	By making OBIS openly accessible to get detailed data. By trainings through OTGA
Communities (local people, and resource managers)	Making them aware of habitats around them Helping them to sustainably use the resources	Participating in environmental days e.g. World Oceans day Providing biodiversity goods and services (products)
Industry	Streamlining their activities	Informing them of impacts of their activities on the ecosystem Giving them relevant summary statistics on stock assessment
Scientists	Integrate data from multiple sources	By providing access to data having implemented key common vocabularies in species and attribute specification
Scientists	Improve data quality	By providing guidance and tools (or promoting tools) to support data quality assessment and management
Marine Biologist	Studying animal (e.g. seal) movement for conservation efforts.	OBIS data service providing data on animal movement over time/space. Also allowing for environmental measurement mapping to movement for climate change impact analysis.
New scientists	Use marine biological and related data	By promoting and providing easy and open access to such data with a minimum level of *authority/quality*
Society (scientists, managers, policy makers, general public)	Understand and conserve the marine environment	Providing integrated, free access to quality controlled marine biodiversity data
Scientists	Understand the marine environment	Providing building blocks & tools and analysis

Policy makers, public-private institutions, universities and researches centers	Regulate the use and reduce threats	Providing tools and indicators, policy briefs and training and quality data available with international standards by teaching lawyers and publications
OBIS community OBIS data node managers OBIS secretariat **Academia** Data users, museum curators, historians Bio-geographers, marine scientists, natural resource managers **Government and Administration** NGOs, Policy makers, Stewardship **Public** Public, non-governmental organisations, humanity	Facilitating data access (free) Formulating Developing Publishing Harvesting Managing (quality control) Teaching Enabling Processing Communication Connecting High quality Data Information Production	Developing Data Products Publishing Policy Briefs Providing public facing access Outreach training and Standardisation
Decision makers Researchers Education Industry General public	Provide easily accessible data for e.g. timelines for environmental assessment, biodiversity change, fluctuations over time Visualization tools	Collect data Write scientific papers Make it easy to produce graphical material Apply for funding to continue data collection and maintenance
International commitments of countries on biodiversity (i.e. CBD and Nagoya protocol)	Access and benefit data sharing	
Mega-biodiverse countries	Establish relationships and quality data	To support countries to provide standardized marine biodiversity indexes to report to the international binding instruments
Civil Society organisations (Private sector, NGO, Communities etc)	Creating tools for Smart and precise tourism	Visiting area with the presence of iconic species during the specific time and area
Government (Policy makers, ministry who work closely with the	Integrated Resource management	Planning, predicting, managing marine natural resources efficiently

usage of data which is available at OBIS e.g. Ministry of Tourism, MInistry of Fisheries, Research Center, etc)		
Scientist/Academician (Research Center etc)	Guided research	Finding knowledge gap priority area, species and monitoring.
General Public	Be well informed about the biodiversity status of the Ocean	Create evidence-based information to increase the level awareness of the public

Proposed OBIS Value Propositions as suggested during the break-out group

OBIS nodes help establishing relationships and quality data to support countries to provide standardized marine biodiversity indices to report to the international binding instruments.

OBIS encourages and help scientists and decision makers to targeted activities through its coherent open access data sharing system. This will help us saving time and money. OBIS is also a friendly platform for scientists who are interested to work globally together.

OBIS helps nations to manage marine ecosystems around the globe by providing access to high quality marine information and ecosystem indices to help make well informed decisions.

OBIS enables strategic and public groups and individuals to access its community driven, free at the point of access, standardised, aggregated, quality controlled data which informs the world of the Marine Biodiversity of OUR OCEANS.

OBIS data services provide data on animal movement over time/space. Also allowing for environ mental measurement mapping to movement for climate change impact analysis.

OBIS for Sustainable development (OBIS4Dep) is a 4 dimensions approach that contains different layers of datasets based on geography, ocean, diversity and time. The OBISDep helps the multi-stakeholders maximize the potential of the ocean by providing robust, trustful information of biodiversity, over space and time available in an open-access database for sustainable development. OBIS4Dep will offer indicators on global marine diversity change over tim, mirroring the health status of the ocean. OBIS4Dep will help Government (Policy makers, ministry who works closely with the users of OBIS data, e.g. Ministry of Tourism, Ministry of Fisheries, Research Center, etc) to create integrated resource management which includes planning, predicting, and managing marine natural resources efficiently. OBIS4Dep will help scientist/academician to develop or conduct guided research by finding knowledge gap priority area, species and monitoring.

OBIS4Dep will help the general public to be well informed about the importance of the ocean biodiversity status by creating evidence-based information to increase the level awareness of the public.

OBIS helps the Civil Society Organizations (Private Sector, NGO, Communities etc) by creating user-friendly tools for smart and precise tourism. These tools will help us to identify the presence of iconic species during specific times and space.

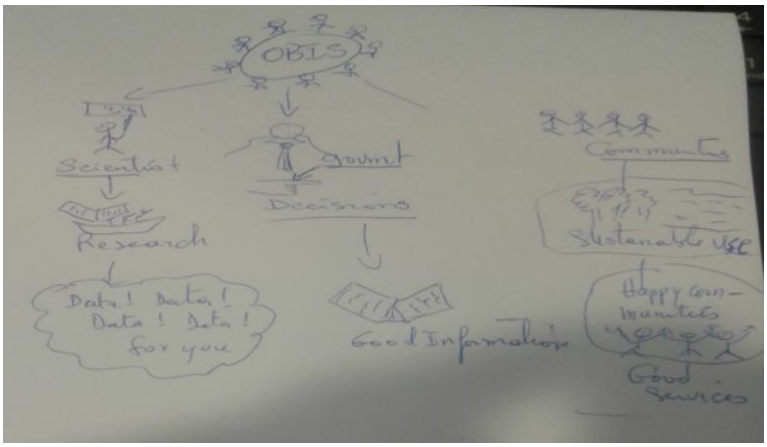
OBIS enables a variety of stakeholders to sustainably use the resources by providing relevant high-quality biodiversity goods and services (products)

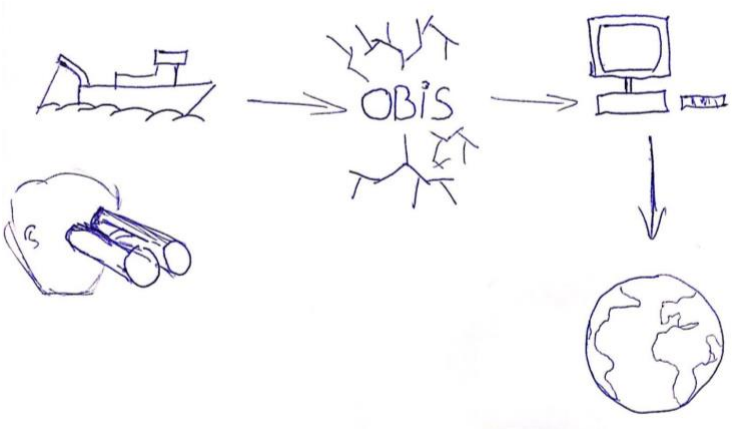
OBIS helps to make a new robust index or protocol for detecting global change in marine biodiversity using whole OBIS data

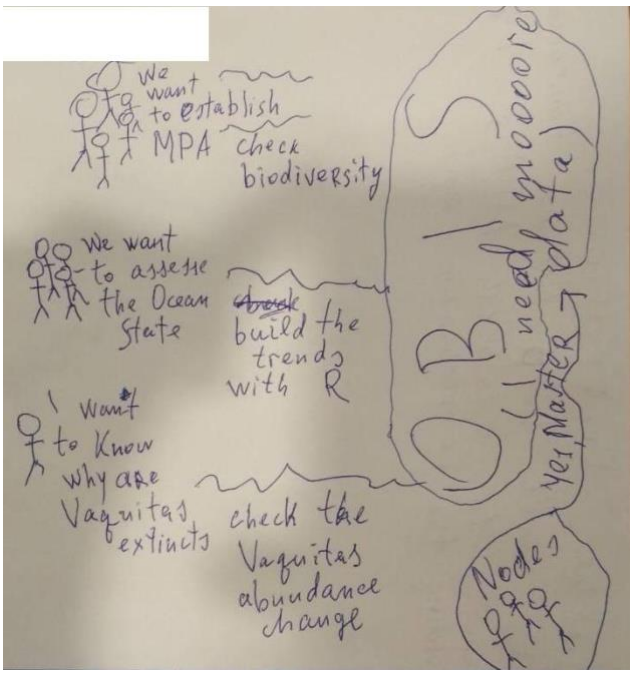
OBIS gives the scientific community access to the data never been assembled before to obtain unique insights on ecological changes in the world ocean

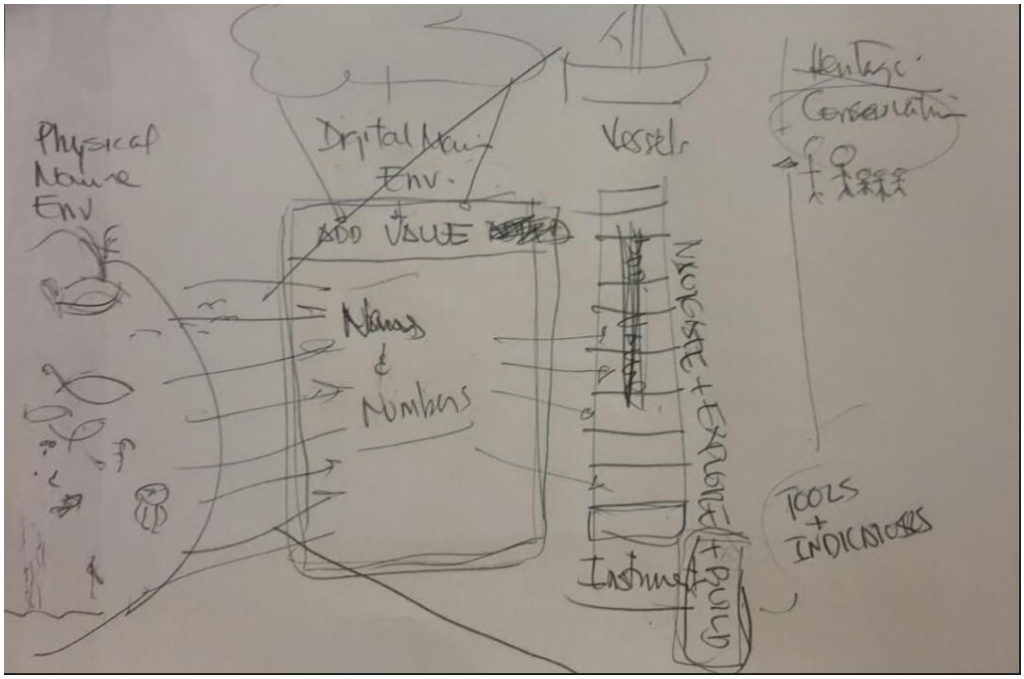
OBIS collects Names and Numbers from the Physical Marine Environment and integrates these into the Digital Marine Environment adding value from other sources. OBIS provides the vessels and the instruments to help the society to navigate, explore and build the construction blocks for tools and indicators that will serve the conservation actions for the Physical Ocean and ultimate preserve the natural heritage for the future generations.

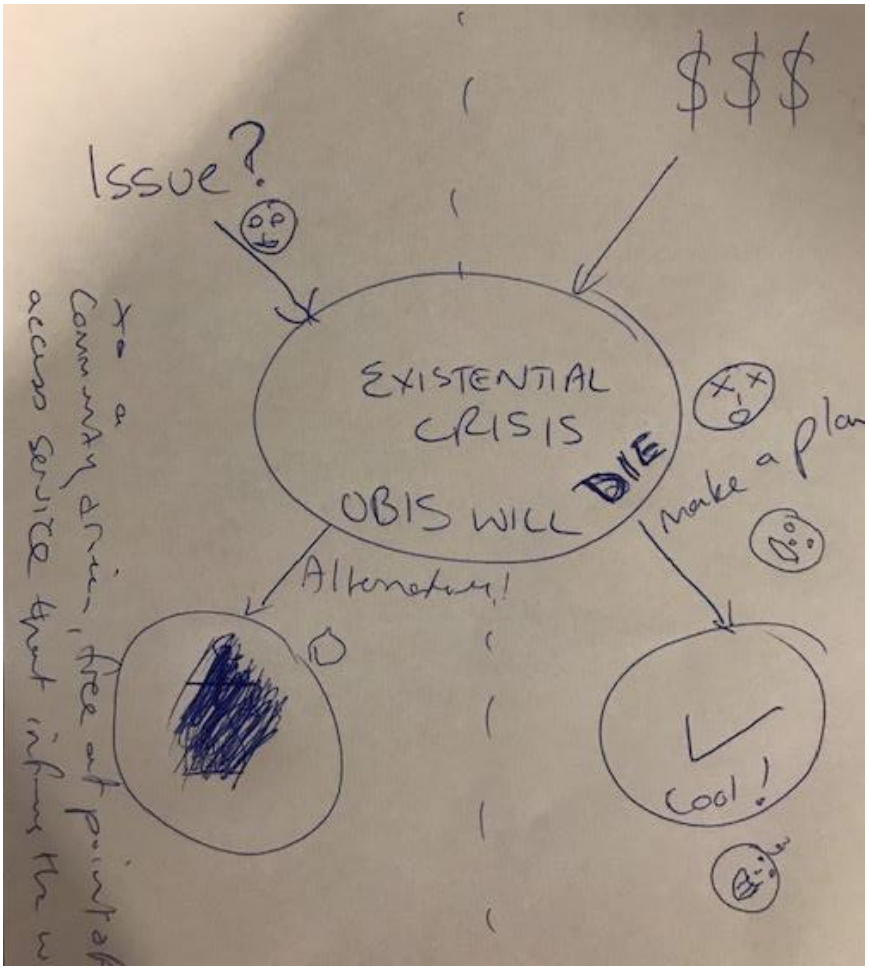
Napkin drawings

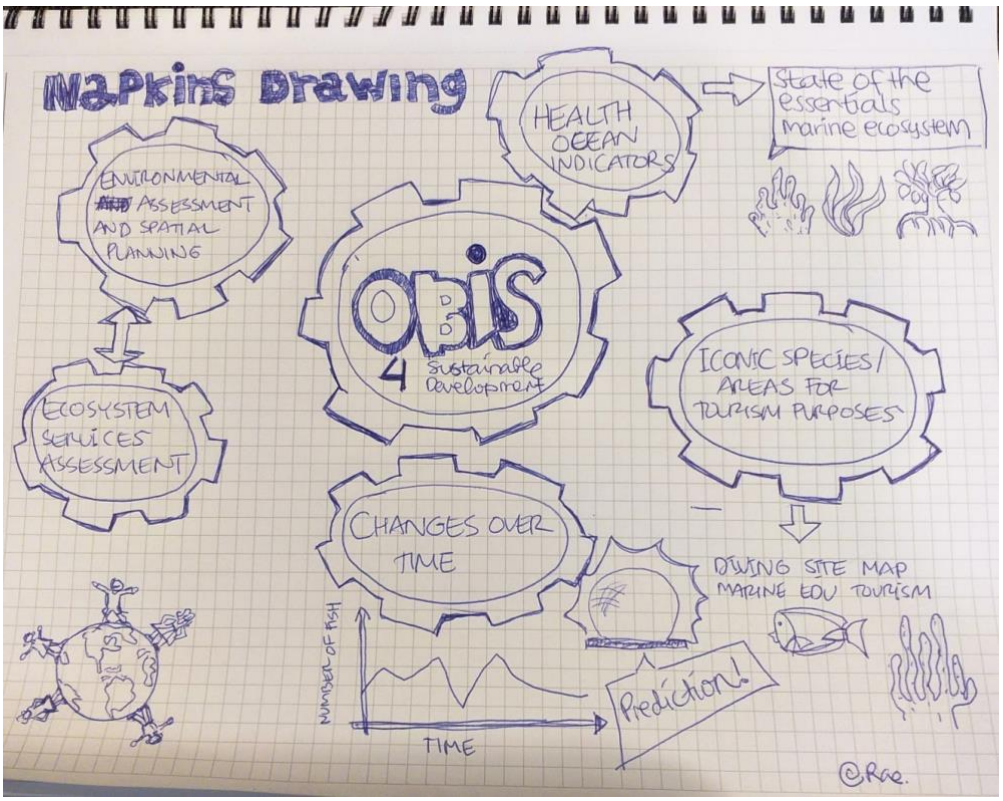


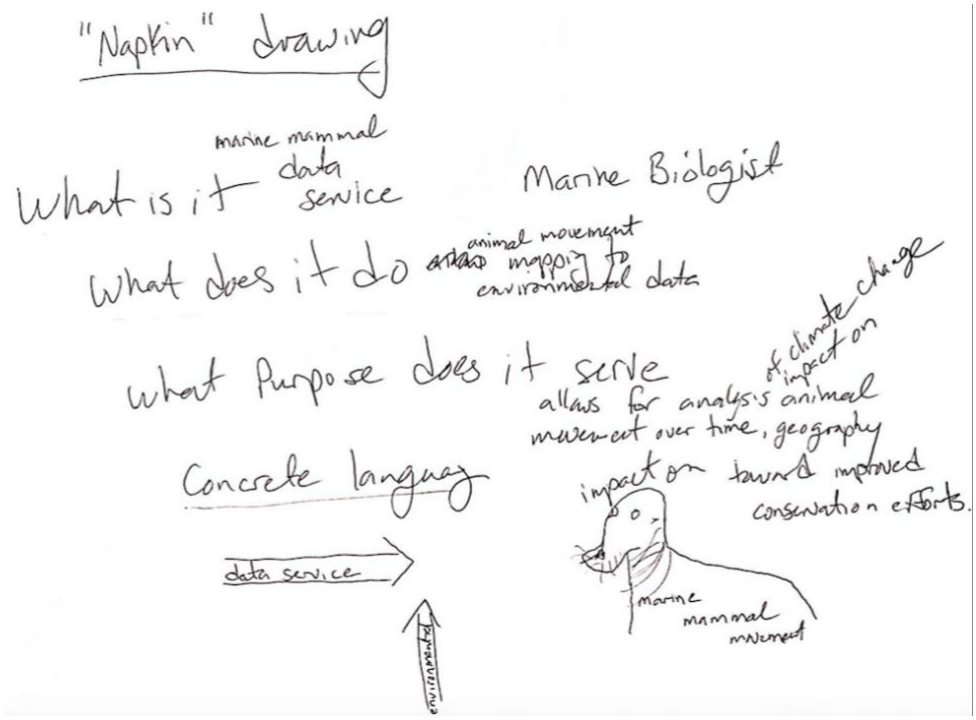





Physical Nature Env
Digital Nature Env.
Vessels
Heritage Conservation
ADD VALUE
Numbers
TOOLS + INDICATORS
Instrument + BUILD


$$$
Issue?
EXISTENTIAL CRISIS
OBIS WILL DIE
Alternatives!
make a plan
Cool!


Napkin Drawing
HEALTH OCEAN INDICATORS
State of the essentials marine ecosystem
ENVIRONMENTAL ASSESSMENT AND SPATIAL PLANNING
OBIS
4 Sustainable Development
ECOSYSTEM SERVICES ASSESSMENT
ICONIC SPECIES/ AREAS FOR TOURISM PURPOSES
CHANGES OVER TIME
DIVING SITE MAP MARINE EDU TOURISM
NUMBER OF FISH
TIME
Prediction!
©Rae.


"Napkin" drawing
What is it
marine mammal data service
Marine Biologist
What does it do
animal movement mapping to environmental data
What Purpose does it serve
allows for analysis animal movement over time, geography of climate change impact on impact on toward improved conservation efforts.
Concrete language
data service
marine mammal movement
environmental

Annex 3: Summary of data quality assessment break-out group discussion

In the "data quality assessment" group we discussed a Quality Flag Scheme for OBIS data records. We used four quality values (we do not use the "missing data", flag No. 9) and their definitions as primary level flags proposed by Ocean Data Standards, IOC Manuals and Guides No. 54 - Volume 3 (Table 1). We defined a colour code for the flag scheme, good = green; not evaluated = black; questionable, suspect = orange, bad = red.

1. Good data (green flag)

Good data will be data with all eight compulsory Darwin Core Terms requested by OBIS as below.

1- occurrenceID
2- eventDate
3- decimalLongitude
4- decimalLatitude
5- scientificName
6- scientificNameID
7- occurrenceStatus
8- basisOfRecord

In addition to having all the mandatory fields, each record needs pass a careful taxonomic and geographic quality control through verification and precision testing using the OBIS data verification test toolset.

Three primary ranges must be carefully considered:

Taxonomic Quality Control
E.g. Taxon match in WoRMS (LSID, presenting at least one record in WoRMS, record identified at the species level).

Geographic Quality Control
E.g. Looking at coordinate format, no data on land, inverse coordinates, coordinate uncertainty more than 20km or where coordinate uncertainty is missing, sampling depth in relation to bathymetric depth.

Temporal Quality Control
E.g. ISO date format, where time elements are recorded in the future, or time ranges are outside of reasonable parameters.

2. Not Evaluated / not available or unknown (black flag)

Used for data where no QC test is performed, or quality information is not available.
If one of the eight mandatory terms are missing, then it means that data cannot be evaluated. If three of the eight mandatory terms are missing, then the data will be classified as Missing Data. Also, if the record is literally blank or non-existent. Typically, these records will be referred back to the data provider and will not be included in OBIS.

3. **Questionable / Suspect (orange flag)**

Failed non-critical documented metric or subjective test(s). E.g., when LSID does not exist in WoRMS, when a new species has not yet been reported to WoRMS. The other example would be when the location of the records does not match the coordinates.

4. **Bad (red flag)**

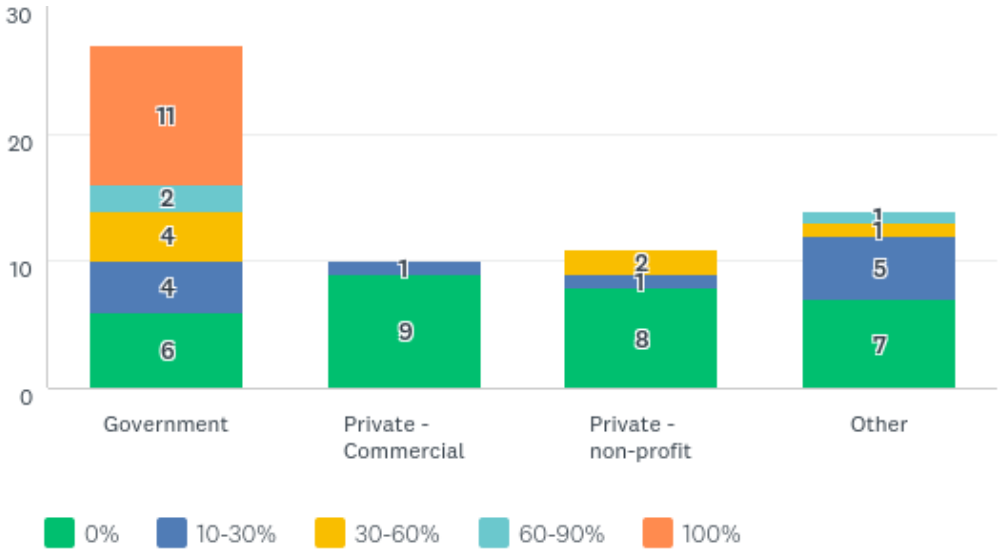
Failed critical documented QC test(s) or as assigned by the data provider. When data are not good data, we will consider them as bad data.

Table 1: Primary level

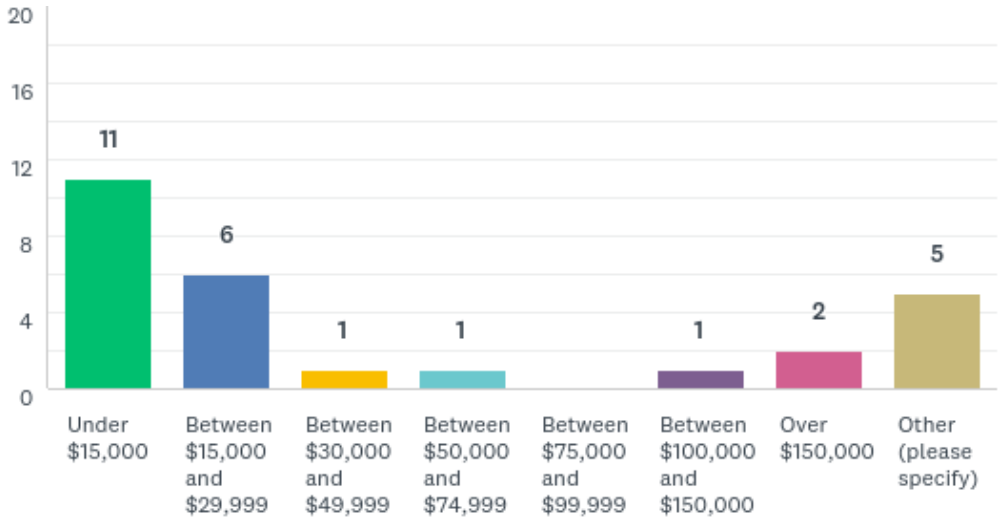
Value	Primary-level flag short name	Definition
1	Good	Having all eight mandatory Darwin Core fields required by OBIS and passed documented required QC tests (taxonomy, location, time period)
2	Not evaluated, not available, unknown, or incomplete data	Used for data when no QC test performed or the information on quality is not available. Also when one of the three information is missing, taxonomy, location, time period
3	Questionable/suspect	Some information in the record is doubtful (e.g., taxon identification, locality report, and time period)
4	Bad	Failed critical documented QC test(s) or as assigned by the data provider

Annex 4: Results of the OBIS nodes survey 2018

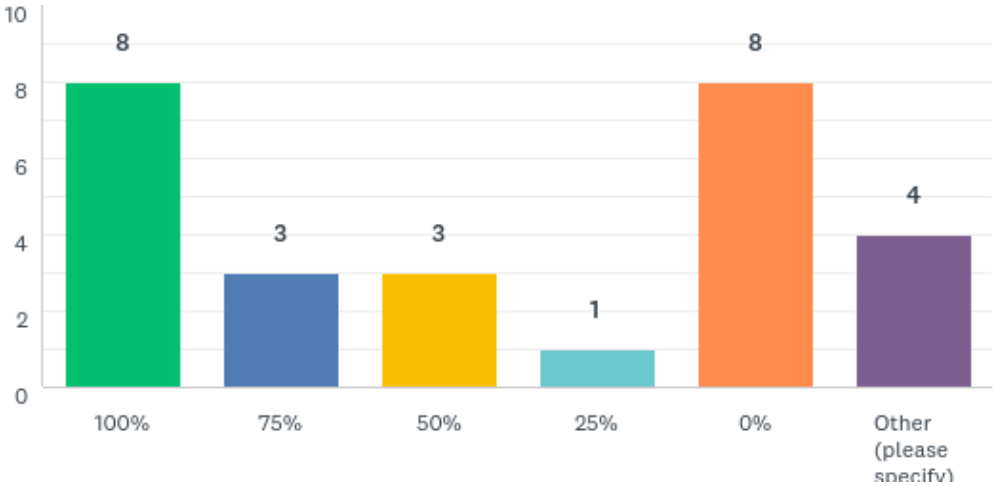
What is the funding source of your OBIS node?



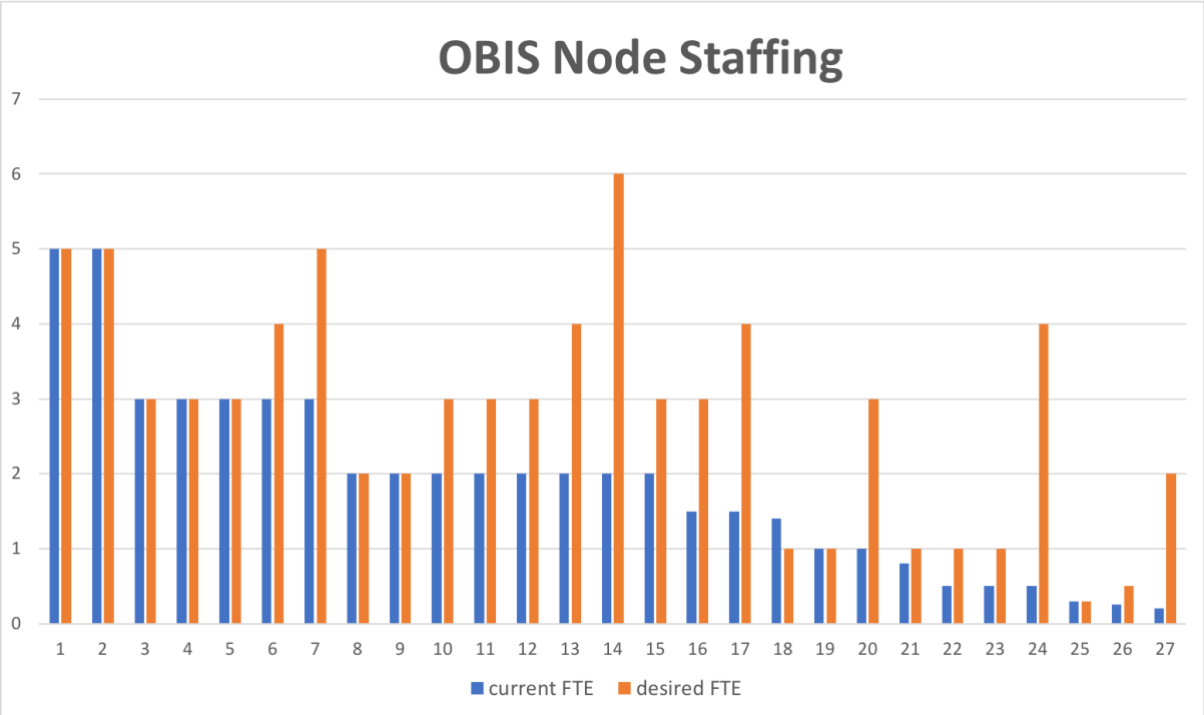
What is the annual operational cost (exclude staff) to run your OBIS node?



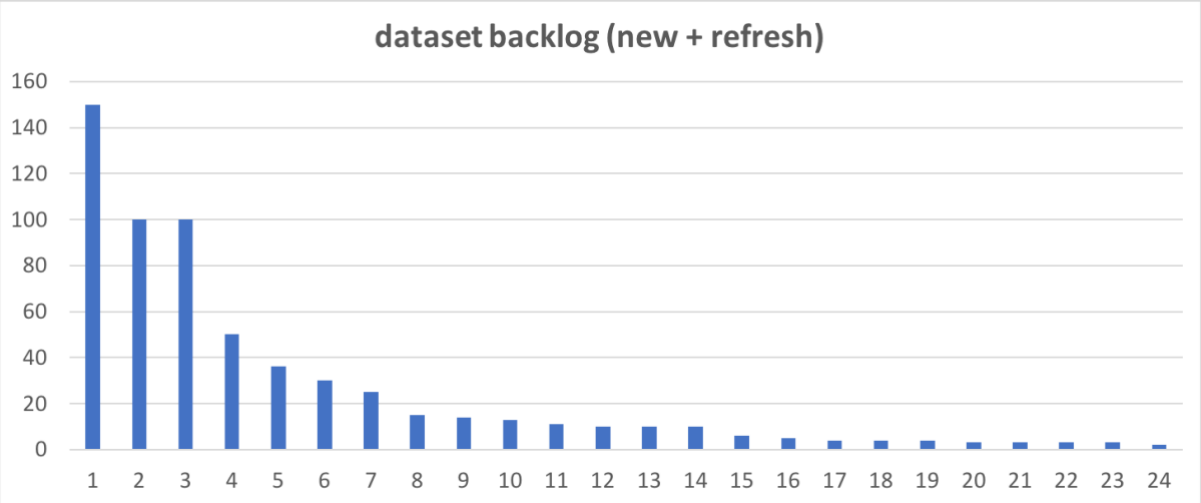
Do you have these financial resources secured for 2019-2020?



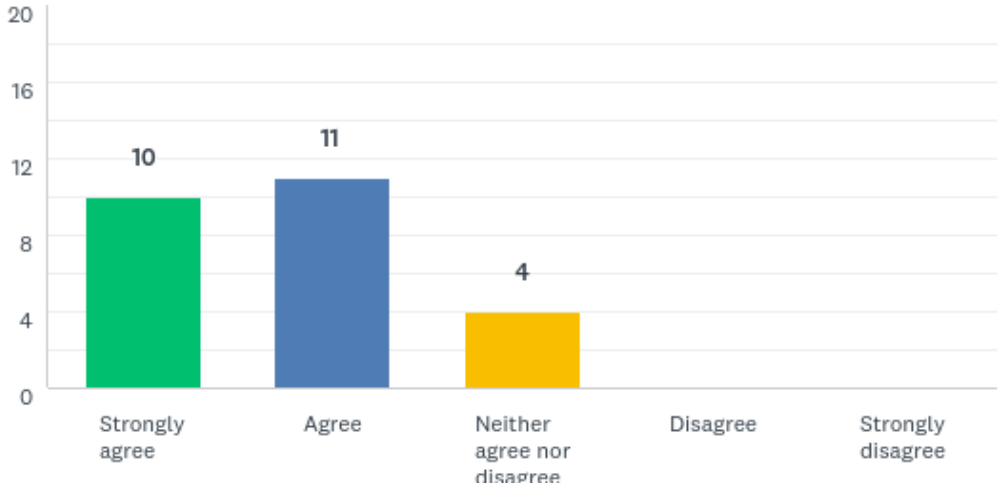
How many staff members are working for the OBIS node (expressed in FTE) and how many would you need to run the OBIS node?



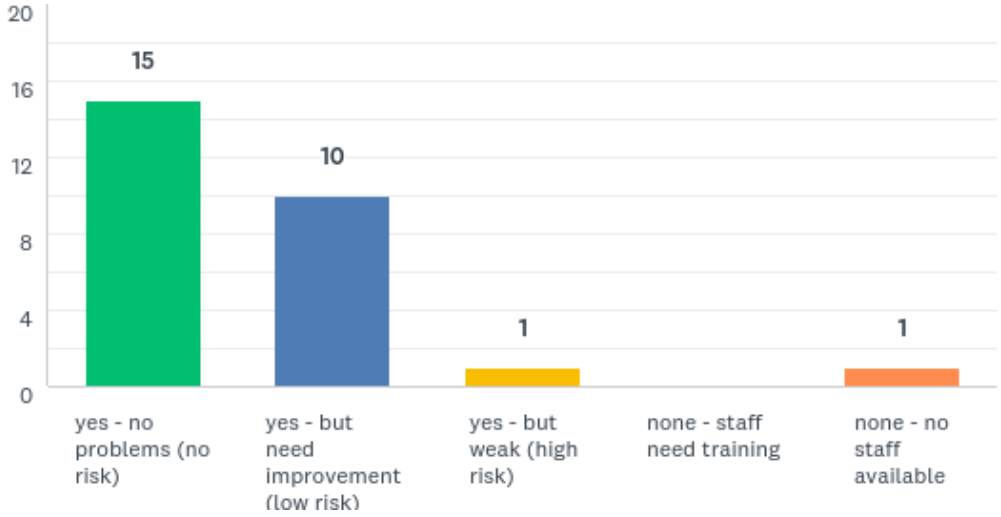
How many datasets are in your back-log to process (new and refresh)?



Does OBIS currently satisfy your needs and expectations?

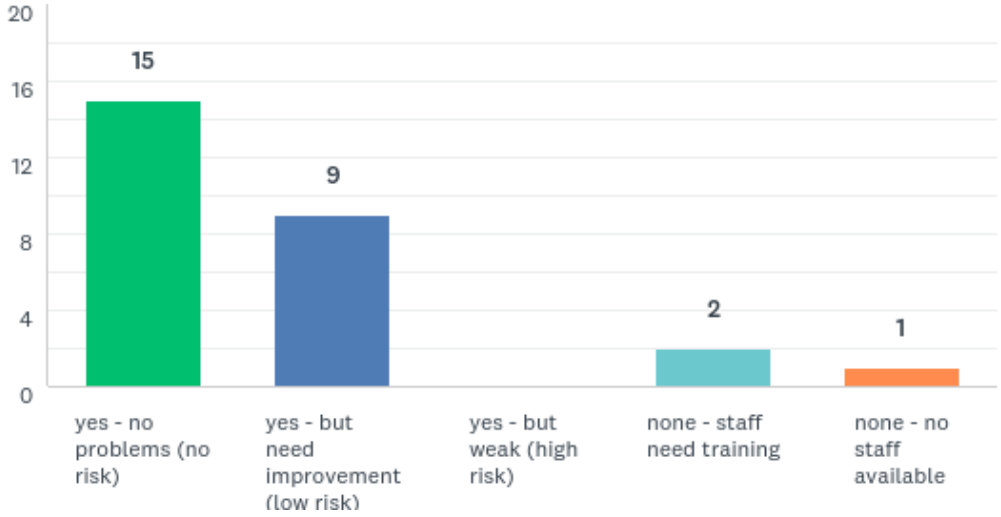


Data management - Our OBIS node has trained staff with the skills and capabilities to communicate effectively with data providers and either enable or conduct the necessary data transformation/standardization practices

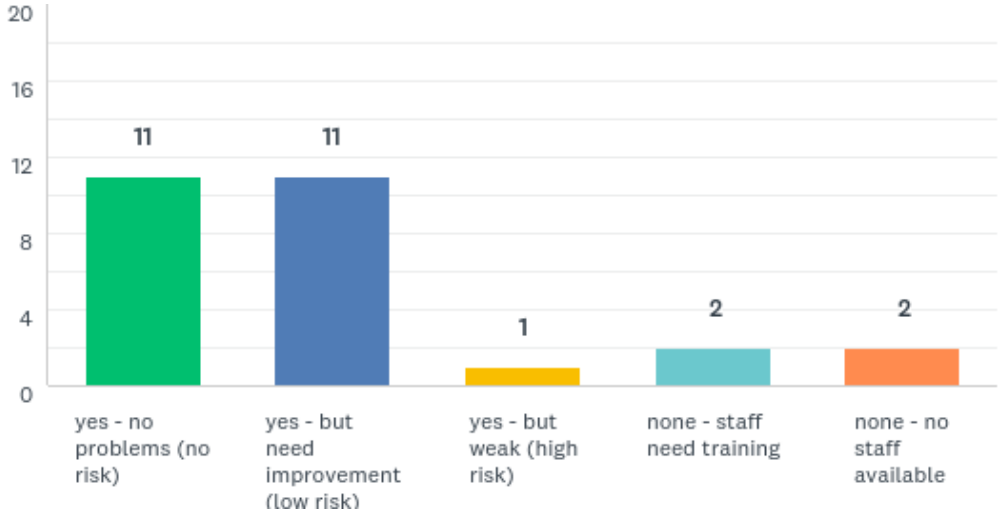


Marketing - Our OBIS node has trained staff with the ability to explain what the OBIS Node is, how it operates, and what its value proposition is to attract new partners and funders

Information technology - Our OBIS node has trained staff with the ability to operate a digital repository, including an IPT server and whatever other technology is necessary to ensure data are well managed and available and can be refreshed through time as the standard evolves



Scientific applications - Our OBIS node has trained staff with the knowledge and expertise to use OBIS data effectively to pursue scientific questions in a given geographic or topical area or apply the data to policy/management questions of interest in a particular jurisdiction



Annex 5: Participants of Seventh Session of the IODE Steering Group for OBIS

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