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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

INFORMATION DOCUMENT

AD HOC REPORT OF THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (IOC) OF UNESCO TO THE 4TH SESSION OF THE PREPARATORY COMMITTEE ON MARINE BIOLOGICAL DIVERSITY OF AREAS BEYOND NATIONAL JURISDICTION (BBNJ PREPCOM) (NEW YORK, 10–21 JULY 2017

IOC strategy on activities in relation to capacity development
and transfer of marine technology

As was requested by BBNJ PrepCom-3, this report from the IOC of UNESCO is to assist the discussions at BBNJ PrepCom-4. It includes information on IOC's activities and functions and in particular on its on-going activities and vision in relation to capacity development and transfer of marine technology, including issues related to the operationalisation of a clearing-house mechanism for the purposes of a new BBNJ instrument. This report is prepared by the IOC secretariat with input from the IOC officers, Co-chairs of OBIS and GOOS BioEco and may not reflect the views of all the 148 IOC Member States. This report does not provide any instructions or suggestions with the purpose to influence or pre-empt the decisions for a BBNJ agreement.

United Nations
Educational, Scientific and
Cultural Organization

Intergovernmental
Oceanographic
Commission

Ad Hoc Report of the

Intergovernmental Oceanographic Commission (IOC) of UNESCO to BBNJ PrepCom-4

IOC strategy and activities in relation to
Capacity development and Transfer of Marine Technology (TMT)

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About this report and disclaimer

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What is IOC?

The Intergovernmental Oceanographic Commission (IOC) of UNESCO, established in 1960 as a body with functional autonomy within UNESCO, is the only competent organization for marine science within the UN system (UNCLOS Annex 8 article 2).

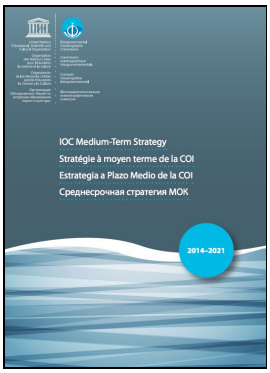
United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

The purpose of the Commission is to promote international cooperation and to coordinate programmes in research, services and capacity-building, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision-making processes of its Member States. In addition, IOC is recognized through the United Nations Convention on the Law of the Sea (UNCLOS) as a competent international organization in the fields of Marine Scientific Research (Part XIII) and Transfer of Marine Technology (Part XIV). According to its Statutes, the Commission may act also as a joint specialized mechanism of the organizations of the United Nations system that have agreed to use the Commission for discharging certain of their responsibilities in the fields of marine sciences and ocean services, and have agreed accordingly to sustain the work of the Commission.

The IOC is a community of 148 Member States (see list and national coordinating bodies here) that work together to observe, understand and manage the shared marine environment that unites us all. A recent, 69 page long brochure highlights the central role the IOC plays in the sustainable management of our oceans and demonstrates the considerable value that all Member States derive from their membership in the IOC.

Download from http://on.unesco.org/2pGh8zD



The IOC Medium-Term Strategy 2014-2021, defined in Decision EC-XLV/Dec.5.2 and adopted through Resolution XXVII-2 of the IOC 27th Assembly 2013, represents the medium-term strategic framework of the Commission. The strategy notes the role of IOC as the competent body and focal point for ocean matters in the UN system, responding concretely in its mandated areas of activity to the Rio+20 Conference Sustainable Development Goals, and acting in conformity with international law, including relevant UN conventions.

Download from http://on.unesco.org/2pFSegV

IOC's Vision:

Strong scientific understanding and systematic observations of the changing world ocean climate and ecosystems shall underpin sustainable development and global governance for a healthy ocean, and global, regional and national management of risks and opportunities from the ocean.

More specifically, through international cooperation, IOC aspires to help its Member States to collectively achieve the following four high-level objectives (HLOs), with particular attention to ensuring that all Member States have the capacity to meet them:

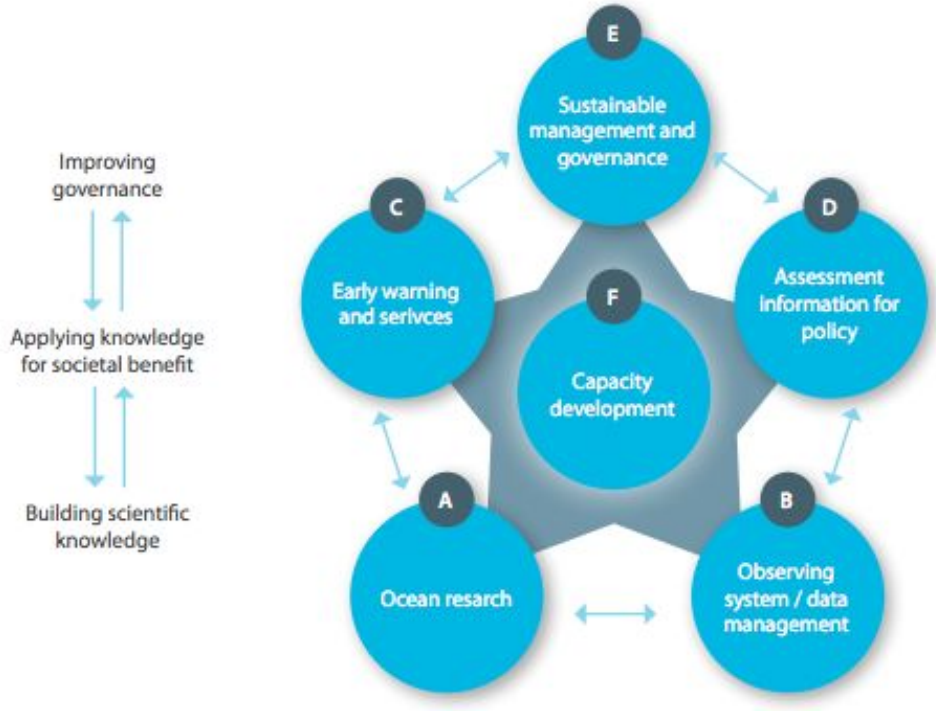
1. Healthy ocean ecosystems and sustained ecosystem services
2. Effective early warning systems and preparedness for tsunamis and other ocean-related hazards
3. Increased resiliency to climate change and variability and enhanced safety, efficiency and effectiveness of all ocean-based activities through scientifically-founded services, adaptation and mitigation strategies
4. Enhanced knowledge of emerging ocean science issues.

When working towards the high-level objectives, IOC will focus on the broad areas of:

- strengthening scientific knowledge of the ocean and human impact on it,
- applying that knowledge for societal benefit, and
- building institutional capacities for sound management and governance

The strategy is organized in a conceptual framework of six functions required to advance towards the IOC Vision:

A. Foster ocean research to strengthen knowledge of ocean and coastal processes and human impacts upon them [**Ocean research**]
B. Maintain, strengthen and integrate global ocean observing, data and information systems [**Observing system / data management**]
C. Develop early warning systems and preparedness to mitigate the risks of tsunamis and ocean-related hazards [**Early warning and services**]
D. Support assessment and information to improve the science-policy interface [**Assessment and Information for policy**]
E. Enhance ocean governance through a shared knowledge base and improved regional cooperation [**Sustainable management and governance**]
F. Develop the institutional capacity in all of the functions above, as a cross-cutting function [**Capacity Development**]

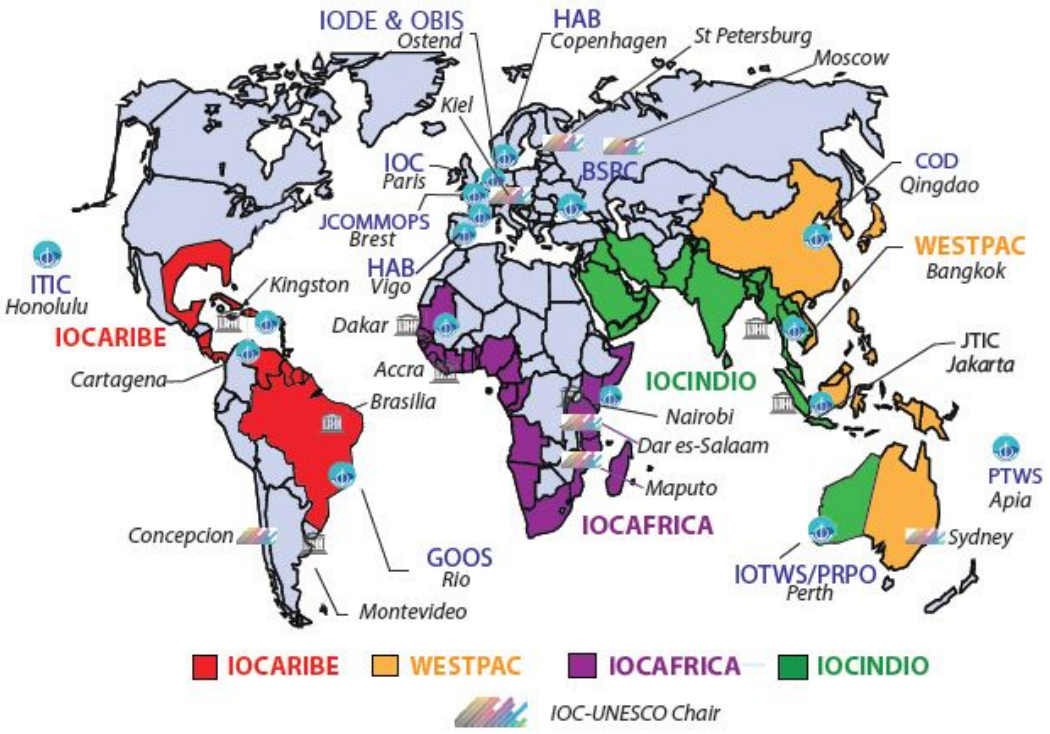


These functions correspond broadly to existing and ongoing IOC programmes, components of programmes and mechanisms of cooperation, such as the Global Ocean Observing System (GOOS), the Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) and the International Oceanographic Data and Information Exchange (IODE), the Ocean Biogeographic Information System (OBIS), the Tsunami Intergovernmental Coordination Groups

(ICGs), World Climate Research Programme (WCRP) and the Ocean Sciences programme, Integrated Coastal Area Management (ICAM), Harmful Algal Blooms (HAB), and Capacity Development (CD).

IOC Regional Sub-Commissions, Committees, Programme Offices and Project Offices

The IOC Secretariat is located in the UNESCO Headquarters in Paris (France), as well as in several decentralised offices worldwide. See overview below.



- Regional Sub-Commissions
    - IOC Sub-Commission for Africa and the Adjacent Island States (IOCAFRICA)
    - IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)
    - IOC Sub-Commission for the Western Pacific (WESTPAC)
- Regional Committees
    - IOC Regional Committee for the Central Indian Ocean (IOCINDIO)
- Regional Programme Offices
    - Rio Regional Programme Office, Brazil
    - Perth Regional Programme Office, Australia
- Project Offices

- Caribbean Tsunami Information Center CTIC, Bridgetown, Barbados
- Data Buoy Cooperation Panel (DBCP) Argo Project Office (JCOMMOPS), Brest, France
- IOC Science and Communication Centre on Harmful Algae/ Harmful Algal Bloom (HAB) Project Office, Copenhagen, Denmark
- International Oceanographic Data and Information Exchange (IODE) Project Office, Ostend, Belgium
- Indian Ocean Tsunami Information Centre (IOTIC), Jakarta, Indonesia
- Ocean Data and Information Network for Africa (ODINAfrica), Nairobi, Kenya
- Omani National Multi-Hazard Early Warning System (NMHEWS), Muscat, Oman
- Strengthening Haitian Early Warning Services for Coastal Hazards, Port-au-Prince, Haïti

IOC and Capacity Development

Capacity building is an essential tenet of IOC's mission. It enables all Member States to participate in and benefit from ocean research and services that are vital to sustainable development and human welfare on the planet. This Strategy's vision identifies capacity development as the primary catalyst through which IOC will achieve its four high level objectives in the current 2014–2021 IOC Medium-Term Strategy.

The renewed IOC Capacity Development website (http://www.ioc-cd.org) provides a detailed description of the CD strategy, information on CD activities in the 3 sub-commissions as well as in the IOC global programmes. The website also maintains a catalogue of training and education opportunities provided by IOC member states and a wide variety of organizations (under "Opportunities"). Interested visitors can subscribe to a mailing list to obtain regular updates on new opportunities and other news items included in the web site. This gateway to capacity building activities around the world aims to improve coordination and cooperation in Capacity Development.

27 training courses will be (co-)organized by IOC in 2017, see calendar

230 people from 60 countries of which 117 are Men and 113 are Women were trained by IOC in 2016, see alumni list

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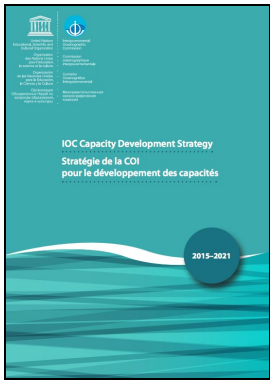


The IOC Capacity Development Strategy 2015-2021 was adopted by the 28th Session of the IOC Assembly (2015) through Resolution XXVIII-2. This strategic framework provides six outputs and numerous activities which call for investing in people and the institutions of which they are a part, enhancing access to scientific tools and methodologies, reinforcing IOC's capabilities to provide services to Member States, enhancing the communication between scientific and policy makers communities, expanding ocean literacy in civil society and mobilising resources to accomplish these goals.

Download from http://on.unesco.org/2oujNIe (EN-FR), http://on.unesco.org/2oTINLR (ES-RU)

IOC's Capacity Development vision

Through international cooperation, IOC assists its Member States to collectively achieve the IOC'S high-level objectives (HLOs), with particular attention to ensuring that all Member States have the capacity to meet them.

Based on the IOC CD Strategy, the expected result of the IOC's capacity development interventions is for Member States to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and decision-making processes. It will be essential to monitor and report on the results taking into account, *inter alia,* the UNESCO priorities including gender, Africa, LDCs, and SIDS. Regional Sub-Commissions and Regional Committees will play an essential role in planning, implementation and monitoring of the strategic plan. Given the needs for capacity development varying from one region to another, IOC regional sub-commissions and regional committees shall take an adaptive approach to capacity development for their respective regions while taking into account all activities and actions contained in this strategy.

The table in annex provides an overview of the six expected outputs of the IOC CD strategy, implemented through specific activities and actions.

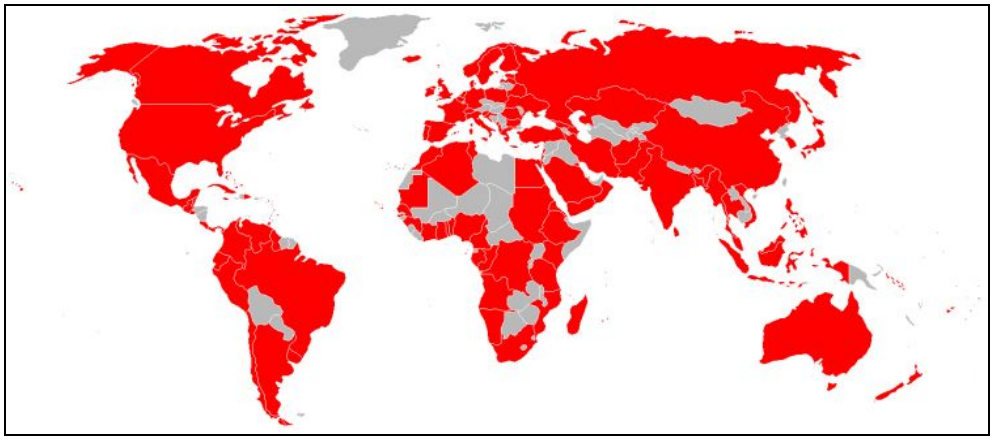
A status report on the implementation of the IOC Capacity Development Strategy (IOC-29, agenda item 10.1) is prepared for the 29th IOC Assembly June 2017 and provides an overview of:

- How each global programme and regional sub-commission currently address the six outputs of the IOC CD strategy;
- gaps where an output, activity or action is currently not addressed, and;
- efforts and associated resource requirements to address the gaps (first attempt).

Capacity building through a network of regional centres

UNCLOS (Part XIV article 276) encourages the establishment of regional centres, in order to stimulate and advance the conduct of marine scientific research, particularly by developing States, and to foster the transfer of marine technology. This call was reiterated in the outcome document of the Third International Conference on Small Island Developing States (SIDS) held in Samoa in September 2014. In 2002, the UN General Assembly (A/RES/57/141 paragraph 25), called upon IOC to act as the focal point to strengthen existing centres and to establish, where appropriate, such regional centres. The OceanTeacher Global Academy and the Regional Network of Training and Research Centres on Marine Science of IOC are two initiatives that fulfil this request.

IODE's technical training programme called OceanTeacher started in 2005 with an initial focus on oceanographic data and information management, and gradually started adding courses on all IOC activities such as operational oceanography, marine spatial planning, tsunami warning, taxonomy of harmful algal species, science and spatial data analysis. The OceanTeacher is now expanding into a global network of Regional Training Centres (RTCs). These RTCs connected through a common OceanTeacher Learning Management System (Moodle) and use a multilingual approach to scientific and technical training. The advantage of Moodle is that the OceanTeacher online platform can act as a distributed system allowing other organizations to maintain and control the training content locally, and share it through the Moodle system. Visit: http://www.oceanteacher.org.



Map showing the 120 countries that received training through OceanTeacher between 2005-2017

6 Regional Training Centres (RTC) (in Colombia, India, Kenya, Malaysia, Mozambique and Senegal) and 4 candidate RTCs (in China, Iran, South-Africa and USA) with Headquarters in Belgium, are part of the OceanTeacher Global Academy

So far, over 1200 people from 120 countries through over 100 training courses have been trained by OceanTeacher

The UN General Assembly (A/RES/70/34) expressed its appreciation to OceanTeacher and especially its expansion to a so called OceanTeacher Global Academy (OTGA) through the establishment of a network of Regional Training Centres (RTCs) in Latin America, Africa, Indian Ocean and Western Pacific.

In addition, the UNESCO/IOC Regional Network of Training and Research Centres on Marine Science, initiated by the IOC Sub-Commission for the Western Pacific (WESTPAC), aims to improve regional capability and capacity in marine science in a sustainable and systematic manner, through the establishment of IOC Regional Training and Research Centres (RTRCs) in national oceanographic institutes or universities, and regular provision in these Centres of training and research opportunities on their domains of focus to young scientists mainly from developing countries within and outside the region. These RTRCs and their focus may vary from one to another as they are established based on regional priority interests and specialization of host national institutions. The overall goal of this project is to help advance marine science capacity in Asia and the Pacific through the transfer of technology. IOC has established the first Regional Training and Research Centres on Ocean Dynamics and Climate (First Institute of Oceanography, State Oceanic Administration of China, Qingdao, China), with regular trainings provided annually on ocean and climate models. Recently, the second RTRC “MarBEST” hosted at the Indonesian Institute of Sciences (LIPI) was established with objectives to improve national and regional scientific capacity, particularly the new generations of marine scientists in the region, and to nurture friendships and cooperation among countries for marine biodiversity conservation and ecosystem health.

Other important training centres are those of POGO-SCOR, UN-Nippon Foundation, World Maritime University of IMO, International Ocean Institute, and regional centres of excellence such as those in the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA).

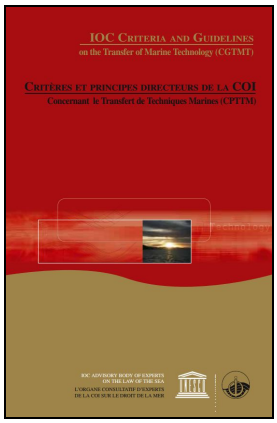
IOC and Transfer of Marine Technology

In 2003, the IOC Assembly adopted the Criteria and Guidelines on the Transfer of Marine Technology, a document cited in several UNGA resolutions, in the Rio+20 document *The future We Want*, and referenced in SDG target 14a. These criteria and guidelines were developed in direct response to article 271 of UNCLOS, with the aim to support the implementation of Part XIV of UNCLOS.

For the purpose of the Guidelines, Marine Technology is understood as comprising:

1. Information and data on marine sciences and related marine operations and services
2. Manuals, guidelines, criteria, standards, reference materials
3. Sampling and methodology equipment
4. Observation facilities and equipment
5. Equipment for in situ and laboratory observations, analysis and experimentation
6. Computer and computer software, models and modeling techniques
7. Expertise, knowledge, skills, know-how and analytical methods.

under the principle that "Transfer of marine technology should enable all parties concerned to benefit on an equitable basis from developments in marine science based activities – in particular, those aiming and stimulating the social and economic context in developing States – …"



The IOC Criteria and Guidelines on the Transfer of Marine Technology, developed by the IOC Advisory Body of Experts of the Law of the Sea (IOC/ABE-LOS), was adopted by IOC Resolution XXII-12 (2003). Since then, the CGTMT has been referenced in many UNGA resolutions (from A/RES/65 to A/RES/70), in the Rio+20 outcome document "The future we want" as well as in Sustainable Development Goal 14a.

Download from: http://on.unesco.org/2oTtUI8

According to the CGTMT, the IOC (in collaboration with others) is to: a) establish and coordinate a clearing-house mechanism for TMT; b) encourage Member States to include in their strategic planning specific components on TMT; c) promote the establishment of focal points; organize events on TMT; and d) seek contributions for promoting and facilitating TMT.

These objectives and actions are aligned with the IOC CD Strategy 2015 – 2021 where the outputs and activities include:

IOC CD Strategy Output	Activities
1 - Human resources developed	1.2 Continuous professional development and, 1.3 Sharing of knowledge and expertise/ community building
2 - Access to physical infrastructure established or improved	2.1 Facilitating access to infrastructure (facilities, instruments, vessels)
3 - Global, regional and sub-regional mechanisms strengthened	3.1 Further strengthening and supporting secretariats of regional commissions 3.2 Enhance effective communication between regional sub-commission secretariats and global programmes as well as other communities of practice (including other organizations)
4 - Development of ocean research policies in support of sustainable development objectives promoted	4.1 Sharing of information on ocean research priorities
5 - Visibility and awareness increased	5.1 Public Information 5.2 Ocean Literacy
6 - Sustained (long-term) resource mobilization reinforced	6.1 In-kind opportunities

In addition, both the Scope of Application and the Guidelines for Implementation of TMT can be directly mapped to the IOC CD Strategy Outputs and Actions respectively. In such way:

IOC CD Strategy Output	relates to	Marine Technology
1. Human resources developed		(i) Information and data on marine sciences and related marine operations and services (ii) Manuals, guidelines, criteria, standards, reference materials (vii) Expertise, knowledge, skills, know-how and analytical methods
2. Access to physical infrastructure established or improved		(iii) Sampling and methodology equipment (iv) Observation facilities and equipment (v) Equipment for in situ and laboratory observations, analysis and experimentation (vi) Computer and computer software, models and modeling techniques
3. Global, regional and sub-regional mechanisms strengthened		(i) Information and data on marine sciences and related marine operations and services (ii) Manuals, guidelines, criteria, standards, reference materials (iii) Sampling and methodology equipment (iv) Observation facilities and equipment (v) Equipment for in situ and laboratory observations, analysis and experimentation (vi) Computer and computer software, models and modeling techniques (vii) Expertise, knowledge, skills, know-how and analytical methods.
4. Development of ocean research policies in support of sustainable development objectives promoted		(i) Information and data on marine sciences and related marine operations and services (ii) Manuals, guidelines, criteria, standards, reference materials
5. Visibility and awareness increased		(i) Information and data on marine sciences and related marine operations and services

		(vii) Expertise, knowledge, skills, know-how and analytical methods.
6. Sustained (long-term) resource mobilization reinforced		(i) Information and data on marine sciences and related marine operations and services (iii) Sampling and methodology equipment (iv) Observation facilities and equipment (v) Equipment for in situ and laboratory observations, analysis and experimentation (vi) Computer and computer software, models and modeling techniques (vii) Expertise, knowledge, skills, know-how and analytical methods.

Clearing House Mechanism (CHM)

The IOC CGTMT call for the establishment of a clearing-house mechanism for the transfer of marine technology, in order to provide interested users in Member States with direct and rapid access to relevant sources of information, practical experience and scientific and technical expertise in the transfer of marine technology, as well as to facilitate effective scientific, technical and financial co-operation to that end. The following functions were foreseen under the CHM. These are matched with the corresponding activities and outputs currently achieved under the IOC Capacity Development Strategy.

IOC TMT		Relates to	IOC CD strategy output/activity/ action
a. Clearing-House Mechanism	2. A list of governmental, non-governmental or private entities interested in participating as donors in TMT;		6/6.1 6.2
	3. Opportunities for projects or initiatives related to TMT		1.3.1/ 1.3.2

	4. Sources, availability and, eventually, cost of marine scientific and technological information and data for transfer in different disciplines of marine sciences;		3
	5. A directory of marine research institutes which offer laboratory facilities, equipment and opportunities for research and training;		2.1.1/ 2.1.2
	6. Offers of cruise studies at the global, regional and sub-regional levels;		1.2.2
	7. A list of available experts/specialists who can provide scientific and technical assistance;		1.2.3
	8. Universities and other organizations offering study grants and facilities in marine science;		1.1.1/ 1.1.2
	9. Workshops, seminars and training courses at global, regional and sub-regional level, in particular those offering financial support;		1.2.1/ 1.2.4
	10. Links with national, sub-regional and/or regional agreements, institutions and centres holding information, experience and technical expertise of scientific relevance to the region concerned.		3/6/6.1 6.2
b.	Encourage Member States to include in their strategic planning specific components on the TMT		4.
c.	Promote the establishment of focal points		2.
d.	Organize events on TMT		1.2.1/ 1.2.4 /3./5.
e.	Seek contributions for promoting and facilitating TMT		1./6.

Whilst a dedicated CHM was not established, due primarily to resource constraints and lack of requests from developing nations to the IOC (only one TMT application was received by the IOC Secretariat after the adoption of the CGTMT), the table above shows that the outputs of the IOC

CD strategy and related activities contribute to a large extent to the implementation CHM functions defined under CGTMT.

In addition, the following list includes operational tools that have already been developed by IOC and can be used, or re-purposed to respond to TMT and CD (non-exclusive list) in the BBNJ context and aimed towards specific disciplines, issues, requirements and regions:

- Global Directory of Marine and Freshwater Professionals (OceanExpert): a directory of individuals and institutions dealing with the marine (and freshwater) environment (http://www.oceanexpert.net) (supported by IOC/IODE)
- IOC CD web site: provides listing and mailing list of IOC relevant training opportunities (http://www.ioc-cd.org) (see also below in 5) (currently not sustainably resourced)
- IODE Alumni directory: list of participants in IODE training courses (to be expanded to all IOC in 2017): (http://www.iode.org/alumni)
- OceanDataPractices e-repository: document repository of manuals and guides related to oceanographic data and information management. Contributions from IOC, SCOR, WMO, JCOMM, ICES, etc. (http://www.oceandatapractices.net)
- OceanTeacher e-Learning Platform: a training dedicated online platform with training resources (structured around courses) (http://www.oceanteacher.org)

Other IOC contributions to the TMT include *inter alia*:

- IOC Harmful Algal Blooms Programme (IOC-HAB) (http://hab.ioc-unesco.org/)
- Training-through-Research Programme (TTR)/At-Sea Training
- Ocean Research IOC Grants
- IOC-UNESCO Chairs
- IOC Regional Network of Training and Research Centres on Marine Science (http://iocwestpac.org/capacity-development/49.html)
- Promoting the Awareness on Coastal Marine Environmental Changes and its Impact (PACMEC)
- Enhance the Capacity for Species Identification and Genetic Analysis on Marine Organisms in the Coral Reef Ecosystems in the Western Pacific (DRMREEF)
- ANCA – HAB Harmful Algal Blooms Programme (IOCARIBE-ANCA Harmful Algae in the Caribbean and Adjacent Regions) (http://iocaribe.ioc-unesco.org/)
- Global Sea Level Observing System (GLOSS) (http://www.gloss-sealevel.org/training)
- Data Buoy and Cooperation Panel (DBCP) (http://www.jcommops.org/dbcp/)
- Early Warning and Services: Tsunami (http://www.ioc-tsunami.org/)

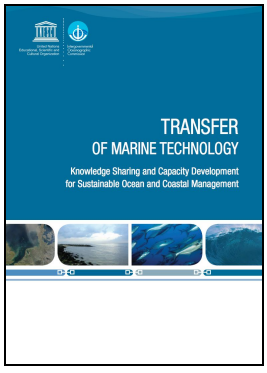
Identifying CD and TMT needs and baselines

We also refer to the **Global Ocean Science Report** (GOSR) which includes information (and data) relevant to the actions requested by the TMT guidelines. The first edition of the GOSR was launched at the UN Ocean Conference in June 2017. It is foreseen that a dedicated data portal will be established to facilitate the reporting of data on ocean science capacity (human, infrastructure, and institutional) by Member States.

This new tool responds to the role of IOC as the custodian agency in relation to SDG target 14.a which focuses on developing adequate capacity in ocean science, including through the transfer of marine technology. This latter target constitutes the focus of the GOSR report.

In 2015, the IOC Assembly decided to launch a Global Ocean Science Report (GOSR) with the main aim to systematically assess the status and trends in ocean science capacity. What are the key elements of ocean science, including workforce, research expenditure, infrastructure and publications globally? What is the current level of human capacity, technology, investments, and needs of nations in ocean and coastal science, observations and services? How can countries collaborate in ocean science operations in the context of their planned investments in this area?

The GOSR identifies and quantifies these key elements and provide decision-makers with a tool to identify gaps and opportunities to advance international collaboration in ocean science and technology so as to meet societal needs and to promote the contribution of ocean research to address global challenges related to sustainable development. In doing so, GOSR will act a mechanism for assessing and reporting progress towards the attainment of SDG Target 14.a., for which, until present, no global mechanism has been available. Beyond the SDG process, the GOSR provide an opportunity to inform scientific capacity gaps in the context of BBNJ.



The IOC brochure on TMT – Knowledge sharing and capacity development for sustainable ocean and coastal management (2015) – provides an overview of how several IOC programmes and projects contribute to transfer of marine technology.

Download from http://on.unesco.org/2oTs4as

Keeping in mind the holistic approach and broad and inclusive conception of marine technology and its transfer as included in CGTMT, a full implementation of the latter implies not only partnering with organizations and sectors as appropriate, but also clear and permanent commitments of stakeholders to ensure an adequate, streamlined and efficient performance. A combination of, at the time of adoption by IOC of the CGTMT, technological challenges and political landscape did not allow for their swift operationalization, including the Clearing House Mechanism (CHM). The role of the CHM is to support the transfer of marine technology in order to provide users from Member States, public and private sector and any interested parties with direct and rapid access to relevant sources of information, practical experience and scientific and technical expertise, as well as to facilitate scientific, technical and financial cooperation for more effective science and policy interface. The CHM should become the primary information repository to support the international conventions and agreements and, at the same time provide a platform to share information, build partnerships and forge collaboration for the growth and transfer of marine technology in developing countries.

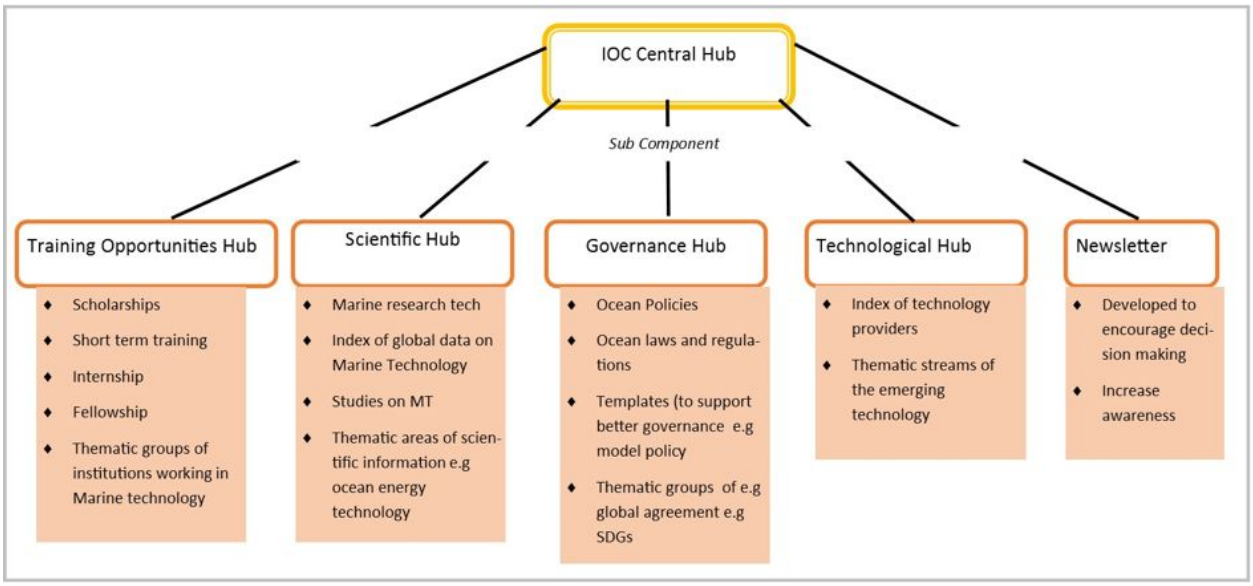
Both technological developments since 2005 and the evolution towards an enabling political environment present us today with a new opportunity to achieve the goals of the CGTMT. Developing the mechanisms envisaged in the CGTMT do present, nevertheless, several challenges including, but not limited to, availability of human and financial resources, appropriate infrastructure and timely access to up-to-date information held by its providers.

With regards to operationalizing the CHM, the IOC is currently analysing ways and means to achieve that target including a) its architecture and infrastructure, b) types and models ranging from centralized, through hybrid to distributed regional nodes, c) partnerships with relevant organizations in different disciplines, building on existing expertise, structures and services, d) tailoring the CHM through a matrix approach by considering disciplines and issues *vis à vis* regional and sub-regional needs and requirements.

The IOC Assembly will consider in June 2017 the establishment of an Expert Group on Capacity Development that will *inter alia* advise IOC Member States on the establishment of Clearing House Mechanism (CHM) as requested by the IOC CGTMT.

Collaboration and cooperation are the key to partnerships which are forged for various purposes, including scientific research in marine technology, training and scholarship and the actual transfer of hardware. In the case of the CHM, partnerships are required at international, regional and national levels (figure below). Creating the partnerships at these levels, would serve to enhance the rate of technology transfer by the donor and reduce the challenges for the recipients lacking in capacity.

Possible example of a dedicated CHM architecture



CB/TMT and Marine Biological Data

Access to data and information in a friendly format is an element of technology transfer. Information sharing can also be an enabler of benefit sharing. Data management and data exchange constitute one of the key areas of IOC's potential contribution to BBNJ, as has been mentioned in the context of the broader discussions on technology transfer and capacity building for marine scientific research. Of relevance is IOC's Ocean Biogeographic Information System (OBIS), the world's most comprehensive database on the diversity, distribution, and abundance of life in the ocean. OBIS provides a shared global marine biodiversity knowledge base for ocean governance, and one that (i) promotes international cooperation, (ii) provides equitable access to data and benefits globally, (iii) enhances scientific understanding and knowledge generation and

(iv) provides important baselines for marine biodiversity monitoring and assessment in all areas of the world.

OBIS was established in 2000 as a project of the Census of Marine Life (CoML) with the goal to create “an online, user-friendly system for absorbing, integrating, and accessing data about life in the oceans”. At that time there was no global registry of marine species and no global repository for their occurrence data. OBIS provided the repository, and the World Register of Marine Species (WoRMS, www.marinespecies.org), which was launched in 2007 as a common source of species and their various names, now provides the taxonomic backbone of OBIS.

After the successful decade-long CoML project, OBIS found a new hosting institution when in June 2009, the IOC Member States adopted OBIS as part of its International Oceanographic Data and Information Exchange (IODE) programme (IOC Resolution XXV-4). OBIS now provides taxonomically and geographically resolved data for over 48 million observations of 116,000 marine species, integrated from more than 2,000 databases, provided by 600 institutions connected through 27 national, regional and thematic nodes. The data in OBIS continue to grow in the range of millions of records per year, and about 100 scientific publications cite OBIS annually (see list).

In terms of governance, the IODE steering group for OBIS (SG-OBIS), composed of the managers of the national, regional or thematic OBIS nodes, has an advising role to the IOC Committee on IODE and prepares, for submission to the IODE committee, OBIS’ work plan, reviews progress and guides and identifies any technical or scientific issues as relevant to the implementation of the work plan. Finally, the OBIS work plan and budget is submitted for approval to the IOC Assembly. The SG-OBIS has established several Task Teams to share tasks and responsibilities between members of the OBIS community. The OBIS secretariat, hosted at the UNESCO/IOC project office for IODE in Oostende (Belgium), builds the central database and fosters global benefits of the OBIS network through leadership in training, standards development, and international cooperation. More information on OBIS governance can be found here. This includes the Terms of Reference for the national, regional or thematic OBIS nodes.

OBIS is a standards driven enterprise, meaning that all data are aligned to international standards, such as DarwinCore and the Ecological Metadata Language. Currently, OBIS leads the development of a new standard that captures all the facts and measurements around a sample or observation (time, location, depth,…), sampling protocol (equipment, methods), sampling effort (length, duration, volume,…), environment/habitat (physical, chemical, sediment,…) and biological details (abundance, biomass, health, behavior, lifestage, …). The metadata are key in documenting provenance and IPR.

The OBIS guidelines on the sharing and use of data in OBIS are based on the principles of timely, free and unrestricted access to biodiversity data, supporting equitable access and benefit sharing

for the benefit of science and society, as defined in the IOC oceanographic data exchange policy. This means all the data and any derived products in OBIS are freely available to anyone. Data users are expected to give attribution to the data providers and the use of data from OBIS should happen in the light of fair use as explained here.

The OBIS Capacity Development activities focus on developing human resources, i.e. training professionals in data management and scientific analysis. With support from IOC's OceanTeacher Global Academy (OTGA) and its regional training centres, OBIS is organising training courses and workshops, and is sharing all the training material through the OceanTeacher e-learning platform. The training courses focus on two aspects: (i) using tools and standards to process, quality control and publish data to OBIS and (ii) using tools to access, analyse and visualize data from OBIS. The OBIS secretariat is also open for internships. Of importance is that the CBD/COP-13 (decision 12, December 2016) requested the CBD to establish a partnership with OBIS to facilitate training opportunities for incorporating new information and new consideration of existing information in future description of areas meeting the EBSA criteria, including both scientific and traditional knowledge. More information on OBIS training is available here.

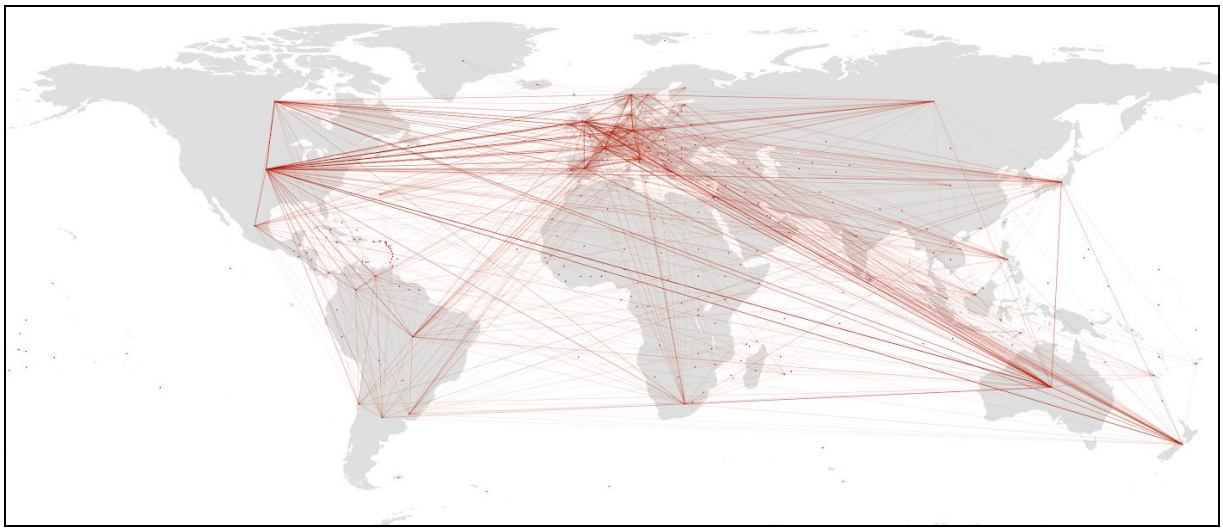
OBIS holds 48 million records of about 120,000 marine species. 3.2 million records are in ABNJ, representing 20,387 marine species
OBIS integrates over 2000 datasets, provided by 600 institutions, of which 643 datasets from 346 institutions cover ABNJ: http://iobis.org/explore/#/area/285
In recent years, OBIS has trained 110 people, from 43 countries, during 8 training courses. Through the OceanTeacher Global Academy, not less than 7 OBIS marine biodiversity data management training courses are planned in 2017 (in Mexico, Colombia, Ecuador, Senegal, Belgium, Malaysia, Iran)

An important use case of OBIS

OBIS supports the CBD process to identify Ecologically or Biologically Significant Areas. In 1997, the secretariats of the IOC and the Convention on Biological Diversity (CBD) signed a Memorandum of Cooperation to develop joint activities in the field of coastal and marine biodiversity. At the CBD/COP 10 (decision X/29), the Parties encouraged governments and organizations to further enhance globally networked scientific efforts, such as the Ocean Biogeographic Information System (OBIS), to continue to update a comprehensive and accessible global database of all forms of life in the sea, and further assess and map the distribution and abundance of species in the sea. In addition, to support the EBSA process, the CBD/COP

requested OBIS to facilitate availability and interoperability of the best available marine and coastal biodiversity data sets and information across global, regional and national scales. OBIS has been recognized as a primary data source for all EBSA regional workshops: the 17th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (UNEP/CBD/SBSTTA/17/INF/3, October 2013) recognized OBIS as the largest single data repository for biological data for the world ocean and one that plays a vital role in scientific analysis to support a number of international processes in areas beyond national jurisdiction (ABNJ).

More use cases are listed at www.iobis.org/usecases.



This graph shows the connections of the co-author's country affiliations of about 500 publications that cited OBIS and that are recorded in Web of Science (over 1,000 OBIS Cited papers are listed at http://www.iobis.org/library/). Interestingly, there are not only N-N but also N-S and S-S connections. Through open-access to data, OBIS provides equitable access and benefits to research and enhances international collaboration. OBIS contribution to Marine Scientific Research was recognized by the United Nations General Assembly (A/RES/69/245).

CB/TMT and Biological Ocean Observations

The Global Ocean Observing System (GOOS), established in 1991 by IOC Resolution XVI-8, and co-sponsored by the World Meteorological Organization (WMO), the UN Environment Programme (UNEP) and the International council for Science (ICSU), is a system of programmes that is building a coordinated, and sustained global programme for observing, modelling and analysing marine physical, biological and biogeochemical variables. The system supports operational

ocean services worldwide, provides accurate descriptions of the present state of the ocean including the impacts of climate, and is developing the capacity to monitor biological resources and the services they provide. The success of GOOS for the physical ocean environment — with the Global Climate Observing System (GCOS) providing the information for regular IPCC reports— led to its expansion to include biogeochemistry and biology & ecosystems in order to address new emerging societal requirements related to ocean health.

The Biology and Ecosystems Panel of GOOS (GOOS BioEco) aims to develop a coordinated and sustained global observing system for ocean biology and ecosystems by (1) identifying and developing with the scientific community priority Essential Ocean Variables (EOVs) that answer relevant scientific questions, supporting identified societal needs, and (2) supporting critical policy development and management decisions on ocean and coastal resource sustainability and health by facilitating the global implementation of EOV observations.

For over 25 years, GOOS has been a critical and leading driver to initiate, coordinate and globalize ocean observations. The GOOS observing systems form the basis for our knowledge of the roles of the ocean in the global climate system

IOC coordinates the Second International Indian Ocean Expedition (IIOE-2) 2015–2020, in co-sponsorship with the Scientific Committee on Oceanic Research (SCOR) and the Indian Ocean Global Ocean Observing System (IOGOOS) (IOC Resolution XXVII-1)

Enhanced and better focused sustained ocean observations that are supported by the international scientific, governance and policy communities are especially needed for in the ABNJ, where available information is poor. Improved information will assist the global community to determine and monitor appropriate trade-offs between conservation and sustainable use, including area-based management and robust environmental impact assessments. Improved information will help develop effective climate mitigation strategies, manage adverse changes including climate change, and predict and prepare for potential future changes.

In addition to the challenges of identifying what needs to be measured in terms of the societal impact and level of technical feasibility, two major obstacles to implement a global observing system are the lack of properly trained people and equipment. The lack of a long-term strategy and funding to support these two components is reducing the capacity to respond to current and future changes. Building global capacity to develop, exchange and use sustained observing technologies by sharing best practices and methods that will generate relevant and interchangeable data, and learning how to make use of the data to create useful products is therefore crucial to future response at national and global levels.

GOOS, its network of 13 regional alliances and the developing suite of global monitoring networks, and in a partnership approach with other initiatives such as POGO, SCOR etc, could provide the scientific and technical expertise, to support capacity building activities that strengthen ocean observations and provide a focus for technology transfer. The regional centers of the IOC provide the start of a global network for developing and maintaining capacity development, while the OceanTeacher Global Academy (OTGA) platform of IOC is a natural place to start developing specific training modules.

Suggested IOC Contributions and Ways Forward

While not implemented though a dedicated central Clearing House Mechanism (CHM), the IOC conducts a range of activities in relation to technology transfer and scientific capacity development, which are relevant to the BBNJ process.

The first group of activities are aimed at ensuring equitable access to research data through using a global online open-access data sharing platform and data clearing house mechanism.

As an example, the Ocean Biogeographic Information System (OBIS), which is the data legacy of the Census of Marine Life, and is now an operational programme under the International Oceanographic Data and Information Exchange (or IODE) of IOC. OBIS enables benefit sharing and technology transfer through open-access to biodiversity data and information. It also sets common standards and guidelines and provides training and capacity development in best practice methods for biodiversity data collection, management and publication, and could be further augmented to meet the information needs of a BBNJ instrument.

Secondly, IOC conducts a number of programs and projects that foster international cooperation in marine scientific research, coordination in global ocean observation, and development of standards, manuals and guidelines and codes of conduct and protocols. Examples include ocean observations through the Global Ocean Observing System. Under this global programme, the GOOS Biology and Ecosystems Panel provides focus on international cooperation on biological research within the IOC and the CD/TMT that will be necessary to achieve this. Furthermore, the deep-ocean observing strategy (DOOS) of GOOS outlines opportunities to enhance international collaboration and foster technological innovation to advance knowledge of biodiversity in the deep-sea. The global monitoring groups that form GOOS have the potential to support sustained capacity building and technology transfer as they become part of dynamic international networks. In addition, the IOC proposal for an International Decade of Ocean Science for Sustainable Development (2021-2030) outlines a series of priorities for international collaboration, scientific capacity development and technology transfer - including an explicit priority for BBNJ. The ongoing International Indian Ocean Expedition II illustrates how this could be achieved under the decade, through regional and international collaboration scales.

Thirdly, IOC has established a global network of regional training and research centres to enhance capacity, by training the next generation of scientists and area managers in applying international standards and best practices. The IOC runs various capacity development initiatives, through the OceanTeacher Global Academy (OTGA) and a set of Regional Training and Research Centers established by Member States. These centres work through a network and deliver a set of regionally driven programs of training courses focusing in ocean data and management. This

initiative could provide a model or vehicle to deliver training for ABNJ, in areas such as environmental impact assessments, area based management measures, monitoring requirements and marine genetic resources, including sample curation, data management, genomics and natural products chemistry. Additional resources for these activities could be sought through the IOC Capacity Development Fund which provides an avenue for voluntary contributions from Member States.

In terms of a Clearing House Mechanisms that could be relevant to BBNJ, the IOC has identified the following broad attributes:

Firstly, a “Hub and spoke” network model, composed of a core coordinating element linking national or regional nodes and fostering partnerships that can be customised to meet regional needs offers advantages of a decentralised system.

Secondly, a CHM could be considered as a dynamic network system for the integration and provision of knowledge with the aim to develop human and technical capacity. In this context, a CHM being discussed in the context of the CGTMT, is one of data, information, and knowledge – meaning that it is not just a computer system but a network of people who provide input into the ongoing development in an agile way, including scientists who contribute to and use data and information on biodiversity in many creative ways and in response to needs.

There is a need for a technologically "Smart" Clearinghouse, built in a way that provides a user interface as the trustworthy source, and can pursue innovative applications powered by the system. Scientists, engineers, application developers, and other stakeholders should have the ability to bring the information from the clearinghouse into their own context to quickly and efficiently answer important questions. For example, OBIS has developed a technology platform with this modality in mind, enabling scientists and developers to work with their own tools to tap into the integrated database.

Thirdly, engagement with providers and users of data and knowledge is crucial. Communication is key to promote buy-in and can be enabled by: designating focal points at national or regional level for contacts, inputs of information on specific needs, workshops, and partnerships with relevant scientific networks and international organisations. This could, for example, provide information on opportunities for participation in research cruises taking place in specific ocean basins.

It is also important to understand how web-based platforms could complement other tools to ensure all Member States have the capacity to effectively make use of information sharing.

Finally - cost effectiveness and non-duplication is key, ensuring that resources are sustained in the long term to ensure the clearing house system delivers value to the various communities that it will serve. For example, OBIS relies on active engagement and investment from member

organizations, and highlights the need to balance project-based funding, which has the benefit of keeping the system moving in new and fresh ways, with the need for structural funding to ensure long-term stability.

Conclusion

Three areas of current IOC activities that could be relevant in the BBNJ context, are:

- Equitable access to research data through an open access online data sharing platform,
- Facilitation of international science cooperation including through reinforcing and extending existing global monitoring networks, and
- Provision of training through a well-established global network of regional training centres.

In a consolidated approach to harness all efforts on ocean science, TMT and CB will be key in ensuring that we deliver on the global 2030 Agenda, and implement a potential BBNJ instrument. The IOC stands ready to collaborate with international organizations concerned with the implementation of relevant provisions of UNCLOS and/or to seek advice and cooperation in the field of ocean and coastal area scientific research, related services and capacity-building. The IOC may act as a joint specialized mechanism of the Organizations of the United Nations system that have agreed to use the Commission for discharging certain of their responsibilities in the fields of marine sciences and ocean services, and have agreed accordingly to sustain the work of the Commission (cfr IOC statutes article 11, Relations with other organizations, which came into force through adoption of 30C/Resolution 22 on 16 November 1999).

ANNEX - Overview of the IOC CD strategy outputs, activities and actions

Output	Activity	Action
1. Human resources developed	1.1 Academic (higher) education	1.1.1 Promote and assist with the establishment of consortia of higher education at the appropriate geographical scale
		1.1.2 Promote collaboration between UNESCO Chairs and IOC
	1.2 Continuous professional development	1.2.1 Promote and assist with the organization of training courses, workshops and “summer schools” relevant to the IOC mandate
		1.2.2 Establish, or collaborate with other organizations on an internship/fellowship programme (including on-board training)
		1.2.3 Establish and collaborate with other organisations on a visiting lecturer programme
		1.2.4 Promote and assist with the establishment of regional training (and research) centres relevant to the IOC mandate

		1.2.5 Promote the sharing of training materials
	1.3 Sharing of knowledge and expertise/community building	1.3.1 Establish a travel grant “fund”
		1.3.2 Establish or collaborate with other organizations on a mentoring programme
		1.3.3 Promote and assist with the development of IOC alumni networks
		1.3.4 Promote and support “young scientist” awards
	1.4 Gender balance	1.4.1 Promoting participation of women in ocean research
2. Access to physical infrastructure established or improved	2.1 Facilitating access to infrastructure (facilities, instruments, vessels)	2.1.1 Establishing and maintaining a register of infrastructure to facilitate access
		2.1.2 Promoting the development of, and expand access to, regional sustainable scientific infrastructure
3. Global, regional and sub-regional mechanisms strengthened	3.1 Further strengthening and supporting secretariats of regional commissions	3.1.1 Improve staffing of secretariat of regional sub-commissions
		3.1.2 Reinforcing budgeting of regional sub-commissions

	3.2 Enhance effective communication between regional sub-commission secretariats and global programmes as well as other communities of practice (incl. other organisations)	3.2.1 Establishing an effective coordination and communication mechanism between the secretariats of the regional sub-commissions and the global programmes
4. Development of ocean research policies in support of sustainable development objectives promoted	4.1 Sharing of information on ocean research priorities	4.1.1 Compare and compile information on existing ocean research priorities among government and other organizations
	4.2 Developing national marine science management procedures and national policies	4.2.1 Assist Member States with the development of marine science management procedures and national policies
5. Visibility and awareness increased	5.1 Public Information	5.1.1 Promote the development of public information (communication) departments in ocean research institutions
	5.2 Ocean Literacy	5.2.1 Foster development of an IOC ocean literacy programme as a community of practice to share experience within and across regions
6. Sustained (long-term) resource mobilization reinforced	6.1 In-kind opportunities	6.1.1 Fostering partnerships to increase in-kind support opportunities
	6.2 Financial support by Member States to IOC activities	6.2.1 Resource mobilisation from Member States, Institutional and Private Sector Partners

ANNEX - IOC's statements at BBNJ PrepCom 2 and 3

BBNJ PrepCom-3

Related to CD/TMT

http://statements.unmeetings.org/media2/14683519/ioc.pdf

Related to CD/TMT

http://statements.unmeetings.org/media2/14683738/ioc-on-cbtmt.pdf

Related to MGR

http://statements.unmeetings.org/media2/14683627/ioc_mgr.pdf

IOC's statements at BBNJ PrepCom-2

Related to MGR

http://statements.unmeetings.org/media2/7659828/ioc.pdf

Related to EIA

http://statements.unmeetings.org/media2/7659933/statement-of-ioc-of-unesco.pdf

Related to CD/TMT

https://drive.google.com/file/d/0BxJTESlH0XYBX19wa3NqLXlsV0k/view?usp=sharing

Related to CD/TMT

http://statements.unmeetings.org/media2/7659973/statement-by-ioc-unesco.pdf

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