Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices

Second Session (GE-BICH-II)

Foresight Centre, University of Liverpool
United Kingdom
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Abstract

The 2nd Session of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices was held at the Foresight Centre at the University of Liverpool from 22 to 24 March 2004, hosted by the British Oceanographic Data Centre (BODC). The Session was attended by, in addition to its regular members, by representatives from FAO, GBIF, ICES and ITIS as well as by the IODE Chair. The group decided to change its acronym to GE-BICH and recommended a slight revision of its Terms of Reference. The Group adopted a detailed work plan that will focus on (i) OceanTeacher modules on biological data management; (ii) raising awareness for the socio-economic importance of data management; (iii) closer collaboration with OBIS, GBIF, ITIS, FAO; (iv) hosting of the URMO web site by the IODE Project Office; (v) collation of guidelines on data quality assurance and quality control for biological data; (vi) pilot projects related to test different systems of distributed querying based on XML (DiGIR and BioCASE) with XML schemas other than Darwin Core and ABCD (using metadata and distributed taxonomic name lists as data types); and (vii) implement survey, requesting information about systems, databases and inventories currently in use in various data centres.

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1. ORGANIZATION OF THE SESSION

1.1. OPENING OF THE SESSION

1.1.1. Welcome on behalf of BODC

The Session was opened at 09h30 on Monday 22 March 2004 by Lesley Rickards, Chair IODE and Deputy-Director BODC. Dr Rickards welcomed the participants on behalf of the BODC. She apologized for the BODC Director who unfortunately could not attend. She informed the Session that BODC would shortly move into its new facilities in the "Joseph Proudman Bulding" at the University of Liverpool Campus. She provided a short overview of the mission of BODC. She explained that BODC now increasingly provides data management support for large multidisciplinary oceanographic projects (eg AMT, ARGO, CLIVAR, UK WOCE, OMEX, …). BODC is now investing in technical development inventing new ways to deliver data and finding ways to handle large volumes of data sets across the web.

The participants then briefly introduced themselves. The Chair expressed his regret that two members of the Group were unable to attend (Guo Fengyi, Makoto Terazaki). The Group welcomed Jacob Van der Land as a new member.

1.1.2. IODE: Importance of biological and chemical data management

Lesley Rickards, in her capacity as IODE Chair gave a short presentation on IODE. She recalled that the main objectives of IODE are (i) to facilitate and promote the exchange of oceanographic data and information; (ii) to develop standards, formats and methods for the global exchange of oceanographic data and information; (iii) to assist Member States to acquire the necessary capacity to manage oceanographic data and information and become partners in the IODE network; and (iv) to support international scientific and operational oceanographic programmes of IOC and WMO and their sponsor organizations with advice and data management services. Lesley described her view on what is expected from IODE: (i) simple access to all types of marine data (and information) on an appropriate time scale (e.g. make sure metadata actually leads to data); (ii) to act as a virtual data centre or one stop shop for data and information; (iii) proactive provision of support for IOC flagship programmes, in particular GOOS (and JCOMM), in a responsive and flexible manner, including handling data in an operational manner; (iv) use of modern IT techniques in a transparent manner to improve service to users; (v) setting the standards (metadata, data quality control, data archival); (vi) long term stewardship of data (implying knowledge of multidisciplinary data); (vii) rescue of data sets (e.g. GODAR and regional efforts); and (viii) capacity building. She also mentioned the IODE Project Office that is planned to open in April 2005, established with support from the Government of Flanders and City of Oostende (Belgium). Headed by Dr Vladimir Vladymyrov, the Office will be a meeting venue, training centre and communication hub, The IODE Project Office will be developed into a forum for IODE and partner projects, programmes and organisations and it will assist with the implementation of the Ocean Information Technology (OIT) pilot project as well as the JCOMM/IODE ETDMP pilot projects. In this regard Dr Rickards recalled that the IODE's GETADE had been merged with the JCOMM ETDMP into the JCOMM/IODE Expert Team on Data Management Practices (ETDMP). She noted that the remit of the ETDMP includes non-physical data management.

Lesley Rickards referred to the objective of GOOS to develop ' … *a global network that systematically acquires, integrates and distributes ocean observations, and generates analyses, forecasts and other useful products*'. GOOS has two modules, one of which is covered by the Coastal Ocean Observations Panel (COOP) . COOP aims at "*planning and*

facilitating the implementation of an end-to-end observing system to provide systematic data sets and products to users".

The Technical Secretary, Peter Pissierssens, reported that the JCOMM Management Committee, during its third session (Geneva, 17-20 March 2004), had made several references to IODE that are relevant to the GE-BICH[1]: (i) "The Management Committee agreed that the Co-President's report to the IOC Executive Council should include mention of the continuing positive interactions between COOP and JCOMM, and the willingness of JCOMM in coordination with IODE, to consider taking on the responsibility for managing the data and product streams suggested by COOP as and when those systems mature"; (ii) "The Management Committee noted that the scope of the (GE-BICH) Group is huge and it may be necessary to share the work with other (JCOMM) group(s). The Committee called on the GE-BICH to closely liase with COOP. The JCOMM Secretariat is to liase with the IODE Secretariat on this issue."

Peter Pissierssens referred to the "Integrated Strategic Design Plan for the Coastal Ocean Observations Module of the Global Ocean Observing System" (available as GOOS Report No. 125 (IOC/INF-1183). In "Chapter 6. Data Management and Communications Subsystem (DMAC)" the important role of IODE is clearly identified but it is remarked that "*international (and often national) mechanisms are generally lacking for most types of geological, chemical, biological and ecological data. An appropriate mechanism must be established that will enable coordination and collaboration among [these] programmes to achieve the goal on an integrated DMAC system that manages both real-time and delayed mode data streams*". The document further notes "that IODE has extensive experience with all data types (physical, chemical, geological, biological, and ecological) but it was noted that few members of Group had read the COOP implementation plan.

1.1.3. Objectives of the meeting: short-term activities, medium-term plans, strategic objectives of the Group

Edward Vanden Berghe explained the objectives of the meeting. He recalled the history that led to the establishment of the Group, which started with the "International Workshop on Oceanographic Biological and Chemical Data Management (Hamburg, Germany, May 1996)". This event aimed at improving the quantity and quality of chemical and biological data available to the scientific community. The second event was the 16th Session of IODE (Lisbon, Portugal, 31 October – 8 November 2000) where Recommendation IODE-XVI.4 was adopted to establish the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices. The Group met for its First Session in Silver Spring, USA between 25-27 June 2002.

He recalled the Terms of Reference of the Group (as adopted by IODE-XVI) which include:

- documenting the systems and taxonomic databases currently in use in various data centres;
- documenting the advantages and disadvantages of different methods and practices of compiling, managing and archiving biological and chemical data;
- developing standards and recommended practices for the management and exchange of biological and chemical data, including practices for operational biological data;

[1] In accordance with the Recommendation formulated by this Session of the Group, the acronym of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices has been changed from GE-BCDMEP to GE-BICH. Accordingly all references in this Report to the Group use the acronym GE-BICH.

- encouraging data centres to compile inventories of past and present biological and chemical data holdings;
- encouraging data holders to contribute data to data centres for the creation of regional and global integrated oceanographic profile and plankton databases;

He noted that the GE-BICH has so far concentrated on biological data and more particularly on taxonomy/nomenclatures. This can be justified as taxonomy represents vocabulary, and thus comes as a natural first step when setting up data systems. He noted however that the Group should also work on chemical data but that this might need additional competence. Further discussions on this issue were referred to Agenda Item 8.

1.2. ADOPTION OF THE AGENDA

The Chair outlined the Provisional Agenda for the meeting and invited comments. The Group adopted the Agenda, as given in Annex I.

1.3. PROPOSAL TO CHANGE THE NAME/ACRONYM OF THE GROUP

Edward Vanden Berghe suggested a renaming of the Group to GE-BICH as a more easily pronounceable acronym. Discussion on this issue was postponed to Agenda Item 8.

2. PRESENTATIONS BY PARTICIPANTS

2.1. BIOLOGICAL DATA MANAGEMENT AT THE BRITISH OCEANOGRAPHIC DATA CENTRE: SYSTEMS IN PLACE AND NEW DEVELOPMENTS

Gwenaëlle Moncoiffé informed the Group that BODC now has several systems in place: (i) BODC parameter dictionary: a multi-disciplinary parameter coding system used for data markup; (ii) Community Research Programmes (CRP) Database: a multi-disciplinary oceanographic relational database primarily used for discrete data collections and measurements; (iii) National Oceanographic Data Bank (NODB): originally designed for moored physical oceanographic instruments and sea level data, now becoming more multi-disciplinary with the addition of data series from biological and chemical sensors; (iv) Metadata catalogues: UK-EDMED: the only centralised source of information about chemical and biological data holdings in the UK, and the UK cruise database.

With regard to biological data, Gwenaëlle Moncoiffé noted that only a small fraction of biological oceanographic data collected in the UK is currently banked at BODC. Many more have been collected but these tend to be scattered across a range of institutions. Some may be properly managed and documented; many are still held on paper or on media at risk of becoming unusable. There are nearly 20 marine biological data holding centres in the UK.

There is now pressure on individual scientists from several sides to take the management of their data seriously. First of all there is the need to make data, collected through public funds, available to the public (the NERC data management policy is more strictly enforced). In addition there are new Government guidelines and regulations, and there is also international pressure for more collaboration (eg the POGO initiative). These are most positive developments for BODC as they increase the data flow.

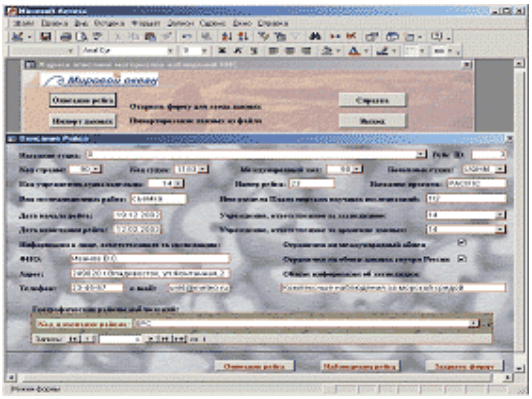
In cooperation with its partners, BODC has identified “Laboratory Liaison Officers” to (i) ensure all datasets collected are documented in EDMED; (ii) identify needs for data management support of on-going research or dataset rescue; and (iii) keep track of dataset processing status and ensure that raw and/or final datasets are acquired by BODC as

appropriate. This makes communication and coordination between the research centre and BODC considerably easier. So far five liaison officers have been nominated. There is a strong biological data emphasis.

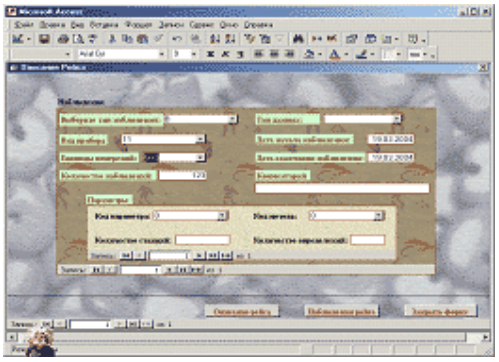
Ongoing activities at BODC include (i) Work on the BODC parameter dictionary: taxonomic parameters and standardisation with IT IS; (ii) Online access to inventories (mainly physical data inventories at present and to be expanded to our biological and non-physical oceanographic data holdings); (iii) Data Distribution: working towards delivery of our multi-disciplinary and, in particular, biological data online and working on providing access to our taxonomic data holdings via OBIS.

During discussions it was revealed that up to now only about 10-25% of all chemical and biological data are captured by BODC. This is expected to change rapidly as resources are now becoming available. In contrast, in those cases where BODC was able to work directly with projects nearly 90% of data were captured. BODC now aims to reach the same level for NERC funded data.

2.2. ACTIVITIES OF THE RNODC/RIHMI-WDC WITH REGARD TO BIOLOGICAL AND CHEMICAL DATA MANAGEMENT



Alexander Kouznetsov informed the Group that the activities of the RNODC/RIHMI-WDC can be summarized as follows: (i) registration of marine information resources and announcement through the web-site; (ii) standardization of metadata; (iii) unification of code systems; (iv) improvement of technologies for data collection and assembling; (v) updating of historical data (restore metadata, QC, quick access); and (vi) development of Integrated Information System based on the web-technology. Several centres were encouraged to compile inventories of past and present biological and chemical data holdings. They were contacted and requested to provide information in cruise list form. Electronic forms for cruise and data description (see figures) were designed.



Experience with the system showed some difficulties. Work will continue this year and then distributed among all marine institutions.

RNODC/RIHMI-WDC also developed "The Unified System of Information on the World Ocean Condition" web site (http://www.oceaninfo.ru) which is partly presented in English.

During discussions the Group noted that the use of non-English terms in the metadatabases would make it difficult to exchange information with other countries. This was considered as particularly unfortunate in view of the huge amount of data (and thus metadata) available in Russia.

2.3. BIOLOGICAL DATA MANAGEMENT ACTIVITIES AT THE BEDFORD INSTITUTE OF OCEANOGRAPHY

Mary Kennedy explained that the BioChem database at BIO covers the following discrete data types: heavy metals, hydrocarbons, light major ions, nutrients, organic matter, oxygen, particulate matter, physical properties, pigments, primary production, radionuclides, seawater chemistry, stable isotopes, tracers.

In addition the following plankton taxonomic groups are covered: bacteria; phytoplankton; microzooplankton; zooplankton and ichthyoplankton.

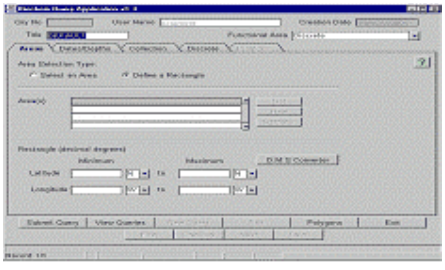
BioChem is a national Department of Fisheries and Oceans (DFO) archive for biological and chemical data. The development of this application was a major task. The migration of decades of biological and chemical data observations into the Maritimes regional BioChem database has been a challenge but to date the majority of data loaded into the archive has been controlled by 2-3 data managers who have worked closely together. The need for a data manager's "How To..." manual will be essential now that BioChem is moving towards becoming a national archive. Internally there must be agreement on issues such as formatting, quality control procedures, data ownership, etc. Following standard practices should facilitate data archival, reduce duplication and mean that data extracted from the dbase can be interpreted correctly.

To facilitate data exchange the code tables include international standards. The discrete data type code tables include a field called "Parameter type". Each parameter type is linked to a GF3+ code.

The BioChem plankton code tables include the ITIS TSN. Agreement must be reached on the correct method to assign these codes. BioChem datamanagers have started the practice of asking their analysts to supply not just a list of species names but a complete list with species name, authority, year and to include the reference book and page number that they used to identify the specimen. In the best case scenario an exact match can be found in ITIS. Sometimes this is not possible hence the need to create standard practices on what to do when a match can't be found. BioChem data managers have adopted the WODB procedure of assigning "-ve" TSN values for taxonomic groups not currently in ITIS.

- 7000 series is assigned to taxonomic groups not in ITIS yet...
- 6000 series assigned to groups of 2 or more taxonomic groups (Calanus finmarchicus and C. glacialis; or Euphausiacea and mysidacea)
- 5000s taxa descriptions are non-taxonomic or are an assemblage of groups (jellies; -phytoplankton; -shrimp)
- 1000s : non-taxonomic, non-existent or misspelled beyond recognition)

Issues such as synonymy must be dealt with. If, according to ITIS, the species is INVALID BioChem will follow the following protocol: retain the 'original' species TSN but, to make the BioChem species lists sort properly, the species name is edited so that the format is "Valid name followed by Synonym name in brackets."



Now that the data has been coded and archived in the database how can users extract information? The BioChem Query application allows users to select data from the archive according to temporal/spatial criteria. However, BioChem is only available on the Intranet, which is accessible to DFO employees only. In

the meantime, non-DFO personnel must submit requests for data. Through extensive querying of the archived data by our users we hope that we will gain enough confidence in our quality control procedures that we can move the BioChem system to the Internet.

One of DFO's Data Management Policies is that a national inventory of scientific holdings will be maintained. MEDS maintains this database called SCIDAT. To ensure proper management and archival of data, all scientific data collected by DFO must be migrated to a 'managed' archive immediately after the data have been processed. The existence of these datasets will be made public through portals/databases such as OBIS.

2.4. OCEANOGRAPHIC AND FISHERY DATA ACQUISITION IN CHILE: FINANCIAL AGENCIES AND AVAILABILITY OF THE INFORMATION TO NATIONAL/INTERNATIONAL OCEANOGRAPHIC DATA CENTERS

This presentation was given by Humberto Gonzalez Estay. He explained that in Chile oceanography and fisheries research is undertaken mainly under the Ministry of Education and Ministry of Economy. Support for science and technology are increasing steadily but are still low (currently 0.7% of GNP) as compared to developed countries (3-4% of GNP). Substantial funds are attributed to fisheries research. (eg Fishery Research Fund – FIP) under the Ministry of Economy. Under the Ministry of Education, a National Fund for Science and Technology Development (FONDECYT) was established in 1981, originally part of the Program of Innovation Technology (PIT). It finances scientific and technological research projects of a high level of excellence in all areas of knowledge, irrespective of the field or of the institution involved. The FONDECYT project support programme operates through an annual competition with a duration of 1 to 4 years.

As part of the Hydrographic and Oceanographic Service of the Chilean Navy (SHOA) there is also the Chilean National Center of Oceanographic Data (CENDOC) that aims to maintain a complete, high quality oceanographic database of different areas off the Chilean coast, with the purpose to open the information to national and international scientific communities who want to use it for research and/or the development of projects of national or international interest.

In January 2004, the South American Steering Committee for Census of Marine Life submitted to Alfred P. Sloan Foundation the proposal "An Ocean Biogeographic Information System for South America (OBISSA)". The goal is to develop a web-based information system containing marine biogeographic information for most of South America, in close contact with the existing Ocean Biogeographic Information System (OBIS).

2.5. STATUS REPORT ON THE WORLD OCEAN DATABASE (WODB)

Sydney Levitus explained that the WDC Oceanography in Silver Spring has continued to add biological data to WODB 2004/2005. About 1940 station data casts were received from IMARPE Peru under the GODAR project: IMARPE has another 15000-20000 stations. It took some years to get the agreements signed but once signed IMARPE was visited by Sydney Levitus and Todd O'Brien when information was provided on how to submit data. IMARPE also has phytoplankton data in manuscript form.

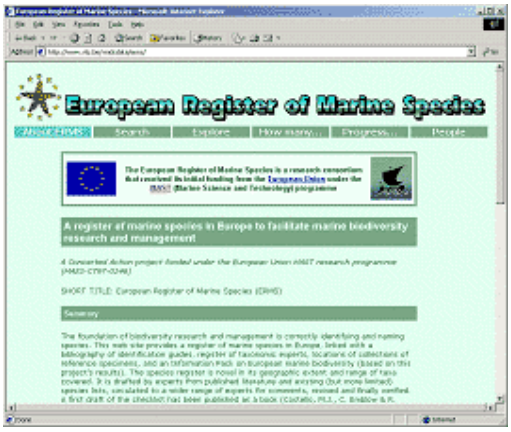
Data were also received from Ukraine (productivity, plankton). Initially plankton was not part of WDC monitoring but now increasingly it is as there is a lot of interest. The remote sensing community is also an important user community. A web-based user interface has now been developed enable users to select data based upon a number of parameters (geographic location, institute, data type,…). The retrieved data sets can be ftp-ed to the user's PC.

WDC is in contact with OBIS and there is interest in real-time bio data. WDC is also looking at real-time physical oceanography data coming in from GTSPP. There are still many problems that need to be resolved. Sydney Levitus cautioned that if we start transmitting biological data before these problems are resolved then the problem will be only worse.

Sydney Levitus informed the Group that it is planned to release a new version of the WODB every two years. Publishing at a higher frequency is difficult due to the quality control work that needs to be carried out. Data can be made available on-line earlier provided the quality control has been carried out. Sydney pointed out that the hard work of QC is often not recognized and warned that quick publishing of data without related documentation should be avoided.

2.6. RECENT DEVELOPMENTS IN VLIZ/VMDC

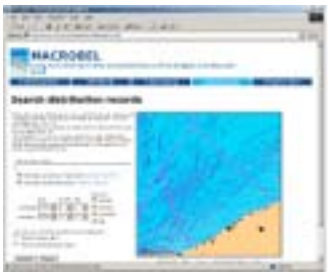
Edward Vanden Berghe informed the Group that the VLIZ activities currently focus on (i) Communication: websites, e-conferences, mailing list; (ii) hosting of web sites of various projects: ERMS (European Register of Marine species), MARBEF (Marine Biodiversity and Ecosystem Functioning), EurOBIS (Europa Ocean Biogeographic Information System), and Macrobel (Macrobenthos of the Belgian Coastal Shelf).



ERMS: Is the result of a previous EU project, now managed by the Society for the Management of European Biodiversity Data (SMEBD). It is a relational database, fully searchable through a web interface. It will be the taxonomic backbone for other data systems/data management activities of MARBEF.(see right image)

EurOBIS: is the European regional node for the OBIS network. It is a distributed system to present biogeographic information, based on the DiGIR (Distributed Generic Information Retrieval) protocol. Regional nodes will cover regional initiatives: MedOBIS (Mediterranean Oceanic Biogeographical System), MedECAT (Mediterranean Electronic Catalogue of Known Organisms).

Macrobel: Is a possible model for taxonomic browser and geographic search screens for EurOBIS. It is a possible model for 'enrichment' of ERMS and is being developed with open source software (php, Apache, SVG, Javascript). An exception: MS SQL server but MSDE is a free alternative included in Microsoft Office). It will be made available under a GNU licence. See a few screen shots below.



Edward Vanden Berghe noted further that ERMS has the ambition to become a standard in its own right. Note that about 100 taxonomists are involved and about 120 excel spreadsheets were prepared (on taxonomic groups). Most of these did not contain higher classification (amphipods: started from genera). VLIZ has now filled in missing classification and added missing families. Soon ERMS will move to the MARBEF web site.

3. REPORT ON INTERSESSIONAL ACTIVITIES

3.1. REPORT PROVIDED BY GE-BICH CHAIR.

Edward Vanden Berghe, GE-BICH chair, recalled the action points of the First Session:

(i) Define a model for questionnaire to request information about documenting systems, databases and inventories. Group to discuss online. Document systems of the institutions represented in GE and announce the results at COD symposium in November 2002. [*Action: All*] – NOT DONE

(ii) Distribute the questionnaire at the COD symposium and encourage other institutions to provide feedback. [*Action: Chair GEBCDMEP*] – NOT DONE

(iii) Investigate suitability of MEDI for describing biological datasets. [*Action: Edward Vanden Berghe and Greg Reed*] - STARTED

(iv) Chair and IOC secretariat would draft a letter to ICES, ITIS, ETI and FAO informing them of the establishment of the GEBCDMEP. This draft would be circulated to members of the Group for comment before distribution. [*Action Chair, IOC Secretariat*]: COMPLETED: *Letter was prepared and sent to limited list. GBIF was not included in initial mailing. Several organizations contacted through the letter are now participating in the GE-BICH-II meeting.*

(v) Start preparations for the 2nd International Symposium on Biological and Chemical Data Management to be held, possibly, in Spring 2004. Suni Wilhelms to investigate the possibility of holding the symposium in Hamburg. Syd Levitus would draft a letter of intent outlining the topics to be covered. [*Action: Sunhild Wilhelms, Sydney Levitus*] – *ONGOING: Conference will be called "Ocean Biodiversity Informatics". More details are available under Agenda tem 5.1.*

The Chair noted with regret that insufficient progress had been made during the inter-sessional period. The Chair acknowledged that better monitoring would be required. More active responses from the membership was also required.

It was also noted that the current focus of the Group was largely on taxonomy. The Group briefly considered the need to establish a separate Group dealing with observational biological and chemical data. Further discussions on this matter were referred to Agenda Item 8.

It was concluded that the work plan of the current session had to be pragmatic, concrete and well planned.

4. COLLABORATION WITH OTHER ORGANISATIONS/INITIATIVES

4.1. OBIS AND REGIONAL NODES, AND INTERACTION WITH NODCS

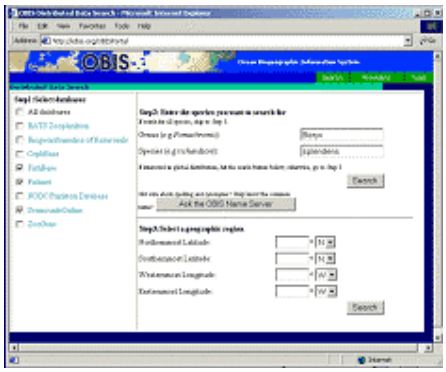
4.1.1. OBIS presentation

Edward Vanden Berghe informed the Group that OBIS (Ocean Biogeographic Information System) is one of the programmes of the Census of Marine Life (CoML). It is the marine component of the Global Biodiversity Information Facility (GBIF). It is a web-based provider of global geo-referenced information on species distribution. It is a distributed system: there is no central database but a well-defined protocol (based on DiGIR) and federation schema (based on the Darwin Core) to retrieve data from distributed servers on the internet.

OBIS originated at the CoML-sponsored Benthic Census meeting, October 1997. An OBIS web site was hosted by Rutgers University as from 1998. It is funded by the Sloan Foundation. At present OBIS has a broad range of affiliations with 18 contributors. It is also an associate participant in GBIF.

OBIS is now a federation of organisations sharing the vision of free and open access to biodiversity information. OBIS is managed by an 'International Committee', chaired by Mark Costello with advice from the CoML (Fred Grassle).

OBIS is a distributed system (multiple providers) making use of recent technology developments such as XML and DiGIR). It is a two-tier system involving an OBIS provider installed at site of contributing database, and an OBIS portal, which can be accessed by the end-users. The OBIS query form is shown right.



DiGIR (Distributed Generic Information Retrieval) is the nuts and bolts of OBIS. It is the technology that drives the system, based on XML. It uses an extension of the Darwin Core schema (additional fields). The taxonomic name and lat/long are compulsory here.

By its very nature as a distributed system, one OBIS portal can query several OBIS providers. In addition to this, one OBIS portal can serve data to several portals, the only requirement being that these servers must have implemented the DiGIR protocol. This feature would facilitate collaboration between OBIS and GBIF, since any OBIS provider would be able to serve data to GBIF portal.

The current OBIS portal is about to be modified. OBIS also has a prediction service

There are several options to contribute to OBIS: (i) through development of tools (eg CSIRO c-squares mapper, University of Kansas mapper); (ii) with data (minimum data taxonomic name, lat/long), installing the provider software and uploading data to other providers.

OBIS has a system that involves regional nodes covering a geographic region. There is European regional node (EurOBIS by MARBEF), US node, Canada node. There will soon be a South-American node, Indian Ocean node, Japan node, Africa node (at SADCO, South Africa). Australia and New Zealand will cover the Pacific.

OBIS has a need for capacity building. For the regional nodes this involves training on setting up the portal and train-the-trainer courses on installing the provider system. At the national level ie the national centres (providers) there is a need to set up a DiGIR provider, setting up data capture and data management. Possible synergy with the IODE activities on capacity building should be explored, and he made reference to OceanTeacher and ODIN networks.

There are several opportunities for cooperation between IODE and OBIS: (i) ODINAFRICA-III: the establishment of OBIS providers at national level has been included in the project work plan; (ii) ODIMeX (new version of OceanTeacher): OceanTeacher could include modules relevant to OBIS (eg the OBIS train-the-trainer curriculum).

The Group recommended that IODE and OBIS discuss the possible inclusion of modules on biological data management, as relevant to OBIS, be included in OdiMex/OceanTeacher.

The Group stressed the importance of identifying the socio-economic relevance of OBIS and other biological data management activities by placing them in a wider, possibly ecosystem framework, and highlighting the need for an integrated data set involving physical, chemical and biological data that enable monitoring and modelling of marine resources.

The Group decided to identify or prepare a paper that describes the relevance of an integrated and end-to-end approach to physical, chemical and biological data management to be used to create awareness amongst decision makers. The paper will explain how the Group and its related community is contributing to this approach at the national, regional and global scale. **The Group composed** a drafting team composed of Syd Levitus, Edward Vanden Berghe and the IODE Secretariat.

4.1.2. Relationship between OBIS nodes and IODE data centres

The Group noted that OBIS and IODE should not duplicate each other's activities nor should OBIS and GBIF data flow replace data flow to the IODE data centres. The Group regretted that there is currently little or no communication or coordination between IODE data centres and OBIS nodes.

The Group recommended that existing OBIS nodes coordinate with IODE data centres to avoid duplication and to assure the long-time preservation of data. Such coordination will be required at the national level (OBIS provider – IODE NODC), regional (OBIS regional node – RNODC or WDC) and international level.

The Group recommended that if the establishment of an OBIS provider is planned in a country that has an IODE NODC then this should be done in close consultation with the NODC.

The Group stressed the need to develop integrated databases (physical, chemical., biological data) and welcomed OBIS to collaborate in this regard.

4.1.3. Capacity building in Regional Nodes, and possible collaboration with IODE/ODIMeX

See 4.1.1

4.2. GLOBAL BIODIVERSITY INFORMATION FACILITY (GBIF) AND ITS INTERACTION WITH NODCS

4.2.1. The GBIF Information Flow

Anton Guentsch explained that the mission of GBIF (Global Biodiversity Information Facility) (http://www.gbif.org) is "*to make the world's primary data on biodiversity freely and universally available via the Internet*".

GBIF has 4 work programme areas: DIGIT (making primary data in natural history collections available, best practices, providing seed money); ECAT (catalogue of organisms: building species lists, providing seed money); DADI (data access and data interoperability: define protocols, making services); and OCB (outreach and capacity building).

Data areas that are fed into GBIF: (i) specimen data; (ii) observations data (specimen data without specimen); (iii) taxonomic data; (iv) factual data (distribution, etc). We could also add a fifth, which are multimedia objects. GBIF builds on 2 protocols, based on XML and http. These are DIGIR and BioCASe. Content schemas used include the Darwin Core (XML), an extension of which is used in OBIS (about 50 elements, flat schema), ABCD (XML) (about 800 elements, highly nested, repeatable elements); and GBIF Taxonomic standard (7 elements). The Darwin core is a subset of ABCD. There are others standards under development. The GBIF information flow is as follows: provider node -> data node -> portal -> access layer. The access layer can be a user interface or a web service for other systems. The portal functions include: (i) registry for data nodes; (ii) data cache; (iii) access system (UI) and (iv_ access system (web services) The user interface was launched a few weeks ago. The web service interface is very important: main purpose of GBIF is to give service for service developers: if you want to develop application for special family of fish then you can GBIF for this and you only have to build user interface. Under the 'hood' we find metadata (where are the fish databases), specimen, taxonomic name service (names, synonyms), namelist (eg threatened species in a region), user feedback, and general resources.

An example query is shown right.

Mandatory elements: The Darwin core has a flat structure with about 40 elements. It does not provide a means for repeatable elements. The mandatory elements are data last modified, institution code, collection code and catalog number. The combination of the latter three makes a unique reference. There are also ways to relate: previous catalog number, related catalog number, relationship type. A third area of fields (non-mandatory) concerns the identification: scientific name, scientific name author, kingdom, phylum, class, order, family, genus, species, subspecies, identified by, year identified, month identified, day identified, type status. The fourth area of fields concerns collection event fields and includes collection number, field number, collector, year collected, month collected, day collected, Julian day and time of day. The fifth area concerns the gathering site: continent ocean, country, state province, county, locality, longitude, latitude, coordinate precision, bounding box, minimum elevation, maximum elevation, minimum depth and maximum depth. Finally there are some fields that include sex, basis of record, preparation type, individual count and notes.

The Group considered GBIF as one of the most important initiatives in biogeography. In terms of the relationship between GBIF and general nomenclators like ITIS, URMO, etc. The Group was informed that ECAT deals with nomenclature and taxonomy. This activity is now coordinated with the "Catalogue of Life".

The Group was further informed that any data centre can make its data available by installing the "wrapper", or provider, software on its database system. (it implements the GBIF protocol/language). This software is available freely and fits with nearly all database systems.

It was also made clear that OBIS is an associated partner of GBIF, and a major provider of data to the GBIF system. Also, both systems are compatible on the technical level: both systems can work with DiGIR as a protocol, and the OBIS schema is a superset of the Darwin Core. This means that any OBIS provider is automatically also a potential GBIF provider.

4.2.2. Relationship between IODE and GBIF

The Group recommended that GBIF and IODE cooperate closely in order to avoid duplication and to assure the long-time preservation of data.

4.3. OTHERS

4.3.1. Online distribution of marine biological related data, and associated tools and policies at FAO

Marc Taconet informed the Group that FIGIS (Fisheries Global Information System) (http://www.fao.org/fi/figis/index.jsp) is the Fisheries Department information system of FAO. Its aims at promoting policy change for the sustainable exploitation of fishery resources through integrated FAO databases, interconnected information networks etc. FIGIS ensures systematic data geo-referencing through integration of a GIS component. A number of tools have been developed: statistics, reference data, fact sheets, maps (FIGIS-KIMS), metadata, mediabase, glossary, DocRep servers. In addition the online information and tools have been developed: biological data, exploitation/usage/management data, information.

In terms of biological data FAO maintains the ASFIS taxonomic list (down to level of species name). ASFIS has been primarily set up for obtaining fisheries statistics at the international level, and is being increasingly adopted by Regional Fisheries Organisations. ASFIS is also used for the ASFA indexing.

There is also the FAO Species Identification and Data Programme (SIDP). This started in 1950s and from this, FAO catalogues on species identification were derived. Outputs include (i) catalogues (available online in PDF) (eg sharks of the world); (ii) derived outputs (species fact sheets: synonyms, FAO names, local names, scientific name with reference, diagnostic features, size, habitat and biology, geographic distribution, interest to fisheries, production statistics, conservation status); (iii) species GIS distribution maps; database on introduction of aquatic species (DIAS) (including date of introduction, origin, introduction site,…); (iv) catch statistics; stocks inventory (FIRMS): in cooperation with national or regional fisheries bodies (eg ICCAT, SPC,…); (v) fishing exploitation profiles; fisheries atlas.

In conclusion: FIGIS is a single entry point to high quality integrated information addressing various audiences.

The above products and services are made possible through the use of XML.(see Agenda Item 4.6.4)

FAO is promoting fisheries management based on ecosystem considerations so we need to rely on an ecosystem definition. Marc Taconet stated that the GE-BICH should consider handling the term "ecosystem" together with associated definitions.

4.3.2. ICES Database clients and users

Janus Larsen informed the Group that ICES has arrangements (contracts) with OSPAR, HELCOM, AMAP (Arctic Monitoring and Assessment Programme), European Environment Agency,…

These agencies submit data to ICES. ICES has 3 departments (Oceanographic data, environmental data and fisheries) However this structure is now changing. Oceanographic data can be submitted in any format but in practices a small number of formats is used. Environmental data and fisheries data are reported in fixed format.

Several products are produced: temporal trend analysis (on eg contaminant data), yearly updated indicator reports (GIS products); simple extractions of data for use with ICES working Groups and outside users.

There are a few environmental databases: contaminant and biological effects in biota, sediment and seawater; fish disease, biological community data (phytoplankton, zooplankton, phytobenthos and zoobenthos). Some are excel spreadsheets, others are databases.

More information on the format at http://www.ices.dk/env/

As part of the process to integrate ICES is building DOME (Database on Oceanography and Marine Ecosystems): a low resolution environmental and oceanographic database. New data have access restrictions (to the submitting organization) but historical data are freely accessible. The system includes an automatic quality control mechanism (data screening) which checks for unrealistic values of position, speeds, range of values. It does not perform quality assurance. The reporting format is fully documented.

4.4. NOMENCLATORS/SPECIES LISTS

4.4.1. Recent developments in ITIS

Janet Gomon provided a detailed overview of progress made in ITIS since the first Session of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices.

- Data content additions/modifications
  - 30,000 scientific names added/records modified;
  - 70,000 vernacular names added/modified
  - Current status: 334,140 scientific names; 191,000 valid/accepted species names
- Strengthened partnerships in N. America & globally

In 2003, ITIS signed an agreement with Species 2000 and GBIF to build the Catalog of Life, a collaborative effort to provide an authoritative view on the taxonomy of known species of living organisms on Earth.

Data development history: The ITIS mission is to develop a scientifically credible database of taxonomic information to meet partner needs. ITIS ~~was started~~ began with 210,000 scientific names inherited from NODC/NOAA mid-1990's. The ITIS data development strategy is to: (i) add new checklists and names; (ii) review and verify NODC legacy data records. 55% of total ITIS records have been verified today.

Data priority setting: These are based on: (i) Partners ranked taxonomic priorities; (ii) Availability of taxonomic treatments/checklists; (iii) Availability of funding/staff; (iv) "Low-hanging fruit" opportunities; and (v) Support of other users data needs as resources allow.

Partners' interests include: Both marine and non-marine; North American; global coverage for some groups.

Data quality control: The process of verification is based on reviewing and linking credible scientific references to individual names, ensuring an accurate set of required data elements, and associating data quality indicators with each scientific name record. ITIS depends upon and works with acknowledged experts if there are any uncertainties or to verify which references they recommend be followed. Alternatively, experts that ITIS has arranged ahead of time to work with may create lists of names from references they judge to be sound.

Required data elements: T~~t~~hese include (i) Scientific Name; (ii) Author(s) (genus & below); (iii) Rank; (iv) Usage/Current Standing (accepted/valid or not accepted/invalid); (v) Connection to ITIS hierarchy: Parent scientific name (mandatory if Name is accepted/valid); Associated Accepted Name (mandatory if Name is not accepted/invalid); (vi) Unacceptability Reason (mandatory if Scientific Name is not accepted/invalid); and (vii) Reference(s) – Publications, Experts, Other Sources

Data quality indicators: Quality indicators ~~these~~ have recently been enhanced and harmonized with ITIS Canada, and include (i) Record Credibility Rating (all records) - Rating reflecting level of review of entire record's data elements and perceived level of accuracy of scientific name and associated attributes: verified – standards met; verified – minimum review; unverified; (ii) Global Species Completeness (rank of genus and above) - Rating indicating whether all known species are represented in ITIS: complete; partial; unknown; and (iii) Latest Record Review (rank of genus or above) - Year a record was reviewed by ITIS: a date (e.g. 1999); unknown.

Current activities: Current activities are focusing on (i) improving data content: accelerate legacy data review – validation/verification; accelerate addition of new data; (ii) improve methods of attribution, incentives for experts to contribute their data; (iii) planning for near-term system improvements; and (iv) longer-range planning for a next-generation ITIS.

Challenges: ITIS has faced some challenges, two being the trade-offs between (i) Global vs. Regional Approaches; and (ii) Single Name vs. Multiple Classifications.

The problem of "Global vs. Regional Approaches" is that funding is more often regionally based and there is a lack of global treatments for many taxa. In addition the combining of regional, or regional and global files, can cause problems: clashing nomenclatures, classifications, concepts, etc. The challenge is to resolve conflicts between aggregated data sources.

The second problem is "Single Name vs. Multiple Classifications." Many users only want "the" answer (i.e., one name). Again, different taxon concepts and classificatory philosophies exist. In addition systematists are continuously "improving" their classification.

The challenge is to meet the needs of average users and systematists, and again there are problems with difficulties for aggregation of data. How ITIS will address this issue in the future remains to be determined.

4.4.2. ERMS and SMEBD

See Agenda Item 2.6 for a short discussion on the European Register of Marine Species, its history and its possible future.

ERMS now contains a total of 47319 taxonomic names, 32996 species names, of which 29862 are valid. The data was also made available in printed form, published by the Musee national d'Histoire naturelle in Paris: Costello, M.J., C. Emblow & R. White, 2001. European register of Marine Species. Patrimoines naturels, 50: 463p.

4.4.3. UNESCO/IOC Register of Marine Organisms (URMO)

Jacob van der Land explained that the origins of URMO go back to 1993 when the project started. The first product, a printed document, was composed of two parts: a species list and a reference list. It was also distributed on floppy disk in 1994. Immediately after 1994 URMO started collecting species names. In those days the project collaborated with US-NODC as they had a list of 240,000 species. Not all of these were taken, as many records in the NODC list were incomplete. There are many species lists that have a regional scope. Combining these is often difficult. In 1996 URMO had approx. 60,000 species on the list. A bibliography is still maintained as well (now 3500 references). In 1996 the list was put on the Internet through ETI and it is still available there; unfortunately no funds were available for update since then (the present web version has about 10,000 species and about 1200 references). It may now be moved to Oostende to be updated in the IODE Project Office. Another output is through the "Catalogue of Life", as part of Species 2000. There are specialized lists of eg stony corals in printed form. There are however many groups in the UNESCO register that are not suited for the "Catalogue of Life".

URMO also contributed to the publishing of the European Register of Marine Species (ERMS). It is also available on Internet but no funds re available to continue the site.

The Group recommended that URMO should continue its web presence but should better reflect its full coverage. **The Group recommended** that the URMO web site should in future be hosted by the IODE project Office in Oostende, Belgium.

The Group noted the desire of URMO to contribute to larger initiatives such as global species lists (eg Catalogue of Life), by working with other organisations, such as ITIS. There are or should be links to other marine taxonomic databases. Very large ones already contributing to the Catalogue of Life are FishBase and Seaweeds 2000. Smaller ones include CephBase and Hexacorallians of the World.

4.4.4. Discussion: how to integrate; role of IODE and GE-BICH

During the discussions the Group was informed that through MARBEF, it is intended to update the information and publish CDs every 2 years (as is the case for Species 2000). Species 2000 (managed in the Philippines at the FishBase office) started with a focus on complete world lists but is now also interested in regional lists. The ERMS and UNESCO registers will remain important as providers for ITIS and others.

The Group considered that ITIS may need to regionalize as staff at the Smithsonian cannot manage ITIS at the full global level. The Group discussed this matter at length. It was noted that the current ITIS is the *de facto* node for North America. The biological ocean community is accepting ITIS as an authority but the resource base of ITIS cannot expand its coverage any further.

The Group stated that this (ITIS) central register is essential to underpin biological databases, making sure we all talk about the same species.

The Group recognized the international success of ITIS in developing a taxonomic system and the value of commonly used taxonomic system**.**

The Group called on the United States to continue and enhance its support to ITIS as a unique and essential authority underpinning biological databases.

The Group stressed the need for continued development of ITIS to achieve global coverage**.** The Group considered that this objective could be reached through a decentralized approach**.**

4.5. DEVELOPMENT OF MARINE PARAMETER DICTIONARIES

4.5.1. Development of a marine parameter dictionary at RNODC-RIHMI/WDC

Alexander Kouznetsov informed the Group that The application of code tables in oceanography has a fairly long history (Beaufort scale, Forel-Ule scale,…). Code Tables are the important part of the marine metadata system. The basic designation of the code table is to replace the plain language description by the short mnemonic or by the alphanumeric value. Usually the code tables have a simple structure where codes are placed in the left column and their definitions in the right one. The development of the parameter dictionary to meet additional requirements results in a more complicated system of several tables. The evolution of data management towards the integration of a wide variety of marine information resources increases the validity of the parameter dictionary. The development of a parameter dictionary in Russia started about 20 years ago. The list covers physical, meteorology, chemical, biological and pollution parameters.

The Uniform Dictionary of Parameters (UDP) is a key element of marine information resources integration technology, developing under the Unified System of Information on the World Ocean Condition in frame of the Federal Programme “World ocean”. The UDP is designed for unification and standardization marine data management and exchange, to provide compatibility of various marine information systems in Russia.

The scope of the UDP includes Cryosphere, Hydrosphere, Land surface, Lithosphere, Low atmosphere and Sea surface. The processes and phenomena covered include Atmospheric phenomenon, Bathymetry Current, Iceberg Optics, Sea ice Wind, Atmospheric Chemistry, Clouds, Convection, , Hydrochemistry, Pollution, Radiation balance and Sea surface level.

An online access tool has been developed. It provides flexible search of parameters by navigation throw several ways: Spheres, Process/phenomenon, Statistics, Single parameters (synonyms) or Groups.

Alexander Kouznetsov demonstrated that there are substantial differences between the Russian and BODC parameter dictionaries. The BODC dictionary has 9000 parameters, the Russian dictionary only 600.

Alexander Kouznetsov concluded that the basic problem is the fast growth of the number of parameters. Many of them are the modifications of primary parameters caused by new measurement method, manner, units or by a new analytical protocol. The number of derived parameters may be enormous. This leads to the complexity of parameter dictionary management and application. The discussion on parameters classification scheme needs to be continued.

The Group noted that the BODC and RNODC databases are based on data models using parameter dictionaries of codes that carry multiple items of information. This approach leads to enormous dictionaries that are difficult to interrogate and maintain. **The Group agreed** that there is a need to identify and document alternative approaches for the construction of integrated databases.

4.5.2. Developments at BODC on parameter dictionaries: EnParDis: Enabling Parameter Discovery

Roy Lowry informed the Group on development at BODC with regard to parameter dictionary. In the 1980s oceanographic data management handled <20 parameters. During the 1990s the number of parameters handled increased dramatically, largely due to JGOFS. BODC adopted a controlled vocabulary approach to parameter management and a parameter dictionary with >9000 entries has been developed. EnParDis is a project to build on this

BODC's data holdings are all marked up with controlled vocabulary codes. Mark-up requires copious quantities of skilled labour. In an ideal world the data would be marked up by scientists using a standard dictionary. This won't happen unless scientists can see benefits, such as improved data access. EnParDis aims to address this.

The objectives of EnParDis are (i) to enhance the BODC Parameter Dictionary into a worthy international standard vocabulary; (ii) to develop interoperability between the BODC Parameter Dictionary and other organisations' dictionaries; and (iii) to examine the potential of semantic and ontological tools for dictionary management and parameter discovery.

The implementation of EnParDis is composed of three work packages:

Work Package 1
- Map biological entities in the dictionary to ITIS
- Implement ITIS taxonomy as a dictionary parameter grouping tool

Work Package 2
- Develop keyword group mappings (SeaSearch and GCMD)
- Investigate feasibility of user-definable groupings
- Investigate techniques to support parameter interconversions (e.g. unit conversions)

Work Package 3
- Expand the BODC dictionary to cover other known dictionaries: SISMER (France), SMHI (Sweden), DOD (Germany), Pangaea (Germany), Rijkwaterstaat (Netherlands), US JGOFS, MEDS (Canada), BIO (Canada), ICES Contaminants Database, CF?, Any others I can find. Some of these dictionaries are huge
- Review the current dictionary
  - Revise implementation structure: eliminate classification that is hard-coded into data markup

- Improve the clarity of parameter descriptions
- Improve the valid parameter value ranges stored in the dictionary
- Investigate if dictionary could be mapped through a data model into an ontology

Progress today and plans for the future are as follows:

WP1 Progress

- ITIS database installed at BODC
- Initial mapping between dictionary biological entities and ITIS
- Over 100 spellings in the dictionary standardised to ITIS
- A couple of errors in ITIS identified and their correction agreed
- 163 additional genera/species submitted to go to ITIS. A further 81 identified for submission
- Access and Web taxonomic browser demonstrators developed

WP1 Taxonomic Browser

- Driven by two tables
  - Map between BODC code and ITIS code plus parameter measured
  - Implementation of ITIS Taxonomy
    - ITIS code plus taxonomy (27 levels) encoded in a 216-byte string
  - Allows all BODC codes for a given parameter to be extracted at any taxonomic level (eg abundance in water column for all species of a given genus)

WP1 Next Stage

- Operational implementation of ITIS mapping
    - Revision of map design to facilitate operation with RIKZ DONAR and WADI data models
    - Map maintenance protocols
    - ITIS database update protocols
    - Incorporation of demonstrator technology into BODC data retrieval tools

WP2 Progress

- First-cut mapping to GCMD parameter valids: has been very difficult because of differences in granularity
- SEASEARCH groupings implemented (in June)

WP2 Next Stage

- Consultations with GCMD on their parameter valids
- Implementation of GCMD groupings as an alternative to SEASEARCH
- Look into potential of RDF or OWL for parameter classification management

WP3 Progress

- Work commenced on RIKZ, SISMER and US JGOFS manual mappings
- Dictionary entries in preparation to fill gaps identified by mappings
- Units abbreviated titles standardised (NPL – National Physical Laboratory)
- Revised dictionary structure implemented

WP3 Next Stage

- Continue mappings and dictionary extension
- Research more elegant techniques for large scale mappings (semantic analysis?)

- Data model mapping and ontology research

There is an electronic discussion list for EnParDis. The list address is: enpardis@mailman.nerc-bidston.ac.uk. The URL for subscription to the list is http://mailman.nerc-bidston.ac.uk/mailman/listinfo/enpardis

The Group recommended for BODC to consult with FAO to learn from its experience with regard to the development of ontologies.

4.6. COLLABORATION WITH TECHNICAL WORKING GROUPS

4.6.1. ICES MDM

Lesley Rickards explained that ICES's Working Group on Marine Data Management (MDM) has been in existence for 25 years. It looks at Data quality/quality control; promotion of good data management practice; standards; guidelines, communication, and long-term data stewardship. It is not a group of IT specialists but a mixture of scientists, data specialists and IT people. As an ICES group its membership covers the North Atlantic and Baltic regions.

The Terms of Reference of the Group included (until 2004): (i) evaluate the use of the MDM guidelines for data management and exchange in response promotional activities; (ii) evaluate the results from SGXML regarding the cross parameter dictionary comparison and make recommendations regarding adoption in the oceanographic community; (iii) further investigate details of the Integrated Taxonomic Information System (ITIS) and actively promote ITIS within the ICES and IOC community; (iv) identify problems in terms of both submission amount and quality of oceanographic data submitted to the ICES data centre and suggest solutions to member countries or international programs as required; (v) evaluate and develop future directions for oceanographic data management based on the results from SGXML; and (vi) comment on the report of the Study Group on the Management of Integrated Data.

In terms of (iii), ICES has endorsed ITIS but expressed some concerns that were passed on to ITIS. IT IS noted that ITIS is an evolving partnership, it is open to new users and collaborators, and it is committed to maintaining highest quality of data.

In 2004 the Terms of Reference of the ICES MDM Working Group were revised as follows:

(i) Continue data management and exchange guidelines
(ii) Develop referral portal for guidelines and data quality control information
(iii) Continue with ITIS and actively promote ITIS within the ICES and IOC community
(iv) Data management and operational oceanography
(v) Access to new data products (CD-ROM/DVD and web-based), online databases
(vi) Evaluate results from SGXML
(vii) Continue to provide input to SGMID

The GE-BICH requested the IOC Secretariat to inform ICES on the nomination of a selected GE-BICH member to participate in MDM meetings and to invite ICES to nominate a suitable expert to participate in meetings of GE-BICH

The Group stressed the importance of easy access to guidelines related to biological data management in general, and their quality control in particular, and **tasked** the IODE Secretariat to copy this information from OceanTeacher to the IODE web site in a prominent location.

The Group was informed that ICES has developed relevant guidelines on data quality assurance for biological data. **The Group tasked** the IODE Secretariat to provide a link to these in OceanTeacher and the IODE web site.

The Group tasked its members to identify and provide to the IODE Secretariat, other relevant guidelines and manuals.

4.6.2. EU project Marine XML

Edward Vanden Berghe introduced this item. He explained that the EU is one of several activities. It started with the proposed establishment of a marineXML consortium. This did not come to exist but two other initiatives did start: the EU marineXML project and the ICES/IODE Study Group on marine XML. The EU project team is planning to submit a new proposal to ensure continuity.

Our management of the marine environment and marine risks is restricted by the lack of interoperability and the huge diversity of data formats, proprietary data management systems, numerical models and visualisation tools. The aim of MarineXML is to demonstrate that eXtensible Mark-up Language (XML) technology can be used to improve data interoperability for the marine community whilst not rendering investment in existing systems obsolete. MarineXML will realise a prototype 'Marine Mark-up Language' (MML) and look to standardisation post project through new IOC/ICES working group on XML for Marine applications.

The partners in the project are : (i) HR Wallingford Ltd (UK); (ii) UK Marine Information Council (UK); (iii) SevenCs (Germany); (iv) Nansen Environmental & Remote sensing Centre (Norway); (v) Central Laboratory of the Research Councils (UK); (vi) National Institute for Coastal and Marine Management (RIKZ); (vii) Flanders Marine Institute(VLIZ); (viii) Social change on line (Australia); (ix) EuroGOOS; and (x) International Oceanographic data and Information Exchange (IODE – UNESCO.

The marineXML first priorities are : (i) What are the existing standards; (ii) On-going international standard development process: SG XML, W3C, OASIS, IHO; and (iii) How do existing standards relate to one another?

The issue of marineXML Data Interoperability involves (i) exchange standards (IHO S57); (ii) Metadata (MEDI, ISO 19115); (iii) Glossaries (GCMD, ASFA, BODC Parameter list); and (iv) Ontologies.

MarineXML testbeds: test beds will take example data flows to develop the basis of Marine Mark-up Language (MML) specification. The principles in development will be to work with on-going initiatives, work with standard bodies and ensure post-project sustainability. Three test-bed applications have been identified: (i) draft of ships approaching southern North Sea harbours, (ii) prediction of algal blooms taking into account river inputs, and (iii) distributed multidisciplinary biodiversity database.

4.6.3. ICES/IOC Study Group on XML (SGXML)

Row Lowry informed the Group that the ICES/IOC Study Group on XML (SGXML) was formed as a co-operative effort between IOC and ICES during 2001 after an initial suggestion at the January 2001 ICES MDM. The Group met in Helsinki in 2002 and Gothenburg in 2003. The next meeting will take place in Oostende in May 2004.

The Terms of Reference of the Group are to:

- Develop a framework and methodology for the use of XML in marine data exchange
- Develop a work plan that within 4 years will lead to published protocols for XML use in the marine community
- Explore how to best define XML tags and structures so that many ocean data types can be represented using a common set of tags and structures.
    - Test and refine these common tags and structures using designated case studies
    - Point (physical/chemical) data (profile, underway, water sample)
    - Metadata (cruise information, building from the ROSCOP/Cruise Summary Report)
    - Marine Biology data (integrated tows (e.g., zooplankton-phytoplankton tows), demonstrate the use of taxonomy)

The Membership includes : Defence R&D, Canada (co-chair); USNODC (co-chair); MEDS, Canada; NODC, Russia; DOD, Germany; IOC; ICES; UK Hydrographic Office; IMR, Norway; SMHI, Sweden; FIMR, Finland; BODC, UK; SISMER, France; RIKZ, Netherlands; VLIZ, Belgium; and observers from US Navy, Japan and more.

In terms of using XML for Marine Data Exchange, the 'Keeley Bricks' content standard for marine data encoding in XML was investigated and tested. Anthony Isenor managed to translate XML bottle data built from bricks to BIO format using XSLT.

Lessons learned so far can be summarized as follows:

- Encoding data into XML is not the wonder cure for data interoperability problems.
- XML isn't good for our (BODC) data as it is verbose, making XML data solutions non-scalable.
- Data virtualisation through modelling and the establishment of standards is a very promising approach, especially when combined with generalised data formats that have readily available I/O methods

We have much to learn from what the atmospheric science community are doing with CF (content standard) and NetCDF. Roy Lowry gave his views on the role for XML in data exchange:

- Data interoperability is all about metadata, not data
- Currently the best technology we have for implementing metadata is XML
- A very powerful concept for interoperable data is a data set comprising:
    - Data files in something like NetCDF (CSV?, XML??)
    - Data model instance in XML (technical metadata)
    - Discovery metadata instance in XML (DIF, FGDC, ISO19115)
    - 'Extras' metadata instance encoded in XML (Methodology information or anything else)

In terms of XML and metadata, two aspects have been investigated: (i) XML and de facto oceanographic metadata standards; and (ii) Parameter dictionaries.

De Facto standards: Mappings between oceanographic and other standards: (i) Oceanographic (EDMED, Cruise Summary Report); (ii) Others (Dublin Core, GCMD DIF, FGDC geo-profile, ISO19115)

EDMED: Excellent progress made by Michel Fichaut and Gilbert Maudire to produce an ISO19115-compliant XML schema for EDMED.XML EDMEDs may be automatically exported from SISMER database. Import/Export tools for BODC EDMED database under construction. EDMED to GCMD DIF XSLT transform would be a welcome next step

Cruise Summary Report : Producing an ISO19115 mapping is much more problematical: there is information vital to CSR that isn't addressed by ISO19115 (e.g. no concept of a cruise in ISO19115). CSR codes are a mixture of what was measured and how it was measured, which complicates mappings to other metadata models. Current thinking is to go for a non-compliant CSR schema to facilitate CSR metadata exchange.

Parameter Dictionaries: Two approaches taken to dictionary interoperability: (i) Code Map XML schema (Various dictionaries mapped into schema; Map used as basis of XSLT code translation; Maintenance problem loomed but not addressed); (ii) Extending BODC dictionary to cover other dictionaries then establishing a mapping (This is what we're attempting with EnParDis. Much harder work than anticipated (automation desirable!))

The Group was informed that at the 2003 Session of the EU-XML meeting (The Hague, December 2003) it had been proposed to "establish a repository of XML structures at the IODE Project Office". It was also expected that the last Session of the SGXML will be held in May 2004 and other ways would need to be found to continue the work of the SGXML.

The Group stressed that an XML registry is required and recommended that the IODE Project Office takes on this responsibility. The IODE Project should deal with the management of the repository and the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices should assist with content management.

4.6.4. XML-related activities at FAO fisheries department

Marc Taconet informed the Group on FAO's activities related to XML. He recalled that part of FAO's mandate is to collect and disseminate information. The FIGIS system, using leading edge web-based information technologies (e.g. XML. XLS and Java), has developed Internet-based tools and functionality with the view to promote more effective and focussed cooperation between information sources, within FAO as well as between FAO, regional fisheries management organisations and national centres of excellence. One of the priority objectives for FIGIS in its first phase is to modernise drastically, improve and streamline the global flow of information about fishery resources and stock status and trends. In a second phase, the streamlining concept will be extended upstream the data collection mechanism with FIGIS also including the provision of methodological and operational tools that will assist the production of fishery statistical data at grassroots level.

In order to enable partners to contribute information to FIGIS, various tools are offered, including on-line editing of fact sheets, upload/import of standalone DTD compliant XML files, and dynamic feeding protocols: FIGIS is a distributed system with fact sheets being constructed on the fly from different data bases or systems.

Since FIGIS is about integrating and sharing data, it requires the definition of standards. Those standards are of two types: reference data (taxonomic lists, species classifications, gear type classifications, fishing area classifications, countries lists and political hierarchies, etc ….) including international standard coding systems, and meta data integrated in DTDs.

FAO chose XML during the second year of FIGIS because it was understood that it would considerably facilitate information exchange. XML addresses semantic and data structure needs. It also facilitates resource discovery. It is an integral part of the system architecture: data archival: well fitting knowledge management; data presentation: stands behind the scene; offers easy implementation of distributed systems.

XML products include AGMES (Agricultural Metadata Element Set): information resources metadata, for resource discovery); FiMES (Fisheries Metadata Element Set); FIStatXML (Fisheries statistical XML); and RDF (used for the Fishery ontology). The RDF may help to address some of the maintenance issues by offering a way to export the content of the FIGIS reference table management system onto the Fishery ontology.

FIMES is a set of descriptive elements and tree structures for fisheries data. It is a flexible standard open to change based on user needs, used by FIGIS to create and edit fact sheets, store them in a database, and return them as web pages. IT is also an independent approach that does not rely on a computer platform, machine language or software. Developed at FAO headquarters by FIGIS staff in consultation with FAO Fisheries and FIRMS partners, FIMES has been in development for over 4 years with repeated modifications following testing by FIRMS partners. FIMES uses existing metadata standards (Dublin Core, AgMES), existing thesauri (AGROVOC, ASFA), existing classifications (CWP, ISO) and controlled vocabularies. It is domain based, with topic trees organised by information domain (Species & species groups, Stocks, Resources, Fisheries, Management systems, Fishing areas, Gear types, Vessel types, Fishing Techniques, Fishing areas, Vessel records, Country profiles, Institutions) and sharing similar standards. Some FIMES elements also imply behaviour, such as dynamic links trigger. FIMES is currently expressed in eXtensible Markup Language (XML) as a Document Type Definition (DTD), with a fi: namespace. Tests of XML schemas are starting. The FIMES proposal is currently available on the Web at http://www.fao.org/fi/figis/devcon/index.html together with a glossary and a set of web-based training materials

FIStatXML is the proposed FIGIS standard for statistical data exchange based on XML. FiStat XML dataset contains everything necessary for the creation of a statistical dataset. It is composed of four main modules: 1) time series (TS_DATA) – actual data matrix: keys, values, symbols; 2) time series metadata (TS_METADATA) – describes the structure of the time series, as well as other information about the dataset; 3) reference data (REF_DATA) – describes the reference objects behind the key IDs; e.g. the names, codes, attributes of each and how they relate to one another; and 4) the reference metadata (REF_METADATA) – describes the key value types; e.g. what attributes they may have, how they may be sorted, how they may be used to build trees. FIStatXML fulfils data exchange - workflow processes and resource discovery roles in FIGIS

The benefits and constraints of a common DTD are:

- Benefits: offers a solution completely software and platform independent; allows semi-generic software solutions; very flexible (great range of data types; easy evolution of the data structure and topics)

- Constraints: versioning management; flexibility must be compensated by data integrity mechanisms

More information available from:
FIMES at: http://www.fao.org/fi/figis/devcon/index.html together with a glossary and a set of web-based training materials

FIStatXML at http://www.fao.org/fi/figis/devcon/FiStat/FiStat.html

The Group recommended that FAO review existing Darwin Core and ABCD XML vocabularies in order to revise the FIMES proposed standard for fisheries where applicable.

4.6.5. Biodiversity data networking – architectures and protocols

Anton Guntsch informed the Group about the Access to Biological Collection Data (ABCD) content specification and BioCASe (Biological Collection Access Service everywhere) protocol.

ABCD is an XML schema developed by TDWG and CODATA, and to be used for biological data exchange. Care was taken to have a strict separation between protocol and the content definition.

The ABCD schema has been accepted by GBIF as a parallel standard to the Darwin Core. So two parallel systems are now accepted by GBIF as standard: one is DiGIR as protocol and Darwin Core as content specification, the other BioCASe as protocol and ABCD as content specification. While the focus of Darwin Core is on the minimum common denominator, ABCD tries to offer comprehensive and high-resolution collection information.

The ABCD schema is very extensive (700 elements). It covers all biological collections, allows a high degree of detail, provides variable atomisation, and references other standards. Specifically, Darwin Core is a subset of ABCD.

The BioCASe protocol makes use of XML and HTTP. Three operations are defined: ‘capabilities’, ‘scan’ and ‘search’. For GBIF standard, it is used in conjunction with the ABCD content specification, but could work with any xml data schema. Portal software making use of the BioCASe protocol is being developed.

A prototype BioCASe portal has been developed by the German node of GBIF; more information on BioCASe itself can be found on http://www.biocase.org

4.6.6. ICES Benthos Ecology Working Group

Edward Vanden Berghe informed the Group that the ICES Benthos Ecology Working Group reports to the Marine Habitat Committee (MHC). It has existed for approximately 20 years. It focuses on benthic ecology of ICES area. The initial focus was on the North Sea Benthos Survey.

The two last meetings of the group were: Tromso, Norway, from 24 to 27 April 2002 (Chair: Dr Karel Essink (Rijksinstituut voor Kust en Zee, Haren, The Netherlands)); and Fort Pierce, US, from 28 April to 1 May 2003 (Chair: Heye Rumohr (Institut fur Meereskunde, Kiel, Germany)).

Topics discussed include: Data management issues; Review of the progress of the WG MHM (Marine Habitat Mapping); North Sea Benthos Project; Standardisation and quality control issues; Wind energy farms; and the Prestige oil spill.

Edward Vanden Berghe then provided an overview of the work of the North Sea Benthos Survey (NSBS), an activity of ICES's Benthos Ecology Working Group. It organized a sampling campaign specifically for the NSBS in 1986. The results included 1,004 taxa with 16,500 distribution records. The database is available through the internet (http://www.vliz.be/vmdcdata/nsbs). Results have also been published in literature and as an ICES report. Obstacles included standardising taxonomic lists and identifications and non-preservation of some specimens (all used to determine dried weight).

The Study Group North Sea Benthos Project is a new ICES study group, with as its primary objective the study of the North Sea Benthos. One of its objectives is to produce an update of the NSBS, in close collaboration with the authors of the previous survey (RIVO, CEME). No sampling is planned specifically for this project, but it relies on existing data. Data ingestion and clean-up was recently finalised, and the resulting consolidated data set used to run first analyses. A database has been developed to capture all information. It will become available on the web site after publication (a.o. as ICES report).

The Group called for the development of a 'repository' if all useful information on guidelines, quality control, quality assurance, etc. In this regard the Group noted that a number of these were included in OceanTeacher and recalled its request under Agenda Item 4.6.1.

4.6.7. General Discussions on XML

The Group noted that successful application of XML has to be backed up by international standards and that these are currently not yet available for marine XML. Although a few projects are ongoing (SGXML, EU Marine XML project, …) standardization has not been agreed upon. The Group called on the IODE Committee to play its role.

The Group considered that XML may be considered too verbose when dealing with gridded physical oceanography data but will be very useful for biological (especially taxonomic) data which are traditionally verbose.

The Group urged to connect fisheries data and oceanographic data by applying ecology concepts. Existing systems must be consolidated and integrated.

The Group saw the great potential of the emerging technologies, **and identified the need** for pilot projects to test the different systems of distributed querying based on XML (DiGIR and BioCASe), with XML schemas other than Darwin Core and ABCD. Two types of data were identified as suitable for a pilot project: (1) metadata and (2) distributed taxonomic name list.

For the metadata, collaboration will be sought with SeaSearch and IFREMER; standards that will be considered are ISO 19115 and the ISO-compliant XML structure for EDMED. Roy Lowry kindly agreed to take the lead on this. For the distributed taxonomic name list, the pilot will in a first phase deal with ITIS, URMO and ERMS data; Edward Vanden Berghe will take the lead, and collaborate in this with Janet Gomon, Jacob van der Land and others. Both projects will be described in a one-page concept paper that will be circulated to group members and others before the actual work starts.

5. INTERSESSIONAL WORK PLAN

5.1. DETAILED WORK PLAN FOR 2004-2005 (FINANCIAL IMPLICATIONS?)

5.1.1. Preparation of the "Ocean Biodiversity Informatics" Conference

Sunhild Wilhelms informed the Group that the "Ocean Biodiversity Informatics" Conference will take place between 29 November and 1 December 2004. The Bundesamt für Seeschifffahrt und Hydrographie (BSH) will host the Conference. Hotel rooms have been blocked (60 rooms). There are some problems in setting up a web site at BSH, but the conference web site at VLIZ (http://www.vliz.be/obi) can be used as an alternative. The first announcement has been prepared and sent out to about 2000 email addresses early January 2004. A number of partners have been identified to co-organize the Conference: Census of Marine Life – Ocean Biogeographic Information System (CoML/OBIS); International Association of Biological Oceanography (IABO); Taxonomic Databases Working Group (TDWG); Flanders Marine Institute (Vlaams Instituut voor de Zee – VLIZ). Support is also being sought from the European Commision.

The Group tasked the IODE Secretariat to formally approach ICES and WDC Oceanography, Silver Spring to invite them to co-organize the event. Other partners of the 1996 event (IOC-EU-BSH-NOAA-(WDC-A) International Workshop on Oceanographic Biological and Chemical Data Management. Hamburg, Germany. 20-23 May 1996) should also be approached.

The conference topics will be restricted to marine biological data management – taxonomy-based, biogeography but also environmental, non-taxonomy based data management. Specific objectives are to:

- Learn how and why researchers have used large-scale marine biodiversity databases to make major discoveries about the functioning and state of ocean ecosystems.
- Bring together biological data managers to discuss the present state, and progress, in this field since the meetings in Hamburg (1996) and Brussels (2002).
- Discuss standards and protocols for data exchange. Take note of new developments such as Distributed Generic Information Retrieval (DiGIR) and OBIS, and discuss how this will influence biological data management in general.
- Provide an opportunity for biological data managers to find out what is happening at IODE National Oceanographic Data Centres and marine research agencies from around the world.
- Discuss potential gaps and overlaps in the taxonomic and geographic scope of existing data systems. How can we, as a community, ensure that we are covering the whole field, and that no taxonomic groups are left behind? How can we make maximal use of resources, and avoid overlaps?
- How do we integrate data from separate databases into large datasets that will enable us to provide answers on the global cover and long time scales that we need?

Proposed themes for the sessions are:

- Taxonomic and biogeographic data management
- Environmental data management
- User requirements for environmental and biological ocean data and data products
- Ocean data management in relation to international organisations

- Case studies

A panel discussion will also be organized addressing the following questions:

- What is our target audience, and how effectively are we reaching it?
- How do we integrate individual databases into datasets that allow large-scale, long-term analyses? What is the role of international organisations such as the International Council for the Exploration of the Sea (ICES), the IOC and the Food and Agriculture Organization of the United Nations (FAO) in this? What is the role of CoML and OBIS, and of GBIF? Which others have a role to play?
- How do we avoid overlap and duplication of effort? How do we avoid gaps in taxonomic/geographical coverage?
- What mechanisms are we using now, or do we plan to use in the future, to disseminate data? What should we do to persuade data providers to make their data available?

Limited by the size of the conference room the maximum number of participants will be 75 (capacity of the conference room). This will need to be made clear. **The Group recommended** that participants should be selected as was done for the 1996 event.

The Group decided to communicate names of relevant experts (and speakers) to the conference secretariat (obi@vliz.be) not later than 15 April 2004. **The Group stressed the need** to involve the user community in the Conference.

A second announcement will be sent out at the end of April 2004. **The Group requested** its members and observers to disseminate the second announcement through their relevant channels.

The Group recommended that a full set of Proceedings could be published by IOC. **The Group requested** Mark Costello (who negotiated the publishing of selected papers in Marine Ecology Progress Series) to contact the Publisher to find out if they could agree for IOC to publish the full set of Proceedings.

A Poster Session is also planned. **The Group requested** IODE data centres that have relevant activities in biological data management, to prepare posters for the event. It was noted that these posters could also be used at IODE-XVIII and JCOMM-II. **The Group requested** the Secretariat to (i) contact IODE data centres to invite posters; and (ii) to provide a vector graphic version of the IODE logo for insertion on the poster. Responses by the IODE data centres should be sent to the IODE Secretariat and Conference Secretariat. The Conference Secretariat will coordinate with the local organizers for related practical issues (eg dimensions of the panels, available panels). The respondents will receive an electronic copy of example posters (by ftp).

Observers in the GE-BICH were also invited to participate and present posters.

5.1.2. Questionnaire

The Group recalled the action item of the first Session of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices *"Define a model for questionnaire to request information about documenting systems, databases and inventories. Group to discuss online. Document systems of the institutions represented in GE and announce the results at COD symposium in November 2002."*

The Group decided to modify and detail the action item as follows:

This survey should give an overview of the current architecture of data collection and data management at the national level in IOC member states. Its focus in terms of data types is wide (including physical, chemical and biological) but will provide the answers to the questions that were to be addressed by the questionnaire planned by the first Session of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices:

(i) which are the institutions that collect oceanographic data (physical, chemical, biological) in your country (provide also an organigram of oceanographic research and monitoring in your country);

(ii) is there a national mechanism that coordinates the data flow?

(iii) what data types are collected by each of the institutions listed under (i) on a regular bases?

(iv) does your country have a system for the management of oceanographic data (quality control, archival, data products/services) including one or more data centres?

- Provide full information on each data centre
- Which data types are managed by which data centre
- What data are NOT managed by the data centres
- Who does the quality control (data collector, data centre, both)
- Provide a list of taxonomic databases and inventories currently in use in each of the data centres

The Group decided to create a small working group to further develop and implement the questionnaire. The working group will include Syd Levitus, Gwen Moncoiffé, Sunhild Wilhelms, Mary Kennedy and the IODE Secretariat. The working group leader will be Gwen Moncoiffé. The working group will finalize the questionnaire by 1 July 2004. The questionnaire should be mailed in July 2004 with a deadline of 1 October. The full report of the questionnaire should be ready by January 2005 for reporting to IODE-XVIII in April 2005.

The Group noted that FAO is starting a major 4-year initiative for a global inventory of existing data inventories for fisheries data. The GE-BICH will not include details on fisheries as this will be covered by the FAO inventory. However, **the Group stressed the need** to coordinate with FAO in this regard. **The Group decided** that any fisheries related information obtained through the GE-BICH survey will be shared with FAO.

The Group then discussed the addressees of the survey. **The Group decided** to send the questionnaire initially to the IODE NODCs. Additional addressees will be identified on the basis of gaps.

5.1.3. Other, following from meeting

Two potential projects were identified during the meeting, and implementation of these projects was discussed.

The first project consists of bringing the present UNESCO/IOC Register on line through the IODE Project Office in Oostende, resulting from the discussions under 4.4.3.

The second project is a pilot project to investigate the use of XML and distributed querying systems such as DiGIR and BioCASe, and resulted from the discussions under agenda item 4.6.7. The pilot project will have two parts: one dealing with metadata, the others to combine taxonomic names from different sources.

The Group adopted Recommendation IODE/GE-BICH-II.2

5.2. STRATEGIC PLAN FOR THE NEXT 5 YEARS

The Group stressed that its ultimate goal and IODE is to build integrated ocean physical, biological and chemical databases at the regional and global scale. This is to support climate change, biodiversity studies, and other issues of global importance.

This goal will need to be achieved through close collaboration between the IODE data centres and all relevant ocean science, monitoring and observation communities.

It s expected that the results of a number of GE-BICH-II action items will provide a more concrete "state of the art" report for discussion at IODE-XVIII, and that IODE-XVIII will provide guidance to GE-BICH leading to a long-term plan.

6. ELECTION OF THE GE-BICH CHAIRPERSON

The IODE Technical Secretary reviewed the rules and practical arrangements for the election of the Officers of the IOC Subsidiary Bodies as they are presented in Document IOC/INF-785, IOC Manual of 1989, Part I, Item 5 and in the Revised Rules of Procedure, as of June 1994 (Document IOC/EC-XXVII/Inf.1).

The Group re-elected Dr Edward Vanden Berghe as its Chair.

7. DATES AND PLACE OF THE NEXT SESSION

The Group was informed by the Technical Secretary that the Chair of the Group would be required to report on the Group's progress during the 18th Session of IODE, planned to take place in April 2005. The Group was also informed that JCOMM-II will take place in September 2005. The Group also noted that US$ 9000 had been set aside for a meeting of the Group in 2005.

The Group decided that work during 2004 and 2005 will be done by email and **requested** to the IODE Committee that the funds set aside for 2005 can be used for the implementation of the work plan.

The Group proposed to have the Third Session of the Group in 2006 in Oostende, Belgium around May.

8. OTHER BUSINESS

Under this agenda item the Group discussed whether the GE-BICH could effectively deal with both biological and chemical data management. It was noted that the current membership included both chemical/biological observation and taxonomic expertise.

The Group decided to discuss the management of chemical/biological observations with COOP to identify the most urgent matters that need attention. On the basis of those discussions further action will be discussed by email. Additional experts can then be contacted for expertise. Sydney Levitus suggested to add Hernan Garcia to the Group. The data obtained from the questionnaire (see Agenda item 5.1.2) could also provide guidance in this regard.

The Group recommended that the GE-BICH Chair should consult with the COOP (Co-) Chairs to discuss the contribution of the GE-BICH and the IODE Data Centres to the COOP Data Management and Communications Subsystem. In this it was noted that information, obtained through the Questionnaire (see Agenda Item …) will contribute to these discussions.

The Group then considered the proposal of the Chair to change the acronym from GE-BCDMEP to GE-BICH.

The Group recommended that the name of the Group be changed to GE-BICH. The Group further requested some changes in the Terms of Reference:

(i) documenting the systems and taxonomic databases [added: ***and inventories***] currently in use in various data centres;

(v) encouraging data holders to contribute data to data centres for the creation of regional and global integrated oceanographic [change: **databases incorporating physical, chemical and biological data**].

The Group adopted Recommendation IODE/GE-BICH-II.1

9. CLOSURE

The GE-BICH Chair thanked everybody for contributing to the meeting. He especially thanked the Session's hosts at BODC, Gwen Moncoiffé, Roy Lowry and Lesley Rickards for the excellent arrangements and hospitality.

The Chair closed the Session on Wednesday 24 March 2004 at 12:30.

ANNEX I

AGENDA

1. ORGANIZATION OF THE SESSION
   - 1.1. OPENING OF THE SESSION
     - 1.1.1. Welcome on behalf of BODC
     - 1.1.2. IODE: Importance of biological and chemical data management
     - 1.1.3. Objectives of the meeting: short-term activities, medium-term plans, strategic objectives of the Group
   - 1.2. ADOPTION OF THE AGENDA
   - 1.3. PROPOSAL TO CHANGE THE NAME/ACRONYM OF THE GROUP

2. PRESENTATIONS BY PARTICIPANTS
   - 2.1. BIOLOGICAL DATA MANAGEMENT AT THE BRITISH OCEANOGRAPHIC DATA CENTRE: SYSTEMS IN PLACE AND NEW DEVELOPMENTS
   - 2.2. ACTIVITIES OF THE RNODC/RIHMI-WDC WITH REGARD TO BIOLOGICAL AND CHEMICAL DATA MANAGEMENT
   - 2.3. BIOLOGICAL DATA MANAGEMENT ACTIVITIES AT THE BEDFORD INSTITUTE OF OCEANOGRAPHY
   - 2.4. OCEANOGRAPHIC AND FISHERY DATA ACQUISITION IN CHILE: FINANCIAL AGENCIES AND AVAILABILITY OF THE INFORMATION TO NATIONAL/INTERNATIONAL OCEANOGRAPHIC DATA CENTERS
   - 2.5. STATUS REPORT ON THE WORLD OCEAN DATABASE (WODB)
   - 2.6. RECENT DEVELOPMENTS IN VLIZ/VMDC

3. REPORT ON INTERSESSIONAL ACTIVITIES
   - 3.1. REPORT PROVIDED BY GE-BICH CHAIR.

4. COLLABORATION WITH OTHER ORGANISATIONS/INITIATIVES
   - 4.1. OBIS AND REGIONAL NODES, AND INTERACTION WITH NODCS
     - 4.1.1. OBIS presentation
     - 4.1.2. Relationship between OBIS nodes and IODE data centres
     - 4.1.3. Capacity building in Regional Nodes, and possible collaboration with IODE/ODIMeX
   - 4.2. GLOBAL BIODIVERSITY INFORMATION FACILITY (GBIF) AND ITS INTERACTION WITH NODCS
     - 4.2.1. The GBIF Information Flow
     - 4.2.2. Relationship between IODE and GBIF
   - 4.3. OTHERS
     - 4.3.1. Online distribution of marine biological related data, and associated tools and policies at FAO
     - 4.3.2. ICES Database clients and users
   - 4.4. NOMENCLATORS/SPECIES LISTS
     - 4.4.1. Recent developments in ITIS
     - 4.4.2. ERMS and SMEBD
     - 4.4.3. UNESCO Register of Marine Organisms (URMO)
     - 4.4.4. Discussion: how to integrate; role of IODE and GE-BICH
   - 4.5. DEVELOPMENT OF MARINE PARAMETER DICTIONARIES

4.5.1. Development of a marine parameter dictionary at RNODC-RIHMI/WDC
4.5.2. Developments at BODC on parameter dictionaries: EnParDis: Enabling Parameter Discovery
4.6. COLLABORATION WITH TECHNICAL WORKING GROUPS
4.6.1. ICES MDM
4.6.2. EU project Marine XML
4.6.3. ICES/IOC Study Group on XML (SGXML)
4.6.4. XML-related activities at FAO fisheries department
4.6.5. Biodiversity data networking – architectures and protocols
4.6.6. ICES Benthos Ecology Working Group
4.6.7. General Discussions on XML

5. INTERSESSIONAL WORK PLAN
5.1. DETAILED WORK PLAN FOR 2004-2005 (FINANCIAL IMPLICATIONS?)
5.1.1. Preparation of the "Ocean Biodiversity Informatics" Conference
5.1.2. Questionnaire
5.1.3. Other, following from meeting
5.2. STRATEGIC PLAN FOR THE NEXT 5 YEARS

6. ELECTION OF THE GE-BICH CHAIRPERSON

7. DATES AND PLACE OF THE NEXT SESSION

8. OTHER BUSINESS

9. CLOSURE

ANNEX II

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ANNEX III

RECOMMENDATIONS

Recommendation IODE/GE-BICH-II.1

Revised Terms of Reference of the Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BICH)

The IOC Committee on International Oceanographic Data and Information Exchange,

Recognizing the increasing importance of managing and archiving biological and chemical data,

Noting the continued development of global research, monitoring and observing programmes, that are relevant to issues such as climate change, ecosystem dynamics and biodiversity, and which rely heavily on biological and chemical data sets,

Further noting the need for integrated databases that combine physical, chemical and biological oceanographic data,

Recommends the revision of the Terms of Reference of the Group of Experts on Biological and Chemical Data Management and Exchange Practices to include:

(i) documenting the systems and taxonomic databases and inventories currently in use in various data centres;
(ii) documenting the advantages and disadvantages of different methods and practices of compiling, managing and archiving biological and chemical data;
(iii) developing standards and recommended practices for the management and exchange of biological and chemical data, including practices for operational biological data;
(iv) encouraging data centres to compile inventories of past and present biological and chemical data holdings;
(v) encouraging data holders to contribute data to data centres for the creation of regional and global integrated oceanographic databases incorporating physical, chemical and biological data.

Invites the IOC Governing Bodies to support this Group of Experts;

Encourages IOC Member States to nominate experts having expertise in biological and chemical data management and exchange practices to the Group of Experts;

Requests that the Group of Experts maintains close relations with GOOS, COOP, JCOMM and other relevant programmes of IOC and other organizations;

Further requests that a progress report be submitted regularly to the IODE Officers and the IODE Committee.

Note: changes are marked in red

Recommendation IODE/GE-BICH-II.2

GE-BICH-II ACTION PLAN FOR 2004-2006

The IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices,

Having reviewed its completed and on-going activities,

Being aware of the resource constraints (staff and funding) under which IOC and its IODE are operating,

Stressing the importance of Biological and Chemical Data Management…,

Adopts a plan of action for the intersessional period 2004-2006, as given in the Annex to this Recommendation.

Annex to Recommendation IODE/GE-BICH-II.2

OBIS (agenda item 4.1.1 and 4.1.2.)

1. IODE and OBIS to discuss the possible inclusion of modules on biological data management, as relevant to OBIS, be included in OdiMex/OceanTeacher.
   ACTION BY: IODE Secretariat/ ODIMeX Steering Gorup/ OBIS
   DEADLINE: as soon as possible

2. identify or prepare a paper that describes the relevance of an integrated and end-to-end approach to physical, chemical and biological data management to be used to create awareness amongst decision makers. The paper will explain how the Group and its related community is contributing to this approach at the national, regional and global scale.
   ACTION BY: drafting team composed of Syd Levitus, Edward Vanden Berghe and the IODE Secretariat.
   DEADLINE: IODE-18 (document to be ready by January 2005)

3. existing OBIS nodes coordinate with IODE data centres to avoid duplication and to assure the long-time preservation of data. Such coordination will be required at the national level (OBIS provider – IODE NODC), regional (OBIS regional node – RNODC or WDC) and international level.
   ACTION BY:Joint Letter to be sent by IODE Chair and OBIS
   DEADLINE: June 2004

4. if the establishment of an OBIS provider is planned in a country that has an IODE NODC then this should be done in close consultation with the NODC.
   ACTION BY:Letter by OBIS to its nodes and centres
   DEADLINE: June 2004

GBIF (4.2.1 and 4.2.2)

5. GBIF and IODE cooperate closely in order to avoid duplication and to assure the long-time preservation of data.
   ACTION BY : IODE Chair to discuss modalities with GBIF

DEADLINE: as soon as possible

UNESCO/IOC Register of Marine Organisms (URMO) (4.4.3)

6. URMO should continue its web presence but should better reflect its full coverage. **The Group recommended** that the URMO web site should in future be hosted by the IODE project Office in Oostende, Belgium.
   PROJECT
   OBJECTIVES:
   a. Objective: Make URMO available as database through web-based interface
   b. Objective: Link URMO and ITIS, add TSN field to URMO
   ACTION BY : Jacob Van der Land, VLIZ and IODE Project Office
   DEADLINE: before December 2004
   FUNDS REQUIREMENTS:US$ 4,500

ITIS S(4.4.4)

7. **The Group called** on the United States to continue and enhance its support to ITIS as a unique and essential authority underpinning biological databases.
   ACTION BY:IODE Secretariat, in consultation with ITIS
   DEADLINE :as soon as possible

Marine parameter dictionary (4.5.1, 4.5.2)

8. there is a need to identify and document alternative approaches for the construction of integrated databases.
   ACTION BY:Group members to discuss by email
   DEADLINE: next Session GE-BICH

9. **The Group recommended** for BODC to consult with FAO to learn from its experience with regard to the development of ontologies.
   ACTION BY:BODC, FAO
   DEADLINE: as soon as possible and report for next Session GE-BICH

ICES MDM (4.6.1)

10. **The GE-BICH called on ICES** to allow a member to participate in MDM meetings and the reverse.
    ACTION BY: Chair IODE to contact ICES
    DEADLINE:As soon as possible

11. **The Group** stressed the importance of easy access to guidelines related to biological data management in general, and their quality control in particular, and **tasked** the IODE Secretariat to copy this information from OceanTeacher to the IODE web site in a prominent location.
    ACTION BY:IODE Secretariat
    DEADLINE:August 2004

12. The Group was informed that ICES has developed relevant guidelines on data quality assurance for biological data. **The Group tasked** the IODE Secretariat to provide a link to these in OceanTeacher and the IODE web site.
    ACTION BY:IODE Secretariat
    DEADLINE:August 2004

13. **The Group tasked** its members to identify and provide to the IODE Secretariat, other relevant guidelines and manuals.
ACTION BY: Group members
DEADLINE: June 2004

Marine XML (4.6.3, 4.6.4, 4.6.7)

14. **The Group stressed that an XML registry is required and recommended** that the IODE Project Office takes on this responsibility. The IODE Project should deal with the management of the repository and the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices should assist with content management.
ACTION BY:IODE Project Office
DEADLINE:July 2004

15. **The Group recommended** that FAO review existing Darwin Core and ABCD XML vocabularies in order to revise the FIMES proposed standard for fisheries where applicable.
ACTION BY:GE-BICH Chair to contact FAO (marc Taconet)
DEADLINE: May 2004
16. **The Group urged** to connect fisheries data and oceanographic data by applying ecology concepts. Existing systems must be consolidated and integrated.
ACTION BY:
DEADLINE:

17. **The Group saw** the great potential of the emerging technologies, **and identified the need** for pilot projects to test the different systems of distributed querying based on XML (DiGIR and BioCASe), with XML schemas other than Darwin Core and ABCD. Two types of data were identified as suitable for a pilot project: (1) metadata and (2) distributed taxonomic name list.
PROJECT
OBJECTIVES
    a) Objective: gain experience with two systems: (i) DiGIR and (ii) BioCASe
    b) Objective: Pilot for XML
ACTION: metadata (EDMED, ISO 19115)
ACTION: set up system for distributed species list (sourcing from different sources)
ACTION BY: Action by: BODC, VLIZ, IFREMER/SISMER (to be contacted), Anton Guentsch (ABCD), ITIS
FUNDS REQUIREMENTS: US$ 4500
DEADLINE: by IODE-XVIII

"Ocean Biodiversity Informatics" Conference (5.1.1)

18. **The Group tasked** the IODE Secretariat to formally approach ICES and WDC Oceanography, Silver Spring to invite them to co-organize the event.
ACTION BY: IODE Secretariat
DEADLINE: May 2004

19. Other partners of the 1996 event (IOC-EU-BSH-NOAA-(WDC-A) International Workshop on Oceanographic Biological and Chemical Data Management. Hamburg, Germany. 20-23 May 1996) should also be approached.
ACTION BY: IODE Secretariat
DEADLINE: May 2004

20. **The Group recommended** that participants should be selected as was done for the 1996 event.
ACTION BY: Organizing Committee
DEADLINE: as appropriate

21. **The Group decided** to communicate names of relevant experts (and speakers) to the conference secretariat (obi@vliz.be) not later than 15 April 2004. **The Group stressed the need** to involve the user community in the Conference.
ACTION BY:Group members
DEADLINE:15 April 2004

22. A second announcement will be sent out at the end of April 2004. **The Group requested** its members and observers to disseminate the second announcement through their relevant channels.
ACTION BY:Group members
DEADLINE: May 2004

23. **The Group recommended** that a full set of Proceedings could be published by IOC.
ACTION BY:IODE Secretariat
DEADLINE:January – April 2005 (preferably by IODE-XVIII)

24. **The Group requested** Mark Costello (who negotiated the publishing of selected papers in Marine Ecology Progress Series) to contact the Publisher to find out if they could agree for IOC to publish the full set of Proceedings.
ACTION BY: Chair GE-BICH to contact Marc Costello
DEADLINE:April 2004

25. A Poster Session is also planned. **The Group requested** IODE data centres that have relevant activities in biological data management, to prepare posters for the event. It was noted that these posters could also be used at IODE-XVIII and JCOMM-II.
ACTION BY: IODE Secretariat to contact IODE national coordinators
DEADLINE: April 2004

26. **The Group requested** the Secretariat to (i) contact IODE data centres to invite posters; and (ii) to provide a vector graphic version of the IODE logo for insertion on the poster. Responses by the IODE data centres should be sent to the IODE Secretariat and Conference Secretariat. The Conference Secretariat will coordinate with the local organizers for related practical issues (eg dimensions of the panels, available panels). The respondents will receive an electronic copy of example posters (by ftp).
ACTION BY:IODE Secretariat/ local organizers
DEADLINE:April – June 2004

Questionnaire (5.1.2)

27. **The Group decided** to create a small working group to further develop and implement the questionnaire.
ACTION BY: Syd Levitus, Gwen Moncoiffé (Chair working group), Sunhild Wilhelms, Mary Kennedy and the IODE Secretariat
DEADLINE:

- *working group to finalize questionnaire by 1 July 2004*
- *IODE Secretariat to mail questionnaire by 5 July with response deadline of 1 October*
- *Report to be prepared by working group by January 2005*
- *Chair working group to report to IODE-XVIII (April 2005)*

28. … **the Group stressed the need** to coordinate with FAO in this regard. **The Group decided** that any fisheries related information obtained through the GE-BICH survey will be shared with FAO
ACTION BY:Report to be provided to FAO by IODE Secretaria
DEADLINE: April 2005

29. **The Group decided** to send the questionnaire initially to the IODE NODCs. Additional addressees will be identified on the basis of gaps.
ACTION BY:IODE Secretariat
DEADLINE: July 2004

Dates and Place of the next Session (7)

30. **The Group decided** that work during 2004 and 2005 will be done by email and **requested** to the IODE Committee that the funds set aside for 2005 can be used for the implementation of the work plan.
ACTION BY:IODE Secretariat
DEADLINE: -

31. **The Group proposed** to have the Third Session of the Group in 2006 in Oostende, Belgium around May
ACTION BY:IODE Secretariat/ IODE Project Office
DEADLINE:May 2006

Other business (8)

32. **The Group decided** to discuss the management of chemical/biological observations with COOP to identify the most urgent matters that need attention. On the basis of those discussions further action will be discussed by email. The data obtained from the questionnaire (see Agenda item 5.1.2) could also provide guidance in this regard.
ACTION BY: Chair GE-BICH to discuss with COOP Chair
DEADLINE: April 2004

33. **The Group recommended** that the GE-BICH Chair should consult with the COOP (Co-) Chairs to discuss the contribution of the GE-BICH and the IODE Data Centres to the COOP Data Management and Communications Subsystem. In this it was noted that information, obtained through the Questionnaire (see Agenda Item …) will contribute to these discussions.
ACTION BY: Chair GE-BICH to discuss with COOP Chair
DEADLINE: April 2004

ANNEX IV

LIST OF ACRONYMS

ABCD	Access to Biological Collection Data
AGMES	Agricultural Metadata Element Set
AGROVOC	: is a multilingual thesaurus on agricultural information systems
AMAP	Arctic Monitoring & Assessment Programme
ARGO	: is a broad-scale global array of temperature/salinity profiling floats
ASFA	Aquatic Sciences & Fisheries Abstracts
ASFIS	Aquatic Sciences & Fisheries Information System
BIO	Bedford Institute of Oceanography (Canada)
BioCASE	Biological Collection Access Service for Europe
BODC	British Oceanographic Data Centre (UK)
CENDOC	Chilean National Center of Oceanographic Data (Chile)
CLIVAR	Climate Variability & Predictability
CODATA	Committee on Data for Science & Technology (ICSU)
CoML	Census of Marine Life
COOP	Coastal Ocean Observations Panel (GOOS)
CSIRO	Commonwealth Scientific & Industrial Research Organization
CWP	Co-ordinating Working Party on Atlantic Fishery Studies
DADI	Data Access & Data Interoperability
DFO	Dept. of Fisheries & Oceans (Canada)
DIAS	Database on Introduction of Aquatic Species
DiGIR	Distributed Generic Information Retrieval
DIGIT	Digitisation of Natural History Collections (of GBIF)
DMAC	Data Management and Communications Subsystem
DOD	Deutsches Ozeanographisches Datenzentrum (Germany)
DOME	Database on Oceanography & Marine Ecosystems
ECAT	Mediterranean Electronic Catalogue of Known Organisms
EDMED	European Directory of Marine Environmental Data
EnParDis	Enabling Parameter Discovery
ERMS	European Register of Marine Species
ETDMP	Expert Team on Data Management Practices (JCOMM/IODE)
ETI	Expert Centre on Taxonomic Identification (Netherlands)
EurOBIS	Europa Ocean Biogeographic Information System
FAO	Food & Agriculture Organization of the United Nations
FGDC	Federal Geographic Data Committee (USA)
FIGIS	Fisheries Global Information System (FAO)

FiMES	Fisheries Metadata Element Set
FIMR	Finnish Institute of Marine Research (Finland)
FIRMS	Fisheries Resources Monitoring System (FAO)
FIStatXML	Fisheries Statistical XML
FONDECYT	National Fund for Science & Technology Development
GBIF	Global Biodiversity Information Facility
GCMD	Global Change Master Directory (USA)
GETADE	Group of Experts on Technical Aspects of Data Exchange
GF3	General Format No. 3
GNU	GNU stands for GNU's not UNIX and is thus a recursive acronym. The GNU project is an effort by the Free Software Foundation (FSF) to make all of the traditional UNIX utilities free.
GODAR	Global Oceanographic Data Archaeology & Rescue Project
GOOS	Global Ocean Observing System
GTSPP	Global Temperature-Salinity Profile Program
HELCOM	Baltic Marine Environment Protection Commission
IABO	International Association of Biological Oceanography
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IHO	International Hydrographic Organization
IMARPE	Instituto del Mar del Perú (Peru)
IMR	Institute of Marine Research (Norway)
IOC	Intergovernmental Oceanographic Commission (of Unesco)
IODE	International Oceanographic Data & Information Exchange
ITIS	Integrated Taxonomic Information System (USA)
JCOMM	Joint Commission on Marine Meteorology
MARBEF	Marine Biodiversity and Ecosystem Functioning
MDM	Marine Data Management
MedECAT	Mediterranean Electronic Catalogue of Known Organisms
MEDI	Marine Environmental Data Information Referral System
MedOBIS	Mediterranean Oceanic Biogeographical System
MHC	Marine Habitat Committee
MHM	Marine Habitat Mapping
MSDE	Microsoft SQL Server Desktop Engine
NERC	Natural Environment Research Council (UK)
NOAA	National Oceanic & Atmospheric Administration (USA)
NODB	National Oceanographic Data Bank
NODC	National Oceanographic Data Centre

NPL	National Physical Laboratory
NSBS	North Sea Benthos Survey
OASIS	Organization for the Advancement of Structured Information Standards
OBIS	Ocean Biogeographic Information System
OBISSA	Ocean Biogeographic Information System for South America
OCB	Outreach And Capacity Building
ODIMeX	Integrated Expert and Training System for Oceanographic Data and Information Management (IOC/IODE)
ODINAFRICA	Ocean Data & Information Network for Africa
OIT	Ocean Information Technology
OMEX	Ocean Margin EXchange
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWL	Ontology Web Language
PDF	Portable Document Format
PIT	Program of Innovation Technology (Chile)
POGO	Partnership for the Observation of Global Oceans
RDF	Resource Description Framework (RDF) / W3C Semantic Web Activity
RIHMI-WDC	All Russian Research Institute of Hydrometeorological Information-World Data Centre (Russia)
RIKZ DONAR	National Institute for Coastal and Marine Management (RIKZ) – DONAR: the database for various data for Rijkswaterstaat
RIVO	Netherlands Institute For Fisheries Research
RNODC	Responsible National Oceanographic Data Centre
ROSCOP	Report of Observations/Samples Collected by Oceanographic Programmes
SADCO	Southern African Data Centre for Oceanography (South Africa)
SCIDAT	Dataset Inventory (Canada)
SEA-SEARCH	Pan European network for oceanographic and marine data & Information management
SHOA	Servicio Hidrográfico y Oceanográfico de la Armada (Chile)
SIDP	FAO Species Identification and Data Programme
SISMER	Marine Scientific Information Systems (France)
SMEBD	Society for the Management of European Biodiversity Data
SMHI	Swedish Meteorological & Hydrological Institute (Sweden)
SPC	South Pacific Commission

SVG	Scaleable Vector Graphics
TDWG	Taxonomic Databases Working Group
UDP	Uniform Dictionary of Parameters
UNESCO	United Nations Educational, Scientific & Cultural Organization
URMO	UNESCO/IOC Register of Marine Organisms
USNODC	United States National Oceanographic Data Centre
VLIZ	Vlaams Instituut voor de Zee
VMDC	Vlaams Marien Data- en Informatiecentrum (Belgium)
W3C	World Wide Web Consortium
WADI	WAter Data Infrastructure (Netherlands)
WDC	World Data Centre
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WODB	World Ocean Database
XML	eXtensible Mark-up Language
XSLT	XSL Transformations, a language for transforming XML documents into other XML documents

[end]