International Oceanographic Data & Information Exchange

IODE

An External Evaluation

spanning the period

2002 – 2006

Submitted to

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List of Acronyms and Abbreviations

ASFA	Aquatic Sciences & Fisheries Abstracts
BODC	British Oceanographic Data Centre
CLIVAR	Climate Variability and Predictability Programme
CIIFEN	International Research Center on El Niño Phenomena
CPPS	Permanent Commission of the South Pacific
DNA	Designated National Agency
E2EDM	End-to-End Data Management
ECET	European Countries in Economic Transition
ETDMP	Expert Team on Data Management Practices (JCOMM/IODE)
EU	European Union
FUST	Flanders-UNESCO Science Trust Fund
GCOS	Global Climate Observing System
GE-BICH	IODE Group of Experts on Biological & Chemical Data Management & Exchange Practices
GE-MIM	IODE Group of Experts on Marine Information Management
GE-TADE	IODE Group of Experts on the Technical Aspects of Data Exchange
GIS	Geographic Information Systems
GLODIR	Global Directory of Marine (& Freshwater) Professionals
GML	Geography Markup Language
GODAR	Global Oceanographic Data Archaeology & Rescue
GOOS	Global Ocean Observing System
GOSIC	Global Observing System Information Center
GOSUD	Global Ocean Surface Underway Data Pilot Project
GTOS	Global Terrestrial Observing System
GTSPP	Global Temperature & Salinity Profile Programme
HAB	Harmful Algal Blooms (IOC)
HTTP	Hyper Text Transfer Protocol
IAMSLIC	International Association of Aquatic & Marine Science Libraries & Information Centers
ICES	International Council for Exploration of the Sea
ICSU	International Council for Science
IGAD	Intergovernmental Authority on Development
IOC	Intergovernmental Oceanographic Commission of UNESCO
IODE	International Oceanographic Data & Information Exchange
IPOI	IOC Project Office for IODE in Oostend, Belgium
IOS	Internal Oversight Service Unit
ISO	International Organization for Standardization
JCOMM	Joint WMO-IOC Technical Commission for Oceanography & Marine Meteorology
JODC	Japan Oceanographic Data Centre
KMFRI	Kenyan Marine and Fisheries Research Institute
MEDI	Marine Environmental Data Inventory
NEPAD	New Partnership for Africa's Development
NMIC	National Marine Information Centre
NODC	National Oceanographic Data Centre Management
ODIN	Ocean Data and Information Network
ODINAFRICA	Ocean Data & Information Network for Africa
ODINCARSA	Ocean Data & Information Network for the Caribbean & South American regions

ODINCINDIO	Ocean Data & Information Network for the Central Indian Ocean Region
OIT	Ocean Information Technology
OP	OceanPortal
SGXML	Study Group on the Development of Marine Data Exchange Systems Using XML
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Science & Cultural Organization
VLIZ	Vlaams Instituut voor de Zee (Flanders Marine Institute, Belgium)
WDC	World Data Center
WDC-MARE	World Data Center for Marine Environmental Sciences
WESTPAC	IOC Sub-Commission for the Western Pacific Region
WMO	World Meteorological Organization
XBT	Expendable BathyTermograph
XML	eXtensible Markup Language

1. Executive Summary

In 1961, the Intergovernmental Oceanographic Commission of UNESCO (IOC) established the **International Oceanographic Data and Information Exchange Programme** (IODE) with the following purpose: "*to enhance marine research, exploitation and development by facilitating the exchange of oceanographic data and information between participating Member States and by meeting the needs of users for data and information products*".

This external evaluation was programmed in UNESCO's Programme and Budget 2006 – 2007 (33 C/5) with the purpose of assessing the extent to which IODE is achieving its proposed objectives. It was conducted in the period March to September 2007, and took into consideration results from an internal review that was undertaken by IODE in the year 2004.

Achievements

The evaluation highlighted the following achievements, among others:

Network of Oceanographic Centres: IODE has continued to build its programme of activities on the basis of its pre-existing network of National Oceanographic Centres. It continues to strengthen and enhance this network in an efficient manner, promoting the use of ICTs to carry out data and information exchanges, archiving, and management, with the support of other international agencies.

Enhancement of networks of NODCs: IODE also continues to facilitate the enhancement of the network of National Oceanographic Data Centres (NODCs) both in terms of additional Member States that have set up such facilities, as well as in terms of capacities of such Centres to be able to exchange data and information using the Internet as the main communication mechanism.

Relationship with WDCs: In addition, IODE has continued to promote the relationship with the World Data Centres (WDCs) to recover, process, catalogue, archive, and disseminate data at a more global scale. At the time of the evaluation, IODE was working very closely with four such Centres.

Capacity Building: During the period 2002-2006 efforts by IODE targeting capacity building included both the development of tools such as OCEAN TEACHER which has now been adapted to the Internet environment; the continuation of training courses mostly targeting participants from developing countries; and the establishment of a training centre in Oostend, in Belgium. Forty-six training courses were organized between 2002 and 2006, 19 of which were at the new facility in Oostend.

From data to information: An important advancement in recent years relates to efforts by IODE and its network in Member States to advance beyond data exchanges to the generation and exchange of information. With the support of its Group of Experts on Marine Information Management (GEM-MIM), IODE has set up a network of National Marine Information Coordinators and has established a strategic alliance with the International Association of Aquatic & Marine Science Libraries & Information Centers (IAMSLIC). As a result, electronic repositories of data have been set up in African countries to gather and exchange a variety of information; Atlases are being developed and put to use, and exchanges of scientific and technical publications have been facilitated through both IAMSLIC and via the Internet in various continents.

Websites and tools: IODE has also been promoting internet-based websites and tools for data and information exchange. The Ocean Portal, the African Portal and Portal Oceánico contain a variety of resources and links to additional information. Other efforts include OCEAN EXPERT which hosts the database of experts spanning the globe; and the IODE web page itself, which contains links to all documents of IODE, provides information on the programme, and serves as a vehicle to reach all other

IODE products.

Policy environment: IODE continues to promote the establishment and use of relevant policies related to the free exchange of data among Member States.

Challenges

The evaluation highlighted the following challenges, among others, being faced by IODE:

Budget constraints: Budget constraints do not allow IODE to reach all Member States that could benefit from ocean and marine data and information exchanges. Budget cuts has led to the reduction in staff allocated to the Secretariat. A related constraint is the limitation of OCEAN TEACHER, being available only in English, in the face of lack of necessary resources for producing the tool in other languages.

Regional Imbalances: While IODE, as well as other IOC bodies have been able to cope with reduction in the regular programme budget temporarily through extra-budgetary funding; in the case of IODE this has led to focusing its efforts on a single continent: Africa. While the focus on Africa allows IODE to better address the priorities for Africa set up in UNESCO's Medium-Term Strategy, it creates an imbalance, in that in reality IODE has a global mandate, and not just a mandate for Africa. A substantial portion of Latin America (from Panama to Mexico), and most of the Caribbean remains untargeted by IODE. Similar gaps exist in Asia, in the Pacific Islands, as well as in the Indian Ocean.

Uneven data quality and loss of data: The programme is dealing with issues of loss of data or lack of access to older data in the case of some developing countries. Issues of unevenness of the quality of the data, and duplication of datasets in some WDCs are also being encountered.

Researchers avoid releasing data: IODE continues to provide the mechanisms for data exchange in a variety of formats, but is confronted with situations in which some researchers and agencies continue to avoid releasing their data. This was found to be due to the fact that the scientific community is evaluated not in terms of the amount of data produced or released, but in terms of scientific publications. In addition, some agencies consider their data as sensitive and thus do not wish to share it on the grounds of national or strategic security.

Conclusions

The overall conclusions from the evaluation is that IODE has been executing a variety of activities efficiently and effectively in providing global mechanisms to promote open and full access to ocean data and marine information. The work of IODE was found to be relevant to both IOC and UNESCO in the context of their Medium Term Strategies for the period under review. In addition, results indicate that IODE has had impacts in Member States as well as in regional and international organizations. This is seen in the fact that through the efforts of IODE, such agencies are now undertaking activities in ocean and marine data and information exchange, which were not possible before.

Recommendations

Recommendation 1: IODE should establish an inter-session working group to assess and recommend how IODE should approach the issue of lack of awareness by the ocean sciences community with respect to the capacities of IODE already in place in terms of data management

(long-term archival and dissemination).

Recommendation 2: Considering the use that Atlases, such as The African Atlas of the Ocean, can have with respect to the planning and utilization of resources in coastal areas in the context of integrated environment management; the IODE Committee should assess how best to transfer the lessons learned from the approach coordinated by ODIN-AFRICA to ODIN-CARSA, ODIN-CINDIO, ODIN-WEST-PAC, ODIN-BLACK SEA and ODIN-CET, which are being established at this time.

Recommendation 3: IODE to promote the replication of efforts related to ocean and marine data and information in other regions of the world where oceanographic networks are being established, such as in the cases of the Indian Ocean, Countries in Economic Transition (CET), and the Black Sea.

Recommendation 4: Only 24 States have made explicit comments on the policy thus far. The IODE **Secretariat should therefore analyze the extent to which the IOC Policy on Data Exchange is having the desired impact.**

Recommendation 5: The IODE Committee should review the issue of translation of Ocean Teacher into other languages, notably Spanish for Latin America, and Russian for several Member States in the former Soviet Union.

Recommendation 6: The IPOI in Oostend should explore options, which could be foreseen to manage this concern regarding the current size of Ocean Teacher linked to the slow speed of Internet in some developing countries.

Recommendation 7: The IODE Committee should assess how best to proceed with respect to the issue of reduced capacity of the Secretariat considering the fact that IOC is not able to enhance the staff of the Secretariat of IODE.

Recommendation 8: The IODE Committee should assess how best to proceed in order to reduce the existing gaps in its coverage between the various regions of the world. One possibility could be to explore existing contributions from the Government of Flanders, which could be targeted to such regions.

Recommendation 9: IODE should consider establishing an inter-sessional working group to look into this issue of how to evaluate the amount of data, which is being exchanged, so that indicators can be developed for the different types of data being exchanged (physical, chemical, biological) in order for IODE to be able to track the progress being made over the years. The IPOI could offer an excellent environment to support this working group.

Recommendation 10: IODE should facilitate networking activities among WDCs so that issues related to quality control of data, management of duplicate data sets, flagging of particular data sets, and partition of data to be archived within the WDCs are addressed and the required actions put in place. The Project Office in Oostend could offer the most appropriate environment to facilitate such networking activities.

Recommendation 11: IODE should set up an inter-sessional working group to assess the magnitude of data losses, and identify corrective actions, and strategies to manage the problem. Based on the outcomes, the working group could then identify corrective actions and promote their implementation via efforts targeted through the IPOI in Oostend. The justification for this recommendation stems directly from one of the five main objectives of IODE.

Recommendation 12: IODE should conduct a global survey to address the issue of the metadata catalogues, and to identify needs to be approached in the guidelines to be developed with respect to such catalogues. It should also stress the issue of placing such catalogues on the web pages as indicators that the process can be reviewed externally and by IODE.

Introduction

The Internal Oversight Service of UNESCO contemplated in its agenda for the year 2007 a series of evaluations of several programmes or subsidiary bodies which are contemplated under the umbrella of UNESCO. One of the subsidiary bodies which has been targeted is the **International Oceanographic Data and Information Exchange Programme** (IODE) which belongs to the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO). This external evaluation of IODE has been carried out from March until August, 2007 and its outcomes are presented in this report. The document is divided into two broad areas: a systematic revision of efficiency, effectiveness, relevance and impacts within the contexts of the five objectives which have been established for IODE by UNESCO-IOC and Member States; and annexes which contain complementary information regarding the evaluation.

It is important to mention at this point that submitting IODE to such an RBM evaluation is to be understood as the process by which IODE can adjust itself into this modern management framework. The RBM framework is relatively new within UNESCO and within several of the United Nation Agencies. A proposed structure for IODE within this framework is presented as an example of what the IODE Officers should assemble with the support of Member States to guide the process, outline short and medium-term goals, and identify through internal and external evaluations the degree to which outcomes are fulfilled and objectives achieved.

This document is structured on the basis of the questions which were addressed in the Terms of Reference for this Evaluation (Annex 2). While the Terms of Reference stated the need to assess the relevance of IODE with respect to UNESCO and UNESCO-IOC, the evaluation also incorporated a segment related to the relevance of the outcomes with respect to IODE itself (its own objectives).

The main findings, conclusions, and recommendations stated in this report are the full responsibility of the author, and in no way reflect the views from UNESCO-IOC or those of UNESCO concerning the IODE programme.

2. IODE: Programme Description

The International Oceanographic Data and Information Exchange (IODE) was established in 1961 by IOC-UNESCO "*to enhance marine research, exploitation and development by facilitating the exchange of oceanographic data and information between participating Member States and by meeting the needs of users for data and information products*".

Initially established as a Working Group on Oceanographic Data Exchange during the first IOC Assembly in October 1961 through Resolution I-9; it was transformed into a Working Committee in November, 1973 during the 8th Session of IOC; and it is now officially considered as a subsidiary body of IOC and more specifically a Technical Committee within the modalities of its operations governed by the IOC Rules of Procedure[1].

For almost five decades, IODE has been building a network of **National Oceanographic Data Centers**, (**NODCs**) or Designated National Agencies (DNA) and more recently National Marine Information Management Centres (NMICs). It has been interacting with the World Data Centers Oceanography (WDCs Oceanography) established in the United States, Russia, and China and the World Data Center for Marine Environmental Sciences (WDC-MARE) in Germany for long-term archival and exchange of oceanographic data. Furthermore, it has carried out capacity building and institutional strengthening efforts in many countries of the world, and has been providing support to a wide range of global and regional projects and programs set up by different international organizations or as multi-country efforts on issues of oceanographic data and marine information exchange.

In the current framework of IOC, IODE is situated as a programme within the **Ocean Observations and Services Division** as a subsidiary body. The framework is presented in figure 1:

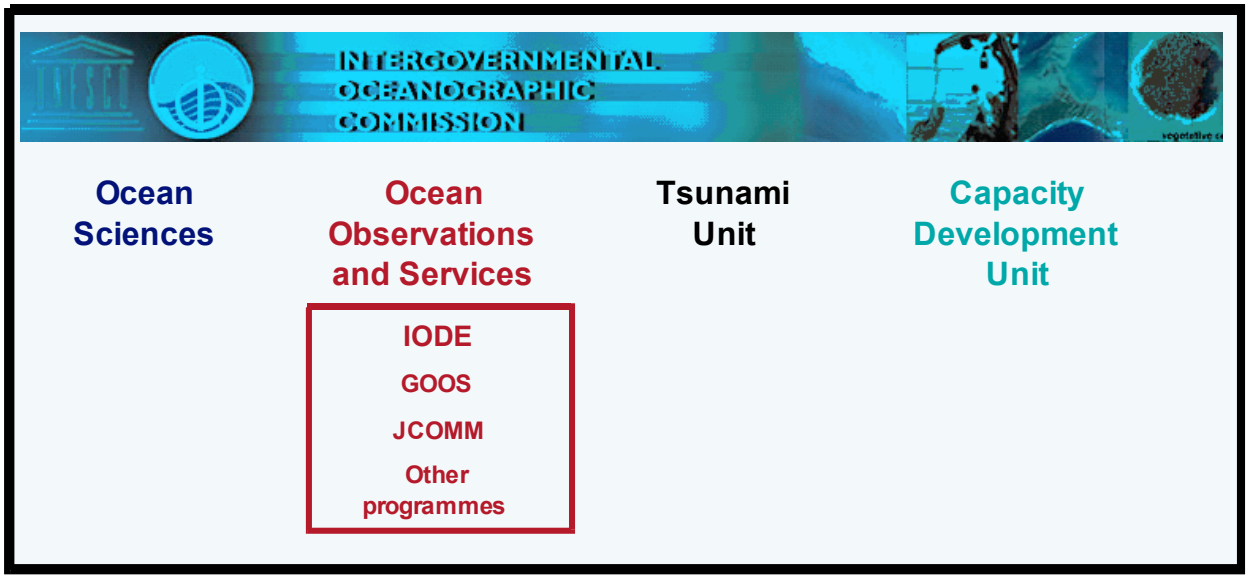


Figure 1: The three Divisions within UNESCO-IOC as of June 2007 (source: UNESCO-IOC).

The justification for IODE in the context of IOC can be traced to the Revised Statutes of the Commission[2] which came into force through adoption of 30 C/Resolution 22 on 16 November 1999. Article 2 and the first segment of Article 3 are reproduced below:

[1] See Document IOC/INF-1166, Chapter VII, Rules 24 and 25.
[2] See document IOC/INF-1148.

Article 2 - Purpose

1. ***The purpose of the Commission is to promote international cooperation and to coordinate programmes in research, services and capacity-building, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision-making processes of its Member States.***

2. ***The Commission will collaborate with international organizations concerned with the work of the Commission, and especially with those organizations of the United Nations system which are willing and prepared to contribute to the purpose and functions of the Commission and/or to seek advice and cooperation in the field of ocean and coastal area scientific research, related services and capacity-building.***

Article 3 - Functions

1. ***The functions of the Commission shall be to:***

   (a) recommend, promote, plan and coordinate international ocean and coastal area programmes in research and observations and the dissemination and use of their results;

   (b) recommend, promote and coordinate the development of relevant standards, reference materials, guidelines and nomenclature;

   (c) respond, as a competent international organization, to the requirements deriving from the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Conference on Environment and Development (UNCED), and other international instruments relevant to marine scientific research, related services and capacity-building;

   (d) make recommendations and coordinate programmes in education, training and assistance in marine science, ocean and coastal observations and the transfer of related technology;

   (e) make recommendations and provide technical guidance to relevant intersectoral activities of UNESCO and undertake mutually agreed duties within the mandate of the Commission;

   (f) undertake, as appropriate, any other action compatible with its purpose and functions.

As can be seen, the main tasks assigned to IODE are considered both in the purpose and in the functions. In the context of the IOC Medium-Term Strategy 2004-2007, section 5.c related to **The Mandate** describes the goals of IOC on issues of data exchange[3]:

5c It (IOC) will build the capacity of developing countries, especially to manage and exchange the marine data and information needed for sustainable development.

In addition, it explicitly describes IODE´s structure, goals, networking and capacity-building efforts in paragraphs 20 to 24 of the section focusing on **Modalities of action** to accomplish the commitments of IOC in relation to this medium-term strategy[4].

Following the recommendations made by the Internal IODE Review Team, the objectives of the IODE

[3] See document IOC Medium Term Strategy 2004-2007, IOC/INF-1192, UNESCO, July, 2003. Page 6.
[4] See document IOC Medium Term Strategy 2004-2007, IOC/INF-1192, UNESCO, July, 2003. Pages 11 & 12.

Programme have been redefined as follow[5]:

(i) *To facilitate and promote the exchange of all marine data and information including metadata, products and information in real-time, near real time and delayed mode;*

(ii) *To ensure the long term archival, management and services of all marine data and information;*

(iii) *To promote the use of international standards, and develop or help in the development of standards and methods for the global exchange of marine data and information, using the most appropriate information management and information technology;*

(iv) *To assist Member States to acquire the necessary capacity to manage marine data and information and become partners in the IODE network; and*

(v) *To support international scientific and operational marine programmes of IOC and WMO and their sponsor organisations with advice and data management services.*

When looking at the five objectives in an integral fashion, it can be concluded that three of these objectives (i, ii, and iv) give specific mandates to IODE related to the execution of particular tasks, while objectives (iii and iv) can be interpreted as necessary for the other three objectives to be fulfilled, as Members States would need capacities and standards to accomplish objectives i, ii, and iv.

A fact which emerges when assessing how IODE has designed its working programme is related to the existing differences between advanced and developing countries on issues of data and information management. During discussions with representatives from developing countries, the need for efforts to focus on capacity building and on the supply of information, rather than on data exchange was manifested. In contrast, developed nations in Europe, North America and Asia have a long tradition and capacity regarding the acquisition of data, and thus would look forward to data exchanges. The capacity building efforts basically are targeting developing countries, but with the overall goal of enhancing the capacities of these countries so that they can benefit from more aspects related to data and information management. In contrast, efforts regarding the development of data exchange tools are geared to facilitate the exchange of data among researchers in developed countries.

To fulfil its objectives, IODE has set up and updated an internal management structure. The current structure as of April 2007[6] is presented in figure 2. The IODE Committee is steered by two Chairs, is composed of National Coordinators for Data Management and National Coordinators for Information Management, IODE Officers, and the Chairs of Groups of Experts. The Committee meets every two years to review the progress achieved during the inter-sessional period, to discuss existing activities and to decide on issues which require its attention. In March, 2007 the Committee met for its nineteenth session in Trieste, Italy.

Other elements of the internal management structure are:

- A small Secretariat which supports the entire programme, monitors activities, and provides the link to other programmes within IOC with which IODE has to interact.
- A network of National Oceanographic Data Centers and National Marine Information Centres.
- Ocean Data and Information Networks (currently the most active is ODINAFRICA. ODINCARSA can be considered as the second most active network and then ODIN-CINDIO, ODINWESTPAC, ODINBLACK SEA and ODINECET).
- Four World Data Centers (United States, Russian Federation, China, and Germany).
- Three Groups of Experts (GE-ETDMP, GE-BICH, GE-MIM)

[5] See document IOC/IODE-XVIII/3, paragraph 281, page 35, and **Recommendation IODE XVIII.1** in the same document as Annex II, Page 5.

[6] Sources: www.iode.org and document IOC/IODE-XIX/3s, page 4.

- An IOC Project Office for IODE in Oostend, Belgium (IPOI)

Between Sessions the programme is managed by the IODE Officers (composed of the two Co-Chairs, the past Chair, the Chairs of the Groups of Experts and the Chair of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) Data Management Coordination Group, and the IODE Secretariat.

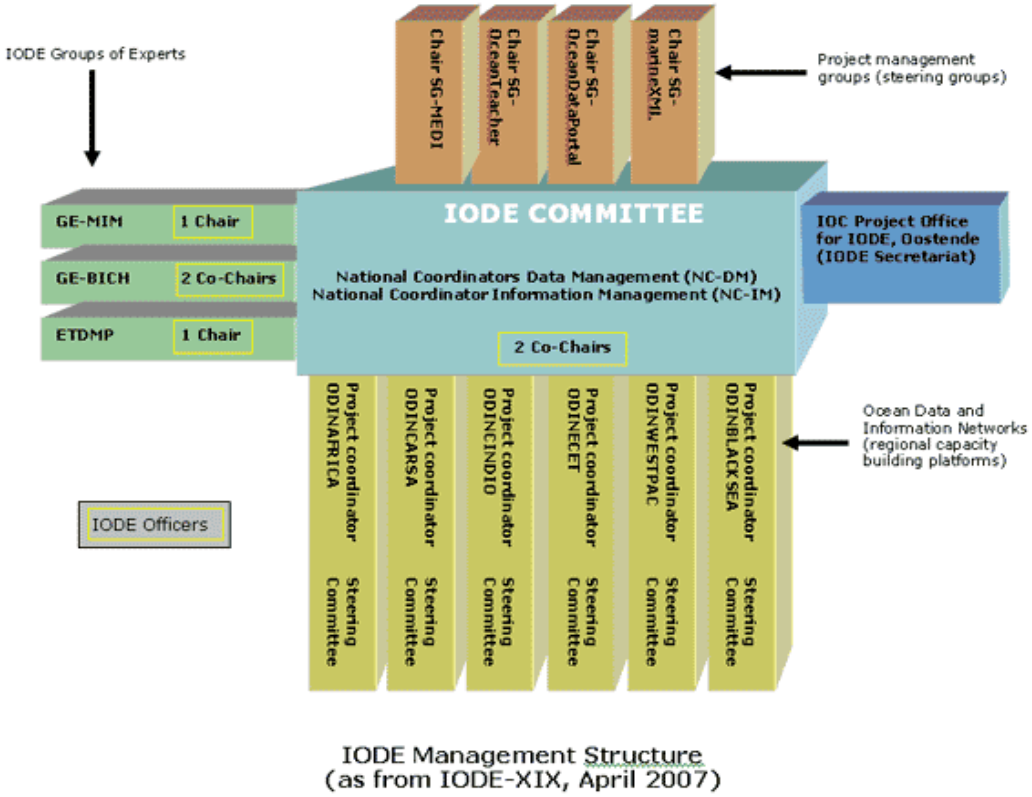


Figure 2: The IODE Management Structure as or April, 2007 (source: IODE webpage).

2.1 The Secretariat

The IODE Secretariat handles various processes such as:

- Providing logistical assistance to the IODE Chairs and Officers regarding the organization of their meetings, as well as the organization of the main sessions every two years.
- Bringing together those actors who coordinate and execute tasks so that planning coordination takes place, hiring consultants to carry out specific tasks and followin up on their work.
- Elaborating, updating, and managing reports stemming from the sessions and meetings, as well as reports to be presented to IOC.
- Coordinating and following-up efforts executed by the ODINs in various regions of the world, as well as in the case of the IPOI in Oostend, Belgium, and the Project Office of the African project financed by the Government of Flanders.
- Providing logistical support to the Groups of Experts set up by IODE to carry out specific tasks.
- Facilitating, promoting, and supporting links between IODE and other UNESCO-IOC programmes, in particular in relation to the Global Ocean Observing System (GOOS) and JCOMM, and with those international projects where IODE has committed itself to participate and provide support, such as in

the case of the Harmful Algae Bloom and the Carbon Projects and most recently the International Polar Year 2007/8.

- Maintaining the institutional memory regarding IODE for prolonged periods of time.

While the Secretariat is acknowledged by many Member States as doing an excellent job, the reduction in terms of its staff during the last years is having a drastic impact curtailing several of its typical activities. In the context of a Results-Based-Management framework, the reduction in staff has already made a direct impact in relation to the day-to-day monitoring of activities and processes, which can no longer take place with the necessary attention to detail required.

2.2 Network of NODCs

Since its establishment, IODE has promoted the incorporation of Member States through the establishment of NODCs. National institutions within Member States which have been designated as NODCs include Meteorological Oceanographic Centres, National Fisheries and Marine Centers, as well as Naval Oceanographic Centres. By April 2007, there are 65 NODCs registered within IODE. Figure 3 presents the temporal evolution regarding membership by country and year of establishment of its NODC. As can be seen, membership within this IODE network in terms of the registration of NODCs began in 1960 with Finland, and the number of Member States which have joined IODE has increased consistently over the decades since its establishment. The newest Member States which set up NODcs are Slovenia and Kazakhstan in 2004 and 2006 respectively. The most successful periods in terms of establishment of NODCs are the years 2000/2001, in which 11 countries joined IODE; 1996/1997, where 7 countries joined; and the period 1970/1972, in which 8 countries became members.

However, it is important to recognize that several countries have began their incorporation to IODE with a more limited effort in terms of nominating National Coordinators for Data Management rather than through the establishment of an NODC. In addition, recognizing the need expressed by developing countries in terms of the use of information by institutions of many kinds, IODE started promoting efforts regarding information management. With the support of International Association of Marine Science Libraries and Information Centers (IAMSLIC), IODE began promoting the establishment of National Coordinators for Marine Information Management. Efforts in this direction promote the enhanced interaction among libraries in various countries to facilitate the task of researchers and end-users regarding discovery and exchange of information, particularly articles in journals and publications of interest. As of March 2007, IODE has 84 registered National Coordinators for Data Management (in contrast to the 65 NODCs) and 33 registered National Coordinators for Information Management.

2.3 Groups of Experts

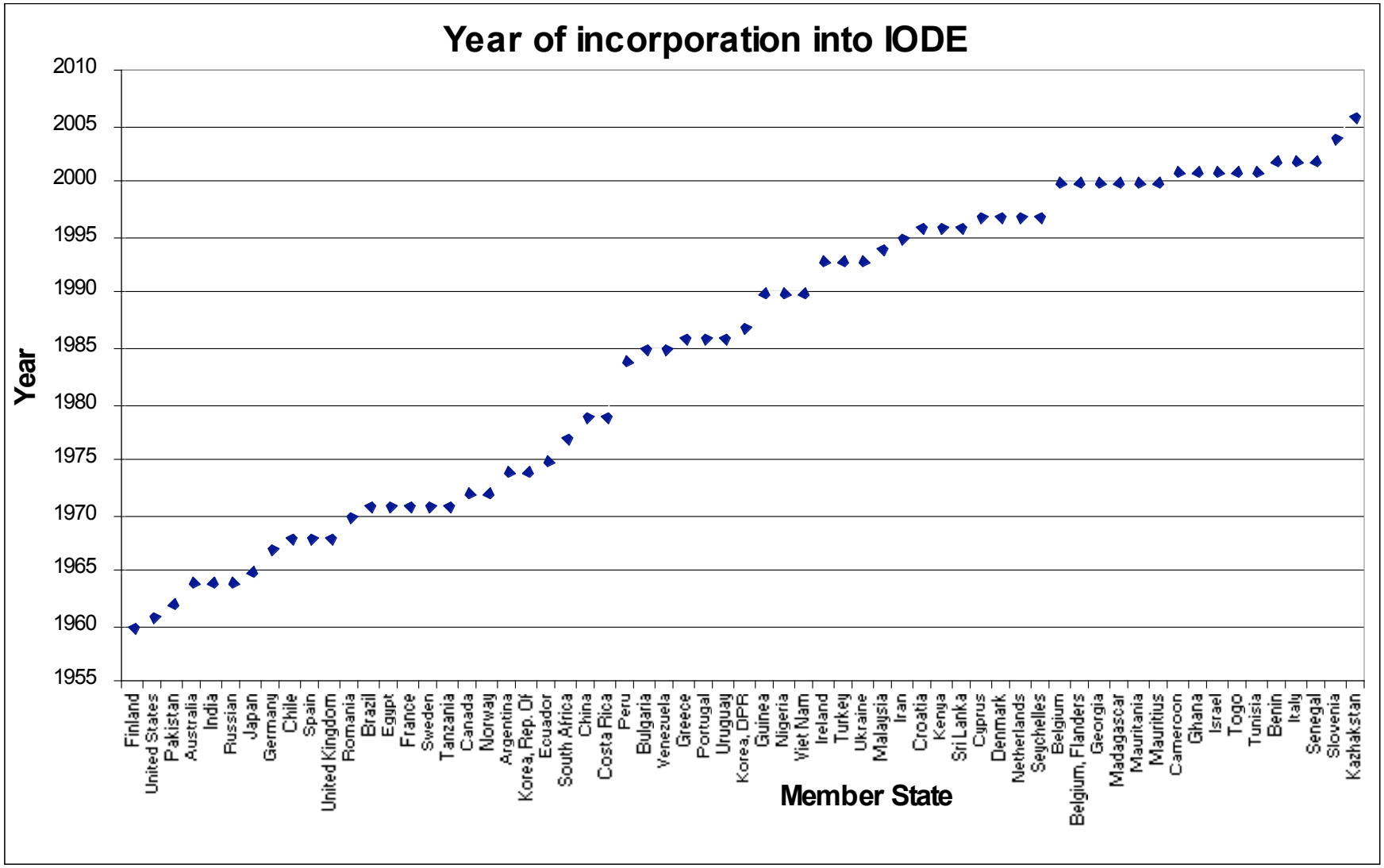
In addition, IODE has set up three Groups of Experts:

JCOMM/IODE ETDMP this Group of Experts is in charge of coordinating and guiding the development of an End-to-End data management system (E2EDM) for JCOMM, recommend best practices for data management; review and assess their effectiveness, develop documentation and guidance, and liaise with other groups.

GE-MIM this Group of Experts is focusing its attention on enhancing the Marine Information Management component, basically focusing on aspects related to the strengthening of coordination among libraries dealing with ocean and marine information, as well as mainstreaming efforts related to information portals set up by IODE focusing on information dissemination.

GE-BICH this Group of Experts is in charge of enhancing IODE´s databases and information in the biological and chemical areas of ocean and marine research.

Figure 3: NODCs established by Member States and their year of incorporation to IODE (source: IODE webpage: www.iode.org).



As documented in the reports of recent IODE Sessions, the Groups of Experts play an important role in outlining the path that IODE has to follow in each of the topics headed by such Groups, and participate actively in the coordination of pilot projects executed within their topics.

2.4 IOC Project Office for IODE

As of April 2005, an IOC Project Office for IODE has been set up with a contribution from the Government of Flanders in Oostend, Belgium, which hosts the Secretariat of IODE and supports capacity building, information management, and technological development efforts related to the tasks assigned to IODE. This Project Office is focusing its efforts on capacity building, networking, and development of information technologies. Its computer facilities and its broad bandwidth allow for fast internet connections, and the Project Office is using this resource to host many of the web-pages of NODCs from Africa and other parts of the world, as well as all IODE portals, web-pages, and web-based training tools.

2.5 ODINs

A very recent strategy promoted by IODE has been the establishment of Oceanographic Data and Information Networks (ODINs) in various regions of the world. In recent years, efforts carried out through the ODINs have increased the number of Member States participating in IODE, and are providing a more efficient link between IODE and the National Oceanographic Data and Information Networks (NODCs, NMICs). While initial efforts targeted Africa, current efforts are now taking place in Latin America, the Caribbean, the Indian Ocean region, the Black Sea, the Western Pacific, and more recently in European Countries in Economic Transition. These networks are providing a more efficient link between the Secretariat in Paris and the Member States.

The first ODIN was established in Africa in 1999 in response to the identification of the need of such a network during IOCINCWIO-III. Since then ODIN AFRICA has been leading the way for other ODINs which are being implemented in other regions of the World. The role of this ODIN is to:

- Promoting IODE's objectives and activities.
- Networking between IODE and NODCs.
- Facilitate capacity building efforts in the region.

One interesting aspect to notice is the apparent change in perception regarding the ODINs by representatives from Member States. In the year 2004, when the IODE Priority Survey was carried out, respondents felt that ODINs were not really relevant to their work. Table 1 displays the results from the survey[7].

Table 1: Relevance of ODINs according to Member States (Source: IODE Priority Survey, Question 20).

	Irrelevant	Somewhat irrelevant	Very relevant	Essential
ODIN AFRICA	31% (16)	25% (13)	17% (9)	27% (14)
ODIN CARSA	33% (16)	31% (15)	21% (10)	15% (7)
ODINCINDIO (starting)	36% (16)	31% (14)	22% (10)	11% (5)
ODIN for Pacific Islands (planned)	38% (15)	40% (16)	15% (6)	8% (3)
ODIN for Eastern Europe (proposed)	32% (14)	34% (15)	25% (11)	9% (4)

[7] See: IODE Priority Survey, IOC/IODE-XVII/23, Question 20, page 18.

The results of the survey carried out during May and June 2007 as a part of this evaluation on the role of ODINs as an interface with IODE indicate that 29 of 33 (88%) National Data and Information Coordinators view the role of the ODINs as positive, whereas only 2 NODCs (6%) expressed a negative opinion in this sense and 2 did not comment on this issue.

With respect to the evolution of ODIN AFRICA and other ODINs, an analysis of the four most recent IODE Session reports allows for the elaboration of table 2. As it can be seen, ODIN AFRICA has consistently added Member States to its network, nearly completing all countries which have a coast in this continent.

Table 2: Evolution of ODINs between the years 2000 and 2007 (Source: IODE Session Reports XVI - XIX).

MS in ODIN / Year of Session	AFRICA	CARSA	CINDIO	West Pac, Black Sea, ECET
November 2000 – XVI Session	Regional Planning Meeting, May, 2000	Preparatory stage		
Number of NODCs by March 2003 – XVII Session and status of other ODINs.	16	Regional Planning Meeting, Oct. 2001	Preparatory stage	
Number of NODCs by April 2005 – XVIII Session and status of other ODINs.	22	19	Regional Planning Meeting, Oct. 2004	Invitation to MS to establish ODIN West Pac and ECET
Number of NODCs by March 2007 – XIX Session and status of other ODINs.	25	19	Not mentioned in Session report	Preparatory meeting for ODIN West Pac Dec. 2006

In recent years IODE has been focusing on the establishment of ODINs for the Central Indian Ocean, for the Black Sea region, and is in the process of establishing one for Countries in Economic Transition, even though this last ODIN is not linked to a particular Ocean or Sea. Each ODIN is provided with a coordinator who coordinates efforts in terms of capacity building for data and information collection, management, archiving, and dissemination via a specific web-page: the respective portal. These ODINs have taken longer to become established as there is limited funding to promote their activities.

An analysis of the results presented in Table 2 indicates that the most developed ODIN in the context of developing countries is the one operating in Africa, which has benefited from the support provided by the Government of Flanders over a period of several years. As such, it has been able to promote training in basic courses related to data management, construction of web pages, more advanced courses focusing on geographical information systems, management of biological and chemical data, and most recently specialized courses to elaborate a web-based African Atlas. As an ODIN, it has also identified needs within selected countries and secured the allocation of resources to build capacities in such countries, and has been essential to promote the establishment of NODCs in African nations.

A somewhat less developed ODIN is the one which focuses on the Caribbean and South American region, ODIN-CARSA. In contrast to ODIN-AFRICA, ODIN-CARSA is constituted by agencies of the Naval Armed Forces of South American countries, which carry out the typical activities of data acquisition, management, archival, and dissemination. As in the case of Africa, this ODIN has coordinated the execution of training workshops related to data and information management, as well as with respect to the use of GIS for various activities.

An analysis of the degree of advancement of the ODINs leads to the conclusion that such advancement

can be related to the amount of funding which can be mobilized by such an ODIN or its respective Member States. SEA-DATA-NET which could be considered as the European ODIN has the capacity to secure funding from the European Union, which allows it to plan and carry out a variety of activities. A similar statement could be made in the case of the ODIN for the Baltic States, where individual states contribute to regional activities. The next paragraphs provide comments regarding how IODE has approached its five objectives.

2.6 IODE Objectives

2.6.1 Exchange of data and information

IODE was established to fulfil the need of scientist to exchange data and information on oceanographic issues at the time of the cold war between the United States and the former Soviet Union. During the first session of UNESCO-IOC, the mission of this Working Group was defined as follows[8]:

"The mission of this Working Group shall be the facilitating of exchange of oceanographic data, the standardization of forms for reporting and coding data, the encouragement of the preparation of data catalogues, and the assistance of development of national oceanographic data centres."

With respect to data exchange, the mission statement promoted the establishment of standards regarding data codification and reporting so that exchanges and the preparation of data catalogues could be carried out. The statement also called for the establishment of national oceanographic data centres. Such centres should be the back-bone to promote the exchange of oceanographic data.

Over the years, IODE has managed a very successful approach to data management through the establishment of its network of NODCs and via links with the World Data Centres managed by the International Council for Science (ICSU). At it was mentioned before, there are four such centres managing data for IODE. These centres have been accumulating data sent by NODCs and projects executed by a variety of agencies, digitizing data originally in paper, as well as reformatting data found in a variety of formats. Once such data is modified to fit it into a more common format, such data is then assembled as a catalogue and posted in the respective webpage to make it accessible to researchers worldwide or in a CD or DVD for distribution by standard mail.

Under the auspices of IODE, the **End-to-End Data Exchange** project currently in execution is focusing on the development of a web-based tool which may be capable of handling differences in data formats, manage the conversion of units, and provide the end user with the data in a desired format. Such a tool will undoubtedly provide an optimum platform for the extraction of data from its databases which may be located in any NODC or WDC.

While during the previous decades data was exchanged among scientists through the National Oceanographic Data Centers, in the latter decades IODE began to seek ways to promote not only the exchange of data, but also the exchange of information. Making use of information technology, information and data were distributed initially through diskettes, later CDs, and in this decade, several webpages have been set up by IODE to facilitate the access and download of information from any place in the world. Two approaches to information exchange are being developed under the umbrella of IODE at this time:

OceanDocs has been developed as part of an African project as an electronic platform to collect scientific documents (articles, conference papers, working papers, etc.) produced by members of African research

[8] For a historical review of the IODE programme, see document IOC/TT-DMS-I/6; elaborated in 2003 by UNESCO-IOC.

institutes in the field of oceanography and marine science. The Hasselt University Library (Belgium) coordinated the project and is still strongly involved in it.

The **Ocean Portals** are internet-based platforms developed to support the ODINs. As such, these portals are also gathering collections of information produced within their respective region which is then made available via internet.

In recent years, the issue regarding metadata is being addressed by IODE. Metadata describe data collection methods, instruments, quality control procedures applied to the data, analysis, etc. The International Organization of Standardisation (ISO) developed a standard for geospatial metadata labelled ISO19115, which was formally accepted in the year 2003[9]. However, it is recognized that efforts are needed to standardize the incorporation of metadata on a global basis as part of the development of data sets and data bases.

2.6.2 Long-term data archiving

From the beginning IODE was set up with a mandate to ensure the long-term archival of data. To accomplish this task, IODE requested the NODCs to serve as national repositories of oceanographic data generated within their respective country, a task which is maintained to this day in many NODCs. In addition, IODE has been promoting a parallel effort in terms of data archiving on a more global basis through the World Data Centers. As stated before, besides archiving data, the WDCs have devoted efforts to transform the format in which some data is stored to generate catalogues which are then distributed to researchers and members of NODCs, and to recover data which is stored in uncommon formats.

When looking at this mandate almost fifty years later, it continues to be valid and in fact is taking on an enhanced relevance in the contexts of climate change, management and conservation of the environment, and the use of ocean resources as one strategy to promote sustainable development. What began half a century ago as a global effort to enhance the knowledge concerning the oceans and their characteristics through research and cooperation has gradually evolved in these last decades towards an effort to understand the complex dynamical nature of several processes in the oceans, the interactions between the oceans and the atmosphere for weather prediction, and more crucially in the context of climate change. In the wake of the recent presentation of the 4th Intergovernmental Panel on Climate Chance Assessment Report on climate change (IPCC) the preparation of data catalogues and the continual archiving of such data now allows scientists to track sea-level rise and other phenomena such as El Niño –ENSO, which have dramatic impacts on coastal populations, particularly in the Small Island Developing States. It is interesting to note the coincidence between the year in which IODE was established and the year mentioned in first paragraph of the Executive Summary of the section on *Observations: Oceanic Climate Change and Sea Level*, contained in the document prepared by Working Group 1 of IPCC entitled: The Physical Basis for Climate Change[10]. The paragraph is reproduced as follows:

> *"The oceans are warming. Over the period 1961 to 2003, global ocean temperature has risen by 0.10˚C from the surface to a depth of 700 m. Consistent with the Third Assessment Report (TAR), global ocean heat content (0–3,000 m) has increased during the same period, equivalent to*

[9] See document IOC/IODE-XIX/45, IOC Strategic Plan for Oceanographic Data and Information Management – Draft 3 March 2007, page 45.

[10] Bindoff, N.L., J. Willebrand, V. Artale, A, Cazenave, J. Gregory, S. Gulev, K. Hanawa, C. Le Quéré, S. Levitus, Y. Nojiri, C.K. Shum, L.D. Talley and A. Unnikrishnan, 2007: Observations: Oceanic Climate Change and Sea Level. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.The document related to this section can be found in the following web-page: http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Pub_Ch05.pdf

absorbing energy at a rate of 0.21 ± 0.04 W m-2 globally averaged over the Earth's surface. Two-thirds of this energy is absorbed between the surface and a depth of 700 m. Global ocean heat content observations show considerable interannual and inter-decadal variability superimposed on the longer-term trend. Relative to 1961 to 2003, the period 1993 to 2003 has high rates of warming but since 2003 there has been some cooling."

Whether a coincidence or not, the fact remains that it has been through efforts carried out by IOC and IODE that it is possible today to access and use oceanographic data generated and archived in the last decades to elaborate such documents focusing on climate change which span the entire world.

2.6.3 International standards for the global exchange of marine data and information

IODE has been promoting the exchange of data and information with a strategy of adopting international standards which are promoted at a global scale by the Information Community rather than developing a unique one developed from within IODE which may lead to incompatibilities in certain regions of the world. The strategy is undoubtedly based on the fact that the adoption of such standards will ensure that a vast majority of users will have no problems in accessing the data and information.

With the emergence of electronic mail, IODE has continued to rely on this practice of adopting the use of international standards to exchange data. In previous decades the ASCII format was used to transfer data. Later IODE started adopting standards such as **XML** (eXtensible Markup Language), and more recently the **HTTP** standard (Hyper Text Transfer Protocol) currently used in the internet environment. In recent years, the development of geographical information systems linked to the availability of satellite images has reached IODE and efforts are being implemented to use OpenGIS Web Mapping Services and to promote the use of the XML-based Geography Markup Language **GML**. However, it is recognized that there is no "universal" data transfer method, even though there seems to be a convergence to a small number of such methods.

2.6.4 Capacity-building efforts to manage marine data and information

The capacity building efforts within IODE and IOC have spanned not only training of human resources in particular topics, but the support to trained staff members of NODCs in terms of the required hardware and communication mechanisms for them to carry out the exchanges of data and information. This enhanced capacity-building strategy arose as a lesson learned from previous training exercises in past decades, where it was detected that despite the training efforts by IODE, data exchanges were still not being carried out by staff members in their respective centres due to lack of such resources.

Efforts on capacity building have included training workshops conducted in different regions of the world, the elaboration of training manuals and additional resources and tools to complement such efforts. In the recent decade **Ocean Teacher** has been developed as an on-line mechanism for capacity building.

A big thrust on capacity building has been made possible through the establishment of the IPOI in Oostend which constitutes a training platform that combines traditional training in a class-room style, access to web resources and GIS products through its computer facilities already implemented in the class-rooms, and field trips on vessels to provide hands-on training regarding oceanographic data acquisition in an arrangement with the Flanders Marine Institute, Belgium (VLIZ).

Capacity building has been an essential task of IODE and of IOC for the past decades and continues to be a relevant task in the present. An advancement within IOC stemming from the recently established Capacity Development Unit is related to the **definition concerning capacity-building**, which is

reproduced as follows[11]:

> *"...development, fostering and support of infrastructure, resources and relationships for ocean science and related systems and services, at Member States, organizational, inter-organizational, regional and systems levels, contributing to the peaceful, socially distributed and sustainable development of our societies."*

Looking at this definition, it can be stated that efforts carried out by IODE are addressing the elements contained in this definition.

2.6.5 Support to international programmes and projects of IOC, WMO, and other international agencies

The fifth objective of the IODE programme is to support international scientific and operational marine programmes of IOC and WMO and their sponsor organizations. It can be stated that IODE has attempted to provide such support to a variety of programs, in particular to the JCOMM which has been set up by both UNESCO-IOC and the World Meteorological Organization, WMO; and is attempting to find the most adequate way to link with the Global Ocean Observing System (GOOS) which has been set up, along with the Global Terrestrial and Climate Observing Systems as global observational platforms (GTOS and GCOS). In addition, IODE is supporting other IOC programmes such as the Carbon Project, the Harmful Algae Bloom project and will support efforts related to the International Polar Year.

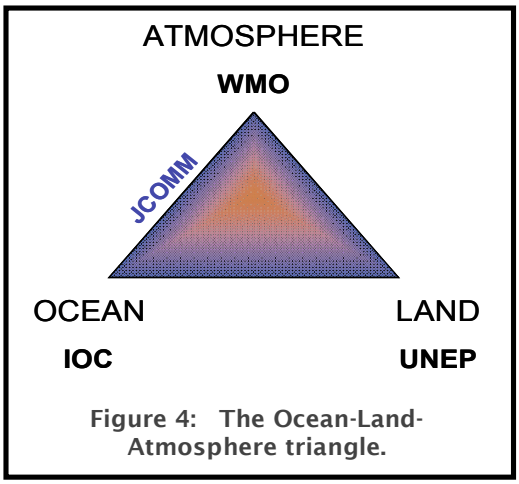


Figure 4: The Ocean-Land-Atmosphere triangle.

In the context of the atmosphere, the oceans, and land, three United Nations Agencies are basically involved in their management. The World Meteorological Organization is handling aspects related to climate and atmospheric processes. UNEP, even though more policy-relevant than executive, is basically focusing its efforts on land-issues. IOC is the traditional UN agency recognized when it comes to Oceans.

[11] See document IOC Principles and Strategies for Capacity-Building, TEMA Report No. 1. IOC/INF-1211, UNESCO, 2005. Page 2, and Annex II.

3. Evaluation purpose

As stated in the Terms of Reference, the external evaluation of IODE is contemplated in the evaluation plan for 2006 – 2007 proposed by IOS-UNESCO which is documented in Annex VI of the 33 C/5 UNESCO Programme and Budget document. The outputs of the evaluation will feed into the assessment of Strategic Objective 5 of UNESCO's medium-term strategy (31 C/4): *Improving human security by better management of the environment and social change.*

As it has been stated in this Annex of the 33 C/5 UNESCO Programme and Budget: *"the evaluation will seek to establish how successful the systems have been as a global mechanism to ensure open and full access to ocean data and management of relevant information for all. What constraints – technical, political and otherwise – were encountered during the last two biennia, and how these were addressed. Also how can IODE be further developed and strengthened to effectively address the challenges requiring accurate and timely access to oceanographic data and information."*

It is to be expected that the evaluation will inform stakeholders, including Member States, IODE partners, and UNESCO Task Force on Decentralization, on the following elements concerning IODE:

(i) Results and progress achieved by IODE in the implementation of the objectives defined in the UNESCO Medium Term Strategy (2002-2007) (Document 31 C/4);
(ii) Results and progress achieved by IODE in the implementation of the objectives defined in the "Medium Term Strategy for IOC (2004-2007)" (INF-1192);
(iii) The extent to which IODE activities, including those specifically targeted at capacity-building, benefit Member States;
(iv) Quality of organizational management, programme implementation systems and associated resource allocation;
(v) Preliminary assessment of the IPOI and its future potential.

Considering the proposed RBM framework, the evaluation has been structured by IOS-UNESCO to provide information on:

Relevance	Results and progress achieved by IODE in the implementation of the objectives defined in the UNESCO Medium Term Strategy (2002-2007) (Document 31 C/4). Results and progress achieved by IODE in the implementation of the objectives defined in the "Medium Term Strategy for IOC (2004-2007)" (INF-1192).
Efficiency and Effectiveness	Quality of organizational management, programme implementation systems and associated resource allocation.
Impact	The extent to which IODE activities, including those specifically targeted at capacity-building, benefit Member States.

The next chapter presents a description of the method employed to carry out this evaluation.

4. Evaluation Method

The evaluation aims at providing information on how successful IODE has been as a global mechanism to ensure open and full access to ocean data and management of relevant information so that it can be further developed and strengthened to effectively address the challenges requiring accurate and timely access to oceanographic data and information

As stated in the Terms of Reference, the evaluation has been carried out in the context of an RBM framework. Based on several documents prepared by the IODE Secretariat in recent years, an RBM matrix has been elaborated to link the various hierarchical elements and later refined with information gathered through interviews with staff members of IODE and representatives of Member States which participate in IODE. The matrix is presented in figure 5.

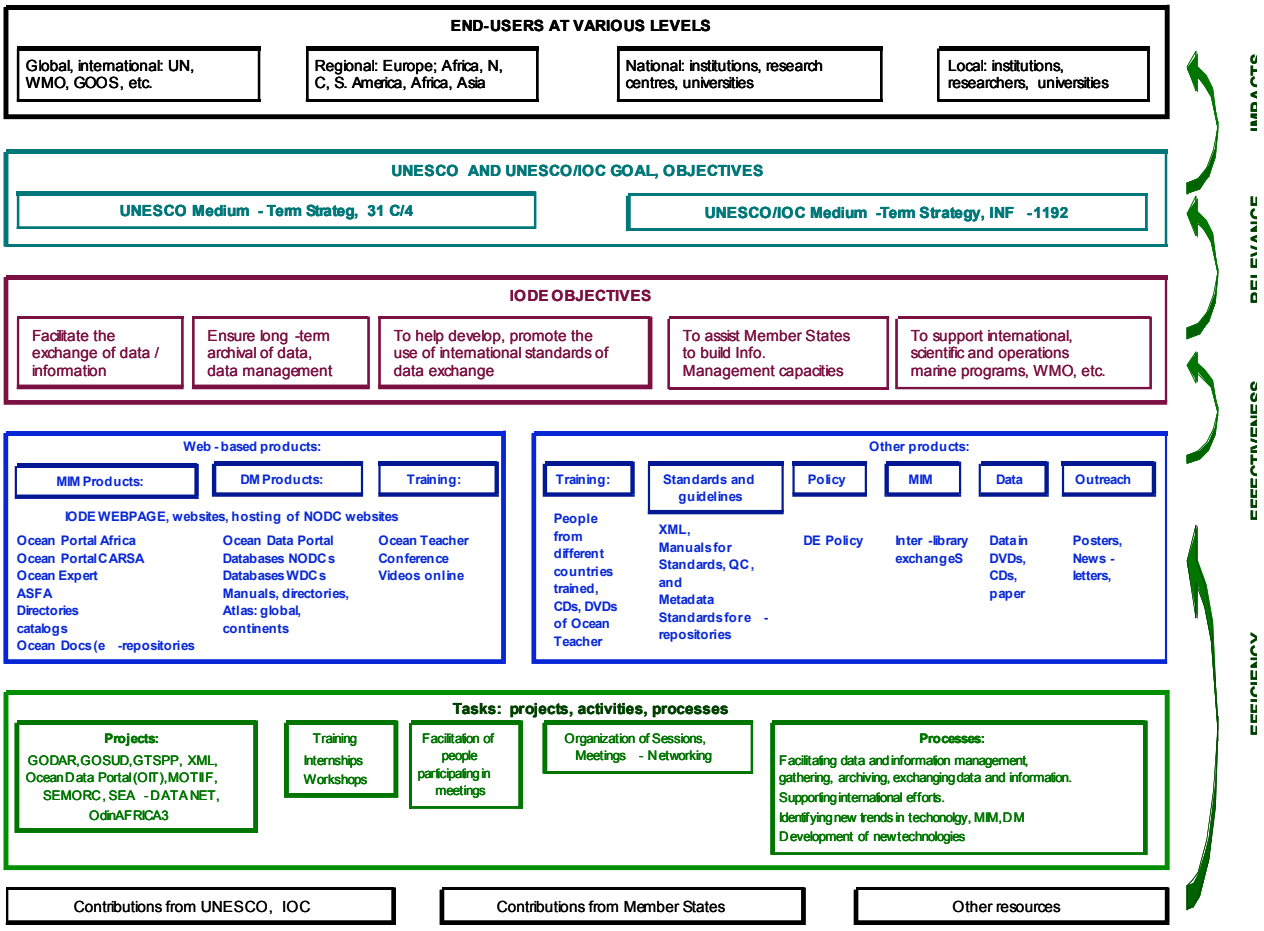


Figure 5: The RBM evaluation matrix in the framework of IODE.

As expected, IODE carries out its planned tasks using contributions from UNESCO (budgetary and extra-budgetary funding), contributions from Member States and other donors, which constitute at this time a major line of funding.

The tasks have been divided into projects, activities and processes as described in the matrix. Such tasks produce the outputs, which for this evaluation have been classified in terms of **web-based products** and **other types of products**. The division of outputs in this fashion is based on the fact that as IODE is a programme which focuses on data and information exchange. Two possibilities can be addressed in terms of the outputs which are required for exchanges to take place: those based on the internet and those which

are not based on the internet.

The decision concerning the tasks to be carried out is usually decided during IODE sessions, but not necessarily considering outcomes which should in turn be geared to achieve the proposed objectives. An example which has been mentioned earlier is the task of long-term data archiving. While stated in IODE as an objective, the Committee basically has not considered it necessary to allocate resources so that certain activities or tasks are carried out in to fulfil this specific objective.

As expected, these outputs should allow IODE to reach its proposed objectives, which in turn should contribute to the achievement of the proposed outcomes expressed in the Medium-Term Strategies of both IOC and UNESCO. The top level is constituted in terms of the impacts of IODE which can be divided in terms of the beneficiaries. Four such groups have been identified: UN and other international agencies; regional agencies at the levels of continents or sub-continents; national agencies; and local agencies and end users.

The guidelines prepared by UNESCO-IOS for this evaluation serve as the basis for this report and focus on four elements: *relevance*, *impact*, *efficiency*, and *effectiveness*. To this end, the Terms of Reference include a variety of questions which have been answered through the evaluation.

The **relevance** was assessed with respect to both the UNESCO Medium Term Strategy (31 C/4), with respect to the IOC-UNESCO Medium Term Strategy (INF-1192). As in the case of efficiency and effectiveness, the relevance was assessed through a review of the documentation elaborated within the IODE Programme and through interviews with high-ranking officers of IOC-UNESCO.

The evaluation of **impacts** has been carried out via the analysis of how IODE is contributing to other efforts carried out by international and regional organizations and Member States. In this context, several agencies and projects were targeted: The Kenyan Marine and Fisheries Research Institute (KMFRI), IGAD Climate Prediction and Applications Centre, New Partnership for Africa's Development (NEPAD) and the United Nations Environment Programme (UNEP) in Africa; the International Research Center on El Niño Phenomena (CIIFEN) and the Permanent Commission of the South Pacific (CPPS) in Latin America, as well as NODCs.

The assessment of the **efficiency** has been carried out through an analysis regarding how resources at the disposal of IODE have been used to generate outputs. In addition, the assessment focused on the analysis of outputs and how such outputs constitute a complete basis for the achievement of the five IODE objectives.

To carry out the evaluation process the following activities were undertaken:

- Reviews of documents prepared by IODE and its working structures, NODCs, National Marine Information Centers (NMICs), regional centres and by different agencies covering the period 1999-2007.
- Reviews of strategic documents elaborated by UNESCO, UNESCO-IOC, WMO, UNEP, NOAA, and other agencies which carry out activities related to IODE.
- Reviews of contents of internet web pages prepared by IODE, by NODCs and by regional agencies whose work is related to IODE.
- Interviews with staff member of IOC-UNESCO, WMO, UNEP; staff members of the IPOI in Oostend, Belgium and in the IODE-Africa Project Office in Nairobi; and with members of various NODCs.
- Participation in the IODE XIX Session held in Trieste between 12 and 16 March, 2007.
- A survey using a tailor-made questionnaire targeting National Data and Marine Information Coordinators conducted between May and June, 2007.

The major findings, conclusions, and recommendations are presented in the next chapters. As requested by UNESCO-IOS in the Terms of Reference, specific questions have been targeted and answered in terms of efficiency, effectiveness, relevance, and impact. In addition, a review of the entire RBM framework in the context of IODE has been carried out to complement the evaluation.

5. Major Findings

5.1 Relevance

As stated in the Terms of Reference, this evaluation has to assess the relevance of IODE, that is: whether its efforts and results are in line with the current framework established by UNESCO in its Medium Term Strategy that spans the period 2002-2007[12], and in line with the framework established by IOC-UNESCO in its Medium Term Strategy which spans the period 2004-2007[13]. The segment of the RBM matrix related to relevance is presented in figure 6.

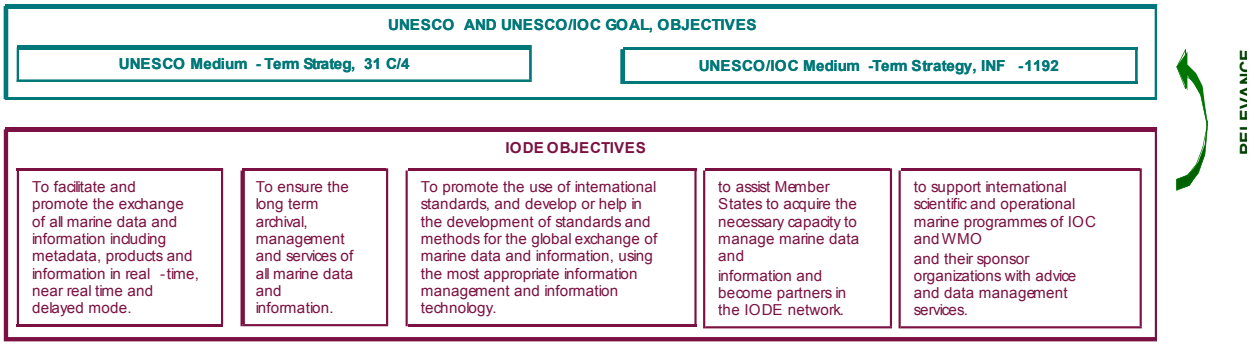


Figure 6: Relevance of IODE in the context of UNESCO and UNESCO-IOC.

The following sections provide information on the relevance of IODE in terms of the questions proposed by UNESCO-IOS.

5.1.1 Is the IODE programme in alignment with UNESCO's strategies and goals?

As stated in the introductory comments to the Medium Term Strategy, UNESCO´s overall strategy is formulated around the unifying theme: "*contributing to peace and human development in an era of globalization through education, the sciences, culture and communication*"[14]. Based on 12 strategic objectives, this Medium-Term Strategy contemplates two cross cutting themes: *the eradication of poverty, especially extreme poverty*; and *the contribution of information and communication technologies to education, science, culture and information and the building of knowledge societies*. The second cross cutting theme has explicit relevance to IODE, as it focuses on the use of information and communication technologies to build knowledge societies.

In relation to building knowledge societies, a review of tasks carried out by IODE leads to the conclusion that the majority of efforts conducted target developing countries, as it is in such countries where the need is recognized. Efforts conducted by IODE in this area focus on the training of personnel from national agencies on oceanography or marine-related activities and on the provision of equipment and resources for such personnel to be able to make efficient use of the information and communication technologies to contribute to the establishment of societies which benefit from the use of information.

In addition, the Medium-Term Strategy points out explicitly for UNESCO to respond to the needs of Africa[15], in particular through the promotion of capacity building efforts in Member States; to facilitate the

[12] UNESCO Medium Term Strategy, Document 31 C/4
[13] UNESCO IOC Medium Term Strategy, Document INF-1192.
[14] UNESCO Medium Term Strategy, Document 31 C/4, page i.
[15] UNESCO Medium Term Strategy, Document 31 C/4, page 7.

coordination of programmes in science and technology education; and to act as a catalyst for international cooperation in support of initiatives by Member States.

In the context of supporting Africa, IODE is recognized by IOC as the programme which is carrying out the most relevant efforts in Africa, particularly on the topic of capacity building. For over a decade, IODE has focused efforts on this continent to build capacities to facilitate the exchange of data and information via the network of national coordinators for data exchange and for marine information management through inter-library exchange programmes and internet webpages and portals.

To get an idea regarding the commitment of IODE to support efforts targeting Africa, Table 3 presents a summary of the financial resources which have been assigned to carry out activities and projects focusing on this continent by IODE, as well as percentages with respect to the total amount of resources which have been allocated to IODE[16]. The majority of the funds allocated to Africa stem from the Flanders-UNESCO Science Trust Fund, FUST. As it can be seen, with the exception of the year 2006, in all other years the funding allocated to efforts in Africa has exceeded half the resources allocated to IODE.

Table 3: Financial resources allocated to efforts targeting Africa explicitly.

	30C/5	31C/5	31C/5	32C/5	32C/5	33C/5	33C/5
YEAR	2001	2002	2003	2004	2005	2006	2007
FUST-I (ODINAFRICA-II))	577.429,00	590.505,00	867.900,00	202.200,00	0,00	0,00	0,00
FUST-II (ODINAFRICA-III)	0,00	0,00	0,00	476.609,00	1.227.591,00	277.200,00	318.600,00
FUST-II (ODINPUBAFRICA)	0,00	0,00	0,00	0,00	57.000,00	44.000,00	0,00
FUST-II (e-repository)	0,00	0,00	0,00	0,00	0,00	0,00	33.000,00
SUB-TOTAL - AFRICA	**577.429,00**	**590.505,00**	**867.900,00**	**678.809,00**	**1.284.591,00**	**321.200,00**	**351.600,00**
SUB-TOTAL - IODE	**649.595,00**	**877.496,00**	**1.089.800,00**	**1.145.434,00**	**1.647.079,00**	**781.677,00**	**548.323,00**
Percentage of Sub-total for Africa with respect to Sub-total for IODE	**89%**	**67%**	**80%**	**59%**	**78%**	**41%**	**64%**

Source: Document IOC/IODE-XIX/14.

The long-term support to Africa has been essential to establish capacities to exchange data and to manage information in the NODCs of the respective Member States. Recalling figure 3, it can be stated that several African Member States have set up their NODCs in the last decade. This fact becomes more relevant when one concludes that 17 of 35 African Member States which have a coast either in the Mediterranean Sea or in the Indian or the Atlantic oceans are now operating an NODC. Figure 7 presents Member States which have registered an NODC within IODE (yellow color), as well as the three Member States which have only established a National Coordinator for Data Management (light blue color).

Altogether, the efforts on capacity building have been recognized by the IODE community as very successful, and as such, developed countries continue to support these initiatives. It is important to mention the fact that the success in targeting Africa has been the outcome of the will of the major donor of IODE, the Government of Flanders, who also foresaw the need to support Africa. However, there is now an imbalance when comparing efforts by IODE in Africa and similar efforts in other regions which include developing countries. This imbalance may be explained as the explicit result of extra-budgetary funding, which may come with some restrictions attached, particularly in terms of geographical areas or tasks where such funding has to be invested.

Based on these findings, it can be concluded that the efforts carried out by IODE in Africa are relevant to the UNESCO Medium Term Strategy, in particular with respect to the second cross-cutting theme related to information and communication technologies to build knowledge societies.

With respect to the Science Division of UNESCO, the evaluation of relevance should focus on Strategic Objective 5 of UNESCO's medium-term strategy: *Improving human security by better management of the environment and social change*[17] and on the Strategic objective 6: *Enhancing scientific, technical and human capacities to participate in the emerging knowledge societies.*[18]

Objective 5 explicitly highlights the role of IOC-UNESCO as the leader in enhancing the knowledge required to manage the resources of the ocean in a sustainable way. In addition, it calls on UNESCO to build the capacity of developing countries especially to manage and exchange data and information and to concentrate efforts significantly in Africa as a follow-up to the Pan-African Conference on Sustainable Integrated Coastal Management.

Figure 7: Map of the African continent displaying Members States which have established an NODC (yellow) or just designated a National Data Coordinator (light blue).

As it will be shown in the following sections, IODE has promoted activities and has achieved results in these areas. It has focused precisely on capacity building in developing countries through a variety of efforts, and as described in the paragraphs above, it has targeted a vast majority of its resources in Africa to build the capacities that are required to manage and exchange data and to produce information which can be used to promote a more sustainable use of the coastal and ocean resources.

Objective 6 focuses on the enhancement of scientific, technical and human capacities to participate in the emerging knowledge societies. Activities carried out in relation to enhancing capacities include:

- The conduction of a series of training courses to enhance the capacities of staff members in the NODCs and NMICs to manage data and information more efficiently using the internet and related mechanisms.
- The provision of technical equipment to facilitate the adoption of internet as the optimum platform to carry out the exchange of data and information in the case of African countries.
- The establishment of ODIN networks to complement the exchange of information, and the linking to the WDCs to facilitate the long-term archival of data, as well as its systematization and subsequent distribution in a more global scale.
- The setup of platforms and mechanisms to facilitate the access to scientific publications and other relevant information via a joint programme with IAMSLIC.

[17] UNESCO Medium Term Strategy, Document 31 C/4, page 29.
[18] UNESCO Medium Term Strategy, Document 31 C/4, page 33

Considering the tasks carried out by IODE, it can be concluded that IODE is contributing to the fulfillment of the tasks which have been assigned to IOC by UNESCO in its Medium Term Strategy.

What were the results achieved during the observed period relevant to the 31 C/4?

Results related to Strategic Objective 5:

The UNESCO Medium Term Strategy defines 8 expected outcomes in the case of Strategic Objective 5. A review of the mandate given to IODE indicates that IODE should contribute to the fulfillment of two of these outcomes:

Outcome 1: *Improved research, elaboration and dissemination of data in the fields covered by the five scientific programmes, geared to address the different dimensions of human security and to establish an enhanced knowledge base for implementing strategies aimed at sustainable development.*

Outcome 2: *Development of integrated environmental management approaches, with emphasis in critical areas such as coastal zones and in disaster mitigation plans for vulnerable groups.*

Results related to Strategic Objective 5 -Outcome 1:

Concerning outcome 1, the aim of IODE has been to promote the dissemination and exchange of data and information generated through a variety of projects. Results achieved by IODE in this topic include:

a) The cataloguing of data and its subsequent dissemination in various formats including CDs, DVDs, and through the internet via webpages of the NODCs, Ocean Docs, Ocean Portals, and through the WDCs.

b) The establishment of electronic repositories of research documents elaborated in Africa to distribute them through the webpage called Ocean Docs.

c) The establishment of a network of national information management centres linked to the IAMSLIC programme to enhance the role of dedicated oceanographic libraries as sources of scientific and technical literature in developing countries.

d) The conduction of workshops such as the International Conference on Marine Biodiversity Data Management in December 2004[19] and the International Symposium on Oceanographic Data and Information Management with special emphasis to Biological Data in November 2004[20] and the publication of its proceedings.

The issue of contributions by IODE to set up databases in NODCs has been surveyed for this evaluation in terms of a questionnaire. 55% of all respondents (18 out of 33) acknowledge contributions by IODE in terms of training of staff. 27% of the respondents (9 out of 33) indicate that they have benefited from the donation of specialized software by IODE to carry out this task. 24% of respondents (8 out of 33) indicate receiving support in terms of computers and hardware required for such a purpose. 9% of respondents indicated that IODE had provided support in terms of sending an expert to the NODC; and 30% (10 out of 33), basically from European Member States, comment that such centres have not received any support, as such a tasks are managed with local resources.

[19] See: Proceedings: Ocean Biodiversity Informatics, Edited by E. V. Berghe, W. Appeltans, M. J. Costello,and P. Pissierssens. IOC Workshop Report No. 202, VLIZ Special Publication No. 37, 2007.
[20] See: Proceedings: The Colour of Ocean Data. Edited by E. V. Berghe, M. Brown, M. J. Costello, C. Heip, S. Levitus, and P. Pissierssens. IOC Workshop Report No. 188, VLIZ Special Publication No. 16. 2004.

While such efforts benefit staff members within NODCs and NMICs, as well as those stakeholders who have links to them, there are several concerns which IODE has to confront with respect to collection and dissemination of data:

1 - The fact that **not all scientists are willing to provide their data**, particularly raw data, to the NODCs for archiving and subsequent dissemination. In the context of scientists, the recent survey carried out by IODE at the end of 2004 targeting the science community displays the fact that scientists are not really keen on sending their data to NODCs or other data management facilities. Table 4 presents results from this survey.

Table 4: Selected Question and Answers – IODE Survey for the Ocean Science Community, 2004

Question number 8	Yes	%	No	%	No answer
Do you send your data to one or more data management facilities within your country?	321	32.7	662	67.3	166

As it can be seen, twice as many scientists do not send their data to data management facilities in their countries. Such results are confirmed by representatives of NODCs when confronted with this issue of the collection of data. The problem is manifested in both developed and developing countries, and may be related to the fact that scientists may not be aware that IODE is carrying out this function of data collection through the NODCs or WDCs; or because scientists will safeguard their data until they believe they have extracted all its usefulness, and only then will they consider the sharing of such data with any agency. In other cases, it has been stated that scientist do not send raw data to such data management facilities, but rather publications which are based on such data. The obvious reason being that the productivity of scientists is measured in terms of publications (generation of information) rather than on the amount of data generated or submitted to an NODC or WDC.

One strategy which is being promoted in Africa is to encourage scientists to elaborate and publish documents so that they can later provide their data to NODCs. In Europe and North America, efforts to gather such data are geared in terms of contractual agreements between researchers and funding agencies, in such a way that the researchers agrees to send his data to the NODC after two years from its acquisition as part of the agreement to receive funding to carry out the research.

2 – The issue related to the **reluctance of some agencies to disseminate particular data due to national security concerns**. The typical example is related to data which is generated by the Naval Armed Forces of many countries, which has to be kept as confidential for naval security reasons. This is the case of South American countries whose NODCs are managed by the Naval Forces and concerns regarding the confidentiality of data have been mentioned explicitly in sessions of IOC-Caribe[21]. As an international effort, IODE is clearly aware of its limitations at the national and sub-national levels, and is promoting the implementation of a data-policy regarding open and unrestricted flow of data to try to persuade such institutions to be more flexible in this respect.

3 – The **lack of perception of stakeholders regarding IODE as a potential source of data and information**, particularly within the community of researchers. The survey carried out by IODE which targeted the ocean science community in 2004 determined that a large proportion of this community is not aware of IODE as a source of data. Of the 650 respondents asked regarding the consultation of IODE web-pages to acquire information, 420 responded negatively (64.6%), and 230 positively (35.4%).

Looking at these results, two questions come to mind:

Who is the target audience when it comes to data exchange?

What type(s) of data should be exchanged in the context of IODE?

[21] Report of the Eighth Session of IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE). Document IOC/SC-IOCARIBE-VIII/3, 2005. Paragraph 142, page 21.

From the point of view of IODE, the target audience includes institutions and researchers devoted to most areas related to ocean research. This may put a considerable demand on capacities within IODE, as it has to fit outputs to a target audience with which it may have little or no connection directly. In addition to physical oceanographic data, IODE now contemplates the management of chemical and biological data and information.

The recent survey carried out by IODE in 2004 targeting the scientific community[22] reveals that many of the respondents do not request data from the NODCs, RNODCs, or WDCs (see questions 16, 20, and 23 in this survey). Table 5 presents results from this survey regarding the use of NODCs, RNODCs, and WDCs as sources of data. As it can be seen, few researchers request data from an NODC, an RNODC or from a WDC. The survey addressed one of the causes: the lack of awareness regarding such sources of information, and the respective report recognized this concern as a main conclusion[23]. Another reason for researchers not to access data from IODE sources could be related to the quality of data hosted within NODCs. IODE has not been successful in establishing global data sets of even quality. To this end, in its XVIII Session, the IODE Committee noted that efforts are already in progress to tackle this issue through a Pilot Project on Quality Control[24] and through an inter-sessional working group on quality control of ocean profile data. In its IODE XIX Session, it has been stated that the working group began to carry out some activities and further progress will be achieved in the next years[25]. In addition, it was mentioned that efforts were under way to develop a training module within OCEAN TEACHER to contribute to efforts to approach this issue of quality control[26].

Table 5: Selected Questions and Answers – IODE Survey for the Ocean Science Community, 2004.

Question	Yes	%	No	%	Unaware of NODC, WDC	%	No answer
Do you request (online or other means) data from your IODE NODC	230	35.4	420	64.6	Not addressed in survey		312
Do you request (online or other means) data from ANY IODE RNODC (Responsible National Oceanographic Data Centre)	94	15.3	261	42.4	260	42.3	341
Do you request data from a WDC (World Data Centre) Oceanography	104	16.8	291	47.1	223	36.1	353

Nevertheless, there is an indirect approach used by IODE which is getting scientific recognition when it comes to dissemination of data: the World Data Centres. As mentioned before, such centres have been assembling catalogues of data which are being employed by the scientific community. In the scope of this evaluation, the Lead Evaluator was made aware of the facilitation provided by IODE as a United Nations programme for the acquisition of data from many countries around the world, something that probably would not take place if data was requested explicitly by one specific country. This facilitation by IODE has allowed World Data Centres to elaborate and disseminate a global catalogue of data, which is being cited in the scientific literature as a reference.

When assessing the activities carried out, it can be concluded that IODE has made efforts to promote the acquisition and dissemination of data and information using various mechanisms. However, it must be recognized that there are factors outside the influence of IODE which may inhibit the process, particularly in the case of the scientific community, and there is a lack of awareness concerning IODE within this community.

[22] IODE Survey for the Ocean Science Community, 2004.
[23] Document IOC/IODE-XVIII/23b, page 13.
[24] Document IOC/IODE-XVIII/3, page 36, paragraph 299. Also see within the same document Resolution IODE-VIII, Annex II, pages 3 and 4.
[25] Document IOC/IODE-XIX/3, pages 17 - 20.
[26] Document IOC/IODE-XIX/3, page 19, paragraph 136.

Recommendation 1:	**IODE should establish an inter-session working group to assess and recommend how IODE should approach the issue of lack of awareness by the ocean sciences community with respect to the capacities of IODE already in place in terms of data management (long-term archival and dissemination).**

Results related to Strategic Objective 5, Outcome 2:

In the case of outcome 2, the Africa Programme Office of IODE is contributing to inter-institutional efforts dedicated to the elaboration of an African Atlas of the Oceans which compiles a variety of products currently dispersed to be used for the elaboration of a strategy to manage coastal resources. In the particular case of Kenya such a product is being developed with the support of IODE, UNEP, and other national agencies, and the aim is to use this Kenyan marine atlas as a guideline to identify environmentally fragile ecosystems that require protection to minimize their deterioration when used by local communities and by national-level agencies.

Recommendation 2:	**Considering the use that Atlases, such as The African Atlas of the Ocean, can have with respect to the planning and utilization of resources in coastal areas in the context of integrated environment management; the IODE Committee should assess how best to transfer the lessons learned from the approach coordinated by ODIN-AFRICA to ODIN-CARSA, ODIN-CINDIO, ODIN-WEST-PAC, ODIN-BLACK SEA and ODIN-CET, which are being established at this time.**

Results related to Strategic Objective 6:

In the case of the Strategic Objective 6, the UNESCO Medium Term Strategy states 9 expected outcomes. When assessing the activities carried out by IODE, it can be stated that IODE has contributed to the achievement of six such outcomes:

1. Enhanced human and institutional capacities at the national level and support for regional and international networking in the field of sciences for research and training;
2. Enhancement of capabilities of national institutions in developing countries to assess and find solutions to environmental problems and to adapt to the exigencies of knowledge societies;
3. Intensified exchanges between scholars and participation in cooperative programmes; expanded training leading to a decrease in the brain drain of graduates from all scientific disciplines;
4. Improved access by developing countries to ICTs for scientific data and information dissemination; access to online media and networks addressing science and development issues;
5. Increased and more effective use of ICTs for better transmission and sharing of scientific knowledge at all levels, including the establishment of virtual universities;
6. Improved quality of teaching and research programmes; broader participation of scientists, especially women scientists, from developing countries in collaborative research;

In the case of the first two outcomes, it has already been mentioned that the strengthening of capacities by IODE has included both the training of staff on the issue of data management, and more recently on the

issue of information management, in particular through links with IAMSLIC. In addition, institutional capacities have been strengthened through the donation of equipment required to carry out both data and information exchanges in the case of African countries.

Once the training of staff on the use of various tools has been completed, IODE has followed up via promoting the development of information products. As mentioned before, in the case of Africa, staff members of the NODCs who have received training on the use of GIS software and its tools are now elaborating an Atlas of the oceans for this continent which should be used to identify sustainable uses of coastal resources. Staff members which have received training regarding how to set up web pages are expected to generate their institutional webpages.

The enhancement of human and institutional capacities by IODE is becoming relevant to regional and international agencies such NEPAD in Africa, which are benefiting from the capacities generated by IODE, and cooperative activities such as the elaboration and the publication of a joint newsletter are now a reality. As a policy-relevant organization, NEPAD is focusing on promoting sustainable development within Africa, and thus is interested in identifying weaknesses in governance issues related to the use of ocean resources. The link between NEPAD and ODIN AFRICA is considered as beneficial to track down such weaknesses. In addition, the need to link sustainable development with available resources in oceans and coasts is recognized. As a result, NEPAD is requesting ODIN AFRICA to promote the issue of marine information management as a strategy to elaborate and then to provide policy-relevant advice to decision makers and political leaders in African countries. NEPAD has identified both the need as well as the benefits in terms of the use of information, stating that countries which have the capacity to exploit marine and ocean resources are those who also manage information better.

Another agency which is benefiting from efforts carried out by IODE is the United Nations Environment Programme (UNEP). UNEP operates a WIOLab unit in Nairobi which focuses on issues related to the land-coast interface. The main contributions from IODE can be traced to the capacity-building efforts of staff within NODCs and within the NDICs, as WIOLAb requires such capacities to proceed with its own tasks. In recent years, WIOLab, ODIN AFRICA, and the Division of Early Warning and Assessment (DEWA-UNEP) have collaborated to generate the African Atlas of the Oceans. UNEP also recognizes the strength of IODE and ODIN AFRICA in terms of their capacity to manage information on the web, which is expected to be utilized to disseminate such an Atlas.

In Latin America, efforts carried out by ODIN CARSA and IODE are also becoming relevant to the work which the Permanent Commission of the South Pacific (CPPS by its initials in Spanish language) is carrying out with respect to the use of ocean resources in South America. The links between IODE and CPPS are based on a Memorandum of Understanding (MOU) between IOC and CPPS which creates an opportunity for ODIN-CARSA to cooperate especially on ocean data management regarding data which is generated via regional cruises coordinated by the Permanent Commission for the South Pacific (CPPS) on South Eastern Pacific Region.

As a conclusion, it can be stated that the efforts carried out by IODE in terms of capacity-building and institutional strengthening contribute to the establishment of a critical mass of researchers and staff that can provide support to regional agencies within Africa such as NEPAD and in South America such as the CPPS, and can contribute to the efforts of UN agencies such as UNEP in terms of development of information at the regional scale.

Recommendation 3:	**IODE to promote the replication of efforts related to ocean and marine data and information in other regions of the world where oceanographic networks are being established, such as in the cases of the Indian Ocean, Countries in Economic Transition (CET), and the Black Sea.**

In the case of the third outcome regarding the exchanges between scholars, it can be stated that the practice of exchanges has not been fully implemented by IODE, event though efforts have taken place to mobilize staff from developing countries for short stays in the World Data Center in Maryland and in other similar centers. While it has been done in the past, budget limitations within IODE have forced its Committee to minimize such efforts. In the context of expanded training to decrease the brain drain, while the problem of brain drain is recognized, the results from the survey conducted during this evaluation suggest that measures should be taken within the national institutions in developing countries to avoid such brain drain. Confronted with this issue which may be experienced by NODCs as a consequence of the enhanced training of their staff by IODE, ODIN AFRICA has identified three strategies to minimize such brain drain:

- Promoting the establishment of a critical mass of staff within the NODCs to avoid that highly trained staff members feel isolated and would look elsewhere for a different working environment.
- Training local trainers, transforming staff members into trainers. The goal is that some local activities can be undertaken to cope with the problem.
- Self training of new staff using OCEAN TEACHER. This is a web-based or a DVD-based resource established by IODE which can contribute to the enhancement of local capacities of staff without having to travel to Oostend or to other places to start their technical training.

In the case of the Latin American NODCs, results from the survey in indicate that brain drain does not seem to be a problem, as such NODCs are managed by the Naval Armed Forces, which basically sustain these efforts through its enlisted personnel.

With respect to the fourth and fifth proposed outcomes related to access to ICTs and improved use of such technologies, there is sufficient evidence to recognize that IODE has been on the forefront regarding the promotion of their use for a variety of tasks. Efforts have included the encouragement of staff within NODCs to use PCs as essential tools to store, exchange and manage both data and information. To this end, training courses have been carried out on the use of specific software to manage oceanographic data and information which has been developed by IODE for such purposes. Furthermore, IODE has been promoting the use of the internet as the mechanism linked to computers to gather or exchange data and to disseminate information. In addition to supporting NODCs with their link to the internet in terms of equipment and resources, it has provided training to the staff of the NODCs regarding the setup of webpages to carry out the dissemination of data and information. In those countries where the bandwidth of the internet is limited, arrangements have been made by IODE and the NODCs so that their respective webpages are loaded and operated from the IPOI in Oostend. This arrangement allows users and researchers to access data and information uploaded by these NODCs with ease. In addition, IODE has been promoting the establishment of electronic repositories and Ocean Portals to facilitate the dissemination of data and information.

Finally, while IODE has not promoted the establishment of a virtual university as proposed in the fifth outcome, its web-based learning tool Ocean Teacher contains a vast amount of scientific and technical information in addition to training modules. The new version of this training tool is a single integrated e-learning and expert system providing expert and training resources for marine data management and marine information management needed by professional ocean data and information managers and scientists involved in data management. It also provides the necessary information for ocean researchers and students to cooperate and interact effectively with their national oceanographic data centers. This new system serves both as an e-learning platform (the 'training manuals' of OceanTeacher) and as an encyclopedia style learning resource (the OceanTeacher Resource Kit). Annex 4 presents a detailed overview of the ICT-related products which IODE has been developing since the past decade.

With respect to the sixth proposed outcome which focuses on improved quality of teachings, efforts by IODE in terms of improving both Ocean Teacher, as well as efforts to set up a state of the art facility for training in Oostend constitute the best examples of improving the quality of teaching.

When looking at these results, it can be concluded that IODE is making efforts in terms of capacity building to increase the use of ICTs for data and information management, and is also making use of such ICTs as tools to improve the quality of teaching.

How does IODE identify capacity building needs of Member States, specifically developing countries?

According to coordinators of NODCs, the identification of needs or weaknesses in Member States regarding data exchange, long-term archival, and information management is carried out frequently through several means. Table 6 presents results of the survey carried out during this evaluation concerning the means employed by IODE to identify such needs and weaknesses:

Table 6: Results of the survey regarding means used to identify needs and weaknesses. Source: IODE evaluation, 2007.

Means employed by IODE to identify needs and weaknesses	Number of M.S.	%
Through Official Letters or email requests on an annual basis or frequently	16	48%
Through specific questions which need to be addressed in the National Report submitted to IODE every 2 years.	21	64%
During IODE sessions every 2 years, in a particular segment of the session.	16	48%
Only on rare occasions, such as in the case of the recent IODE Priority Survey in 2004.	2	6%
Through meetings with ODIN coordinators.	17	52%

As it can be seen, IODE Officers employ a variety of ways which may be complementary to identify such needs and weaknesses. These efforts are repeated every two years as an activity preceding the IODE Sessions in terms of questions which need to be answered as part of the national report to be submitted to IODE, as well as during such sessions. However, when looking at the questions which should be addressed by National Data and Marine Information Management Coordinators when elaborating such national reports, it can be deduced that questions are in some cases too general and do not target specific needs associated with each particular objective. This may explain why for example the objective related to long-term data archival has not been targeted for quite some time.

Therefore, it can be concluded that while IODE is making efforts to identify needs and weaknesses of NODCs, perhaps the approach is still too general, and thus a recommendation is made for IODE to develop a more thorough way to identify the needs more precisely.

5.1.2 Is IODE in line with IOC-UNESCO?

The relevance of IODE can be directly linked to the **IOC Medium Term Strategy 2004-2007**. Within the section related to the IOC Mandate, services and capacity-building is addressed in paragraph 4 which is reproduced textually[27]:

4. *Consequently, the permanent mission of the Intergovernmental Oceanographic Commission (IOC) of UNESCO, as defined by the IOC revised Statutes (1999) is "to promote international cooperation and coordinate programmes in research,* ***services and capacity-building****, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision-making processes of its Member States" (Article 2.1).*

[27] See document IOC Medium Term Strategy 2004-2007, IOC/INF-1192, UNESCO, July, 2003. Page 5.

The IOC Medium-Term Strategy[28] mentions explicitly the efforts to be carried out by IODE in the topic of capacity-building in paragraphs 22 and 23 of the section focusing on modalities to accomplish the commitments.

> *22. Through the development of regional ocean data and information networks (ODIN), on the model of ODINCARSA for Latin America and the Caribbean and ODINAFRICA in Africa, IOC will assist Member States to develop the necessary human and institutional resources to collect, manage and disseminate data and information services and products required by all stakeholders.*

As it has been stated, ODIN-CARSA, ODIN-AFRICA, and more recently the IPOI in Oostend have been conducting a wide variety of workshops and training programmes to develop such human resources: The aim is for NODCs and NMICs to collect, manage, and disseminate data and information to end users. Table 7 presents a brief summary of training courses which have been organized by the ODINs in their respective region or by the IPOI in Oostend within the time period 2001-2007. A survey of reports presented in IODE sessions XVII, XVIII, and XIX and the visit by the Lead Evaluator to the Project Office in Oostend allows for the conclusion that efforts have been more substantial since the year 2005, when the Project Office was implemented. The reason for such an increase in training sessions in recent years is related to the source of funding provided by the Government of Flanders, which accommodates such training activities when carried out in Oostend. Since its formal inauguration in April 2005, the IPOI has carried out 33 training workshops for 318 participants from 90 countries. In contrast, 20 such activities have been carried out in three regions benefiting 41 countries, half of them in Africa alone.

Table 7: Data regarding training courses offered by IODE in recent years.

Year	Region	Training Courses
2001	AFRICA	2
2002	AFRICA CARSA	3 1
2003		
2004		
2005	AFRICA	3
2006	AFRICA CARSA CET	4 5* 1
2007	CET	1

Oostend Project Office	Training courses
Not operational as an IOC Project Office for IODE in this period	
2005	10
2006	19
2007	4**

* These courses were offered by NODCs within their countries in cooperation with ODIN CARSA.
** These courses have been offered between January and April 2007

A review of the table allows for the conclusion that in the period related to this evaluation (2002-2006), 46 training courses were offered by IODE, 29 of them in the new IPOI. In addition, the majority of these training courses were offered in 2005 and 2006.

It is important to mention the fact that capacity building efforts have basically targeted developing countries or European countries in economic transition. In the case of developed nations in North America, Europe, and Asia, national research centres and universities are in charge of such capacity building efforts, and thus there has been no need to approach IODE in this respect. Nevertheless, there is an overall recognition that the capacity building efforts carried out by IODE are very successful in targeting staff members in developing countries, and that such effort should be continued.

Table 8 displays the number of people trained in their respective region (in the context of the ODINs) through IODE. Africa is leading in terms of the number persons trained, followed by the Indian Ocean. This is to be expected as a large number of training activities have focused specifically in Africa.

[28] See document IOC Medium Term Strategy 2004-2007, IOC/INF-1192, UNESCO, July, 2003. Pages 11 & 12.

Table 8: Number of people trained according to their region.

Source: http://www.iode.org/index.php?option=com_alumni&task=start

Region	Number of people trained
ODINAFRICA	111
ODINCARSA	41
ODINCINDIO	60
ODINECET	34
ODINWESTPAC	38
Total	**284**

When looking at the Priority Survey carried out in 2004 which targeted national coordinators for data and information management, 41 of the 52 respondents (79%) mentioned being satisfied with the way in which IODE is implementing the capacity building efforts through the ODINs and combining training, equipment, and operational support and 11 respondents had mixed opinions (21%)[29] regarding this approach. When confronted with the identification of missing elements in relation to capacity building, respondents presented several issues such as monitoring and assessment of the capacity-building efforts, efforts to carry out capacity building at a more local level or to span different topics; and several respondents manifested their concern regarding the sustainability of such capacity-building efforts should funding from donor countries stop.

Based on these results, it can be stated that IODE has conducted various activities to carry out efforts related to capacity building as stated in the modality.

The next modality which has been contemplated in the IOC Medium Term Strategy is:

> 23. *IODE has developed a strong capacity-building programme, at the national, regional and global level (Ocean Teacher, ODIN networks) that will assist Member States in developing the necessary institutional capacity to manage data and information and to disseminate technical and scientific knowledge. The IODE Committee, during its 17th Session, has recommended that Ocean Teacher gives more attention to "continuous professional development", management of delayed-mode as well as operational data management, and also to prepare material that could be used in graduate courses in marine science/ oceanography to create awareness for the importance for ocean research of quality data management.*

The new web version of Ocean Teacher was put online for the IODE Session in Trieste in March 2007. The Kewl.NextGen eLearning software (developed by the University of the Western Cape, South Africa) was used to implement this new system. The new version improves efficiency because it allows for the development of new courses with a minimum of effort, provided the basic materials are present. The new materials necessary to create new courses can be added to the Library quite easily. The following new features have increased the efficiency and also the impacts of OceanTeacher to the end-users:

- The new Dynamic Content Management System (DCMS) which enables editing of content online
- A hierarchical tree structure enabling directory style browsing
- The ability to manage various types of content, including text, documents and links, with the possibility to add metadata for each type
- The system is indexable by search engines (i.e. Google) and provides functionality for its resources to be harvestable
- The system is partially or fully exportable to a CD – ROM or DVD for distribution in countries without good internet access
- A number of video lectures were recorded during training events at the IODE Project Office for IODE in 2006. The Video lectures have the advantage that the trainees can repeat their training at home and train others in their home institution (IOC/IODE-XIX/43, p. 4)

It is now up to IODE to facilitate the development of the training material focusing on information management, as well as material which could be used in graduate courses.

[29] See: IODE Priority Survey, IOC/IODE-XVII/23, Question 26, page 24.

Therefore, it can be concluded that IODE has been carrying out efforts to comply with the UNESCO-IOC Medium Term Strategy as well.

What were the results achieved during the observed period as relevant to INF-1192?

The IOC Medium-Term Strategy outlines five broad modalities of action to accomplish the commitments of IOC in the UNESCO Medium-Term Strategy. The five broad modalities are[30]:

a) IOC will coordinate the major ocean science programmes for understanding the ocean's role in climate change and the carbon cycle, and will assess man's impact on the oceans.

b) IOC will continue to lead development and implementation of the Global Ocean Observing System (GOOS), as part of an Integrated Global Observing Strategy (IGOS) to improve forecasting of natural phenomena as well as management of coastal seas and their living resources.

c) IOC will build the capacity of developing countries, especially to manage and exchange the marine data and information needed for sustainable development

d) IOC will intensify support to the African Process as a follow-up to the Pan-African Conference on Sustainable Integrated Coastal Management (PACSICOM), to the effect that IOC will concentrate in Africa a significant portion of its field activities, especially in the development of marine data and information networks and integrated coastal management.

e) Furthermore, IOC will improve ocean services to Member States through the new Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology.

While IODE may have some relevance with respect to the five proposed modalities, it is in the third modality where IODE is mentioned explicitly[31]. Within this third modality, five target areas are proposed:

Target Area 1: *IOC will address the need to ensure access to information technologies by all Member States.*

Target Area 2: *IODE will continue to advocate and apply a policy of open and unrestricted flow of ocean data to the international community.*

Target Area 3: *IOC will assist Member States to develop the necessary human and institutional resources to collect, manage and disseminate data and information services and products required by all stakeholders through the development of the regional ODINs.*

Target Area 4: *IODE will employ its strong capacity-building programme based on Ocean Teacher and the ODIN networks to assist Member States in developing the necessary institutional capacity to manage data and information and to disseminate technical and scientific knowledge.*

Target Area 5: *IOC will support the work of IODE in connection with the Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) and in other ways and encourage its efforts to establish widely accepted global standards for marine data.*

[30] IOC-UNESCO Medium Term Strategy, Document IOC/ INF-1192, July 2003. Page 6.
[31] IOC-UNESCO Medium Term Strategy, Document IOC/ INF-1192, July 2003. Pages 11 and 12.

Target Area 1: ensure access to information technologies by all Member States

As it has been stated, IODE has been promoting the use of information technologies by all Members States. In the case of African countries, IODE has provided training to staff members of NODCs, as well as ICT equipment for such NODCs to have access to the internet and to the internet-based databases and services set up by IODE. Of the 21 Member States which have received training regarding the setup of web pages, by 2007 it can be stated that 17 Member States (82%) have set up a web page, 2 Member States (9%) are in the process of establishing it, and 2 Member States (9%) have not established it (see Annex 3). In the case of Latin America and Asia, while the provision of equipment has not taken place, IODE nevertheless has facilitated the elaboration of web-based products, in particular the webpages of NODCs, as well as the various portals that have been set up for the respective ODINs.

In addition, IODE has been promoting the establishment of NMICs and has incorporated IAMSLIC as a strategy to facilitate access to information technologies for information management in Africa and more recently in Latin America. By 2007, Member States have nominated 32 persons as National Coordinators for Marine Information Management. These strategies, along with the promotion of the use of internet as the main mechanism to exchange and disseminate information in terms of portals and webpages is the ideal mechanism when compared to other mechanisms such as printed journals, and less efficient efforts such as mechanisms which involve a restricted communication between a single emitter and a single receptor of information (fax communications by telephone for example). The implementation of the Ocean Portals and the support that IODE is providing to NODCs and NMICs to set up webpages ensures that an emitter of information can reach a wide variety of end-users simultaneously through the internet.

Based on the review of activities and results related to ICT, it can be concluded that IODE has been addressing the need of Member States to use ICTs, and has been most successful in the case of Africa due to the capacity o mobilize external funding for this purpose via the Flanders UNESCO ScienteTrust Fund.

In addition, it can be concluded that the efforts to input both relevant data and information in the internet through the Ocean Portals and webpages is an efficient way to ensure global access to the information.

Target Area 2: advocate and apply a policy of open and unrestricted flow of ocean data to the international community

One way in which IOC is promoting open and free access to data is through the advocacy and application of a policy of open and unrestricted flow of ocean data to the international community. The draft version of the policy was adopted in the June 2002[32] and later adopted by IOC in its 22nd Assembly in June 2003 as Resolution IOC-XXII-6[33].

The recognized need regarding such a policy can be deduced from a review of the national reports elaborated by Member States for IODE Session XVIII. 20 Member States mentioned the lack of a policy as a root-cause which is inhibiting data exchanges and 9 States mentioned problems associated to lack of will of researchers and agencies to share their data. As a follow-up recommendation, 12 Member States suggested IODE to support efforts at the national level to promote this policy (11 of these 12 Member States are among the 20 States that identified the lack of such a policy as a root cause). However, it has also been recognized that in some countries, particularly in the case of South American countries, the issue of disseminating collected data is a concern, as such data is considered as classified in terms of national security. Undoubtedly this is also a concern for such advanced nations in Europe, North America, Asia, and advanced nations in which the respective Naval Armed Forces also generate data which can be considered as classified.

By 2007, a review of the national reports elaborated by Member States for IODE Session XIX indicates

[32] See document IOC/IODE-XVI/3, paragraphs 110-117, pages 16 & 17.
[33] See document IOC/IODE-XVIII/3, paragraph 189, page 23.

that 15 States are applying the IOC policy, 5 countries are not applying it, and 5 States are in the process of considering the implementation of this policy or are applying it to some degree.

Recommendation 4: Only 24 States have made explicit comments on the policy thus far. The IODE **Secretariat should therefore analyze the extent to which the IOC Policy on Data Exchange is having the desired impact.**

Concerning the problems related to the lack of capacity of NODCs to manage data, IODE has been training staff members on issues of data archival and management. A strategy is being promoted within Africa to encourage scientists to elaborate and publish documents so that they can later provide their data to NODCs. In developed Member States funding agencies are requiring researchers to share their data with NODCs after two years from its initial acquisition.

Target Area 3: develop the necessary human and institutional resources to collect, manage and disseminate data and information services and products through the development of its ODINs.

During the interviews conducted for this evaluation, efforts on capacity building to collect, manage, and disseminate data and information have been recognized by many Member States as a task which IODE has been carrying out very well. Regarding the organizations of training activities, courses have been organized by the ODIN networks in their respective geographical areas, and more recently by the IPOI in Oostend, Belgium.

In the context of this evaluation, a survey carried out via a questionnaire requested representatives of NODCs to comment on how IODE identified the needs **specifically on capacity building** in Member States. 24 of 33 respondents stated that IODE routinely identified capacity-building needs. Table 9 presents the outcome of the results:

Table 9: Results of the Survey carried out as part of this evaluation.

Means by which IODE identifies needs and gaps regarding capacity building	Number	%
Through Official Letters or email requests on an annual basis or frequently	11	33%
Through specific questions which need to be addressed in the National Report submitted to IODE every 2 years.	16	48%
During IODE sessions every 2 years, in a particular segment of the session.	14	42%
Through meetings with ODIN coordinators.	13	39%
Only on rare occasions, such as in the case of the recent IODE Priority Survey in 2004.	2	6%

One result which emerged from this survey is the perception regarding the high quality of the capacity-building efforts carried out by IODE targeting developing countries when compared to efforts carried out through other international or regional programmes. 25 out of 33 representatives from NODCs confirm that the capacity building efforts carried out by IODE are better than any efforts conducted through other programmes. The remaining respondents, basically from Europe, state that efforts through SeaDataNet are better than those conducted by IODE. Neverthless, training courses have also organized at the IPOI in Oostende, Belgium with SeaDataNet..

While Ocean Teacher is the main tool employed to develop human capacities, two concerns have been raised during the evaluation:

Language

In recent years, Ocean Teacher has been developed as the main teaching tool to be employed by IODE. In several occasions requests have been made to translate this tool into Spanish, Russian, and Chinese languages. During IODE Session XIX, the issue was raised again. However, two difficulties have been

identified:

1 - The continuous enhancements that this tool undergoes on a regular basis implies that similar regular efforts and resources have to be allocated to keep up to date Ocean Teacher in terms of its translation to any other languages.

2 - The vast amount of contents which Ocean Teacher currently spans.

In addition, existing budget limitations may be impeding IODE to carry out such a translation into other languages. However, while the cost of translating Ocean Teacher into other languages is a costly and time-consuming process, it is important to recognize that the translation into Spanish and Russian languages could have ample benefits when considering that there are many countries which use such languages as national languages, and when considering that these two languages have been recognized as official UN languages.

Recommendation 5:	**The IODE Committee should review the issue of translation of Ocean Teacher into other languages, notably Spanish for Latin America, and Russian for several Member States in the former Soviet Union.**

Size

In recent years, Ocean Teacher has been enhanced with learning modules, references, and more recently lectures displayed on a video format. While such enhancements can be recognized as the proper way to advance in terms of information technlogies, one has to recognize that in some developing countries, where the band-width of the internet is limited, access to such a training product becomes difficult. In addition, because in some countries, particularly in Africa, the use of internet may still be limited due to local high costs, the training of staff using this product could face difficulties, as staff members may not necessarily be able to have full access to all resources contained within this training tool due to the high costs of using internet for prolonged times.

Looking at the comments made by representatives of NODCs, it can be concluded that the efforts on capacity building should be continued by IODE, as they are seen as necessary to enhance the capacities of developing countries, and as being of a very good quality when compared with other efforts.

Recommendation 6:	**The IPOI in Oostend should explore options, which could be foreseen to manage this concern regarding the current size of Ocean Teacher linked to the slow speed of Internet in some developing countries.**

In the context of the ODINs, it has already been stated that the ODINs are being strengthened by IODE through the delegation of a coordinating role in the organization of training courses and other activities. In addition, ODIN AFRICA and ODIN CARSA have benefited from the development of their own Ocean Portals, which constitute the respective web-based platforms for such ODINs to carry out the promotion of activities in terms of information dissemination. The questionnaire which was sent to NODCs and NMICs addressed the question related to the ODINs as mechanisms set up by IODE to coordinate regional tasks. 88% of the respondents (29 out of 33) concluded that the ODINs are providing a better interface to link to IODE to carry out data exchange, archival, and marine information management. In contrast, 6% of the respondents (2 our of 30) responded that the ODINs were complicating the links with IODE, and two respondent did not comment on this issue.

Therefore, it can be concluded that the approach using the ODINs as more local interfaces to link with

IODE and to coordinate efforts is perceived as excellent. The recommendation is then for IODE to continue efforts to strengthen the ODINs which are being set up in other regions of the world.

Target Area 4: assist Member States in developing the necessary institutional capacity to manage data and information and to disseminate technical and scientific knowledge.

As it was presented in the previous sections, IODE has continually carried out efforts through the ODIN networks to build the capacity of institutions in Member States to manage data and information. Efforts by IODE have targeted NODCs rather than isolated persons, and IODE continues to build the network of NODCs. The outcome of such efforts can now be seen through the institutional webpages which have seen set up by these institutions to present not only general information regarding such institutions, but also to disseminate data and information produced within the respective Member State.

Target Area 5: encourage joint IODE/JCOMM efforts to establish widely accepted global standards for marine data

As stated in various documents, IODE is supporting efforts related to data exchange in cooperation with JCOMM. In the case of manuals, IODE and JCOMM have contributed to the elaboration of a guide concerning the collection and exchange of oceanographic data[34]. However, on the mode of data exchange, IODE is more perceived as focusing on the delayed mode, rather than on the real time mode. In contrast, WMO sees itself workin on real-time mode for issues of climate prediction.

The links between IODE and WMO now include efforts related to the management of data to be generated by the Global Earth Observing Systems (GEOS). Under the coordination of the United Nations, three such observing systems have been set up in the 1990s, one for the atmosphere and climate, another one for the oceans and one focusing on terrestrial aspects. However, the three observing systems are basically working independently from the other one. Figure 8 tries to capture the three systems in vertical columns under one roof, but with no connections among them.

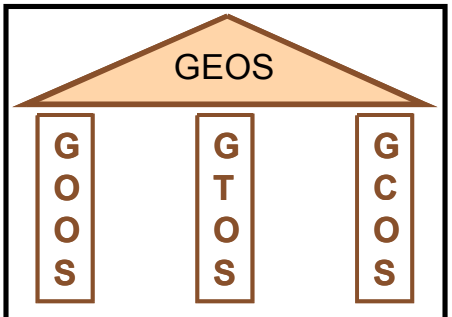


Figure 8: The three global observing systems.

In the context of the Oceans, the Global Ocean Observing System (GOOS) is coordinated by IOC. It has been recognized that IODE should work with the GOOS Scientific Steering Committee in designing and planning data and information management aspects related to GOOS[35]. At this time, it is the impression of the Evaluation Team that IODE is finding most difficulties in supporting international programmes when it comes to GOOS. It may well be that from the perception of GOOS, IODE cannot fulfil its needs in terms of data and information exchange and management, and thus GOOS may seek its own platform to carry out such tasks. GOOS is considering the use of the GOSIC software which has been developed under GOOS to manage data and information exchanges as an alternative to IODE. While there are perceived difficulties to work together, IODE and GOOS continue to try to find avenues of cooperation which may inhibit the duplication of efforts and products.

Therefore, as in the case of UNESCO, it can be concluded that the efforts of IODE can be considered as in line with the mandate regarding capacity building set up by IOC.

[34] Guide to Operational Procedures for the Collection and Exchange of JCOMM Oceanographic Data. IOC Manuals and Guides No. 3, (3rd Rev. Ed.).
[35] See: Document IOC/TT-DMS-I/6, page 39.

5.2 Efficiency and Effectiveness

Quality of organizational management, programme implementation systems and associated resource allocation;

- **To what extent does the IODE management structure (IODE Committee, IODE Officers, Secretariat) use its own system of planning, monitoring and evaluation to implement and adjust its programme activities?**

A review of the documentation elaborated between 2001 and 2006 suggests that IODE has some kind of planning strategy, but such documentation does not display monitoring and evaluation of on-going programs by IODE on a regular basis using a Result-Based Management framework. The identification of projects, activities, and processes to be carried out has been an on-going process in which the entire management structure participates. Tasks are identified and proposed by Member States, ODINs, Groups of Experts, Chairs of Steering Groups, and by IODE Officers. Tasks may be identified from the assessment of needs or weaknesses at the level of NODCs and NMICs, or in response to the recommendations of the Groups of Experts and needs expressed by Chairs of Steering Groups and Project Coordinators. During the IODE Sessions held every two years, a decision is taken regarding which tasks are to be executed in the next biennium. A Budget Working Group is then set up to allocate funding to those tasks which have been approved for execution.

However, it is until very recently that the IODE is embarking on the development and implementation of an RBM framework. The first document outlining an RBM framework which could be used to monitor and evaluate planned activities has only been developed in the fall of 2006[36]. Nevertheless, as mentioned in previous sections of this document, an effort was undertaken by IODE to carry out an internal evaluation, which may have stemmed from the external evaluation of IOC which was conducted in the year 2000. A review of several documents prepared by IODE reveals that there are no benchmarks or indicators to assess the degree to which the proposed objectives are being achieved. Two additional findings which point out to the lack of a planning, monitoring, and evaluation framework can be deduced indirectly from lack of efforts by IODE targeting long-term data archival, and the lack of assessment of the quality of databases in a continuous fashion. If a proper monitoring and evaluation framework was in place, these two issues would have risen immediately.

Therefore, it can be concluded that there is a need for IODE to conduct its activities under an RBM framework, so that it can conduct monitoring and evaluation activities to assess the degree of advancement towards the fulfilment of its proposed objectives. A document prepared by the Coordinator of the IODE Programme serves as a basis to carry out this task.

- **How involved are the IODE main stakeholders (e.g. Data and Information Centres, IOC action addresses) in the activities of the IODE programme?**

To evaluate this issue of stakeholders properly, one must start by determining who the main stakeholders are with respect to IODE. At this time, two such groups could be identified when interviewing staff members of IOC and of the IODE Secretariat:

[36] See Document: IOC/IODE-XIX/46. Guidelines for the Development of the IODE short-term (2008-2009) and medium-term (2008-2013) Work Plan and Budget.

1 - The Directors and staff members of NODCs and NMICs set up by IODE, as well the as staff members dedicated to the ODINs. The identification of this group stems from the fact that it is this group which has direct relation to the tasks carried out by IODE in terms of data and information management, archival, and exchange.

2 – The research community worldwide, which benefits from the efforts of IODE in terms of the data and information management processes carried out by IODE.

When assessing the main efforts of IODE in terms of target groups, it can be stated that the main beneficiaries of such efforts are those in group 1. Considering then the main stakeholders as those within group 1, visits to the IPOI in Oostend revealed that staff members of NODCs in advanced countries are participating as instructors in training courses which target staff members of developing countries. In the context of data management there is evidence that staff members of the NODCs from developing countries are also involved, but as recipients of trainings, and then as developers or facilitators in the exchange of information. Similar results are observed when assessing how the planning process is carried out during the IODE Sessions, where it is the members of Group 1 which basically propose and decide what needs to be done.

In addition, it can be stated that members of the IODE Committee, in particular the Chair and the Vice-Chair actively participate in international meetings representing IODE, as well as in regular activities related to sessions. For example, during the recent IODE Session XIX, the Lead Evaluator witnessed how the Committee engaged all participants in various working groups to discuss which tasks should be carried out, and the Members of the Committee carried out a variety of coordination roles during this session.

Therefore, it can be concluded that if the main stakeholders are those staff members and Directors of NODCs, then such stakeholders are then heavily involved in all activities related to the programme.

- **How does the IODE programme/secretariat interact with UNESCO field offices?**

The interaction between the IODE Secretariat and the UNESCO field Offices is usually minimal. It is important to recognize that IOC has set up regional offices and IODE is setting up ODINs and thus, the IODE Secretariat then interacts mostly with the ODINs, and with the IOC offices, but not with the Field Offices of UNESCO. For example, in the Latin American and Caribbean regions, there is a UNECO-IOC regional office in Cartagena which focuses on a variety of efforts related to all tasks conducted by IOC. ODIN-CARSA has its regional office in Guayaquil, Ecuador. The Regional Office of UNESCO for Education is located in Santiago de Chile. In case of regional meetings coordinated by this IOC regional office, ODIN CARSA has been invited to participate, as well as other members of other programmes of IOC. In developing countries, it is likely that the interaction could be better if both the ODIN or IOC regional offices coincide geographically with the regional offices of UNESCO, as can be seen in the case of Africa, where ODIN AFRICA is located in the building where UNESCO is hosted. Nevertheless, it is interesting to point out the fact that the webpage of the Regional Office of UNESCO in Santiago de Chile and the webpages of the Cluster Offices of UNESCO in various Member states and regions of Latin America do not mention IOC or IODE in their front texts at all.

- **What is the level of staffing, type of staffing and how does this ensure effective and efficient implementation in a sustainable way?**

IODE concentrates its staff in the Paris Headquarters of IOC and more recently in the IPOI in Oostend. The role of the Secretariat is to coordinate sessions, activities and projects carried out within the umbrella of IODE; to provide logistical support to the Committee and the Groups of Experts; to monitor their progress, and to link with other IOC, UN programmes and other international programmes. As such, the

Secretariat handles basically communications with members of the Committee, organizes the biannual IODE sessions, elaborates and manages the required documentation regarding IODE and its activities (reports), keeps the inventory of all IODE documents, and oversees activities carried out by the Groups of Experts and ODINs.

As in the case of other UNESCO programmes, IODE has been experiencing reductions in the type and level of staffing over the years. In the late 90s IODE's Secretariat was supported by a high-rank member, basically acting as Deputy Director of IOC in the level of a P-5 officer, and had the support of a P-3 level officer and a GS staff. At present, the P-3 officer was upgraded to a P-4 level, and took over the post of Coordinator of the Secretariat and the GS staff continues to provide support, but only on a half time basis, as this staff has also been requested to support the GOOS programme. It can be concluded that the reduction in staff within IODE is impacting in the monitoring of projects, processes and activities which is carried out by the Secretariat.

One aspect in terms of staffing in the case of IODE is related to the ODINs, which could be considered as extensions of the Secretariat to the various continents of the world. ODIN AFRICA, having received support through projects funded by the Government of Flanders, is able to provide resources to its Coordinator to carry out a variety of tasks which have allowed several African Member States to become more engaged with IODE and to execute activities in relation to data and information exchanges. ODIN CARSA is in a less advantageous situation, as its coordinator is only contracted on a limited basis and has far less resources to promote the efforts of IODE. As a result, Mexico, Central America, and the Caribbean practically do not participate in activities or IODE, nor are there NODCs set up by these countries. ODIN CINDIO is facing a similar situation as ODIN CARSA. In the case of the Pacific Islands, it has been through the efforts of Australia that IODE is reaching such island states in a limited basis. When looking at figure 3 in page 9, it is easy to conclude that the lack of permanent staff with resources from IODE within the ODINs is not allowing IODE to enhance its network of NODCs particularly in the case of developing countries in some regions of the world.

The use of temporary consultants to cope with the reduction in staff is now employed by IODE to carry out several tasks such as the upgrade of web-based products (web page for example), and to continually enhance OCEAN TEACHER. In addition, technical aspects related to IT, training, and product development have also been delegated to the staff in the IPOI in Oostend.

Another practice within the UN is the use of staff on secondment from agencies in Member States. Such a practice is allowing IOC to cope with staff limitations in relation to the tsunami programme. Nevertheless, there is concern that the adoption of such practices may not provide the long-term sustainability of activities and processes which have been delegated to such UN agencies.

Recommendation 7:	**The IODE Committee should assess how best to proceed with respect to the issue of reduced capacity of the Secretariat considering the fact that IOC is not able to enhance the staff of the Secretariat of IODE.**

- **What is the level and type of programme funding and how does it ensure efficiency, effectiveness, relevance, impact and sustainability of the IODE programme?**

As mentioned before, IODE gathers funding from three sources:

- Contributions from UNESCO which can be either arising from budgetary contributions or from extra-budgetary contributions.
- Contributions from Member States.
- Contributions from international or regional agencies.

Contributions from UNESCO-IOC are channelled to support the Secretariat in carrying out such activities as the organization of sessions, meetings, and networking; to coordinate IODE´s contributions to external projects and links to WMO and other UN agencies, and to facilitate IODE Officers to participate in meetings or events organized by other UN agencies or international agencies.

Considering the diversity of activities, projects, and processes which are carried out in parallel, as well as the resources required to coordinate the execution of all of these, IODE has had to seek extra-budgetary funding to carry out several activities, in particular the IODE sessions which take place every two years. The main extra-budgetary source of funding in this decade has been the Government of Flanders in Belgium. The support includes training efforts, development of software tools, hosting of IODE's portals and other web-pages within the Project Office in Oostend, Belgium, funding for activities in Africa carried out under the coordination of ODIN AFRICA, and support to the IODE Secretariat in the Project Office in Oostend. In addition, it is foreseen that this support could be extended to Latin America, the Caribbean and the Indian Ocean regions. The substantial and long-term contributions provided by the Government of Flanders to Africa and to the Project Office in Oostend are geared to allow IODE to reach solid, concrete results. In this sense, the funding strategy of the Government of Flanders aims at supporting few programmes with sufficient funding over a prolonged time, so that major accomplishments can be achieved instead of targeting too many projects of short duration which may not yield equivalent successes.

Examples of other contributions from organizations which could be considered in the context of IODE are the World Data Centers, which carry out the task related to data rescue, archival, and data exchange through the distribution of catalogues and through the internet.

The Regular Budget allocated by IOC to IODE has been used within the 2002 – 2006 period to carry out a variety of activities such as:

- Organization and execution of the IODE Sessions every two years.
- To provide financial and managerial support for IODE to carry out sessions organized by the Committee and by the Groups of Experts.
- To support its main projects such as GTSPP, GOSUD, Marine XML, MEDI, Ocean Portal, and GODAR.
- To promote the development or upgrade of internet tools such as OCEAN EXPERT and OCEAN TEACHER.
- To support activities carried out by ODIN CARSA, and to a lesser degree ODIN CINDIO.
- To provide seed funding to MIM in terms of travel grants.
- To support activities of the Secretariat, including travel.

A critical issue which emerges as an outcome of this evaluation is the identification of the impacts which the reduction in budgets allocated to IOC by UNESCO and consequently by IOC on IODE is having on such activities. UNESCO has reduced its contributions to this and other programmes to adapt to the reduction in funding provided by Member States and the Lead Evaluator has been made aware that in the year 2007 UNESCO transfered between 1.1% and 1.2% of its overall budget to IOC. In addition, as a consequence of the catastrophic 26 December 2004 Indian Ocean Tsunami, IOC has been requested by the United Nations and by Member States to coordinate and facilitate the implementation of early warning system in this and other oceans. Unfortunately, no additional resources have been provided by UNESCO for the tsunami programme headed by IOC. To carry out all new tsunami-related activities, the Secretariat of IOC has relied basically on extra-budgetary funding. For these reasons, IODE and other IOC programmes have had to adapt to reductions in budgets and staff assigned to their Secretariats.

As expected, budget limitations are impacting this program in several ways, in particular, monitoring of day-to-day activities has been reduced due to the fact that he has to oversee many other activities. Some of the impacts due to lack of funding from UNESCO-IOC in terms of tasks include:

- The need to shorten the length of IODE Sessions.
- No contributions to important projects such as GOSUD, GTSPP, and ASFA, and the cancellation of the participation of the Chairs in important events.
- No new out-reach programmes, particularly in terms of paper products (posters and leaflets). Implying that the only effort regarding outreach is carried out through the web-page.
- No funding to upgrade manuals, or to print biennium Session documents.
- No translation of documents, particularly those related to biennium sessions.
- Library exchange programs now limited to Africa.
- Lack of capacity to coordinate efforts to support other ODINs.

As in the case of UNESCO-IOC, IODE has been able to acquire extra-budgetary funding to carry out its main activities. While this is a temporal solution, it is allowing IODE to manage the reduction in budget allocated by IOC. Among the tasks which are now executed with extra-budgetary funding, the following stand out:

- Web-based portals and pages now maintained in the Project Office in Oostend.
- Continuous enhancement of Ocean Teacher.
- Training courses for African NODCs and NMICs
- E-repositories

In relation to budget allocated to IODE from IOC, no reduction in budget was placed on IODE during the current biennium (2006 – 2007). Nevertheless, during the IODE XIX Session held in Trieste in March, 2007, the IODE Committee was confronted with the request to analyze the feasibility of working with an IOC supplied budget of either $ 50,000.00 or $ 100,000.00. As an outcome of the analysis of IODE with relation to the tasks it carries out, the Budget Working Group concluded that it was impossible for IODE to continue on a budget with the lesser monetary figure and therefore it would only plan for the next biennium with a proposed budget of $ 100,000.00 per year. Even with this financial figure, the Budget Working Group recognized that it could not provide support to all current tasks (projects, activities, and processes), and opted to fund fewer activities.

One segment of funding which had been allocated in previous years to IODE by IOC was related to the area of training and capacity building. However, as of 2004, with the establishment of the cross cutting Capacity Development Unit, this budget allocation was removed from IODE as a means for IOC to maximize the funding provided by UNESCO. There is however an on-going issue with funding capacity building; namely the Capacity Development Unit is initially targeting Directors of National Agencies of Member States, while the IODE Committee would prefer to target staff members within NODCs or within those Marine Information Centres recently established in various countries.

In the context of ODINs, the support provided to ODIN AFRICA is allowing this ODIN to set an example for other ODINs currently in development. Another contribution during the past year stems from the United States and as a result of the April IODE XIX Session, it is expected that additional contributions from the United States may target the Caribbean and Latin America through ODIN CARSA. However, it is to be recognized that other regions of the World (ODINs) have not been targeted with equivalent level of funding, and thus results cannot be achieved at the same speed as in the case of Africa. In this context, targeting Africa is within the lines of action defined in the Medium-Term Strategies of UNESCO and UNESCO-IOC. However, such geographical focus in a particular region is creating an imbalance when it

comes to a UNESCO-IOC program and emerges as a result of the need to target extra-budgetary funding, which may come with some restrictions attached, particularly in terms of geographical areas or tasks.

In conclusion, IODE has been a very efficient programme in terms of using its resources to carry out the tasks which it considers essential to fulfil its objectives. In those cases where budget has been reduced, IODE has been somewhat successful in identifying and securing extra-budgetary funding so that tasks continue to be carried out. Of course, budget reductions have had an impact in stopping some activities, but this is to be understood, as not every task can be executed with extra-budgetary funding.

One concern which UNESCO has to consider when reducing budgets and staff allocations to programmes is the potentially wrong conclusion that donors providing substantial extra-budgetary funding may reach when staff and resources allocated to a particular programme are reduced to a bare minimum.

Considering these findings, the following recommendation is made:

Recommendation 8:	**The IODE Committee should assess how best to proceed in order to reduce the existing gaps in its coverage between the various regions of the world. One possibility could be to explore existing contributions from the Government of Flanders, which could be targeted to such regions.**

- **Could the same results have been achieved at lower costs if alternative programme delivery mechanisms had been applied?**

Considering the types of tasks IODE is executing, the answer to this question is best presented addressing the objectives of IODE in a separate fashion:

Capacity building:

The efforts on capacity building carried out by IODE span the development of training tools, the execution of training activities on a variety of topics related to data and information management and the allocation of ICT equipment within developing countries so that the NODCs and NMIC can carry out such tasks.

Since the year 2001, training activities have been carried out in various regions of the world under the coordination of the ODINs, and with the opening of the IPOI in Oostend this effort is shifting towards Oostend. The IPOI has been fitted with training rooms equipped with the proper hardware and software to carry out the efforts in capacity building which are required by IODE. In addition, links established between IODE and VLIZ allow for training activities to be complemented with practical training in the ocean through the research vessel operated by VLIZ. Considering the fact that such training efforts bring together staff members from many Member States, the opportunity allows not only for networking among such staff, but as a strategy by IODE to continue building its network to continue promoting the tasks which it has been mandated to carry out as part of IOC and UNESCO.

While it is conceivable to carry out training courses in developing countries on selected topics, the setup in Oostend offers the advantage of being able to provide all types of training under the same roof, as well as tools that cannot be accessed efficiently when executing training programmes in developing countries. In addition, mobilization costs within Africa can be very costly. A similar situation could take place in the case of Latin America and in the Central Indian Ocean, where the cost of mobilization of participants within the region may be as costly as the mobilization of participants to Europe.

Therefore, it can be concluded that IODE has been conducting efforts in an efficient way with respect to capacity building. It is unlikely that the same results in terms of quality could be achieved at lower costs using alternative mechanisms.

Dissemination of data and information

In this context, the strategy followed by IODE in terms of promoting efforts basically through the internet is the one that should be expected in terms of efficiency. In comparison to the regular edition, production, and printing of a catalogue for data dissemination and a parallel journal for dissemination of information (research articles, technical articles, etc) in a paper format which could be used for the purpose of disseminating data and information, the internet based approaches offer several advantages:

- Much lower costs of operation for internet products than for printed products, which in addition would incur in high costs related to their mailing using standard Post Offices or private couriers when considering the dissemination in a global scale.
- Dissemination of efforts is dispersed by IODE to participating Member States, as IODE is requesting NODCs in Member States to set up institutional webpages for this purpose.
- Dissemination of data and information in portals (Ocean Portal, African Ocean Portal, Portal Oceanico), which can be downloaded by any interested end-user.

In the context of the use of internet, there are many platforms that allow for the dissemination of information, as well as engines to discover data and information. However, from the point of view of staff members within NODCs, using search engines such as google does not necessarily lead to the discovery of information with a certain minimum level of quality. As part of the survey carried out for this evaluation, NODCs and NMICs were confronted with the issue of comparing both the IODE search engines such as the Ocean Portals and Google or other commercial search engines. 67% of the respondents commented that the use of the IODE-based search engines ensured access to information of good quality. In contrast, 15% of the respondents commented that Google and other commercial search engines offer access to information of equal quality to that accessed through IODE and 12% of the respondents commented that quality of information was still not a concern, but just access to information of any kind.

As in the previous cases, it can be concluded that IODE has been carrying out these activities in an efficient way and it is unlikely that costs could be lower through alternative means such as paper-format publications.

Data archiving

In this case of data archiving, IODE could have been promoting the establishment of a main data collection center, possible within its Headquarters in Paris. However, since decades ago, IODE has found an alternative way in terms of delegating this task to the World Data Centers and NODCs. As such, the four World Data Centers and many NODCs have been gathering, recovering, archiving, cataloguing, and distributing data. .

An attempt to establish such a database in the Headquarters of IOC in Paris could also run into the same problems that other IODE web-based tools were experiencing with respect to limited bandwidth, which translated into slower speeds to access and retrieve information. Such problems promoted IODE to move its web-based products to the IPOI in Oostend.

Based on this finding, it can be concluded that IODE has been quite successful in finding other agencies to carry out this task. However, efforts at the level of NODCs are required to ensure that data archiving is also being carried out in these countries in a reliable fashion, as it has been mentioned by representatives

of some NODCs in developing countries that some data has been lost due to factors such as the lack of access to such data stored in obsolete equipment, or due to the fact that it had not been properly archived and was lost.

- **Preliminary assessment of the IOC Project Office for IODE and its future potential;**
  - **How does the IOC Project Office for IODE improve efficiency, effectiveness, relevance, and impact of the IODE programme?**

The IPOI was officially inaugurated in the year 2005 during the XVIII Session of IODE. The Project Office has been set up to:

- Conduct training courses as part of the capacity-building efforts which have been delegated to IODE by IOC.
- Facilitate the development of web-based products such as the Ocean Portals, Ocean Teacher, Ocean Docs and Ocean Expert.
- Facilitate the development of tools and products on behalf of IODE.
- Hosting of web-pages for IODE and its NODCs.
- Providing administrative support to the Secretariat of IODE.

As it has been described in previous sections, the IPOI has been executing a variety of activities within the topics described above. In terms of efficiency, it has been stated that the operational mode within the office allows for more efficient procurement and acquisition of resources in terms of administrative processes and in a timely fashion. It has been commented that similar processes would take much longer to be carried out in the IOC Headquarters in Paris.

With respect to effectiveness, it can be concluded that the IPOI is allowing IODE to reach several of its proposed objectives, particularly on capacity building; data and information exchange via the development of web-based tools and the hosting of NODC webpages; and the improvements to existing products such as the Portals, Ocean Teacher and other IT products.

In terms of impacts, the Project Office is providing an environment which allows IODE to carry out its activities related to dissemination of data and information through its computerized facilities. The large computing capacity within the Project Office is allowing for the hosting of the web-pages of NODCs of several Member States, improving thus access from a global-level point of view to the information and the data contained in such webpages. Nevertheless, the webpages continue to be managed from the respective NODC.

  - **What recommendations can be made to improve and expand the future potential of the IOC Project Office for IODE?**

At first glance, the IPOI is an ideal set up for IODE to conduct training courses, to manage its web-based tools, to develop new web-based products, and to support activities of the Secretariat. Five areas where the IPOI could be expanded to strengthen IODE are:

1 – To facilitate the development of web-based tools for the exchange of data in a real-time format. The most obvious need at this time in the context of IOC is related to tsunami warnings. As IODE has the task to focus on data and information exchanges and the Project Office in Oostend has been fitted with tools for such a purpose, IOC could also use the potential of this Office for such a purpose. The IPOI offers the

tools to develop such methods to transfer data quickly across oceans, and has network of NODCs around the world to test such methods before launching them for their use as part of the tsunami early warning efforts.

2 – The training facilities within the Project Office in Oostend offer an excellent platform for the conduction of training programmes in other areas of interest to IOC. One training session has already been carried in the topic of tsunamis in the year 2007, and IOC could use such facilities for similar purposes in the context of GOOS and other programmes which contemplate the exchange of data or information within IOC.

3 – The Project Office could be used to carry out the tasks which have been recommended by the IODE internal review process in terms of reviewing the quality of data stored in databases and to coordinate efforts in terms of enhancing the interaction among the four World Data Centers when it comes to data management. It has been recognized that the World Data Centers need to interact more efficiently to avoid duplication of data, to analyze the different inventories and databases to sort out duplicates. The IPOI provides an excellent environment for these World Data Centers to conceive ways in which to advance.

4 – As an outcome of this evaluation and of the internal review process, it has been recognized that there are no benchmarks or indicators to assess how much data and information are being exchanged, so that IODE can detect gaps and needs. To this end, the Project Office coul help IODE establish such a working group to look at this issue, so that IODE can then assess the impact of its training programs but in terms of the amount and quality of data being exchanged among NODCs, and among other agencies.

5 – The Project Office in Oostend hosts excellent facilities to carry out particular types of awareness activities focusing on the research community. As it has been stated, the research community does not make use of the potential of IODE for data and information exchange. The execution of seminars and workshops in the facilities provided by the Project Office offers an opportunity to target this scientific community, so that the community is exposed to the work carried out by IODE and so that the community also manifests ways in which IODE could meet their needs regarding data exchanges, long-term archival, etc.

5.3 Effectiveness: from products to objectives

This segment of the evaluation focuses on the issue of whether the diverse products which have emerged and which continue to emerge from IODE are fulfilling the objectives which were set for this programme. The corresponding segment of the RBM matrix is presented in figure 10. When carrying out the assessment of effectiveness, one of the main difficulties which arises is the identification of guidelines to assess whether the objectives have been achieved or not. This difficulty stems from the generality with which the objectives have been defined, as well as the fact that when a program is dealing with data and information, technology is now essential, and unfortunately, information technology is changing on a daily basis. This rapid and continuous evolution in technology is perceived within the IODE community as a need to keep up to date with such technology. As such, IODE has been upgrading its products and processes according to new information technology trends. In this respect, it may well have been that some of the objectives were achieved a long time ago, but because of technological innovations, the trend followed by IODE is to continue upgrading all its tasks in a permanent basis. The difficulty then arises regarding how to assess if IODE has or not achieved an objective.

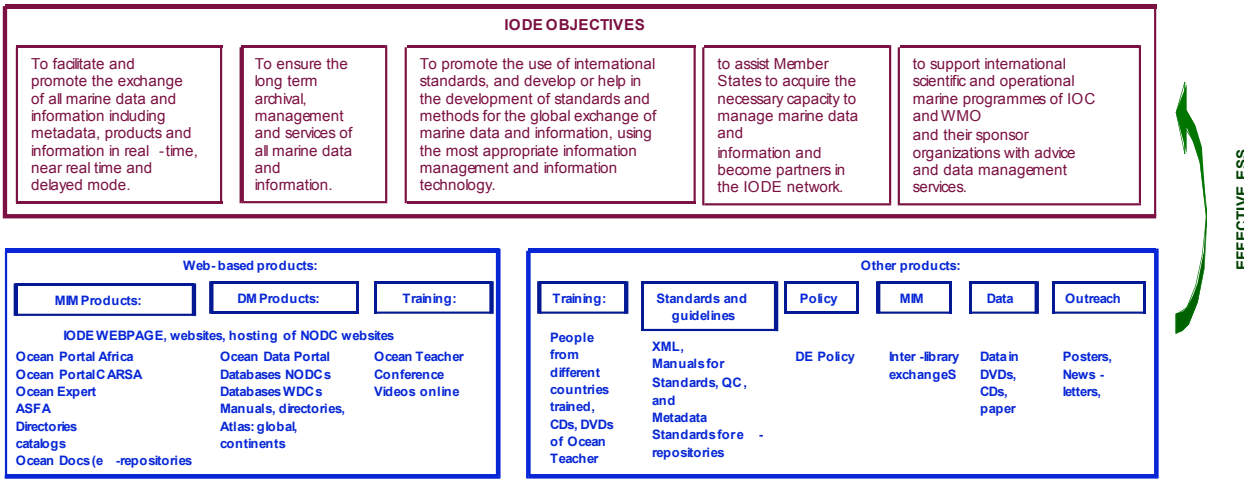


Figure 8: From Products and Outcomes to Objectives in IODE – Effectiveness.

One aspect that is important to mention in relation to effectiveness relates to expectations which may stem both from UNESCO-IOC and from the IODE Committee concerning tasks and related products or outcomes. From one point of view, representatives from Member States who attend the IODE sessions may wish to see IODE focus on a set of particular tasks with the expectation that some goals may be reached. In contrast, UNESCO-IOC may wish IODE to address other areas or topics, or may wish to address tasks in a particular way. The capacity building task is one such example, where IODE may wish to target technical staff directly linked to data exchange and information management, whereas UNESCO-IOC has introduced a strategy of targeting initially Directors of agencies in terms of capacity building.

In the context of data and information exchange, IODE has been finding ways to interact efficiently with JCOMM, and efforts are taking place for IODE to interact with GOOS, both of which are coordinated by UNESCO. However, GOOS may be looking for alternatives to its data exchange process. Thus, it is important to assess the differences in perceptions regarding whether IODE should constitute a cross-cutting platform for all IOC programmes, or just as a platform for the Member States which participate more actively in IODE. One particular view stemming from Member States[37] is the fact that IODE is the only platform for NODCs to exchange data, experiences, and lessons learned. In this context, IODE is then seen as an internal platform to fulfil the needs of NODCs and NMICs. In the broader context, IODE would be requested to collaborate with GOOS, JCOMM, and with the Tsunami unit, all of which may demand more resources and products than what IODE can accommodate with its limited funding, and with extra-budgetary funding. As this is a general issue which is taking place within IOC when it comes to its programmes, it is recommended that the IOC Secretariat assess such issues with the support of the staff and a selected group of Officers from each programme, so that agreements can be reached through the exposition of expectations stemming from each Committee of each particular group.

The following sections outline the assessment of effectiveness from the point of view of each proposed objective.

5.3.1 Data exchange

Data exchange

In the case of IOC programmes, and in the particular case of IODE, continuous advances in information technology are fuelling the continuous upgrade of web-based products. During the evaluation, attempts were made to identify the use of indicators to track the progress concerning tasks very closely related to

the main objectives. In particular, on the issue of data exchange attempts were made to identify whether there was any progress in recent years in relation to data exchange. However, there are no indicators set up by IODE to track this activity. As such, it is difficult for IODE officers at this time to track how successful their efforts may be in enhancing the amount of data being exchanged or archived within NODCs. As an outcome of the survey carried out for this evaluation, 12 of 33 respondents (36%) stated the fact that their respective NODCs were measuring the amount of data exchanged while 20 respondents (61%) indicated that no measurements were being made regarding data exchanges. In many cases, data exchanges are now carried out automatically through webpages. However, no counters have been fitted within such webpages to keep track of users logging into these webpages, nor to keep track of the amount of data downloaded through such webpages. Only advanced agencies are keeping such a record of data archived and exchanged, among them the World Data Centres, in particular WCD-A. Recent publications by this WDC display the year-to-year evolution in data stored by type.

Regarding the actual pertinence of this task, the survey carried out for this evaluation indicates that 4 out of 33 Member States which responded the questionnaire carry out this task at the request of IODE, whereas 16 Member States carry it because it has been recognized as an essential task to be performed by the NODC and IODE offers resources to assist in its execution. 12 Member States indicate that they execute this task as a combination of the two previous options and only 2 Member States mentioned that efforts are underway to carry out such a task.

Combining the information gathered from documents prepared by IODE, interviews with staff of IOC, representatives of Member States, and considering the capacity-building definition proposed by the Capacity-Building Unit of UNESCO-IOC, it can be concluded that for any Member State to carry out an exchange of data with other Member States, six requirements have to be met. These requirements are presented in Table 10.

Table 10: The six requirements for data and information exchange

Data is available to be exchanged.	Top management in national institutions hosting the NODCs convinced of benefits regarding Data and Information exchange.	There is human capacity to carry out the exchange of data.	Mechanisms, standards, hardware and software to exchange data and information are available and operational.	There are no restrictions to the exchange of data or information (national security concerns or concerns from private sector).	External agencies and researchers willing to exchange data or information.

While there is no particular ranking of these six factors, it is essential to begin with the issue of data. Data has to be there in order for it to be exchanged. Whereas IODE might have started back in the 60s to promote the exchange of data to learn about the oceans; since the 80s the trend has been one of understanding not just the oceans, but their dynamic nature: changes in time a space. Developed nations have been generating data for centuries, and now, with the support of such nations, even developing nations are beginning to generate and exchange data. One such example is the sea-level data, whereby developing countries around the world have been supplied with sea-level gauges which generate and transmit in real time data to global centres, where they are then processed and finally put on a web-page for global dissemination.

While it is not the direct task of IODE to promote the generation of data, it has been involved in promoting its exchange over the decades through the NODCs and through the World Data Centres. Data is finding its way into these centres, where it is introduced into databases and later disseminated through various means. One important process carried out by the World Data Center in the United States is the recovery of old data, as well as data in various non-typical formats through the Global Ocean Data Archaeology and Rescue Project (GODAR). Data rescued within this project is provided by countries around the World, and then finds its way back to such countries in a format which is now easily accessible.

The second requirement in order to carry out data exchanges has been clearly identified by the Capacity-Building Unit of UNESCO-IOC, which began its training activities targeting the Directors of National Agencies, with the aim of enhancing the awareness of such Directors on all issues related to data exchange and information management.

The next two requirements are complementary to each other, in the sense that staff members need to have the required training on how to use the tools and methods to carry out data exchanges and archival (hardware, communication platforms and software), as well as access to such tools and methods. As mentioned earlier, IODE learned the lesson that simply training individuals was in some cases not enough to achieve the process of data exchange, archival, and information management in developing countries. Therefore, IODE has facilitated the access to internet to NODCs in several developing countries and donated hardware and software so that trained staff could carry out such tasks.

The fifth requirement concerning the capacity to exchange data stems from the experience of IODE and IOC that not in all cases national agencies are willing to exchange or disseminate data regarding their oceans and marine environment. The typical example is related to data which is generated by the Naval Armed Forces of many countries, which has to be guarded for national security reasons. Nevertheless, IODE and IOC are striving to facilitate the exchange and dissemination of data through the Oceanographic Data Exchange Policy established by IOC that promotes the timely, free and unrestricted international exchange of oceanographic data and associated metadata that is essential for the efficient acquisition, integration and use of ocean observations gathered by the countries of the world.

The sixth requirement focuses on the need or will for people in other institutions to also be interested in the exchange of data and/or information. As it has been mentioned previously, the research community does not necessarily share data, but information. Nevertheless, IODE has promoted the exchange of data through the network of NODCs.

As stated before, when confronted with the question regarding whether the NODCs are measuring the amount of data exchanged during the survey conducted for this evaluation, 61% of the respondents indicated that the NODC was not measuring the amount of data exchanged, while 36% commented that the NODC was executing such measurements. When confronted with the question regarding how much data or information was being exchange, several NODCs or NMICs supplied an answer, but the units mentioned varied from NODC to NODC. Examples of units to measure the amount of data exchange mentioned by respondents include: titles, megabytes or gigabytes, cruises, data sets, and queries.

In contrast, most NODCs which are not measuring the amount of data exchange indicated that they do not execute this task either because it has not been set up in their respective webpages (46%), or because it has not been identified as a required task (46%), or because it could be too costly (8%) to carry out this task.

In conclusion, it can be stated that exchanges of data and information are taking place, but it is difficult to assess improvements in recent years as there are no methods or indicators to assess this issue at the level of NODCs. However, World Data Centers continue to receive data from NODCs, and this is indeed tracked through publications elaborated by such centers.

Recommendation 9:	**IODE should consider establishing an inter-sessional working group to look into this issue of how to evaluate the amount of data, which is being exchanged, so that indicators can be developed for the different types of data being exchanged (physical, chemical, biological) in order for IODE to be able to track the progress being made over the years. The IPOI could offer an excellent environment to support this working group.**

Tools and methods for data exchange

With respect to the tools or methods to carry out data and information exchanges, during IODE Session XVI, the importance of recognizing the technological developments within the internet was highlighted to the point that IODE should adopt internet-based technologies such as the eXtensible Markup Language (XML) for this purpose. During that session, the Working Group GETADE (which later became the JCOMM/IODE ETDMP) presented the following medium-term objectives concerning data exchange:

- To develop an End-to-end Data Management Framework strategy and appropriate projects, products and services, based on user requirements;
- To develop an IODE Global metadata management system;
- To develop a marine XML as a mechanism to facilitate format and platform independent information, metadata and data exchange;
- To develop the IODE Resource Kit as a marine data and information management reference tool for scientists and data/information managers;

Recognizing the variety of formats in which data is acquired (precision, measuring units), as well as the format in which data is stored throughout the world, IODE has realized the need to develop tools which can manage such a variety. The End-to-End Data Exchange project is focusing on developing a web-based tool which may be capable of handling such differences, manage the conversion of units, and provide the user with the data in the desired format. Such a tool, referred to as the "DATA-ATM" will undoubtedly provide an optimum platform for the extraction of data from its databases which may be located in any NODC or WDC.

In the context of databases and their management, the evolution of the ocean research community and the enhanced interests in oceanographic and marine research have led to the establishment of not one, but several agencies or institutions devoted to various aspects related to ocean and marine sciences within countries. This enhanced institutional capacity is leading to the establishment of distributed data bases, whereby the NODC serves as a coordinator of agencies and data, but such data is held and sent to WDCs or to regional data centres such as ICES directly. In recent sessions, IODE has thus begun to promote the trend to migrate to such a framework of distributed databases.

When assessing the effort carried out by IODE in conjunction with IOC, it can be concluded that IODE is maintaining efforts to improve tools and methods to facilitate data exchanges.

5.3.2 Long-term data archiving

As in the case of data exchanges, a review of documents prepared by IODE and outcomes from interviews allow for the conclusion that there are five requirements which have to be met to carry out the task associated with data archiving. These requirements are presented in Table 11.

Table 11: The five requirements for data and information archiving.

Top management in national institutions hosting the NODCs convinced of benefits regarding Data and Information archival.	**Data is available to be archived.**	**There is human capacity to carry out the archiving of data.**	**Mechanisms, standards, hardware and software to archive data and information are available and operational.**	**There are no restrictions to the archiving of data or information.**

In the context of long-term data archiving, IODE officers indicate that this task should be carried out by NODCs and by the WDCs. However, as mentioned in the previous section, few scientists send their data

to the WDCs, although European NODCs send their data to ICES, which in turn sends it to the WDCs. In the context of the National Reports submitted in IODE Session XVIII, twelve Member States acknowledge sending their data to the WDCs; two States acknowledge sending some data, and three do not send their data because of lack of capacity or interest or because of national security concerns.

In the context of NODCs, the survey carried as part of this evaluation provides the following results:

Table 12: Site where data is archived. Source: IODE evaluation 2007.

Sites where to archive data	Number	%
Data is archived in locally within NODC.	20	61%
Data is sent to a national facility, other than the NODC, for long-term archival.	1	3%
Data is sent to one of the WDCs or similar (ICES) for long-term archival.	8	24%
Two or three options listed above are carried out in parallel	14	42%
Data is not archived.	1	3%

Despite the fact that most countries use one or two modes to archive data, a critical aspect within IODE is the lack of attention with respect to this issue of long-term data archival, as it has not been explicitly addressed in quite a long time. A review of the IODE Session documents related to Sessions XVI, XVII, XVIII, and XIX, as well as a review of the two surveys carried out by IODE, and a review of the questions proposed by IODE for Member States to be answered in the National Reports submitted for the sessions yields no links to this topic. In addition, IODE has recognized that there problems regarding the quality of data sets archived in the WDCs[38] but has not given attention to this issue.

Recommendation 10:	**IODE should facilitate networking activities among WDCs so that issues related to quality control of data, management of duplicate data sets, flagging of particular data sets, and partition of data to be archived within the WDCs are addressed and the required actions put in place. The Project Office in Oostend could offer the most appropriate environment to facilitate such networking activities.**

The issue of long-term archival takes on particular relevance in the case of developing countries which have experienced problems with respect to archival of data during migrations from one computer platform to another, or due to the incapacity to access data because of obsolete or defective equipment. In the survey carried out as part of this evaluation concerning problems with archiving and accessing data, representatives of NODCs from 30 Members States responded as follows:

Table 13: Problems identified by Member States regarding long-term data storage and retrieval. (Source: IODE evaluation, 2007).

Type of problem	Number of Member States which experienced this problem	Comments
Data was lost during the migration from one mainframe computer to another one.	4 (12%)	Mostly in developing Member States
Data was lost due to permanent damage of storage device where data was stored.	5 (15%)	Mostly in developing Member States
Data is stored in a medium which can no longer be accessed (equipment no longer available to retrieve data).	13 (39%)	Problem spans developing and developed Member States
Another reason, please comment:	3 (9%)	One problem identified was a virus infection in the files.

It is interesting to consider that 4 NODC Coordinators mentioned experiencing two of these problems. Nevertheless, as expected, these problems manifest themselves mostly in developing countries, as well as

[38] See document IOC/IODE-XIX/3, paragraphs 78, 84, and 91 in pages 11 and 13.

in few eastern European countries.

When discussing the issue of sending original data tapes to developed countries for data retrieval, there is now a concern among African countries, as there was one unfortunate experience where both the data and the media where it was stored were lost. This loss of data is to be avoided as such data cannot be recuperated once lost.

The value of archiving data in the World Data Centers has been acknowledged by some NODCs which have encountered serious problems when migrating archives from one computer platform to the other. In the cases where such NODCs continually send their data to the WDCs for long-term archival, the re-establishment of the database has been easily achieved with the support of such WDCs.

The results from the survey carried out as part of this evaluation regarding the actual pertinence of data archiving within NODCs are similar to those related to data exchange: 6 Member States manifest executing this task as a request proposed by IODE; 10 Member States execute it regardless of IODE, but recognize the benefits obtained from IODE when conducting it; and 15 Member States comment that the task is carried out both as an internally recognized need and because it emanates as a request from IODE.

Recommendation 11:	**IODE should set up an inter-sessional working group to assess the magnitude of data losses, and identify corrective actions, and strategies to manage the problem. Based on the outcomes, the working group could then identify corrective actions and promote their implementation via efforts targeted through the IPOI in Oostend. The justification for this recommendation stems directly from one of the five main objectives of IODE.**

5.3.3 International standards for the global exchange of marine data and information

In the context of global exchanges, the first issue that should be considered is quality control regarding the data to be exchanged. IODE has been active in this area for decades developing manuals and promoting the topic. The first mention of quality control in an IOC manual can be found in the **Manual on international oceanographic data exchange**[39]. In this manual, the Working Group on Oceanographic Data Exchange stated that it was the responsibility of the national centres to implement quality control measures to their data prior to submitting such data to the World Data Centres. In addition, it foresaw the role of such WDCs in monitoring the quality of incoming data and advising national centers of any errors detected.

As explained in the **Manual of Quality Control Procedures for Validation of Oceanographic Data**,[40] "*quality control comprises all actions of the data originator in connection with data collection and validation and quality tests of her or his own data set. Only after these tests should the data be included in a database or distributed to users via international or national data exchange*". The need for quality control starts in the context of the IODE programme with the NODCs. As stated in the revised version of the Guide for **Establishing a National Oceanographic Data Centre** [41] elaborated by IODE, one of the

[39] IOC Manual **No 1**. UNESCO, 1965. Part III, page 15. The document can be downloaded from the IODE web page in this site:
[40] IOC Manuals and Guides **No. 26**. SC-93/WS-19, UNESCO, 1993. The document can be downloaded from the IODE web page in this site:
http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=874
[41] IOC Manuals and Guides **No. 5** (rev). Section on Quality Control, page 20.

most important activities that contribute to the performance and reputation of an NODC is the quality control it applies to the data and information it holds and distributes, as such quality control will directly impact on the image of the NODC as a reliable or non-reliable source of information.

Other manuals which can be downloaded from IODE´s webpage on quality control include[42]:

- **A General formatting system for geo-referenced data, v. 1: Introductory guide to the GF3 formatting system.** IOC Manuals and guides **No. 17** - Volume 1.
- **Guide to operational procedures for the collection and exchange of oceanographic data (bathy and tesac).** IOC Manuals and Guides **No. 3**, (1st Rev. Ed.).

From the point of view of the NODCs and NMICs, the need to strengthen capacities on quality control and management of metadata has been highlighted in the IODE Priority Survey conducted in September-October 2004. Question 19 addressed the issues related to data quality and the results are reproduced in table 14. As it can be seen, most respondents from National Data Centres identified as prime targets the needs to develop manuals and guidelines for metadata management (80%) and quality control (72%).

Table 14: Outcomes related to Quality Control and Data Management. IODE Priority Survey, 2004.

19. Should IODE work on developing manuals and guides for the following:		
Response Percent	**Response Total**	**Percentage**
How to set up a data centre	**39**	60.9%
How to prepare and manage metadata	**51**	79.7%
How to quality control data	**46**	71.9%
How to format data	**32**	50%
How to set up an oceanographic data base	**36**	56.2%
How to put data on line	**39**	60.9%
How to build a library catalogue	**26**	40.6%
How to serve a library catalogue over the web	**36**	56.2%
Other (please specify)	**11**	17.2%

Total Respondents	**64**
(skipped this question)	**9**

While efforts have attempted to promote quality control with respect to the data, one of the conclusions reached by the IODE Internal Review Team and by the Working Group on Quality Control of Ocean Profile Data is the fact that the issue of quality assurance is under-developed and that IODE has not been able to create global data sets of the same quality[43] as data archived in NODCs varies in quality. To this end, IODE established a Working Group on Quality Control of Ocean Profile Data during Session XVIII with the following goals[44]:

(i) review existing quality control procedures and software;

(ii) discuss quality control issues of historical, real-time, delayed-mode and modern ocean profile data;

(iii) prepare a report on (i) and (ii) above.

[42] IODE manuals and guides can be found in this site: http://www.iode.org/index.php?option=com_oe&task=viewDoclistRecord&doclistID=9

[43] See document: **Follow-up to the IODE Review**, IOC/IODE-XIX/11 prepared by P. Pissierssens, pages 1 & 2. See also document IOC/IODE-XIX/3, section Quality Control / Quality Assessment, paragraphs 121-142, pages 17-20.

[44] See document IOC/IODE-XVIII/3, Resolution IODE-VIII.4, Annex II, page 3.

This effort should complement the identified need[45] regarding the revision of the Guide "**Manual of Quality Control Procedures for Validation of Oceanographic Data**" published in 1997. In addition, as mentioned in during Session XIX, the concern will be addressed by means of the insertion of a training segment within Ocean Teacher through course number DM 209 focusing on oceanographic data quality control[46].

The incorporation of the use of metadata within IODE probably began in the late 90s, as it is not mentioned explicitly in the **Guide to establishing a National Oceanographic Data Centre** in 1997 (revised version), but is mentioned explicitly several times during session XVI in the year 2000 and in subsequent sessions. The implementation of metadata directories within NODCs has enhanced its technical standing as such directories allow end-users to find out particular information concerning the data they wish to acquire and use.

When analyzing the answers to the questions related to metadata in the National Report submitted by Member States for IODE Session XIX, 24 States confirmed having a metadata catalogue or directory, while 6 confirmed not having such a catalogue. Of the 24 States which have a catalogue, 12 have published it on the web, while the remaining 12 have not published it on the web. Considering the fact that there are 65 registered NODCs within IODE, it would be interesting for IODE to complete the survey and assess how best to structure the metadata guidelines as requested by NODCs through the IODE Priority Survey (table 5).

Recommendation 12:	**IODE should conduct a global survey to address the issue of the metadata catalogues, and to identify needs to be approached in the guidelines to be developed with respect to such catalogues. It should also stress the issue of placing such catalogues on the web pages as indicators that the process can be reviewed externally and by IODE.**

In the context of this evaluation, NODC coordinators were requested to comment on the usefulness of guidelines related to quality standards. Table 15 presents results from this survey:

Table 15: Comments from NODCs regarding guidelines elaborated by IODE. Source: IODE evaluation, 2007).

Comments on guidelines	Number of Member States	%
Most guidelines are implemented easily taking into account existing capacities in NODC.	16	48%
Few guidelines are implemented taking into account existing capacities in NODC.	9	27%
Insufficient guidelines have been produced by IODE and more attention should be given to this.	3	9%
Guidelines are not implemented yet, these can only be implemented with additional capacities (human, equipment, other).	5	15%

As it can be seen, most respondents concluded that guidelines are being applied with existing capacities (48%), whereas only in few cases (27%) is there a problem with respect to the application of guidelines due to lack of capacities. In addition, only a minority responded mentioned the issue of insufficient guidelines (10%).

However, a more relevant issue to address is related to whether other international or regional programmes adopt the guidelines elaborated by IODE, of whether they promote the use of other types of guidelines. Table 16 summarizes responses from coordinators of NODCs with respect to this issue.

[45] See document IOC/IODE-XIX/3, paragraph 42 in page 7.
[46] See document IOC/IODE-XIX/3, paragraph 136 in page 19.

Looking at the results of the table, it can be concluded that most international and regional projects are willing to use the guidelines developed by IODE.

Table 16: Comments from NODCs regarding the adoption of guidelines elaborated by IODE by other international and regional programmes. Source: IODE evaluation, 2007).

Comments on guidelines in the context of other programmes	Number of Member States	%
The Guidelines developed by IODE for data quality are recognized by all such projects and programs, and are adopted (that is, there is no demand to adopt new guidelines by such projects).	9	27%
Few projects or programs require the adoption of new guidelines, different from those developed by IODE.	15	45%
Most of these projects or programs require the adoption of new guidelines, different from those developed by IODE.	2	6%
Insufficient guidelines have been produced by IODE and more attention should be given to this.	3	9%

In conclusion, it can be stated that IODE has identified the need to look into this issue and is conducting tasks through its inter-sessional working group to address such needs.

5.3.4 Assisting Member States to build information management capacities

As it has been stated, IODE has been facilitating a series of activities to build institutional capacities within Member States in regards to information management. Efforts along these lines are:

- The establishment of a specific Group of Experts on Marine Information Management to guide IODE regarding how to proceed with respect to this issue.
- The establishment of national coordinators for information management and their subsequent training on such activities.
- The establishment of links with IAMSLIC to support on the efforts related to the training of staff and support in terms of information management.
- The development of tools to facilitate such information management, in particular web-based tools.

However, as stated before, IODE has not set up indicators or benchmarks to measure advances and to identify weaknesses or needs within Member States. Nevertheless, a survey targeting NODCs and NMICs during this evaluation reveals that 8% of the respondents carry out marine information management activities as part of their routine tasks, while 12% carry out such tasks as a request from IODE and the remaining respondents comment that the task is executed because of both reasons (it is an institutional task, and it has been requested by IODE).

5.3.5 Supporting international scientific and operation marine programmes, WMO, etc.

As mentioned before, IODE has been supporting WMO through JCOMM, and is supporting additional programmes such as GOOS, HAB, and more recently the International Polar Year to the extent of its capacities. Therefore, it can be concluded that IODE is providing such support.

When analyzing the matrix related to effectiveness presented in figure 8 and the tasks carried out in the past years, it can be concluded that IODE has been focusing its efforts on four of the five objectives. The

one that lags behind is related to long-term archival of data. However, it can be stated that a variety of efforts have been carried out to achieve the objectives.

5.4 Impacts

The extent to which IODE activities, including those specifically targeted at capacity-building, benefit Member States;

When carrying out the assessment of impacts, one should ask whether the objectives and tasks carried out are providing any support to such external agencies and projects or programmes. The corresponding segment of the RBM matrix is presented in figure 9.

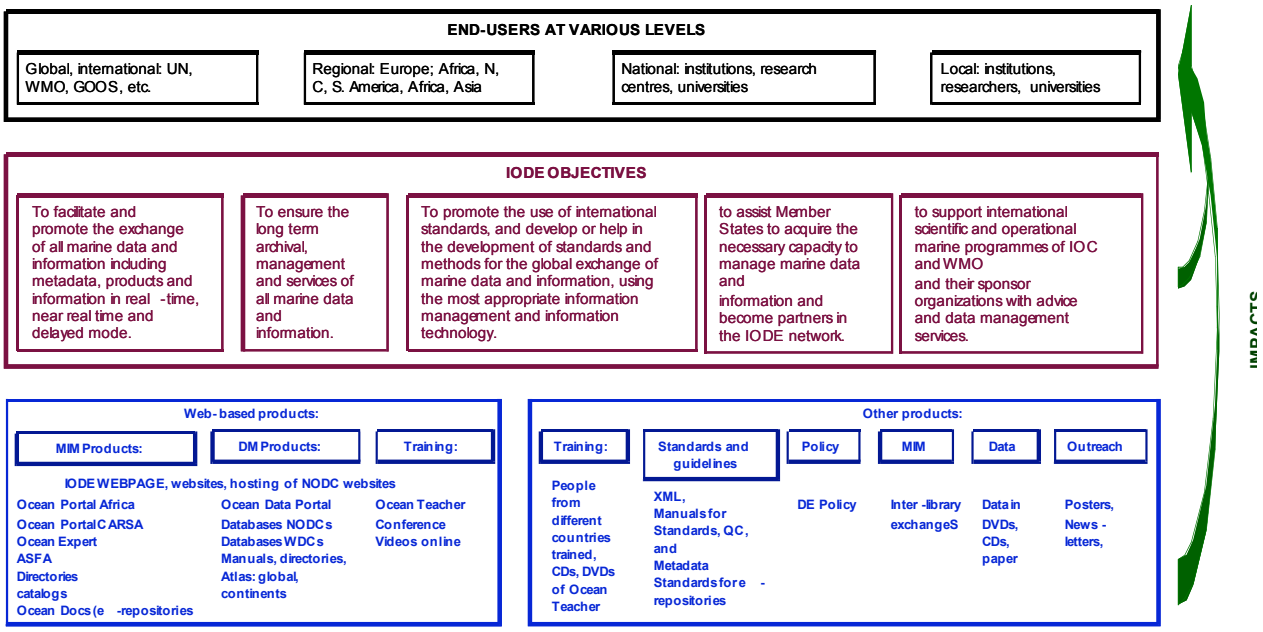


Figure 12: Impact of IODE in the context of global, regional, and national efforts.

In the case of impacts, several national, regional and international agencies in particular regions of the world have manifested the usefulness of the efforts carried out by IODE in terms of establishing capacities to carry out both data and information management activities. However, the funding allocated to IODE by IOC, as well as the available extra-budgetary funding may not be sufficient to generate impacts in other regions of the world where there may be needs regarding data and information exchange, as well as on capacity building. There are large gaps in terms of efforts by IODE targeting Mesoamerica, which spans the region from Mexico to Panama; the Caribbean, the Pacific Islands, and South East Asia. In addition, there are identified needs in terms of looking at the quality of data and information to propose minimum standards and to build a solid program which incorporates metadata. Nevertheless, in the following paragraphs impacts are discussed in terms of Member States and regional and international agencies.

- **What have been the effects of the programme (IODE) on Member States?**

Member States comment that IODE has been useful to their agencies in several ways. In the context of developed countries, the usefulness resides on the exchange of data. As recognized by representatives of the United States, Canada, Russia, Japan, and from European countries, IODE has been useful in the context of data exchange. Data provided by individual countries is minimal when compared to the data which they are gathering through IODE. Of course, this was the main reason behind the establishment of IODE in the first place almost five decades ago, and continues to be valid. However, such developed countries manifest lesser impact when it comes to training tools and activities, as they feel they have their own training and capacity-building programmes which are more advanced. In addition, such advanced countries have advanced beyond IODE, in the particular case of Europe for example, through calibration exercises within Member States to ensure quality control of data.

In the topic of long-term data archival, several NODCs recognize the benefits of sending data to the WDCs for long-term archival, as such efforts provide the opportunity to recover data which may be lost at any time.

Nevetheless, in the context of developing countries, the impact of IODE has been more recognized on issues of capacity building and access to information. This is to be expected, as few developing countries have global commercial or naval fleets which could require global oceanographic or marine information. The impacts are now seen with respect to the setup of webpages for the dissemination of data and information by NODCs, and through enhanced exchanges of information using the means provided through IAMSLIC for example. Finally, it is important to recognize that the exchange of data and information is now much faster than a few decades ago, when such exchanges had to be carried out through standard mail services. Now, such exchanges can be completed in a matter of seconds at any time of day or night.

In relation to impacts, one concern which was raised by representatives of NODCs is the lack of visibility of IODE and its products. Being in the middle between the producers of data and those who use it, IODE and NODCs get little or no credit for the tasks which are carried out. Continuous successes in keeping up with technology, with enhanced demands from NODCs, and enhanced capacities to facilitate data and information exchanges are often discarded by researchers and end-users. Such neglect can end-up in the reduction in resources allocated to NODCs, as well as to IODE in general. This, in the view of the Evaluation Team, is a critical issue that needs to be addressed, as decision makers may end up not viewing and recognizing the efforts carried out by data and information managers, and end up financing other projects in other areas due to lack of visibility.

One possible way forward would be for IODE to develop regional ocean Atlases and data catalogues which have the IODE logo, which could constitute sources of information which can then be cited by researchers and end-users. This task is already carried out by the World Data Centres, which developed the first global catalogue of information in the 1980s, and have continued updating this practice in recent years. As an outcome, such publications are mentioned in the citation indices in many countries and within the international scientific community.

- **What have been the effects of the programme (IODE) on other agencies?**

In the context of other United Nations agencies, UNEP in Africa has benefited from the efforts on capacity building carried out by IODE, as using such capacities it can embark itself on the generation of useful information. Nevertheless, UNEP has identified the need for IODE to focus on policy-relevant issues when it comes to the dissemination of data and information. In the late 1990s, the Navy of the United States declassified data and information related to particular geographical areas within the oceans, which was then provided to IODE and other agencies. Unfortunately, this led to the identification of new fishing grounds in areas not usually covered by the global fishing fleets of developed countries, and to a massive exploitation of such resources.

In the context of WMO, IODE is seen as contributing to the Global Observing Systems in the context of data management. On the issue of training, WMO sees in IODE the opportunity to use its training product Ocean Teaches as a means to incorporate Marine Meteorology segments within its contents so that it can be used during training programmes.

Other agencies which have benefited from the efforts of IODE at the regional level are NEPAD and CPPS. As it has been stated, the efforts by IODE in terms of the establishment of capacities in countries or regions is allowing such agencies to make use of such capacities to carry out activities to fulfil their own purposes.

- **How do Member States report back to IODE regarding benefits received from IODE?**

To assess how Member States report back to IODE regarding benefits, a specific question addressed this issue in the survey conducted for this evaluation. 28 out of 33 respondents indicate that they report back to IODE regarding benefits, while 5 did not comment on this issue. Table

Table 17: How do Member States report back to IODE on benefits? Source: IODE evaluation, 2007).

Comments on guidelines in the context of other programmes	Number of Member States	%
Through email requests on an annual basis or frequently.	11	33%
Through specific questions which have to be addressed in the National Report submitted to IODE every 2 years.	24	73%
During IODE sessions every 2 years, in a particular segment of the session.	12	36%
Only on rare occasions, such as in the case of the recent IODE Priority Survey in 2004.	1	3%

In addition, the survey allows for the conclusion that many Member States use several methods to report back to IODE regarding benefits.

What were the results achieved during the observed period related to capacity building?

As it has been pointed out throughout this report, IODE has been able to achieve a variety of results in terms of capacity building:

46 Training courses carried out between 2002 and 2006

More than 300 staff members from NODCs trained on a variety of courses.

The upgrade of Ocean Teacher as a web-based training tool and additions to its contents on a variety of topics.

The establishment of the Project Office in Oostend, which now offers excellent facilities for training of staff.

Such results allow the Evaluation team to conclude that IODE is conducting several efforts in parallel to contribute to capacity building efforts in Member States.

6. Conclusions

The evaluation of the IODE programme has yielded a summary of findings, which have been manifested in various sections of this document. Considering the Terms of Reference established for this evaluation, it can be concluded that IODE has been successful in developing efficient mechanisms based on the use of ICTs to ensure open and full access to ocean data and management of relevant information for all.

With respect to the management structure, it can be stated that the Secretariat has been efficient in coordinating efforts so that products are achieved. The network of NODCs and the ODINs are essential platforms to carry out operations regarding data and information management and exchange, and provide a solid basis on which to continue enhancing IODE. In addition, alliances with the WDCs and with IAMSLIC are also extremely beneficial to the work which IODE is carrying out, as such international agencies provide the necessary support for the NODCs and ODINs to execute activities and reach the desired outcomes.

Based on the objectives of IODE, it can be stated that in relation to data exchange, IODE continues to promote it through a variety of means, in particular using ICTs. Through its Group of Experts on Data Exchange, IODE is promoting the development of an internet-based tool to carry out the exchange of data with several advantages including the transformation of physical units. In addition, its is building up capacities in developing Member States so that such States can become involved in exchanges of data. Finally, it has engaged four World Data Centres to contribute to such a process through the elaboration and dissemination of global oceanographic data catalogues.

Concerning constraints which may inhibit data exchange, three have been identified: issues of national security, lack of capacity; and the lack of will by the ocean community of researchers to share their data. While issues of national security have been recognized by IODE with respect to limiting access to data, IODE has been promoting a variety oft measures, including the establishment of a policy related to data exchange. On issues of lack of capacity, IODE has attempted to build capacities through the required types of activities which span training courses and workshops, providing assistance in terms of equipment and communication links, and providing in many cases virtual space within its web-space to promote such an exchange of data and information. The third constraint related to the reluctance of researchers to share their data requires some attention from IODE, as such researchers are potential beneficiaries of the efforts conducted by IODE.

Another area where IODE has been pursuing efforts is related to the tasks of marine information management. With the support of its Group of Experts on Marine Information Management, access to literature, articles, and other documents in developing countries is becoming easier through links with IAMSLIC. Such efforts are considered as very useful, and now IODE is enhancing such efforts through the establishment of e-repositories, and ocean portals.

It can be concluded that IODE has been building on its network of NODCs to continue the tasks of data and information exchanges in an efficient method, event though IODE could benefit from efforts to link better with the scientific oceanographic research community to enhance activities related to data and information exchanges. However, as stated in the report, efforts are needed in the issue of data archival, which is the objective where IODE is lagging behind. While the cooperation is there to target this issue, is up to the IODE Committee to review its current program and devise the adequate measures to target this goal. In the context this evaluation, the issues of data archival and data exchange require special consideration when it comes to technology. One could conclude that the objectives of archiving and exchanging data were achieved since the 1960s with data handled in paper format and exchanged using standard mail. A decade later, the processes were upgraded using magnetic tapes for storage and more recently data began to be transmitted via the internet on delayed mode, and now some data is available on real time. Finally, when reading the results of the IODE internal review, it is important to recognize the

needs identified by the Review Team in relation to the issue of completing databases for all oceans with the same quality of data in all cases.

Integrating the three topics outlined above the conclusion is reached that IODE should advance in three different directions when it comes to data exchange as presented in figure 10:

- *Completing data sets at the global scale.*
- *Keeping up with new technology trends.*
- *Incorporating new data trends.*

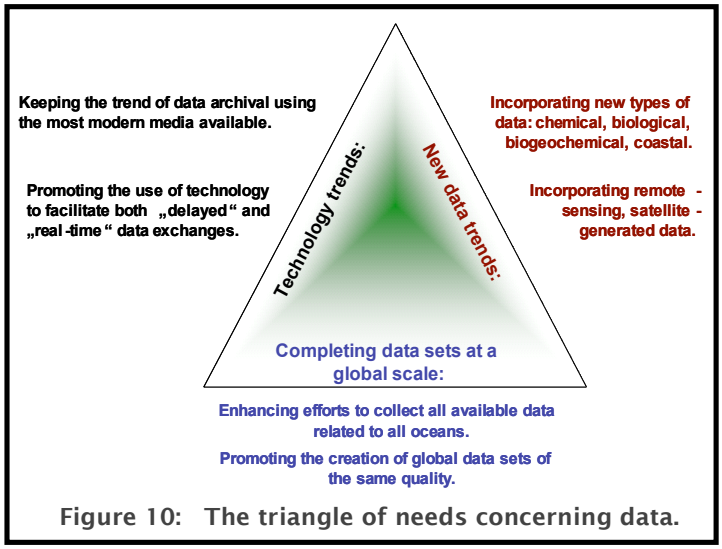


Figure 10: The triangle of needs concerning data.

On the use of ICTs, it can be stated that IODE has been promoting the use of ICTs as means to process, archive, and exchange data and information. It has been successful in promoting that NODCs not only acquire and archive data, but also exchange it through the use of the internet. In addition, it has tailored its main training product, Ocean Teacher, along these lines so that it can be used on line in the internet and in the Project Office in Oostend for training purposes. In addition, IODE has been on the forefront of setting up internet portals for itself and for the ODINs to be able to facilitate the exchange of data and information using ICTs.

One of the objectives of IODE focuses on capacity building to facilitate both data and information management and exchanges. This task has been recognized by many National Data and Information Coordinators as the most relevant activity carried out by IODE in recent years, and IODE is fulfilling the identified need of developing Member States in this respect. IODE has approached this objective along three different types of activities:

- The development of a web-based tool: OCEAN TEACHER, which constitutes a platform that can be used both in house within developing countries, as well as in the training centre in Oostend. This tool constitutes an excellent platform spanning from basic to advanced topics, and is continually upgraded with new contents, as it has been structured in a modular fashion. The only constraints identified by representatives of Member States is the fact that it is only available in English Language, and the fact that it may become an extremely large tool, requiring large bandwidths to make the best use of it in the internet. While its developers are aware of this issue, it is important to address both concerns from the point of view of the IODE Committee.

- The execution of many workshops both in the new training facility in Ootend, as well as in various regions of the world. Such training courses include a variety of topics, in particular the training of webmasters to set up institutional webpages in those Member States which have implemented NODCs.

- The establishment of a state-of-the-art facility for training and for the development of web-based training tools in Oostend. This facility incorporates training rooms with computerized facilities, fast access to the internet, and because of its location next to the VLIZ NODC, it can complement theoretical training with field training on the VLIZ research vessel which offers an excellent opportunity for trainees to gather data, process it, and load it on a particular webpage. Additional courses have targeted a variety of topics, including the elaboration of an African Atlas of Marine Resources.

From these results it can be concluded that IODE has been executing a variety of activities to train staff members of NODCs to contribute to the establishment of capacities to carry out data and information exchanges.

The other objective stated for IODE relates to the issue of quality standards for data exchanges. During its internal Review, IODE identified that there were some concerns which needed its attention. To this end, IODE established an inter-sessional working group to address such concerns. In joint efforts with WMO through JCOMM, IODE is developing standards as well. Therefore, it can be concluded that IODE is undertaking efforts to fulfill this objective as well.

With regards to the objective related to networking with WMO and other agencies, IODE has been open to such efforts and is finding ways to collaborate, although in recent years fewer activities are undertaken due to the reduction in budgets. Nevertheless, IODE contributes to effort related to several IOC programs, and is expected to continue carrying out this task. At this point, the only concern relates to the difficulties which have risen in terms of the relationship between IODE and GOOS. However, both programs continue to search ways to interact more efficiently.

The findings have allowed for the conclusion that IODE is advancing well with respect to the execution of tasks which enable it to achieve its proposed goals. The evaluation has identified a series of recommendations which have been inserted within the text. Such recommendations are provided in those areas where IODE needs to focus some efforts. Another conclusion which has emerged from this evaluation is the fact that IODE can be considered as a very relevant program with respect to both the Medium-Term Strategies of UNESCO-IOC and UNESCO. Tasks carried out by IODE have been shown to target those outcomes, modalities, or targets which have been proposed in these Medium-Term Strategies, in particular on issues of targeting Africa, the promotion of the use of ICTs in developing Member States, and in the task of capacity building.

In conclusion, it can be stated that IODE has been a rather successful global mechanism to ensure open and full access to ocean data and management which should continue to be supported by IOC, not only for the sake of learning about the oceans, but more relevant in the context of sustainable development especially when considering the issues of climate change, which can only be accessed with the support of long-term programs such as IODE. As a global project, it is attempting to reach all regions of the world. However, the lack of financial resources has forced IODE to seek extra-budgetary funding, which in some cases comes linked to a particular region of the World. In the case of IODE, it has been very successful in finding such extra-budgetary funding through the Government of Flanders, which is contributing not only to efforts in Africa, but also to capacity building efforts in the Project Office in Oostend. Such support is allowing IODE to continue developing tools for data exchange, and to open the forum for technical and scientific discussions regarding data exchange. However, IODE will need to find additional extra-budgetary funding to cover others geographical areas besides Africa.

7. Lessons learnt/ factors contributing to the achievements (of results) or lack thereof.

Recent advances in terms internet, information management, and databases are essential tools associated with ICTs, which are opening opportunities to reach communities in the global level with relative ease. IODE has been successful in adapting its data and information exchange programs to the internet environment, and has been successful in continuing to build on its network of NODCs through the implementation of such tools related to data and information management and ICTs. In addition, the quality of the efforts on the use of such ICTs is allowing IODE to achieve excellent training platforms.

IOC and IODE learnt the lesson that in order to ensure that information and data are exchanged regionally and globally, capacity building has to span not only the training of staff in developing countries, but the provision of equipment and means of communications in the context of data and information exchanges. Examples of such efforts by IODE in Africa are pointing out to achievements in terms of the development of information which can be used for policy-relevant advice locally.

IODE has been successful in establishing partnerships with agencies that provide support, technical guidance, and which become partners in the tasks carried out by IODE. Examples are the World Data Centers and IAMSLIC. However, IODE should monitor some tasks which it delegates to such agencies to ensure that quality results are being achieved.

IODE has been successful in mobilizing external, extra-budgetary funding to carry out activities to achieve its proposed objectives. However, it is important to recognize that sometimes such external funding may be restricted to be employed to fulfil particular tasks or to be targeted within particular geographical areas. In the particular case of IODE, the main source of funding has provided an excellent match to the needs identified, as well as with respect to the targeting of Africa, which allows IODE to fulfil requirements set up by UNESCO in its Medium Term Strategy.

Since the 1960s data has been stored in different media: paper, magnetic tapes, diskettes, CDs, DVDs, and most recently in terms of flash memories. While modern technological means to store data allow for faster retrieval and processing, as well as to archive data using less physical space, the migration from an older to a newer platform to archive data has not been successful in some cases, as data has been lost during migrations from one computer platform to another, or because the data has been stored in a medium which is no longer accessible because of its old age and obsolescence. Considering the identified need to store data in the present and in the future in order to track changes in properties of the oceans, these continuous technological innovations in storage mechanism present a challenge[47], as it forces the National Oceanographic Data Centres and the World Data Centres to contemplate resources to continually migrate from older storage platforms to the most-up-to-date ones in order to fulfil the demands of the users who actively use such emerging technologies.

A similar technological trend is observed in the context of data exchange. In the 1960s, paper was the typical format to handle data, and standard mail was the typical mode to go about the exchanges. With the advent of magnetic tapes, data could then be sent to those requesting it so that it could be accessed faster once received by the user. The introduction of computer-based mechanisms to exchange data via email which preceded the internet facilitated the task, and then came the internet, and now the trend is to download data. In the last 25 - 30 years there has been a trend in data/information exchange to progress from a "*delayed*"-mode to a more "*real-time*" mode. This trend has included shortening the "dark" interval of time between data acquisition and it's posting for exchange anywhere in the world, which 30 years ago may have taken about 6 months, later 3 months, then a few days, and now in "real time". For example, the tsunami early warning system is one such case where real time, extremely fast exchange of data is required. In the opening remarks during the IODE Session XVIII, it has been emphasised that the

[47] See document IOC/IODE-XVIII/3, paragraph 317, page 38.

challenge faced by IODE is to adapt to the era of real-time data and products.[48] When confronting NODCs with this question regarding perception concerning the demand for data exchange in real-time, near-real-time, and in delayed-mode, respondents commented as follows:

Table 18: Survey of demand for modes regarding data exchange. Source: IODE evaluation 2007.

Demand for data exchange	Number of NODCs which selected this demand.		
	High	Medium	Low
Data exchange on real time: demand is:	8	8	9
Data exchange on near-real time: demand is:	9	10	6
Data exchange on delayed mode: demand is:	12	13	2

Looking at these results, it can be concluded that within the IODE community, there may be more demand for data exchanges in near-real time or delayed modes than there is a demand for data exchanges in real time.

Another area where IODE has recognized the need to widen its scope in recent years is related to other types of ocean-related data. In the last few years biological, chemical, biogeochemical, and coastal data are beginning to be collected and managed, as well as data generated through satellite-observing platforms. However, this widened scope puts a strain on IODE when considering the need to keep up with technology. The team of experts carrying out the IODE internal review in the year 2004 concluded that IODE has become more oriented towards technology rather than ocean sciences[49]. The question to be addressed is then whether the end-users prefer faster access to some type of data, or a more complete data set spanning all ocean and marine areas.

8. Recommendations

Recommendation 1: IODE should establish an inter-session working group to assess and recommend how IODE should approach the issue of lack of awareness by the ocean sciences community with respect to the capacities of IODE already in place in terms of data management (long-term archival and dissemination).

Recommendation 2: Considering the use that Atlases, such as The African Atlas of the Ocean, can have with respect to the planning and utilization of resources in coastal areas in the context of integrated environment management; the IODE Committee should assess how best to transfer the lessons learned from the approach coordinated by ODIN-AFRICA to ODIN-CARSA, ODIN-CINDIO, ODIN-WEST-PAC, ODIN-BLACK SEA and ODIN-CET, which are being established at this time.

Recommendation 3: IODE to promote the replication of efforts related to ocean and marine data and information in other regions of the world where oceanographic networks are being established, such as in the cases of the Indian Ocean, Countries in Economic Transition (CET), and the Black Sea.

[48] See document IOC/IODE-XVIII/3, paragraph 7, page 1.
[49] See document IOC/IODE-XVIII/3, paragraph 273, page 34.

Recommendation 4: Only 24 States have made explicit comments on the policy thus far. The IODE **Secretariat should therefore analyze the extent to which the IOC Policy on Data Exchange is having the desired impact. .**

Recommendation 5: The IODE Committee should review the issue of translation of Ocean Teacher into other languages, notably Spanish for Latin America, and Russian for several Member States in the former Soviet Union.

Recommendation 6: The IPOI in Oostend should explore options, which could be foreseen to manage this concern regarding the current size of Ocean Teacher linked to the slow speed of Internet in some developing countries.

Recommendation 7: The IODE Committee should assess how best to proceed with respect to the issue of reduced capacity of the Secretariat considering the fact that IOC is not able to enhance the staff of the Secretariat of IODE.

Recommendation 8: The IODE Committee should assess how best to proceed in order to reduce the existing gaps in its coverage between the various regions of the world. One possibility could be to explore existing contributions from the Government of Flanders, which could be targeted to such regions.

Recommendation 9: IODE should consider establishing an inter-sessional working group to look into this issue of how to evaluate the amount of data, which is being exchanged, so that indicators can be developed for the different types of data being exchanged (physical, chemical, biological) in order for IODE to be able to track the progress being made over the years. The IPOI could offer an excellent environment to support this working group.

Recommendation 10: IODE should facilitate networking activities among WDCs so that issues related to quality control of data, management of duplicate data sets, flagging of particular data sets, and partition of data to be archived within the WDCs are addressed and the required actions put in place. The Project Office in Oostend could offer the most appropriate environment to facilitate such networking activities.

Recommendation 11: IODE should set up an inter-sessional working group to assess the magnitude of data losses, and identify corrective actions, and strategies to manage the problem. Based on the outcomes, the working group could then identify corrective actions and promote their implementation via efforts targeted through the IPOI in Oostend. The justification for this recommendation stems directly from one of the five main objectives of IODE.

Recommendation 12: IODE should conduct a global survey to address the issue of the metadata catalogues, and to identify needs to be approached in the guidelines to be developed with respect to such catalogues. It should also stress the issue of placing such catalogues on the web pages as indicators that the process can be reviewed externally and by IODE.

Annexes

Annex 1: List of Persons Interviewed

Annex 2: Terms of Reference for this Evaluation

Annex 3: ICT Details

Annex 4: NODC Questionnaire

Annex 5 : Itinerary

Annex 6 : List of Websites and Documents reviewed for this evaluation

ANNEX 1:

LIST OF PERSONS INTERVIEWED

Name	Function	Topics covered
UNESCO Paris		
Prof. Alaphia Wright	Advisor IOS	Introduction to the evaluation context – institutional framework, guidelines, quality assurance
Dr. Patricio Bernal	Executive Secretary, UNESCO-IOC	General aspects related to IOC. Standing of IODE within IOC, strategies, guidelines
Dr. Keith Alverson	Head of the Ocean Observation Services of UNESCO-IOC	General aspects related to IOC. Standing of IODE within IOC, strategies, guidelines. Relationships between IODE, GOOS, and JCOMM
Dr. Peter Pissierssenns	Coordinator of IODE	General aspects related to IODE. Historical evolution of IODE and current trends.
Mr. Adrien Vannier	Staff member assigned to IODE.	Operational aspects related to IODE.
IOC-IODE Project Office, Oostend, Belgium		
Dr. Vladimir Vladimirov	Head, UNESCO/IOC Project Office for IODE, Oostend, Belgium	General aspects related to IODE, IOC Project Office for IODE, Capacity building efforts, NODCs in Asia and Europe.
Dr. Rudy Herman	Senior Researcher IOC/UNESCO Representative for Belgium Member of the Flanders UNESCO Commission	Contribution of the Government of Flanders to IODE, IOC Project Office for IODE in Oostend
Dr. Wouters Rommens	Training Coordinator UNESCO/IOC Project Office for IODE, Oostend, Belgium	IOC Project Office for IODE, Capacity building efforts, web-based tools, Ocean Teacher, Ocean Portals.
Mr. Mark Van Crombrugge	IT Expert, IOC Project Office for IODE, Oostend, Belgium	IOC Project Office for IODE, IT, web-based tools, Ocean Teacher, Ocean Portals.
Dr. Murray Brown	IODE-SG Ocean Teacher Consultant	Training programs within IODE, Ocean Teacher
Dr. Greg Reed	Executive Officer Australian Ocean Data Centre Joint Facility, Australia	Training programs within IODE, product development.
Evaluation Mission, Trieste, Italy		
Dr. Lesley Rickards,	Former Chair, IODE Deputy Director British Oceanographic Data Centre (BODC) Natural Environment Research Council, United Kingdom.	General comments regarding IODE. Comments regarding ODINs, NODCs, and WDCs.
Mr. Ricardo Rojas	Former Vice-Chair of IODE. Head of CENDHOC Executive Secretary, National Oceanographic	General comments regarding IODE. Chilean NODC. Comments regarding activities in

	Committee (CONA) Servicio Hidrográfico y Oceanográfico de la Armada, SHOA	Latin America. Comments regarding ODINs.
Dr. Rodney Martínez	Regional Coordinator ODINCARSA, Ecuador	General aspects related to ODINs; current status of IODE activities in Latin America
Dr. Martin Rutherford	Technical Director Defence Oceanographic Data Centre Directorate of Oceanography & Meteorology	General comments regarding IODE. Australian NODC.
Dr. Robert Keeley	Senior Technical & Policy Advisor, Canada	General comments regarding IODE. Canadian NODC. Additional comments regarding scientific community and links to IODE
Dr. Nasser Hadjizadeh Zaker	Assistant Professor, Faculty of Environment University of Tehran, Iran	General aspects related to ODINs; current status of IODE activities in Indian Ocean
Dr. Marcus Simoes	Head of Oceanography Data Division of Brazilian NODC (BNDO), Brazil	General comments regarding IODE. Brazilean NODC.
Prof. Shao Hua Lin	Director-General National Marine Data & Information Service State Oceanic Administration, China	General comments regarding WDCs. WDC-China.
Dr. Frierich Nast	Deutsches Ozeanographisches Datenzentrum, Germany	General comments regarding WDCs. WDC-Germany. SEA-DATA NET, ICES.
Ms. Riitta Olsonen	Senior Statistician Finnish Institute of Marine Research, Finland	General comments regarding IODE. Finnish NODC. Baltic Network of NODCs
Prof. Vlado Dadic	Scientist - Research, Teaching/Education Institute of Oceanography & Fisheries, Croatia	General comments regarding IODE. Croatian NODC.
Dr. Regina Folorunsho	Chief Research Scientist Nigerian Institute for Oceanography & Marine Research, Nigeria	General comments regarding IODE. Nigerian NODC.
Ms. María Jesús García	Chief of Programme Instituto Español de Oceanografía, Spain	General comments regarding IODE. Spanish NODC. SEA-DATA NET, ICES.
Dr. Malika Bel Hassen-Abid	Chair, IODE. IODE National Coordinator Institut National des Sciences et Technologies de la Mer, Tunisia	General comments regarding IODE. Tunisian NODC.
Mr. Terry Tielking	Acting Director National Oceanographic Data Center US/DOC NOAA, United States	General comments regarding IODE. United States NODC.
Mrs. Zdenka Willis	Director, Integrated Ocean Observing System, (IOOS) Office, NOAA US/DOC NOAA	General comments regarding IODE. United States NODC.
Mr. Hirofumi Okano	Principal Oceanographic Data & Information Officer Japan Oceanographic Data Center (JODC), Japan	General comments regarding IODE. Japanese NODC.
Dr. Yutaka Michida	Associate Professor Ocean Research Institute University of Tokyo, Japan	General comments regarding IODE. Japanese NODC.
Dr. Mohd Taupek Mohd Nasir	Deputy-Director, National Oceanography Directorate. Ministry of Science, Technology & Innovation Malaysia	General comments regarding IODE. Malaysian NODC.
Dr. Sydney Levitus	Director, World Data Center for Oceanography,	General comments regarding WDCs. WDC-United States

	Silver Spring	
Ms. Suzanne Davies	Library Manager Great Barrier Reef Marine Park Authority, Australia	General comments regarding IODE, role of IAMSLIC.
Dr. Nickolay Michailov	Head, Russian NODC All Russian Institute for Hydrometeorological Information, World Data Centre, Russian Federation.	General comments regarding WDCs. WDC-Russia
Dr. Mario Alberto Palacios Morenos	Director of Scientific Affairs CPPS, Ecuador	General comments regarding CPPS, links with ODIN CARSA and IODE.
Mrs. Pauline Simpson	National Oceanography Centre University of Southampton, United Kingdom	General comments regarding IODE, role of IAMSLIC.
Evaluation Mission, Geneve, Switzerland		
Dr. Edgar Cabrera	Chief, Ocean Affairs Division. Applications Programme Dept. WMO, Geneve, Switzerland	General information regarding WMO, JCOMM, CPPS, and IODE activities in Latin America.
Dr. Alice Soares	Scientific Officer, Oceanography and Marine Meteorology, WMO, Geneve, Switzerland	General information regarding WMO and JCOMM. Links between IODE and JCOMM
Dr. Etienne Charpentier	Scientific Officer, Ocean Affairs Division Applications Programme Dept., WMO, Switzerland.	General information regarding WMO and JCOMM.
Evaluation Mission to Kenya		
Dr. Mika Odido	Head of Project Office, ODIN AFRICA, Kenya	General information regarding IODE, ODINs, ODIN AFRICA, and African NODCs.
Dr. Norberto Fernandez	Head, Early Warning and Observing Systems, UNEP, Kenya	General information regarding UNEP. Information on GEOS, GOOS, and links between IOC and UNEP.
Stefano Mazzilli	Intergovernmental Oceanographic Commission of UNESCO UNESCO Nairobi Office, Kenya	IOC Capacity building programme. Activities in Africa on capacity building.
Dr. Peter Scheren	Project Manager, UNEP/GEF/WIO-Lab	Links between IODE and UNEP
Mr. Ali Mohamed	Regional Coordinator, New Partnership for Africa´s Development, NEPAD, Kenya	General information regarding NEPAD, Links between NEPAD and IODE.
Prof. Laban A. Ogallo	ICPAC Director, IGAD Climate Prediction and Applications Centre	Links between IODE and IGAD Climate Centre.
Dr. Johnson M. Kazungu	Executive Director, Kenya Marine & Fisheries Research Institute	Kenyan NODC, Role of NODC in coastal activities.
Sam Ngete	System Administrator/Web	NODC webpage. Training programmes
Mr. Elijah Mokaya	Information Manager, KMFRI, Kenya	Kenyan NMIC, Role of Information Centre in Kenya.
Ms Jane Ndungu	Kenyan NODC Data Manager	Kenyan NODC, data management. Role of NODC in coastal activities.

ANNEX 2:
TERMS OF REFERENCE FOR THIS EVALUATION

- **UNESCO**
-
- Internal Oversight Service (IOS)
-
-

Terms of Reference (TOR) for the Evaluation of the International Oceanographic Data and Information Exchange (IODE) Programme of the Intergovernmental Oceanographic Commission of UNESCO (IOC)

February 200

DRAFT

A: BACKGROUND

1. Brief history, legislative authority and mandate

IOC's International Oceanographic Data and Information Exchange (IODE) was established in 1961 "*to enhance marine research, exploitation and development by facilitating the exchange of oceanographic data and information between participating Member States and by meeting the needs of users for data and information products*".

Formally the IODE started out as a Working Group on Oceanographic Data Exchange, which was created by the First IOC Assembly (19-27 October 1961) through Resolution I-9. The Working Group became a Working Committee in 1973 through Resolution VIII-31, adopted by the 8th Session of the IOC Assembly (5-17 November 1973). IODE is a subsidiary body of the IOC, more particularly a Technical Committee, with the modalities of its operations governed by the IOC Rules of Procedure (Document IOC/INF-1166), Chapter VII, Rules 24 and 25.

2. Main objectives and expected results

The main objectives of the IODE Programme are:

(i) To facilitate and promote the exchange of all marine data and information including metadata, products and information in real-time, near real time and delayed mode;
(ii) To ensure the long term archival, management and services of all marine data and information;
(iii) To promote the use of international standards, and develop or help in the development of standards and methods for the global exchange of marine data and information, using the most appropriate information management and information technology;
(iv) To assist Member States to acquire the necessary capacity to manage marine data and information and become partners in the IODE network; and
(v) To support international scientific and operational marine programmes of IOC and WMO and their sponsor organisations with advice and data management services.

The expected results are inherent in the main objectives and can be summarized as follows:

"*to promote and facilitate the access to oceanographic data and information for all*". This will be achieved through the:

(i) Establishment of National Oceanographic Data (and Information) Centres in IOC Member States;
(ii) Establishment of the networking National Oceanographic Data (and Information) Centres into a global network;
(iii) Establishment of global standards for the processing, quality control, archival and exchange of oceanographic data and information;
(iv) Establishment of national capacity in IOC Member States for the processing, quality control, archival, exchange and dissemination of oceanographic data and information.

3. Programme Budget

The IODE Programme Budget consists of a contribution from the UNESCO Regular Programme Budget (through the IOC Programme Budget) and extra-budgetary contributions (either through the IOC Trust Fund, UNESCO Funds-in-Trust or direct support to the IOC Project Office for IODE).

3.1 UNESCO Regular Programme contributions

- For the biennium 2002-2003 the contribution to IODE from the UNESCO Regular Programme was **US$ 215,000;**
- For the biennium 2004-2005 the contribution to IODE from the UNESCO Regular Programme was **US$ 389,000** (of which US$50,000 was assigned to temporary staff); and
- For the biennium 2006-2007 the contribution to IODE from the UNESCO Regular Programme was **US$ 332,715** (of which US$120,000 was assigned to temporary staff) + **US$ 87,000** from crosscutting projects.

3.2 Extra-budgetary contributions

- The revenue from extra-budgetary sources includes contributions to the IOC Special Account (direct financial contributions from Member States to the IOC Trust Fund) as well as funds received through the FUST (Funds-in-Trust);
- For the biennium 2002-2003 the contribution to IODE from Extra-budgetary sources was approx. US$ 1,000,000;
- For the biennium 2004-2005 the contribution to IODE from Extra-budgetary sources was US$ 1,173,300. In addition approx. US$ 750,000 was provided in 2005 to the IOC Project Office for IODE (through Flanders Marine Institute – VLIZ);
- For the year 2006 the contribution to IODE from Extra-budgetary sources was approx. US$ 1,200,000 through IOC Special Account, FUST FIT. In addition approx. US$ 750,000 was provided to the IOC Project Office for IODE (through Flanders Marine Institute – VLIZ).

The main extra-budgetary support for the IODE programme is provided through the UNESCO/Flanders Fund-in-Trust for the support of UNESCO's activities in the field of Science (FUST). This Fund-in-Trust focuses on activities by IOC, IHP and MAB and was established in 1999. As far as IODE is concerned support was provided for ODINAFRICA-III (project 513RAF2003, US$ 2,530,000, 2003-2007); ODIMeX (project 513GLO2002, US$ 382,800); and ODINPubAfrica (project 513RAF2004, US$ 111,100).

Since April 2005, the Government of Flanders (Kingdom of Belgium) is also supporting the IOC Project Office for IODE in Ostend, Belgium. The support consists of the provision, maintenance and payment of utilities and Internet connection of the facility. In addition an annual contribution of €500,000 is provided for the payment of 3 local staff (administrative assistant, IT engineer and training coordinator), organization of training events, payment of visiting experts, and purchase/maintenance of equipment). The commitment of this support has been made for a period of 4 years.

B: PURPOSE OF THE EVALUATION

4. Overall purpose of the evaluation

The 33 C/5: The evaluation plan for 2006 – 2007, Annex VI of 33 C/5 states that:
"The evaluation will seek to establish how successful the systems have been as a global mechanism to ensure open and full access to ocean data and management of relevant information for all. What constraints – technical, political and otherwise – were encountered during the last two biennia, and how these were addressed. Also how can IODE be further developed and strengthened to effectively address the challenges requiring accurate and timely access to oceanographic data and information."

The outputs of the evaluation will feed into the assessment of Strategic Objective 5 of UNESCO's medium-term strategy (31 C/4), that is *Improving human security by better management of the environment and social change.*

5. Informing stakeholders

In particular, the evaluation will inform stakeholders, including Member States, IODE partners, and UNESCO Task Force on Decentralization, on the following concerning IODE:

(i) Results and progress achieved by IODE in the implementation of the objectives defined in the UNESCO Medium Term Strategy (2002-2007) (Document 31 C/4);
(ii) Results and progress achieved by IODE in the implementation of the objectives defined in the "Medium Term Strategy for IOC (2004-2007)" (INF-1192);
(iii) The extent to which IODE activities, including those specifically targeted at capacity-building, benefit Member States;
(iv) Quality of organizational management, programme implementation systems and associated resource allocation;
(v) Preliminary assessment of the IOC Project Office for IODE and its future potential.

The IODE Committee (the Governing Body of the IODE Programme) during its Seventeenth Session (March 2003) commissioned its own review, which was implemented in 2004 and submitted to the Eighteenth Session of IODE (April 2005) as Document IOC/IODE-XVIII/18. IODE-XVIII accepted the report and decided on a number of actions responding to recommendations by the review. The results of the review were reported to the 23rd Session of the IOC Assembly (2005). This evaluation will take the said review into consideration.

C: SCOPE OF THE EVALUATIONS

6. Timeframe and geographical coverage of the evaluation

The evaluation will cover the UNESCO biennia: 2002-2003 (31 C/5), 2004-2005 (32 C/5) and the year 2006 (biennium 2006-2007, 33 C/5). Reference to earlier periods may be necessary depending on emerging issues during the course of the evaluation. Site visits to the IOC Project Office for IODE (established in April 2005 in Ostend, Belgium) and UNESCO's Headquarters will be necessary. Further, since the beneficiaries of the various programmes offered by UNESCO are from all regions, the evaluators must propose and adopt suitable mechanisms for assembling relevant data and information from as wide a geographical coverage as possible. In this regard it is noted that the 19th Session of the IOC Committee for IODE will take place at ICTP (Trieste, Italy) between 12 and 16 March 2007. Many representatives of participating IOC Member States active in IODE will participate in that event. It is therefore recommended to schedule interviews with Member States at that venue. The need for additional visits to Member States (to National Oceanographic Data Centres or Information Centres) may be considered by the evaluators as necessary.

7. Thematic coverage

The evaluation will need to cover the entire programme that is both data and information management.

8. Evaluation questions

The following major questions are to be answered by the evaluation. The list given here is indicative, and not exhaustive. UNESCO and IOC may propose additional evaluation questions where they are deemed necessary.

Relevance

Results and progress achieved by IODE in the implementation of the objectives defined in the UNESCO Medium Term Strategy (2002-2007) (Document 31 C/4);
- Is the IODE programme in alignment with UNESCO's strategies and goals?
- What were the results achieved during the observed period relevant to the 31 C/4?
- How does IODE identify capacity building needs of Member States, specifically developing countries?

Results and progress achieved by IODE in the implementation of the objectives defined in the "Medium Term Strategy for IOC (2004-2007)" (INF-1192);
- Is the IODE programme in alignment with IOC's strategies and goals?
- What were the results achieved during the observed period as relevant to INF-1192?

Efficiency and Effectiveness
Quality of organizational management, programme implementation systems and associated resource allocation;
- To what extent does the IODE management structure (IODE Committee, IODE Officers, Secretariat) use its own system of planning, monitoring and evaluation to implement and adjust its programme activities?
- How involved are the IODE main stakeholders (e.g. Data and Information Centres, IOC action addresses) in the activities of the IODE programme?
- How does the IODE programme/secretariat interact with UNESCO field offices?
- What is the level of staffing, type of staffing and how does this ensure effective and efficient implementation in a sustainable way?
- What is the level and type of programme funding and how does it ensure efficiency, effectiveness, relevance, impact and sustainability of the IODE programme?
- Could the same results have been achieved at lower costs if alternative programme delivery mechanisms had been applied?
- Preliminary assessment of the IOC Project Office for IODE and its future potential;
    - How does the IOC Project Office for IODE improve efficiency, effectiveness, relevance, and impact of the IODE programme;
    - What recommendations can be made to improve and expand the future potential of the IOC Project Office for IODE?

Impact
The extent to which IODE activities, including those specifically targeted at capacity-building, benefit Member States;
- What have been the effects of the programme (IODE) on Member States?
- How do Member States report back to IODE regarding benefits received from IODE?
- What were the results achieved during the observed period related to capacity building?

D: EVALUATION METHODS

9. Approaches
The evaluators will be expected to adopt an appropriate mix of approaches covering / selected from:
- Desk study of relevant documents:
    - It is recommended that the evaluators have a preliminary meeting with the IODE Secretariat staff. Relevant documentation and guidance for further information sources will then be provided;
    - Particular attention should be drawn to the 2004 IODE Review;
- Interviews

- Interviews with IODE staff (at UNESCO-HQ (1 UNESCO professional staff member, 1/2 UNESCO GS); at IOC Project Office for IODE (1 UNESCO professional staff member, 3 local seconded staff)
- Interviews with IODE Chair (UK)
- Interviews with IODE programme participants in Member States (could be done during IODE-XIX, ICTP, Trieste, Italy, 12-16 March 2007);
- Interviews with other IOC professional staff (related to interaction with other IOC programmes) at UNESCO/IOC HQ and/or field offices (e.g. Copenhagen, Nairobi, Bangkok, and Cartagena).

- Questionnaires and Surveys: The evaluators may wish to use questionnaires/surveys to obtain particular information. In this regard

E: EVALUATION TEAM

10. External experts

The evaluation is to be carried out by an independent team (maximum two consultants) of external experts[50]. The team should include members with professional backgrounds and/or extensive experience in/with:

- Programme evaluation, evaluation methodologies and techniques, both qualitative and quantitative;
- Organizational strategy development;
- International organizations and the UN system;
- Capacity building and technical education, specifically for developing countries;
- Technical competence in oceanographic data and/or information management;
- Technical competence in oceanography.

F. PLANNING AND IMPLEMENTATION ARRANGEMENTS

11. Management arrangements

SC/IOC/IODE will assist in the preparation and organization of the evaluation exercise and will facilitate the activities of the evaluation team. IOS will have a quality assurance role. The TOR, the evaluation team, and the deliverables will have to be approved by the DIR/IOS.

12. Timeframe and logistics

The evaluation will start in February 2007 with a preparatory meeting at UNESCO HQ including some interviews and document reviews, followed by field surveys/visits. Decisions as to whether to hold follow-up meetings will be taken after the receipt of the draft and final evaluation reports. The final evaluation report is expected by the end of June 2007.

The **evaluation team** will be responsible for being self sufficient as regards logistics (office space, administrative and secretarial support, telecommunications, printing of documentation, etc.). However, suitable working space, when necessary, will be provided for the team when they visit UNESCO Headquarters and other stakeholders. While the evaluation team is primarily responsible for the dissemination of all methodological tools SC/IODE would facilitate this process to the extent possible (providing contact information, email addresses, etc.). Relevant stakeholders are being requested to provide planning documents, mission reports or other documents relevant to the evaluation. Table 1 shows a tentative schedule for the evaluation. The schedule is to be firmed up in the evaluation plan to be submitted by the lead external evaluator.

[50] Team should reflect gender balance

13. Deliverables

Three main deliverables are envisaged from the evaluation, namely:

- The evaluation plan highlighting, among other details, the methods to be adopted by the evaluation team, including an evaluation design matrix indicating the data sources and analyses necessary for answering the evaluation questions, and the time schedule for completing the evaluation. The lead evaluator may have to conduct a logical framework exercise during the initial visit to UNESCO Headquarters to review planning documentation so that the evaluator and SC/IODE have a common understanding of the programme activities and expected results

- The draft evaluation report, which will be circulated among stakeholders for comments; and

- The final evaluation report in which comments submitted by the various stakeholders would have been considered and appropriately incorporated by the lead evaluator. The final report should include, but not necessarily be limited to, the following elements:
    - Executive Summary (maximum 3 pages)
    - Programme description
    - Evaluation purpose
    - Evaluation methods
    - Major findings (given in terms of achievements and challenges)
    - Conclusions and recommendations
    - Lessons learnt/ factors contributing to the achievements (of results) or lack thereof
    - Annexes, including interview list, key documents consulted, itinerary, etc.

The **executive summary**, in particular, should be in a format suitable for direct incorporation into relevant reports on evaluation to the Executive Board. Namely, the Executive Summary should contain the following elements:

- Brief description and background of the programme/projects evaluated;
- Major findings – achievements;
- Major findings – challenges; and
- Recommendations.

Table 1: Tentative Schedule for the evaluation

WHEN	WHAT	WHO
February 2007	Contract with lead evaluator	IOS
	Briefing of lead Evaluator	SC/IOC/IODE, IOS
	Completion of Inception report, including evaluation plan	Lead Evaluator
March 2007 – April 2007	Visits, interviews, surveys, analysis	Evaluation team
30 May 2007	Draft report due	Lead Evaluator
30 June 2007	Final report due	Lead Evaluator

LIST OF INFORMATION DOCUMENTS AND WEB SITE

Web sites:

IODE: http://www.iode.org
ODINAFRICA: http://www.odinafrica.net
ODINCARSA: http://www.odincarsa.net
ODINCINDIO http://www.iode.org/odincindio
ODINECET http://www.iode.org/odinecet
OceanExpert http://www.oceanexpert.net
OceanTeacher http://www.oceanteacher.org
OceanPortal http://www.oceanportal.org
OceanDocs http://www.oceandocs.net
Ocean Data Portal http://www.oceandataportal.net
FUST website http://www.iode.org/fust
"old" IODE web site (<2007): http://www.iode.org/iodeold

Documents

- **UNESCO Medium Term Strategy (31 C/4)**
- **IOC Medium Term Strategy (2004-2007) (INF-1192)**
- **IOC core documents**
  - IOC Rules of Procedure (IOC/INF-1166, November 2001)
  - IOC Statutes (IOC/INF-1148, July 2000)
- **Reports of IOC Governing Bodies**
  - IOC-XXIII (2005)
  - EC-XXXVII (2004)
  - IOC-XXII (2003)
  - EC-XXXVI (2002)
  - IOC-XXI (2001)
- **Reports of IODE Committee Sessions**
  - 18th Session (2005)
  - 17th Session (2003)
  - 16th Session (2000)
- **Documents related to the IOC Project Office for IODE** (established in April 2005)
  - IOC resolution IOC-XXII-7
  - Draft guidelines for the establishment of (IOC) decentralized offices (*IOC/XXII/2 Annex 6 REV.)*
  - IODE Project Office Business Plan (IOC/INF-1187, May 2003)
  - Proposal for the establishment of an IODE Project Office (IOC/IODE-XVII/34)
- **IODE Review (2005)**
  - IODE REVIEW – REPORT OF THE IODE REVIEW TEAM (IOC/IODE-XVIII/18)
  - HISTORICAL OVERVIEW OF THE IODE PROGRAMME BETWEEN 1961 AND 2003 (IOC/TT-DMS-I/6)
  - IODE Survey Questionnaire for the IODE review
  - Results of the IODE Priority Survey (IOC/IODE-XVIII/23)

- Survey of the Marine Science Community on IODE (IOC/IODE-XVIII/23B)
- IODE Evaluation Progress Report: A Proposal for an IODE Review (IODE-XVII/31)

- **Full list of IODE documents**:
  - http://www.iode.org/documents
  - Older documents: 2003: http://www.iode.org/iodeold/files2.php?year=2003&Submit=Go
  - Older documents: 2004: http://www.iode.org/iodeold/files2.php?year=2004&Submit=Go
  - Older documents: 2005: http://www.iode.org/iodeold/files2.php?year=2005&Submit=Go
  - Older document: 2006: http://www.iode.org/iodeold/files2.php?year=2006&Submit=Go

ANNEX 3
ICT DETAILS

Due to the relevance of web-based products in the context of IODE, several of its products have been reviewed, in particular: OceanPortal, OceanExpert, OceanTeacher and OceanDOCuments.

OceanPortal

OceanPortal is the name used for 3 websites: the global OceanPortal (http://www.oceanportal.org) and two regional OceanPortals: PortalOceanico (http://www.portaloceanico.org) and African OceanPortal (http://www.africanoceans.org). The common objective of all the OceanPortal websites is to address the ocean/coastal information and data needs to the wide audience, to increase the ability of the OceanPortal partners to communicate their expertise to a non-academic audience and to facilitate improved access to the portal and its information[51].

1.1 OceanPortal (global)

The OceanPortal (OP) website provides a central, categorized assemblage of the entire set of internet websites which IOC has identified as primary sources of ocean data and information, worldwide. The ensemble of utilities contained in OceanPortal allows easy access to thousands of pages at premier websites checked for quality by IODE staff. Judging from the available metrics it is the most heavily used website among all IOC resources (including the main IOC webpage), and also the most widely cited. These accomplishments bring OP to a very broad audience, promoting all IOC resources in the process. OP has not reached equilibrium between outside submittals (very low) and annual attrition of websites (10-15%), so active updating of existing records and addition of new records is necessary to maintain current level of service and resource base.
Since the 18th session in 2005 two annual housecleaning efforts took place in order to eliminate non-existent websites, relocate moved websites, to add new websites, and to continue the long-term project of adding new categorical descriptors to all records. This is the reason for the slight reduction in the number of records between the 18th to the 19th Session as presented in table A3-1. Nevertheless, about 1,000 records were added in the last intersessional period. Hence, OP currently holds 4682 records in 8 super-categories and 251 in specific subject categories.

Table A3-1: Ocean Portal Statistics

Intersessional period	Records	Linked to Number of Web pages	Visits to webpage / year	Citations in Google
2001 – 2003 (17th)	3400+	500,000	19,000	
2003 – 2005 (18th)	5000+		90,300	19,300
2005 – 2007 (19th)	4682		130,000	92,200

Source: http://webstats.motigo.com/

In recent years OP has become a highly regarded international source-of-choice for marine site information, and it is currently the most frequently visited of all IOC websites. The complete website was also moved from the servers at the UNESCO office in Paris to its permanent location at the Project Office website in Ostend, Belgium. OceanPortal has been edited by Dr. Murray Brown (until the end of 2005) and Dr. Wouter Rommens (2006 till present) (IOC/IODE - XIX/31, p. 2). There are 92,200 citations of OceanPortal in Google (from non-OP web pages) which explains the very high score Google assigns to OP records. It is non uncommon to find OP records about resources to be placed before the actual

[51] See document: IOC/IODE - XIX/31, p.1

resource, during Google searches. This confirms OP's position as the premier ocean data and information index today.

Table A3-2: Page views per year. Source: http://webstats.motigo.com/

Year	Page views
2001	9,226
2002	22,911
2003	24,799
2004	113,883
2005	132,216
2006	125,204
2007	52,241
Total	480,543

For the future Ocean Portal seeks to increase the number of visits to the website to 150.000 and to add about 250 new records per year, as well to issue one new poster and one new brochure in 2008 and to have 20 additional editors worldwide (IOC/IODE XIX/31, p. 4). It was further recommended to continue the yearly revision and addition of new records, to establish an editor network and to promote the Portal through the UNESCO and IOC community.

Regional OceanPortal websites

The goal of these regional ocean portals (PortalOceanico and African OceanPortal) is to facilitate access to information and data on all aspects of ocean/coastal research and management for the benefit of stakeholders in the respective regions by using collaborative websites and distance learning technologies (IOC/IODE XIX/31, p. 1).

PortalOceanico

The Regional Ocean Portal for Latin America and the Caribbean: Portal Oceanico, has compiled more than 5,123 knowledge objects related with ocean issues. The Portal has recruited more than 420 editors from Latin America and the Caribbean regions, and contains contributions mostly in Spanish, but also in Portuguese, English and French. National marine information from 40 countries is included in the portal. More than 454 volunteer editors have contributed with the portal during this year and have assisted on the promotion of the Portal. A total of more than 85,000 visits to the portal have been registered. Visitors came from 102 different countries with 80 % of them from Latin America and the Caribbean and 17,7 % from the USA, Canada and Europe.

Until the middle of 2006, the average number of daily visits was near 100, however, a significant fall of them has been evidenced during the last months of 2006. Despite of the significant efforts to keep an active contribution of volunteer editors and promotion, the proposed goal has not been accomplished. To get sustainability in the Portal, increase the number of visitors, institutional mechanisms must be established to get the support of relevant Marine institutions from the regions, to keep the Portal useful to visitors offering usable information about the Ocean. Finally, a promotion strategy will be implemented during 2007, in order to increase the number of visits and ensure the involvement of other partners across the regions.

Table A3-3: Page views per year (Source: http://webstats.motigo.com/)

Year	Page views
2004	18,538
2005	22,336
2006	11,430
2007	4,042
Total	56,346

For the future it is hoped to increase the number of visitors to 80 daily visitors at the end of the year, to establish a new and more friendly and attractive structure of the portal, to get the commitment of no less than 5 National institutions to support the Portal, to establish cooperation with SPIN CAM initiative, to disseminate the Tutorial to Universities and Secondary Schools, Two Newsletter and One Brochure issues. (IOC/IODE - XIX/31, p.4). It is recommended to promote the Portal through the different UNESCO and IOC web sites, to get the commitment of ODINCARSA National institutions to support the provision of contents and promotion of

the Portal at National level and to make an update of the current structure of the Portal including critical issues as Climate change, disaster Prevention, ICAM, Operational services and information systems.

African OceanPortal

The Regional Ocean Portal for Africa: **African Oceans** has compiled more than 2,713 knowledge objects related with ocean issues relevant for Africa. A total of more than 13,700 visits to the portal have been registered. More than 27 % of the visitors came from African countries.

The COSMARNEWS newsletter is published quarterly since 2006 to publish the materials available in the portal. The African Ocean portal is one of the partners in the development of the Clearing House Mechanism for Eastern Africa which is coordinated by the UNEP Regional Seas program.

Table A3-4: Page views per year Source: http://webstats.motigo.com/

Year	Page views
2003	1,797
2004	3,063
2005	3,996
2006	3,574
2007	3,298
Total	15,728

For the future it is hoped to increase the number of visitors substantially, to get the commitment of no less than 5 National institutions to support the Portal, to have 5 additional African editors, to increase the number of knowledge objects by at least 2,000 in the current year, to publish 4 issues of COSMARNEWS and link the materials in the newsletter closely with knowledge objects in the portal (IOC/IODE XIX/31, p. 4). It is recommended to promote the portal through the ODINAFRICA and IOC websites, to get a commitment from ODINAFRICA national institutions to support the provision of contents and promotion of the portal at national level. Moreover, to expand the scope of the portal to include more marine related issues so as to attract a wider user base and to publicize the materials available in the portal through brochures, posters, newsletters and the ODINAFRICA mailing lists.

Ocean Expert

OceanExpert started as the Global Directory of Marine (and Freshwater) Professionals (GLODIR) in 1997 after the IODE Group of Experts on Marine Information Management (GE-MIM) had noted that the International Directory of Marine Scientists project, developed and maintained in the 1970s and 1980s by several UN agencies had been stopped despite its high appreciation by the ocean research community. The first version of the new GLODIR was launched in 1997 as a web product enabling experts to enter and edit their information. In 1999 a number of IAMSLIC members agreed to cooperate in GLODIR as national or regional 'input coordinators'. This led to a rapid increase (doubling!) in the number of entries and GLODIR passed the size of 10,000 records at the end of 1999. At that time it was decided to add the citation field enabling experts to include short descriptions of their most important and/or recent scientific publications. This also proved to be a success as within a year over 15,000 citations were added.

Once a year all experts registered in GLODIR received an email inviting them to update their record. On average 30-40% of the experts responded to this request. A problem emerge with respect to the password required for editing records as in many cases the registered experts forgot this password and needed to obtain it from the Project Office in Oostend, which proved to be a very time-consuming and inefficient procedure. Another problem was the fact that some experts who had not provided an email address could not be contacted for an update on their data. By the year 2002 the number of records reached 13,500, of which 3000 did not have an email address. Hence early in 2002 the need to re-engineer and to make GLODIR more efficient was addressed. It was found that the technical solution on which GLODIR was based until then had reached its limits. In addition the mailing function of GLODIR (sending out email to all or part of GLODIR addresses) caused crashes or serious slowdown of the UNESCO Paris mailserver when the number of addressees exceeded 1,000. It was therefore decided to migrate GLODIR to a more robust and flexible solution. A contractor was hired to re-engineer GLODIR during the summer of 2002. The following new features were specified:

a) easy registration with 'forgot my password' function that emails the forgotten password;
b) enable registered expert to send emails to others in the same country and/or with the same research interest ("community subscribe" function to receive such mails and "community mail" function to send such mails);
c) citation alert: to receive an email alert when an expert with your research interest submit a citation. In addition, to respond to the request to also provide a 'directory of research institutions' the system now uses a 'controlled' institution list whereby new experts can choose from a list of institutions previously entered.

It was decided to rename GLODIR to a more intuitive 'OceanExpert' and the domain name www.oceanexpert.net was registered. The new OceanExpert has been launched officially on 1 November 2002. The 3000 addresses that do not have an email address were also removed (IOC/IODE-XIX/29 p. 1-2).

During the GE – MIM Session in 2004 recommendations of how to improve the Ocean Expert were made and since 2005 a staff member within the IOC Project for IODE has been including such recommendations. A major check-up was carried out and all invalid records were removed. The evolution regarding the number of experts is presented in table 21.

Table A3-5: Evolution of the number of Experts.
Source: http://www.iode.org/index.php?option=com_alumni&task=start

Date	Number of experts
01.01.2002	6258
31.12.2002	6565
31.12.2003	6925
31.12.2004	7128
31.12.2005	7348
31.12.2006	8445
22.05.2007	9058

There is an average of about 30-40 records submitted weekly and about 50% of them are denied because information is missing (also many try to abuse the system and register just in order to access e-mail addresses and send around junk mail), hence increased and continuous quality control is very important. In Africa the quality of information on experts is more or less guaranteed because it is checked by ODINAfrica.

The evolution of OceanExpert and the constant improvements and upgrades have contributed to an increased use of the database especially this can be noted in Table 15 which shows a 6-fold increase in visits is observed in 2006 compared to 2005: 20, 883 visits (the years before the visits to the page were at about the same number). This steep increase in visits to this page is due to the implementation of the new features: i.e. one can now look for persons in Google and then end up in Ocean Experts. Moreover, the section on Jobs, Events, and Conferences was added and improved which contributes to this increase in use.

Table A3-6: OceanExpert Usage Statistics

Number of visits and records	Year 2005	Year 2006
Total number of visits	20.883	132.099
Average number of visits per month	1.740	11.008
Average number of visits per day	57	362
New approved records	195	1040
New approved institutional records	No data	414 *
* period 15/03/06 - 31/12/06 Source: IOC/IODE-XIX/29 p. 7		

OceanExpert was moved from the server at UNESCO in Paris to the new permanent server in Ostend in November 2005. The new features of OceanExpert are in place since the last Session in March 2007, but on a daily basis new members are approved or disapproved by Wouter Rommens (IPOI) who is administrating OceanExpert since January 2006. Administration tasks include quality control of new experts, institutions, jobs and messages and the alumni management (events and people) and management of the site. Technical assistance is provided by Coldrose.

For the moment all the necessary technical requirements for the functioning of OceanExpert are there. However, the following future modifications, which are identified by the GE-MIM, the community and during the IODE meetings, are proposed:

a) the implementation of a **Unique Author Identifier** to link the Publications of the Experts to ASFA (Aquatic Science & Fisheries Abstracts) in order to be able to find the publication right away. Currently, the IPOI is in conversation with ASFA in order to do this link, but some technical requirements still need to be solved for its implementation

b) to expand the geographical coverage of Ocean Expert to Eastern Europe, Asia (China), and the Pacific (Small Islands). This extension of the network costs a lot of efforts and it is necessary to rely on volunteers.

c) Quality control is the greatest challenge for the future. The desire is to make Ocean Expert grow towards a globally recognized **Clearing House** on MI Experts. However, certain criteria to be able to classify an expert are needed, and then a Quality Flag could figure on a certain record. For this, it is necessary to rely on NODC Coordinators and their knowledge to define the quality of the contacts/experts. This effort will be started now and shall be accomplished by the next session of IODE in 2009.

2. NODC Web pages

All the ODIN pages are ready but they keep changing constantly (since October/ Nov 2005). There are no specific guidelines for the design and layout of the web pages. Usually the NODCs follow the same procedures as taught in the course and then start changing it. Hence, the first months after the training course all the pages were almost the same but now there is some kind of healthy competition amongst the different NODCs on who makes the nicest webpage. However, as a suggestion it is thought that it would be useful to have the websites follow a similar basic structure, such that an external person browsing in the different NODC web pages knows already beforehand what to expect and where to find specific information (IOC/IODE-XIX/43 p.2). An important tool to be installed in the future would be the web statistics.

The IPOI in Ostend has become the host for most of the NODC web pages and other IODE related web pages since 2006. The reason for this, among others, is that the internet connection in developing countries is often not stable. An interesting side-effect or impact is that also GOSIC has asked for being hosted on the server in Belgium. Hence, through mouth to mouth communication requests from other bodies are presented to the Project Office in Oostende.

Table A3-7: Countries that have received Web design training and activity of web page

Countries that have received training:	URL	Website active		
		Yes	No	Under Construction
Angola	www.nodc-angola.org			x
Benin	www.nodc-benin.org	x		
Cameroon	www.nodc-cameroon.org	x		
Comoros	www.nodc-comoros.org	x		
Congo	www.nodc-congo.org	x		
Cote d'Ivoire	www.nodc-cotedivoire.org	x		
Egypt	www.nodc-egypt.org	x		
Gabon	www.nodc-gabon.org	x		
Ghana	www.nodc-ghana.org	x		
Guinea	www.nodc-guinea.org	x		
Kenya	www.nodc-kenya.org	x		
Mauritania	www.nodc-mauritania.org	x		
Mauritius	www.nodc-mauritius.org	x		
Morocco	www.nodc-morocco.org		x	
Mozambique	www.nodc-mozambique.org			x
Nigeria	www.nodc-nigeria.org	x		

Senegal	www.nodc-senegal.org	x		
Seychelles	www.nodc-seychellles.org	x		
South Africa	www.nodc-southafrica.org		x	
Tanzania	www.nodc-tanzania.org	x		
Togo	www.nodc-togo.org	x		

3. OceanDOCuments

The objective of OceanDocs is the development of a network of OAI-compliant repositories (Institutional and the OceanDocs Central repository) providing access to full-text publications created by scientists affiliated to oceanographic and marine institutes and managed by their libraries and information centers. The creation of the OceanDocs network seeks to have the following immediate and direct advantages:

- Make scientific publications of oceanographic and marine institutes more easily and freely accessible to the research and management community,
- Make local and regional grey literature available on a worldwide scale,
- Enhance the internal scientific communication;
- Facilitate publishing of research findings (e-journal as well as e-archive), specifically for scientists in developing countries thereby promoting their research and increasing their access to the international research forum.

The interest of the project is to have as wide a scope as possible. Different sort of documents, grey literature and commercially published papers can be collected as long as they have a scientific significance, i.e. articles, scientific reports (annual, regular), project reports, theses, technical progress notes, conference papers. The documents which are excluded are administrative reports, PowerPoint presentations, etc. The goal of the project is to make the documents in the repository freely available for the general public. Only in specific cases a limitation of access can be installed.

ODINPUBAFRICA – OCEANDOCS

The goal of this two year project (2004-2006) 2006), funded by the Government of Flanders (Kimgdom of Belgium) through the Flanders-UNESCO Trust Fund for Science, was to develop an electronic platform to collect scientific documents (articles, conference papers, working papers, etc.) produced by members of African research institutes in the field of oceanography and marine science. The Hasselt University Library (Belgium) coordinated the project and is still strongly involved in the follow up project OceanDocs. The results of the project are the following:

- It has accomplished its objective to establish a central repository of electronic publications. The repository contains 1122 documents related to marine science and oceanography prepared by African authors
- The project has trained information professionals in Africa and two regional coordinators (one for East and one for West Africa)
- This project has been recognized as a valuable example for the development of electronic repositories in developing countries and similar repositories are now planned for Latina America and Eastern Europe and it was decided to place all e-repository projects under a new umbrella called Ocean Docs.

However, also some complications were experienced because many research scientists in developing countries are unfamiliar with the e-repository concept and see it as a competitor with 'traditional journals'. It has been challenging for the African marine information managers to convince scientists. Furthermore,

entering input into the e-repository is an extra and unrewarded task for the librarians and as internet connectivity remains a problem in some locations this task might prove difficult to be realized.

OceanDocs is therefore a follow-up and extension of ODINPubAfrica with the software having been upgraded and new features developed. But mainly it is a strategic choice to use one platform for the different ODIN communities and also from the user point of view it is better to have a one point access to OceanDocs publications instead of being confronted with different repositories.

The sixth expected outcome of the Strategic Objective 6 refers to improved quality of teaching and research programmes, broader participation of scientists from developing countries in collaborative research,, especially women. In the case of improvements with respect to the quality of teaching, IODE has carried out in recent years extensive efforts in this direction.

As mentioned before, efforts span:

Training of staff, both in countries of the various continents, as well as in the newly established IOC Office of IODE in Oostend, which has been fitted with excellent tools to enhance the teaching process, as well as the learning process. The arrangement of field trips in research vessels of VLIZ is an excellent complement to the theoretical material presented in the training workshops conducted in Oostend.

The continuous improvement of the Ocean Teacher system. The objective of OceanTeacher (http://www.oceanteacher.org) is to provide training tools for Oceanographic Data and Information exchange. These tools are used during IODE Training Courses but can also be used for self training and continuous professional development. The early prototypes of OceanTeacher were floppy disk based and used in various ad hoc activities in the late 1990's. The first version of the current system of resources was initially developed in 2000, during the ODINAFRICA II project. However, considering today's technology this first web version of Ocean Teacher was a bit rigid in use and handling because it was a static html were all elements and changes needed to be inserted, typed and updated manually. The previous static html version of OceanTeacher, which has grown steadily over the years (2000 – 2006), has now been transformed into an Integrated Expert and Training System for Oceanographic Data and Information Management (ODI – MEX) using the existing OceanTeacher structure and content as a basis. This work was carried out in the ODIMEX project which was funded by Flanders over a period of 4 years (2004 – 2007).

The way to measure if the objectives have been met is to know the number of people trained and the number of courses taught. The result or impact of the course can be measured through the establishment of a national data centre and the establishment of the web pages. It depends on the course which products are developed. The follow-up to the training courses is usually done at the end of the capacity-building course where a work plan (to do list/ homework) is established for tasks that shall be carried out by the trainees when they are back in their home country. A good recommendation here would be to ask the trainees more explicitly to train and teach other relevant persons in their office and home country in order to spread the capacities and the impact.

Recently the training courses offered by IODE have all been held in the project office in Ostend, Belgium. Having the training activities all in Belgium greatly increase the efficiency and effectiveness of the courses. For instance, the agreement between the Government of Flanders (Belgium) and UNESCO makes the procedure very flexible, because the tickets and visa for the participants can be provided directly from Oostende, Belgium. Furthermore, at the project office there is a very good access to a large number of modern PCs and a high speed internet connection (an issue which usually is problematic in developing countries).

In order to increase effectiveness and offer more advanced level courses in the future, the system will provide video lectures. People can then train themselves the basics through video lectures before coming

to an advanced level course. It is suggested that a webstatistics counter is installed on the OceanTeacher video lectures page in order to track the number of people teaching themselves. Further future modifications are identified by the steering group of Ocean Teacher. The editor group is responsible for the content, the system is in constant evolution to meet increased technological and user needs. Capacity-building needs of member states are identified through the ODINs..

OCEAN TEACHER

In the area of computed-based tools for training, IODE has been upgrading some of its tools on a consistent basis. Ocean Teacher has been by far the most relevant tool in this case, and has been tailored to take advantage of new information technologies such as the internet.

During IODE Session XVI in November, 2000, the Executive Officer of the Australian Ocean Data Centre Joint Facility [52] mentioned the recent development of the IODE Resource Kit which was elaborated with the following goals in mind:

- to constitute a computer-based tool as a follow-up and complement to IODE Data and Information Management activities;
- to contain a number of modules which address marine data and information management requirements in the marine research process, going from programme design to program report;
- to support the development of marine data and information management capabilities.

The tool was developed as a static HTML website; it contained data and information management material and software tools for data centres, and was made available on CD-ROM but it could also be accessed through the internet. Having been set up in a modular fashion, it contained three modules initially:

- IODE Data Centre System,
- Data Management Systems,
- Data Analysis and Products.

By March 2003, the Ocean Teacher system[53] was introduced as the basis for the IODE capacity building programme and was already used in several training activities. The 2003 version of Ocean Teacher was accessible through the Internet (http://www.oceanteacher.org) but can also be made available on CD-ROM... It comprised two segments: marine data management and marine information management. The Kit provided the latest versions of popular public-domain software, documentation for global and regional datasets, documentation for major formats, and links to data sources. Other resources in Ocean Teacher for data management would include annually written Training Manuals, and specially produced regional datasets.

By 2004, the IODE Priority Survey displayed the high ranking in terms of priority assigned to Ocean Teacher by Member States when compared to other web-based products and tools developed by IODE. It was ranked as the number 2 project (product) behind Ocean Portal as 44% of the respondents assigned it the highest priority, while 40% of the respondents assigned to it a high priority[54].

During the IODE Session XVIII, advances on Ocean Teacher included additional modules on various topics. Dr. Murray Brown commented that Ocean Teacher contained 5,333 files in nearly 1006 megabytes[55]. By 2007, Dr. Wouter Rommens of the IPOI reported additional advances and mentioned

[52] See: document IOC/IODE-XVI/3, paragraphs 279 – 291, pages 37 & 38.
[53] See: document IOC/IODE-XVII/3, paragraphs 200 – 202, pages 26 & 27.
[54] See: IODE Priority Survey, IOC/IODE-XVII/23, Question 16, page 11
[55] See: document IOC/IODE-XVIII/3, paragraph 484, page 55.

that Ocean Teacher now contained over 6,000 files, and required over 1,800 megabytes of memory to be stored[56].

[56] See: document IOC/IODE-XIX/3, paragraph 504, page 60.

ANNEX 4:
IODE NODC QUESTIONNAIRE - 2007

TO BE FILLED JOINTLY BY IODE NATIONAL COORDINATORS FOR OCEANOGRAPHIC DATA MANAGEMENT AND IODE NATIONAL COORDINATORS FOR MARINE INFORMATION MANAGEMENT

Name of the Person: _____	**Country:** _____	**E-mail Address:** _____

Identification of needs or weaknesses of NODCs in Member States:

Does IODE identify routinely needs or weaknesses in Member States related to data exchange, long-term archival, and information management?	yes ☐ no ☐	*If yes, please indicate how (select all options that apply):* ☐ Through Official Letters or email requests on an annual basis or frequently ☐ Through specific questions which need to be addressed in the National Report submitted to IODE every 2 years. ☐ During IODE sessions every 2 years, in a particular segment of the session. ☐ Only on rare occasions, such as in the case of the recent IODE Priority Survey in 2004. ☐ Through meetings with ODIN coordinators.
Do you report back to IODE regarding benefits received from IODE regulary?	yes ☐ no ☐	*If yes, please indicate how (select all options that apply):* ☐ Through email requests on an annual basis or frequently. ☐ Through specific questions which have to be addressed in the National Report submitted to IODE every 2 years. ☐ During IODE sessions every 2 years, in a particular segment of the session. ☐ Only on rare occasions, such as in the case of the recent IODE Priority Survey in 2004.
Regarding potential targets to be set up by IODE to be achieved in a period of 2 years, please choose the three more relevant from your perspective.	☐ 10% more countries incorporated as NODCs globally. ☐ Complete incorporation of all IOC Member States in one particular continent as NODCs. ☐ 20% more data or information exchanged than in the previous period within NODCs. ☐ Geographical areas currently inactive such as the Caribbean should be targeted to become active in IODE. ☐ Strengthen capacities of already active NODCs. ☐ Other (please specify) _____	
*Consider the task of **data exchange** proposed in one of the 5 objectives by IODE. Please select the option that applies best.* (the IODE webpage presents the 5 objectives)	☐ This task is incorporated into the routine work of NODC because it has been requested by IODE. ☐ This task has been previously identified as necessary by the NODC, and IODE is an option to get support to execute it. ☐ A combination of the two previous options. ☐ No data is exchanged (please comment) _____	
*Consider the task of **long-term data archival** proposed in one of the 5 objectives by IODE , Please select the option that applies best.* (the IODE webpage presents the 5 objectives)	☐ This task is incorporated into the routine work of NODC because it has been requested by IODE. ☐ This task has been previously identified as necessary by the NODC, and IODE is an option to get support to execute it. ☐ A combination of the two previous options. ☐ Other (please specify) _____	

*Consider the task of **long-term data archival** proposed in one of the 5 objectives by IODE , Please select the option that applies best.* (the IODE webpage presents the 5 objectives)	☐ This task is incorporated into the routine work of NODC because it has been requested by IODE. ☐ This task has been previously identified as necessary by the NODC, and IODE is an option to get support to execute it. ☐ A combination of the two previous options. ☐ Other (please specify) _____

Regarding the ODINs:

Concerning the ODINs as the mechanism set up by IODE to coordinate activities within regions or continents, please select one:	☐ The ODINs are **providing a better interface to link to IODE** to carry out data exchange, archival, and marine information management. ☐ The ODINs are **making a link to IODE more difficult**, complicated to carry out these tasks.

Regarding capacity building:

Does IODE identify routinely capacity building needs or weaknesses in Member States?	yes ☐ no ☐	*If yes, please indicate how (select all options that apply):* ☐ Through Official Letters or email requests on an annual basis or frequently ☐ Through specific questions which need to be addressed in the National Report submitted to IODE every 2 years. ☐ During IODE sessions every 2 years, in a particular segment of the session. ☐ Through meetings with ODIN coordinators. ☐ Only on rare occasions, such as in the case of the recent IODE Priority Survey in 2004.
Once NODC staff members are trained on data and information management capacities, they may be attracted by the private sector. This is a risk for the NODC in terms of loosing trained staff. What actions are taken by the NODC to minimize this risk?	Please comment: _____	
Are there other capacity-building efforts on ocean and marine data exchange and information management which have more impact than those carried out by IODE?	☐ Yes ☐ No If yes, please comment: _____	

Data management and exchange

What has been the contribution of IODE in the development of databases in your NODC? Select the options which apply:	☐ Donation of specialized software for the elaboration and setup of databases. ☐ Donation of hardware (PCs, related equipment). ☐ Technical assistance – expert sent to NODC. ☐ Training of local staff. ☐ None of the above. please comment why: _____
Is the NODC ensuring long-term data archival of its data? How?	☐ Data is archived in locally within NODC. ☐ Data is sent to a national facility, other than the NODC, for long-term archival. ☐ Data is sent to one of the WDCs or similar (ICES) for long-term archival. ☐ Two or three options listed above are carried out in parallel. ☐ Data is not archived. please comment why: _____
If unfortunately some data has been lost or is now inaccessible within the NODC, please select the option (s) which could be the reason.	☐ Data was lost during the migration from one mainframe computer to another one. ☐ Data was lost due to permanent damage of storage device where data was stored. ☐ Data is stored in a medium which can no longer be accessed (equipment no longer available to retrieve data). ☐ Another reason, please comment: _____

Do you measure in a quantitative fashion the amount of data exchange between your NODC and other centers? (NODCs, research centers, end-users)	yes ☐ no ☐	*If **YES**, please indicate:* How much data has been exchanged this year: _____ *If **NO**, please indicate why:* ☐ The mechanism employed (webpage, etc) to exchange data is not capable of supplying information on the amount of data exchanged. ☐ The mechanism employed (webpage, etc) could do it, but the NODC has not identified the need to evaluate this process. ☐ The cost of carrying out the measurement is too costly to justify it. Is there a more appropriate way to measure this quantity, please comment: _____
Data can be exchanged in real time, near real time, and in delayed mode. Please rank the demand within your NODC in this context.	*Characterize demand for all modes of data exchange applicable within your NODC:* Data exchange on real time: demand is: High ☐ Medium ☐ Low ☐ Data exchange on near-real time: demand is: High ☐ Medium ☐ Low ☐ Data exchange on delayed mode: demand is: High ☐ Medium ☐ Low ☐ If there is no demand for data exchange, please comment: _____	

Data Quality:

IODE has supported the development of guidelines on quality standards for data. Please select one the following:	☐ Most guidelines are implemented easily taking into account existing capacities in NODC. ☐ Few guidelines are implemented taking into account existing capacities in NODC. ☐ Insufficient guidelines have been produced by IODE and more attention should be given to this. ☐ Guidelines are not implemented yet, these can only be implemented with additional capacities (human, equipment, other).
Considering the fact that new regional and international projects, programs and efforts request the support of NODCs, please select one of the following concerning issues related to data quality	☐ The Guidelines developed by IODE for data quality are recognized by all such projects and programs, and are adopted (that is, there is no demand to adopt new guidelines by such projects). ☐ Few projects or programs require the adoption of new guidelines, different from those developed by IODE. ☐ Most of these projects or programs require the adoption of new guidelines, different from those developed by IODE. ☐ Insufficient guidelines have been produced by IODE and more attention should be given to this.

Metadata:

IODE has supported the development of metadata frameworks. Please choose one:	☐ Metadata frameworks can be implemented easily taking into account existing capacities in NODC. ☐ Metadata frameworks are implemented with difficulty considering current capacities in NODC. ☐ Metadata frameworks can only be implemented with additional capacities (human, equipment).
Considering the fact that new regional and international projects, programs and efforts are being executed with the support of NODCs, please select one of the following	☐ The Metadata frameworks developed by IODE are recognized by all such projects and programs, and are adopted (that is, there is no demand to adopt new Metadata frameworks by such projects). ☐ Few projects or programs require the adoption of new Metadata frameworks, different from those of IODE. ☐ Most of these projects or programs require the adoption of new Metadata frameworks, different from those of IODE.

Marine Information:

Please rank and comment regarding these information management products developed by IODE:	
Ocean Portal ☐ Useful, I use it to: _____ ☐ Not useful, I rather use: _____ ☐ I do not know it.	*Ocean Docs:* ☐ Useful, I use it to: _____ ☐ Not useful, I rather use: _____ ☐ I do not know it.

OceanExpert	*IODE Website:*
☐ Useful, I use it to: _____ ☐ Not useful, I rather use: _____ ☐ I do not know it.	☐ Useful, I use it to: _____ ☐ Not useful, I rather use: _____ ☐ I do not know it.

Considering the relations established through IODE for NODCs to have access to and to acquire publications of different kinds with the support of IAMSLIC, please select	☐ IODE web-based products and efforts through IAMSLIC allows discovery and access to required publications and documents more quickly than other methods. ☐ I prefer to use other search methods such as google scholar, etc.
Considering the quality of information needed, please select one:	☐ Searching information through IODE and its portals or web pages **is necessary** to ensure quality of information. ☐ Google and other commercial search engines offer access to information of equal quality to that accessed through IODE. ☐ Quality is not an issue at this time, the issue is just finding any type of information. ☐ Other comments: _____.

Other comments: _____.

Thank you very much for your cooperation.

ANNEX 5
ITINERARY

The following itinerary was carried out in order to carry out this evaluation.

Date	Activity	Comment
Field Missions		
13-17 March, 2007	Participation in IODE Session XIX in Trieste, Italy	Interviews with members of IODE Committee, with representatives of NODCs, National Data and Information Coordinators, and representatives of international organizations. Interviews with ODIN Coordinators.
April 1 – 3, 2007	Mission to WMO, Geneve, Switzerland	Interviews with staff of the Ocean Affairs Division of WMO.
2 – 4 May, 2007	Mission to UNESCO HQ in Paris, France	Interviews with Secretariat of IOC, staff of IODE.
8 – 16 May, 2007	Mission to Kenya: Visits to Nairobi and Mombasa 8 – 12 May, Nairobi 13 – 16 May, Mombasa	Interviews with representatives of UNESCO, UNESCO-IOC, UNEP, HABITAT in UN Compound in Nairobi; interviews with regional agencies in Nairobi. Visit to KMFRI.
20 – 23 May, 2007	Mission to IOC Project Office for IODE in Oostend, Belgium	Review of IODE Programme with Secretariat of IODE, staff of Project Office. Interviews with representatives of Government of Flanders.
20 May – 15 June 2007	Internet-based survey	Survey related to evaluation executed via email using a questionnaire addressing National Data and Information Coordinators of all Member States participating in IODE
30 May – 1 June 2007	Mission to UNESCO HQ in Paris, France	Interview with Secretariat of IOS
8 – 9 June, 2007	Mission to IOC Project Office for IODE in Oostend, Belgium	Review of training programme in Oostend. Interviews with participants and trainers during training activities.
Desk Work		
April, 2007	Review of IODE reports, documents	Acquisition and systematization of information for evaluation.
May, 2007	Review of IODE reports, documents, Conduction of survey	Acquisition and systematization of information for evaluation. Processing of survey data.
June, 2007	Conduction of Survey. Elaboration of Draft Report	Processing and analysis of survey data. Elaboration of Draft Report.
August – Sept. 2007	Elaboration of Final Report	Edition of Draft Report to complete Final Report.

ANNEX 6
LIST OF WEBSITES AND DOCUMENTS REVIEWED FOR THIS EVALUATION

Web sites:

IODE:	http://www.iode.org
ODINAFRICA:	http://www.odinafrica.net
ODINCARSA:	http://www.odincarsa.net
ODINCINDIO	http://www.iode.org/odincindio
ODINECET	http://www.iode.org/odinecet
OceanExpert	http://www.oceanexpert.net
OceanTeacher	http://www.oceanteacher.org
OceanPortal	http://www.oceanportal.org
OceanDocs	http://www.oceandocs.net
Ocean Data Portal	http://www.oceandataportal.net
African OceanPortal	http://www.africanoceans.org
PortalOceanico	http://www.portaloceanico.org
FUST website	http://www.iode.org/fust
"old" IODE web site (<2007):	http://www.iode.org/iodeold
CIIFEN	http://www.ciifen-int.org
CPPC	http://www.cpps-int.org
IAMSLIC	http://www.iamslic.org
NEPAD	http://www.nepad.org
WMO	http://www.wmo.org
WDC, Silver Spring, USA	http://www.nodc.noaa.gov/General/NODC-dataexch/NODC-wdca.html

Websites of NODCs in various countries
Websites of UNESCO in various regions of the World, in particular Latin America

Documents

- **UNESCO Medium Term Strategy (31 C/4)**
- **IOC Medium Term Strategy (2004-2007) (INF-1192)**
    - **IOC core documents**
        - IOC Rules of Procedure (IOC/INF-1166, November 2001)
        - IOC Statutes (IOC/INF-1148, July 2000)
        - IOC Principles and Strategy for Capacity-Building, TEMA (IOC/INF-1211, 2005)
    - **Reports of IOC Governing Bodies**
        - IOC-XXIII (2005)
        - EC-XXXVII (2004)
        - IOC-XXII (2003)
        - EC-XXXVI (2002)

- IOC-XXI (2001)

- **Reports of IODE Committee Sessions**

- 19th Session (2007)
- 18th Session (2005)
- 17th Session (2003)
- 16th Session (2000)
- National reports submitted by Member States in these sessions.

- **Documents related to the IOC Project Office for IODE** (established in April 2005)
- IOC resolution IOC-XXII-7
- Draft guidelines for the establishment of (IOC) decentralized offices (*IOC/XXII/2 Annex 6 REV.)*
- IODE Project Office Business Plan (IOC/INF-1187, May 2003)
- Proposal for the establishment of an IODE Project Office (IOC/IODE-XVII/34)

- **IODE Review (2005)**
- IODE REVIEW – REPORT OF THE IODE REVIEW TEAM (IOC/IODE-XVIII/18)
- HISTORICAL OVERVIEW OF THE IODE PROGRAMME BETWEEN 1961 AND 2003 (IOC/TT-DMS-I/6)
- IODE Survey Questionnaire for the IODE review
- Results of the IODE Priority Survey (IOC/IODE-XVIII/23)
- Survey of the Marine Science Community on IODE (IOC/IODE-XVIII/23B)
- IODE Evaluation Progress Report: A Proposal for an IODE Review (IODE-XVII/31)

- **Full list of IODE documents**:
- http://www.iode.org/documents
- Older documents: 2003: http://www.iode.org/iodeold/files2.php?year=2003&Submit=Go
- Older documents: 2004: http://www.iode.org/iodeold/files2.php?year=2004&Submit=Go
- Older documents: 2005: http://www.iode.org/iodeold/files2.php?year=2005&Submit=Go
- Older document: 2006: http://www.iode.org/iodeold/files2.php?year=2006&Submit=Go

- **Reports of other IOC Subsidiary bodies**

- IOC Caribe, (2005): IOC/SC-IOCARIBE-VIII/3, 2005

- **Manuals, documents elaborated by IODE**

- IOC Manual **No 1**. UNESCO, 1965.
- IOC Manuals and Guides **No. 26**. SC-93/WS-19, UNESCO, 1993
- IOC Manuals and Guides **No. 5** (rev).

Guide to Operational Procedures for the Collection and Exchange of JCOMM Oceanographic Data, **IOC Manuals and Guides No. 3, (3rd Rev. Ed.).**

END OF REPORT