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IODE Evaluation Progress Report: A Proposal for an IODE Review
(Dr Ron Wilson and Secretariat)

1. Introduction

The 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*". This early definition has meanwhile been clarified as follows:

"The main objectives of the IODE Programme are (i) to facilitate and promote the exchange of oceanographic data and information; (ii) to develop standards, formats and methods for the global exchange of oceanographic data and information; (iii) to assist Member States to acquire the necessary capacity to manage oceanographic data and information and become partners in the IODE network; (iv) to support international scientific and operational oceanographic programmes of IOC and WMO and their sponsor organizations with advice and data management services."

The IODE system forms a worldwide service oriented network consisting of DNAs (Designated National Agencies), NODCs (National Oceanographic Data Centres), RNODCs (Responsible National Oceanographic Data Centres) and WDCs (World Data Centres – Oceanography). During the past 40 years, IOC Member States have established **over 60 oceanographic data centres** in as many countries. Collaboration with the ICSU network of World Data Centres has been, and remains close.

This network has been able to collect, control the quality of, and archive millions of ocean observations, and makes these available to Member States. The network of RNODCs established by IODE has also supported several international science programs including FGGE, TOGA, WOCE and Clivar and has assembled and published many project datasets for regional projects such as MEDAR/MEDATLAS. A number of global databases including sea level, drifting buoys, and sub-surface temperature and salinity continue to operate in IODE data centres in support of international programmes and national requirements.

With the advance of oceanography from a science dealing mostly with local processes to one that is also studying ocean basin and global processes, researchers need an international exchange system to provide data and information from all available sources. Additionally, scientists studying local processes benefit substantially from access to data collected by other Member States in their area of interest. The economic benefit of obtaining data by exchange as opposed to collecting it oneself is huge.

During the past 4 decades emphasis has been mostly on delayed-mode data. In addition the system has been developed as a passive one that depends on participants submitting data on a regular basis according to agreed general principles rather than a proactive one that actively searches out and acquires specific data that should be made available to its users. Such a passive system does not work well in the present climate of restraint and diminishing resources. These 'limitations' have become weaknesses of IODE, and to some extent, have marginalized the programme. By

comparison other programmes focusing on operational, real-time data and their products, such as GOOS, have become more relevant and appreciated. Unless IODE re-defines itself the programme is at risk of being seen 'merely' as a 'passive data archive' with too little data too late.

In addition the IODE data centres have traditionally focused on physical oceanographic data and have given little attention to biological, chemical, coastal and remotely sensed data. This has alienated a large component of the science community, an unfortunate situation especially as during the past decade increasing attention has been given to multi-disciplinary research serving integrated coastal area management (ICAM). Another frequent criticism of 'traditional' NODCs has been the lack of user or client-oriented services with data centres merely absorbing data and giving little in return. Much has been said about the development of products and services as a priority activity. However this can not be only a data centre action. Very few data centres have the scientific capability to design, develop, and prepare scientifically valid data products. This needs to be done in cooperation with appropriate scientific agencies, either nationally or internationally. The shortcoming of the system is that IODE and the scientific community have not developed the joint activities and cooperation to design and implement routine production of such products taking full advantage of the scientists knowledge for the design and the data centres abilities to routinely process data and generate the products. Put in other words, the relationship between data centres and the science community needs attention.

These facts that have impacted negatively on IODE have not remained unnoticed within the ocean science and operational communities. Many NODCs have partly remedied the situation at the national level: Some data centres have included 'non-traditional' data types in their coverage, have developed impressive user interfaces to access their data and products, and some have even decentralized data management involving other national institutions as well as projects. Unfortunately these national development and responses to the user needs have not been reflected in the IODE programme. Until recently IODE Sessions addressed roughly the same agenda focusing on 'traditional' issues and this continued an inward-looking strategy.

In addition between the establishment of GOOS and IODE-16 very little, if any, collaboration existed between IODE and GOOS. For any neutral observer this was an odd situation as it appeared that IOC maintained two programmes that deal with ocean data management yet they did not 'talk to each other'. This is not perhaps as odd as it might seem. The first stages of the development of GOOS involved designing the programme and writing requirements. However GOOS has now reached the stage of having defined an integrated observing system (IOS) and a number of pilot and regional programs, all of which requires data management. GOOS has also written and published a data management strategy (GOOS Report No 103: [GOOS Data & information Management Strategy & Plan](#)), announced that it is depending on the existing data management subsidiary bodies of IOC and WMO to implement the data management activities required for GOOS, and published an action plan for these subsidiary bodies to do so (GOOS Report No 66: [Implementation of Global Observations for GOOS/GCOS - An Action Plan](#)). It is an appropriate time for IODE to begin working closely with GOOS and JCOMM in implementing the necessary end-to-end data management systems to meet the needs of both organizations.

In preparation for IODE-XVI (Lisbon, Portugal, 30 October – 9 November 2000), the IODE Chair (Ben Searle) prepared Document IODE-XVII/27 entitled 'Review of IODE' (attached to this Document as [Annex II](#)). He had prepared this document as he felt that IODE had remained largely unchanged since it was formed in 1961. However, the marine community that it was created to support had changed considerably over this time. The paper provided a brief overview of the current structure of IODE, as well as of IODE's strengths and weaknesses. The paper listed 11 actions that IODE could take to improve its ability to meet the users needs.

At its 16th Session, under Agenda Item 10, the Committee considered Mr Searle's document. The summary of the discussions is added as [Annex I](#).

The Committee decided that a more comprehensive review was required albeit covering largely the same topics as the Chair's document. It should answer the following questions:

- What is the mandate of IODE?
- What are the terms of reference, compositions and interactions of its subsidiary bodies?
- What relationships exist with other programmes, projects and bodies?
- How does the IODE Programme serve science and monitoring programmes of the IOC (in particular GOOS)?
- What are the links with those programmes and what are the roles and responsibilities of Member States, IODE Officers and the Secretariat?

And it should contain:

- Recommendations on the ways of increasing effectiveness of the system and of the Committee as the subsidiary IOC body responsible for the IODE programme;
- Recommendations on the ways of increasing effectiveness of IODE's interaction with the IOC regional subsidiary bodies and other co-operating organizations and bodies;

It was further recommended that the Review should be carried out by the IODE Officers and a group of invited consultants, *if necessary*, and that the Review should be submitted to the IODE Officers and to the 21st Session of the IOC Assembly (3-13 July 2001).

Even during the IODE-XVI Session the Committee recommended several actions that already responded to the concerns mentioned in the Chair's paper:

- 1) Forge strong partnerships with marine programs that have a data management component: *To respond to this option, IODE-XVI established (i) the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (see also Document IOC/IODE-XVII/15.1); and (ii) recommended the establishment of a Steering Group to establish, maintain, and strengthen IODE's participation in co-operative marine research and monitoring programmes. Unfortunately, due to lack of funds this Group has not been composed;*
- 2) Develop a marine data management framework (standards development) e.g. reference model for oceanographic data and XML data formats: *This is being addressed by the SG-MarineXML as well as through IODE's cooperation in JCOMM;*
- 3) Undertake joint projects of mutual national interest between NODC's – making the applications and outputs available to the broad IODE community: *A number of projects are being carried out at a regional level (e.g. ODINAFRICA, ODINCARSA, MEDAR/MEDATLAS, MAMA,...). However it is not clear to what extent the applications and output are being made widely available to the IODE community.*
- 4) Reduce the amount of duplication in software development by using a common data framework as suggested above: *Again this is being addressed as part of the marineXML project, as well as through IODE's cooperation with, and participation in the new JCOMM/GOOS/IODE OIT initiative;*
- 5) Build data management software based on main stream IT frameworks such as the Internet: *most software applications developed now by IODE and by its NODCs are now Internet-based.*
- 6) Build a modular IODE Resource Kit that includes training, software applications and data sets: *This is being implemented fully as part of the OceanTeacher project;*
- 7) Increase user communities knowledge of the existence of data sets and data and information products through a directory system and IODE Internet Portal: *This is being addressed both by MEDI (and its collaboration with NASA's GCMD) and by the OceanPortal project.*
- 8) Broaden client base to include policy makers, resource managers, commercial companies and general public in addition to traditional scientific community: *This is being addressed, to some extent, by the ODIN networks that stress the need to develop products and services that address the needs of a wide user community, and that develop these in cooperation with other programmes such as ICAM. However, this regional initiative should also be more visible in the global IODE.*

- 9) Examine mechanisms to bring international needs together with national data management objectives, so both activities can be served by NODC's: *Again this is being addressed, to some extent, by the ODIN networks but needs more elaboration at the global level;*
- 10) Develop mechanisms to improve the ability of IODE to better address needs between IODE Committee meetings: *This remains a weak point as there are insufficient funds to organize regular meetings of the Officers. Possibly other mechanisms could be investigated.*
- 11) Investigate mechanisms for improving funding and improving promotion of the IODE program: *This remains a weak point (see also Document IOC/IODE-XVII/7rev)*

We also note that a number of additional actions have been taken by IODE to respond to some of the concerns expressed in the paper and stressed during IODE-XVI:

- Recommendation IODE-XVI.3: ESTABLISHMENT, MAINTENANCE, AND STRENGTHENING OF CO-OPERATION BETWEEN IODE AND RESEARCH AND MONITORING PROGRAMMES;
- The Committee decided that a constructive relationship should be established between IODE and JCOMM;
- Recommendation IODE-XVI.4 : ESTABLISHMENT OF A GROUP OF EXPERTS ON BIOLOGICAL AND CHEMICAL DATA MANAGEMENT AND EXCHANGE PRACTISES;
- The Committee recommended the strengthening of linkages to other coastal programmes such as COOP of GOOS and LOICZ;

Some of these recommendations have resulted in concrete action:

- IODE is now an active member in the JCOMM Management Committee (MC), the JCOMM Data Management Coordination Group (DMCG) and the JCOMM Expert Team on Data Management Practices (ET-DMP);
- IODE is now an active member of the GOOS Steering Committee and the GOOS Capacity Building Panel;
- The IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BCDMEP) has been established and has had its first Session in 2002;
- IODE has co-sponsored the 'Colour of Ocean Data Symposium' (Brussels, 25-27 November 2002) bringing together the ocean science (biological and ecological research) and ocean data management communities to exchange views on what is required to improve relationships and services;
- IODE has joined JCOMM in the establishment of the 'Oceans Information Technology Pilot Project' spearheaded by Dr Neville Smith;
- IODE has taken the initiative to coordinate efforts in the development of a 'marineXML' standard that is expected to revolutionize data exchange in the next decade. IODE is hereby collaborating with ICES (ICES/IOC Study Group on marineXML) as well as with several EU institutions in the framework of an EU-funded project on the development of a marineXML;
- MEDI is now being developed jointly with NASA's Global Change Master Directory (that also collaborates with GOSIC)

We therefore feel that it is appropriate to say that IODE has seen very rapid changes during 2001, and even more during 2002: the decisions made by IODE-XVI were of such an impact that they substantially and rapidly changed the way IODE operates as a programme. In addition the close collaboration between IODE and JCOMM and the opportunities this represents for IODE had to be taken into consideration. It was therefore felt that a Review undertaken during the critical phase of the changes (2001-2002) would result in an incomplete and possibly even incorrect representation of "the state and future of IODE".

In addition the IOC Executive Council, during its 35th Session (4-14 June 2002) adopted Resolution EC-XXXV.2 entitled "IOC Strategic Plan for Oceanographic Data and Information Management" (Attached as [Annex III](#)). The Resolution calls for the development of "an IOC Strategic Plan with clearly defined roles for each of its observational and data management elements, for oceanographic data and information management, embracing the requirements, capabilities and infrastructures of its

Member States, as well as the needs of their user communities". As such it will require input from IODE, and in particular it will require a (preliminary) version of the IODE Review.

The First Session of the Task Team is planned to take place on 23 June 2003 (prior to the 22nd Session of the IOC Assembly).

Considering the above it is now essential that the IODE review is started and that at least an executive summary with clear statement of 'current state' and 'recommendations for the future' is prepared for use by the First Session of the Task Team on the Development of an IOC Strategic Plan for Oceanographic Data and Information Management.

2. Elements of the Review: Proposal

On 28 August 2002, the Secretariat consulted Dr Ron Wilson, former Chair of IODE requesting him to consider assisting with the review process. On 4 October 2002 we received a draft document including details on a possible way forward. We include here the proposal as submitted by Dr Wilson and subsequently modified in the preparation of this document for consideration and discussion by the Committee at its 17th Session.

2.1 History of IODE and Development of its Mandate

As a first step in implementing the review it will be necessary to prepare a clear statement of the mandate of IODE. This will be used by the review team to evaluate whether the organization has met its responsibilities in the past. It will also be used as a starting point for suggestions for a modified mandate for the future. This statement of mandate should be a matter of record and can be abstracted from IODE, IOC Assembly, and IOC EC meeting reports. The statement of mandate should be reproduced in the section on mandate in the review report.

2.2 Consultation with the Client Community

Consultation with the client community will have to be a part of any review. The IODE XVII session should develop and promulgate instructions for the review team including but not limited to the following points.

Reasons for consultation

- For past performance
- For future mandate
- Requirements and form of an email or postal survey
- Requirements and selection of candidate sites for visits (including any international programme offices)
- Manner and schedule for vetting the report with the client community before its release
- etc

3. The Review Team, Budget, and Schedule

3.1 Review Team

IODE-XVI stated that the Review should be carried out by the IODE Officers and a group of invited consultants, if necessary. As stated above the Secretariat consulted Dr Ron Wilson. **The Committee is requested to advise on the composition of the Review team** (in addition to the IODE Officers should other experts be invited). If it is decided to add consultants then **the Committee will need to identify criteria for their selection and/or recommend names.**

We would recommend that the Review Team identifies clear areas of individual responsibility (eg member A will take care of 'Background', member B will take care of 'Present Mandate'). The consultant, if required, could be the Chief Editor or 'coordinator' who will receive the material, edit it, and combine into a draft document. This will then be shared with the Team for discussion and finalization.

The Committee may wish to select the Team as a sub-group of the IODE Officers in view of the fact that the Officers Group now consists of 20 members which may be too large to operate effectively and efficiently on this task.

3.2 Budget

It should be noted that the IODE Regular Programme Budget for 2003 currently does not include an item for the Review. **The Committee is therefore requested to take into consideration the cost of the required consultants (cost approximately US\$5,000/month) when preparing the 2003-2005 work plan and budget.**

3.3 Schedule

As stated above a first draft of the Review Report should be available for the First Session of the Task Team on the Development of an IOC Strategic Plan for Oceanographic Data and Information Management. This means that the Review Team will have approximately 3 months to produce a first draft of the Review Report. **The Committee is requested to prepare a detailed work plan and timetable for the Review Team.** In view of the available time and funding the Committee may wish to recommend that the Review Team works by email in preparing the first draft. After the first draft has been reviewed by the Task Team on the development of an unified, comprehensive IOC Strategic Plan for Oceanographic Data and Information Management it is recommended that the review team prepare and hold a meeting to repond to recommendations of the Task Team and finalize the review report.

4. Contents of the Report: Proposal

A draft table of contents, submitted by Dr Ron Wilson, is attached as [Annex IV](#) to provide guidance on the content of the report and thus on the expectations of IODE for the review.

The Committee will be requested to adopt the Table of Contents for the Review Report.

5. Use of the Report

The Committee should discuss and provide a clear statement on how and for what purpose the report will be used. The Committee should also discuss a mechanism for implementation of key recommendations of the study as appropriate in the coming intersessional period. This will not only provide necessary information to the review team but will also provide justification for the study and associated expenditures.

6. Actions required from the Committee (summary)

Requested actions from the Committee

The Committee is requested to:

- The Committee is requested to advise on the composition of the Review team (in addition to the IODE Officers should other experts be invited). If it is decided to add consultants then the Committee will need to identify criteria for their selection and/or recommend names.
- The Committee is therefore requested to take into consideration the cost of the required consultants (cost approximately US\$5,000/month) when preparing the 2003-2005 work plan and budget
- The Committee is requested to prepare a detailed work plan and timetable for the Review Team
- The Committee is requested to Provide guidance to the review team on clients consultations for the review.
- The Committee will be requested to adopt the Table of Contents for the Review Report.

ANNEX I**Extract from the IODE-XVI Summary Report, Agenda Item 10**

388 This Agenda Item was introduced by the Chairman, Mr. B. Searle, referring to Document IOC/IODE-XVI.27 'Review of the IODE System'. He recalled the progress made during this Session, which would guide the Committee into new directions. He noted that the sessional working groups that had discussed various important issues such as co-operation between IODE and research programmes, the review of RNODCs and their Terms of Reference, the role of Regional Co-ordinators, future IODE data and information products, IODE's data policy, and the future of MEDI, gave a clear indication of the ambitions of the IODE system in the years to come.

389 Mr. Searle then called the attention of the Committee to the numerous products that IODE was now decided to develop or improve upon including MEDI, the IODE Resource Kit, Ocean Portal, IODE web site, inventory of NODC data products, software tools and services, promotional materials, etc.

390 With regard to capacity building, he referred to the discussions deciding on the need to undertake IODE capacity building activities within a framework of linking training with equipment and operational support, highlighting the success of the RECOSCIX-WIO and ODINEA projects that had already applied this framework strategy. He restated that training courses and workshops should be organized within such a framework and that these activities should be organized in response to clear requests by the concerned Member States. It was essential that requests were submitted as detailed proposals, indicating the needs, as well as available and required resources.

391 The Committee recommended that a review and evaluation of the IODE be initiated for submission to the IODE Officers and to the forthcoming IOC Assembly in July 2001. This should cover the mandate of the Committee and of its Subsidiary Bodies and should consider the respective compositions, modus operandi, interactions and other relevant aspects. The review will be made by the IODE Officers and a group of invited consultants, if necessary.

392 This evaluation should also review how the IODE Programme serves science and monitoring programmes of the IOC, and in particular, the complementarity and interaction with GOOS. The evaluation should include the description of links with those programmes and include the role and responsibilities of Member States, IODE Officers and the Secretariat. Evaluation should contain recommendations on the ways of increasing effectiveness of the system and of the Committee as the subsidiary IOC Body responsible for the IODE Programme, as well as of its interaction with the IOC Regional Subsidiary Bodies and other co-operating organizations and bodies."

Annex II
Document IOC/IODE-XVI/27: REVIEW OF IODE (Ben Searle, IODE Chairman)

1. Introduction

This report will examine the existing IODE program and will look at the strengths and weakness of its past activities. The paper will also suggest changes to IODE in order to improve the effectiveness of international oceanographic data and information exchange.

To a great extent, IODE has remained largely unchanged since it was formed in 1961. However, the marine community it was created to support has changed considerably over this time. IODE was initially developed to support the marine scientist with data and information products. But today the scope for access to marine data and information products has grown considerably with a much broader user community now requiring this type of support.

This paper will propose a number of suggestions and options for the future activities and structure of IODE that may be considered suitable in today's Internet age and suitable to meet the rapidly changing needs of the broad user community.

2. Existing Structure

The IODE program was established to facilitate the exchange of data between countries generally in support of the scientific communities objectives and needs. In more recent years, governments have recognised the importance of their ocean environments as a resource that needs to be managed. The scientific requirement for data and products still remain, other users such as resource managers and policy makers are requiring products developed from the best available data.

Since its formation, the composition of the IODE program has remained relatively static, with the exception of adding an 'information' component to the program with its associated Group of Experts on Marine Information Management in 1987.

The IODE program has the following structure:-

- The IODE Committee
- The IODE Chairs
- The IODE Officers
- The IODE National Coordinators
- The IODE Regional Coordinators
- IODE Secretariat at IOC
- IODE Group of Experts on Technical Aspects of Data Exchange
- IODE Group of Experts on Marine Information Management
- Steering Group on IGOSS/IODE End-to-End Data Management Systems
- Task Team on Oceanographic Data Quality Control
- The World Data Centres
- Responsible National Oceanographic Data Centres
- National Oceanographic Data Centres

3. The Changing Marine Community

In recent years there has been a change in the 'environment' in which IODE operates. The user community is changing rapidly and there is a blurring between the near real-time and the delayed mode data streams that is making it difficult to differentiate between these two traditional activities. Information technology, especially those driven by the Internet, are simplifying many aspects of marine data management.

Three developments in particular are impacting IODE. These are: -

- rapid progress in developments of the Internet and its associated information technologies,
- the rapid development and implementation of GOOS and its new management structures such as the new Joint Commission on Oceanography and Marine Meteorology (JCOMM), and
- the rapid convergence of near real-time and delayed mode data streams and management activities and also the convergence of the user communities of these previously distinct data streams.

In addition to these significant developments many Governments around the world are increasingly recognising the need for improved ocean programs and as a result the demand for data management activities and data products is increasing. While this should be viewed as being positive for IODE, in many cases it is resulting in the establishment of potentially duplicate data management systems, rather than building on the existing frameworks such as IODE.

While the requirements for improved coordination of regional and global marine data management and exchange is growing, the information capabilities now easily available is resulting in each new ocean program looking at establishing its own data management mechanisms. These new activities are NOT always seeking support, assistance or advice from IODE.

Despite its many successful projects and activities, the IODE program is not considered relevant to many of the more recent marine programs. The IODE community is not presenting an appropriate image to these groups and in many cases our programs and activities are not seen as providing support to much of the user community. If the IODE program was supporting the users needs, then the IODE program would be the first point of call for any group undertaking a program that included marine data management. Unfortunately this is not the case.

To overcome this relatively negative situation, IODE must project a much stronger image. This image must be backed up by a strong, vibrant and relevant program that provides standards, marine data management tools, training in data management and above all effective data management capabilities to national, regional and international user groups. IODE must adapt to the significant changes mentioned above and must also adapt to new needs that are being increasingly driven by national interests.

4. Strengths, Weaknesses, Opportunities and Threats Analysis

4.1 Introduction

6.1

6.2 A brief summary of the strengths and weaknesses of IODE, the opportunities available and the 'threats' to the IODE program will be described in dot point form.

6.3

6.4 4.2 Strengths

The IODE program has strengths in a number of areas.

1. Long term archival capabilities and experience
2. Proven capabilities of establishing and operating data management programs
3. Existing partnerships with a large number of scientific and intergovernmental programs and projects
4. Large number of individuals (several hundred) working on marine data management activities – developing applications, under taking quality control, developing databases and data products
5. Broad expertise across most marine data parameters and marine information
6. Data management, Information Technology, oceanographic, climate change expertise
7. Excellent spirit of cooperation and collaboration
8. Capabilities in data management training and capacity building

4.3 Weaknesses

1. Projects predominantly driven by individuals and their success is very much dependent on the enthusiasm of the project leader.
2. Poor performance difficult to rectify.
3. Volunteer basis of operation.
4. Insufficient budget to fully fund projects – generally seed funding only.
5. Limited cooperation between data centres on a practical or day to day level.
6. Limited visibility of the IODE data management process.
7. Each NODC operates in isolation from the others, developing similar procedures and computing systems (significant duplication of effort).
8. Different national agenda's for each NODC resulting in different views, procedures and objectives.
9. Lack of agreed standards for data management and data exchange.
10. Lack of commercially developed marine specific data management software.
11. National focus at the data centre but IODE operates as a international program

6.5

6.6 4.4 Opportunities

- Establishing Standards
- Establishing leadership in data management
- Supporting new programs including GOOS
- Training and capacity building
- Developing a niche data management role eg. Data directory (Portal) services, metadata and standards, data management tools etc.
- Data management consulting

6.7 4.5 Threats

- Perceived ease with which data management programs can be established
- Relative simplicity of modern software – databases, GIS, Internet
- Profusion of new systems
- Profusion of data formats
- Blurring of real-time and delayed mode oceanographic data management activities

5. Analysis

The IODE program is at a critical point and may have difficulty continuing in an effective manner under its present structure and method of operation. As stated above, the requirements for marine data and information management and exchange have changed considerably since IODE was created. While the program has a large number of strengths, many of these are not obvious or visible outside the program. In addition to this much of the activity is undertaken on a volunteer basis or when a data centre sees national benefit in implementing or supporting a specific project. There is a constant tension between national needs and objectives and the international activities of IODE. This conflict is difficult to resolve in most NODC's.

IODE is under threat from many directions. While there is no 'plan' to cause IODE harm, the development of new programs is making some of IODE's activities superfluous or sometimes duplicating IODE activities. The threats are coming from changing needs and the difficulty IODE has in changing its activities quickly to respond to these different needs.

However, these changes provide an opportunity for IODE to 're-invent' itself. There is an even greater need to day for a program such as IODE and the IODE community needs to take this opportunity. There are a number of options available to IODE to improve its ability to meet user needs and some of these are indicated below.

6. Options

6.8 6.1 Introduction

There are many different things IODE can do to improve its ability to meet the users needs. Some of these are given below as dot points. These ideas are provided to stimulate debate and discussion at IODE-XVI.

- Forge strong partnerships with marine programs that have a data management component
- Develop a marine data management framework (standards development) eg. reference model for oceanographic data and XML data formats
- Undertake joint projects of mutual national interest between NODC's – making the applications and outputs available to the broad IODE community.
- Reduce the amount of duplication in software development by using a common data framework as suggested above.
- Build data management software based on main stream IT frameworks such as the Internet
- Build a modular IODE Resource Kit that includes training, software applications and data sets.
- Increase user communities knowledge of the existence of data sets and data and information products through a directory system and IODE Internet Portal
- Broaden client base to include policy makers, resource managers, commercial companies and general public in addition to traditional scientific community.
- Examine mechanisms to bring international needs together with national data management objectives, so both activities can be served by NODC's.
- Develop mechanisms to improve the ability of IODE to better address needs between IODE Committee meetings
- Investigate mechanisms for improving funding and improving promotion of the IODE program

7. Recommendations

There are a number of directions that the Committee could proceed in to address many of the issues mentioned above. In order to develop a way ahead, the IODE Committee should establish an *ad hoc* group to develop a draft plan for the future directions and activities of IODE. This can be undertaken at IODE-XVI and the committee can provide guidance to this group on directions. The group could continue its efforts in more detail after the XVI Session and gain approval from the Committee via correspondence.

Some of the areas that need to be examined include:

- Structure of the IODE program and its composition
- Linkages and partnerships with other relevant programs
- Marine data standards development
- Areas and activities on which IODE can focus its resources
- Improving visibility of IODE program
- Improving collaboration between data centres

ANNEX III
EXTRACT FROM THE REPORT OF THE 35TH SESSION OF THE
IOC EXECUTIVE COUNCIL

4.1.6 Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM): Resolution on Integrated Data Management Strategy

83 Peter Pissierssens, Head of the Ocean Services Section of IOC, reported that the first session of the JCOMM Management Committee had been held in Geneva between 6 and 9 February 2002. During discussions related to the 'Data Management Programme Area' the Management Committee decided that stronger emphasis should be placed in the JCOMM Data Management Coordination Group's work programme on the development of a JCOMM data management strategy. The Management Committee noted that data management activities under different IOC programme areas were not yet fully integrated.

84 The Head of Section recalled that the IODE Committee, during its 16th session in 2000, had made important decisions and recommendations towards enhancing the data management activities to better include biological, chemical and coastal oceanography data, and had recognized the increasingly vague boundaries between delayed mode and real-time data. These decisions and recommendations however, often still needed to be translated into concrete actions at the national as well as international level. At the international level reference was made to the establishment of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BCDMEP). This new group would meet for its first session between 25 and 27 June 2002 in Silver Spring, USA hosted by the US-NODC. The meeting would be attended by experts sourced from the IODE community as well as by experts from the science community.

85 In order to bring the data management activities of the different IOC programmes together, the JCOMM Management Committee had recommended that a draft resolution be prepared for the 35th session of the IOC Executive Council calling for the development of an IOC integrated data management strategy, encompassing all IOC programmes. In order to assist with this task, the Management Committee had further requested IODE to carry out an assessment of data and data product requirements of existing oceanography and marine meteorology programmes/projects, and evaluate whether these were currently met by the various groups of data centres. It had been recommended also to use the experience gathered in the preparation of the GOOS Data Management Plan (1998-1999) and possibly the GCOS Data Management Plan as examples.

86 The Head of Section informed the Executive Council that a draft resolution entitled 'IOC Strategic Plan for Oceanographic Data and Information Management' had been prepared.

87 Whilst appreciating that the policy aspects of data exchange were already being addressed separately, several delegations expressed strong support for the proposed development of an IOC Strategic Plan for the Technical Aspects of Oceanographic Data and Information Management, calling it an extremely timely and appropriate initiative.

88 The Executive Council was reminded about the third meeting of the United Nations Open-ended Informal Consultative Process (ICP) from 8-15 April 2002 that had proposed that the General Assembly should emphasize the need to improve systems for collecting and reporting data and information relevant to the marine environment. To this end, ICP proposed that the General Assembly should invite, at the global level, all relevant United Nations agencies to *"individually review their arrangements for collecting information and data relevant to the marine environment"*. This meant that the proposed IOC Strategic Plan would be complementary to the ICP proposal to be presented to the UN General Assembly for adoption in December 2002. **The Executive Council agreed** that the Executive Secretary should draw this fact to the attention of all IOC Member States, by means of a circular letter,

in order that their delegations to the UN General Assembly be aware of the developing position of IOC on the issue.

89 Several delegations regretted that the draft resolution had not been distributed to the Member States in advance to allow for national consultation. The Secretariat apologized for this and explained that the finalization of the draft resolution had required extensive discussions between the members of the drafting group, which had made it impossible to circulate the document in a timely fashion to the Member States prior to the session of the Executive Council.

90 **The Executive Council** noted the importance of retaining the two principles: "free and open" and "acknowledgement to data producers" in data management activity continuously in the new strategy.

91 The Representative of WMO expressed his Organization's strong support for the development of an IOC Strategic Plan for Oceanographic Data and Information Management, as this would contribute substantially to the work of JCOMM.

92 **The Executive Council noted** that the issue of a strategic plan for oceanographic data and information management is also closely related to the work of the Intergovernmental Working Group on IOC's Oceanographic Data Exchange Policy and **recommended** that Dr Angus McEwan, Chairman of that group, should become a member of the task team established by the resolution.

93 **The Executive Council further asked** that efforts be made to ensure that all required expertise should be available in the task team, and **requested** IODE and GOOS to identify additional experts as necessary taking into account the need for multidisciplinary expertise.

94 **The Executive Council adopted** Resolution EC-XXXV.2 and **requested** that progress be reported to the Assembly in 2003.

Resolution EC-XXXV.2 IOC STRATEGIC PLAN FOR OCEANOGRAPHIC DATA AND INFORMATION MANAGEMENT

The Executive Council,

Recalling:

- (i) Resolution XX-4 requesting IODE to work in concert with JCOMM and GOOS to develop a comprehensive ocean data management system,
- (ii) Recommendation IODE-XVI.3 on the establishment, maintenance, and strengthening of co-operation between IODE and research and monitoring programmes,
- (iii) Recommendation IODE-XVI.4 on the establishment of a Group of Experts on Biological and Chemical Data Management and Exchange Practices,
- (iv) Resolution 4 of JCOMM-I that, *inter alia*, invites IODE to participate in the work of the JCOMM Data Management Programme Area,

Considering:

- (i) the existence of several data management plans, such as those of GOOS and IODE, all providing potential elements of a strategy and implementation plan for oceanographic data management,
- (ii) that IODE has developed national, regional and global infrastructures, expertise, experience and programmes for the management of oceanographic data and information, mostly for delayed-mode data,
- (iii) that IODE and JCOMM have each created data management structures to deliver the products and services required by their own programmes and activities which, although linked and coordinated, are not presently implemented and managed according to a common strategy,
- (iv) that the WMO Commission for Basic Systems has developed data management systems that satisfy part of the identified requirements of JCOMM for real-time data management,

(v) that the data management systems of many Member States are abandoning strict distinctions between real-time and delayed-mode data management in favour of end-to-end data management, (vi) that both IODE and JCOMM are considering broader remits into non-physical ocean data management,

Recognizing the need for IOC to develop a Strategic Plan for oceanographic data and information management, embracing the requirements, capabilities and infrastructures of Member States, as well as the needs of their user communities,

Decides to establish a Task Team on the development of an unified, comprehensive IOC Strategic Plan for Oceanographic Data and Information Management with terms of reference as detailed in the Annex to this Resolution;

Urges Member States of IOC to provide in-kind support and/or financial contributions to the IOC Trust Fund to cover the costs of the meetings of the Task Team.

Financial implications: US\$ 30,000 from Extra-budgetary Resources (2002-2003)

Annex to Resolution EC-XXXV.2
Terms of Reference for the Task Team on the Development of an IOC Strategic Plan for Oceanographic Data and Information Management

1. Purpose

To develop an IOC Strategic Plan with clearly defined roles for each of its observational and data management elements, for oceanographic data and information management, embracing the requirements, capabilities and infrastructures of its Member States, as well as the needs of their user communities.

2. Tasks

In pursuit of its task the Task Team shall:

- (a) carry out an assessment of data and data product requirements of existing oceanography and marine meteorology programmes/projects, and evaluate whether these are currently met by the various groups of IODE data centres;
- (b) take into consideration existing data management plans such as the GOOS data management plan and relevant WMO data management plans;
- (c) draft an IOC Strategic Plan for oceanographic data and information management, taking into consideration the requirements for such a plan within the framework of JCOMM;
- (d) submit a report on progress to the IOC Assembly in 2003.

3. Composition

The Task Team shall be composed of:

- (a) the chairperson or vice-chairperson of IODE;
- (b) the chairperson of the GOOS Steering Committee;
- (c) the coordinator of the JCOMM Data Management Programme Area;
- (d) a representative of the WMO Commission for Basic Systems;
- (e) one co-president of JCOMM;
- (f) the chairperson of the IOC Working Group on Data Policy;
- (g) two additional experts nominated respectively by IODE and I-GOOS, taking into account the need for multi-disciplinary expertise.

4. Schedule

At least two meetings of the Task Team will need to take place during the period 2002-2003.

ANNEX IV
Draft Table of Contents of the IODE Review Report
(Prepared by Dr Ron Wilson)

The following draft table of contents is for use as guidance on the content of the review report and are not considered to be fixed. It should be viewed as the minimum information that is to be included.

1. Background (say two to four pages to set the scene for the present IODE)

Initially

IODE was established in the 1960s as a programme of the IOC.

- Based on a network of NODCs in the members states of IOC
- Initial focus
 - development of standards, protocols, and formats for exchange of data
 - data flow was from national sources to NODCs, to WDCs of ICSU for distribution on request to IOC member states.
 - bilateral arrangements between member states arranged as desired.
 - TEMA aspect
 - etc

Development of RNODCs

- Concept was developed to assist the WDCs which were not staffed or funded or had the equipment to handle the variety and volume of data being collected.
- RNODCs were volunteers but had to conform to standards of service established by IODE.
- G of E on RNODCs established
- Parameter, area, and project RNODCs have been established
- RNODCs come and go (data are passed to a WDC when they go)
- etc

Information added to IODE responsibilities

- IODE became responsible for international information exchange as well as for data
- GE-MIM established
- Cooperative arrangement established with library associations, ASFA
- Various projects established such as directory of marine scientists, MEDI
- etc.

The 80s and 90s and the Global Science Experiments

- On a voluntary basis some IODE data centers offered services to support international experiments such as TOGA, WOCE, Clivar, etc usually as RNODCs
- GCOS and GOOS were developed and are in an early stage of implementation stage
- GOOS, GCOS and WMO have developed an action plan for existing bodies for the implementation of global and regional aspects of the observing systems
- GOOS has written a data management strategy
- JCOMM has been formed to meet the needs for the development of operational systems in support of GOOS and GCOS and is in the initial stages of developing it programs

TEMA or Capacity Building

- Review of this aspect of the IODE program over the years

Budget and Staffing

- (table of IOC support from 60s to now for dollars and staff)
- Discussion of table

2. The Present Mandate of IODE

- Discussion of the evolution of the IODE mandate to the present that provides a clear view of what IODE is supposed to be doing. This will form the basis of an evaluation of whether IODE is doing what its supposed to be doing and provide a jumping off point for recommendations about a future mandate and how IODE should proceed to implement it.

3. Evaluation of IODE in Terms of the Mandate

- Provide as many figures and statistics as are available and practical for
 - Client satisfaction
 - Data and information exchange.
- Overview anecdotal information on client satisfaction.
- Discuss the success or not of the IODE/ICSU WDC arrangements.
- Describe in detail the status of international ocean data and information exchange relative to the IODE mandate as defined in the previous section.

4. What Should be the IODE Mandate?

- What should be the role of IODE?
- What should be the linkages and responsibilities in regard to JCOMM?
- What should be the IODE role and responsibilities in regard to GOOS?
- What should be the IODE role in standards and new technology?
- Recommend and prioritize the major foci of a newly focussed IODE program such as
 - data management and exchange
 - information activities and projects
 - identification and prioritization of new data types for incorporation in IODE
 - standards and formats
 - new technologies
 - capacity building

5. What Should be the Structure of IODE?

- What are the strengths and weaknesses of the present organizational structure of Committee, Officers, NODCs, RNODCs, Groups of Experts, Steering Groups etc
- Should the programme be operating more in a fashion for implementing end-to-end data management systems and information systems as opposed to developing generalized strategies and standards.
- Are there more effective structures to deliver the information aspects of the IODE programme.

6. Implementation and Management of the IODE Program

Provide guidance and suggestions on

- Is there a need for say a five year implementation plan as IGOSS used to do or some other means to establish clear goals against which progress can be measured?
- What sort of IODE substructure would best suit development and implementation of the newly structured program?
- What effective working relationships can be established with GOOS, GCOS, JCOMM, ICSU, ICES data management, etc?
- What should be the role of IODE in the OIT project?
- Should the major focus of the program remain on development of generalized strategies and standards for oceanographic data and information exchange or should the focus shift to implementing specific end-to-end data management systems for national and international requirements such as the GOOS Integrated Observing System.

- Are there more productive ways of implementing the capacity building aspects of the IODE programme, in addition to OceanTeacher and ODIN (or expanding on these), such as partnering with other programs in providing complete system or service of some sort to a region or member state.

7. Voluntary vs More Formal Participation in IODE Activities

Participation in the activities of IODE has always been voluntary for the member states of IOC. This was generally satisfactory in earlier times but now there seems to be a requirement for more help in managing data internationally than is available operating in the present mode. On the other hand a mandatory system for participating in IODE activities does not seem realistic.

Is there some other course? The WMO has a system whereby National Weather Services in WMO Members have agreed to make weather observations and exchange them on the GTS in a timely manner for an operational system. They have regulated various aspects of the instrumentation and measurement programs and have laid down the formats and schedules. Since oceanography is now moving to an operational mode is it time for some sort of acceptance of certain responsibilities to the international systems? Certainly there are existing bilateral agreements for the exchange of certain types of data such as between neighbouring countries for water level data for operational needs and tidal predictions. Should we pursue such a limited international agreement for IOC member states and their IODE data centres to supply certain data and services to the international systems. In fact such an arrangement need not be costly as it would probably be a matter of organization rather than new activities. All those data are already being managed in some way. It could even give some data centres positive visibility in their countries to have this matter discussed at a national level.

The review team should give this matter consideration and provide discussion of the pros and cons as well as a recommendation on whether or how to proceed.

8. Budget and Staffing

Provide a discussion of the state of the present IODE budget and level of staffing in regard to its present mission and to similar international organizations and provide ideas on new or novel ways or funding, cooperating with others, leveraging funds, etc. to increase the support to the program.

[end]