1. BACKGROUND

The IODE Think Tank Session was held in order to review the IODE programme in detail and develop a plan of action to carry IODE forward into the next decade of international oceanographic data management and exchange.

Annex B contains a document that was prepared in advance of the Meeting and which served as a point of departure for the discussions. The sections below contain a summary of the discussions and the conclusions that were reached and a number of recommendations for consideration by IODE-XV.

Annex A contains a List of Participants of the Meeting.

2. GENERAL OVERVIEW OF THE DISCUSSIONS

The discussions were focussed around several questions that served to clarify the issues.

2.1 WHAT HAS CHANGED IN THE CLIENT COMMUNITY THAT REQUIRES CHANGES IN IODE?

Three major areas of change were noted. There is a wider range of marine disciplines, customers are more demanding, and ocean science is becoming more global. These changes require NODCs, RNODCs, and WDCs to deal with a growing diversity of data types and with larger scale programmes with a variety of objectives collecting a much larger volume of data from more sensors, and more sophisticated sensors. Also, the need for more operational data must be addressed. IODE must move toward IGOSS time-scales and be prepared to deal with a wider range of data types more promptly.

In addition to these changes, the development of computer and communications technologies have changed fundamentally the way in which data and information can be managed and made available.

Customers have become more demanding because they understand the new technologies and expect the data centre to use them and deliver better data products sooner. If IODE cannot do this, IODE clients will find another way which will bypass IODE and fragment international data management.

As a result of these changes, IODE data centres must take steps to expand their expertise, skills and efficiency; to do so quickly; and to do so at a time when resources are not increasing but the workload is. The Meeting also noted that it is necessary for data centres to develop scientific expertise in specialized fields to deal with the increasing complexity of the data types that they handle.
What has not changed and needs to be changed is that some data centres do not handle important new data types, many scientists are still not submitting their data to an NODC, and many data centres are under-funded and understaffed. What has also not changed is that good national data management drives good international data management and vice-versa.

The other important consideration here is that new initiatives must not be developed to the detriment of important elements of the existing programme. For example, a need was recognized for handling model data in a manner, so that it is systematically organized for intercomparison. At the same time is was cautioned that these sorts of tasks must not lead to a lessening of the effort to gather up the historical data, which cannot be replaced.

2.2 WHO ARE THE NEW CLIENTS: NATIONAL, REGIONAL AND INTERNATIONAL?

The primary set of new users will continue to come from the science community for the immediate future. These scientists will have needs for new data types (e.g., greenhouse gases, underway ADCP data); complex datasets (e.g., merged chemical, biological and physical data); and for coastal zone data. IODE must develop partnerships and co-operative programmes with IGBP, LOICZ and JGOFS.

Scientists in developing countries can become important users of IODE services provided IODE can make significant progress on electronic publishing of data and information and can develop the necessary partnerships with aid agencies to deliver data and data products and the technology to use these data and products effectively. The technology can be realized through OceanPC.

As progress is made in the implementation of GOOS and as programmes are implemented to take advantage of the advances in the understanding of ocean science and prediction new users will not necessarily be marine scientists in the traditional sense. IODE must be prepared to serve industry and operations.

With the increased use of electronic publication, data centres will have less direct contact with users and IODE will have to make an extra effort to identify, understand and serve their broadening client base.

2.3 WILL NODCS AND OTHER DATA CENTRES BE ABLE TO ACCOMMODATE NEW DATA TYPES AND WHAT ARE THE PROBLEMS?

NODCs will be able to handle the new data types if they are motivated to do so, if the new data types are supplied by the originating science community together with any useful algorithms, software and with complete documentation, and if stronger ties are established between the NODCs and the science community to assure a transfer of scientific and data management expertise from one to the other. Both the scientists and the NODCs will often be in the position of a learning partner in such activities. Of course, the NODC will have to provide a service back that will benefit the supplier of the data in order to offset the additional workload on the supplier in transferring scientific insight or software to the NODC. The scientists supplying data to the system will have to recognize that they must put some effort into educating the data centre as to their needs. The data centres will have to recognize that the science programmes do not exist to conveniently supply them with data and that they the data centres are there to provide a service back to the community. Everyone has to recognize that data management is a common good and that it will not be well done or successful unless there is a shared commitment to making it work.

The Meeting also recognized that there will likely be user requirements for new data types of a specialized nature which the data centres cannot meet. Sometimes such data will not be of the classic oceanographic type of may not be collected as part of scientific research programmes. In those cases, data, services and products might be provided by other arrangements made at the national level with the co-operation of the NODC. This can perhaps be viewed as expanding the RNODC system to include organizations other than NODCs. University and other academic sites were mentioned.

Another well recognized point was that IODE needs a proactive programme to make data centres more active and to build the skills of their data centres. Strong centres must help weaker centres. IODE needs to review and publish the skills and abilities of its various centres in order to provide a means for centres to take advantage of work already done by other centres.
2.4 FOR NEW DATA TYPES IS THE IODE ROLE CENTRAL OR RATHER THROUGH CO-OPERATION WITH OTHER PARTNERS?

In fact this question is broader than just for new data types. With the modern computer technologies scientists can do themselves much that only data centres with larger computers could do in the past. Is there still a need for the IODE NODC system?

The view of the Meeting was that there is a stronger need now for the IODE data and information programme than there ever was. It was pointed out that the IODE NODCs and RNODCs are the only centres with the responsibilities to gather and manage oceanographic data, data products, and associated information on a long-term and continuing basis. The World Data Centres for Oceanography, who are partners with IODE in this responsibility, function well when compared with other WDCs of the ICSU system. This is at least partially due to the existence and efforts of the IODE Data Centres. If the IODE system does not meet the needs of the client programmes, the IODE programme will be undermined and the whole system will become much less effective.

It should be recognized that although scientists could do what NODCs do, they don't want to, particularly those in multi-disciplinary programmes. Scientists want to get on with their primary function which is the development of knowledge and understanding. Large complex data compilations are still in the field of the data centre with its high throughput systems that have been designed for building and managing these large datasets.

The other partner in ocean data and information management is the system of libraries in Member States. Libraries are not generally a part of the data centres from an organizational stand point. The need for improved library services and access to the literature can not be over-emphasized. However, the realities of the funding situation in many Member States, particularly in developing countries, is that library services and subscriptions to journals and other scientific publications are being reduced. It is important for the information side of IODE to address how the computer and communications technologies can be brought to bear on improving access to necessary printed scientific and technical information.

The Meeting also encouraged IODE to take a much more proactive role in dealing with users and data collectors, and with developing the IODE capacity building programme. It is important to get to know funding agencies and promote data submission and the idea that the job is not finished until the data and information is published electronically. It is important to get to know the aid agencies and develop common priorities that can achieve more benefits for developing countries than can separate efforts.

The Meeting specifically highlighted the role of IODE in:

· Maintaining a central inventory of the location of datasets (For example, an improved MEDI available on WWW and CD-ROM. IODE needs something like the DIU and the WOCE handbook).

· Facilitating standards, format structures, protocols, and linkages to operate on a truly global scale.

· Establishing reference materials.

· Co-operating with aid agencies and implementing arrangements for capacity building.

· Providing and sharing information on quality control guidelines and giving high priority to quality control of datasets.

· Providing general and topical forums for communication on international and regional scales.

It was noted that co-operation should be the keynote of IODE operations. IODE should encourage partnerships between data centres, partnerships with the scientific community, partnerships with government funding agencies, and partnerships with international organizations. In particular, IODE will have to deal with the diversity in data types by developing stronger linkages to share expertise in data centre specialties in a distributed network of expertise and skills.
2.5 WHAT PROGRAMMES DO WE NEED TO SUPPORT AS A PRIORITY?

The Meeting identified the following programmes and functions as priorities for IODE attention in further developing the IODE programme for science activities. The order of the items does not imply priorities within the Group. The discussions were not detailed as the intent was to provide general guidance only.

- GOOS;
- Capacity Building;
- Coastal Zone Data Management;
- Co-operation and Partnerships with Regional Bodies;
- Pollution Data;
- JGOFS.

In particular, it was pointed out that IODE should deal with GOOS more or less in the manner of providing services to WOCE. In the latter case, IODE helped develop and operate joint data management partnerships with WOCE once WOCE had identified its data collection and analysis requirements. The suggestion was that IODE work with GOOS on the same terms.

Pollution data was mentioned as a priority. However, it was mentioned as part of a discussion on GOOS and should probably be dealt with in partnership with GOOS.

The Meeting also suggested that IODE explore a joint project with IGBP-JGOFS for a dataset that would include satellite and in situ data management.

The discussions on co-operation with regional bodies noted the importance of data and information exchange between regional bodies and the IODE centres.

The other priorities that were discussed included services to private industry and operational programmes. It was noted that in the future IODE must provide an increasing level of services to these clients.

2.6 HOW DO WE INCREASE THE VISIBILITY/ACCEPTABILITY OF NATIONAL OCEANOGRAPHIC DATA CENTRES?

The new technologies for the World Wide Web and CD-ROM publishing provide the technology for IODE to made a significant step forward in providing data and information to clients in a timely and technically advanced manner. In addition to scientific and operational data and information, IODE needs a publicity programme on the World Wide Web and a brochure and CD-ROM package for clients not connected to the Internet.

To achieve and display improved services, IODE should pick some important products and make them available on-line on the Web. The Groups of Experts on MIM and TADE should become expert on these technologies and be prepared to advise and assist Member States in developing homepages and making products available through Internet and CD-ROM.

The key in gaining acceptability however, is not just being on the leading edge of technology. IODE must improve its services. Success will be achieved by doing a good job.

Another key to success here lies in impressing on the scientific world that a project is not finished in an acceptable manner until the data and scientific and technical results are published in electronic form and available for use by the marine community.

2.7 HOW DO WE MAKE THE NEW TECHNOLOGIES WORK FOR IODE?

A second set of questions addressed the implementation of the new computer and communications technologies in IODE and how to increase interest and participation in the IODE programme.
(i) **How do we exploit the opportunities and avoid the obstacles of Internet?**

The obstacles of Internet were considered to be security and access. On the matter of security, there is much work being done by a variety or interests and it is likely that the problem will be solved for us. The question of access is extremely relevant as it is expensive and can be beyond the means of developing countries. However, it must be realized that more users and countries are finding the means to connect every day. IODE needs to state the importance of being connected to the network and assist Member States where possible.

(ii) **How can we exploit the OceanPC technology and realize the benefits of standardization in data exchange and services?**

The knowledge to exploit OceanPC exists in the community but the resources to develop and implement the required product are beyond the IODE programme. The only possible solution is to find a partner with mutual interests to share in a joint project to develop and deploy the system. A proposal is made in section 4 below as to how to proceed.

(iii) **Can we extend the success of GTSSP to other data types?**

The GTSSP model can be relevant to other data types. In fact, specific projects like GTSSP may be the best way to proceed for priority data types in the future if appropriate partnerships with the scientific community can be arranged. However, progress cannot be made unless the skills and expertise in IODE are ungraded as described in this report, and Member State data centres and scientific organizations are willing to participate actively in such new projects as are identified.

(iv) **How can we extend active participation in IODE?**

Many of the points already discussed above that lead to provision of more and better services would extend active participation in IODE. However, there is another aspect to this question. IODE should try to improve the skills of data centres as mentioned above by developing partnerships with scientific programmes. However, there is also an opportunity to develop partnerships among data centres to enhance the data centre skills and capabilities of less developed centres.

Another initiative that could extend participation could be to actively approach agencies that collect data but do not supply it. These approaches could be at the national and international levels.

(v) **What information services can we offer to improve the effectiveness and efficiency of the IODE system.**

Information and data products were highlighted in other sections of this report. One item worth repeating here is the decline of library services in some developing countries due to lack of resources for subscribing to journals and operating the libraries. If IODE can develop information to offset these difficulties, it would be of great help.

3. **IDENTIFICATION OF KEY ISSUES**

The following 5 key issues have been identified:

(a) Upgrading the skills, expertise and efficiencies of the IODE data centres;
(b) The IODE capacity building programme;
(c) Improving the visibility and acceptability of IODE;
(d) Structure, responsibilities, and management of the IODE programme;
(e) Priorities for further development of the IODE programme.

The following section discusses each of these issues and suggests actions for consideration by the IODE-XV Meeting.
4. DISCUSSIONS AND SUGGESTIONS FOR IODE-XV

The Think Tank Meeting had numerous suggestions as to how IODE can improve and progress. It was, in fact, quite encouraging that the users see a very real need for the programme and are prepared to contribute ideas and assistance to help IODE move forward. The following paragraphs review the major points and make suggestions as to how to proceed. The suggestions on how to proceed are those of the Chairman and are presented as a beginning for discussions at the IODE-XV Meeting. The intention is that IODE become more proactive in developing the international data and information management activities, as opposed to waiting for users to come asking for services. The proactive approach is seen as absolutely necessary if IODE is to progress. The need for IODE is not in question.

In the discussions which follow, there is some overlap between the issues. This can not be avoided. Electronic publishing, Internet, and OceanPC, for example, cut across issues.

4.1 UPGRAADING THE SKILLS, EXPERTISE AND EFFICIENCIES OF THE IODE DATA CENTRES

The issue of the skills and abilities of the IODE Data Centres received much attention at the Think Tank Meeting. The IODE-XV Meeting should consider strategies to address this problem. The strategy that was advanced by the Meeting was for IODE to seek active partnerships with scientists and scientific programmes for management and exchange of the most important new data types. This approach would be most effective by providing a two way exchange of skills and knowledge; from the scientist to the data centre for scientific requirements, and from the data centre to the scientist for data management requirements. In particular, it was considered to be important that IODE tag along with big agencies such as CEOS so that the programme is kept relevant to the needs of the day.

Of course, IODE will have to be selective and pursue such partnerships for the most important new data types first. With the problems of lack of resources in many data centres, care must be taken not to take on more than can be done. Taking on additional responsibilities that can not be achieved would only serve to discredit IODE.

Although the Meeting discussed this matter primarily in the context of the international science and operational programmes, the principle applies equally to national situations. Data Centres should seek partnerships with national oceanographic institutions as well to further develop their scientific data management skills and expertise.

**Suggestion for Proceeding:**

It is important that the partnerships be developed around specific projects or programmes so that the exercise is not theoretical. Development of projects like GTSP would be an ideal way to implement such a partnership. There must be benefits to both sides from the partnership or the desired result will not be achieved. Specifically, the Group of Experts on RNODCs and Global Programmes should be given the responsibility to discuss the needs of the international programmes and of GOOS and to recommend partnerships and GTSP like projects to be pursued to achieve management of the most important new data types. LOICZ and JGOFS in particular, are two programmes that were considered to be of high priority by the Think Tank Meeting. In fact, the need to get IODE involved in coastal zone data management can not be understated.

When looking for Member States to take on responsibilities for these projects, the Group of Experts should consider the benefits of including a mix of strong centres and centres that are not as strong in the partnership in order that the stronger can help the weaker one develop its skills and expertise.

4.2 THE IODE CAPACITY BUILDING PROGRAMME

The issue of capacity building was discussed as part of several other issues. The fundamental question is what can IODE do so that scientists and others in developing countries can become important users of and contributors to the IODE system. It was recognized that with the resources now available to the IODE programme, it will not be possible to go beyond offering the level of training courses that are presently available. In fact, the number and quality of the training courses that IODE has managed within the present resources is quite remarkable.
However, there is a need to go beyond this and the OceanPC, CD-ROM, and Internet technology that is now available would make it appear possible to make a major step forward. With a PC with appropriate software, with a CD-ROM reader, and with an optional connection to Internet, it is possible to create an instant data and information centre that can be placed in a scientist's office anywhere in the world. Coupled with a well thought out electronic publication policy this would provide a major improvement in the services that developing countries could expect from IODE. This project is seen to be of particular importance because of the declining resources available in some developing countries to support the existing library systems.

It is beyond the resources of IODE to do the development of such a system, but IODE does have the skills, knowledge, data, and information to guide and provide content for such a development. The only way to achieve the end would be to partner with one or more international development agencies to share the work and expense. The project would have to be complete in the sense that it included initial and ongoing training in data and information management and technical aspects, that it provided for ongoing maintenance of the equipment and software, and that reviews of the utility and usage of the systems were conducted to guide ongoing development.

An approach to aid agencies to support a development such as is suggested here would not likely succeed unless the project was very much in line with a need already perceived by the agency. A better approach might be to develop a partnership with one or more aid agencies to address an agreed common problem. Thus IODE might be more successful if a short preliminary proposal is developed to present the scope and benefits of a possible joint project, and then discussions are undertaken with possible sponsors while the project can be significantly modified to meet the needs of the sponsor.

The Think Tank Meeting also pointed out that it is important to get to know the "right" people. That is it is important for IODE to know senior people in the aid agencies in order to know who to approach for guidance in developing the capacity building programme, and in order that the agencies will think of IODE when certain requirements arise.

Suggestion for Proceeding:

IODE might wish to consider two activities in terms of the capacity building programme in the next intersessional period. The first activity would be to continue the existing programme of training and mutual assistance as in the past. The second activity would be to develop an initial proposal for instant data and information centres along the lines suggested above and attempt to find an interested partner or partners among UN or national agencies involved in capacity building to join the project and fund the development. OceanPC would be central to the project as the delivery tool for the data and information. Development would be based on common commercial software to the extent possible to reduce the amount of ongoing software development that would be necessary, and to make the facility as useful as possible.

This second activity could be the responsibility of the Vice Chairman of the Committee, and the Chairs of the Groups of Experts on TADE and MIM.

4.3 IMPROVING THE VISIBILITY AND ACCEPTABILITY OF IODE

There was much discussion of the issue of the visibility of IODE and the acceptability of the programme to its clients. As was discussed earlier the IODE programme was seen as important to international data and information management and exchange. IODE is the only programme with on-going responsibilities in this area. However, there are obvious problems that must be addressed. One avenue that was suggested is to address the fact that IODE is not as well known as it should be, resulting in its services being under utilized and in reduced submission of data. The best way in which to improve the image and acceptability of IODE was seen as to get the priorities right and do a good job. This of course involves increasing the expertise, efficiency and skills of the data centres as described above. It involves increased co-operation and more effective working arrangements with the scientific programmes as also discussed above. It also involves improved services, more data products, and some amount of effective advertising of those services.

For two of these requirements the new technologies available on the World Wide Web and Internet provide a feasible solution for many centres. CD-ROMs, hard copy publications, and a brochure will have to be developed for
centres that are not connected to Internet. The Think Tank Meeting pointed out the usefulness of being connected to the Internet. IODE needs to encourage its centres to get connected to that network.

In particular, the Meeting specified a need for IODE centres, and for the IOC Secretariat to develop homepages on the Internet that would advertise IODE services and contain data products of use to the community of users. It is particularly important that these developments serve national as well as international users. The point was made once again that good national data management and services leads to good international data management and services.

The Meeting also identified a need for a well designed IODE Brochure.

Suggestion for Proceeding:

As mentioned in the discussion above, some of the actions necessary have already been addressed by earlier items. The remaining suggestions are that a brochure be produced and that homepages be developed for IODE centres and for IOC Headquarters. In fact, some of these homepages already exist, including one for IOC Headquarters. In order for the system to be as highly visible as possible it is important that the IOC Home Page in Paris be kept up to date in referring to the homepages of the IODE Centres on the system. Individual homepages in IODE Centres in Member States should include a link to the IOC Home Page in order that national users can find their way into the international system.

The Group of Experts on MIM might wish to consider undertaking the development of an IODE brochure.

4.4 STRUCTURE, RESPONSIBILITIES, AND MANAGEMENT OF THE IODE PROGRAMME

One of the issues presented to the Think Tank Meeting for discussion was whether the present Groups of Experts were the most appropriate ones or whether some merging of responsibilities and specification of new groups was required. The Meeting concluded that there was no viable reason to change from the existing Groups of Experts, but that some realignment of responsibilities would be in order to take into account the guidance from the Meeting. Some realignments have been described under various items in this section of the report. It will be the responsibility of the IODE-XV Meeting to modify the Terms of Reference of the Group of Experts to take into account new requirements identified in this report that are adopted by the Meeting.

The Meeting did discuss some items that are not covered elsewhere. In regard to some merging of the responsibilities of the Groups of Experts on MIM and TADE, or even merging of the two groups into one, it was decided that merging of the two groups was not advisable. There are, in fact, more differences than similarities in responsibilities. There is, however, a requirement for the groups to co-operate in the development of electronic publishing in IODE and in advising on the development of OceanPC.

Two other interesting points were made in discussing upgrading the skills of the IODE data centres, and dealing with more complex data types. The first point was that IODE should consider actively seeking members for its Groups of Experts from science programmes that have may have more extensive experience with these other data types. It is recognized that nominations to the Groups of Experts are not restricted to data centre personnel with relevant expertise. The suggestion is that persons outside the IODE system might be a better choice in some cases. For example could a person from IGBP-DIS participate in the work of the Groups of Experts on RNODCs and Global Programmes and help develop a partnership project for JGOFS including satellite and in situ data. The need for such a project was mentioned at the Think Tank Meeting.

The second point has to do with the accreditation of RNODCs. In section 2.3 above, there was a suggestion that in some cases scientific centres could take on the role of an RNODC for a particularly complex data type or service. Once again there is no rule that says only NODCs can be accredited as RNODCs. However, it needs to be pointed out and agreed that this option is acceptable and can be used where appropriate.

The issue of the requirement for a seconded staff member for IODE to perform duties for delayed mode data flows along the lines of the IGOSS Operations Co-ordinator was raised in the discussion document presented to the
Think Tank Meeting. The idea was presented at the Meeting but was not discussed further and there was no recommendation. The issue should be discussed at the IODE-XV Meeting.

Suggestions for Proceeding:

IODE-XV might wish consider the advantages of holding partially overlapping meetings of the Groups of Experts on MIM and TADE in order to discuss common technology related agenda items.

IODE-XV might also wish to consider and make recommendations on the need for a seconded staff member to monitor data flows and other IODE activities as discussed in the Think Tank Document in Annex B.

IODE-XV should review the Terms of Reference of the Groups of Experts under the appropriate agenda items and amend them as appropriate to take into account new activities that are implemented as a result of the guidance from the Think Tank Meeting.

4.5 PRIORITIES FOR FURTHER DEVELOPMENT OF THE IODE PROGRAMME

As discussed in section 2.5, the Think Tank Meeting suggested that consideration of priorities for development of the IODE programme should include capacity building, coastal zone, GOOS, improved co-operation with regional bodies, JGOFS, services to industry, service to operational programmes. These priorities are considered to be for general guidance only and were admittedly a product of the experience of the Meeting participants.

Suggestions for Proceeding:

IODE-XV should review these priorities and amend them as necessary. The resulting list of priorities can then be used to develop the programme for the next intersessional period, and to guide the committee in deciding the new Terms of Reference for the subsidiary bodies.

5. IN SUMMARY

The most important result of the Meeting is the realization that IODE is needed and can advance and improve through the mechanism of partnerships. IODE needs to diversify and upgrade the expertise of its centres as already discussed. IODE must also make a real effort to find partners for an enhanced capacity building programme. IODE must devote more effort and be more proactive in the development and operation of its programme but can probably do so by using its existing Groups of Experts and structure.
ANNEX A

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THE IODE THINK TANK SESSION

1. PURPOSE OF THE SESSION

   The purpose of the 'Think Tank Session is to examine the subject of international oceanographic data and information management and exchange and make recommendations for change and improvement.

   This is to be accomplished by:

   -identifying the major reasons why the existing system does not function effectively as it has been designed to function,
   -considering the new technologies in data collection and communication of data and information, and
   -recommending changes as necessary to find a new and effective way forward for oceanographic data and information exchange in general and IODE in particular.

   The Meeting is expected to:

   -produce recommendations for the priorities and objectives of the Committee on IODE and the structure and responsibilities of its sub-groups in order to improve international data and information management and exchange,
   -propose new partnerships and recommend new working arrangements for old partnerships with other national and international organizations and programmes to better work with and serve the client programmes,
   -propose new methods for managing the international data and information exchange programmes both nationally and internationally,
   -make recommendations on how to fund and otherwise support data and information activities on national and international levels which do require resources and commitments,
   -make recommendations on the adoption of new computer and communications technologies for implementation in the data and information exchange programmes,
describe any gaps that become apparent in international ocean data and information management and exchange and make recommendations to the appropriate bodies to fill them.

A practical concern is the pressure in many competent ocean nations to reduce expenditures by government. Future data management systems must demonstrate the best possible cost/benefit and the financial advantages of governments working together. There must not be inefficient fragmentation of effort or unnecessary duplication. New technologies that are more efficient and cost effective than the older ones must be adopted sooner rather than later.

It should be noted that the wording above has deliberately not restricted the discussions to the boundaries of the responsibilities of the IODE Committee. The Meeting has been arranged by the C-IODE, but is intended to look at the broader picture of data and information management and exchange. This is necessary both to find the IODE role in the ocean community, and to make clear to the ocean community what IODE needs from the community to make the resulting system work. The participants of the Think Tank Session have been selected to have the necessary broad range of expertise and experience to carry out these tasks.

2. BACKGROUND

The IODE system as developed in the 1960s was focussed primarily to maintain an adequate archive and to make ocean data available to researchers. In late 1960s, the IGOSS system was developed to provide a subset of the ocean data being collected to users with a need to receive such data, analyses, and forecasts in operational time-frames. Over the years, co-operation between IGOSS and IODE has lead to mechanisms by which the data flowed smoothly from one system to the other to provide data on time-scales from hours to decades.

In 1986, the role of the system was expanded to include international information management and exchange.

The last study on the role of IODE and the data processing system of IGOSS was carried out in October 1984 by the CCCO and IODE. The purpose of the study was to examine the existing international data management systems to determine how they could be of assistance to the WCRP. In regard to IODE, the shortcomings that were identified had mostly to do with the timeliness and completeness of the databases, and the fact that IODE was handling primarily XBT, hydrocast and CTD data only. There were requirements for handling current velocity data that were not being met, and the handling of meta data was not considered to be adequate. For IGOSS, the main charge was to acquire more research vessel data in real-time. In fact, in the past 10 years many of these problems have been addressed and the situation is better today.

As stated above, the IODE System was developed in the 1960s. In the intervening years it has gradually been expanded and improved. However, in the past decade the scope of international research, the needs for information, the needs of operational programmes, and the volume and complexity of data and information have all increased or expanded greatly. New requirements for exchange have developed. Several urgent research programmes, global in coverage, are operating; and some success in forecasting ocean and climate conditions on seasonal and inter-annual time-scales is being achieved. Satellite systems that measure ocean variables of importance on a global scale are on-line or coming on-line. The problems that must be addressed today also require interdisciplinary approaches and much more sharing of data and information than in the past. Developing countries need to participate both as data providers so that research has the necessary global picture, and as users of the data and information so that the economic and social benefits of better knowledge and prediction can accrue to them.

At the same time that the programmes for research and data collection have changed, the technology for publishing data and information on electronic media and networks has developed to the point that the ground has literally shifted under us. There is a completely new and powerful way of working in the business of disseminating and exchanging data and information.

These changes and new requirements have lead to a need to re-examine and re-focus the international data and information management and exchange systems.
3. METHODOLOGY FOR THE STUDY OF IODE

It is considered necessary that an uninhibited look at the future needs of data exchange and the way it is managed be the basis of this study. This document identifies a number of subjects for discussion at the Meeting. In fact, this list forms the agenda for the Meeting. The list is as follows.

1. Review of the IODE Programme, identification of shortcomings, and recognition the strengths of IODE in order to build on them.

2. Identification of the client community, classes of needs, and new types of data with which IOC should deal and their priorities.

3. Ideas for new and more effective ways of doing business (including use of new technologies and other co-operative pilot projects among interested data centres, such as the GTSP, ways of increasing available funding).

4. Review of existing partnerships and opportunities for new ones. A proactive and constructive approach to promoting more partnerships.

5. Review of the IODE structure and mandate and ideas for improvement.

6. Ideas for improved international and national management of IOC ocean data services.

To facilitate this study this document has been prepared. It is intended to broadly outline the problems being addressed and to stimulate thinking on how to solve them or at least how to put a process in place to solve them. With this document in hand the Group of Experts will meet for 3 days in Paris to perform the study and make recommendations to guide the further development of the IOCs international data and information management programmes.

Section 4 below explains the timing of the study and what will be done with the results and the recommendations. Section 5 gives an overview of the present mandate of IODE and the way in which it works.

The remainder of the sections discuss items 2 through 6 on the above list for the purpose of stimulating thought and offering a point of departure for the discussions that will be held at the 'Think Tank' Meeting.

It is worth stating again that although this Meeting has been arranged by IODE for the purpose of obtaining guidance on the future of the IODE programme, the discussions and recommendations will not be limited to a perceived mission of IODE. In order to see the IODE role clearly it will be necessary to look at the broader ocean data management picture.

4. TIMING OF THE STUDY AND PROMULGATION OF THE RESULTS

A valid question is whether this is the proper time to undertake such a study. Would it be more appropriate to wait until GOOS and GCOS have specified requirements? The answer is no. Now is the time. The present observational and data management systems are under budgetary pressure in many countries. A clear presentation of that system and the role of the various components may help in keeping it up. In addition, many organizations are building new pieces of the global data system in new technological paradigms such as client server. Having a picture of the larger system can only help to achieve compatible access schemes. Finally and most importantly, the study will be of benefit to GOOS and GCOS in moving forward.

The 'Think Tank' Session has been organized for March 1995, which will leave adequate time for the results to be finalized and circulated well before IODE-XV in January 1996. This will permit a fully informed discussion of the recommendations at IODE-XV. IODE-XV will make the recommendations as it sees fit and will forward them to the Assembly for final approval.
5. THE PRESENT MANDATE OF IODE

The present responsibilities of the Committee on International Oceanographic Data and Information Exchange System encompasses two major areas of endeavour; data and information. Data covers the results of measurement programmes and numerical model data. Information covers textual information including published information (journals, grey literature, etc.), meta data, directories of people and organizations, bibliographies, etc.

5.1 DATA

For data, the traditional role of IODE has been to facilitate the voluntary exchange of oceanographic data between Member States by developing agreed standards, mechanisms and rules. The mechanisms are based on oceanographic institutes that collect data declaring certain of these data as being intended for international exchange. After these data were fully calibrated by the scientist, they were submitted to a national oceanographic data centre (NODC) that had the responsibility to forward a copy of the data to an international centre which was either an ICSU World Data Centre (WDC), or an IOC Responsible National Oceanographic Data Centre (RNODC). The RNODCs serve as archival and dissemination centres on behalf of the WDCs for a particular data type or a region of the world's oceans.

The basic principles and rules for data exchange are presented in the IOC/ICSU Manual on IODE and in the ocean data policy statement adopted by the IOC Assembly at it's Sixteenth Session in 1993.

Over the past 4 years 3 new data-related IODE projects have been established that take a more proactive approach to international data and information management and exchange.

The Global Temperature and Salinity Pilot Project (GTSPP)

GTSPP has been designed and is overseen by a steering committee to serve as the model for international data management systems of the next decade. In particular, it was designed to make the maximum amount of temperature and salinity data available at the earliest moment after collection. GTSPP also formed part of the WOCE Data Assembly Centre for the WOCE Upper Ocean Thermal Experiment. The project certainly has had a degree of success in creating more timely and complete datasets of temperature and salinity data. The project has increased the volume of data being captured in operational time-frames and delivers data around the world 3 times a week to users that include modelling centres in the US and Australia.

Global Data Archaeology and Rescue Project (GODAR)

The purpose of GODAR is to locate and rescue oceanographic data that have been collected but have never gotten into the international data banks. The rescue part of the GODAR mission has to do with data that are in danger of loss. GODAR has been extremely active and has already doubled and will probably at least triple the amount of some data types that are in the international oceanographic data banks. Four regional workshops have been held and a CD-ROM set entitled World Atlas 1994 has been published.

OceanPC

OceanPC is an IODE project designed to provide a suite of software for a PC computer that can be used to manage and analyze ocean data. Version 1.0 of OceanPC has been issued and contains software that was contributed by the International Council for the Exploration of the Seas (ICES) and the US Geological Survey Minerals Management Service. In addition, a training course has been developed for OceanPC and several training sessions have been held in developing countries. Equipment has also been made available to the OceanPC project for distribution to developing countries.

There is no doubt that the IODE and IGOSS data management community has a large body of knowledge and expertise on international data management and exchange. This expertise is current. Several IODE centres have adopted the newest technologies such as Web servers on Internet as quickly as has anyone else. This body of knowledge and
abilities is available for assistance to scientific programmes as well as emerging programmes such as GOOS and GCOS.

5.2 INFORMATION

The development of the information side of the IODE mandate has been quite active over the past 5 years. It has several initiatives underway.

Standards

Standard structures for bibliographic and directory databases have been developed. IODE produces standard methodology for national and regional information centres and networks.

Capacity Building

A major achievement of the Marine Information Management (MIM) programme has been the development of the RECOSCIX networks. RECOSCIX-WIO (Regional Co-operation in the Scientific Information Exchange in the Western Indian Ocean Region) has now matured and has produced an active network involved in information services (query handling and document delivery) information products (directory of scientists and institutions, bibliographic database of library holdings) and information dissemination (Newsletter WINDOW). As a next step RECOSCIX-WIO is now developing a virtual Internet node to provide scientists in this region with access to Internet. A WWW home page is also being planned. Following the success of RECOSCIX-WIO, the IOC has embarked in 1994 on the development of a parallel network in West Africa, i.e., RECOSCIX-CEA. However, due to lack of funds, achievement has been limited so far.

IODE has launched its MIM Publication Series which attempts to keep pace with the development of new technologies and methodologies related to information management, and disseminate information on these topics with the marine information specialist community. Actions have been recommended related to document delivery services for developing countries and the development of regional information networks such as RECOSCIX. Providing developing countries with access to Internet has been given substantial attention.

Information Products

The development of a full text CD-ROM of IOC publications is underway and assistance is provided to GTSP with the publication of a CD-ROM integrating data and information. IODE has also played an active role in the revitalization of ASFA by advising the IOC Secretariat in this matter. The MEDI Catalogue is under revision, including its loading onto Internet. Providing information through Internet is a new challenge actively responded to.

Connections with international library associations have been established which gives an opportunity to have access to the entire marine science library community. Knowledge, technology and experience available in IODE in information management is of great value to other IOC programmes such as GOOS. At this time, the information side of IODE is extremely important. The new electronic publishing technologies for CD-ROM and Internet have changed fundamentally and for ever the way data and information are managed. IOC must keep pace in order to continue to be a provider of services in this area.

6. SHORTFALLS OF THE EXISTING IODE PROGRAMME

It would not be productive to dwell extensively on the shortfalls of the existing IODE programme or the other IOC and other international programmes managing ocean data and information. It is, however, necessary to discuss the problems in general terms in order to develop solutions. For example, it will be necessary to recognize that there are shortfalls in data flow monitoring and management of data types other than physical as these are crucial areas that need attention.
One of the most serious problems is that the mechanisms of IODE depend entirely on the data collectors and centres of the system performing tasks that are not in their primary national mandates. Lately, NODCs and RNODCs because of shrinking resources, have been unable to carry out their responsibilities toward the international system. Some centres have gone to the extent of saying they can not do the international work because they are not funded for it. The fact that GODAR has been so successful and is likely to triple the amount of oceanographic data in the international data banks is evidence that the traditional approach to international ocean data exchange has not performed as it should have.

A recent presentation by ICES has revealed that little or no data from some European countries has been submitted to the WDCs since the late 1960s.

Another major failing of the existing system is that the ability of developing countries to participate in the IODE programme and draw commensurate benefits from that participation has not improved in proportion to the advances in technology and data collection. If there ever was a time to do something about this failing, it is now. The new computer and communications technologies based on the Internet have the ability to make the same information and data available to the scientist in a developing country that is available in developed countries. It reduces to getting the developed countries hooked up to Internet. This may well be the most important TEMA activity that can be undertaken at this time.

OceanPC demonstrates another problem. The project has been developed through the efforts of 3 enthusiasts, Harry Dooley of ICES, Dr. Murray Brown of the US Geological Survey, and John Withrow of the IOC Secretariat. It has been well received and there have been many requests for the software, manual, and training courses. The difficulty with OceanPC is that its now time to take the next step, there is no consensus on what the next step should be, and we can not continue to impose on the 3 enthusiasts. Additional support and a thoughtful design are needed to move towards development of OceanPC into the tool that IOC ultimately needs for data entry, Internet access, and CD-ROMs.

From this short discussion some of the problems would seem to be in the areas of lack of national support for IODE activities, perhaps lack of an adequate planning function for the programme, and perhaps lack of sufficient monitoring of the performance of the system.

7. IDENTIFICATION OF THE CLIENT COMMUNITY AND CLASSES OF NEEDS

The client community for IOC ocean data and related services in the 1960s was seen as researchers, marine weather forecasters, engineers, and others operating facilities including ships, platforms, etc. These clients could be further broken down into two groups, those requiring data in operational time-frames, and those requiring more complete and carefully processed databases for which they were willing to wait a certain time. The latter was to be serviced by IODE and the former by IGOSS.

Such a division and simplification of the needs of the community has not been viable for two decades, if it ever was. The client community is now much more complex and diverse. The focus is still primarily research, but the operational and monitoring side is developing new needs. These new needs are not just for operations and monitoring, but also spill over into research. For example, the operation of experimental coupled ocean-atmosphere models running in real-time, as do the weather models, need data for assimilation. The large experiments that last 10 years or so must establish an operational data flow to assemble the data from various sources and deliver it to research groups on a regular basis so that it can be ensured that the specified data are being collected and that preliminary analyses can verify that the right data are being collected. In addition, there is an increasing need for monitoring data for a host of requirements having to do with health of the oceans and detection of change.

Global and Regional Science and Monitoring Programmes

Programmes such as WOCE and TOGA are examples of this class of user. These programmes, however, dealt in data types that IGOSS and IODE have experience with. IGBP, GIPME, and other multi-disciplinary programmes are presenting a challenge to existing programmes in terms of managing new data types that require complex meta data management as well.
Operational Programmes

Although TOGA and WOCE are thought of primarily as research programmes, both had requirements to establish an operational data delivery system. The coupled ocean-atmosphere models that are operating now require, and even more in the future will require, improved and more comprehensive operational data flows for assimilation. As modelling multi-disciplinary processes begins, there will be a requirement for new data types in these operational flows. There is also the traditional community of marine weather forecasters and operators that require continued support with operational data services.

GOOS and GCOS

GOOS and GCOS are both recent programmes that are in the process of defining their needs for ocean data, information and services. It is clear however that both will require databases of historical ocean data, and access to recent data. GOOS will likely require an operational data flow. It is not clear if this will be a need for GCOS. Certainly both will be clients for the experience and expertise of the existing IOC bodies involved in ocean data management.

Satellite Services

Those operating satellite based remote-sensing systems who then run processing algorithms to calculate the geophysical variables from the sensor numbers require ground truth for many of the variables. It may be necessary to provide improved data flows of in situ ocean variables to these organizations.

There is a requirement for developing merged datasets of satellite and in situ data for the complete spectrum of ocean users.

Process Researchers and the Engineering Community in General

This class of user is the traditional one supported by IODE. These are researchers and engineers in government, industry, and universities who need data for specific research or engineering design projects. They are usually served by the national oceanographic data centres in the country in which they are located, but will also need data from RNODCs and WDCs for projects in other parts of the world.

Coastal Zone

The coastal zone has been identified as one of the most important areas for concentration of research and development of knowledge because of the local problems and the threat to the health and well-being of the oceans on a larger scale. In spite of this designation, it would seem that little has happened in the coastal zone in terms of data management since the UNCED. Given this situation would it be productive for IGOSS and IODE to get involved in the coastal zone in a serious way until monitoring and research programmes have developed and can state their data management needs? Should IGOSS and IODE work towards a formal framework for the exchange of data in the coastal zone or is this a job for another international body? Are there products of proven value that can be of use in the coastal zone with which IGOSS or IODE can assist?

Conventions

It is not clear whether conventions such as the Law of the Sea and Biodiversity are yet in a position to seriously consider their data management needs if they have them. IODE has been asked to help with species lists for the Biodiversity Convention. There may well be other conventions that are relevant to the work of IODE. It is not known at the moment what sorts of support IODE could or should offer. The IODE and IGOSS programmes are stretched thinly now and are not able to take on additional clients or responsibilities without those clients providing some assistance. New responsibilities should not be accepted unless they are accompanied with the support to do them. This support could take the form of partners or commitments by national centres whether these centres are already part of IODE or not.
Information is an essential component of all the above categories of users: the exponential growth of research data and publications necessitate the use of information tools which assist the 'data client' in locating data and information (e.g., publications). Again, Internet would be considered as a 'carrier' in this respect.

As can be seen above there are a host of users who are now or may be clients for IODE data and information services. It will be necessary to decide where the most significant and important contributions are to be made so as not to spread the IOC ocean programmes too thinly. For example, can more be accomplished in the coastal zone by working entirely through GOOS as opposed to dealing with coastal zone problems inside and outside of GOOS. Of course, this approach would involve some commitment on the part of GOOS as well.

8. IDEAS FOR NEW AND MORE EFFECTIVE WAYS OF DOING BUSINESS

The technology used in data and information management and communications has progressed a great deal in the past few years. The Internet, the World Wide Web (WWW), and the CD-ROM technology have virtually rewritten the way in which the data and information world does business. When IODE-XV is convened in early 1996, the situation will have changed drastically since IODE-XIV in 1992. It is important that international ocean data and information management take full advantage of these existing technologies. They offer a variety of efficiencies and opportunities.

First of all, it should be realized that these are not emerging technologies. They are proven, operational, here to stay, and they can only get better. They offer the means to move into a mode of distributed electronic publication of data and information on CD-ROM and networks. The technologies are generic so that the data or information content is not linked to the software or hardware. The effort that data and information centres put into developing and publishing material goes almost entirely into content. Thus the centre should be able to offer more with less work needed for preparation.

In addition, several national oceanographic data centres have been enticed by the technology and are already publishing on CD-ROM and have Internet and WWW servers. They are doing so for two reasons. Their national clientele are demanding it because they have seen it elsewhere and like it. Secondly, it offers a way for data centres to reach a broader audience that may be interested in their products and services. Thus, there is a strong national need driving the direction of development. The international community wants the same thing. This situation where a national need and an international one coincide is the prerequisite for a successful international system. Good international data and information management can only be achieved if there is good national management.

Thus, the technology has presented an opportunity to rethink how data and information are managed internationally. Centres in the IOC system can be encouraged to move to Internet and WWW for on-line access to ocean data and information. There is more opportunity for centres around the world to help each other to set up servers on the Web, for example, since the technology is to a great extent platform independent. Centres can be assured that moving to this technology will not only help them fulfil an international mandate, but will be very good for their image and performance nationally.

Having a series of national databases of ocean information and data on-line is, of course, only part of the solution. In GTSSPP, for example, there is a requirement for many agencies to have access to a single global database of temperature and salinity data. It would be a waste of resources to require that each of these agencies set up a system to collect the data from the present 9 sources of data, and perform quality control and duplicates resolution to develop their own dataset. All the users would not have the time or inclination to do this. However, having the databases on-line on the Internet allows the GTSSPP centres that do this processing to more easily gather up the data and would yield a more complete and timely dataset. Thus, there is still a requirement for more specific cooperative data management groups, but their jobs would be made easier, and their delivery of datasets or products would be enhanced. RNODCs building global datasets of various ocean parameters would be another example of this type of data management group.

The electronic progress also offers a way in which developing countries can participate more fully in IODE and IGOSS. The newest technologies that are being discussed here can be operated on inexpensive workstations. As
mentioned earlier, if a scientist in a developing country has access to Internet, he can be served and provide his data and information to the international systems as easily as can the scientist in the developed country.

IODE has had concerns with improving data centre services for many years and has set up task teams to suggest the means to do so. These task teams have had considerable difficulty in reaching conclusions that could be implemented because of work load in the data centres. The new technologies that are coming into use are generic in nature and are becoming more and more platform independent. This may provide the opportunity to achieve improved data centre services, as the generic, platform independent applications can be more easily distributed and implemented. It is easier for centres to exchange applications and help each other.

To summarize there is a new method of doing business available to participants in international data and information management. Anyone can set up servers and make their information available and can access the databases of others.

Another advantage; the software is mostly free, and if not free, it is still quite inexpensive.

For some IOC programmes this new technology will provide an opportunity to do some existing things better. For example, the global inventory of cruise summary reports could be maintained on a World Wide Web Server, without much effort and be available to all. At the same time, however, the shortfalls of the existing system will become more evident. The fact that only a small percentage of the data collected is entered into a CSR database will be seen. The failure of the IODE Centres to implement common structures, formats, and standards in spite of the work of the GE-TADE will become obvious as users find the data even in one centre stored in several formats. It will become obvious to all that OceanPC does not have Internet tools that will be needed to connect to new IOC systems.

Thus, the new way of doing business with the new technologies will have to be accompanied by a renewed commitment to supporting and implementing existing and new IODE agreements.

9. REVIEW OF EXISTING PARTNERSHIPS AND OPPORTUNITIES FOR NEW ONES

Existing partnerships for international data management consist of a number of formal ones, and a number of less formal ones.

ICSU World Data Centres for Oceanography/Geophysics

The oldest partnership was with the ICSU World Data Centre System. This partnership dates back to the early sixties. The IODE system of national oceanographic data centres has been feeding data directly to the World Data Centres for Oceanography and Marine Geology and Geophysics. Development of the RNODC network supported the WDC System which was having difficulty with the volumes and diversity of data it was receiving. This partnership could probably be improved and updated. It could also be better organized and co-ordinated. Some data services are provided from WDCs that could be better provided from the RNODC and vice versa. Data flow through IODE to the WDCs is too slow.

IGOSS and WMO

These particular partnerships have worked well. GTSPP is a joint IGOSS-IODE project which has significantly improved the data flow between the two systems. IGOSS itself is a joint IOC-WMO programme. Thus, there is a productive relationship existing between the meteorological and oceanographic communities already. There may be room for more co-operation in the area of the WMOs move to develop a series of distributed databases for meteorological data and information. There are IODE databases that could be on-line in the same fashion and perhaps be reachable by the same technology as the WMO databases for clients who need both types of data.

International Science Programmes (WOCE/TOGA/IGBP/JGOFS)
IODE and IGOSS have developed ad hoc partnerships with WOCE and TOGA for data management through GTSPPP, through participation of IODE experts in WOCE data management planning, and through support provided directly by IODE Data Centres to WOCE data management. There has been considerable interaction and co-operation between the various groups. However, the success of this co-operation is viewed by the various participants, the co-operation has been more successful than other similar efforts. This is probably because the data types being handled are those that are familiar to IODE and IGOSS. Also, the WOCE and TOGA people involved have long experience with IODE and IGOSS and have similar data management philosophies.

In the case of IGBP and JGOFS, there is a large difference in the approach to data management. Meta data is more important, and the scientists in these programmes are less interested in approaches involving processing of large files on computers using home built software. They tend to use generic tools such as spreadsheets with laboratory or scientist dependent content and formats. This presents a data management challenge for international exchange. There is significant room for learning on both sides and for improving the productivity of these partnerships.

**New Partnerships - GOOS and GCOS**

Since GOOS is providing the ocean module of the Global Climate Observing System, support to GOOS would in many areas constitutes support to GCOS. As yet there are no real partnerships between IODE, IGOSS, and GOOS. The Meeting should consider how these programmes might partner to better serve the needs of the clients for the services of these programmes. For example, should IODE and IGOSS undertake to prepare a draft specification for, and participate in a pilot for the Ocean Services Module of GOOS? Should IGOSS and IODE offer to partner with GOOS in the design of the data management system for the Climate Module once the data collection requirements are specified and approved?

**New Partnerships - European Community**

IODE began an informal partnership with the EC through the joint project of publishing the quality control manual for oceanographic data 3 years ago. Since that time, EC has become involved in other projects with several of the IODE data centres in Europe. This involvement should be encouraged and expanded. The Meeting should consider whether ways can be found to improve co-operation and the development of these joint projects to the benefit of all.

**New Partnerships - Universities, Oceanographic Labs, PIs in Member States**

Perhaps the greatest opportunities for productive partnering is with the Universities, Labs, and PIs in Member States of IOC. Many of these organizations and scientists are now operating systems that provide data, data services, and information to clients. There may be opportunities to benefit from these activities to the benefit of both parties. For example, why couldn't some of these organizations serve as RNODCs or IGOSS SOCs?

**10. REVIEW OF THE IODE STRUCTURE AND MANDATE AND IDEAS FOR IMPROVEMENT**

What should be the new IODE mandate? Is a change of emphasis required? The Meeting should consider if and how the existing mandate and responsibilities should be modified. Are new responsibilities indicated because of a changing client base or because of the changing technologies? Does the fact of GOOS change the requirements for IODE or the priorities for IODE? A number of shortfalls have been identified for IODE in an earlier section. The approach to international data exchange has been passive over the years. The systems and standards were established and then everyone waited for data to come voluntarily. Is there a proactive approach and mandate that would work better? Should IODE get into the business of electronic publishing on CD-ROM and networks in a big way for all aspects of the programme.

How about the IODE subsidiary bodies. IODE has worked with 3 Groups of Experts, Groups of Rapporteurs, and Task Teams. Is there a requirement for restructuring? We have noted that there is no consensus on the way forward for OceanPC. Do we need a group that can develop a way forward for IODE projects like OceanPC? Who looks into the need for projects like GTSPPP. At present, IODE relies on some Member States to notice the need for something like GTSPPP and propose the project. Should there be a Group of Experts for looking into needs and making proposals? How
about the funding for proposals such as OceanPC which is really directed towards developing countries? Is the TEMA effort that we can now manage the best that can be done? Considering the state of existing funding support we are doing remarkably well. However, are there sources of funding, such as World Bank, that we have not tapped because we have not defined projects that would interest them? Are there partnerships we could develop that would attract participation of funding agencies we have not before managed to interest in our programme? Who can look into such opportunities? Should we have a Group of Experts for this aspect?

It is clear that IODE will not have more than 3 Groups of Experts. It is clear that groups of rapporteurs and Task Teams have difficulties in working because of the increasing work load members face in their national centres. Could we reorganize the existing 3 groups to focus better on what is important in order to further build IODE?

The following is presented for stimulating thought and discussion at the Meeting. It is not intended as a proposal for discussion at the Meeting, but only to illustrate the sorts of things that might be considered.

Suppose the Groups of Experts for TADE and MIM are combined with information and data co-chairs. As time passes, it becomes more and more difficult to distinguish where the border between data and information is. It is already clear that these groups could be working more closely together. Data products are frequently more like information than data. One person’s information is often another’s data. Could the combined expertise of the two groups make better progress on publishing data and information on CD-ROM and networks and help Member States to move into this highly desirable method of operation with the associated benefits?

Suppose we modified the responsibilities of the Group of Experts for RNODCs and Global Systems to become responsible for development and implementation of projects, new data types, etc. The new group could write the specification for the next version of OceanPC. It could also review programmes such as IGBP and GCOS to propose the IODE role and write specifications for projects such as GTSSP when required. This group would have to be very practical in such matters. It would have to set clear priorities for new work as it is clear that new work can only be taken on if a centre in a Member State is prepared to support it or if other funding could be found to do it.

Suppose a new Group of Experts was created to develop the TEMA aspect of IODE and find funding support for IODE TEMA projects. Could we find members for this group from agencies that are interested in sponsoring the development of data and information networks in developing countries? Could we find partners who would like to use the expertise we have to help guide the development of projects they had in mind for developing countries and at the same time provide access to our ocean data for the developing country in exchange for provision of data to the international systems.

As stated above, this is not a proposal to reorganize the structure of the IODE subsidiary bodies, but to stimulate thinking and discussion.

11. INTERNATIONAL AND NATIONAL MANAGEMENT OF OCEAN DATA SYSTEMS

It is proposed that there is a need for improved co-operation and co-ordination between the ocean data and information management programmes of IOC, specifically IODE, IGOSS, and GOOS. These programmes can share technology and techniques to the advantage of all in the new world of Internet, World Wide Web servers, and distributed data and information management. As IGOSS and IODE centres have shared the work of the data management for GTSSP to the benefit of all, other projects can increase efficiency and share work. This may be the only way to manage to do more in the international systems without increases of resources that will be extremely difficult to justify nationally.

IGOSS has a seconded position in Paris for co-ordinator of the programme. GOOS also has staff support provided from outside the secretariat staff. IODE has only secretariat support at IOC Headquarters. It is suggested that a position seconded to Paris from a Member State for an IODE co-ordinator be sought to provide co-ordination and monitoring of the IODE programme that is agreed at the meetings of the Committee on IODE. For example, one of the most important aspects of making the IODE programme work is the completion and acquisition of Cruise Summary Reports, and other inventory information. These forms are received in Paris and circulated to Member States, ICES, and
the WDCs. Yet, there is no regular analysis and review of the information to proactively contact NODCs to encourage them to acquire and submit data. This could be one of the duties of such a position. Other duties could include co-ordination between the IODE projects such as OceanPC and GODAR, for example. GODAR could probably have used some support in standardizing data formats and with software for acquiring data not in digital form if OceanPC had such facilities available at the critical moment.

It is also suggested that the persons responsible for IGOSS, IODE, and GOOS co-ordination in Paris would form a group which met on a regular basis to provide co-ordination between the 3 programmes.

Member States should also be encouraged to have joint committees and workshops on GOOS, IODE, IGOSS. Most Member States already have national co-ordinators for IGOSS and IODE. Many are setting up national committees for GOOS. It would be to the advantage of all if these 3 activities in Member States could work together to share the work load of international data management and thus, increase productivity while using the same resources. As an example, the US had joint IGOSS-IODE national meetings for a number of years.

12. INCREASING THE RESOURCES DEVOTED TO DATA MANAGEMENT AND EXCHANGE

The IOC ocean data and information management and exchange programmes are based on the assumption that Member States will undertake the necessary work by funding national centres to do it. This is becoming less and less the case in spite of the enormous cost benefit of exchanging data as opposed to collecting it. New international science programmes do in some countries generate additional money for managing the data. This funding generally does not go to the IODE data centres. In Europe, CEC has financially supported IODE data centres to provide datasets and services. Some IODE centres are now stating that they have not been mandated or funded to participate in the IODE system and that they can not get involved in processing and submitting various data to the international system even though the data are types that have historically been exchanged. Finding centres to take on new tasks for international data management has become extremely difficult. Volunteers are not coming forward.

If IODE is to continue and succeed a way must be found to increase international contributions from the Member States in ways that are cost effective and mutually beneficial. It is clear that the present national centres will not receive significant on-going additional resources if in fact they can hold on to what they have. In many countries resources now come to support defined programmes that have a specific goal that will be achieved in a fixed period of time, and which will then end. This includes some data management programmes as well as the more familiar research programmes. The only way data centres can increase their effectiveness is to partner with these programmes, share the workload to the greatest extent possible, and adopt and use the most efficient technologies. Data centres can also submit programmes to their national funding agencies for funding if the programme has a specific saleable goal and an end date.

The Meeting is invited to consider possible ways of obtaining additional support for international data management and make appropriate recommendations for consideration by IODE.